

7. Diversity in Living Organisms

Check Point 01

1. Question

Certain regions of the earth have rich biodiversity of species. What are these regions called? Give examples.

Answer

The regions of the earth which have a rich biodiversity of species are called biodiversity hotspots. More than half of the earth's biodiversity is supposed to be concentrated in these areas. For example Brazil, Columbia, Ecuador, Australia, India, etc. Biodiversity hotspots in India are present in Western Ghats, Eastern Himalayas, Indo- Burma border, etc.

2. Question

List the basis on which Aristotle classified organisms?

Answer

Aristotle classified organisms into two groups- plants and animals. The animals were further classified based on their habitat, i.e. whether they lived on land, in water, or in air. The plants were categorised as small medium and large.

3. Question

Name an organism who carries out all its body functions through a single cell?

Answer

Bacteria is one such organism which carries out all its body functions through a single cell. Belonging to kingdom Monera, the bacteria are single celled organisms which don't have a well defined nucleus or organelles. But, they have special mechanisms to carry out metabolic functions through single cell only.

4. Question

Suggest, how does functional organization of any organism help in classification?

Answer

In situations where cells are grouped together to form an indivisible organism, the principle of division of labour is followed. All cells in these organisms are not identical and particular groups of cells perform particular functions. This functional similarity of cells leads to their organisation in a specific manner which dictates their body design. This makes a basic distinction in the body design of organisms, simplifying the classification process.

5. Question

Who wrote the book "The Origin of Species"?

Answer

Charles Darwin wrote "The Origin of Species" in 1859. It was his most famous work.

Check Point 02

1. Question

State the contribution of Biologists, such as Woese and Whittaker in formulating the basis of classification?

Answer

Ernst Haeckel, Robert Whittaker and Carl Woese made attempt at classifying all organisms into categories or kingdoms.

Robert Whittaker proposed a five kingdom classification, which includes Monera, Protista, Fungi, Plantae and Animalia, and Woese modified it by dividing Monera into archaeobacteria and eubacteria.

2. Question

How is kingdom the highest category of taxonomic study?

Answer

All organisms have been grouped into five categories called kingdoms, based on cell structure, mode of nutrients, source of nutrition and body organization. Kingdoms include organisms of different species, genus, class, family, order and phylum. Hence, it is the highest category of taxonomic study.

3. Question

To which kingdom blue-green algae belongs?

Answer

Blue-green algae belong to kingdom Monera, because they lack well defined nucleus, organelles, and don't have a multicellular body organization. They are autotrophic in nature.

4. Question

Both bacteria and Amoeba are single-celled, yet are placed in different kingdoms. Give one reason.

Answer

Though both are unicellular, bacteria are prokaryotic whereas amoeba is eukaryotic in body design. This means that the bacteria don't have a well defined nucleus or organelles, but in amoeba, the nucleus and organelles are well defined. Thus they are grouped separately.

5. Question

An organism feeds on dead matter. Which kingdom is it most likely to belong to?

Answer

An organism which feeds on dead and decaying matter is called a saprophytic organism. Such organisms belong to kingdom fungi.

6. Question

In which kingdom would you place an organism which is multicellular and without cell wall?

Answer

Multicellular eukaryotic organisms without cell wall are placed under kingdom Animalia. Organisms of kingdom Plantae have cell wall and the organisms of other kingdoms are unicellular.

Check Point 03

1. Question

Identify the group of plant kingdom, in which plant body is differentiated into stem and leaf-like structure?

Answer

Bryophytes are differentiated into stem and leaf like structure. Thallophyta don't have such structures and Pteridophytes are differentiated into stem and leaf.

2. Question

Give an example of vascular cryptogams.

Answer

Pteridophytes such as *Marsilea* are vascular cryptogams, because they have specialised structures for transportation of water and nutrients, but their reproductive organs are hidden.

3. Question

Gymnosperms as well as angiosperms bear seeds. Why are they classified separately? Give one reason.

Answer

Gymnosperms have naked seeds while the seeds in angiosperms are enclosed in a flower. Hence, they are grouped separately.

Examples: woody shrubs and trees include pines, spruces, firs, and ginkgoes.

4. Question

Which group of plants is known as flowering plants?

Answer

Angiosperms are known as flowering plants, because they produce flowers.

Examples: pines, cedars, spruces and firs.

5. Question

What is the scientific term used for seed leaves?

Answer

Seed leaves are called cotyledons in scientific terms.

Check Point 04

1. Question

On the basis of the presence and absence of coelom how are animals classified?

Answer

On the basis of presence or absence of coelom, animals are classified into three groups :

1. Acoelomate – which don't have coelom.
2. Pseudo coelomate - which have a false cavity.

3. Coelomate- which have a true body cavity.

2. Question

Write two characteristic features of the phylum the contains the first animals with complete alimentary canal.

