Chapter 13. Diversity of Life and Classification

PAGE NO:117

Solution 1:
Diversity refers to the variety of living organisms found within a given ecosystem, biome, or on an entire planet.

Solution 2:
The method of arranging organisms into series of groups on the basis of similarities and differences is called classification.
Classification is important in the following ways:

1. It makes the study of a wide variety of organisms easy.
2. It gives us an overall picture of all the life-forms.
3. It helps us to understand the interrelationships among different groups of organisms.
4. It forms a base for the development of other biological sciences.

Solution 3:
According to binomial system, all organisms are given two proper names.

- The first is the generic name beginning with a capital letter whereas the second is the species name starting with a small letter.
- Both these names are underlined when written or italicised when printed.
- Naming organisms using this system avoids confusion among people all over the world.
- Example –
- **Common name** **Scientific name**

Pea	→	Pisum sativum
Wheat	→	Triticum aestivum
Earthworm	→	Pheretima posthuma
Lion	→	Panthera leo

Solution 4:
Taxonomy is the study of the theory, practice and rules of classification of living and extinct organisms.

Solution 5:
The five kingdom system of classification was proposed by R. H. Whittaker in 1969. This classification is based on the following four facts:

- Complexity of cell structure
- Methods of nutrition (autotrophic or heterotrophic)
- Complexity of body organization.
- Phylogenetic relationships.

The five kingdoms in this system are:

1. **Monera –** It includes all the prokaryotes like bacteria and cyanobacteria. They are important decomposers.
2. **Protista –** It includes the aquatic, eukaryotic, acellular organisms like protozoans.
3. **Fungi** – This kingdom includes moulds, mushrooms and yeasts.
4. **Plantae** – It includes all the coloured, multicellular, eukaryotes with cell walls.
5. **Animalia** – These are multicellular eukaryotes lacking cell wall and showing heterotrophic nutrition.

Solution 6:

Important characters of five kingdom are:

Characters of kingdom Monera are:

1. It contains acellular organisms, ranging in size between 0.15 to 2.0 .
2. They are prokaryotes, lacking a well-defined nucleus .
3. They usually lack chlorophyll and hence are parasites or saprophytes.
4. Reproduction occurs by binary fission or budding in bacteria.
   Example – Actinomycetes, bacteria, cyanobacteria.

Characters of kingdom Protista are:

1. They are aquatic, unicellular organisms.
2. They have eukaryotic cells with well-defined nucleus and organelles.
3. They show autotrophic or heterotrophic mode of nutrition.
4. Some protists are parasites and few are decomposers too.
   Example – Euglena, Ameoba, Paramoecium.

Characters of kingdom Fungi:

1. They may be unicellular or multicellular.
2. They have heterotrophic nutrition and mostly they are saprophytes.
3. Their body is made up of mycelium, a filament of which is called hypha.
4. Their cell wall is made up of chitin.
   Example – Aspergillus, Agaricus, Penicillium.

Characters of kingdom Plantae:

1. They are multicellular, eukaryotic organisms.
2. The cell membrane is surrounded by a thick cell wall of cellulose.
3. Except a few aquatic life forms, plants are non-motile.
4. They have different modes of nutrition: autotrophic, parasitic even insectivorous.
   Example – Mango, Cycas, Fern, Moss.

Characters of kingdom Animalia:

1. They are multicellular, eukaryotic organisms without cell wall.
2. They show heterotrophic mode of nutrition.
3. They can retract or expand with the help of muscles.
4. They are consumers in-between producers and decomposers.
   Example – Fish, Frog, Earthworm, Man.

Solution 7:
The kingdom Plantae has been divided into following groups:
Thallophyta

- They are consists of red, green and brown algae.
- Algae are of universal occurrence.
- Their body ranges from unicellular to multicellular colonies, filaments or sheets of cells.
- Vascular tissues are absent.
- Nutrition is generally autotrophic (through photosynthesis).
- Reproduction is vegetative or sexual.

Bryophyta

- It consists of liverworts and mosses.
- They are terrestrial, found in damp, shady places.
- Their life cycle has a long gametophytic phase and a short sporophytic phase.
- Liverworts have prostrate thalloid gametophytic body, but mosses have erect body.
- True roots are absent, but rhizoids presents.
- Vascular tissues are absent.
- Nutrition is generally autotrophic (through photosynthesis).
- Reproduction is vegetative or sexual.

