

Assignments in Science Class IX (Term II)

7

Diversity in Living Organisms

IMPORTANT NOTES

1. There are more than a million kinds of living things exhibiting an infinite variety in form, structure and living places.
2. **Classification** puts things in order.
3. The use of important distinguishing features forms the basis of classification.
4. The process of grouping similar things into groups and categories on the basis of similarities and dissimilarities is called classification.
5. The system of classification was devised by **Carolus Linnaeus**.
6. The naming of organisms is called **nomenclature**.
7. The science of classification is called **taxonomy**.
8. Carolus Linnaeus is called the **Father of Taxonomy**.
9. **Species** is a group of organisms capable of interbreeding to produce fertile offspring.
10. **Genus** is a group of similar and closely related species.
11. **Binomial name** has two parts — genus and species.
12. The names given to living organisms following the binomial system are called **scientific names**.
13. The **genus** name begins with a capital letter, the species name begins with a small letter.
14. **R.H. Whittaker** was the first one to propose a five-kingdom classification in 1969.
15. **Monera, Protista, Fungi, Plantae and Animalia** are included in five-kingdom classification.
16. Kingdom Plantae is divided into two subkingdoms — **Cryptogamae** and **Phanerogamae**.
17. The **simplest** plants belong to the division Thallophtya.
18. **Lichen** is a symbiotic association of algae and fungi.
19. Plants belonging to bryophyta are called **amphibians** of the plant kingdom.
20. Bacteria are often called “fission plants” as they multiply by binary fission.
21. Biologists have identified, named, classified and described more than a million types of animals inhabiting the earth.
22. Animals differ in their structure ranging from single celled to multicellular animal.
23. All animals are eukaryotic organisms.
24. Most animals have a high level of tissue differentiation.
25. Animal nutrition is **heterotrophic**.
26. Animal cells lack cell wall.
27. Animals possess the **power of locomotion**.
28. Two main criteria, used to classify animals are :
 - (i) presence or absence of vertebral column.
 - (ii) cellular organisation.
29. The first group of animals is **invertebrates** — animals without backbone.
30. The second group of animals is **vertebrates** — animals having backbone or vertebral column.
31. Based on the cellular organisation, animals can be divided into — **protozoa** and **metazoa**.
32. Protozoa represent the one-celled animals/unicellular animals, e.g., *Amoeba*, *Paramecium*, *Euglena*, *Trypanosoma*.
33. Metazoa represents the many-celled animals/multicellular animals, e.g., *Hydra*, earthworm, corals, flatworms, insects, frogs, etc.
34. The phyla, in order of their increasing complexity beginning from the simple single-celled form to complex form are like these — protozoa, porifera, cnidaria, platyhelminthes, nematoda, annelida, arthropoda, mollusca, echinodermata, hemichordata and chordata.
35. **Symmetrical** body shape means the parts of an animal body are arranged in such a way that it can be cut into two similar halves by one or more planes.
36. **Germ layers** are the primary layers of cells which differentiate in the animal embryo.
37. Phylum **protozoa** includes minute, microscopic, eukaryotic organisms, e.g., *Amoeba*, *Euglena*, *Trypanosoma*.

<p>38. Phylum porifera includes mostly sessile or stationary sea animals, having porous body e.g. <i>Sycon</i>, <i>Leucosolenia</i>, etc.</p> <p>39. Phylum coelenterata includes radially symmetrical, multicellular, aquatic animals, e.g., <i>Hydra</i>, <i>Obelia</i>, etc.</p> <p>40. Phylum platyhelminthes includes bilaterally symmetrical, triploblastic, mostly parasitic animals. e.g., liver fluke, blood fluke, tapeworm.</p> <p>41. Phylum nematoda includes mostly parasitic animals having narrow, elongated, cylindrical unsegmented body. e.g. roundworm, pinworm, filarial worm, etc.</p> <p>42. Phylum annelida includes free living coelomic animals having metameric segmentation, e.g., earthworm, sea-mouse, etc.</p>	<p>43. Phylum arthropoda are the largest group of animals and its main feature is jointed legs and body is divided into three regions—head, thorax and abdomen. e.g., prawn, crab, housefly, mosquito, etc.</p> <p>44. Phylum mollusca includes mainly aquatic animals having soft, unsegmented body. e.g., snail, mussel, cuttlefish.</p> <p>45. Phylum echinodermata includes star-shaped, spherical or elongated exclusively marine animals, e.g., starfish, brittle star, sea cucumber, etc.</p> <p>46. Phylum hemichordata possess characters of both vertebrates and invertebrates, e.g., tongue worm, <i>Rhabdopleura</i>.</p> <p>47. Phylum chordata – the animals with vertebral column like horse, man etc.</p>
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ASSIGNMENTS FOR SUMMATIVE ASSESSMENT

I. VERY SHORT ANSWER QUESTIONS

(1 Mark)

PREVIOUS YEARS' QUESTIONS

- | | |
|---|--|
| <p>1. (a) A flowering plant whose embryo possesses single cotyledon (Give scientific term).</p> | <p>(b) A unicellular, eukaryotic aquatic organism (Name the kingdom). [2011 (T-II)]</p> |
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OTHER IMPORTANT QUESTIONS

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|---|--|
| <p>1. Meena and Hari observed an animal in their garden. Hari called it an insect while Meena said it was an earthworm. Name the characteristic which confirms that it is an insect.</p> <p>2. What is the mode of nutrition in fungi?</p> <p>3. What are the divisions of living organisms?</p> <p>4. What is the basis of classification of plants?</p> <p>5. What is <i>Systema Naturae</i>?</p> <p>6. What is a scientific name?</p> <p>7. What are the divisions of cryptogamiae?</p> <p>8. What are the examples of thallophyta?</p> <p>9. What are the parts of a scientific name?</p> | <p>10. Write the scientific names of pea and peacock?</p> <p>11. What are amphibians of the plant kingdom?</p> <p>12. According to the two-kingdom classification, what are the main divisions of animals?</p> <p>13. What is the basis of classification of animals?</p> <p>14. What are invertebrates?</p> <p>15. Which animal shows bilateral symmetry?</p> <p>16. What type of body symmetry is shown by <i>Hydra</i>?</p> <p>17. What is pseudocoel?</p> <p>18. In which phyla, true body cavities are present?</p> |
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II. SHORT ANSWER QUESTIONS - I

