



CHAPTER 14 BIOLOGICAL DIVERSITY

NOTES

BIOLOGICAL DIVERSITY:

- It is the variation of life forms, occurring within a given ecosystem, locality or on the entire Earth.
- It is the variation at all levels of biological organization.
- According to United Nations Earth Summit in Rio de Janeiro - Biodiversity is defined as the variability among living organisms from all sources, including ‘*inter alia*’, terrestrial, marine and other aquatic ecosystems”.

GLOBAL BIODIVERSITY:

- Total no. of species: **10 to 50 million species**; only about **1.5 million species** are known and recorded.
- **Need for Classifications:** It is a huge task to study all the living organisms. So, classification is essential for studying organisms by grouping them into groups based on similarities and dissimilarities.

TAXONOMY: Identification, Nomenclature and Classification.

IDENTIFICATION:

- It is the first step of assigning a pre-existing **taxon name** to an organism (or a process of describing organism).

NOMENCLATURE: (Carolus Linnaeus is known as Father of taxonomy)

- It is the second step i.e. naming of organisms. Carolus Linnaeus introduced **binomial nomenclature** in 1758.
- Accordingly the scientific name consist of two Latin or Latinized words; first word- **generic name** (and should always begin with a capital letter) while the second word represents **species epithet** that starts with small letter; **italicized when printed** or **separately underlined** when hand written.



TAXONOMIC HEIRARCHY:

- Classification is not a single step process and involves hierarchy of steps that represent a **rank or category**.
- Each unit of classification is known as **taxon**.

SIX MAJOR TAXONS

Phylum / Division (plants)

Class

Order

Family

Genus

Species

- **Phylum/Division** is the highest rank or taxon under kingdom, while **species** is lowest rank of classification. **Species** may be defined as morphologically identical, interbreeding population capable of producing fertile offspring.
- From phylum to species there has been increasing in similar characteristics.
- **Aristotle** (Father of biological classification).
- **John Ray** was credited with revising the concept of naming and describing organisms and also coined the term species.

FIVE KINDOM SYSTEM OF CLASSIFICATION:

