Chapter-7

Biodiversity

7.1 Meaning and significance of Biodiversity:

Many clades are present around us (Clade is a group of biological organisms that share features inherited from a common ancestor). All the living beings differ from each other in some way or the other. On earth, on one hand there are the microscopic bacteria, whose size is just a few microns, while on the other hand are the 30 meter long Blue whale and the 100 meter tall trees of Red Wood in California. Some pine trees stay alive for hundreds of years while the life span of some insects is only of a few days. The unlimited variety of organisms present around us is known as the **biodiversity.**

Biodiversity refers to the diversity present in various life forms. It indicates the different living beings available in a particular habitat or specific area. According to an estimate, nearly one crore species are present on the earth while, currently, we know only about 20 lakh of them. Rich diversity of plants and animals is present on the earth in the regions lying between the Tropic of Cancer and the Tropic of Capricorn. Hence this region is known as the **Mega biodiversity region**.

7.2 Need of Classification :

All the organisms present on the earth are classified on the basis of their similarities and differences and some specific characteristics. Such classification helps in identifying and studying the organisms and understanding their utility. Here by 'characteristics of the organism' we mean some specific form or specific function of that being, on the basis of which it may be differentiated from other organisms.

7.3 Major groups of animals and plants :

Biologists, like Ernst Haeckel (1894), Robert Whittaker (1959) and Carl Woese (1977) have tried to categorize the living organisms into groups called **kingdom**. These kingdoms were made on the basis of the cellular structure, source of nutrition and body organisation.

There are five kingdoms in the five kingdom hypothesis proposed by Whittaker : Monera, Protista, Fungi, Plantae and Animalia. These kingdoms have been further subdivided into categories like Phylum (Division), Class, Order, Family, Genus.

7.3.1 Monera : These are the prokaryotic organisms. These organisms lack organised nucleus and organelles. On the basis of their type of nutrition they may be autotrophic or heterotrophic. Reproduction is by conjugation. Example : Bacteria, Blue-green algae (Cyanobacteria), Mycoplasma.

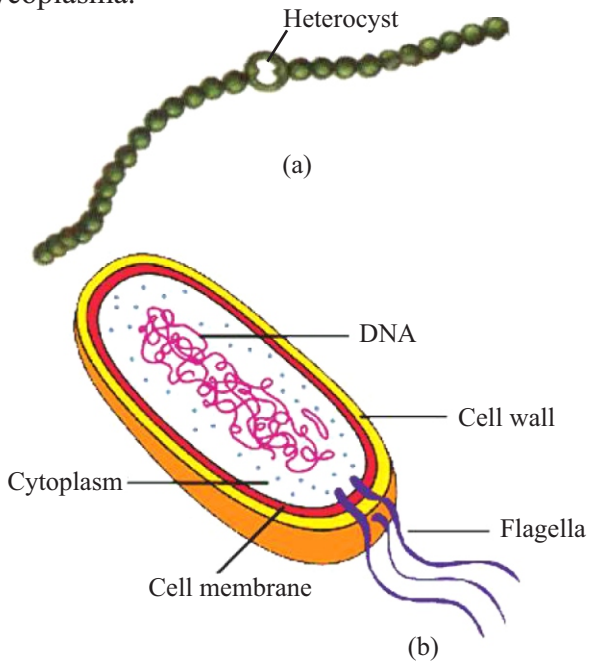


Fig. 7.1 : Organisms of Kingdom Monera
(a) Nostoc (b) Bacteria

7.3.2 Protista : It comprises the unicellular eukaryotic organisms. Their cells contain a well organised nucleus and membrane bound cell organelles because they are eukaryotes. These organism have structures like cilia and flagella for

locomotion. Asexual reproduction in these organisms is by cell fusion while sexual reproduction is by the formation of zygote.

Example : Unicellular algae, diatoms, protozoa

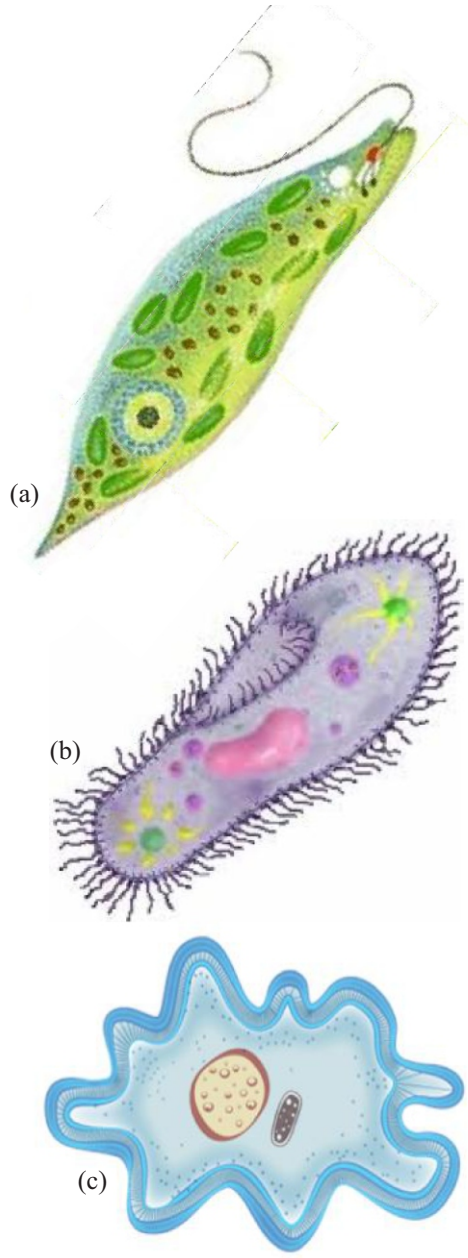


Fig. 7.2 : Organisms of the Kingdom Protista (a) Paramecium (b) Euglena (c) Amoeba

7.3.3. Fungi : They are the heterotrophic, eukaryotic organisms. Most of the fungi are parasitic. They absorb their nourishment from the dead and decaying organic matter. Hence they are known as **saprophytic**. Some of the fungi depend on living plants and animals for their nutrition. They are known as **parasitic**. This type of fungi, i.e. parasitic fungi, cause disease in plants and animals. Some species of fungi live in association with blue green algae (cyanobacteria). This type of mutually beneficial association is known as **symbiosis**. These symbionts are together known as **lichens.**

Generally, the fungi are filamentous, but yeast, which is unicellular, is an exception. The long thread like structures are known as the mycelium. The cell wall of fungi is made up of chitin and polysccharides. In fungi, vegetative reproduction takes place by budding and fragmentaion; asexual reproduction by spores and sexual reproduction by ascospores, basidiospores etc. Example : Yeast, mushroom etc..

Fig. 7.3 Fungi (Mushroom)

7.3.4. Plantae : This kingdom is made up of multicellular eukaryotic organisms. They are autotrophic and prepare their own food by photo-synthesis. Plants have been categorised in the divisions : Thallophyta, Bryophyta, Pteridophyta Gymnosperms and Angiosperms on the basis of differentiation in the plant body, tissues for the conduction of water and other substances in the plant body, seed bearing capacity etc.

(a) Thallophyta : In the plants of this division, the body structure is not differentiated into root, stem and leaves. Such type of undifferentiated plant body

is known as a **thallus**. Eg. : Algae.
Vegetative, asexual and sexual reproduction takes place in the algae. Vegetative reproduction takes place by fragmentation, asexual reproduction by spores and sexual reproduction by the fusion of the two gametes. Example : *Chlamydomonas, Volvox, Chara*.