(2 Marks)

PREVIOUS YEARS' QUESTIONS

- | | |
|--|---|
| <p>1. Which organisms are called primitive? How are they different from the advanced organisms? [2011 (T-II)]</p> <p>2. What are the four main characteristics of chordates? [2011 (T-II)]</p> | <p>3. (a) Give one characteristic difference between primitive and advanced organisms. [2011 (T-II)]</p> <p>(b) Name the phylum to which the following are included.</p> |
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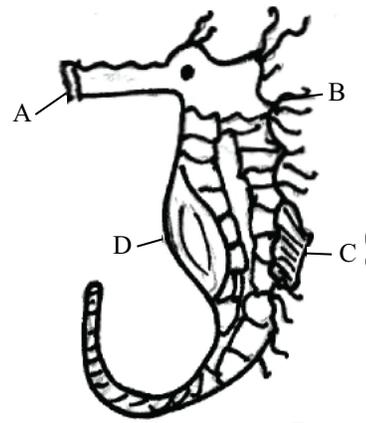
- (i) Spider (ii) Cockroach
(iii) Prawn (iv) Housefly
4. (i) Write one main characteristic feature that differentiates gymnosperms from angiosperms.
(ii) Give one example of each of a gymnosperm and an angiosperm. **[2011 (T-II)]**
5. (i) Identify the class of animals having the following characteristic features.
(a) The warm blooded animals that lay eggs and have four chambered heart and a covering of feathers.
(b) The cold blooded animals having scales and they breathe through lungs.
(ii) Give one example of an animal belonging to each of these classes. **[2011 (T-II)]**
6. In the hierarchy of classification, which grouping will have the smallest number of organisms with maximum characteristics in common and which will have the largest number of organisms? **[2011 (T-II)]**
7. Characteristics of some organisms are given. Identify their group and give one example of each.
(a) Single celled, eukaryotic and photosynthetic
(b) The body is divided into segments, may be unisexual or hermaphrodite. **[2011 (T-II)]**
8. (a) List two features which differentiate chordates from non-chordates.
(b) In which phylum will you place the organisms which have
(i) calcareous spines on their body?
(ii) the presence of holes or pores all over the body? **[2011 (T-II)]**
9. How do the saprophytes get their food? Give two examples of a saprophyte. **[2011 (T-II)]**
10. List the major divisions in kingdom plantae. Write the characteristic features of any one of them. **[2011 (T-II)]**
11. Explain Binomial Nomenclature? Name the scientist who has given it. Write its advantage ? **[2011 (T-II)]**
12. List the conventions used for writing a scientific name. What is the importance of scientific names? **[2011 (T-II)]**
13. (a) How many chambers do the heart of fish, amphibians and mammals have?
(b) Name the classes of vertebrates which lay eggs with shells. **[2011 (T-II)]**
14. Why bryophytes are called the amphibians of the plant kingdom? **[2011 (T-II)]**
15. Some reptiles live in water and yet lay eggs with tough covering unlike the amphibians. Why? **[2011 (T-II)]**
16. How are fungi (i) similar and (ii) dissimilar to plants? **[2011 (T-II)]**
17. How do thallophytes and pteridophytes differ from each other? Write two differences. **[2011 (T-II)]**
18. (a) Name the phylum to which the following are included spider, cockroach, prawn, house fly.
(b) What is biodiversity? **[2011 (T-II)]**
19. (a) List any three important features of vertebrates.
(b) Name one reptile. **[2011 (T-II)]**
20. Write two peculiar characters of sponges? **[2011 (T-II)]**
21. Why are bats not placed in birds (Two Points)? **[2011 (T-II)]**
22. (a) What are saprophytes? **[2011 (T-II)]**
(b) Name the kingdom to which they belong.
(c) What is the cell wall of fungi made up of?
23. (a) Identify the class of following organism having following features :
(i) Slimy skin and three chambered heart.
(ii) Covering of feather and four chambered heart.
(b) List two important characteristics of phylum Nematoda. **[2011 (T-II)]**
24. What is notochord? Mention its function. **[2011 (T-II)]**
25. Write the main features of Fungus plants. **[2011 (T-II)]**
26. Enlist four main features of organisms placed in protista. **[2011 (T-II)]**
27. Give four main features of phylum coelenterata. **[2011 (T-II)]**
28. What is binomial nomenclature? Who introduced it? **[2011 (T-II)]**
29. (a) What are the two adaptive features of birds ? **[2011 (T-II)]**
(b) What is the scientific name of ostrich?
30. Why is there a need for classification and

systematic naming of living organisms?

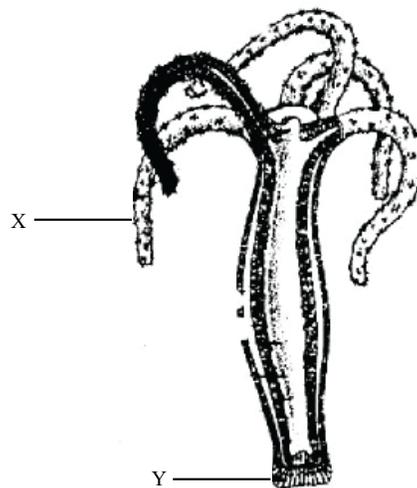
[2011 (T-II)]

