

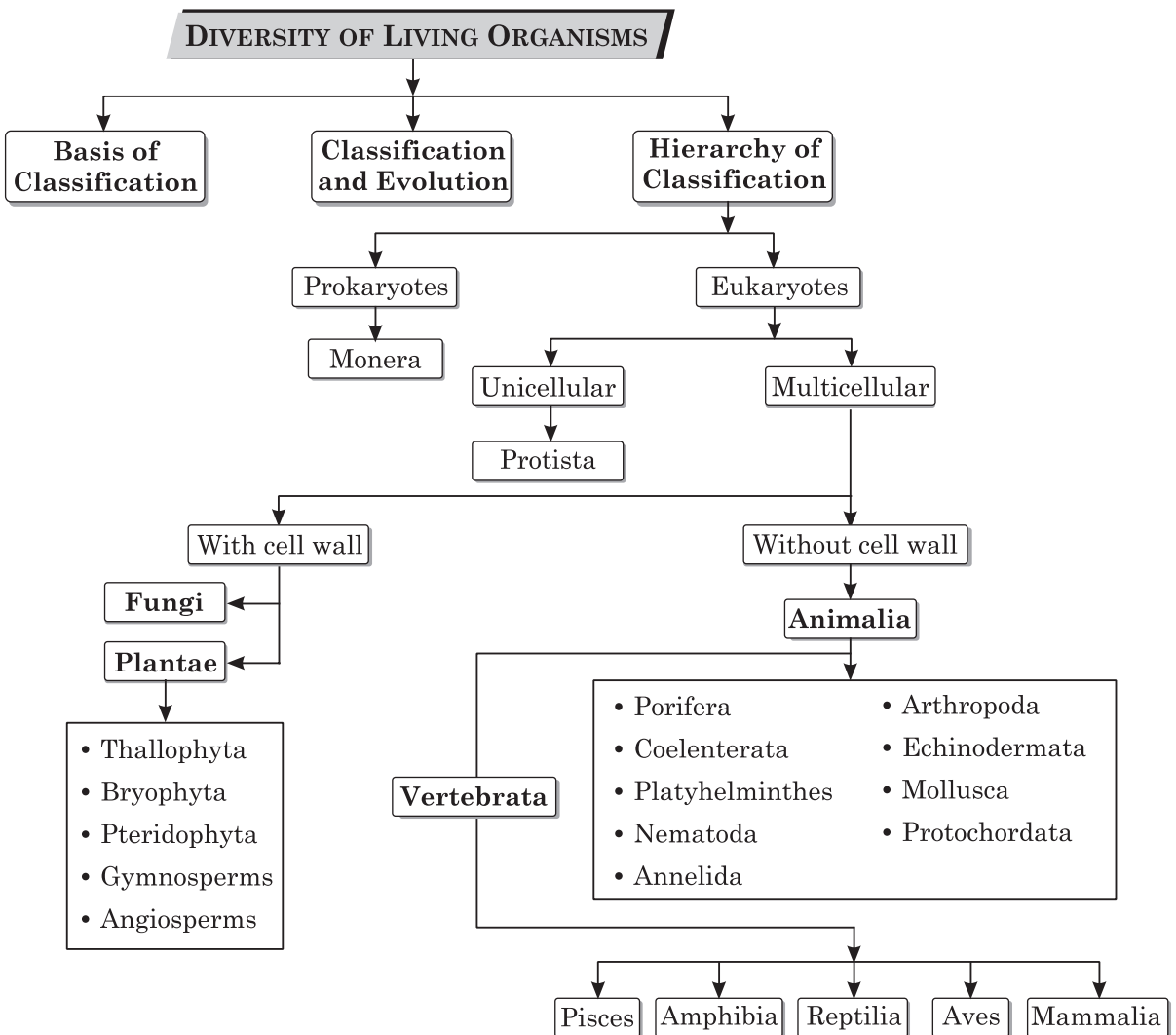
7

Diversity in Living Organisms

TOPICS COVERED

- 7.1 What is Basis of Classification?
- 7.2 Animalia
- 7.3 Nomenclature

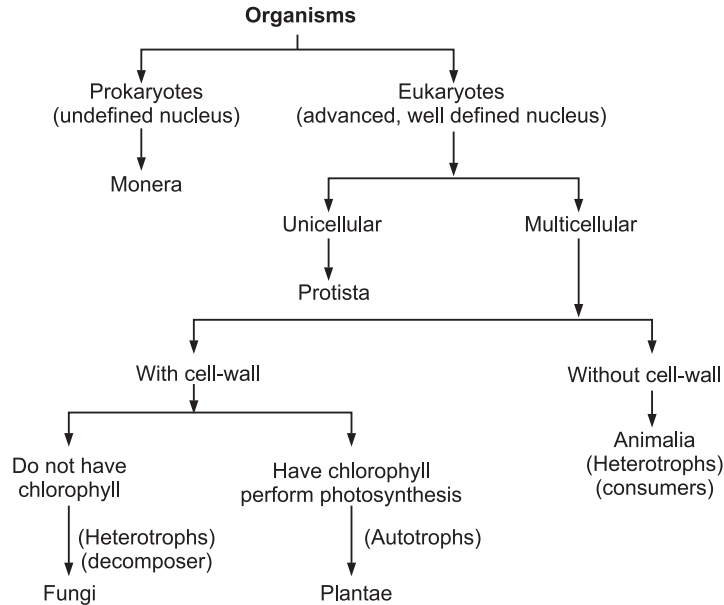
CHAPTER MAP



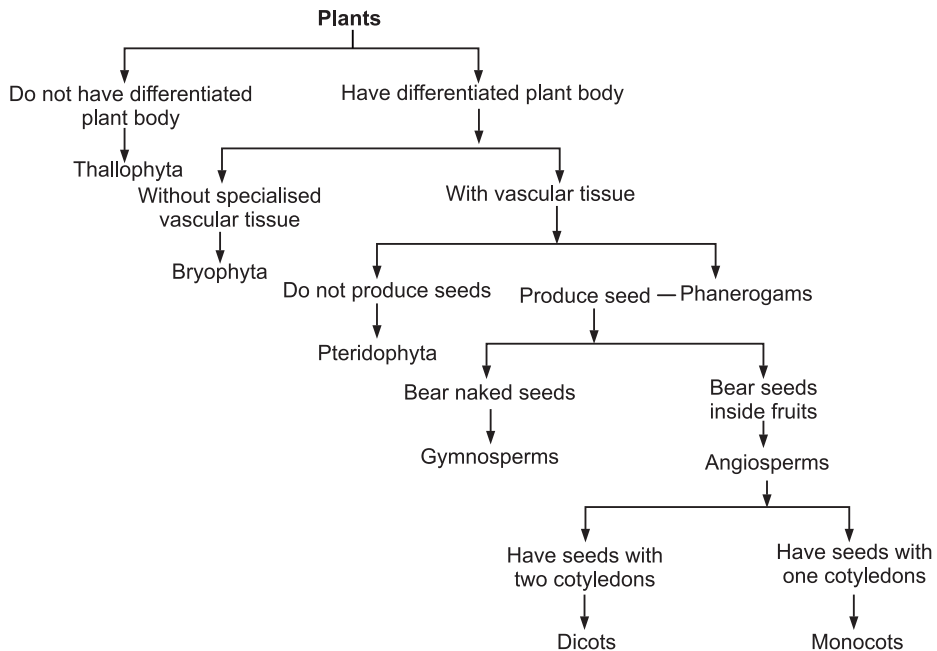
QUICK REVISION NOTES

- The existence of wide variety of species of plants, animals and micro-organism in natural habitat is called biodiversity.
 - Classification helps us in exploring diversity of life forms.
 - Earlier attempts to classify organisms took few characters under consideration. *Whittaker* gave five kingdom classification.
 - *Linnaeus* classified living things into plants and animals. He is known as father of Taxonomy. He gave binomial nomenclature and wrote the book *Systems Natura*.
 - *Taxonomy* is branch of biology dealing with identification, classification and nomenclature of organisms.
 - The major features considered for the classification of all organisms into five major kingdoms are:
 - > Types of cells: prokaryotic or eukaryotic.
 - > Single cell or multicellular complex organism.
 - > Cells have cell wall and prepare their own food.
 - > Whether they lack cell wall but are holozoic (heterotrophic).
 - Their basic body design to make sub-groups.
 - Classification makes their study easier.
 - Five kingdoms are *Monera, protista, fungi, plantae* and *animalia*
 - *Woese* classified *Monera* further into *Archaea* and *Eubactaea*.
 - Classification of life forms is related to their evolution.
 - The binomial nomenclature proposed by *Linnaeus* made a uniform way for identification of the vast diversity of life around us.
 - It is made up of two words: a generic name and a specific name.
 - *Plantae* and *animalia* are further classified into sub-divisions on the basis of their body designs.
 - There is more degree of diversity in animals than plants.
 - 75% of existing animal life is contributed by *Arthropods* (insects) having 6,75,000 species.
 - *Plants* are divided into five kingdoms:
 - > *Thallophytes* (Algae)
 - > *Bryophytes* (liverworts and mosses).
 - > *Pteridophytes* (ferns, *Marsilea*)
 - > *Gymnosperms* (pines *cycas*) and
 - > *Angiosperms* (flowering plants).
 - *Angiosperms* are further classified into *monocots* (wheat, maize, bajra) and *Dicots* (gram, mango).
 - *Bryophytes* are non-vascular plants (plants with no xylem and phloem).
 - *Vascular plants* are divided into seedless (*cryptogams*) and seeded plants (*phanerogams*) which are further classified into *gymnosperms* and *angiosperms*.
 - *Animals* are classified into—*Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata, Chordata, Protochordata* and *Vertebrata*.
 - *Animals* are broadly classified into *vertebrates* (with backbone) and *invertebrates* (without backbone).
-

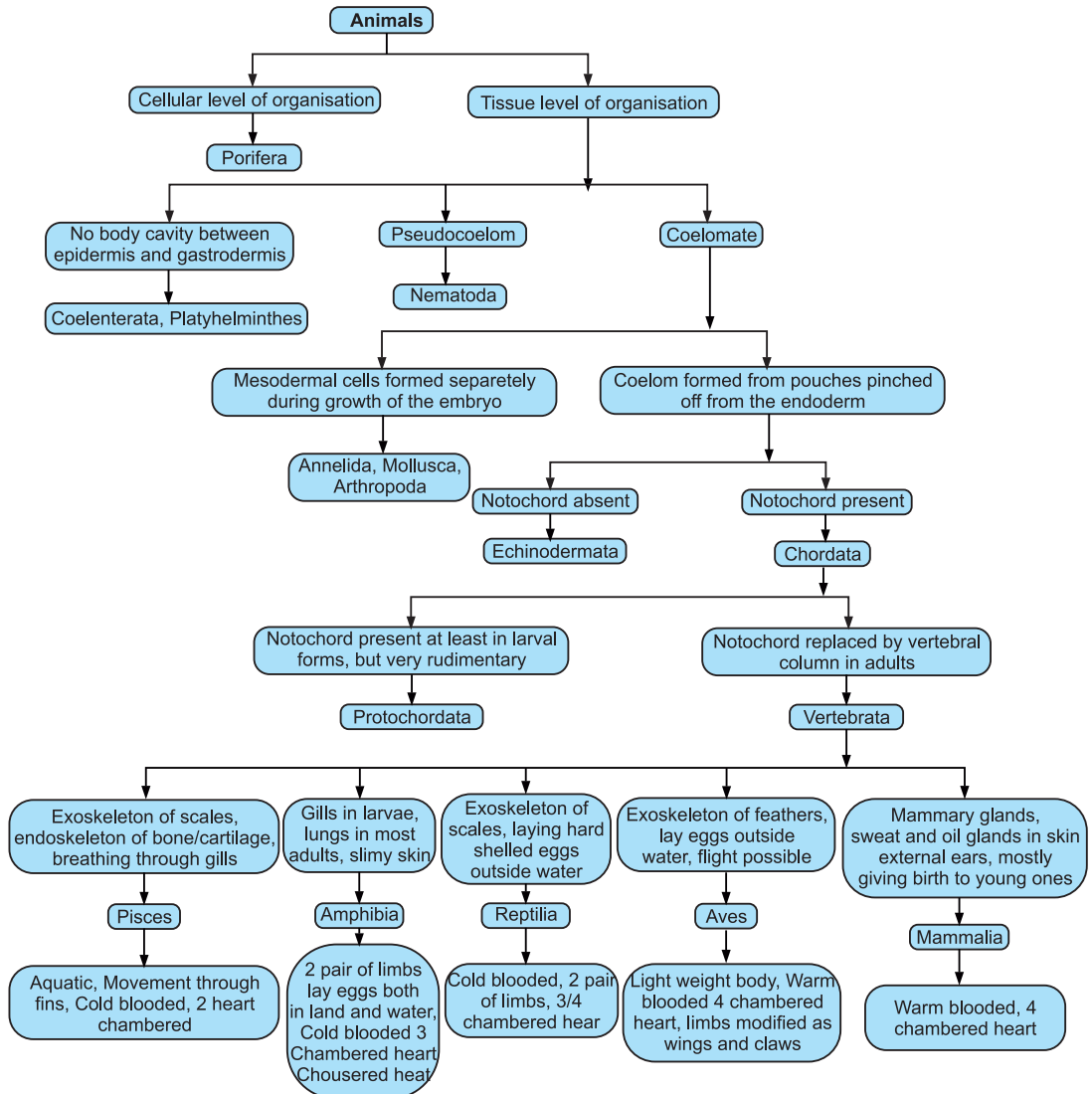
- Invertebrates with joined legs (Arthropods) are classified into Insects, Crustaceans, Arachnids, Centipedes and Millipedes.
- Invertebrates without joined legs are classified as Echinoderms, Flatworms, Cnidarians, Roundworms (Nematodes), Mollusca, Segmented worms (Annelids) and Sponges.
- Vertebrates are further classified into Mammals, Pisces, Amphibians, Aves and Reptiles.



