CHAPTER 14
BIOLOGICAL DIVERSITY

SOLUTIONS

TEXTUAL QUESTIONS AND ANSWERS

1. What is biological diversity?

Ans: Biological diversity is the variation of life forms, occurring within a given ecosystem, locality or on the entire Earth.

2. What is meant by identification and naming?

Ans: Identification refers to assign a pre-existing taxon name to an organism.

The system of naming of organism is known as **Nomenclature.**

3. Write what you know about binominal nomenclature.

Ans: It was introduced by Carolus Linnaeus in 1758.

a) The scientific name of a species is made up of two Latin or Latinized words.

b) The first word represents generic name and should always begin with a capital letter while the second word represents species epithet that starts with small letter.

c) The scientific name is always printed in italics or are separately underlined when hand written.

d) The author's name can be full or abbreviated and is kept after the two words without any comma.

e) The specific name may be formed by Latinizing the name of a revered person, name of a locality, colour etc. Example: Man- *Homo sapiens*

4. What is taxonomic hierarchy? Who had introduced it?

Ans: A systematic framework for biological classification in which taxonomic groups are arranged in an ascending series of levels with ever increasing inclusiveness is known as **taxonomic hierarchy.** It was introduced by **Carolus Linnaeus** in 1758.

5. Define classification.

Ans: The arrangement of organisms into groups based on their relationship is called **Classification**.

6. Define taxonomy.

Ans: The branch of biology that deals with principles and procedures of **description, classification** and **naming** organism is called Taxonomy.

7. Who is known as the father of biological classification?

Ans: Aristotle is known as the father of biological classification.

8. Why Linnaeus is called as father of taxonomy?

Ans: Because most of the principles of taxonomy presently following were introduced by **Linnaeus**.

9. Who had proposed the five Kingdom of classification?

Ans: Robert H. Whittaker (1969)

10. What are the advantages of the five kingdom system over the two kingdom system of classification?

Ans: The advantage of the five kingdom classification system is that there is far less overlap and confusion as compared to the original two kingdom classification system.

11. Write down the three important basis of the five kingdom classification.

Ans: The five kingdom classification is based on

a) The kind of cells that make up the organism (**prokaryotic cell /eukaryotic cell**).

b) The number of cells that make up the organism (**unicellular/multicellular**).

c) The method by which the organism obtains food (**autotroph/heterotroph**).

12. Write briefly on the following:

Kingdom Monera:

a) It includes prokaryotic organisms such as bacteria, cyanobacteria and mycoplasma etc.

b) Membrane bound organelles are absent.

c) Nucleoid region contain single, circular naked DNA.

d) Mostly decomposers and some cause diseases.

Kingdom Protista:

a) It includes unicellular, eukaryotic organisms like diatoms, dinoflagellates and protozoans etc.

b) Nutrition may be autotrophic or heterotrophic.

c) Nucleus and other membrane bound organelles are present.

d) Mostly aquatic, some have flagella or cilia.

e) They reproduce by asexual or sexual.

Kingdom Fungi:

a) It includes heterotrophic, multicellular eukaryotic organisms like molds, *Agaricus*, mushrooms, rusts, etc.

b) Cell wall is made up of cellulose and chitin.

c) Glycogen is reserve food.

d) Some are decomposers or pathogens.

Kingdom Plantae:

a) Plants are multicellular, eukaryotic and photosynthetic organisms.

b) Cell wall is made up of cellulose.

c) Starch is reserve food.

d) It includes mosses, liverworts, ferns, conifers and flowering plants.

Kingdom Animalia:

a) Animals are multicellular, eukaryotic, heterotrophic organisms.

b) They have higher levels of system development.

c) They represent consumer in a food web.

d) It represents the largest of the five kingdoms.

13. Write down the salient features of the following:

Thallophyta: (*Thallos* – a young shoot, *phyton* – plant)

a) It includes non- vascular, autotrophic plants.

b) Plant body without true roots, stems or leaves.(known as **thallus**)

c) Cell wall is made up of cellulose.

d) Mostly aquatic; thallus ranges from microscopic-unicellular, filamentous to giant macroscopic form.

e) Embryo stage is absent.

e.g. *Chlamydomonas*, *Spirogyra*, *Fucus* etc.

Pteridophyta: (*Pteridos* – fern, *phyton* – plant)

a) It includes seedless vascular plants.

b) Root, stem and leaves are present.

c) Spore bearing plants.

d) Reproductive structures are called sporangia.

e.g. *Dryopteris*, *Marsilea*, Horse tail etc.