31. How do reptiles differ from amphibians?
[2011 (T-II)]
32. (a) Define cryptogams? [2011 (T-II)]
(b) Name the division of plant kingdom having amphibian plants.
33. Bats can fly still they are placed in mammal. Why? [2011 (T-II)]
34. Give reasons for each of the following.
[2011 (T-II)]
- (a) "Blue-green algae is placed in Monera and not in plantae"
- (b) "Bryophytes and Pteridophytes grow in moist and shady places".
35. (a) Write any two important features that are present in all chordates. [2011 (T-II)]
(b) Mention one difference between triploblastic and diploblastic animals.
36. List the four conventions that are followed while writing the scientific names of an organism? [2011 (T-II)]
37. Give two differences between bony fish and cartilaginous fish. Give one example of each.
[2011 (T-II)]
38. (a) Give a difference between lizards and snakes. [2011 (T-II)]
(b) Name the type of nutrition in fungi.
39. Thallophyta, bryophyta and pteridophyta are classified as cryptogamae whereas gymnosperms and angiosperms are classified as phanerogamae, why? [2011 (T-II)]
40. How can we say that sea horse is a fish while jelly fish is not a fish but a coelenterate? [2011 (T-II)]
41. (i) Which group of plants is known as 'flowering plants'?
- (ii) On the basis of seed how a maize plant is different from a pea plant? [2011 (T-II)]
42. Give any two reasons why mosses are found in moist and humid places. [2011 (T-II)]
43. Write the names of the parts as A, B, C and D given in the figure in your answer book.

[2011 (T-II)]



44. What are gymnosperms? Give two characteristics. [2011 (T-II)]
45. (a) State two characteristic features of nematode.
(b) Identify the phylum with the help of following features :
- (i) Spiny - Skinned, radial symmetrical and have tube feet.
- (ii) Triploblastic, worm - like, having segmented body. [2011 (T-II)]
46. Write conventions followed while writing the scientific names? [2011 (T-II)]
47. Give reasons for the following :
- (a) Blue green algae are classified with bacteria and placed in kingdom Monera.
- (b) Bryophytes are called amphibians of plant kingdom. [2011 (T-II)]
48. Who proposed the five kingdom classification? What is the basis of this classification? [2011 (T-II)]
49. Label X and Y in the given diagram of *hydra*. [2011 (T-II)]



50. Give one example of each :
- Reptile which has a four chambered heart.
 - Egg - laying mammal.
 - Parasitic Platyhelminthes
 - Division among plants which has the simplest organisms. [2011 (T-II)]
51. Identify the phylum for the following characteristics given :

- Organisms with joint appendages.
- Organisms are generally flatworms
- Body is segmented
- Skin of organisms is full of spikes

[2011 (T-II)]

52. Write any two characteristics of class mammalia. Name one egg laying mammal. [2011 (T-II)]

OTHER IMPORTANT QUESTIONS

- Answer the following questions :
 - Who is known as the 'Father of Taxonomy'?
 - What is meant by nomenclature?
- Write the contribution of Haeckel and Whittaker in classification.
- Name the group of plants with the following characters :
 - Plants with seeds
 - Plants without roots, stem, leaves or flowers
 - Plants having seeds with two cotyledons
 - Plants visible with naked eye but having no chlorophyll

- You are provided with the seeds of gram, wheat, rice and pumpkin. Classify them whether they are monocot or dicot.
- Distinguish between bryophyta and pteridophyta.
- What are vascular cryptogams?
- Write any four differences between dicotyledons and monocotyledons.
- Name the phylum to which each of the following animals belong: Seahorse, Silverfish, Jellyfish, Cuttlefish.
- Give two characters of bryophytes.
- How is classification and evolution interrelated with each other?

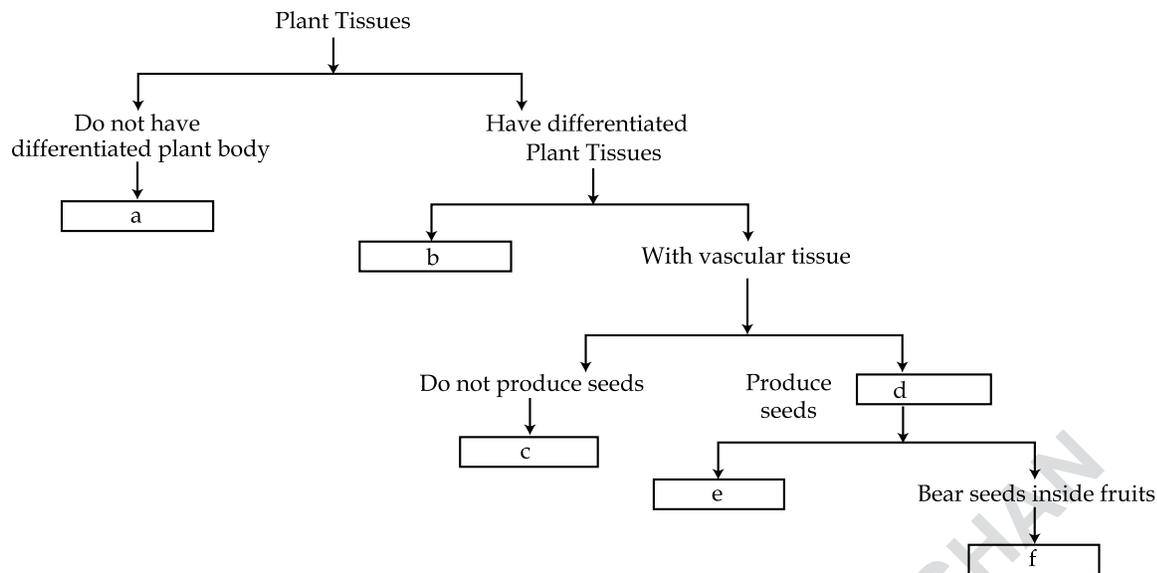
III. SHORT ANSWER QUESTIONS - II

(3 Marks)

PREVIOUS YEARS' QUESTIONS

- List three groups of plants. Which plants are referred to as vascular plants? Out of these which group is further classified on the basis of number of cotyledon? State its two characteristics. [2011 (T-II)]
- List in the tabular form any three differences between the Aves and the Mammalia group. [2011 (T-II)]
- Identify the plant bodies, which are commonly named as 'cryptogamae'. State and explain two characteristics, which are exhibited by each category of these plant bodies. [2011 (T-II)]

