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Diversity in Living Organisms

In the Chapter

- Classification helps us to know about the diversity of life forms.
- The major characteristics considered for grouping all organisms into five major kingdoms are:
 - (a) whether they are made of prokaryotic or eukaryotic cells.
 - (b) whether the cells are living singly or organised into multicellular and thus complex organisms.
 - (c) whether the cells have a cell-wall and whether they prepare their own food.
- All living organisms are classified on the above bases into five kingdoms, namely Monera, Fungi, Protista, Plantae and Animalia.
- The classification of life forms is based on their evolution.
- Animalia and Plantae are further sub-divided on the basis of increasing complexity of body organisation.
- Plants are divided into five groups: Thallophytes, Bryophytes, Pteridophytes, Angiosperms and Gymnosperms.
- Animals are divided into ten groups: Porifera, Annelida, Coelenterata, Platyhelminthes, Protochordata, Nematoda, Arthropoda, Mollusca, Echinodermata and Vertebrata.
- The binomial nomenclature provides a uniform way of identification of the vast diversity of life around us.
- The binomial nomenclature is made up of two words – a generic name and a specific name.

Intext Exercises

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1. Why do we classify organisms?

Ans. The classification of organisms help us in the following ways–

- (i) It makes the study of different types of organisms easy.
- (ii) We can know all life forms together and as a whole.
- (iii) It helps in the development of other life sciences.

2. Give three examples of the range of variations that you see in life forms around you.

Ans. We can see range of variations in –

- (i) The life span of organisms e.g., mosquito lives for a few days while cow and dog lives longer.
- (ii) The body colour of the organisms.
- (iii) The shape and size of the organism's body.

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1. 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. (b) The kind of cells they are made of.

Reason : The organisms living in the same habitat may or may not have similarities. So, the place where they live cannot be a basis of classification.

2. What is the primary characteristic on which the first division of organisms is made?

Ans. Whether the organism is made up of eukaryotic or prokaryotic cells is the primary characteristic for first division.

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

Ans. Plants and animals are put into different categories on the basis of their mode of nutrition.

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

Ans. The organisms which have ancient body designs that have not changed very much are called primitive organisms.

The advanced organisms are those which have acquired their particular body designs relatively recently.

As per the body design, the primitive organisms have simple structures while, the advanced organisms have some more complex structures.

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

Ans. The advanced organisms once had been like these primitive organisms in the remote past. They have obtained a particular body design in course of time.

It is possible that in course of their development, the advanced organisms will acquire more complex structures so that they could live in the changing environment.

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

Ans. Monera : These organisms are unicellular and their cell organelles are not covered with membranes.

Protista : The organisms which are unicellular and their cell organelles are covered with membranes are placed in Protista Kingdom.

2. In which kingdom will you place an organisms which is single-celled, eukaryotic and photo-synthetic?

Ans. In Protista.

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

Ans. Species have smallest number of organisms having maximum similarities in common. The kingdom has maximum number of organisms.

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1. Which division among plants has the simplest organisms?

Ans. Thallophyta.

2. How are pteridophytes different from phanerogams?

Ans. Pteridophytes

1. Have open embryo.
2. Have hidden reproductive organs. Hence also called cryptogams, meaning hidden reproductive organs.

Phanerogams

1. Seeds are enclosed within the fruit.
2. Reproductive organ is distinct and divided into reproductive tissue. They develop fruits and seeds after reproduction.

Q. 3. How do gymnosperms and angiosperms differ from each other?

Ans. Gymnosperms

1. They have conical shaped sporophylls containing male and female reproductive organs.
2. Seeds are not enclosed within fruits.

Angiosperms

1. They have flowers bearing male and female reproductive organs.
2. Seeds are enclosed within fruits.

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1. How do poriferan animals differ from coelenterate animals?

Ans. Porifera

1. Their body has many pores called Ostio.
2. They have canal system for circulation of water.
3. They have exo skeleton.
4. They don't have tentacles.

Coelenterate

1. Their body has a single pore.
2. They don't have canal system.
3. They don't have skeleton.
4. They have tentacles.

2. How do annelid animals differ from arthropods?

Ans. Annelida

1. They have true body cavity.
2. The coelomic cavity does not have blood.
3. There are lateral appendages for locomotion.

Arthropoda

1. They have coelomic cavity.
2. Their coelomic cavity is filled with blood.
3. They have jointed legs that helps in locomotion.

3. What are the differences between amphibians and reptiles?

Ans. Amphibians

1. They live both on land and in water.
2. Their body is covered with scales.
3. Their eggs don't have any hard covering around them.
4. They lay eggs in water.
5. Water is necessary for reproduction.

Reptilia

1. They live either on land or in water.
2. They also have scales on their body.
3. The eggs have hard covering.
4. Water is not necessary for laying eggs.
5. Water is not necessary for reproduction.

4. What are the differences between animals belonging to the Aves group and those in the Mammalia group?

Ans. Aves

1. They have beaks
2. They have their body covered with feathers.
3. Anterior limbs transform into wings.
4. They lay eggs.
5. They don't have mammary glands to feed milk to their young ones.