- Key classification of Kingdom plantae (Plants)–



- Classification of Kingdom Animalia (Animals)



1. WHAT IS THE BASIS OF CLASSIFICATION?

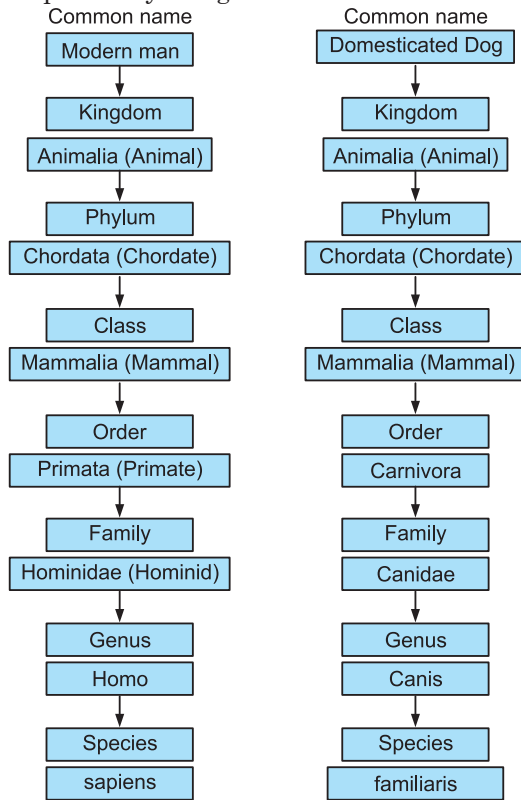
Characteristics are basis of classification

- Type of cells: Eukaryotic or Prokaryotic.
- Unicellular or multicellular.
- Autotrophs or Heterotrophs.
- Level of organisation of body in plant if they are autotrophs or heterotrophs.
- In animals, body designs decide classification.

Classification and evolution

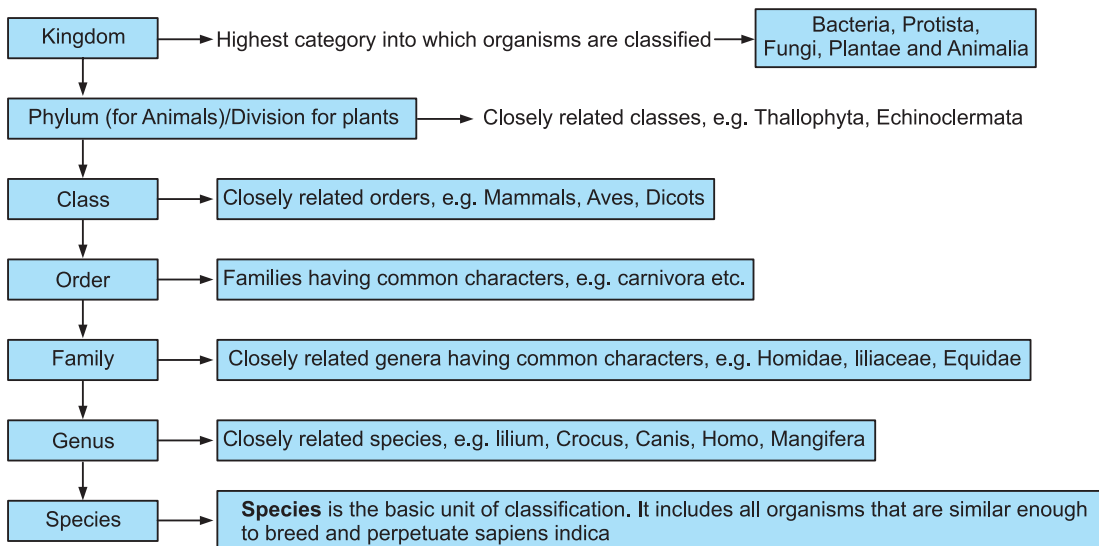
- **Evolution:** Most of the life forms that we observe today have arisen by an accumulation of changes that allow the organisms to survive better.
- **Primitive (Lower):** Those organisms which have not changed very much. These have simple body design.

Advanced (Higher): Those organisms who have acquired particular body designs recently. They have complex body design.



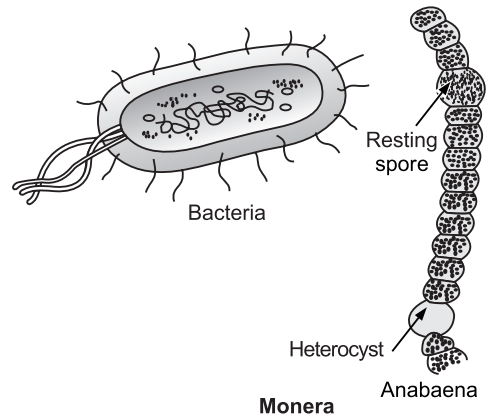
The Hierarchy of Classification of Groups

The groups are made on the basis of the cell structure, mode and source of nutrition and body organisation.



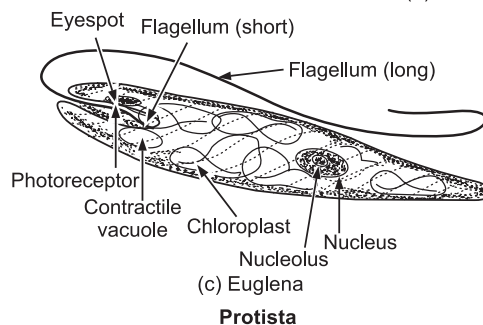
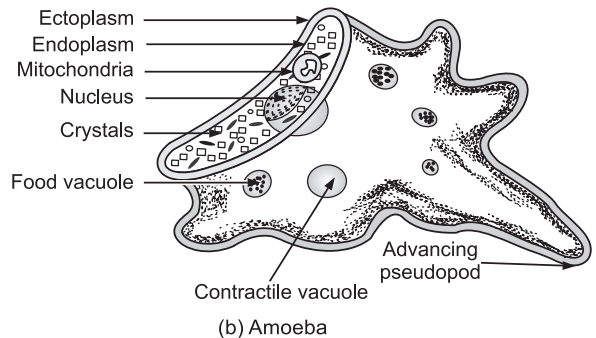
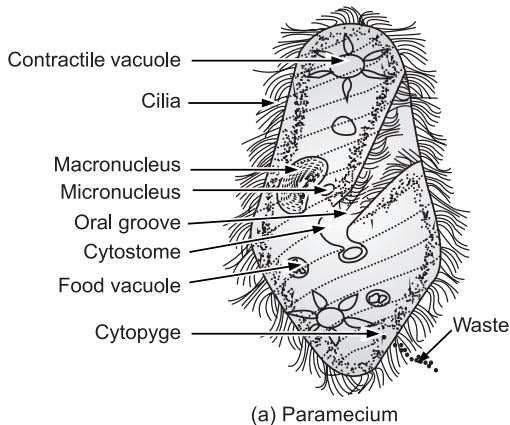
Monera (Unicellular Prokaryotes)

- Undefined nucleus, genetic material lies naked in cytoplasm. It is called nucleoid. Cell organelles with membrane are absent. Only ribosomes are present.
- Some have cell walls like bacteria and bluegreen algae, and some are without cell wall, e.g. mycoplasma.
- Autotrophic nutrition (make their own food) or Heterotrophic (obtain from environment, e.g. mycoplasma and most bacteria).
- Bacteria, blue green algae (cyanobacteria) Mycoplasma are some examples.



Protista

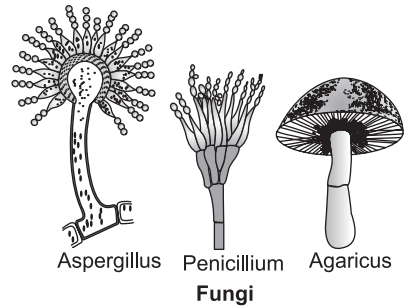
- Unicellular, Eukaryotes with defined nucleus and membrane bound cell organelles. Cell wall may or may not be present.
- Use appendages such as hair like cilia or whip like flagella for moving around. They may have pseudopodia too.
- Autotrophic or Heterotrophic nutrition in protozoans.
- Diatoms, protozoans, unicellular algae, Euglena, Amoeba, Paramecium.



Fungi

- Eukaryotic non-green (lacking chlorophyll) organisms.
- Cell wall is made up of chitin (complex sugar). Food may be stored as oil droplets or glycogen.
- Heterotrophic nutrition, use decaying organic material as food and is therefore, called as saprophytes.

- Many of them can become multicellular at later stage of life.
- Yeast, mushrooms (Agaricus), rusts, smuts, Aspergillus, Penicillium.
- Some fungi live permanently on mutually dependent relationship with blue green algae (cyanobacteria).
- Some fungi cause diseases in plants, animals and human being e.g. Ring woman Rwt of wheat some are source of food and antibiotics.
- Such relationships are called symbiotic, e.g. lichens grow on coloured patches on the bark of a tree.



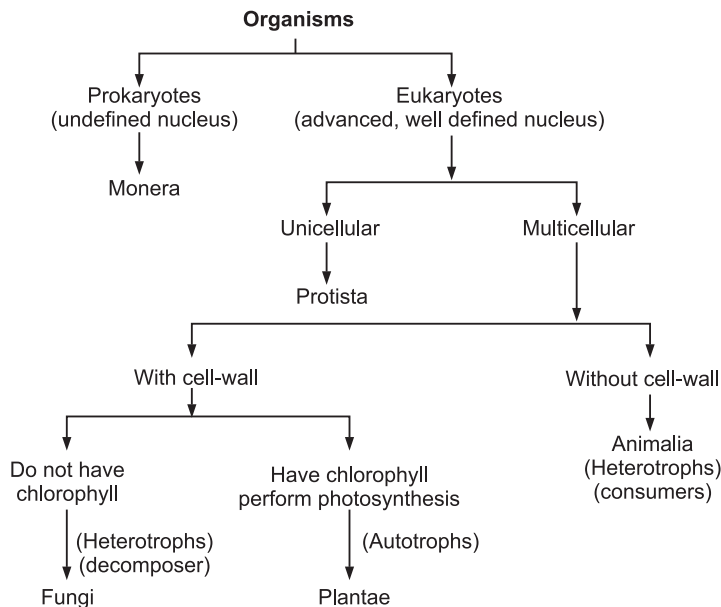
Plantae

- These are multicellular eukaryotes with cell walls made up of cellulose.
- They are autotrophs and use chlorophyll for photosynthesis.
- All plants are included in this kingdom.
- These are further classified into Thallophyta, Bryophyta, Pteridophyta, Gymnosperms and Angiosperms on the basis of the following characteristics:
 - Body is differentiated or not.
 - Sex organs are conspicuous or not present There are two major groups cryptogams in which they are not conspicuous phanerogams where they are thallophyte, bryophyte and pteridophyte are cryptogams. They are non-seeded plants too.
 - Differentiated body has vascular tissues or not.
 - Ability to bear seeds and whether seeds are enclosed within fruits or naked.
 - Seeded plants are further classified into Gymnosperms (naked seeds, non-flowering plants) and Angiosperms (flowering plants).
 - Angiosperms are further classified into Monocot and Dicot plants.