- (i) Draw a neat diagram of *Hydra*. [2011 (T-II)]
 - Label mesoglea and gastrovascular cavity.
 - Name the group of animals it belongs to.
 - Name one species of this group that lives in colonies.
- In the given classification scheme fill in the boxes with appropriate plant groups : [2011 (T-II)]



6. Define the terms and give one example of each

(i) Bilateral symmetry (ii) Coelom

(iii) Triploblastic [2011 (T-II)]

7. Write any three differences between Amphibia and Mammalia belonging to kingdom Animalia.

8. Pick the odd one out and justify your choice by giving reasons. [2011 (T-II)]

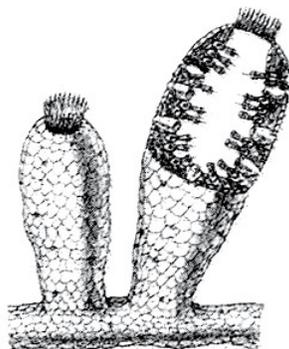
(a) Moss, Fern, *Pinus*, *Spirogyra*.

(b) Sea Cucumber, Octopus, Feather Star, Star fish. [2011 (T-II)]

9. Identify the following diagrams. Write the phylum do they belong to? Write down the characteristic features of each phylum. [2011 (T-II)]



A



B

10. (a) Write down the four characteristic features of the members of the class Aves.

(b) To which group do the following belong : [2011 (T-II)]

(i) Evergreen trees that bear naked seeds.

(ii) Plants which have tap root system and two cotyledons in their seeds.

11. Mention any three conventions which are followed while writing the scientific name? [2011 (T-II)]

12. Name the group which is called 'Amphibians of Plant kingdom'. Cite an example of this group also mention one important feature of the same group. [2011 (T-II)]

13. How do Aves differ from Mammals? (Give three points) [2011 (T-II)]

14. On the basis of the following features, identify the group and give one example of each :

(i) Presence of notocord at some stage of life.

(ii) Unicellular, microscopic and eukaryotic.

(iii) Seeds are enclosed in fruits. [2011 (T-II)]

15. (a) Draw a well labelled diagram of *Euglena*.

(b) Name the kingdom to which it belongs.

[2011 (T-II)]

16. Differentiate between annelida and nematode.

[2011 (T-II)]

17. What is the importance of classification?

[2011 (T-II)]

18. (a) In which two ways are amphibians differed from fishes?

(b) Identify the phylum of organisms having the following characteristics.

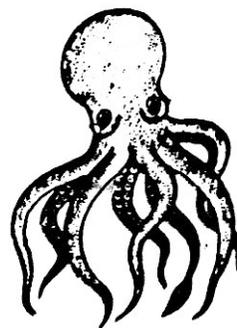
(i) Pore bearing animals and radial symmetry

(ii) Body spiny and radial symmetry

- (c) Why gymnosperms do not require water for fertilization? [2011 (T-II)]
19. (a) Name the phylum to which each of the following animals belongs to, Silver fish, Starfish, Tapeworm, Leech. [2011 (T-II)]
- (b) List two features of vertebrates.
20. To which group do the following organism belong and give one reason for each. [2011 (T-II)]
- (a) Cyanobacteria (b) *Euglena*
- (c) *Ulothrix*
21. (i) What are vertebrates? [2011 (T-II)]
- (ii) Name four sub groups of vertebrates.
22. Write one difference for each of the following pairs. [2011 (T-II)]
- (i) Thallophyta and Bryophyta
- (ii) Nematoda and Annelida
- (iii) Amphibia and Reptilia
23. Differentiate between the following , giving one main point of difference. [2011 (T-II)]
- (a) Gymnosperm and Angiosperm
- (b) Diploblastic and Triploblastic animals
- (c) Dicotyledons and Monocotyledons.
24. (a) List any two main characteristics of chordates. [2011 (T-II)]
- (b) In which class would you place any organism which has —
- (i) four chambered heart and lay eggs.

(ii) skeletons made of both bones and cartilage and are cold blooded.

25. Name the phylum to which this organism belongs. Write any two characteristic feature of the phylum. [2011 (T-II)]



26. Classify the following organisms based on the absence / presence of true coelom (i.e. acoelomate, pseudocoelomate and coelomate) [2011 (T-II)]
- (a) Scorpion (b) sea anemone
- (c) *Ascaris* (d) Earthworm
- (e) *Wuchereria* (f) *Nereis*
27. Write the most striking features of the following phyla : [2011 (T-II)]
- (i) arthropoda (ii) amphibia
- (iii) porifera
28. (a) What is the significance of binomial nomenclature?
- (b) Who introduced the system of scientific naming?
- (c) Write any two conventions followed while writing the scientific names. [2011 (T-II)]

OTHER IMPORTANT QUESTIONS

1. Classify the following organisms based on the absence/presence of true coelom (i.e., acoelomate, pseudocoelomate and coelomate)
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|------------------|-------------------|------------------|
| <i>Spongilla</i> | Sea anemone, | <i>Planaria</i> |
| Liver fluke | <i>Wuchereria</i> | <i>Ascaris</i> , |
| <i>Nereis</i> , | Earthworm | Scorpion |
| Birds, | Fish, | Horse. |
2. Endoskeleton of fish are made up of cartilage and bone; classify the following fish as cartilagenous or bony
- | | | |
|----------|--------------|------------|
| Torpedo, | Sting ray, | Dog fish, |
| Rohu, | Angler fish, | Exocoetus. |