Answer

Nematodes are first animals to have complete alimentary canal.

1. They are pseudo coelomate.
2. They are cylindrical in body structure

3. Question

Animals of which phylum are considered to be the first animals having true body cavity, coelom? Name the phylum.

Answer

Annelida is the first phylum to have animals with true body cavity.

Explanation: Annelida is a group commonly referred to as segmented worms, and they are found worldwide from the deepest marine sediments to the soils in our city parks and yards

4. Question

Name the animal and its respective phylum having parapodia for locomotion.

Answer

Nereis of phylum Annelida has parapodia for locomotion.

5. Question

Give the characteristics of phylum/group having the largest number of animals.

Answer

Phylum arthropoda has the highest number of animals. It's features are :

1. Open circulatory system.
2. It has blood filled coelomic cavity.
3. They have jointed appendages.

6. Question

Give the features of the phylum to which Chiton and Pila belong?

Answer

Chiton and Pila belong to Mollusca phylum. It's features are :

1. Reduced coelomic cavity.
2. Little segmentation.
3. Kidney like organ for excretion
4. Open circulatory system
5. Foot like appendage for movement.

7. Question

Vertebrata is considered as the most advanced group of animals. Give one reason.

Answer

Vertebrates are most advanced group of animals because they have a true vertebral column and internal skeleton.

8. Question

Amongst sponge, mollusc, snail, lizard, which one is the simplest animals and Why?

Answer

Sponge is the simplest animal of the given because it has the minimally differentiated body design.

9. Question

Does feather star belongs to class-Aves?

Answer

No, feather star is an echinoderm, because it has a slender skinned body, and is exclusively marine. It also has a water driven tube system to help in moving around.

Check Point 05

1. Question

Scientific name is related to classification. What information does it provide?

Answer

Scientific name provides the genus and species name of an organism, thus indicating the group in which the organism belongs. It also helps in grouping organisms of same category together, thus helping in classification.

2. Question

Who proposed the binomial nomenclature?

Answer

Carolus Linnaeus proposed binomial nomenclature.

3. Question

Give two norms of writing scientific names.

Answer

1. The name of genus should start with a capital letter and that of species with a small letter.
2. When printed, the scientific name should be in italics.

4. Question

Who is the father of Taxonomy? Name the book written by him.

Answer

Carolus Linnaeus is considered the father of taxonomy. He wrote a book called *Systema naturae*.

5. Question

The genus name of potato is Solanum. Write two species name of organisms which belong to genus-Solanum?

Answer

Solanum melongena – eggplant

Solanum dulcamara – bittersweet.

Chapter Exercise

1. Question

Define diversity in the living world.

Answer

Diversity in living world is defined as the variety of living organisms present in the world.

2. Question

Give any two objectives of classification.

Answer

The objectives of classification are:

1. Grouping of related organisms based on similar characteristics.
2. Simplifying the identification of organisms.

3. Question

Are cyanobacteria, autotrophs or heterotrophs?

Answer

Cyanobacteria are autotrophic in nature and obtain energy through photosynthesis.

These are a phylum of bacteria that obtain their energy through photosynthesis and are the only photosynthetic prokaryotes able to produce oxygen.

4. Question

name the group of organisms to which Amoeba belongs.

Answer

Amoeba belongs to kingdom Protista.

This kingdom comprises of Eukaryotic organisms that are mostly unicellular with some exceptional multicellular algae

5. Question

The cell wall of different organisms differ. Is it true?

Answer

Yes, it is true. The cell wall of different organisms differs in their composition.

Cell walls exist in all kingdoms except for the animals: plants, protists (algae), fungi, bacteria, and archaea. And in all these, the cell wall is made of different materials and composition.

Example:

Type of cell	Composition
Plant cell wall	Cellulose, pectin, lignin
Algal cell walls	Cellulose and Polysaccharides
Bacterial cell walls	Peptidoglycan
Archaeal cell walls	Pseudo-peptidoglycan
Fungal cell walls	Chitin

6. Question

A weed is growing on the border of your play ground. How would you recognize it to be a dicot or monocot?

Answer

The difference between monocot and dicot can be made by opening the seed of the weed. Presence of one or two cotyledons respectively would differentiate between them.

7. Question

The protozoans are early animals. Do you agree? Give at least two reasons to support your answer.

Answer

Yes, protozoans are early animals. This is because:

1. They have a very basic body design and minimal differentiation.
2. They are unicellular organisms, and only one cell performs all necessary functions.

8. Question

Name the respective organisms.

- (i) An arthropod that cannot fly.
- (ii) A mollusk that possesses eyes.

Answer

- (i) prawn

A prawn is a small shellfish with a long tail and many legs.