Animalia

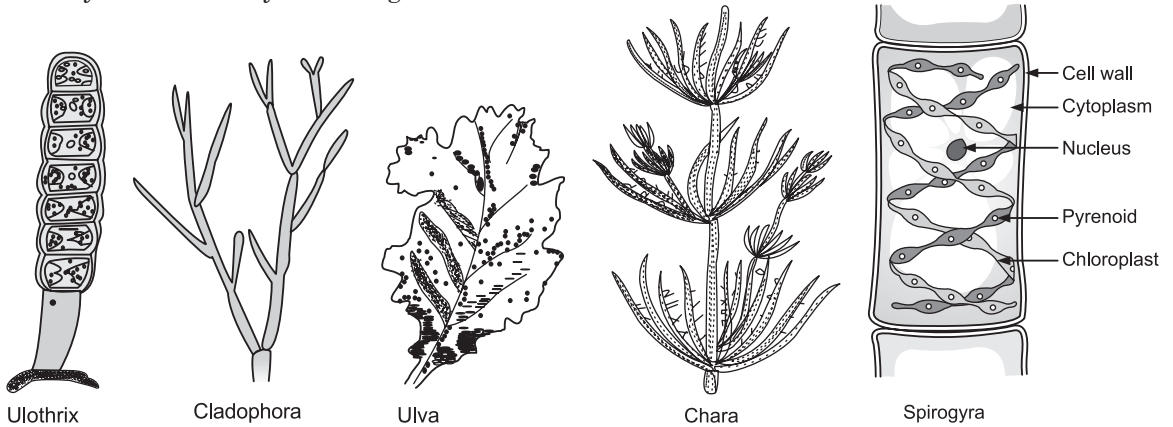
- Eukaryotic without cell wall. Multicellular.
- Heterotrophic.
- Further divided into ten sub-groups on the basis of extent and type of body design differentiation, e.g. tiger, peacock, ant, insects, fishes.

The classification of five kingdom



Thallophyta (Thallus-undifferentiated, phyta-plants)

- Plant body is not well differentiated into stem, roots and leaves.
- They are commonly called algae.

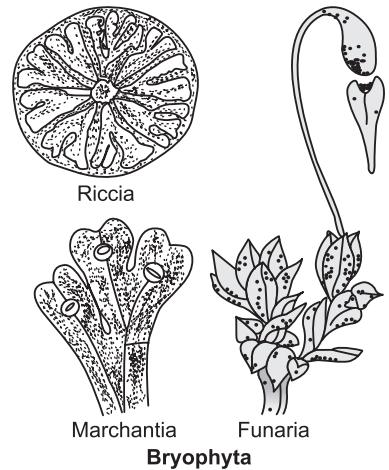


Thallophyta

- Most of the plants are aquatic, e.g. spirogyra, cladophora, chara, ulva, red algae, brown algae and ulothrix.
- Vascular tissues are absent.
- Autotrophic, prepare their own food.
- Usually contain green pigment, some algae contain red, brown and purple pigments.
- They have cell wall made up of cellulose.
- Asexual production through spores, single vegetative cell covered with a hard covering for protection. It can germinate to give rise to a new individual.
- No embryo formation after fertilisation.

Bryophyta (Bryon-moss, phyta-plants)

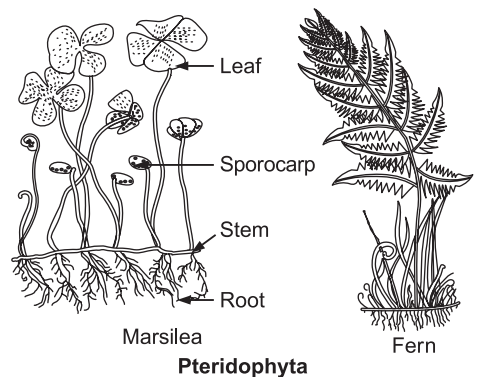
- Body structure some what differentiated but not fully developed.
- They are called amphibians of plant kingdom as they require water for reproduction.
- They are multicellular, green, land and water plants.
- Do not have true vascular system for conduction of water.
- Plant body is flat, green thallus in liverworts, leafy and erect in mosses (funaria), Riccia, Marchantia, Anthoceros, Barbula.
- They do not have real roots, stems, leaves and no flower.
- Reproduce through spores also.
- Multicellular sex organs.
- An embryo is formed after fertilisation.
- It is gametophytic.



Bryophyta

Pteridophyta (Pteris-idos-fern)

- These are found in shady or damp places on land.
- Plant body is differentiated into roots, stem and leaves.
- Vascular tissues for conduction of water and substances, i.e. Xylem and Phloem are present.

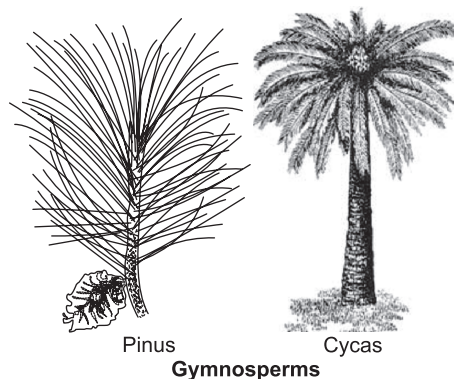


Pteridophyta

- They can also reproduce through **spores**.
- They have no flowers and do not produce seeds.
- Fertilised egg develops into embryo.
- Sex organs are multicellular and jacketed by sterile cells, They also require water for sexual reproduction. e.g. Marsilea, Fern, Horse tails (Equisetum).

Gymnosperms (Gymno-naked, spermo-seeds)

- The plants bear naked seeds and or usually ever green and woody without flowers and fruits.
- Differentiated body parts—roots, stem, leaves.
- They have unisexual cones instead of flowers, both are present on the same plant.
- Xylem lacks vessels and phloem lacks companion cells, e.g. Cycadae (Cycas), Coniferae (e.g. pines (pinus), cedrus (deodar), Ginkgo).



Angiosperms (Angeion-case or covered sperms-seeds)

- These are advanced, highly evolved, have seeds enclosed in fruits or flowers. These also are called flowering plants.
- Plant embryos in the seeds have structures called cotyledons.
- Cotyledons are 'seed leaves' which sometimes emerge and become green when seed germinates.
- Dicot plants have two cotyledons whereas monocot plants have single cotyledon.
- They also differ in leaf venation, type of roots, and number of flower parts.



Monocot	Dicot
They contain embryo with one seed leaf.	Their seed contain embryo with two seed leaves.
They have fibrous roots.	They have tap root system.
Their leaves have parallel venation.	Their leaves have reticulate venation.
Their flowers are trimerous.	Their flowers are pentamerous.

Exercise 7.1

I. Very Short Answer Type Questions

(1 Mark)

1. Name the most ancient flowering plant.
2. Define biodiversity.
3. What is meant by Taxonomy?
4. Who is the father of Taxonomy?
5. What is meant by classification?
6. Which in your opinion is the most basic characteristic for classifying organisms—the place they live in or the kind of cells, they are made up of? [NCERT] [CBSE 2012]
7. In which kingdom would you like to place an organism which is single celled, eukaryotic and photosynthetic? [NCERT] [CBSE 2012]
8. Which division among plants has simplest organisms? [NCERT]

9. How are pteridophytes different from the phanerogams? [NCERT]
10. How do gymnosperms and angiosperms differ from each other? [NCERT]
11. Write the criteria used for classification of organisms as proposed by Whittaker.
12. Give two types of the organisms without nucleus and cell organelles?
13. Who wrote the book of “Origin of species”?
14. Does blue green algae have well designed nucleus? To which group does it belong?
15. 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 [NCERT Exemplar]
16. Name two classes of plantae which do not have specialised tissue for conduction of water.
17. Why bryophytes are called amphibians of plant kingdom?
18. What is the primary characteristic on which the first division of organism is made? [NCERT]

II. Short Answer Type Questions–I

(2 Marks)

19. On what basis are plants and animals put into different categories? [NCERT]
20. In the hierarchy of classification, which group will have the smallest number of organisms with maximum number of characteristics in common and which will have the largest number of organisms? [NCERT]
21. Differentiate between Bryophyta and Pteridophyta. Give one example of each.
22. Give four differences between monocot and dicot plants.
23. Create a flow chart to show the classification of four eukaryotic kingdoms. [CBSE 2016]
24. How did Aristotle classify animals? In today’s world, do you feel that was a scientific way of classifying?
25. Explain what are ‘characteristics’? Give some examples.
26. What are the contributions of following taxonomists?
 (a) Ernst Haeckel (b) Robert Whittaker
 (c) Carl Woese (d) Carolus Linnaeus
27. What are lichens? Where are they found?
28. Identify the division
 (a) Naked seed
 (b) Covered seed
 (c) amphibians of plant kingdom
 (d) prokaryotes without cell wall
29. Identify the following organism. Where are you likely to find it? List some of the identifying feature to justify its classification in its division/phylum. Draw it again and label it
30. List any four names of Thallophytes.
31. Discuss why some plants are called as ‘Cryptogams’ while others are called as ‘Phanerogams’?

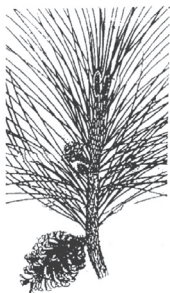


III. Short Answer Type Questions–II

(3 Marks)

32. Why is there a need to classify living organisms? [NCERT]
33. State any three differences between cryptogamae and phanerogamae. [CBSE 2016]
34. State the characteristic features of thallophytes? Name two thallophytes which are predominantly aquatic. [CBSE 2016]
35. What are phanerogams? Name its two groups along with criteria of division. [CBSE 2015]
36. Classify the following plants into different sub-division–Spirogyra, Fern, Funaria, Pinus, Apple tree, Mustard plant.

37. What is evolution? Justify that classification and evolution are closely related.
38. In the language of evolution, how would you place those which came earlier and those which arose later?
39. It is said, tropics are the biodiversity hubs? Why? Name some countries that harbour more biodiversity than rest of the world.
40. Look at the pictures of the plants given below. Identify the group and list any two features that segregate them from another closely related group/s



Pinus



Cycas

41. Name the structure resulting from the reproduction in plants. Discuss the components present in it and their significance?

IV. Long Answer Type Questions

(5 Marks)

42. Construct a table to differentiate between Monera and Fungi on the following grounds:
(a) Body organisation (b) Prokaryotic/Eukaryotic (c) Cell wall (d) Mode of nutrition
Name an organism belonging to each of these kingdoms. [CBSE 2016]
43. Draw a flow chart to show different division of kingdom plantae and answer the following questions:
(a) Which division has simplest plant?
(b) To which division Pinus and Cycas belong?
(c) What is other name given to flowering plants? Classify them on the basis of number of cotyledons present in the seed.
44. How do we make use of characteristics to classify organisms?

Answers 7.1

1. Waterlily.
2. Biodiversity means the variety of living organisms present on a particular region.
3. It is a branch of biology which deals with identification, nomenclature and classification of organisms.
4. Carolus Linnaeus
5. The method of arranging organism into groups or sets on the basis of similarities and differences is called classification.
6. The kind of cells, they are made of is most important characteristic.
7. Protista
8. Thallophyta
9. Pteridophytes do not produce seeds whereas phanerogams produce seeds.
10. Gymnosperms have naked seeds whereas Angiosperms have seed inside their fruits.
11. It is based on cell structure, body design source of nutrition and body organisation.
12. Archaeobacteria and cyanobacteria
13. Darwin

14. No, they do not have well defined nucleus. It belongs to Monera.
15. (a) Presence of notochord
16. Thallophyta and Bryophyta
17. It is because they are found on land as well as in water.
18. Whether the organism is prokaryotic or eukaryotic is the primary characteristic.
19.
 - Plants and animals are classified on the basis of **mode of nutrition** and **body designs**.
 - Plants are autotrophs whereas animals are heterotrophs.
 - Plants have cell wall whereas animals do not have cell wall.
20. **Species** will have the smallest number of organisms with the maximum number of characteristics in common.
Kingdom will have the largest number of organisms.

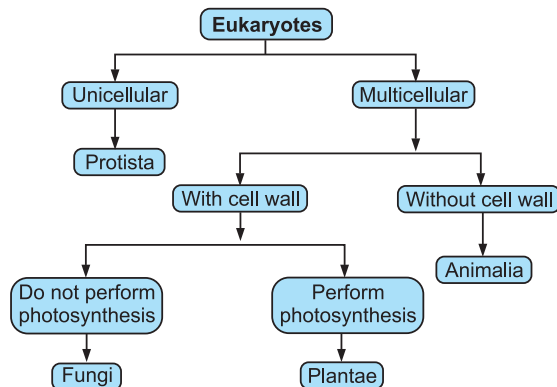
21.