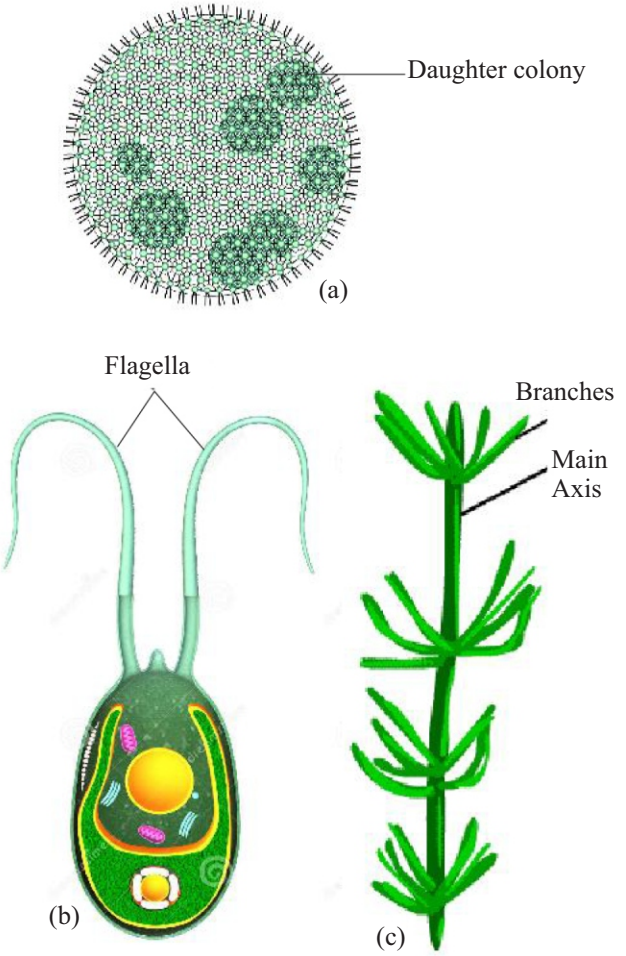


Fig. 7.4 Thallophyta
(a) *Volvox* (b) *Chlamydomonas* (c) *Chara*

(b) Bryophyta : The plants of this division are also known as the **amphibians** of the plant kingdom. They are known as amphibians because they can survive on land but depend on water for sexual reproduction. These plants lack the actual root, stem and leaves instead have the root-like, leaf-like and stem-like structures. They are connected with the substratum by means of unicellular or multicellular rhizoids.
Liverworts and mosses are there in the bryophytes, in which asexual reproduction is by the fragmentation of the thallus or by special structures known as the gemma and the sexual reproduction occurs by the fusion of the antherozoid and egg produced by the antheridia and archegonia of the gametophyte respectively. Example : *Marchantia*, *Funaria*.

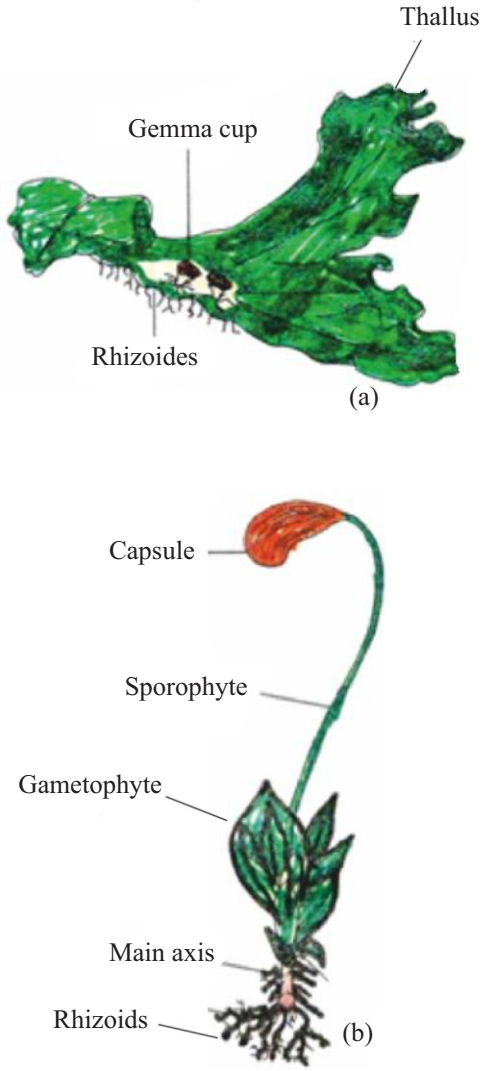
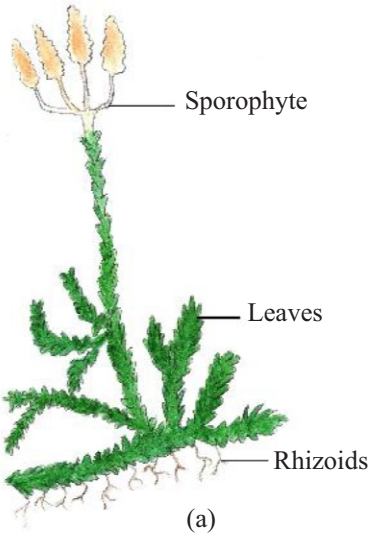


Fig. 7.5
Bryophyta : (a) Liverwort - *Marchantia*
(b) Moss - *Funaria*

(c) Pteridophyta : The plant body of the members of this division is differentiated into root, stem and leaves. They have xylem and phloem for the conduction of water and other substances within their body. Usually they are present in moist places.



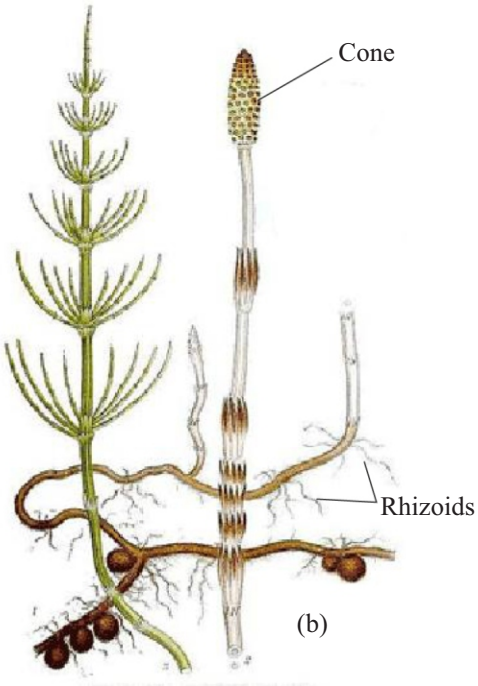


Fig. 7.6 Pteridophyta
(a) *Selaginella* (b)*Equisetum*

The thallophyta, bryophyta and pteridophytes have inconspicuous reproductive organs. They do not produce fruits and seeds. So, they are known as **Cryptogams**. Pteridophytes, however, have a vascular system, i.e. xylem and phloem are present. Hence they are also known as the **vascular cryptogams.** In the division pteridophyta reproduction is by means of spores and the union of sperms and eggs produced by the antheridia and archegonia respectively.
Example : *Marsilia*, *Selaginella*, *Equisetum*.