Pteridophyta

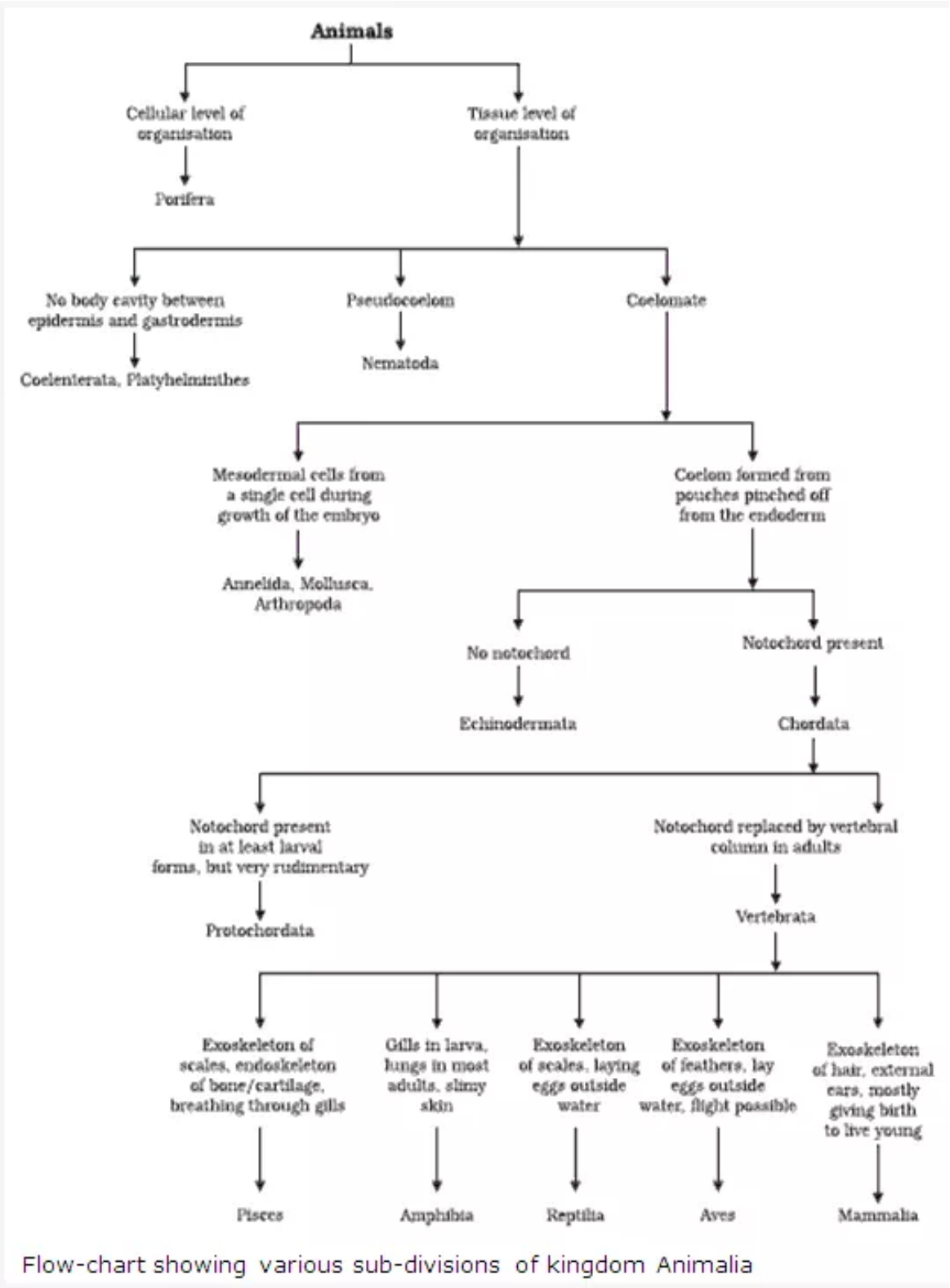
- They include ferns, horse-tails and club mosses.
- They occur mainly in cool, shady and moist places.
- They are mostly terrestrial.
- They are perennial herbs with stem in the form of rhizome.
- Fibrous roots present.
- Their life cycle has a gametophytic phase and a short sporophytic phase.
- Vascular tissues are present.
- Nutrition is generally autotrophic (through photosynthesis).
- Reproduction is vegetative or sexual.