Bryophyta	Pteridophyta
Their body does not have true roots, stems and leaves	They have true roots, stems and leaves
They do not have true vascular system	They have true vascular system
Example: Moss	Example: Fern

22.

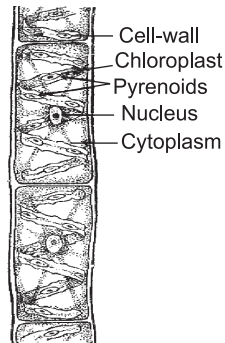
Monocot	Dicot
They contain embryo with one seed leaf	Their seed contain embryo with two seed leaves
They have fibrous roots	They have tap root system
Their leaves have parallel venation	Their leaves have reticulate venation
Their flowers are trimerous	Their flowers are pentamerous

23.



24. Aristotle classified animals according to whether they lived on land, in water or in the air. This is a very simple way of looking at life, but misleading too. For example, animals that live in the sea include corals, whales, octopuses, starfish and sharks. We can immediately see that these are very different from each other in numerous ways. In fact, their habitat is the only point they share in common. This is not an appropriate way of making groups of organisms to study and think about.
25. When we are trying to classify a diverse group of organisms, we need to find ways in which some of them are similar enough to be thought of together. These 'ways', in fact, are details of appearance or behaviour, in other words, form and function. What we mean by a characteristic is a particular form or a particular function. That most of us have five fingers on each hand is thus a characteristic.
-

26. (a) *Carolus Linnaeus* was the first one to classify all living organisms into two broad categories, Plant kingdom and animal kingdom. He is called Father of Taxonomy. He wrote a book *Systema Naturae*. He gave binomial system of nomenclature whereby the scientific names with two parts are being given to all living beings.
- (b) *Ernst Haeckel* (1894), proposed the third kingdom- Protista
- (c) *Robert Whittaker* (1959) proposed five kingdoms: Monera, Protista, Fungi, Plantae which Animalia, and is widely used. These groups are formed on the basis of their cell structure, mode and source of nutrition and body organisation.
- (d) *Carl Woese* (1977) divided Monera into Archaeobacteria (or Archaea) and Eubacteria (or Bacteria).
27. Some fungal species live in permanent mutually dependent relationships with bluegreen algae (or cyanobacteria). Such relationships are called symbiotic. These symbiotic life forms are called lichens. Lichens grow on the bark of trees.
28. (a) Gymnosperms (b) Angiosperms
(c) Bryophyta/pteridophyta (d) Mycoplasma
29. *Spirogyra*. Found in fresh water body like pond but in stagnant water. It has an undifferentiated body. Cells have a cellulosic wall, chloroplast with chlorophyll. Therefore it is a thallophyte.



Spirogyra

30. Ulothrix, Spirogyra, Cladophara, Ulva and Chara,
31. The thallophyta, bryophyta and pteridophyta are called as 'Cryptogams' because:
- (i) The reproductive organs of these groups are inconspicuous or hidden.
- (ii) Seeds are absent.
- Phanerogams' include gymnosperms and angiosperms because:
- (i) They have well differentiated reproductive tissue.
- (ii) the embryo with stored food.
- (iii) Embryo develops into seed.
32. (i) It enables us to study living things more easily and understand them better.
- (ii) It helps to identify and communicate about the large number of living organisms on earth.
- (iii) It helps to trace the possible origins of different living organisms and to determine any relationship among them.

33. Cryptogamae	Phanerogamae
It contains seedless plants.	It contains plants with seeds.
It includes both vascular and non-vascular plants.	It includes only vascular plants.
An external source is needed for fertilisation.	External source is not required for fertilisation.

34. Thallophytes body is not well differentiated, no vascular tissue present, usually contain green pigment and have cell wall made up of cellulose. Spirogyra, Ulva are thallophytes and are aquatic.

35. • Phanerogams are higher plants that bear flowers and seeds.
• Seeds are the result of reproductive process.
• They contain an embryo which store food.
• They are further divided into Gymnosperms and Angiosperms.
• Gymnosperms have naked seeds, i.e. not inside the fruit.
• Angiosperms have seeds inside the fruit.

36. Spirogyra	– Thallophyta
Fern	– Pteridophyta
Funaria	– Bryophyta
Pinus	– Gymnosperms
Apple tree	– Angiosperms
Mustard plant	– Angiosperm

37. Most life forms that we see today have arisen by an accumulation of changes in body design that allow the organism possessing them to survive better. This change in life forms is called the evolution.

All living things are identified and categorised on the basis of their body design in form and function. Some characteristics are likely to make more wide-ranging changes in body design than others. There is a role of time in this as well. So, once a certain body design comes into existence, it will shape the effects of all other subsequent design changes, simply because it already exists. In other words, characteristics that came into existence earlier are likely to be more basic than characteristics that have come into existence later. This means that the classification of life forms will be closely related to their evolution.

38. When we connect this idea of evolution to classification, we will find some groups of organisms which have ancient body designs that have not changed very much. They are frequently referred to as 'primitive' or 'lower' or 'older' organisms,

Organisms that have acquired their particular body designs relatively recently are called 'advanced' or 'higher' or 'younger' organisms.

Complexity in design will increase over evolutionary time, it may not be wrong to say that older organisms are simpler, while younger organisms are more complex.

During classification they are placed in the same order as they arose on earth and it would also be justified in the order of complexity of body design.

39. Biodiversity means the diversity of life forms. or the variety of life forms found in a particular region. communities is affected by particular characteristics of land, water, climate and so on. Rough estimates state that there are about ten million species on the planet, although we actually know only one or two millions of them.

The warm and humid tropical regions of the earth, between the tropic of cancer and the tropic of capricorn, are rich in diversity of plant and animal life. This is called the region of mega diversity.

Of the biodiversity of the planet, more than half is concentrated in a few countries – Brazil, Colombia, Ecuador, Peru, Mexico, Zaire, Madagascar, Australia, China, India, Indonesia and Malaysia.

40. These are Pinus and Cycas-Gymnosperms.

Two Features are:

(i) Naked seeds

(ii) Cone bearing plants, no flowers

41. Seeds are the result of the reproductive process. They consist of the embryo along with stored food, which serves for the initial growth of the embryo during germination.
- (i) Plant embryos in seeds have structures called cotyledons. Cotyledons are called 'seed leaves' because in many instances they emerge and become green when the seed germinates.
- (ii) Thus, cotyledons represent a bit of pre-designed plant in the seed.

42. Monera	Fungi
Unicellular, undefined nucleus.	Multicellular at later stage, organised body.
Prokaryotic	Eukaryotic
Some have cell wall made up of cellulose.	All have cell wall made up of chitin.
Autotrophic nutrition.	Heterotrophic nutrition.
Example: Blue green algae, bacteria	Example: Yeast, mushroom

43. For flow chart please refer page no. 155
- (a) Thallophyta (b) Gymnosperms (c) Angiosperms
- They are further classified into Monocot and Dicot plants having one and two cotyledons respectively.
44. Following are some uses of characteristics for a hierarchical classification
- (i) A eukaryotic cell has membrane-bound organelles, including a nucleus, which allow cellular processes to be carried out efficiently in isolation from each other. Therefore, organisms which do not have a clearly demarcated nucleus and other organelles would need to have their biochemical pathways organised in very different ways. This would have an effect on every aspect of cell design.
- (ii) Do the cells occur singly or are they grouped together and do they live as an indivisible group? Cells that group together to form a single organism use the principle of division of labour. In such a body design, all cells would not be identical. Instead, groups of cells will carry out specialised functions. This makes a very basic distinction in the body designs of organisms. As a result, an Amoeba and a worm are very different in their body design.
- (iii) Do organisms produce their own food through the process of photosynthesis? Being able to produce one's own food versus having to get food from outside would make very different body designs necessary. Plants are different from animals in this regard.
- (iv) Of the animals, how does the individual's body develop and organise its different parts, and what are the specialised organs found for different functions can also be the characteristic to be considered.

2. ANIMALIA

- These organisms are multicellular, heterotrophic and eukaryotic.
- They do not have cell wall.
- Most animals are mobile.
- They are further classified into various classes on the basis of extent and the type of body designs differentiation.

Basis of classification

I. Symmetry

- **Bilateral symmetry:** Organisms can be divided into two equal halves, through one central plane only, identical but mirror images.

- **Radial symmetry:** Organisms can be equally divided into similar halves by placing more than a plane along the central point.

II. Germ layer: The layers of cell in the embryonic stage are called germ layers.

- **Ectoderm:** It is the outermost layer which forms nail, hair, epidermis, etc.
- **Endoderm:** It is innermost layer which forms alimentary canal, stomach, colon and urinary bladder.
- **Mesoderm:** It forms middle layer between the ectoderm and the endoderm which forms bones, cartilage, muscles, heart, kidney etc.

Animals can be classified on the basis of germ layers.

Diploblastic: These organisms are derived from two embryonic germ layers i.e. endoderm and ectoderm.

Triploblastic: These organisms are derived from all the three embryonic germ layers.

III. Coelom (Body cavity): It is important for the proper functioning of various organs, e.g. heart has coelom which helps it to contract and expand.

Organisms are further divided into four types on the basis of presence or absence of Coelom.

- **Acoelomates:** Simple organisms with no body cavity (coelom). eg platyhelminthes or flatworm.
- **Coelomates:** Complex organisms having coelom lined by mesoderm from all the sides. e.g. Arthropoda, Echinoderms, Chordates etc.

Pseudocoelomates: They have false coelom. They have pouches of mesoderm which are scattered in between endoderm and ectoderm. eg Nematodes or round worms.

IV. Notochord: It is a long rod like structure, which runs along the body between the nervous tissue and a gut.

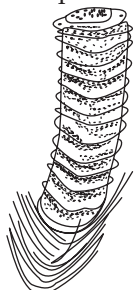
- It provides place for the muscle to attach, for the ease of movement. It changes to endoskeleton in vertebrates.

Organisms are also classified on the basis of notochord

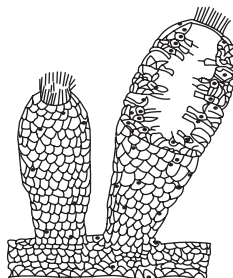
- (i) Notochord absent
- (ii) Notochord present
- (iii) Notochord present in initial embryonic stage and continues as a vertebral column in the adult phase.

Phylum Porifera (Sponges) (Body with holes)

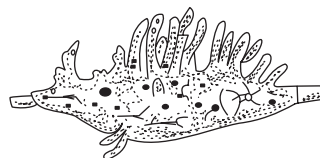
- Non-motile animals attached to a support.
- Most of them are not a symmetrical and some have radial symmetry.
- Minimal differentiation and division into tissues.
- They have outer hard layer called the skeletons.
- Have holes or pores all over the body.



Euplectella



Sycon



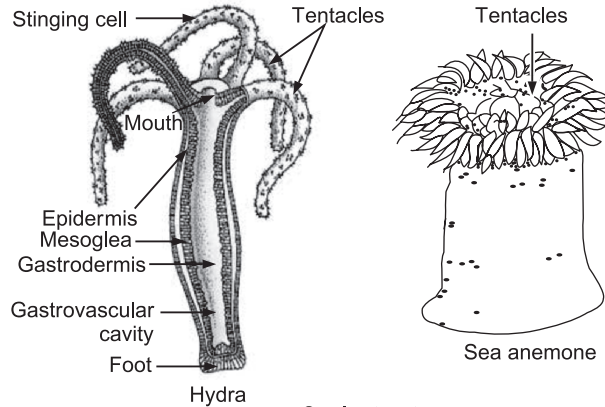
Spongilla

Porifera

- Body is porous with pores called Ostia. Single stage opening is called Osculum.
- Forms a canal system which helps in the movement of water throughout the body to bring food and oxygen. Water Ostia → body cavity spongocoel → osculum → outside
- They do not have nervous system.
- Found mostly in marine habitat, e.g. Euplectella, Sycon, Spongilla.

Phylum Coelenterata (hollow gut)

- These animals live in water or moist places.
- They have tissue level design differentiation.
- There is a cavity in body made up of layers of cells, one makes up the outside layer of a body epidermis and other makes the inner lining of the body. They are **diploblastic**.