(d) Gymnosperms : (Gymno = uncovered or naked; sperma = seeds) Gymnosperms are the plants in which the ovules are not protected by the ovary and they remain open i.e. are not covered before or after fertilisation. They are also known as the **naked-seeded plants**. Gymnosperms are medium to tall trees or are shrubs. They have a tap root and in some plants of this group there is symbiotic association between their roots and fungi. This association is known as the **mycorrhizal association**. Example *Pinus*. In some gymnosperms like *Cycas*, the nitrogen fixing cyanobacteria are associated with small special type of roots called the **corraloid roots.** Reproduction in gymnosperms is by means of spores and the fusion of antherozoids and the egg.
Example : *Cycas, Pinus*.

Fig. 7.7 Gymnosperms (*Cycas*)

(e) Angiosperms : (Angio=covered; sperma=seed). Angiosperms are the plants in which the seeds are 'covered' within the fruits. In other words, their seeds develop within the ovary which later on form the fruit. They are known as the **flowering plants**.

The food in their seeds is either stored in the cotyledons or in the endosperms. On the basis of the number of cotyledons present in the seeds, they may be monocot (having single cotyledon) or dicot (having double cotyledon). Reproduction in these plants may be vegetative or sexual. In sexual reproduction there is fusion of the male gamete and the female gamete.

Example : Mustard, Mango, Banyan.

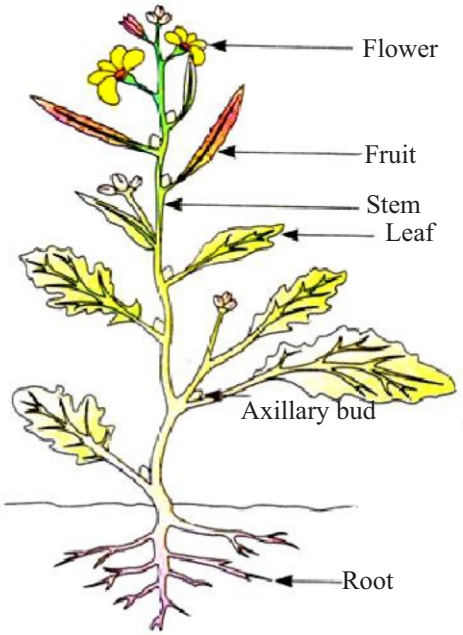


Fig. 7.8 Angiosperm (Mustard)

7.3.5 Animalia : The multicellular, eukaryotic and heterotrophic organisms are placed in this kingdom. Their cells lack the cell wall. Most of the animals exhibit locomotion. Animalia has been further subdivided into **non-chordata** and **chordata** on the basis of the presence of notochord.

(a) Non-chordata : The animals of this group lacks notochord. They have been sub divided into various phyla on the basis of their body structure and differentiation.

1. **Porifera :** Porifera means organisms having perforations or holes. These are the non-motile organisms which remain attached to some support. They have holes or pores all over their body, which are known as the **ostia** (ostium - singular).

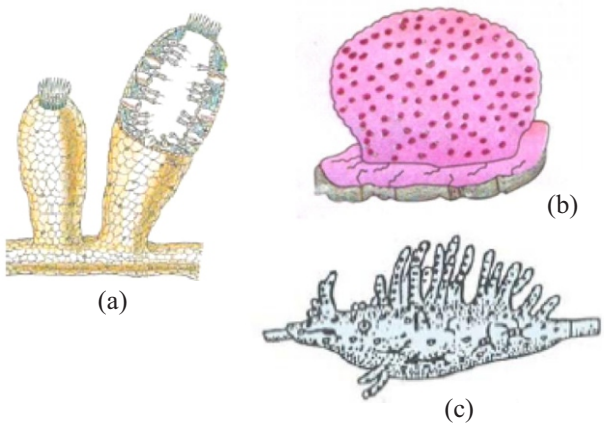


Fig. 7.9 Porifera
(a) Sycon (b) Euspongia (c) Spongilla

Water enters the body through these pores into a central body cavity and passes out through large pores, the **oscula** (osculum - singular). This water canal system is helpful in food intake, respiration and excretion. Their body is covered with external skeletal system, made up of spicules and spongin fibres. Their body organisation is of a cellular level. They are commoly known as the sponges. They are found in aquatic habitats. Examples : *Sycon, Spongilla, Euplectelia, Euspongia*.

2. **Cnidaria** : These are aquatic animals. Their body organisation is of the tissue level. The body of the organisms of this phylum has radial symmetry. These animals have tentacles and stinging cells (nematocysts) on their body this phylum was earlier known as *Coelentrata*. Examples : *Hydra, Sea-anemone*, Jelly fish.

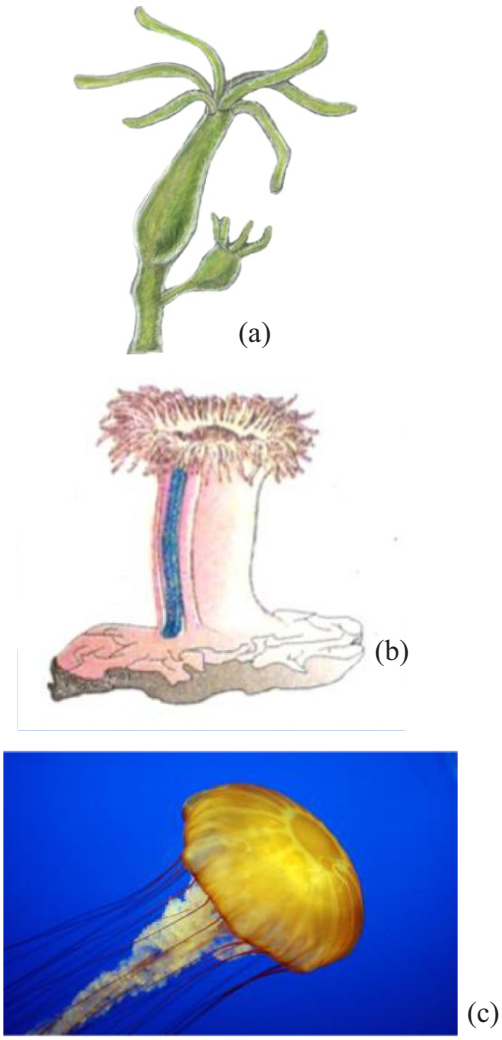


Fig. 7.10 Cnidaria
(a) Hydra (b) Sea-anemone (c) Jelly fish

3. **Platyhelminthes :** The animals of this phyla are dorsoventrally flattened. They are commonly known as the flat worms. Most of the animals of this phylum are present as parasites in human beings and other animals. Their body organisation is of the organ level. Their body is triploblastic (made up of three layers of cells) and have bilateral symmetry. They lack a true internal body cavity or coelom. Examples : *Taenia* (Tape-worm), *Liver fluke, Planareia.*