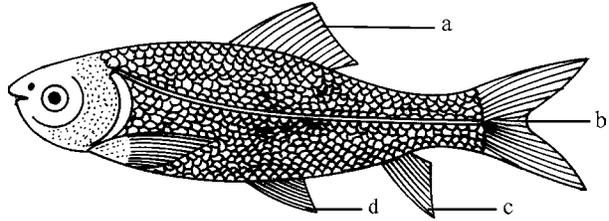
3. Classify the following based on number of chambers in their heart.
- Rohu, *Scoliodon*, Frog, Salamander, Flying lizard, King Cobra, Crocodile, Ostrich, Pigeon, Bat, Whale.
4. Classify Rohu, *Scoliodon*, Flying lizard, King cobra, Frog, Salamander, Ostrich, Pigeon, Bat, Crocodile and Whale as the cold blooded/ warm blooded animals.
5. Match items of column (A) with items of column (B)
- | | |
|--------------------------|------------------|
| (A) | (B) |
| (a) Pore bearing animals | (A) Arthropoda |
| (b) Diploblastic | (B) Coelenterata |

- (c) Metameric segmentation (C) Porifera
- (d) Jointed legs (D) Echinodermata
- (e) Soft bodied animals (E) Mollusca
- (f) Spiny skinned animals (D) Annelida

6. What is the difference between the following :

- (a) The heart of a fish and that of a bird
- (b) Breathing organs of fish and lizard
- (c) The position of mouth in shark and salmon.

7. Label a, b, c and d, given in figure. Give the function of (b).



IV. LONG ANSWER QUESTIONS

(5 Marks)

OTHER IMPORTANT QUESTIONS

1. Thallophyta, bryophyta and pteridophyta are called as 'Cryptogams'. Gymnosperms and Angiosperms are called as 'phanerogams'. Discuss why?
2. You are given leech, *Nereis*, *Scolopendra*, prawn and scorpion; and all have segmented body organisation. Will you classify them in one group? If no, give the important characters based on which you will separate these organisms into

different groups.

3. Which organism is more complex and evolved among bacteria, mushroom and mango tree. Give reasons.
4. Differentiate between flying lizard and bird. Draw the diagram.
5. How can we keep mosquito and prawn in the same group?

ASSIGNMENTS FOR FORMATIVE ASSESSMENT

A. Activities

1. Objective

To prepare Herbarium sheet of a flowering plant.

Materials Required

A freshly plucked plant twig with leaves and flowers, a thick white sheet of dimension 40 × 28 cm, old newspapers, adhesive, heavy book, sewing needle and thread.

Procedure

- Take a freshly plucked plant twig with leaves and flowers. Place it inside the folds of old newspapers. Be assured that the leaves and flower are spread well.
- Place a few more newspaper sheets and keep a heavy mass on the sheets of newspapers containing plant specimen (plant twig).
- Next day place the plant specimen in a fresh dry newspapers following the same procedure as did earlier. Repeat the process 4-5 days till the plant specimen becomes dry.
- Smear very small quantity of a good adhesive on the stem and leaves. Mount the plant on the white card sheet of dimension 40 × 28 cm.

- You can stitch the plant specimen a few places of stem with the help of needle and thread.



- Place this card sheet on a dry newspaper. Cover this sheet with another newspaper then heep the heavy mass on it. After 2-3 hours check the specimen whether it sticks to the card sheet or not. If not, keep it as such for one more hour to stick.
- Now at the bottom right corner of herbarium sheet, write your name, name of plant, place and date of collection. Prepare such herbarium sheets containing different plants and parts of plants.

Precautions :

1. Select plants with small leaves.
2. Carefully spread the leaves and other parts of plants.
3. Mount the plant specimen after all the moisture and water has been completely removed.

2. Objective :

To compare the external features of Monocot and Dicot plants.

Materials Required

A maize plant or grass with roots, a mustard plant or *Hibiscus* with roots, simple microscope, hand lens, slide, coverslip and a razor with sharp blade.

Procedure :

- Take a monocot plant (maize) and a dicot plant (mustard) with roots, leaves, flowers and fruits.
- Observe and compare the external features i.e., stem, leaves, roots, flowers, fruits, seeds, etc of monocot and dicot plants.

- Wash the roots of both plants and spread them on separate white sheets of paper to study them.
- Observe the shape and venation of leaves of both the plants.
- Observe the different floral parts and count the number of sepals, petals, stamens and stigma in both the flowers with the help of simple microscope.
- Take a T.S. (Transverse Section) of ovary and count the number of carpels under the simple microscope.
- Carefully remove the seeds from both the types of fruits then remove the seed coats and count the number of cotyledons in each case.
- Draw the diagrams of all the parts you observed and studied. You can record your observations.

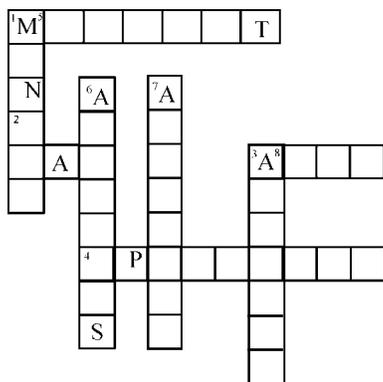
Observations :

The important features that distinguish a monocot and a dicot plant are listed below :

Features	Monocot (Maize plant)	Dicot (Mustard Plant)
1. Roots		
2. Leaf shape		
3. Leaf venation		
4. Sepals (number and colour)		
5. Petals (number and colour)		
6. Stamens		
7. Pistil		
8. Cotyledons in seed		

B. Quiz

1. During a practical examination Pankaj was asked to identify a plant cell and an animal cell correctly by looking through two microscopes. They looked alike. How can he identify them correctly?



2. **Puzzle :** Find the names by going across and down in the given puzzle.

Across

1. Plants having a single cotyledon.
2. A mammal which digs hole in the ground.
3. Heterotrophic eukaryote which uses decaying organic material as food.
4. An aquatic alga containing chlorophyll.

Down

5. The kingdom in which organisms do not have a defined nucleus or organelles and do not show multicellular body designs.
6. Scientific name of Starfish.
7. The phylum to which earthworm belongs.
8. Whip like appendages in Euglena.