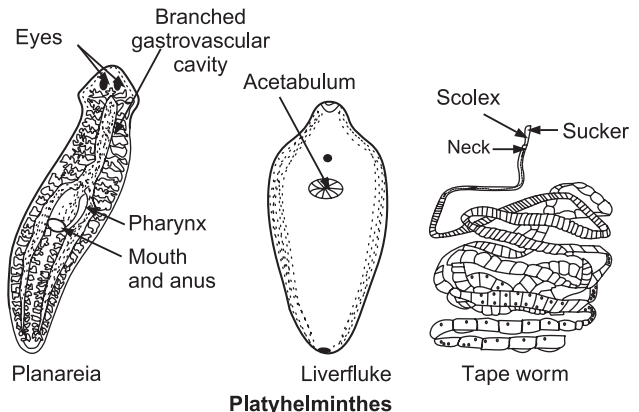


Coelenterata

- They may live in colonies like **Corals** whereas others have a solitary life span (Hydra).
- Some can move from one place to another.
- They have radial symmetry.
- Jelly fish, sea anemones, Hydra, Coral, Obelia.

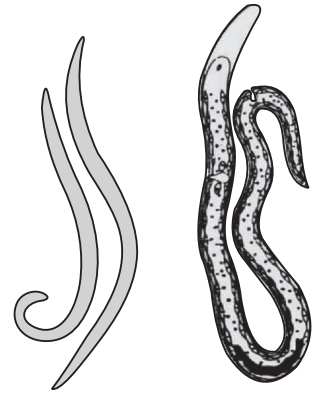
Phylum Platyhelminthes (Flat-worms)

- Their body have a organ level body design.
- Their body is bilaterally symmetrical.
- There are three layers of cells from which differentiation of tissues takes place i.e., **triploblastic**.
- There is some degree of tissue formation.
- No true coeloms or body cavity.
- The body is flat from top to bottom e.g., Flat worms.
- Digestive cavity has one opening for both ingestion and egestion.
- They may live freely like planarians or as parasites like liver flukes, (Fasciola) Tape worm (Taenia solium).



Phylum Nematoda (Thread or round worms) (Aschelminthes)

- Body is bilaterally symmetrical and triploblastic.
- Body is cylindrical, elongated and narrow.
- There are tissues but no real organ.
- Pseudocoelom is present.
- These are parasitic worms.
- These are the first animals to have complete and straight alimentary canal.
- Filarial worms causes elephantiasis, intestinal worms as roundworms or pinworms, *Ascaris* (roundworm), *Wuchereria* (filarial worm) are some examples.



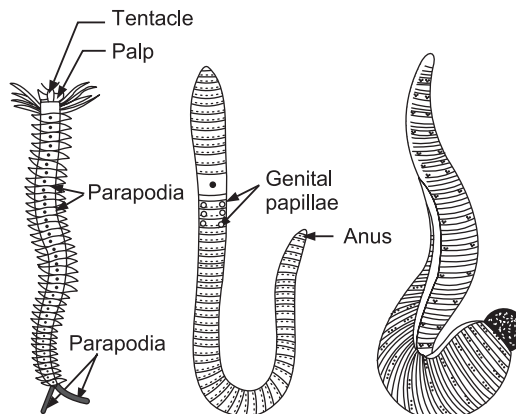
Ascaris

Wuchereria

Nematoda

Phylum Annelida (Segmented worms)

- Body is bilaterally symmetrical and triploblastic. Organ-system level of organisation.
- They have true body cavity-coelom.
- True organs are packed in a body structure.
- Extensive organ differentiation in segments which are lined up one after the other from head to tail.
- They are found in fresh and marine water as well as on land.
- Earth worms (*Pheretima*), Leeches (*Hirudinaria*), *Nereis*.



Nereis

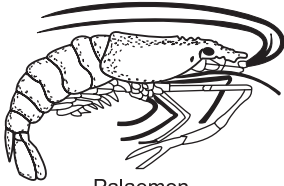
Earthworm

Leech

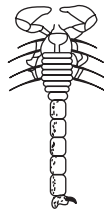
Annelida

Phylum Arthropoda (Animals with jointed legs)

- It is the largest group of animals (80% of species).
 - Animals are bilaterally symmetrical, segmented and sometimes fused.
 - They have open circulatory system.
 - Coelom is present.
 - Blood does not flow in well defined blood vessels.
 - They have jointed legs (appendages) (Artruros = jointed, poda = feet), eyes-simple or compound.
 - They are also called insects.
 - It is called haemocoel. It is filled with hemolymph.
 - Tough exoskeleton made up of chitin.
 - Insects like butterflies; houseflies; cockroach; spiders; crustaceans like prawns; scorpions; crabs, millipede, centipede belong to Arthropoda.
-



Palaemon
(Prawn)



Palamnaeus
(Scorpion)



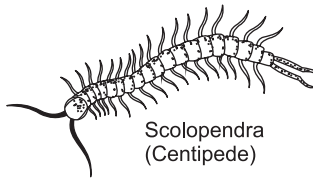
Aranea (Spider)



Butterfly



Pariplaneta
(Cockroach)



Scolopendra
(Centipede)



Musca
(House fly)

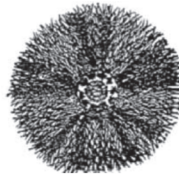
Arthropoda



Antedon
(feather star)



Holothuria
(sea cucumber)



Echinus
(sea urchin)



Asterias
(star fish)

Echinodermata

Phylum Echinodermata (Spiny skinned animal)

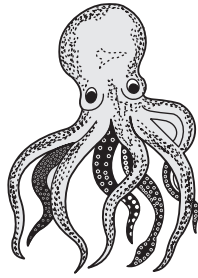
- They are free living marine animals.
- They are triploblastic, have coelom, adults have radial symmetry but bilateral in larvae.
- They have peculiar water driven tube system and tube feet for moving around made of water canals.
- They have hard calcium carbonate structure which is used as skeleton.
- There is no head or tail, and left or right side.
- Star fish (Asterias), sea urchins (Echinus), Antedon (feather star), Holothuria (sea cucumber).

Phylum Mollusca (Soft Body Animals)

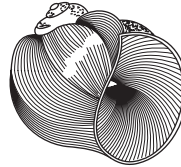
- It is the second largest phylum.
 - Animals are bilateral symmetrical.
 - The coelomic cavity is reduced.
 - There is little segmentation.
 - They have open circulatory system.
 - They have kidney like organ for excretion.
 - There is a foot that is used for moving around (Locomotion).
 - They are mostly aquatic, lives in sea water and some live in fresh water also.
 - Soft body is covered by a hard shell made up of calcium carbonate.
 - Body is divided into anterior head, a ventral muscular foot and a dorsal visceral mass.
 - Example: Snails, mussels, chiton, octopus, pila, unio.
-



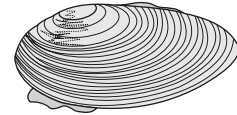
Chiton



Octopus



Pila



Unio

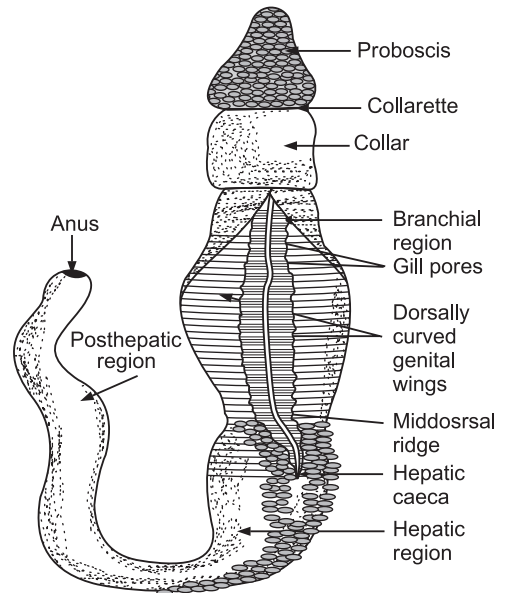
Mollusca

Phylum Protochordata (First Notochord)

- Bilaterally symmetrical, triploblastic and have a coelom.
- They have a notochord at least at some stage of their life.
- Notochord is a long rod like support structure along the back of an animal separating nervous tissue from the gut.
- Notochord provides a place for the muscles to attach for the ease of movement.
- They are marine animals.
- Example: Balanoglossus, Herdmania, Amphioxus.

Phylum Chordata

- All chordata have:
 - (i) notochord, (ii) dorsal nerve cord, (iii) triploblastic, (iv) paired gill pouch/lungs, (v) Coelom
- The Chordates in which notochord develops further into an endoskeleton are called vertebrates.



A protochordata: Balanoglossus

Phylum Vertebrate (having backbone)

- They have true vertebral column and internal skeleton. developed funotochard.
- They have muscles attached to the bones for the movement.
- Bilaterally symmetrical, triploblastic, coelomic and segmented body.
- Complex differentiation of body tissues and organs are more advanced.

Vertebrates are further classified into:

Pisces, Amphibia, Reptilia, Aves and Mammalia

Pisces

- These are water living animals, e.g. fishes.
- Skin is covered with scales or plates.
- They use gills for taking in oxygen dissolved in water.
- Their body is streamlined, have fins and a muscular tail is used for the movement.
- They are cold blooded.
- Their heart has two chambers.
- They lay eggs and fertilization is external.

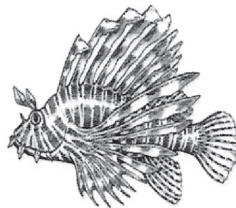
Example: Tuna, rohu, Mandarin fish, Angler fish, lion fish, dog fish, sea horse, flying fish, climbing perch.

Fishes are two types

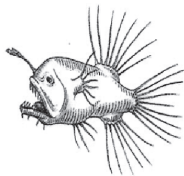
- **Cartilaginous fish:** Skeleton is entirely made up of cartilage, such as Sharks and Rays.
- **Bony fish:** Some have skeleton made up of bones and cartilage such as *Labeo rohita* (Rohu), Catla, Hilsa, *Anabus* (climbing perch), *Exocoetus* (flying fish), Sea horse, tuna etc.



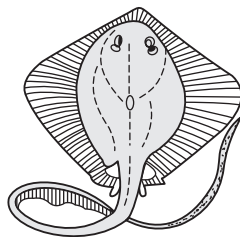
Synchiropus splendidus (Mandarin fish)



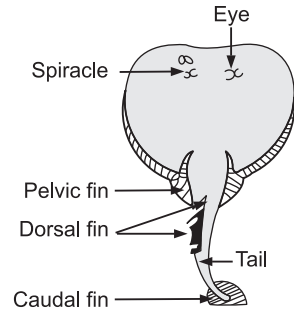
Pterois volitans (Lion fish)



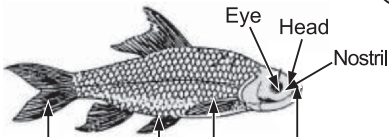
Caulophryne jordani (Angler fish)



Sting ray

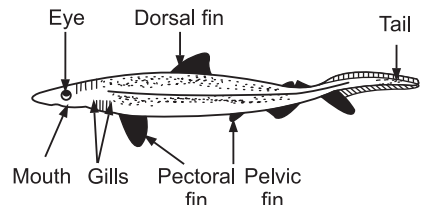


Electric ray (Torpedo)

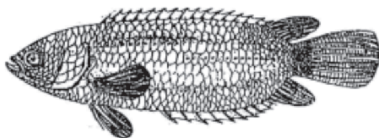


Caudal fin, Pelvic fin, Pectoral fin, Mouth

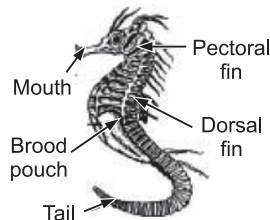
Labeo rohita (Rohu)



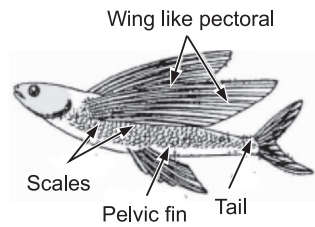
Scoliodon (Dog fish)



Anabas (Climbing perch)



Male Hippocampus (Sea horse)

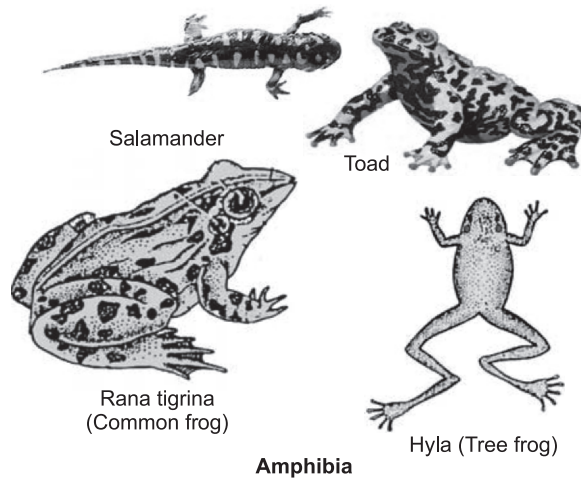


Exocoetus (Flying fish)