Bryophyta: (*Bryon*-moss, *phyton*- plant)

a) Plants are small, found in humid and shady places.

b) Plant body differentiated into stem and leaf like structures.

c) Rhizoids are present.

d) The male reproductive structure requires water for their movement. Hence, they are also known as amphibians of the plant kingdom.

e) Vascular system is absent

f) Plant body may be flattened in liverworts, erect, stem-like or branched in mosses.

e.g. *Funaria, Riccia* etc.

Spermatophyta: (*Sperma*-seed, *python*-plant)

a) It includes seed bearing plants.

b) It consist of angiosperms and gymnosperms

c) The body is made up of root, stem and leaves.

d) Vascular system is well developed.

e) Angiosperms have seeds enclosed by fruits while gymnosperms have naked seeds.

e.g. *Pinus, Cycas*, Rice etc.

Cycadophyta:

a) These are palm like plants with large seed and pollen cones.

b) They form dominant vegetation during Mesozoic era.

c) Dioecious plant with pollen cones and seed cones developed on separate individuals.

e.g. *Cycas* (**Yendang**)

Ginkgophyta:

a) They are medium sized dioecious trees with tall and branched stems.

b) Leaves are similar in shapes to maidenhair fern.

c) Reproductive structures are called **pollen sacs** and **ovules** which are borne on dwarf shoots (known as strobili).

d) Seed are borne in pairs.

e.g. *Ginkgo biloba*

Gnetophyta:

a) It includes *Ephedra*, *Gnetum* and *Welwitschia*.

b) The stems of Ephedra are joined with small scale-like leaves at the nodes.

c) The bizarre, shredded, wind-blown leaves of *Welwitschia* arise from a woody caudex on the desert floor.

d) *Gnetum* have vessels and other angiospermic characteristics.

Coniferophyta:

a) The members are commonly called **conifers** and include *Pinus*, *Thuja*, *Araucaria*, etc.

b) They form dominant vegetation in temperate region and high altitude.

c) The reproductive structures are borne on cones.

d) Seed are borne on the surface of woody scales, the overlapping scales forming a cone.

14. Write down the salient features of the following:

Porifera:

a) Multicellular, aquatic (mostly marine), irregular animals (**cellular grade**) includes sponges.

b) Animals bear pores. (***Ostia* and *Osculum***).

c) Body wall is supported by spicules and spongin fibres.

d) Internal chamber and canals are lined with flagellated collar cells called **chaonocytes**.

e.g. *Spongilla, Euplectella,* etc.

Cnidaria:

a) Multicellular, radially symmetrical, diploblastic animals (**tissue grade**)

b) Animals with tentacles bearing stinging cells called **nematocysts.**

c) Life cycle consist of polyp (sedentary) and medusa (free swimming) generation.

e.g. *Hydra, Physalia, Metridium,* etc.

Platyhelminthes:

a) Dorsi-ventrally flattened, bilaterally symmetrical and triploblastic animals.

b) Digestive system incomplete without anus, and absent in parasitic form.

c) Coelom is absent.

d) Flame cells are the excretory organs.

e.g. Liver flukes, Tapeworms etc.

Rotifera:

a) Microscopic, aquatic animals.

b) They possess a rotating ciliated wheel organ called **corona.**

c) The anterior end of the animal resembles an electric shaver.

e.g. *Brachionus, Philodina* etc.

Gastrotrica:

a) The animals are microscopic, free living, acoelomate, aquatic worms.

b) The animals have powerful sucking pharynx.

c) They are microphagus, detritivorous, benthic community.

d) They are preyed upon by turbellarians.

e.g. *Chaetonotus*.

Nematoda:

a) The body of the animals are worm like, circular in section.

b) Free living in soil or water and others are parasitic.

c) Sexes are separated.

d) Trichinisis (caused by *Trichenella*), Filariasis (caused by *Wuchereria*), Ascariasis (caused by *Ascaris*) are some of human diseases.

e.g. Human round worm, Hookworm etc.

Mollusca:

a) Animal body is soft, bilaterally symmetrical and covered with mantle.

b) Exoskeleton is made up of calcareous shell.

c) Body is divided into an anterior head, visceral mass and a ventral muscular foot for locomotion.

e.g. Pila, Octopus, Squids etc.

Annelida:

a) Mostly aquatic or terrestrial; burrowing and some are parasitic.

b) Animals are triploblastic, bilaterally symmetrical.

c) Body is elongated with rings of segments.

d) They have true coelom (cavity lined with mesoderm).

e.g. Leeches, earthworm etc.

Arthropoda:

a) Animals are triploblastic, bilaterally symmetrical and segmented.

b) Body is covered with chitinous exoskeleton.

c) Body divided into head, thorax and abdomen.

d) Animals have jointed appendages.

e.g. Ant, Bees etc.

Echinodermata:

a) Animals with radial symmetry and radiating arms.

b) Body is distinguished into dorsal or aboral and ventral or oral surface.

c) Body wall bears calcareous plates often with spines.

d) Animals possess water vascular system and tube feet for locomotion.

e.g. Star fish, Sea Cucumber etc.