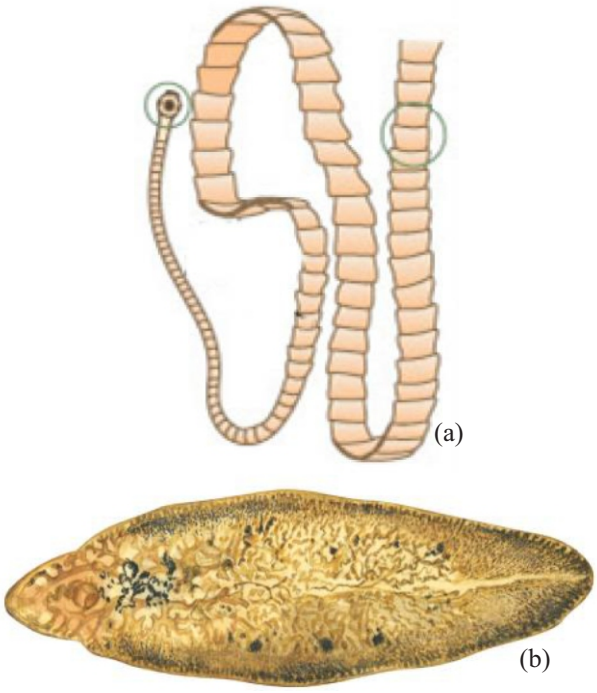


Fig 7.11. Platyhelminthes
(a) Tape worm (b) Liver fluke

4. **Aschelminthes :** The body of the animals of this phylum is cylindrical, hence they are also known as the round worms. They may be free living aquatic or parasitic. They are bilaterally symmetrial, triploblastic and have a pseudocoelom. Their body organisation is of the organ-system level. Example : *Ascaris, Wuchereria.*

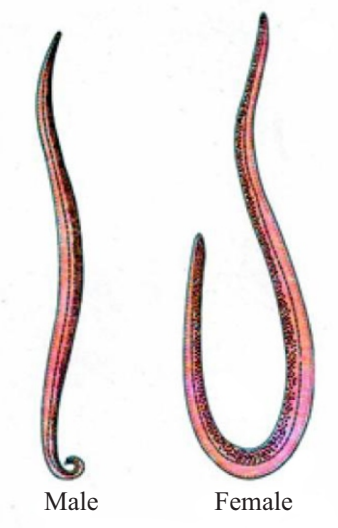


Fig. 7.12 Aschelminthes (Ascaris)

5. **Annelida :** The animals of this phyla are aquatic or terrestrial, free living and sometimes parasitic. These animals are bilateral, triploblastic and have a true coelom. Their body is segmented. They possess *nephridia* for excretion. Examples : *Leech, earthworm, Nereis*.

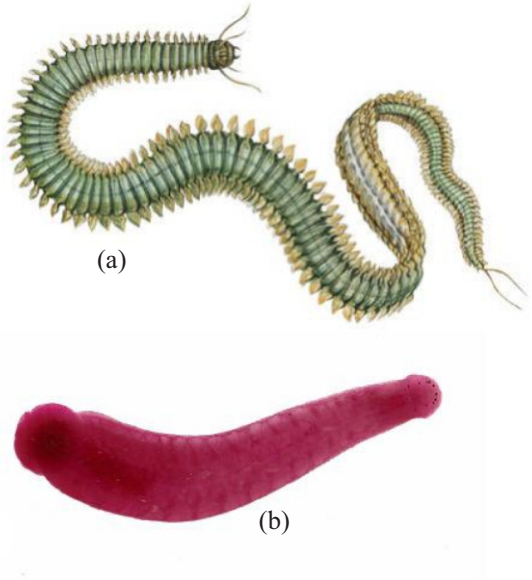
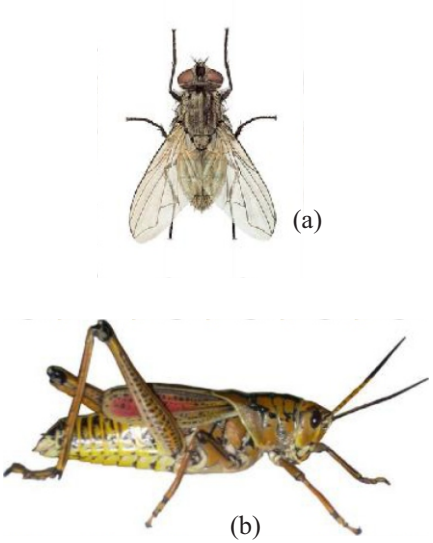


Fig. 7.13 Annelida
(a) Nereis (b) Leech

6. **Arthropoda :** The word arthropoda means arthro - jointed podas = appendages, i.e. these animals have jointed appendages. Maximum number of animals are present in this phylum. They are present at all the places on the earth. They are bilaterally symmetrical, triploblastic and coelomic animals. They have an open circulatory system. The body is segmented and is divisible into head, thorax and abdomen. Class insecta is important in this phylum. Most insects have wings. Excretion in this class is by Malpighian tubules. Their body is covered with chitin and external skeleton. Examples : House-fly, Shrimp, Cockroach, Butterfly, Grass-hopper, Scorpion.



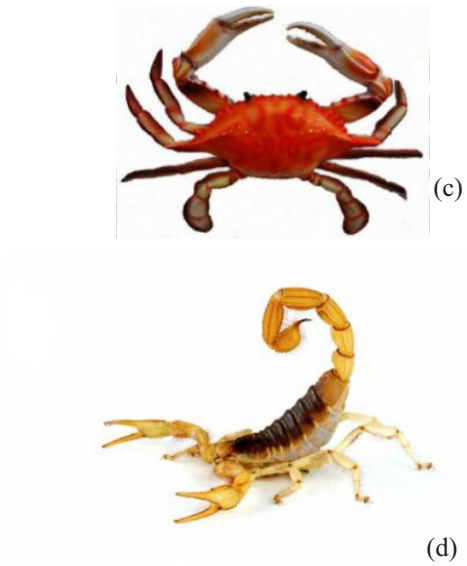


Fig. 7.14 : Arthropoda
(a) House fly (b) Grasshopper (c) Crab (d) Scorpion

7. **Mollusca :** The animals of this phyla are terrestrial or aquatic. Body organisation is of the organ-system level. Their body is soft. In some organisms the body is covered with a shell made up of calcium. They are bilaterally symmetrical, triploblastic, coelomic animals. Their body is partially segmented and is differentiated into head, foot and visceral hump. Example : *Pila, Unio, Octopus*.

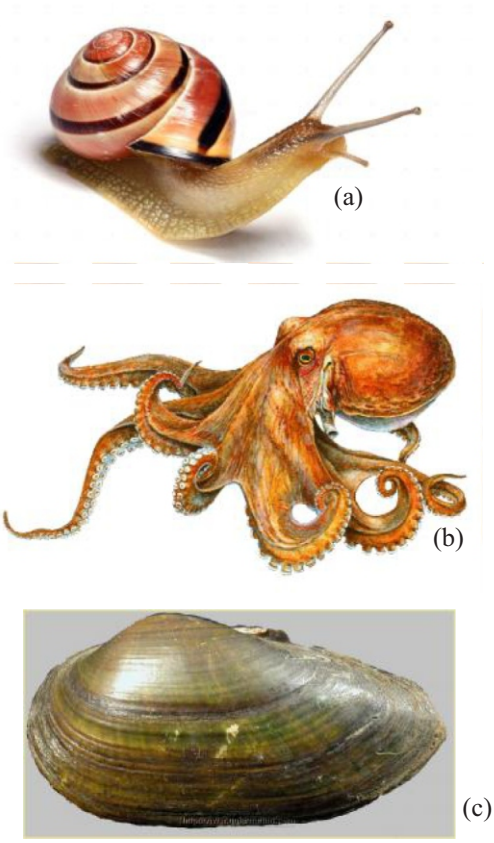


Fig. 7.15 Mollusca :
(a) Pila (b) Octopus (c) Unio

8. **Echinodermata :** The animals of this phylum has calcareous exoskeleton. Their skin is covered with spines. Hence they are known as echinodermata (spiny body). They are free living marine animals. These animals are radially symmetrical, triploblastic and coelomic. Their body organisation is of organ-system level. Water-vascular system is the characteristic feature of these animals, which help in locomotion, food intake and respiration. Example: Star-fish, sea-urchin, sea-cucumber, brittle star.