Pisces

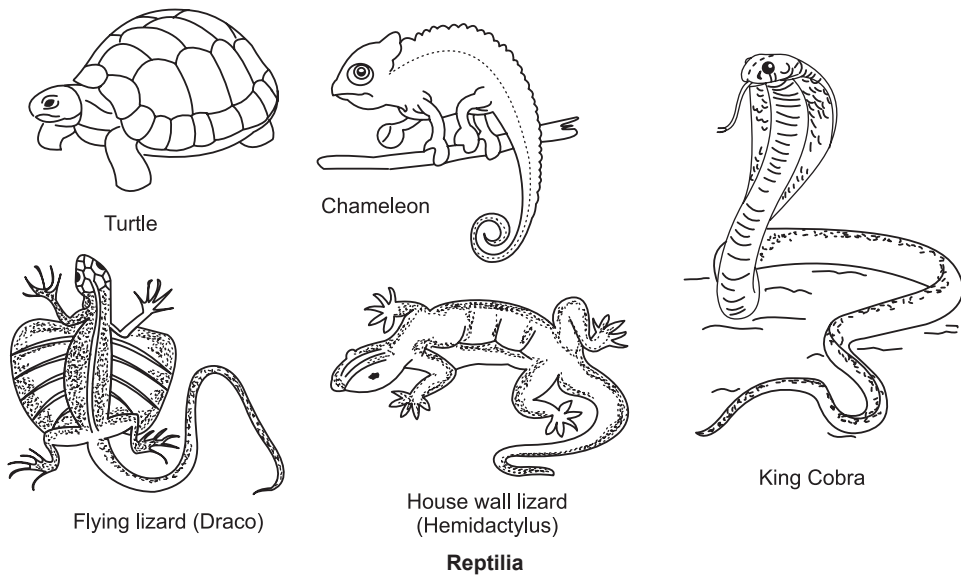
Amphibia (Amphibians)

- They are found on land and in Water. Water is required for breeding.
- They have three chambered heart, cold blooded.
- They have mucous glands in the skin to make it slimy and moist but no scales.
- Respiration is through moist skin, gills or lungs.
- They lay eggs and fertilization is external.
- They have two pairs of limbs to walk on land. Larval stage have gills.
- Frogs, toads and salamanders, Hylas are some examples.



Reptilia (Reptiles)

- They are cold blooded, have scales and breathe through lungs.
- Most of them have three chambered heart but crocodiles have four chambered heart.
- They lay fertilized eggs on land with tough coverings.
- Snakes, lizards, turtles, crocodiles, King cobras, chameleons, flying lizards (Draco).



Aves (Birds)

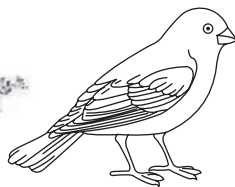
- They are warm blooded animals and have four chambered heart.
 - They lay fertilized lay eggs with shells of calcium carbonates.
 - Their body is covered with feathers, two forelimbs are modified for flight.
 - They breathe through lungs. Their forelimbs are modified into wings while hindlimbs are modified into claws.
 - Crow, sparrow, pigeon, duck, white stork, ostrich, etc are some examples.
-



White Stork
(*Ciconia ciconia*)



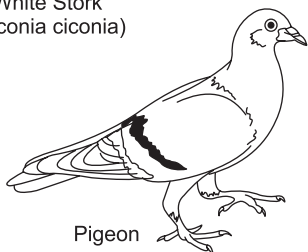
Male Tufted Duck
(*Aythya fuligula*)



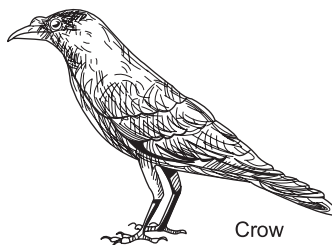
Sparrow



Ostrich
(*Struthio camelus*)



Pigeon

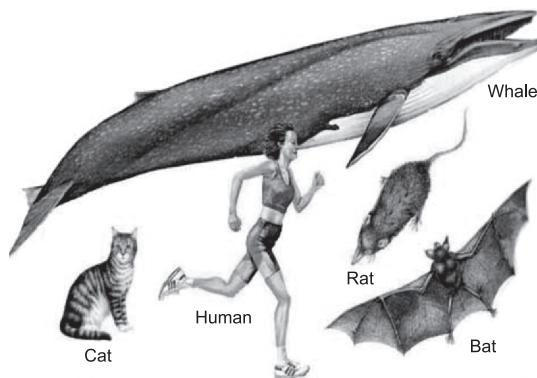


Crow

Aves

Mammalia

- They have four chambered heart.
- They are warm blooded animals.
- They have hair on body, have external ear. Possess sweat glands and they give birth to young ones.
- They have mammary glands for production of milk to nurture their young ones.
- Few of them like the platypus, echidna lay eggs.
- Some like kangaroos give birth to very poorly developed young ones.
- Cat, Human, Rat, Bat, Whale are some examples.



Mammalia

Exercise 7.2

I. Very Short Answer Type Questions

(1 Mark)

1. Name the term which is used for the following:
 - (a) The left and right halves of the body have the same design.
 - (b) The animal tissue is differentiate from the three embryonic germ layers.

2. State the phylum to which centipede and prawn belongs.
3. Why are amphibians present close to the water bodies?
4. Name the smallest and the largest bird.
5. Which is the largest phylum of animal kingdom?
6. Why do we keep turtle and snake in the same class?
7. A pore bearing organism like creature 'A' belongs to a phylum 'B' of kingdom animalia. Identify 'A' and 'B'. [CBSE 2014]
8. Who proposed the system of binomial nomenclature for the organisms? [CBSE 2016]
9. Which among the following has 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) [NCERT Exemplar] [HOTS]
10. In which group of animals, coelom is filled with blood?
 (a) Arthropoda (b) Annelida (c) Nematoda (d) Echinodermata
[NCERT Exemplar] [HOTS]
11. Elephantiasis is caused by
 (a) Wuchereria (b) Pinworm (c) Planarians (d) Liver fluke [NCERT Exemplar]
12. 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
13. Name two egg laying mammals. [NCERT Exemplar]
14. Where are the seeds of gymnosperm found?
15. What is common in bacteria, blue-green algae or cyanobacteria, and mycoplasma?
16. How are Platypus and Echidna different from human beings?

II. Short Answer Type Questions–I

(2 Marks)

17. How is the criteria for deciding divisions in plants different from the criteria for deciding the subgroups among animals? [NCERT]
18. Which organism is more complex and evolved among Bacteria, Mushroom and Mango tree? Give reasons. [NCERT Exemplar]
19. Give one similarity and one difference between organisms like diatoms and protozoans.
20. Both yeast and amoeba are eukaryotic yet are placed in separate kingdoms. Give two reasons.
21. Eukaryotic, multicellular and heterotrophic. Does it describe a member of Animalia? Comment.
22. Classify the following based on number of chambers in their heart.
 Rohu, Scoliodon, Frog, Salamander, Flying lizard, King Cobra, Crocodile, Ostrich, Pigeon, Bat, Whale
23. Classify Rohu, Scoliodon, Flying lizard, King Cobra, Frog, Salamander, Ostrich, Pigeon, Bat, Crocodile and Whale into the cold blooded/warm blooded animals.

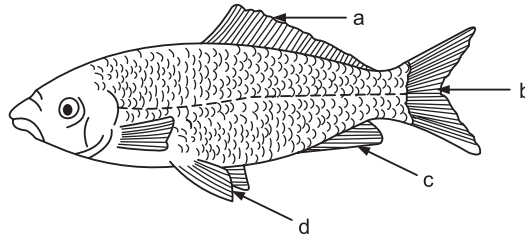
III. Short Answer Type Questions–II

(3 Marks)

24. You are provided with the seeds of gram, wheat, rice, pumpkin, maize and pea. Classify them whether they are monocot or dicot. [NCERT Exemplar]
 25. Write three characteristics each of the following groups of animals:
 (a) Platyhelminthes (b) Nematoda
-

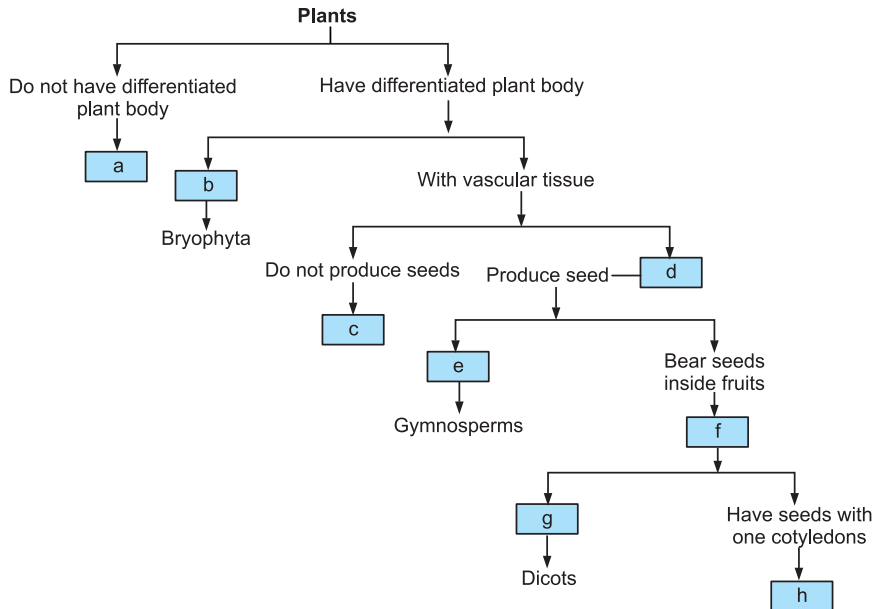
26. Label a, b, c and d given in the figure. Give the function of b.

[NCERT Exemplar]



27. Identify (a), (b), (c), (d), (e), (f), (g), (h) in the flow chart.

[NCERT Exemplar]



28. Write the names of few thallophyta. Draw a labelled diagram of spirogyra.

[NCERT Exemplar]

29. Thallophyta, Bryophyta and Pteridophyta are called as 'Cryptogams'. Gymnosperms and Angiosperms are called as 'phanerogams'. Discuss why? Draw one example of a Gymnosperm.

[NCERT Exemplar]

30. Define the given terms and give one example of each:

(a) Bilateral symmetry (b) Coelom (c) Triploblasty

[NCERT Exemplar]

31. You are given Leech, *Nereis*, *Scolopendra*, Prawn and Scorpion which 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.

[NCERT Exemplar]

32. Differentiate between flying lizard and bird. Draw their diagrams.

[NCERT Exemplar]

33. List out some common features in cat, rat and bat.

[NCERT Exemplar]

34. List any three differences between Aves and Mammalia group.

[CBSE 2011]

35. Identify the phylum

(a) Pore bearing animals

(b) diploblastic with one opening in body

(c) segmented worm like body

(d) Jointed legs

(e) Soft bodied animals

(f) Spiny skinned animals

36. Classify the following animals in correct phylum

Spongilla, Sea anemone, Planaria, Liver fluke

Wuchereria, Ascaris, Nereis, Earthworm,

Scorpion, Birds, Fishes, Horse.

IV. Long Answer Type Questions

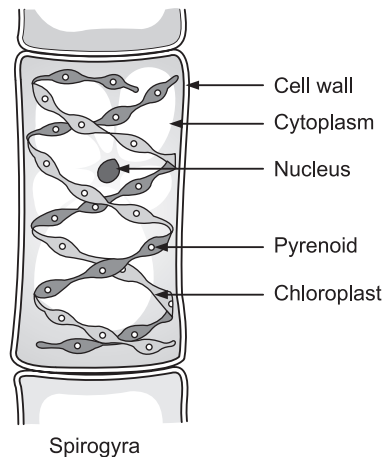
(5 Marks)

37. (a) Write four important features that all chordatas possess (vertebrates).
(b) Write one characteristic of each of the amphibians and aves.
(c) Write the name of the class to which the following belong: (i) Sea horse, (ii) King cobra.
38. Mention the class to which they belong and give one characteristic feature of each:
Frog, Fish, Lizard, Pigeon, Bat
39. What is the scientific name for humans?
(a) To which class of vertebrate does it belong. [CBSE 2012]
(b) Write five characteristic features of this group. Also mention the exceptions, if any.
40. Endoskeleton of fishes are made up of cartilage and bone; classify the following fishes as cartilage no us or bony
Torpedo, Stingray, Dogfish, Rohu, Anglerfish, Exocoetus.