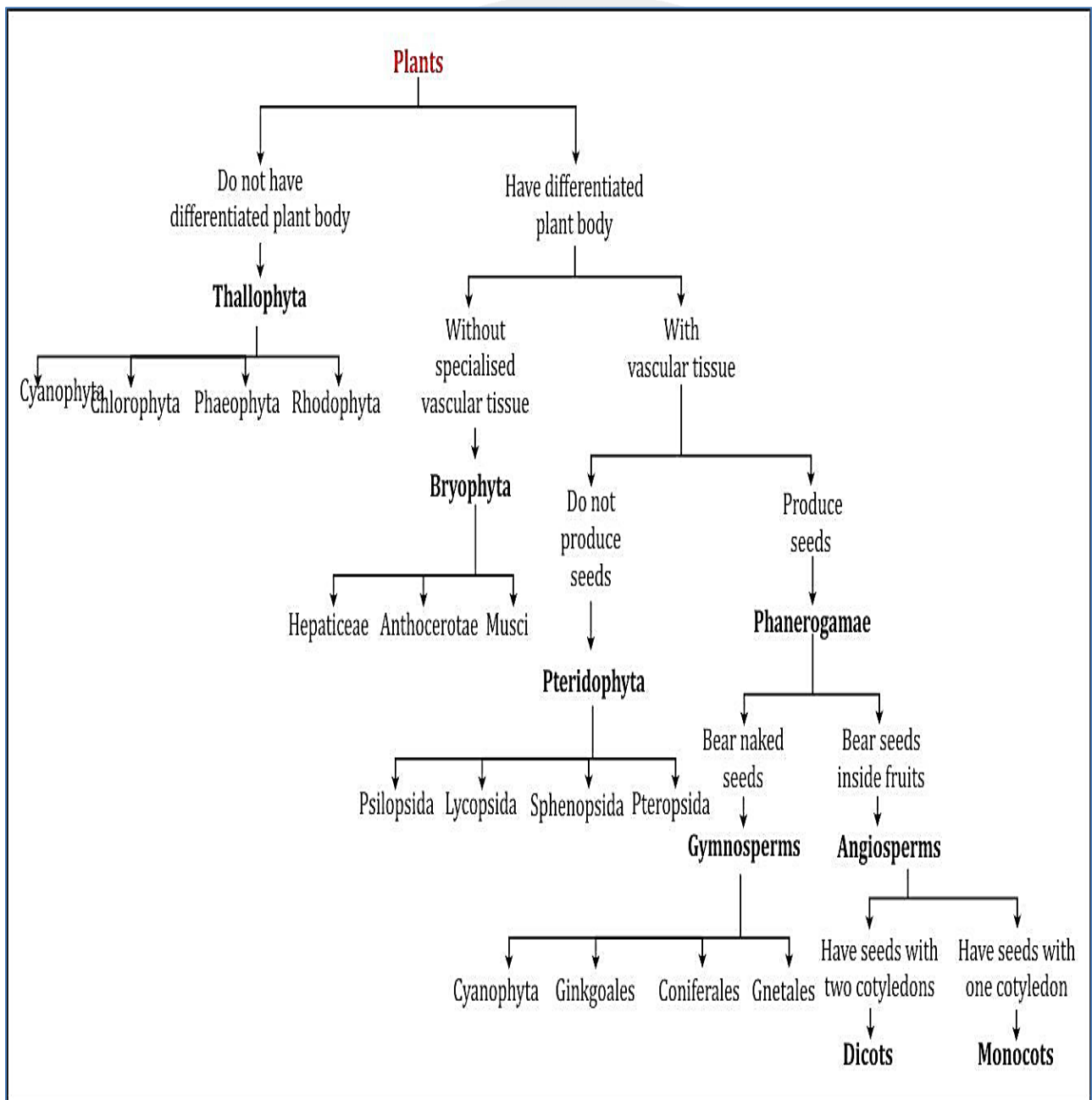
- **proposed by Robert H. Whittaker.**
- It is based on **kind of cells, number of cells and mode of nutrition.**
The 5 kingdoms are
- **Kingdom Monera** - includes unicellular prokaryotic organisms.
- **Kingdom Protista** - includes unicellular, autotrophic or heterotrophic, eukaryotic organisms.
- **Kingdom Fungi** - includes multicellular, heterotrophic, eukaryotic organisms, with cell wall.
- **Kingdom Plantae** - includes multicellular, autotrophic, eukaryotic organisms with cell wall.
- **Kingdom Animalia** - includes multicellular, heterotrophic, eukaryotic organisms, without cell walls.



KINGDOM PLANTAE:

- Plants are multicellular, eukaryotic and photosynthetic organisms.
- They form the basis of food web in terrestrial ecosystems.
- Plantae includes mosses, liverworts, ferns, conifers and flowering plants.

SUMMARY OF CLASSIFICATION OF PLANTAE





COMPARISION OF DIVISION OF KINGDOM PLANTAE

THALLOPHYTA	BRYOPHYTA	PTERIDOPHYTA
<ul style="list-style-type: none"> ➤ Non-vascular, autotrophic plants. ➤ Plant body is known as thallus without true roots, stems or leaves. ➤ Mostly aquatic; thallus ranges from microscopic-unicellular, filamentous to giant macroscopic form. ➤ Embryo stage is absent. 	<ul style="list-style-type: none"> ➤ Non-vascular plants found in humid and shady places with rhizoids. ➤ Plant body differentiated into stem and leaf like structures; flattened in liverworts, erect, stem-like or branched in mosses. ➤ Reproductive structure requires water for their movement. Hence, they are also known as amphibians of the plant kingdom. 	<ul style="list-style-type: none"> ➤ It includes seedless vascular plants. ➤ Root, stem and leaves are present. ➤ Spore bearing plants. ➤ Reproductive structures are called sporangia.

