NCERT SOLUTIONS

Diversity in living Organisms

Homework Index

Diversity in living Organisms

1	Introduction	In Chapter Questions Part-1 after lecture 1
2	What is the Basis of Classification?	In Chapter Questions Part-2 after lecture 2
3	Classification and Evolution	In Chapter Questions Part-3 after lecture 3
4	Nomenclature	In Chapter Questions Part-4 after lecture 07
5	The Hierarchy of Classification-Groups	
6	Five Kingdoms of Classification - Monera	
7	Five Kingdoms of Classification - Protista, Fungi, Plantae, Animalia	
8	Introduction to Plantae	In Chapter Questions Part-5 after lecture 10
9	Plantae-Thallophyta, Bryophyta, Pteridophyta	
10	Plantae-Gymnosperm, Angiosperm	
11	Introduction to Animalia	In Chapter Questions Part-6 and exercises after lecture 20
12	Animalia - Porifera, Coelenterata, Platyhelminthes	
13	Animalia - Nematoda,Annelida	
14	Animalia -Arthropoda	
15	Animalia - Mollusca, Echinodermata	
16	Animalia-Chordata, Protochordata,Vertebrata	
17	Animalia- Vertebrata (Pisces,Amphibia)	
18	Animalia- Vertebrata (Reptilia)	
19	Animalia- Vertebrata (Aves, Mammalia)	
20	Summary of Animalia	

IN CHAPTER QUESTIONS

PART - 1

Q1. Which do you think is a more basic characteristic for classifying organisms?
(a) The place where they live.
(b) The kind of cells they are made of. Why?

Ans. The kind of cells that living organisms are made up of is a more basic characteristic for classifying organisms, than on the basis of their habitat. This is because on the basis of the kind of cells, we can classify all living organisms into eukaryotes and prokaryotes. On the other hand, a habitat or the place where an organism lives is a very broad characteristic to be used as the basis for classifying organisms. For example, animals that live on land include earthworms, mosquitoes, butterfly, rats, elephants, tigers, etc. These animals do not resemble each other except for the fact that they share a common habitat.

Q2. What is the primary characteristic on which the broad division of organisms is made?

Ans. The primary characteristic on which the first division of organisms is made is the nature of the cell. It is considered to be the fundamental characteristic for classifying all living organisms. Nature of the cell includes the presence or absence of membrane-bound organelles. Therefore, on the basis of this fundamental characteristic, we can classify all living organisms into two broad categories of eukaryotes and prokaryotes. Then, further classification is made on the basis of cellularity or modes of nutrition.

Q3. On what basis are plants and animals put into different categories?

Ans. Plants and animals differ in many features such as the absence of chloroplasts, presence of cell wall, etc. But, locomotion is considered as the characteristic feature that separates animals from plants. This is because the absence of locomotion in plants gave rise to many structural changes such as the presence of a cell wall (for protection), the presence of chloroplasts (for photosynthesis) etc. Hence, locomotion is considered to be the basic characteristic as further differences arose because of this characteristic feature.

PART - 2

Q1. Which organisms are called primitive and how are they different from the so-called advanced organisms?

Ans. A primitive organism or lower organism is the one which has a simple body structure and ancient body design or features that have not changed much over a period of time. An advanced organism or higher organism has a complex body structure and organization which they have acquired relatively recently. For example, an amoeba is more primitive as compared to a starfish. amoeba has a simple body structure and primitive features as compared to a starfish. Hence, an amoeba is considered more primitive than a starfish.

Q2. Will advanced organisms be the same as complex organisms? Why?

Ans. It is not always true that an advanced organism will have a complex body structure. But, there is a possibility that over the evolutionary time, complexity in body design will increase. Therefore, at times, advanced organisms can be the same as complex organisms.

PART - 3

Q1. What is the criterion for classification of organisms as belonging to kingdom Monera or Protista?

Ans. The criterion for the classification of organisms belonging to kingdom Monera or Protista is the presence or absence of a well-defined nucleus or membrane-bound organelles. Kingdom Monera includes organisms that do not have a well-defined nucleus or membrane-bound organelles and these are known as prokaryotes. Kingdom Protista, on the other hand, includes organisms with a well-defined nucleus and membrane-bound organelles and these organisms are called eukaryotes.

Q2. In which kingdom will you place an organism which is single-celled, eukaryotic and photosynthetic?

Ans. Kingdom Protista includes single celled, eukaryotic, and photosynthetic organisms.

Q3. In the hierarchy of classification, which grouping will have the smallest number of organisms with maximum common characteristics in and which will have the largest number of organisms?

Ans. In the hierarchy of classification,a species will have the smallest number of organisms with a maximum of characteristics in common, whereas the kingdom will have the largest number of organisms.

PART - 4

Q1. Which division among plants has the simplest organisms?

Ans. Thallophyta is the division of plants that has the simplest organisms. This group includes plants, which do not contain a well differentiated plant body. Their body is not differentiated into roots, stems, and leaves. They are commonly known as algae.