15. Write down three basic features of Chordata.

Ans: Characteristics features of Chordata:

a) An axial rod called **notochord** to support the body is present.

b) They possess a single dorsal tubular nerve cord.

c) A series of pharyngeal gill slits.

d) A post-anal tail is present (heart is ventral).

16. Enumerate the living classes under subphylum Vertebrata.

Ans:

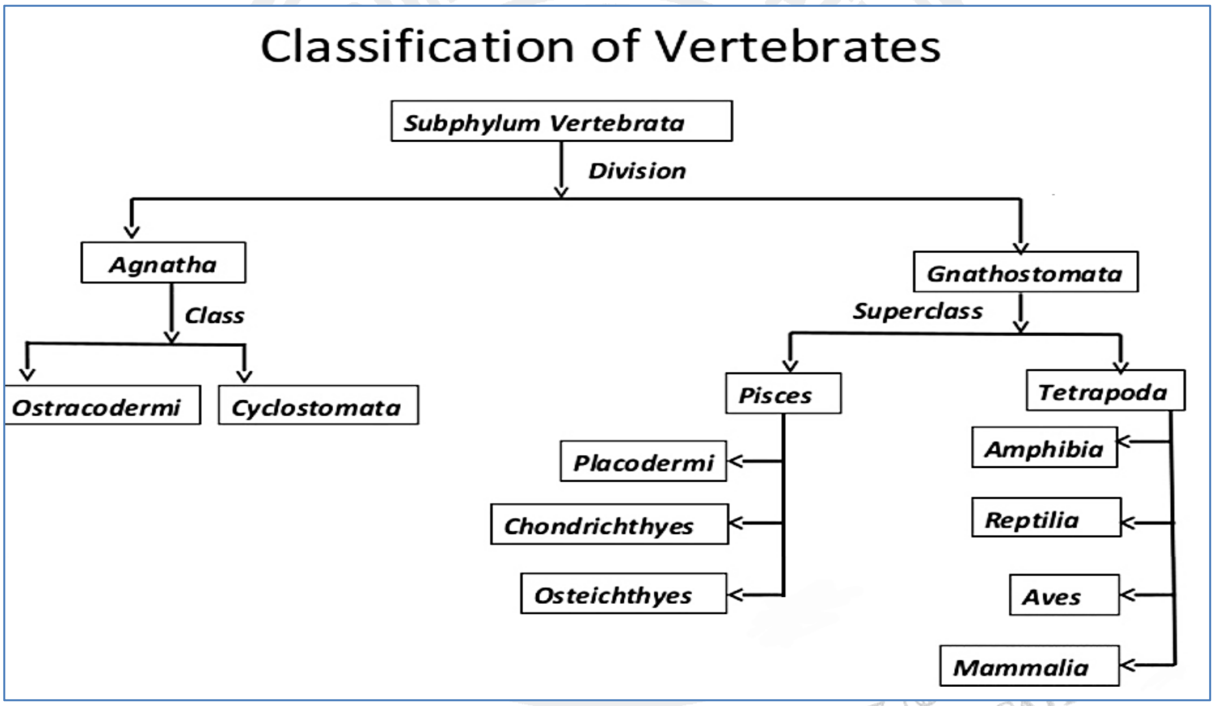

Fig. A schematic diagram of Classification of Vertebrates

The major Classes of sub-phylum Vertebrata are described below:

a) **Ostracodermi:** Primitive, fish like jawless animals e.g. *Cephalapsis*

b) **Placodermi:** Extinct, armoured fishes with jaws e.g. *Climatius*

c) **Cyclostomata:** **Eel like jawless and scaleless fishes** e.g. Lamprey

d) **Chondrichthyes:** Marine fishes with cartilaginous endoskeleton and placoid scales e.g. Shark

e) **Osteichthyes: Fishes with bony endoskeletons, body with or without scales** e.g. ***Pengba, Shareng***

f) **Amphibia:** Cold-blooded, 3-chambered heart, gilled aquatic larvae and air-breathing adults, intermediate between fishes and reptiles e.g. frogs, toads, salamander, etc.

g) **Reptilia:** Cold-blooded, 3-chambered heart, oviparous, four legs, breathing through lungs, scales or scutes or bony plates, e.g. crocodile, turtle, snakes, lizard, etc.

h) **Aves:** Warm-blooded, 4-chambered heart, endothermic, forelimbs are modified into wings, lungs for respiration, oviparous, beak without teeth, pneumatic bones, e.g. sparrow, eagle, hawk, etc.

i) **Mammalia:** Warm-blooded, 4-chambered heart, endothermic, nourished their young ones with milk secreted by mammary glands, presence of hairs or fur, sweat glands in skin, specialized teeth, e.g. human being, bat, monkey, elephant, cat, dog, etc.