Mammalia

1. They don't have beaks.
2. They have their body covered with hairs.
3. Does not happen so.
4. Most of them give birth to young ones.
5. They have mammary glands for producing milk.

Exercise**1. What are the advantages of classifying organisms?****Ans.** Classifying of organisms helps us in the following ways–

- (i) This makes the study of different kinds of organisms easy.
- (ii) We can know all types of organisms at once.
- (iii) It tells us about inter-relationship among the organisms.
- (iv) It helps in the development of other life science.

2. How would you choose between two characteristics to be used for developing a hierarchy in classification?**Ans.** We choose that characteristics which depends on the first characteristics and determines the rest variety.**3. Explain the basis for grouping organisms into five kingdoms.**

- Ans.** (i) Whether the organisms are eukaryotic or prokaryotic.
 (ii) Whether the organisms are unicellular or multicellular.
 (iii) Whether the cell has a cell wall or not.
 (iv) Whether they make their food on their own or not.

4. What are the major divisions in the Plantae? What is the basis for these divisions?**Ans.** Five major divisions are –

- (i) Thallophyta
- (ii) Bryophyta
- (iii) Pteridophyta
- (iv) Gymnosperms
- (v) Angiosperms

Basis of division

- (i) Whether the plants have distinct organelles or not.
- (ii) Whether the plants have distinct and differentiated tissues, which can carry food and water or not.
- (iii) The plant has seeds or not.
- (iv) The seeds are enclosed within fruits or not.

5. How are the criteria for deciding divisions in plants different from the criteria for deciding the sub-groups among the animals?

Ans. Criteria for plants

- (i) Presence of distinct organs.
- (ii) Distinct vascular tissues.
- (iii) Seeds producing capacity.
- (iv) Have seeds enclosed within fruits.

The animals can't be divided into groups on these criteria. The animals are divided on the basis of their body structure.

6. Explain how animals in Vertebrata are classified into further subgroups?

Ans. Vertebrates can be further classified into subgroups. This is based on simple to complex body structures and their functions. For examples– Fishes have two chambered heart, Amphibians have three chambered heart and Birds and Mammals have four chambered hearts. These are chambered to keep oxygenated and deoxygenated blood separate.

Additional Questions

1. What is important in forming desired category ?

Ans. Characteristic properties are important in forming desired category.

2. What is meant by classification of living organisms?

Ans. It means categorising living organisms on the basis of their similarities and dissimilarities.

3. Write the scientific names of pea and peacock ?

Ans. Pea – *Pisum sativum*

Peacock – *Pavocristatus*

4. What are amphibians of the plant kingdom?

Ans. Bryophytes are the amphibians of plant kingdom.

5. What are invertebrates?

Ans. Invertebrates are animals without backbone.

6. Name the plant having lifespan of more than thousand years.

Ans. Pine trees.

7. In which phyla, true body cavities are present ?

Ans. Annelida.

8. Which one of the followings is not an algae? Aspergillus, chara, ulothrix, spirogyra.

Ans. Aspergillus.

9. How are living beings classified?

Ans. Living beings are classified on the basis of similar or dissimilar characteristic features present in them.

10. What are eukaryotes?

Ans. The organisms with true nucleus are called eukaryotes.

11. Some fungal species live in permanent mutually dependent relationship with blue green algae. What such relationship is known as ?

Ans. Symbiotic relationship.

12. What term is used for organisms which use decaying organic material as food?

Ans. Saprophyte.

13. What is the basis of classification (in animal)?

Ans. Habitat is one of the bases of classification.

On the basis of their habitats, animals can be classified into following categories :

(a) Terrestrial, (b) Aerial, (c) Aquatic.

- 14. The cell wall of organisms that belong to kingdom fungi are made of what material.**

Ans. A tough complex sugar is called chitin.

- 15. What are the important characteristics of gymnosperms ?**

Ans. Gymnosperms bear naked seed. They are evergreen, perennial and woody.

- 16. Name two gymnosperms which are usually grown for decoration in plains.**

Ans. Pinus, Thuja/Cycas.

- 17. Who was the first to give the idea of evolution ?**

Ans. It was Charles Darwin, in 1859.

- 18. What do you mean by 'cryptogamae'? Give one example of a group plants which show cryptogamae.**

Ans. Plants which bear hidden/inconspicuous reproductive organs.

- 19. What is chitin?**

Ans. Fungal cell-walls are made of a tough complex-sugar called chitin.

- 20. What is 'evolution'?**

Ans. Evolution is the gradual unfolding of organisms since the beginning of life, from pre-existing organisms through constant change.

- 21. In which phyla, true body cavities are present?**

Ans. Annelida.

- 22. What is binomial nomenclature?**

Ans. In binomial nomenclature, every organism is given two proper names. The first is the genus to which the organism belongs. The second name is the name of the species to which it belongs.

- 23. What are phanerogams ?**

Ans. Plants with well-differentiated reproductive tissues that ultimately make seeds are called phanerogams.