Q2. How are pteridophytes different from the phanerogams or spermatophytes ?

Ans.

Differences Between Pteridophytes and		
	Pteridophytes	**Phanerogams/ Spermatophytes**
1	They are seedless plants.	Phanerogams are seed bearing plants.
2	Reproductive organs are inconspicuous.	Reproductive organs are quite conspicuous.
3	An external water is required for fertilization.	Fertilization does not require an external water.

Q3. How do gymnosperms and angiosperms differ from each other?

Ans.

Differences between gymnosperms and angiosperms		
	Gymnosperms	**Angiosperms**
1	Sporophylls are aggregated to form cones.	Sporophylls are aggregated to form flowers.
2	The seeds are naked.	The seeds are enclosed by fruit wall.
3	The microspores and megaspores are produced by male and female cones.	They are produced in the same or two different types of flowers.
4	Xylem lacks vessels and phloem lacks companion cells.	Xylem contains vessels and phloem contains companion cells.
5	The ovules are not contained in the ovary.	The ovules are enclosed in the ovary.

PART - 5

Q1. How do poriferan animals differ from coelenterate animals?\

Ans.

Differences between porifera and coelenterata		
Characteristics	**Poriferans**	**Coelenterates**
Organisation	It is cellular level	It is of tissue level.
Pores	A number of inhalent pores (ostia) and a single exhalent pore (osculum) are present.	There is a single opening.
Appendages	They are absent.	Appendages are represented by tentacles.

Q2. How do annelid animals differ from arthropods?

Ans.

Differences Between Annelids and Arthropods		
Characteristics	**Annelids**	**Arthropods**
Appendages	They are unjointed.	Appendages are jointed
Circulation	Blood flows inside blood vessels (closed circulatory system).	Blood flows through large sinuses or spaces (open circulatory system)
Coelom	True coelom is well-developed.	True coelom is small. Instead, blood filled with body cavity called haemocoel is present.
Chitinous Exoskeleton	Absent	Present.
Excretory organs	They are nephridia.	Green glands and Malpighian tubules.
Locomotary Organs	They are parapodia and setae.	They are legs and wings.

Q3. What are the differences between amphibians and reptiles?

Ans.

Differences Between Amphibia and Reptilia		
Characteristics	**Amphibia**	**Reptilia**
Skin	It is glandular smooth and moist.	Skin is nonglandular, dry and keratinised.
Scales	They are absent	Scales are present over the body.
Heart	It is three chambered.	Heart is incompletely four chambered.
Fertilization	It is external.	Fertilization is internal.
Eggs	They have a soft covering	They have a hard covering or shell.
Examples	Frog, Toad.	Lizards, Snakes, Tortoise.

Q4. What are the differences between animals belonging to the Aves group and those in the mammalia group?

Ans.

Characteristics	Aves	Mammalia
Wings	Forelimbs are modified into wings	Wings are absent except in bats.
Feathers and Scales	The body is covered with feathers and scales.	Feathers and scales are absent.
Skin Glands	Skin is dry. Only a single preen gland (oil gland).	Skin bears a number of sweat and oil glands.
Mammary Gland	They are absent	Female possesses mammary glands for feeding the young ones.
Beak	A toothless beak is present	Jaws do not form a beak. Teeth are present.
Bones	They are hollow or pneumatic.	Bones do not possess air cavities.
Larynx/ Syrinx	Larynx is non-functional. Instead syrinx is present	Larynx is functional. Syrinx is absent.
Air Sacs	Lungs possess external air sacs.	External air sacs do not occur over lungs.

EXERCISES

Q1. What are the advantages of classifying organisms?

Ans. There are a wide range of life forms (about 10 million-13 million species) around us. These life forms have existed and evolved on the earth over millions of years ago. The huge range of these life forms makes it very difficult to study them one by one. Therefore, we look for similarities among them and classify them into different classes so that we can study these different classes as a whole. This makes our study easier.
Therefore, classification serves the following advantages:
(i) It determines the methods of organising the diversity of life on earth.
(ii) It helps in understanding millions of life forms in detail.
(iii) It also helps in predicting the line of evolution.

Q2. How would you choose between two characteristics to be used for developing a hierarchy in classification?

Ans. For developing a hierarchy of classification, we choose the fundamental characteristic among several other characteristics. For example, plants differ from animals in the absence of locomotion, chloroplasts, cell wall, etc. But, only locomotion is considered as the basic or fundamental feature that is used to distinguish between plants and animals. This is because the absence of locomotion in plants gave rise to many structural changes such as the presence of a cell wall for protection, and the presence of chloroplast for photosynthesis (as they cannot move around in search of food like animals). Thus, all these features are a result of lack of locomotion. Therefore, locomotion is considered to be a fundamental characteristic. By choosing the basic or fundamental characteristic, we can make broad divisions in living organisms as the next level of characteristic is dependent on these. This goes on to form a hierarchy of characteristics.