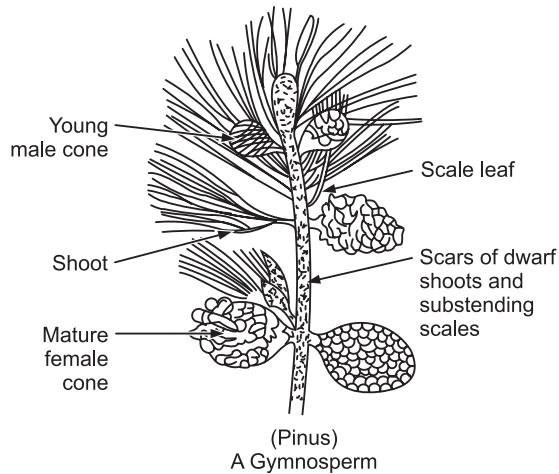
Answers 7.2

- (a) Bilaterally symmetrical
(b) Triploblastic
 - Arthropoda
 - Most amphibians lay eggs in water or in moist location on land, so they are always present near the water bodies.
 - Humming bird is the smallest whereas Ostrich is the largest bird.
 - Arthropoda
 - (i) Both are cold blooded.
(ii) Their body is covered with epidermal scales.
(iii) They respire through lungs.
(iv) Both have three chambered heart.
(v) Both lay eggs with thick coverings.
 - 'A' is a sponge; 'B' is phylum porifera
 - Carolus Linnaeus proposed the system of binomial nomenclature.
 - (a) (i) and (ii)
 - (a) Arthropoda
 - (a) Wuchereria
 - (a) Presence of notochord
 - (i) Duck billed platypus, (ii) Echidna
 - Gymnosperms have naked seeds.
 - These organisms do not have a defined nucleus or organelles, they belong to Kingdom Monera.
 - Egg laying mammals.
 - Plants are classified on the basis of:
(i) Ability to bear seed or not
(ii) Body is well differentiated with distinct components or not
Animals are classified on the basis of:
(iii) Cell organisation
(iv) Presence of symmetry
(v) Presence or absence of notochord
(vi) Presence or absence of body cavity or coelom
-

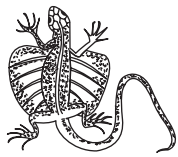
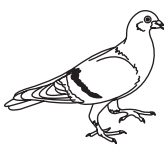
18. Mango tree is more complex and evolved because it has vascular tissues, differentiated sporophyte, embryo stage and seeds present inside a fruit.
Bacteria are prokaryotic whereas mushroom is eukaryotic with simpler body organisation, saprophytic nature.
19. Both are unicellular eukaryotic organisms.
Diatom is a unicellular alga so is autotrophic and Protozoa is heterotrophic.
20. Yeast
(i) It is a fungus.
(ii) They use decaying organic material as food and are therefore called saprophytes.
They have cell-walls made of a tough complex sugar called chitin.
- Amoeba
(i) It is a protozoa belong to Kingdom Protista
(ii) It does not have a cell wall and takes complex organic food. It moves with the help of pseudopodia.
21. Though these definitely are features seen in animals but apart from these some more are essential in their description which are as follows:
(i) Their cells do not have cell-walls. (ii) Most animals are mobile.
22. Rohu, Scoliodon—2 chambered.
Frog, Salamander, Flying lizard, King Cobra—3 chambered.
Crocodile, Ostrich, Pigeon, Bat, Whale—4 chambered.
23. Cold blooded—Rohu, Scoliodon, Frog, Salamander, Flying Lizard, King Cobra, Crocodile, Warm blooded—Ostrich, Pigeon, Bat, Whale.
24. **Monocot:** Wheat, Rice, Maize
Dicot: Gram, Pumpkin, Pea
25. (a) (i) Their body is bilaterally symmetrical.
(ii) They are triploblastic. (iii) There is no coelom.
(b) (i) Their body is cylindrical and bilaterally symmetrical.
(ii) Pseudocoelom is present. (iii) They are triploblastic.
26. (a) Dorsal fin, (b) Caudal fin, (c) Anal fin, (d) Pelvic fin
Caudal fin helps the fish in streamlined movement in water.
27. (a) Thallophyta (b) No vascular tissue
(c) Pteridophyte (d) Phanerogams (produce seeds)
(e) Bear naked seeds (f) Angiosperms
(g) Have seeds with two cotyledons (h) Monocots
28. Spirogyra, Chara, Ulothrix, Cladophora



29. They are called cryptogams because the reproductive organs of these groups are hidden. Gymnosperms and Angiosperms are called 'Phanerogams' as they have reproductive organs visible with seeds containing an embryo and stored with food.



30. (a) *Bilateral Symmetry*: The organisms which can be divided into two identical equal halves, i.e., like mirror images are said to possess bilateral symmetry.
 (b) *Coelom*: It is the body cavity of the organisms. It is necessary for proper functioning of the body, e.g. heart has coelom which helps it to contract and expand.
 (c) *Triploblastic*: These are the organisms derived from three embryonic germ layers.
31. All organism do not belong to same group.
 Leech and Neries belong to phylum Annelida group because they have metamericly segmented body, internally closed circulatory system and do not have joined appendages. Scolopendra, Prawn and Scorpion belong to phylum Arthropoda and they have open circulatory system and have joined appendages.

32. Flying lizard	Bird
It belongs to reptilia	It belongs to Aves
Cold blooded	Warm blooded
No hollow bones	Hollow bones
No feather	Feather
It has three chambered heart	It has four chambered heart
Forelimbs are normal	Forelimbs modified into wings
 Flying lizard	 Bird

33. • All have mammary glands. • All give birth to young ones.
 • Notochord is present at some stage of their life.
 • Bony endoskeleton is present. • Warm blooded animals.
 • Four chambered heart is present.
 • Skin covered with hair, having sweat and oil glands.

34.	Aves	Mammalia
	(i) They lay eggs.	(i) They give birth to young ones.
	(ii) Do not have mammary glands.	(ii) They have mammary glands.
	(iii) Their body is covered with feathers.	(iii) Their body is covered with hairs.

35. (a) Porifera (b) Coelenterata
 (c) Annelida (d) Arthropoda
 (e) Mollusca (f) Echinodermata

36. Spongilla — Porifera
 Sea anemone — Coelenterata
 Planaria, fluke — Platyhelminthes
 Wuchereria, Ascaris — Nematoda
 Nereis, Earthworm — Annelida
 Scorpion — Arthropoda
 Birds, Fishes and Horse — Chordata, sub phylum is vertebrata

37. (a) All chordates have:
 (i) notochord, (ii) dorsal nerve cord, (iii) paired gill pouches/lungs, (iv) coelom
 (b) Amphibians live both on land and in water have three chambered heart and have mucous glands present on their skin.

Aves have hollow bones covered by feathers and two forelimbs modified into wings for flight. They have four chambered heart.

- (c) Sea horse — Pisces
 King cobra — Reptiles

38. Fish — Pisces
 Frog — Amphibia
 Lizard — Reptilia
 Pigeon — Aves
 Bat — Mammalia

39. (a) *Homo sapiens*
 (b) Human beings belong to mammals.
 (c) • They are warm blooded.
 • They have four chambered heart.
 • They have mammary glands for the production of milk to nurture their off springs.
 • Their skin have hair and sweat glands.
 • They give birth to young ones.

Exception: Platypus and Echidina lay eggs.

40. Torpedo—Cartilagenous, Stingray—Cartilagenous, Dogfish—Cartilagenous,
 Rohu—Bony, Anglerfish—Cartilagenous, Exocoetus—Bony.

3. NOMENCLATURE

The scientific name of an organism is necessary for the universal communication Each organism has a name comprising of two parts. The words are derived from greek or latin.

Conventions

1. The name of genus begins with capital letter.
2. The name of the species begins with small letter.

- When printed, the scientific name is given in Italics
- When written by hand, the genus name and the species name have to be underlined separately.

Examples

1. Tiger	<i>Panthera tigris</i>
2. Peacock	<i>Pavo cristatus</i>
3. Dog	<i>Canis lupus familiaris</i>
4. Goat	<i>Capra hircus</i>
5. Horse	<i>Equus caballus</i>
6. Potato	<i>Solanum tuberosum</i>
7. Radish	<i>Raphanus sativus</i>
8. Carrot	<i>Daucus carota</i>
9. Indian vulture	<i>Gyps indicus</i>
10. Clove	<i>Syzygium aromaticum</i>

Exercise 7.3

I. Very Short Answer Type Questions

(1 Mark)

- Who introduced the system of scientific nomenclature of organisms
 - Robert Whittaker
 - Carolus Linnaeus
 - Robert Hooke
 - Ernst Haeckel

[NCERT Exemplar]

II. Short Answer Type Questions–I

(2 Marks)

- Write the scientific names of any five common animals and plants.

Answers 7.3

- (b) Carolus Linnaeus

2. Animal

- Dog
- Cat
- Cow
- Sparrow
- Peacock

Scientific names

- Canis lupus familiaris*
Felis catus
Bos taurus
Passeridae
Pavo cristatus

Plants

- Potato
- Radish
- Carrot
- Spinach
- Mango

Scientific names

- Solanum tuberosum*
Raphanus sativus
Daucus carota
Spinacia oleracea
Mangifera indica

VALUE BASED QUESTIONS

- Rohan purchased a parrot from a pet shop. He kept it at home for one day and then made it free. It flew away from his home. He felt very happy.
 - What values are associated with Rohan?
 - To which class of Animalia does parrot belong?
 - Is it warm blooded or cold blooded?
- Saksham saw a dog who was injured. He brought the dog home and applied antiseptic cream on the wound. He gave him food and kept the dog at home.

- (i) What values are associated with Saksham?
 - (ii) To which class a dog belong?
 - (iii) Give one special feature which are not there in other classes.
3. Disha saw a house lizard crawling on the wall and asked the following questions to her mother who is a biology teacher:
- (i) Is the body temperature related to surrounding temperature in reptiles? How can we define this feature of reptiles?
 - (ii) What is their breathing organ?
 - (iii) Is there any reptile with four chambered heart? Summarise her mother's statment.
- [CBSE 2016]

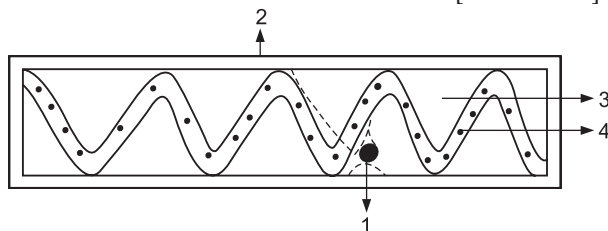
Answers

1. (i) Rohan is a kind hearted person and understands the importance of freedom.
 (ii) Aves (iii) It is warm blooded. for the loving
2. (i) Saksham is a kind hearted person.
 (ii) Dog belongs to mammalia. (iii) It has mammary glands.
3. (i) Yes, cold blooded. (ii) Lungs
 (iii) Crocodile is a reptile, which has four chambered heart.

PRACTICAL BASED QUESTIONS

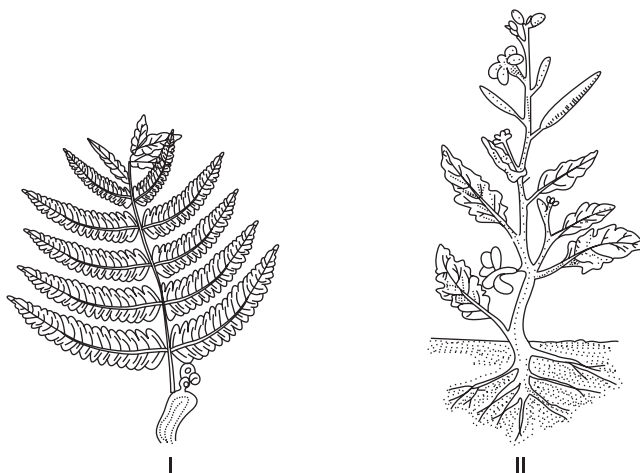
EXPERIMENT 8: To study the characteristics of *Spirogyra*, *Agaricus*, *Moss/Fern*, *Pinus* (Either with male or female, *Angiospermic* plant. Draw and give two identifying features of the groups they belong to.

- Q1.** The following figure shows a slide of *Spirogyra*. The correct labelling of the parts 1, 2, 3, 4 are:
 [MSE 2009] (OBSERVATIONAL SKILLS)



- Ans.** 1. Nucleus 2. Cell wall 3. Vacuole 4. Pyrenoid

Q2.



Which is the correct classification for the two plants I and II, the figures of which are given above? [Foreign 2009] (OBSERVATIONAL SKILLS)

Ans. I is pteridophyta because it has roots and leaves.
II is Angiosperm as it bears flowers and fruits.