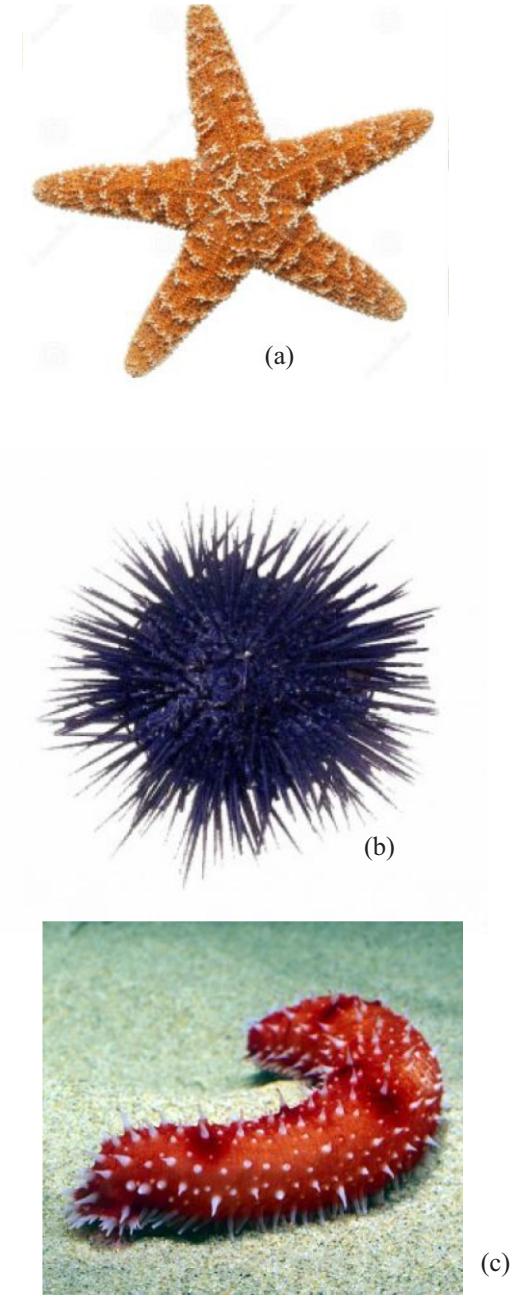


Fig. 7.16. Echinodermata
(a) Star-fish (b)Sea-urchin (c) Sea cucumber

B. Chordata : Notochord, true vertebral column, and endo-skeleton is present in the animals of this group. They are bilaterally symmetrical, triploblastic animals with a body cavity. There is complex differentiation of tissues and organs in them.

Chordates have been divided into five divisions :

1. **Pisces :** The animals of this division are found in both, marine and fresh water. Their skin is covered with scales. Body is stream-lined. Gills are present for respiration which use the oxygen dissolved in water. They are cold-blooded and lay eggs. Heart is two chambered. Skeleton is made up of bones and cartilage. Example : Rohu, Dog-fish, Electric-ray, Sting ray.

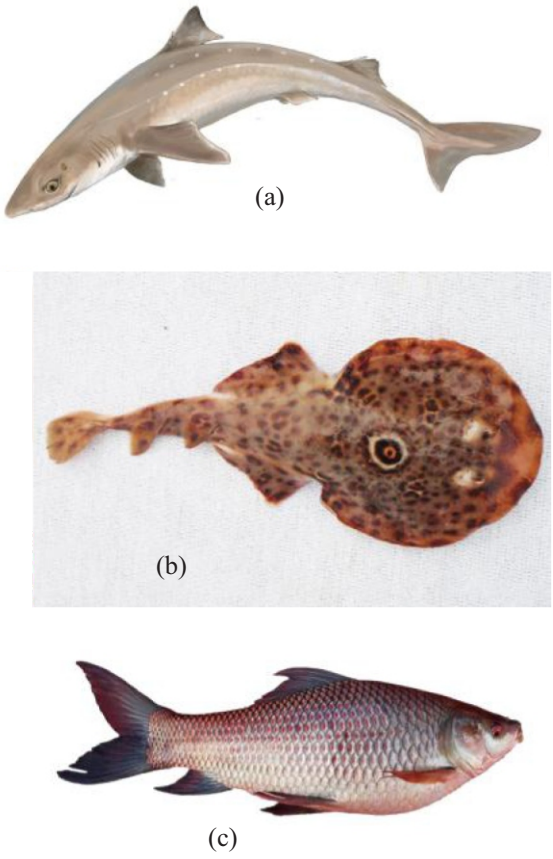


Fig. 7.17 Class Pisces
(a) Dog fish (b) Electric ray (c) Rohu

2. **Amphibia :** The animals of this class can live both on land and water. Their skin lacks scale, and have mucus glands. Respiration is through gills, lungs and skin. They are cold blooded animals that lay eggs. Heart is three chambered (Two atrium and one ventricle). Example : Frog, Salamander.

Fig. 7.18 : Amphibians
(a) Salamander (b) Frog

3. **Reptilia :** The animals of this class live mostly on land i.e. they are terrestrial. They are known as reptiles because they move by crawling. Their body is covered with scales. Respiration is through lungs. They are cold-blooded and mostly lay eggs. Eggs are covered with a hard shell. Usually, the heart is three chambered (two atrium and one ventricle). Example : Snake, lizard, crocodile, tortoise, tree-lizard.

(a)

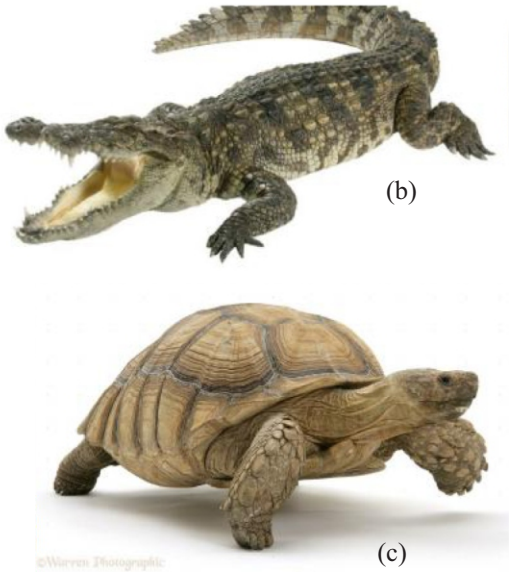


Fig. 7.19 Reptiles
(a) Snake (b) Crocodile (c) Tortoise

4. **Aves :** All the birds have been placed in this class. Their most characteristic feature is the presence of wings and the capacity to fly (exceptions include ostrich). They are warm blooded animals and lay eggs. Their heart is four chambered (Two atrium and two ventricles). The bones are light weighted, longer and hollow to assist in flight. Examples : Eagle, parrot, peacock, ostrich.