An “arthropod” is an invertebrate animal that has an exoskeleton, a segmented body, and jointed appendages. Examples of arthropods:

1. Insects such as ants and bees

2. Spiders and scorpions

3. Crabs, lobsters, and shrimp

(ii) octopus

9. Question

Sea cucumber belongs to which phylum? Describe its structure associated with locomotion.

Answer

Sea cucumber or holothuria belongs to phylum Echinodermata. For locomotion, sea cucumbers use tube feet, which are small sucker-like projections present on the three ambulacral canals on the surface close to the substratum. These are numerous and allow the animal to crawl.

10. Question

How are whales and electric rays different from each other?

Answer

Whale is a mammal, belonging to class Mammalia. The electric ray or torpedo is a fish belonging to class Pisces. Whale is warm-blooded whereas the electric ray is a cold-blooded animal.

11. Question

Jellyfish is not a fish. Comment.

Answer

Jellyfish is an animal belonging to phylum Coelenterata of kingdom Animalia. It is not a chordate like true fishes. It is a medusa form of certain species of cnidarians.

12. Question

An animal phylum has lowest structural organization. Name and describe its features.

Answer

Lowest structural organisation is seen in phylum Porifera. Its features are:

1. They are marine nonmotile animals.
2. They have minimal differentiation of body design.
3. The outer skeleton is hard.

4. Canal system is present for the exchange of food and oxygen.
5. They have pores all over the body.

13. Question

Which group of organisms have segmented worms? Give it's two major characteristics.

Answer

Phylum Annelida has segmented worms. Its characters are:

1. They are bilaterally symmetrical, triploblastic animals with true coelom.
2. They have extensive differentiation in body design.

14. Question

Differentiate briefly the characteristics of kingdom-Plantae and Animalia.

Answer

Plantae	Animalia
They are autotrophic in nature	They are heterotrophic in nature
They are nonmotile	They are motile
They have rigid cell walls.	They don't have cell walls
They store food in form of starch	They store food in form of glycogen
Their growth is unlimited	They have limited, controlled growth.

15. Question

Describe two important characteristics of each division of kingdom-plantae.

Answer

1. Thallophyta

- Not well differentiated body design
- Primarily aquatic

2. Bryophyta

- Plant body differentiated into stem and leaf like structures.
- No specialised tissue for conducting food and water.

3. Pteridophyta

- Plant body differentiate into root stem and leaf.

- Have specialised tissue for conduction of food and water.

4. Gymnosperms

- They bear naked seeds.
- They are usually woody and perennial.

5. Angiosperms

- They have enclosed seeds.
- Plant embryo in seed have structures called cotyledons.

16. Question

Compare among Pisces, Amphibia and Reptilia.

Answer

Pisces	Amphibia	Reptilia
They are exclusively aquatic	They live on both land and water.	They live only on land.
They have a streamlined body	They have moist skin	They crawl on land
They have fins for swimming in water	They have two pairs of limbs for movement	They have two pairs of legs for locomotion
They breathe through gills	They breathe through lungs and skin	They breathe through lungs
For example rohu	For example frog	For example lizard

17. Question

Enumerate the characteristic of a class that contains organisms with two types of symmetry in their life cycle.

Answer

Two types of symmetry, i.e. bilateral and radial both is found in phylum Ctenophora. The characters are:

1. Incomplete gut, only mouth present.
2. No organ for excretion, respiration or circulation.
3. Diploblastic.
4. Biradially symmetrical
5. Eight rows of ciliated comb-like structures.

18. Question

Biological classification is a dynamic and ever-evolving phenomenon. Justify with two examples.

Answer

Biological classification bases have to keep on changing depending on our understanding of life forms.

The initial very basic methods of classification gradually have been replaced by more advanced and complex ideas. For example:

1. The two kingdom classification proposed by Aristotle based only on the habitat was replaced by three kingdom classification suggested by Haeckel.
2. Even the most accepted classification suggested by Whittaker which is the five kingdom classification was modified by Whittaker based upon his understanding of bacteria dividing the Monera into archaebacteria and eubacteria.

19. Question

Anukool's father works for an international bank and has been transferred to Paris. He stayed in a rented house there. People in his office have come from different countries and speak various language viz. Dutch, French, Urdu, and English. Due to different mother tongues, he is finding it difficult to communicate with others and hence, could not work efficiently.

One day, he told his communication problem to his son. Anukool discussed his father's problem with his teacher and then called him up next day to give his advice.

- (i) What advice did Anukool give to his father?
- (ii) List two advantages of speaking the same language all over the world.
- (iii) What value shown by Anukool by his action?

Answer

(i) Anukool must have advised his father to either learn the different languages or to use a translator for better communication.

(ii) speaking the same language over the world would provide room for easier communication and decrease the chances of confusion and misunderstanding. It will also bring about global harmony.