C. Group Activities

1. To show the plant growth

[Participation - 5 to 6 students]

- (i) Create a unified story from a sequential picture.

[Hint : A student can crouch and sit down to represent a seed.

Next a student can rise up a little, to show the growing seed.

In the third step, a person in the standing position can represent further growth.

The hands, palm and fingers can be outstretched to represent the branching of the plant.]

2. Cell division in *Amoeba*

[Participation - 10 to 12 students]

- (i) Divide the class into groups with 10 to 12 students in each groups.
- (ii) Each group should represent the three parts of an *Amoeba* - protoplasm, cell wall and nucleus.

[Hint : Hold hands to form a ring. The ring should be in the shape of a closed curve and not of any definite shape. Two students huddled in the centre can represent the nucleus. 4-5 students can remain scattered inside the ring to represent the protoplasm.]

- (iii) Next show the division of the nucleus and the cell wall along with the protoplasm to form two separate cells.

[Hint : The student representing the nucleus and cell wall should stretch out (with hands held) as far as possible. Once the students representing the nucleus separate, the students forming the ring can surround them to form two new rings.]

D. Project

1. Bird Project

A bird project can be devised rising a particular species of bird.

- Which type of plants attract the bird species?
- Which type of habitats do they prefer?
- Do they prefer to eat in a group or alone?
- What type of seeds do they prefer to eat?
- What factors increase the egg-laying in the species?

2. Animal Project

[Participation — 5 to 6 students]

This project will include areas of animal studies in order to understand various biological processes in animals.

You can start with tadpoles or small fishes and name this **Fish project**.

- Does temperature affect the respiration of the tadpoles or fishes?
- Does the temperature of water affect their respiration?
- Does the temperature of water affect their colour?
- Does the size of their population affect their growth?
- Does the amount of sunlight/light received affect their growth?
- How does pH of water affect their growth?

[Hint : You can collect some tadpoles or small fish in a glass bowl and observe their movement/activities.

Add some warm water in the bowl and observe if they can survive in the higher temperature. You can direct a torch beam or keep the bowl in sunlight to observe how their behaviour changes or how long they survive.]

E. Seminar

1. Classification of Chordata

[Hints - Following points should be included.

- (i) Classification of protochordata
- (ii) Exoskeleton of scales
- (iii) Exoskeleton of hairs
- (iv) Exoskeleton of feathers
- (v) Egg laying animals
- (vi) Mammals nourish their young ones.]

The seminar can be made interesting by showing slides of different diagrams, showing the related animated activities and by showing related specimens.

2. The characteristics of the body design of plants is used for their classification.
3. The basic body design of animals is based in their need to acquire food.
4. Hierarchy of classification proposed by the biologist Robert Whittaker.

Class IX Chapter 7 – Diversity in Living Organisms Science

Question 1:

Why do we classify organisms?

Answer:

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 to study these different classes as a whole. Thus, classification makes our study easier.

Question 2:

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

Answer:

Examples of range of variations observed in daily life are:

- (i) Variety of living organisms in terms of size ranges from microscopic bacteria to tall trees of 100 metres.
- (ii) The colour, shape, and size of snakes are completely different from those of lizards.
- (iii) The life span of different organisms is also quite varied. For example, a crow lives for only 15 years, whereas a parrot lives for about 140 years.

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?

Answer:

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. Therefore, the nature or kind of a cell is considered to be a

fundamental characteristic for the classification of living organisms.

Question 2:

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

Answer:

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.

Question 3:

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

Answer:

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.

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

Answer:

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. 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.

Question 2:

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

Answer:

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.

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

Answer:

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.

Question 2:

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

Answer:

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

Question 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?

Answer:

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.

Which division among plants has the simplest organisms?

Answer:

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.

Question 2:

How are pteridophytes different from the phanerogams?

Answer:

Pteridophyta	Phanerogams
They have inconspicuous or less differentiated reproductive organs.	They have well developed reproductive organs.
They produce naked embryos called spores.	They produce seeds.
Ferns, Marsilea, Equisetum, etc. are examples of pteridophyta.	Pinus, Cycas, fir, etc. are examples of phanerogams.

Question 3:

How do gymnosperms and angiosperms differ from each other?

Answer:

Gymnosperm	Angiosperm
They are non-flowering plants.	They are flowering plants.
Naked seeds not enclosed inside fruits are produced.	Seeds are enclosed inside fruits.
Pinus, Cedar, fir, Cycas, etc. are some examples of gymnosperms.	Coconut, palm, mango, etc. are some examples of angiosperms.

How do poriferan animals differ from coelenterate animals?

Answer:

Porifera	Coelenterate
They are mostly marine, nonmotile, and found attached to rocks.	They are exclusively marine animals that either live in colonies or have a solitary lifespan.
They show cellular level of organisation.	They show tissue level of organisation.
Spongilla, Euplectella, etc. are poriferans.	Hydra, sea anemone, corals, etc. are coelenterates.

Question 2:

How do annelid animals differ from arthropods?

Answer:

Annelids	Arthropods
The circulatory system of annelids is closed.	Arthropods have an open circulatory system.
The body is divided into several identical segments.	The body is divided into few specialized segments.

Question 3:

What are the differences between amphibians and reptiles?

Answer:

Amphibian	Reptiles
They have a dual mode of life.	They are completely terrestrial.

Scales are absent.	Skin is covered with scales.
They lay eggs in water.	They lay eggs on land.
It includes frogs, toads, salamanders.	and turtles, lizards, snakes, chameleons, etc.

Question 4:

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

Answer:

Aves	Mammals
Most birds have feathers and they possess a beak.	They do not have feathers and the beak is also absent.
They lay eggs. Hence, they are oviparous.	Some of them lay eggs and some give birth to young ones. Hence, they are both oviparous and viviparous.

Question 1:

What are the advantages of classifying organisms?

Answer:

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.

Question 2:

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

Answer:

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 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.