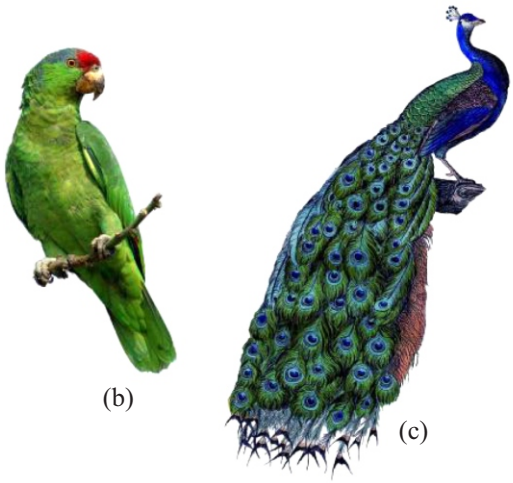


Fig. 7.20 Aves
(a) Ostrich (b) Parrot (c) Peacock

5. **Mammalia :** The animals of this class are found in all type of environments. They have mammary glands to nourish their young ones. Their heart is four chambered (two atrium and two ventricles).
The animals of this class are warm blooded and give birth to the young-ones. However, there are a few exceptions : Echidna lay eggs; kangaroos give birth to very poorly developed young ones, which remain in a sac named marsupium until they develop completely. Example : Human beings, Duck-billed platypus, Kangaroo, Bat.

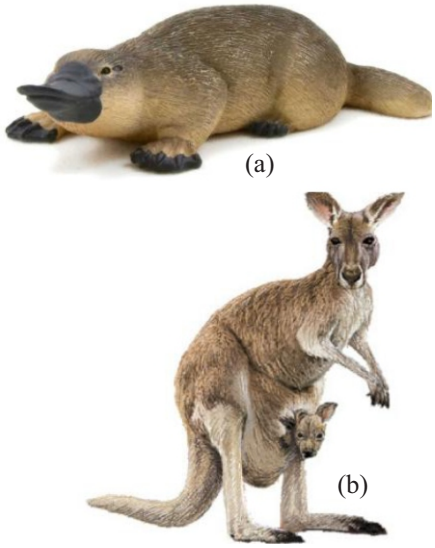


Fig. 7.21 Mammals
(a) Duckbilled platypus (b) Kangaroo
(c) Bat

7.4 Adaptations of Animals according to their habitat :

Although animals and plants are present on all parts of the earth, but the environment of all the places is not the same. All the living beings (plants and animals) interact with their environment. Plants and animals are capable of surviving and reproducing in that environment because of their special type of organs, characteristics (anatomical, physiological, behavioural) and activities. This is known as **adaptation**. Adaptations in living beings are generated because of the environment and also depends on the genetic factors.

7.4.1. Habitat and adaptations of the plants : Based on the water present in their environment and their need for water, plants are of the following types :

1. Hydrophytes
2. Xerophytes
3. Mesophytes
4. Cryophytes
5. Halophytes

1. Hydrophytes : The plants which live in or on water or on water logged soil are known as **hydrophytes**. Examples : *Vallisneria*, *Eichchornia*, *Sagittaria*, *Ranunculus*, *Hydrilla*, Lotus, Water chestnut (singhara) etc.

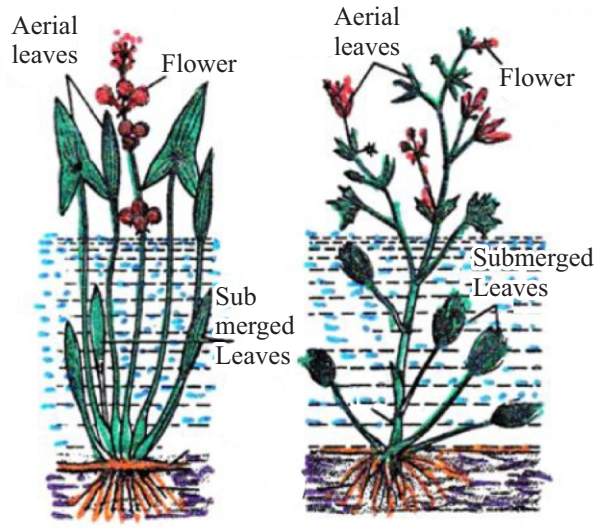


Fig. 7.22 : Hydrophytes
(a) *Sagittaria* (b) *Ranunculus*

Adaptations of hydrophytes :

1. The main function of the root system is to absorb water hence, because of abundant availability of water all around, the root system is less developed and water is absorbed from the plant surface.
2. In some plants like water- chestnut (Singhara or *Trapa*) the roots are green coloured for photosynthesis. They are known as the **assimilatory** roots.
3. Root hairs are absent. The **root pockets** replace the root hairs.
4. In some plants like *Lemna,* roots perform the act of balancing the plant body.
5. The stem is soft, thin and flexible in hydrophytes.
6. The leaves of the floating hydrophytes are broad while those of the submerged plants are dissected or ribbon shaped.
7. In hydrophytes pollination and dispersal of seeds and fruits is by means of water, hence their seeds and fruits are light in weight.
8. Air chambers are present in the internal structure of the leaves, stem and roots of the hydrophytes.
9. The osmotic concentration of the

cells of hydrophytes is less i.e. the concentration of salts in the cytoplasm is less.

10. Hydrophytes lack well developed mechanical tissue and vascular tissue.

2. Xerophytes : Xerophytes are the plants that are found in dry habitat having scarcity of water. Example : *Opuntia*, *Thor* (*Euphorbia*), Cactus etc.

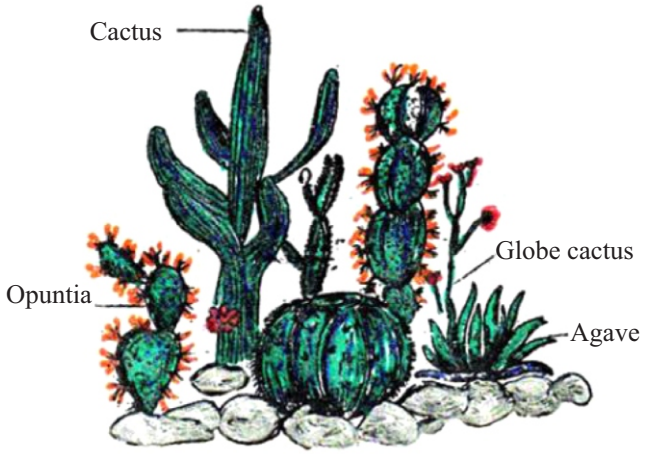


Fig. 7.23 : Xerophytes

Adaptations of Xerophytes : Xerophytes are recognised by their specific characteristics. These characteristics are as follows :

1. Xerophytes are present in habitats having scarcity of water, hence their roots are well developed and go deep down into the soil to absorb water.
2. Root hairs are present on roots for water absorption and root cap for protecting the growing root tip.
3. The stem of Xerophytic plants is woody and have multicellular hair on its surface. In some plants like *Calotropis* there is a layer of wax and silica present on the stem surface.
4. In some xerophytes the stem is green, succulent (stores water) and perform photosynthesis, as in *Aloe vera*.
5. To prevent water loss from its surface, the leaves of xerophytic plants fall off during summer season. In some plants like *Opuntia* the leaves are modified into spines.
6. In some other xerophytic plants, a waxy coating is present on the leaf surface and the sunken stomata are present on the lower surface of the leaf to reduce transpiration.
7. A hard cover is present around the fruits and seeds of the xerophytic plants.
8. The osmotic concentration of the cells of xerophytic plants is high.