17. Write briefly on the following classes.

Chondrichthyes:

a) Skin is covered with scales and fins present.

b) Marine fishes with cartilagenous endoskeleton

c) Gills are the respiratory organs, without operculum.

d) Cold-blooded animals with placoid scales.

e) Heart has two chamber e.g. *Scoliodon*, etc.

Osteichthyes:

a) Skin is covered with scales and fins present.

b) Fresh fishes with bony endoskeleton.

c) Gills are the respiratory organs, with operculum.

d) Cold-blooded animals with cycloid or ptenoid scales.

e) Heart has two chamber e.g. ***Shareng*** etc.

Amphibia:

a) First group of four limb land vertebrates

b) Larval Stages are aquatic and fish like

c) Skin always moist, used as an accessory respiratory organ.

d) Three chambered heart is present.

e.g. Salamander, Frog, etc.

Reptilia:

a) Group of four-limbed land vertebrates with dry scales covering the body

b) Cold blooded animal with respiratory organ.

c) Crawling animals, lungs claws in digits.

d) Heart is three chambered most, while four chambered in Crocodiles

e.g. Lizard, Cobra, etc.

Aves:

a) Vertebrate with feathers, that covers the body.

b) Forelimbs are modified into wings for flight.(Some are flightless)

c) Lungs with air sacs and light bone, teeth absent.

d) Warm blooded animals and four chambered heart is present.

e.g. Parrot, Owl, etc.

Mamallia:

a) Warm blooded animals with hairs covering the body.

b) Mammary glands are present, produce milk to nurture young ones.

c) Lungs are the respiratory organ.

d) Most animals are viviparous (some are oviparous)

e.g. Dog, Rat, Monkey, Man, etc.

EXTRA QUESTIONS AND ANSWERS

1. **Why do we classify organism?**

   Ans: In order to study the broad groups of organisms of wide varieties in the easiest way.

2. **Write the taxonomic classification of man**.

   Ans: Taxonomic classification of Man:

   Phylum - Chordata
   Class- Mammalia
   Order- Primates
   Family- Hominidae
   Genus- Homo
   Species- *Homo sapiens*

3. **What are Phylum, Class, Order, Family, Genus and Species in taxonomic classification?**

   Ans: Phylum (Division) is highest category under a Kingdom, includes animals which possess common characteristic feature. e.g. **Phylum- Chordata** includes all animals with a notochord.

   Class is the taxonomic category in between Phylum and Order, includes animals of large group sharing certain common characteristics. E.g. **Class- Mammalia** includes warm blooded animals with fur, mammary glands etc.

   Order is the taxonomic category in between Class and Family, a subgroup under class which is based on the presence of certain characters. E.g. Order- **Lepidoptera** (butterflies and moths) are characterized by minute scales on their wings, a soft-bodied herbivorous larval form (caterpillar), mouth parts in the adult specialized for feeding on nectar from flower

   Family is the taxonomic category in between Order and Genus**,** include Group of organisms among which the differences are quite minor**.** e.g. **Family- Equiidae**, which include horses and their relatives.

Genus is the taxonomic category in between Family and Species and closely related species are grouped together in single genus. E.g. *Canis lupus* (wolf) is distinguished from *Canis familiaris* (dog)

Species is the basic taxonomic unit used to define a definite kind of living organism**.** Any two individuals are said to belong to the same species if they are able to interbreed and produce fertile offspring.

e.g. *Canis familiaris* (dog) is a species dog.

4. What is Angiosperm? Write its characters? What are its classifications and write characteristics features.

Ans: Angiosperms are the flowering plants which bear seeds enclosed within ripened ovary.

Characteristics:

a) Cotyledons are present.

b) They are flowering plants and seeds are developed inside fruit

c) Plant body is divided into root system and shoot system

d) Microsporophyll and Megasporophyll are arranged in flowers which may be unisexual or bisexual.

Classifications:

DIFFERENCES	
MONOCOTYLEDONEAE	**DICOTYLEDONEAE**
a) Single cotyledon inside seed. **b)** Parallel leaf venation **c)** Flower parts in 3's or its multiple. **d)** E.g. Rice, Wheat, etc.	**a)** Two cotyledons inside seed. **b)** Branched or reticulate venation. **c)** Flower parts in 4's or 5's. **d)** E.g. Pea, Potato, etc.

5. Write one character each of the subphyla of Chordata.

Ans: Urochordata: Notochord present in tail region, includes tunicates.

Cephalochordata: Notochord extends throughout the length of the body, includes Lanceolets.

Vertebrata: Notochord becomes transformed into a vertebral column, includes chordates.

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