Question 3:

Explain the basis for grouping organisms into five kingdoms.

Answer:

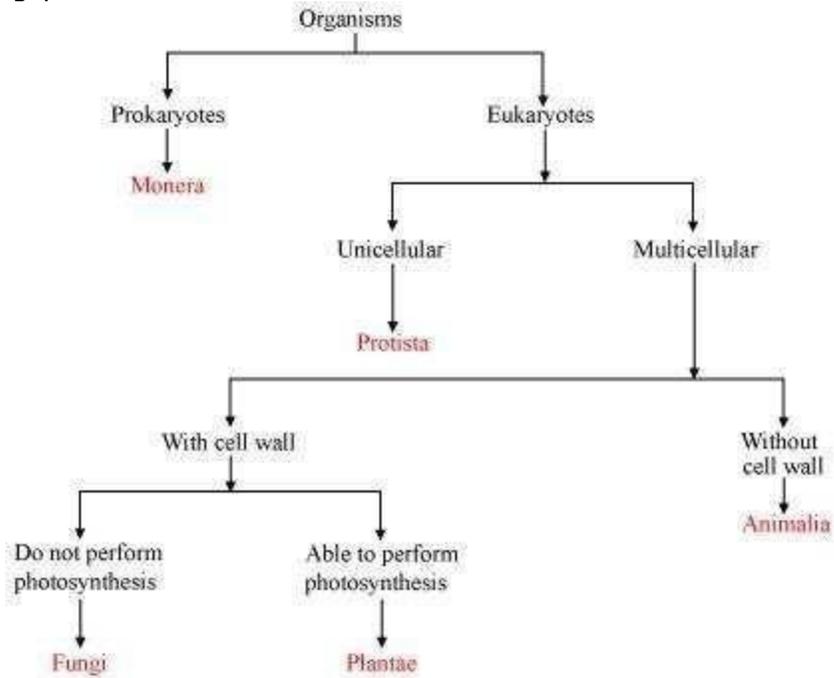
R.H. Whittaker proposed a five kingdom classification of living organisms on the basis of Linnaeus' system of classification. The five kingdoms proposed by Whittaker are Monera, Protista, Fungi, Plantae, and Animalia.

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.



Question 4:

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

Answer:

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

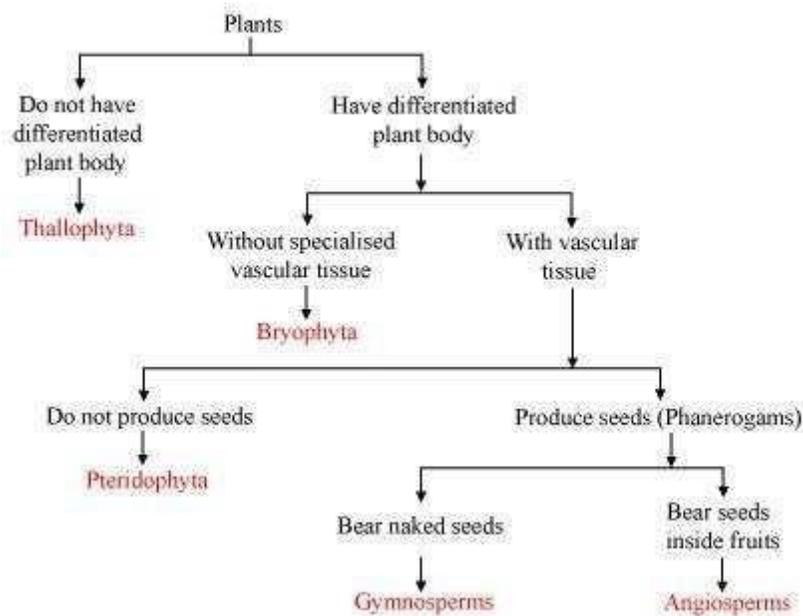
(i) The first level of classification depends on whether a plant body is well

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, on the basis of the absence of seed formation.

(iv) The other group of plants having well developed reproductive organs that finally develop seeds are called Phanerogams. 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.

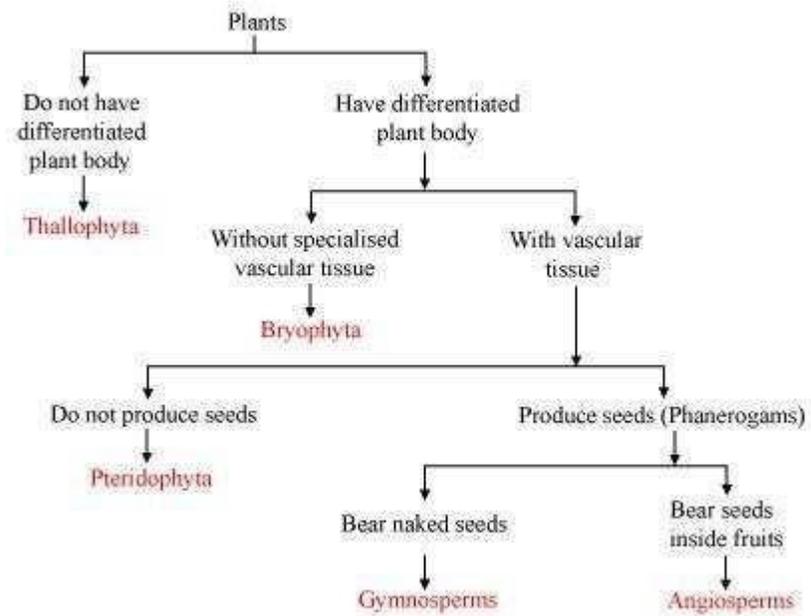


Question 5:

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

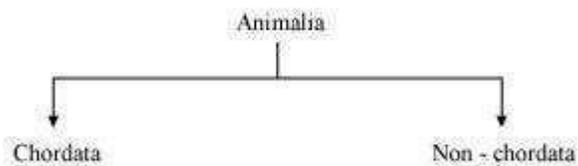
Criteria for deciding divisions in plants are:

- (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.