3. Halophytes : Halophytes are the plants that grow in saline soils or marshes. In saline soil, soluble salts like sodium chloride, magnesium chloride and magnesium sulphate are present in abundance. The plants growing in marshy soils are known as **Mangrove vegetation**. Examples: *Rhizophora*, *Salsola* etc.

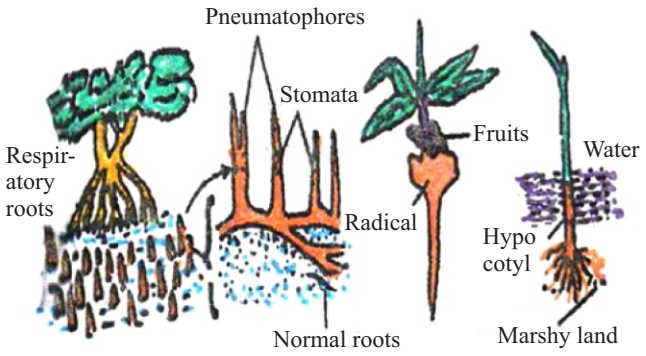


Fig. 7.24 : Halophytes

Adaptations of Mangrove Vegetation :

1. The roots of these plants do not go deep down into the soil therefore the 'stem-roots' develop and enter the marshy soil to provide extra support and stability.
2. Due to water-logging, marshy soils are deficient in oxygen and the normal regular roots do not get enough oxygen for respiration

Therefore in these plants some branches of the root become negatively geotropic and come out from the soil surface. Small pores are present on these aerial root which help the roots in oxygen uptake. These roots are known as **Respiratory roots** or **Pneumatophores.**

3. The stems of these trees are spongy because of storage of chloride ions.
4. The leaves are small, fleshy with a shining surface.
5. The seed in these plants start germinating while still within the fruit, attached to the parent plant. The embryo grows out from the fruit in the form of a seedling made up of the radical and the hypocotyl. The seedling falls down vertically on the ground and the radical directly enters the marshy soil. This type of germination is known as the **viviparous germination**.

4. **Cryophytes :** The vegetation growing in colder regions and ice-laden soil are known as cryophytes. Example : Moss, Lichens, Salmon-berry.

   Adaptations : In cold habitats, mostly the plants are herbs, mosses and lichens, which grow when the ice melts and complete their life cycle in very short duration i.e., these plants are short-lived.

   Salmon-berry is one of the many flowering plants which perennate under the snow and at the time of flowering when the snow melts by the respiratory - heat produced, only the flower emerges on the surface of the snow.

5. **Mesophytes :** The plants that grow in habitats having moderate amount of water, moisture and temperature are known as mesophytes. In such habitats all the conditions are ideal for the growth and reproduction of the plants.

   The root system is well developed in these plants and bear root hairs and root cap. The stem is aerial, branched, thick and hard. Leaves are broad with stomata on both surface. Plants are well developed, with normal physiology. Examples : Garden-plants and crops.

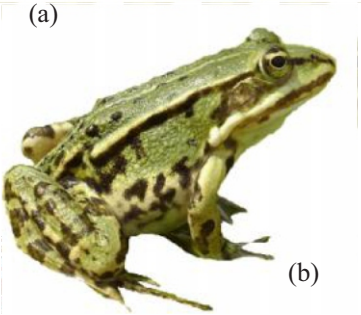
7.4.2 Habitat and Adaptation of the animals : In nature, animals are found in habitats like, water, land, air (sky) etc. The animals can be classified on the basis of their habitat as follows :

1. Aquatic animals 2. Terrestrial animals 3. Aerial

1. **Aquatic animals :** The animals which live in water i.e. aquatic habitat are known as aquatic animals. Some of these animals lie in marine water, some in fresh water and others are amphibious. These animals have characteristic features in order to adapt to their habitat. These features include :
   (a) The body of those animals is stream-lined so they can swim easily in water.
   (b) These animals have fins or feathers, which help them in swimming and balancing their body.
   (c) Aquatic animals have gills for respiration and use the oxygen dissolved in water.
   (d) The bones of these animals are light in weight and are spongy. The neck is absent or is less developed.
   (e) They have scales or mucus glands on their body.
   (f) Salt excreting glands are present in animals living in marine habitat to remove the excess of salt from their body.
   (g) In amphibians like Salamander, respiration is both, by gills and by lungs.

   Example : Fish, Frog, Sea-turtle etc.

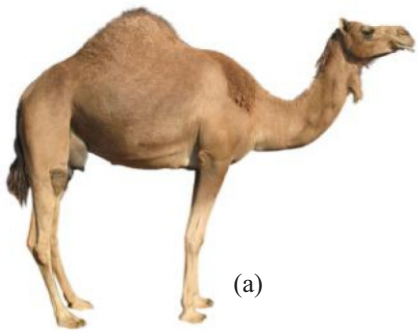
(a)



(b)

Fig. 7.25 Aquatic animals
(a) Fish (b) Frog

2. **Terrestrial Animals :** The animals which live on land are known as terrestrial animals. These animals have been subdivided on the basis of their surrounding environment on land.
   (i) Desert animals : The animals which live on dry lands, i.e. habitat with scarcity of water are known as desert animals. These animals have characteristic features which help them survive harsh conditions. These include :
   (a) The foot of these animals are adapted to walk, run and dig in the sandy deserts. For example, camels have cushioned feet.
   (b) The body-color of these animals is sandy i.e. brown like sand, so that they are protected against predators.



(a)

Camel's foot

(b)

Fig. 7.26 Desert animals
(a) Camel (b) Moloch

   (c) The faeces of these animals is solid and their urine is concentrated. Sweat glands are absent or less developed in their body.
   (d) On the body of some animals like Phrynosoma, scales are present to conserve water in the body.
   (e) The skin of some animals like moolak, is hygroscopic i.e. absorbs moisture from the surroundings.
   (f) There are water storing organs in these animals which perform the function of water storage, example - Camel.
   (g) The nasal apertures are small and are covered by valves to prevent the entry of sand particles, examples - Camel.
   Example : Camel, Phrynosoma,

Wild-rat, Moolak etc.