Q3. Explain the basis for grouping organisms into five kingdoms.

Ans. R.H. Whittaker proposed a five kingdom classification of living organisms on the basis of Linnaeus' system of classification. The five kingdoms proposed by Whittaker are Monera, Protista, Fungi, Plantae, and Animalia.
The basis for grouping organisms into five kingdoms is as follows:
(i) On the basis of the presence or absence of membrane-bound organelles, all living organisms are divided into two broad categories of eukaryotes and prokaryotes. This division lead to the formation of kingdom Monera, which includes all prokaryotes.
(ii) Then, eukaryotes are divided as unicellular and multicellular, on the basis of cellularity. Unicellular eukaryotes form kingdom Protista, and multicellular eukaryotes form kingdom Fungi, Plantae, and Animalia.
(iii) Animals are then separated on the basis of the absence of a cell wall.
(iv) Since fungi and plants both contain a cell wall, they are separated into different kingdoms on the basis of their modes of nutrition. Fungi have saprophytic mode of nutrition, whereas plants have autotrophic mode of nutrition. This results in the formation of the five kingdoms.

Q4. What are the major divisions in the Plantae? What is the basis for these divisions?

Ans. The kingdom Plantae is divided into five main divisions: Thallophyta, Bryophyta, Pteridophyta, Gymnosperms, and Angiosperms.
The classification depends on the following criteria:
Differentiated/ Undifferentiated plant body Presence /absence of vascular tissues With/ without seeds Naked seeds/ seeds inside fruits
(i) The first level of classification depends on whether a plant body is well differentiated or not. A group of plants that do not have a well differentiated plant body are known as Thallophyta.
(ii) Plants that have well differentiated body parts are further divided on the basis of the presence or absence of vascular tissues. Plants without specialised vascular tissues are included in division Bryophyta, whereas plants with vascular tissues are known as Tracheophyta.
(iii) Tracheophyta is again sub-divided into division Pteridophyta and phanerogams, on the basis of the absence or presence of seed formation.
(iv) Pteridophyta plants do not produce seeds.
(v) Phanerogams have well developed reproductive organs that finally develop seeds. This group is further sub- divided on the basis of whether the seeds are naked or enclosed in fruits. This classifies them into gymnosperms and angiosperms. Gymnosperms are seed bearing, non-flowering plants, whereas angiosperms are flowering plants in which the seeds are enclosed inside the fruit.

Q5. How are the criteria for deciding divisions in plants different from the criteria for deciding the subgroups among animals?

Ans. Criteria for deciding divisions in plants are:
(i) Differentiated/ Undifferentiated plant body
(ii) Presence/ absence of vascular tissues
(iii) With/without seeds
(iv) Naked seeds/ seeds inside fruits
Criteria for deciding subgroups among animals are:
Kingdom Animalia is divided into two major groups on the basis of the presence or absence of a notochord. Non-chordates do not possess a notochord, while all members of the phylum chordates possess a notochord.
Non-chordate is further divided into subgroups on the basis of the following features :
(1) Body symmetry
(2) Germ layers
(3) Metameric segmentation
(4) Body cavity (Coelom)
These subgroups are : Porifera, Coelenterate, Platyhelminthes, Nematodes, Annelids, Molluscs, Arthropoda and Echinodermata.
All members of the phylum chordate possess a notochord. However, some animals such as Balanoglossus, Amphioxus, Herdmania, etc. have a notochord, which is either absent or does not run the entire length of the animal's body. Therefore, these animals are kept in a separate sub-phylum called Protochordata, and the rest of the chordates are included in the sub-phylum vertebrata. The members of the sub-phylum vertebrata are advanced chordates. They are divided on the basis of presence of vertibral column into five classes: Pisces, Amphibian, Reptilia, Aves and Mammalia.

Q6. Explain how animals in Vertebrata are classified into further subgroups.

Ans. Animals in Vertebrata are classified into five classes:

(i) Class Pisces: This class includes fish such as Scoliodon, tuna, rohu, shark, etc. These animals mostly live in water. Hence, they have special adaptive features such as a streamlined body, presence of a tail for movement, gills, etc. to live in water.

(ii) Class Amphibia: It includes frogs, toads, and salamanders. These animals have a dual mode of life. In the larval stage, the respiratory organs are gills, but in the adult stage, respiration occurs through the lungs or skin. They lay eggs in water.

(iii) Class Reptilia: It includes reptiles such as lizards, snakes, turtles, etc. They usually creep or crawl on land. The body of a reptile is covered with dry and cornified skin to prevent water loss. They lay eggs on land.

(iv) Class Aves: It includes all birds such as sparrow, pigeon, crow, etc. Most of them have feathers. Their forelimbs are modified into wings for flight, while hind limbs are modified for walking and clasping. They lay eggs.

(v) Class Mammalia: It includes a variety of animals which have milk producing glands to nourish their young ones. Some lay eggs and some give birth to young ones. Their skin has hair as well as sweat glands to regulate their body temperature.