(iii) Anukool is considerate and caring. He has a sense of responsibility and Helping Nature.

Challengers

1. Question

Choose the odd one out from the options given below.

- A. Labeo
- B. Hippocampus
- C. Anabas
- D. Scoliodon

Answer

Scoliodon is a mammal while the rest three are fishes. Thus it is an odd one.

2. Question

The scientific name of lion fish is

- A. Synchiropus splendidus
- B. Pterois volitans
- C. Torpedo
- D. Caulophryne

Answer

lion fish is called *Pterois volitans*. *Synchiropus splendidus* is scientific name for mandarin fish, *Torpedo* is the name of electric ray and *Caulophryne* is the name given to fanfins.

3. Question

Which of the following statement is incorrect?

- A. The chloroplast in Spirogyra is spirally arranged without pyrenoids.
- B. Needle-shaped structure in Pinus is a leaf.
- C. Dicot plant has a woody stem and its leaves show reticulate venation.
- D. Pneumatic bone is an important characteristic of whales.

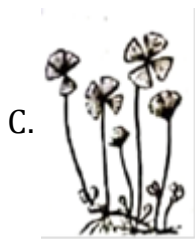
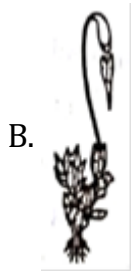
Answer

chloroplast in Spirogyra are arranged with pyrenoids.

All the other options are true statements.

4. Question

Which among the following is a Pteridophyte?



Answer

Figure (a) is of Pinus, a gymnosperm.

Figure (b) is of Funaria, a bryophyte.

Figure (d) is of Cladophora, a thallophyte.

5. Question

Identify the incorrectly matched pair from the options given below.

A. Largest bird — Ostrich

B. Bat — Bird

C. Egg — laying mammals — Duck - billed platypus

D. Mollusks — Soft-bodied animals

Answer

bat is not a bird. It is a mammal. All the other options are correctly matched pairs.

6. Question

The fish belonging to the phylum — Arthropoda is

- A. Cray fish
- B. Devil fish
- C. Jellyfish
- D. Starfish

Answer

Cray fish belongs to arthropoda. Devil fish is a chordate , jellyfish is a coelenterate , and starfish is an echinoderm .

7. Question

The type of symmetry found in coelenterates is

- A. asymmetry
- B. circular symmetry
- C. biradial symmetry
- D. radial symmetry

Answer

coelenterata are radially symmetrical, as they have vertical symmetry around a central axis.

8. Question

Pick out the incorrect statement.

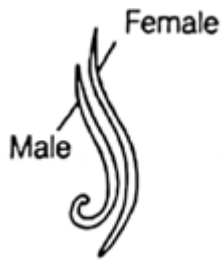
- A. All chordates have notochord some state of life.
- B. Birds have a streamlined body to reduce resistance during flight.
- C. Whale represents a huge class of fishes (or Pisces)
- D. A true coelom is derived from the mesoderm whereas pseudocoelom is not lined by mesoderm.

Answer

whales are mammals, not fishes. All other statements are correct.

9. Question

The organism given below belongs to phylum.



- A. Platyhelminthes
- B. Nematoda
- C. Annelida
- D. Arthropoda

Answer

Ascaris belongs to nematodes. They are not as well differentiated as Annelida or Arthropoda, but have different sexual forms unlike Platyhelminthes.

10. Question

Sea cucumber is

- A. mollusc
- B. coelenterate
- C. echinoderm
- D. protochordate

Answer

Sea cucumber is a coelenterata. It has a very basic structural organisation as compared to Mollusca, echinoderms and protochordate.

11. Question

In a taxonomic hierarchy, family comes between

- A. class and order
- B. order and genus
- C. genus and species
- D. division and class

Answer

family is a taxonomic group between order and genus. The order of taxonomic hierarchy is as follows:

Species, genus , family, order , class , phylum / division , kingdom .

12. Question

Among the following given options, a pseudocoelomate organism is

- A. sea anemone
- B. liver fluke
- C. Nereis
- D. Wuchereria

Answer

Nematodes are pseudocoelomate. The others are not nematodes and hence are not pseudocoelomate.

13. Question

Which of the following is a warm-blooded organism?

- A. Ostrich
- B. King cobra
- C. Crocodile
- D. Rohu

Answer

ostrich is a mammal, which is warm blooded. The other three are cold blooded organisms.

14. Question

Similar characteristic among whale and crocodile is that

- A. they both are cold-blooded organisms.
- B. they both are warm-blooded organisms
- C. their heart is 3-chambered.
- D. their heart is 4-chambered.

Answer

Both reptiles and mammals have four chambers in the heart. Reptiles are cold-blooded organisms, while mammals are warm-blooded organisms. Three-chambered heart is found in other reptiles, except crocodile.