(ii) Cold Habitat Animals : The animals living in ice laden regions having low temperature are known as cold habitat animals. The cold habitats have very low temperature and the winds blowing in these regions are cold and dry. For most part of the year the land remains ice-laden. The skin of animals living in such habitats is covered with dense hair. Their colour is white, in order to protect them from predators.
Example : Polar - rabbit, Musk-ox

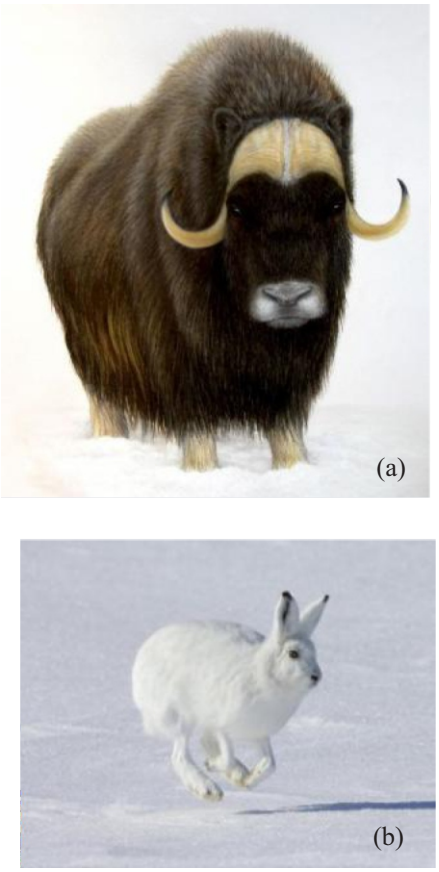


Fig. 7.27 Animals of cold habitat
(a) Musk - ox (b) Polar - rabbit

3. Avians : Animals that fly in air are known as avians or aerial animals. Following adaptations are found in these animals :

(a) The bones of these animals are hollow and light.
(b) Their forelimbs are modified into wings which help in flight.
(c) Their eye-sight is more sharp as compared to that of the terrestrial animals.
(d) Their body is covered with feathers which keep the body temperature constant.
(e) Their tail assists in maintaining the balance of their body.
(f) Body is cylindrical
Example : Sparrow, Vulture, Parrot, Crow, Peacock etc.

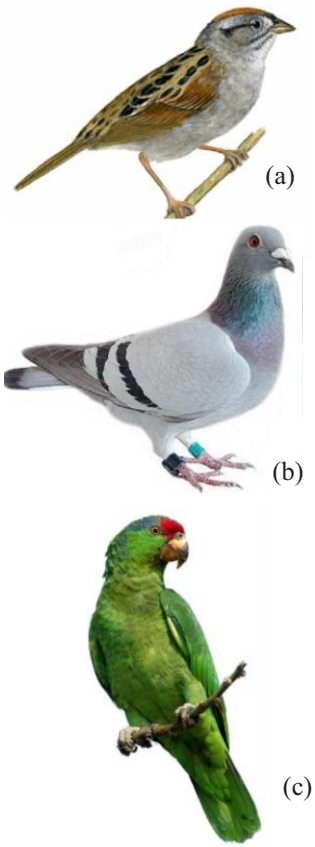


Fig. 7.28 Avian animals
(a) Sparrow (b) Pigeon (c) Parrot

Binomial Nomenclature : Lakhs of plants and animals live on the earth. They are known by local names at the places they are found. These local names are different in different regions of a country. Similarly, the name of these plants and animals are different in different languages. Therefore if

anyone is talking about an organism in local dialect, others not familiar with the local language are unable to understand. Scientists solved this problem by giving all the organisms (plants and animals) a scientific name. Each organism has a scientific name, by which it is known world wide. This process is known as **nomenclature**.

The universally valid rules for giving scientific names to plants have been laid forward by "International Code of Botanical Nomenclature" (ICBN) and those for animals in "International code of Zoological nomenclature" (ICZN).

The scientific method used for nomenclature is known as **binomial nomenclature**. Carolus Linnaeus proposed this method of nomenclature. This method is universally accepted worldwide for naming organisms. All the biologists use this method. According to this method of binomial nomenclature:

1. There are two parts in the scientific name of each organism - first is the name of the **genus** and the second is the **species** name.
2. Scientific names are usually of **latin origin**. They are written in **italics**. However, in case of hand-written names the two parts are underlined separately.
3. When writing in English the first alphabet of the genus name is capitalised while the name of species should start with small alphabet.
   Example : The scientific name of mango is *Mangifera indica*.

Important Points

1. In plants and animals the process of adapting (i.e. becoming better suited) to the environment by means of its special organs and special processes is known as adaptation.
2. The plant world has been classified into five divisions : Thallophyta, bryophyta, pteridophyta, gymnosperms and angiosperms.
3. Carolus Linnaeus is the "Father of binomial nomenclature". The first name of a binomial nomenclature denotes genus while the second name is that of the species.
4. Animal world has been classified into two groups invertebrata and vertebrata.
5. On the basis of their habitat, plants have been classified into hydrophytes, xerophytes, halophytes, cryophytes and mesophytes.
6. Whittaker gave the five kingdom hypothesis. According to this the organisms of earth can be grouped into five kingdoms : Monera, Protista, Fungi, Plantae and Animalia.
7. Animals can be classified as **aquatic, amphibian, terrestrial** and **avian**, on the basis of their habitat.
8. Halophytes are also known as the mangrove vegetation. They have pneumatophores or the respiratory roots.
9. In aquatic organisms, respiration is by means of gills while in terrestrial animals it is by lungs or the skin.
10. The osmotic concentration of aquatic plants is less while that of the xerophytic plants is more.

Questions

Objective questions

1. The most developed division of plants is :
   (a) Bryophyta (b) Angiosperm
   (c) Gymnosperm (d) Thallophyta
2. Viviparous germination of seeds take place in :
   (a) Hydrophytes (b) Mesophytes
   (c) Xerophytes (d) Halophytes
3. Presence of sunken stomata on leaves is an adaptation of :
   (a) Xerophytes (b) Halophytes
   (c) Hydrophytes (d) Mesophytes
4. Which plant group is known as vascular cryptogams :
   (a) Pteridophyta (b) Bryophyta
   (c) Gymnosperms (d) None of the above
5. An organisms of the class arthropoda is :
   (a) Leech (b) Tape worm
   (c) House fly (d) Star-fish

Very short answer questions :

6. Write the name of the Father of Binomial Nomenclature.
7. To which animal class does the frog belong to?
8. What is adaptation?

9. Who proposed the five kingdom classification?
10. The blue-green algae (cyanobacteria) is a member of which division.
11. What is a lichen?
12. Give two examples of gymnosperms.
13. Name the organism in which respiration is by means of gills, lungs and skin.
14. Name an egg-laying mammal.
15. In which habitat is the mangroove vegetation found?

Short answer type questions :

1. Name the two specialities found in halophytes.
2. Write the adaptations of aquatic animals.
3. What are the special features of cold habitat?
4. Write the characters of the animals of the class mammalia.
5. Write the characters of the animals of the class arthropoda.
6. What is the function of mycorrhizae and coralloid roots in gymnosperms?
7. Explain symbiosis in lichens.
8. Why pteridophytes are known as the vascular cryptogams?
9. Describe the adaptations of xerophytes.
10. What are saprophytes?
11. Write two similarities between bryophytes and pteridophytes.
12. What are monocots and dicots?
13. Write two differences between invertebrates and vertebrates.
14. What is the function of pneumatophores in halophytes?
15. What is the function of assimilatory roots in water chest-nut?
16. Write the adaptations of aves (aerial animals).

Essay type answer questions :

1. Classify the plants on the basis of their habitat and describe the adaptations of each type.
2. Write the rules of the nomenclature of organisms, according to the binomial nomenclature system.
3. Write the characteristic feature of the animals living in aquatic and desert habitats.
4. Describe the characteristic features of angiosperms and gymnosperms.
5. Write notes on the following :
   (a) Mangrove vegetation
   (b) Amphibians
   (c) Salt secreting glands
   (d) Lichens
   (e) Viviparous germination
   (f) Stem roots

Answer Key

1. (b) 2. (d) 3. (a) 4. (a) 5. (c)