- 24. Who has classified living organisms into five groups?**

Ans. Robert Whittaker, in 1959.

- 25. A student found an animal which has an open circulatory system, blood filled coelomic cavity and has jointed legs. To which group the student should classify this animals.**

Ans. Arthropoda.

- 26. An animal has triploblastic, flattened dorsiventrally body with no true filled coelomic cavity and has jointed legs. To which group of kingdom animalia this animal belongs to ?**

Ans. Platyhelminthes.

- 27. Define species.**

Ans. The group of organisms which show similarity and can reproduce among themselves is called species.

- 28. Give two examples of monera.**

Ans. Bacterium *Escherichia coli* and Cyanobacterium *Anabaena*.

- 29. What is protista?**

Ans. Protista is a kingdom of unicellular eukaryotes.

- 30. What is a genus?**

Ans. Genus is a group of related species.

31. What is the scientific name of human being ?

Ans. Homo sapiens.

32. What is lichen ?

Ans. Lichen is a composite or dual organism made of a fungus and an algae associated in mutually beneficial association.

33. Define thallus.

Ans. Thallus is the plant body in which there is no differentiation of root, stem and leaves.

34. What are the two modes of nutrition?

Ans. Autotrophic and heterotrophic.

35. What are heterotrophs?

Ans. Organisms which get their food from the environment are called heterotrophs.

Multiple Choice Questions

1. Which among the following has specialised tissue for condition of water?

- | | |
|--------------------|--------------------|
| (i) Thallophyta | (ii) Bryophyta |
| (iii) Pteridophyta | (iv) Gymnosperms |
| (a) (i) and (ii) | (b) (ii) and (iii) |
| (c) (iii) and (iv) | (d) (i) and (iv) |

Ans. (c)

2. Which among the following produce seeds?

- | | |
|------------------|-----------------|
| (a) Thallophyta | (b) Bryophyta |
| (c) Pteridophyta | (d) Gymnosperms |

Ans. (d)

3. Which one is a true fish?

- | | |
|----------------|-----------------|
| (a) Jelly fish | (b) Star fish |
| (c) Dog fish | (d) Silver fish |

Ans. (c)

4. Which among the following is exclusively marine?

- | | |
|--------------|-------------------|
| (a) Porifera | (b) Echinodermata |
| (c) Mollusca | (d) Pisces |

Ans. (b)

5. Which among the following have an open circulatory system?

- | | |
|-------------------|--------------------|
| (i) Arthropoda | (ii) Mollusca |
| (iii) Annelida | (iv) Coelenterata |
| (a) (i) and (ii) | (b) (iii) and (iv) |
| (c) (i) and (iii) | (d) (ii) and (iv) |

Ans. (a)

6. In which group of animals, coelom is filled with blood?

- | | |
|----------------|-------------------|
| (a) Arthropoda | (b) Annelida |
| (c) Nematoda | (d) Echinodermata |

Ans. (a)

7. Elephantiasis is caused by :

- | | |
|----------------|------------------|
| (a) Wuchereria | (b) Pinworm |
| (c) Planarians | (d) Liver flukes |

Ans. (a)

8. Which one is the most striking or (common) character of the vertebrates?

- (a) Presence of notochord
- (b) Presence of triploblastic condition
- (c) Presence of gill pouches
- (d) Presence of coelom

Ans. (a)

9. Which among the following have scales?

- | | |
|--------------------|--------------------|
| (i) Amphibians | (ii) Pisces |
| (iii) Reptiles | (iv) Mammals |
| (a) (i) and (iii) | (b) (iii) and (iv) |
| (c) (ii) and (iii) | (d) (i) and (ii) |

Ans. (c)

10. Find out the false statement:

- (a) Aves are warm blooded, egg laying and have four chambered heart.
- (b) Aves have feather covered body, fore limbs are modified as wing and breathe through lungs.
- (c) Most of the mammals are viviparous.
- (d) Fishes, amphibians and reptiles are oviparous.

Ans. (d)

11. Pteridophyta do not have

- | | |
|-------------|------------|
| (a) root | (b) stem |
| (c) flowers | (d) leaves |

Ans. (c)

12. Identify a member of porifera.

- | | |
|-----------------|-------------|
| (a) Spongilla | (b) Euglena |
| (c) Penicillium | (d) Hydra |

Ans. (a)

13. Which is not an aquatic animal?

- | | |
|------------|----------------|
| (a) Hydra | (b) Jelly fish |
| (c) Corals | (d) Filaria |

Ans. (d)

14. Amphibians do not have the following :

- (a) Three chambered heart
- (b) Gills or lungs
- (c) Scales
- (d) Mucus glands

Ans. (c)

15. Organisms without nucleus and cell organelles belong to

- | | |
|----------------------|--------------------|
| (i) fungi | |
| (ii) protista | |
| (iii) cyano bacteria | |
| (iv) archae bacteria | |
| (a) (i) and (ii) | (b) (iii) and (iv) |
| (c) (i) and (iv) | (d) (ii) and (iii) |

Ans. (b)