Spermatophyta

- They are the most successful terrestrial plants having seeds.
- They produce seeds (fertilized ovules).
- They are divided into two groups –

1. **Gymnosperms** -They bear naked seeds and lack flowers.
   Examples: Pine, Cycas
2. **Angiosperms –** They produce seeds enclosed in ovary and flowers are present.
   Examples: Rose, Grass

Solution 8:



Flow-chart showing various sub-divisions of kingdom Animalia

Solution 9:

The non- chordates are divided into nine phyla:

(i)	Protozoa	→ Euglena , Amoeba
(ii)	Porifera	→ Sycon, Euplectella
(iii)	Coelenterata	→ Hydra, Physalia
(iv)	Platyhelminthes	→ Fasciola, Dugesia
(v)	Nemathelminthes	→ Ascaris, Wuchereria
(vi)	Annelida	→ Nereis, Hirudinaria
(vii)	Mollusca	→ Unio, Pila
(viii)	Arthropoda	→ Palemon, Periplaneta
(ix)	Echinodermata	→ Antedon, Echinus

Solution 10:

The various classes of Chordata are:

1. **Pisces** – Labeo (Rohu), Scoliodon (Dog fish)
2. **Amphibia** – Rana (Frog), Hyla (Tree frog)
3. **Reptilia** – Kanchuga (Tortoise), Naja naja (Cobra)
4. **Aves** – Columba (Pigeon), Pavo (Peacock)
5. **Mammalia** – Elephas (Elephant), Funambulas (Squirrel)

Solution 11:

Important chordate characters are:

(i) Presence of dorsal, hollow, tubular, nerve cord
(ii) Presence of long notochord
(iii) Presence of series of gill slits

CHORDATES	NON-CHORDATES
• Notochord is found in all stages of the life-cycle	• Notochord is not found in any stages of the life-cycle.
• Heart is situated on ventral side of the alimentary canal.	• Heart is poorly formed and if present it is situated on the dorsal side.
• Nervous system is situated on the dorsal side	• Nervous system is situated on the ventral side.
• RBCs are present in blood.	• RBCs are absent in blood.

Solution 12:

Characters of mammals are:

1. The females of this class are provided with mammary glands which produces milk to feed the young one.
2. Body usually covered with hair, spines, scales, nail, hoof or horn.
3. External ear or pinna is well-developed.

4. They are warm-blooded.

PAGE NO:118

Solution 13:

(a) Starfish belongs to phylum Echinodermata.
Two characters of starfish are:

1. Spines found on the body which is covered by calcareous plates.
2. Body is star shaped with five radiating areas called ambulacra with inter-ambulacra in between.

(b) Whale belongs to phylum Chordata.
Two characters of whale are:

1. They are warm blooded marine animals.
2. Heart is completely four-chambered.

(c) Jelly fish belongs to phylum Coelenterata.
Two characters of jelly fish are:

1. Body diploblastic having outer epidermis and inner gastrodermis with gelatinous mesoglea.
2. Tentacles are present around the mouth.

(d) Cockroach belongs to phylum Arthropoda.
Two characters of cockroach are:

1. They have jointed legs.
2. Their exoskeleton is made up of chitinous cuticle which is shed from time to time.

Solution 14:

GYMNOSPERMS	ANGIOSPERMS
• Seeds are naked	• Seeds are enclosed in ovary.
• Flowers are absent	• Flowers are present.
• Reproductive organs are in the form of cones	• Reproductive organs are flowers.
• E.g. – Pine, *Cycas, Taxus*	• E.g. Rose, Sandal wood, sunflower

Solution 15:
Bryophyta – Liverwort and Moss.
Pteridophyta – Fern and Horsetail.

Solution 16:
Antedon (Sea lily) and Asterias (Star fish).

Solution 17:
Whale

Solution 18:
Cockroach, crab

Solution 19:
Frog

Solution 20:
Echidna

Solution 21:
Earthworm – Pheretima posthuma and
Roundworm – Ascaris

Solution 22:

Cobra → Reptilia

Peacock → Aves

Earthworm → Annelida

Euglena → Protozoa

Frog → Amphibia

Spongilla → Porifera

Solution 23:
(a) Arthropoda
(b) Porifera
(c) Mollusca

Solution 24:
(a) Protozoa
(b) Mollusca
(c) Annelida

Solution 25:
(a) Asterias (Star fish), Echinus (Sea-urchin)
(b) Scoliodon (Dog fish), Labeo (Rohu)
(c) Fasciola (Liver fluke), Taenia solium (Tapeworm)
(d) Ascaris (Roundworm), Wuchereria (Filarial worm)
(e) Pheretima (Earthworm), Hirudinaria (Leech)
(f) Palemon (Prawn), Periplaneta (Cockroach)

Solution 26:
(a) Annelida
(b) Coelenterata
(c) Arthropoda
(d) Echinodermata

Solution 27:

(a) Flame cells
(b) Nemathelminthes
(c) Annelida
(d) Porifera
(e) Chordata

Solution 28:

1. (a) three pairs of legs are present.
2. (a) coelentrata
3. (c) octopus
4. (c) paramoecium
5. (c) hippocampus
6. (a) Scorpion
7. (b) for five kingdom classification
8. (a) prokaryotic and multicellular eukaryotic cell
9. (d) plant
10. (d) C. Linnaeus
11. (c) Carolus Linnaeus