Q3. Give two characteristics of Ferns. [CBSE 2011, 12] (CONCEPTUAL SKILLS)

Ans. (i) They have vascular tissues.

(ii) The Rhizome in the fern grow below the soil.

Q4. Name the structure by which the nucleus in spirogyra cell is held? What type of chloroplast is present in it? (CONCEPTUAL SKILLS)

Ans. Each cell has single nucleus suspended in the centre by the cytoplasmic strands.

Spirogyra has spirally arranged and ribbon like chloroplast.

Q5. To which kingdom Agaricus (Mushroom) belongs? Give the characteristics of this kingdom. (CONCEPTUAL SKILLS)

Ans. Agaricus (Mushroom) is an edible fungi. These are saprophytic, eukaryotic and multicellular organisms.

Q6. What are Gymnosperms? Where are vessels present in them? (CONCEPTUAL SKILLS)

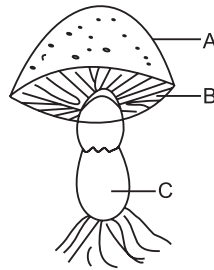
Ans. Gymnosperms are naked seeds. Vessels are not present in Xylem tissue.

Q7. Which of the plant groups are called amphibians of the plant kingdom? Give reason. (CONCEPTUAL SKILLS)

Ans. Bryophyta and Pteridophytes because they can require water for reproduction.

Q8. Identify the parts A, B and C shown in the diagram. (IDENTIFICATION SKILLS)

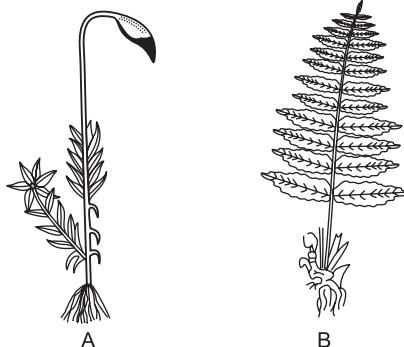
[CBSE 2016]



Ans. A. Pileus B. Gills C. Stipe.

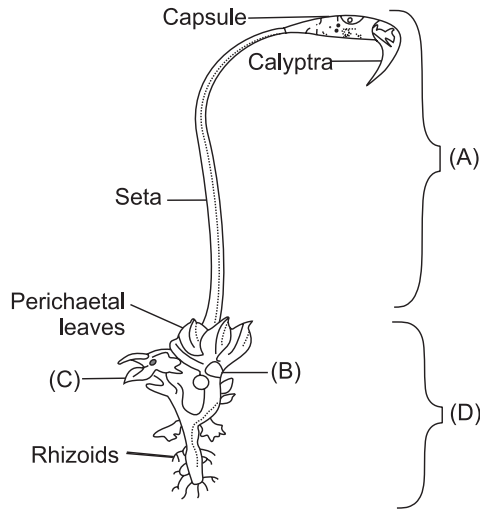
Q9. Student observed the specimens of two plants and sketched them as shown below. They noted in their notebook the identification and the names of the group to which these plants belong as given below. The correct identification is:

(IDENTIFICATION SKILLS) [CBSE 2012]



Ans. A, Moss ; Bryophyta B, Fern ; Pteridophyta

Q10.



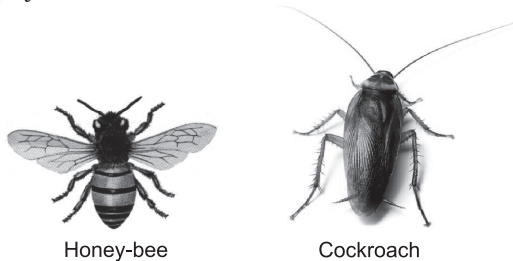
Which parts of the plant bears sporogonium?

(IDENTIFICATION SKILLS)

Ans. 'D', Gametophyte bears the sporogonium.

EXPERIMENT 9: To observe the given pictures charts models of earthworm, cockroach, bony fish and bird.

Q1. Observe the diagrams of honeybee and a cockroach. Give a common feature that assigns them to the same phylum. (OBSERVATIONAL SKILLS)



Ans. They belong to same phylum Arthropoda. They have joined appendages. They have open circulatory system and coelomic cavity is filled with blood.

Q2. To which phylum earthworm belong? which group of segments form its clitellum? (CONCEPTUAL SKILLS)

Ans. Earthworm belongs to the phylum Annelide. Its clitellum comprises of 14-16 segments.

Q3. How many wings are present in cockroach? Anal style is present in which gender? (CONCEPTUAL SKILLS)

Ans. Two pair of wings are present in cockroach. Anal style is present in male cockroach.

Q4. Name four aerial adaptation in birds. (CONCEPTUAL SKILLS) [CBSE 2014]

Ans. (i) Presence of feathers (ii) Forelimbs modified into wings (iii) Hollow bones (iv) Presence of flight muscles.

Q5. Suggest two ways in which a cockroach body is adapted to terrestrial life? (CONCEPTUAL SKILLS)

Ans. (i) It has three pair of legs for running.

(ii) Its body is covered with exoskeleton.

(iii) Trachea–air tubes and spiracles–airhole for breathing

Q6. Name the correct structure which is associated with earthworm, cockroach, bony-fish and birds. (CONCEPTUAL SKILLS) [CBSE 2010]

Ans. Earthworm has metamereres, cockroach has chitinous plates, bony fish has gills and birds have pneumatic (hollow) bones.

Q7. Name the substance which constitutes the exoskeleton of a cockroach. State its functions. [CBSE 2015]

Ans. Chitin constitutes the exoskeleton of the cockroach. It protects cockroach from the chemical injuries.

Q8. How many chambers are present in the heart of the birds? Are they warm or cold blooded? (CONCEPTUAL SKILLS)

Ans. There are four chambers in the heart of the bird. They are warm blooded.

Q9. How many chambers are present in the heart of a fish? Which fish is a true fish among Silver fish, Star fish, Bony fish, Cattle fish and Jelly fish? (CONCEPTUAL SKILLS)

Ans. Two chambers are present in the heart of a fish. Bony fish is a true fish among these.

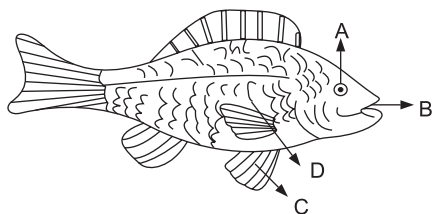
Q10. Which specimen is known as “farmer’s friend”. Write its two adaptive features. (CONCEPTUAL SKILLS)

Ans. Earthworms is considered as the ‘farmer’s friend’ because it increases fertility of the soil.

(i) Its body is covered with exoskeleton.

(ii) It has three pairs of leg and its body is divided into head, thorax and abdomen.

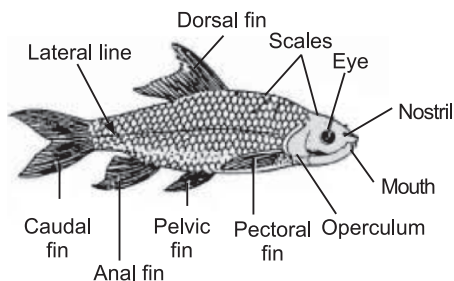
Q11. The correct labelling of parts A, B, C and D is: (IDENTIFICATION SKILLS) [CBSE 2012]



Ans. A-Eye B-Mouth C-Fin D-Scale

Q12. Draw the diagram of a bony fish and write one of its characteristics. (DRAWING AND CONCEPTUAL SKILLS) [CBSE 2014]

Ans.



It breathes dissolved oxygen in water with the help of gills.

EXPERIMENT 10: To study the external features of root, stem, leaf and flower of monocot and dicot plants.

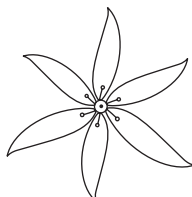
Q1. Identify which of the following belong to monocot and dicot plants? Give reason. (IDENTIFICATION AND REASONING SKILLS)



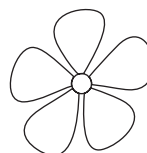
(i)



(ii)



(iii)

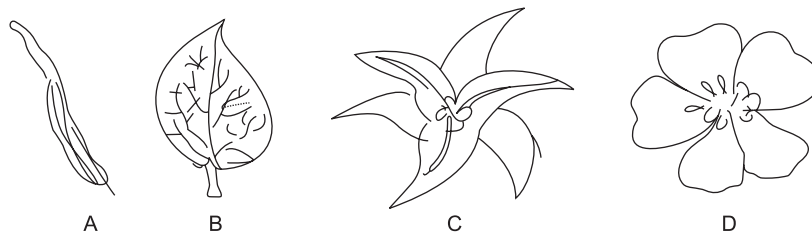


(iv)

Ans. (i) and (iv) are dicot plants as their leaves are broad with reticulate venation and flowers have 5 petals (ii) & (iii) are dicot plants because their leaves are long, narrow with parallel venation and flower have petals in multiple of three.

Q2. What information is conveyed by the following diagrams:

(OBSERVATIONAL AND CONCEPTUAL SKILLS) [CBSE 2016]



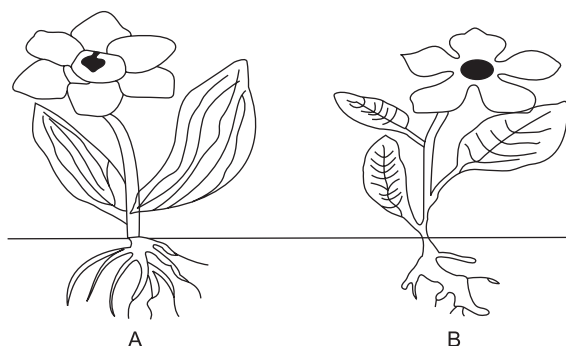
Ans. 'A' Parallel Venation 'B' reticulate venation.

'C' Trimerous flower 'D' - Pentamerous flower.

Q3. What type of stem are present in the dicot plants? What is the usual colour of the sepals?
(CONCEPTUAL SKILLS)

Ans. Stem of dicot plants have vascular bundles. The sepals are usually green in colour.

Q4. Identify the type of plant in figure A and B. (IDENTIFICATION SKILLS) [CBSE 2015]



Ans. 'A' is a monocot plant with trimerous flower.

'B' is dicot plant with pentamerous flower.

Q5. What are the difference between monocot and dicot plants in terms of seed pod and spores of pollen?
(CONCEPTUAL SKILLS)

Ans. Seed pods have three parts in monocot plant whereas in dicot plants there are two seed leaves.

Pollens of monocot have single pore whereas pollen of dicot plants have three pores.

Q6. What are the characteristics of the dicot plants?
(CONCEPTUAL SKILLS)
[CBSE 2014 & 2015]

Ans. Dicot plants have reticulate venation, tap root system and pentamerous flowers (flowers with 5 petals).

Q7. Give one example of dicot plant and three examples of monocot plants. Give reason.

(CONCEPTUAL AND REASONING SKILLS)

Ans. Mustard is a dicot plant with tap root system, leaves with reticulate venation. Maize, wheat, paddy are dicot plants with fibrous root system and leaves with parallel venation.

Q8. A student observed a leaf and identified it as parallel venation. The same kind of venation is the characteristic of which of the following plants? Identify the type of plant with reason. (IDENTIFICATION AND REASONING SKILLS) [CBSE 2014]

- (a) Hibiscus (b) Grass (c) Tulsi (d) Mustard

Ans. Grass is a monocot plant with long, narrow leaves with parallel venation.

Q9. Give two differences between leaves of monocot and dicot plants?

(CONCEPTUAL SKILLS)

Ans. Leaves of Monocot plants are narrow and long with parallel venation.

Leaves of Dicot plants are broad, short with reticulate venation.

Q10. Select monocot and dicot plants among the following:

(CONCEPTUAL SKILLS)

Tomato, apple, onion, banana, grass, pea, melons

Ans. Tomato, melons, apple and pea are dicot plants whereas onion, banana and grass are monocot plants.

COMMON ERRORS

Errors	Corrections
• Children do not remember scientific names of plants and animals.	☞ Learn scientific names by writing and not orally with correct spelling.
• Children are not able to recognise organism from its diagram.	☞ Keep a chart on your reading table with labelled diagram of all organisms given in NCERT book
• Children are not able to classify given organism into proper phylum and class.	☞ Learn common characters on basis of which classifications is done, comparison and correlation method will help you e.g. bryophyta are amphibians of plant kingdom.
• Children do not remember characters of phylum.	☞ Learn meaning of name of each phylum, it will help you to remember characters.
• Children do not remember examples of various class and phylum.	☞ Learn 5 examples of names of each type of organism.

REVISION CHART