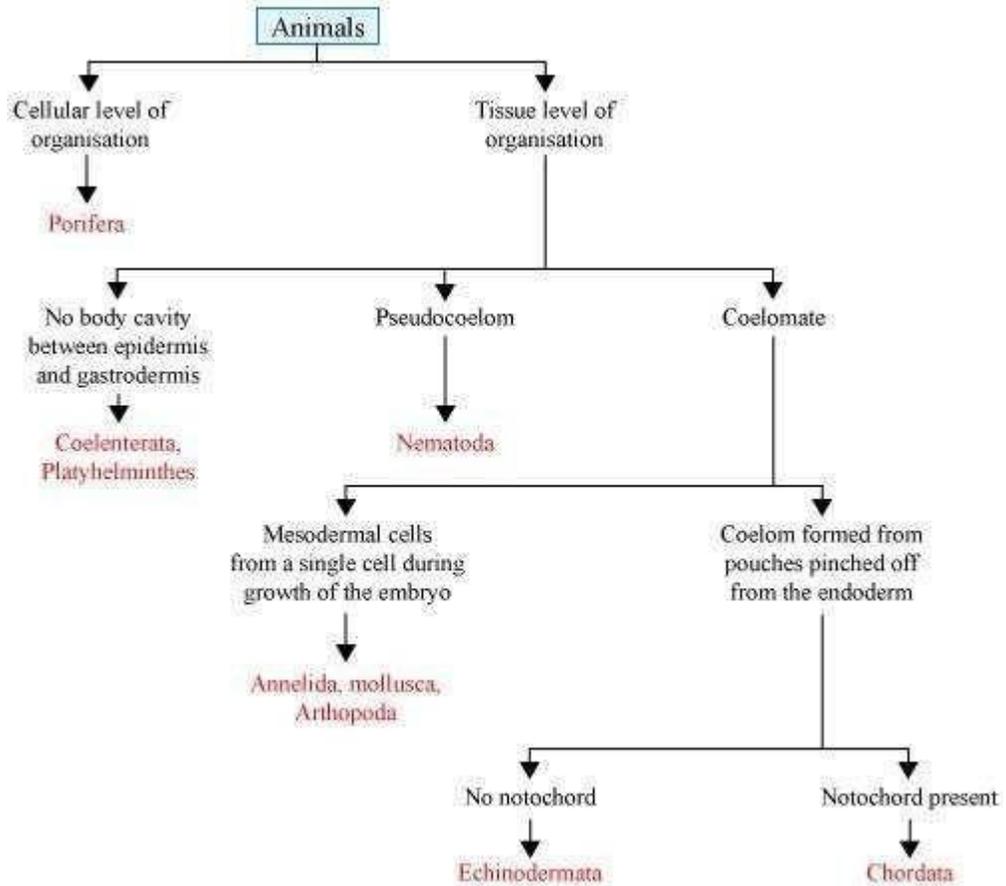


Non-chordates do not possess a notochord, while all members of the phylum chordates possess a notochord.

Non-chordate is further divided into subgroups on the basis of the following features:

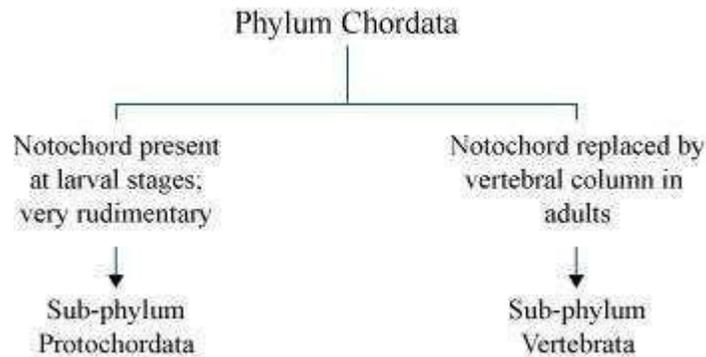
1. True Tissue [Absent
Present
2. Body cavity [Absent
Present
3. Type of body symmetry [Radial
Bilateral
4. Type of coelom development [Acoelom
Pseudocoelom
True coelom
5. Types of true coelom [Enterocoelom
Schizocoelom

On the basis of the above features, non-chordates are divided into the following subgroups: 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 subphylum vertebrata are advanced chordates. They are divided into five classes:

Pisces, Amphibian, Reptilia, Aves, and Mammalia.

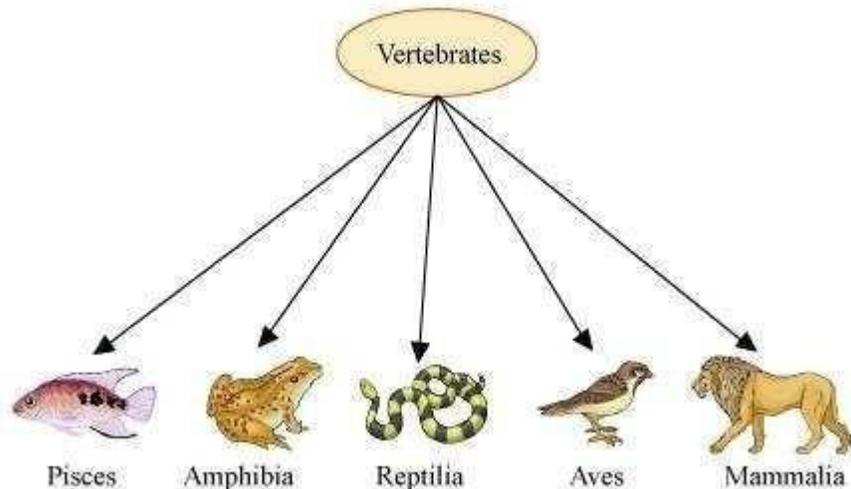


Question 6:

Explain how animals in Vertebrata are classified into further subgroups.

Answer:

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 claspings. 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.