GYMNOSPERMS	ANGIOSPERMS
<ul style="list-style-type: none"> ➤ Vascular, seed bearing plants. ➤ Seeds are naked and do not enclosed by fruits. ➤ Reproductive organ is called cone. ➤ Xylem has tracheids while phloem with sieve cells. ➤ Pollen cone produce pollen grain while female cone produce egg within naked ovule. 	<ul style="list-style-type: none"> ➤ Vascular plant that produce flowers. ➤ Seeds are enclosed by fruits. ➤ Flower is the reproductive structure; stamen is the male reproductive organ, produce pollen grain while carpel is the female reproductive organ, produce egg within ovule. ➤ Xylem has tracheids while phloem with sieve cells.

KINGDOM ANIMALIA:

- Animals are multicellular, eukaryotic and heterotrophic organisms.
- They represent consumer in a food web.

Characteristics features of Chordata:

- An axial rod called **notochord** to support the body is present.
- They possess a single dorsal tubular nerve cord.



- A series of pharyngeal gill slits.
- A post-anal tail is present. (heart is ventral)

Phylum chordata is divided into **three** major sub-phyla:

1. **Urochordata:** Notochord present in tail region, includes tunicates.
2. **Cephalochordata:** Notochord extends throughout the length of the body, includes Lanceolets.
3. **Vertebrata:** Notochord becomes transformed into a vertebral column, includes chordates

COMPARISION OF MAJOR PHYLA OF ANIMAL KINGDOM AND CLASSES OF PHYLUM CHORDATA

1. Phylum - Porifera	2. Phylum - Cnidaria	3. Phylum - Platyhelminthes
<ul style="list-style-type: none"> • Multicellular, cellular-grade, aquatic animals with chaonocytes includes sponges. • Animals bear ostia and osculum. • Body wall with spicules. 	<ul style="list-style-type: none"> • Multicellular, tissue-grade radially symmetrical animals. • Animals have stinging cells called nematocysts • Life cycle - 2 generation sedentary polyp and free swimming medusa. 	<ul style="list-style-type: none"> • Worm-like, dorsi-ventrally flattened, bilaterally symmetrical, triploblastic animals. • Digestive system incomplete and absent in parasitic form. • Excretory organ- flame cells.
4. Phylum - Rotifera	5. Phylum - Gastrotrica	6. Phylum - Nematoda
<ul style="list-style-type: none"> • Microscopic, aquatic animals that possess a rotating ciliated wheel organ called corona. • The anterior end of the animal resembles an electric shaver. 	<ul style="list-style-type: none"> • Microscopic, free-living, acoelomate, aquatic worms. • They are detritivores, benthic-animals with powerful sucking pharynx. 	<ul style="list-style-type: none"> • Worm, circular in section. • Free living in soil or water and others are parasitic. • Sexes are separated.
7. Phylum - Mollusca	8. Phylum - Echinodermata	9. Phylum - Hemichordata
<ul style="list-style-type: none"> • Animal are bilaterally symmetrical and covered with mantle. 	<ul style="list-style-type: none"> • Animals with radial symmetry and radiating arms; with dorsal and ventral/oral surface. 	<ul style="list-style-type: none"> • Marine invertebrates with somatochord. • Gill slits or pharyngeal gill

<ul style="list-style-type: none"> • Exoskeleton is made up of calcareous shell. • Body consists of head, visceral mass and a ventral muscular foot for locomotion. 	<ul style="list-style-type: none"> • Body wall bears calcareous plates, water vascular system and tube feet for locomotion. 	<p>clefts are present.</p>
Class- Chondrichthyes	Class-Osteichthyes	Class-Amphibia
<ul style="list-style-type: none"> • Marine fishes with fins. • Cartilagenous endoskeleton. • Cold-blooded animals with placoid scales. 	<ul style="list-style-type: none"> • Fresh water fishes with fins. • Bony endoskeleton. • Cold-blooded animals with cycloid or ctenoid scales. 	<ul style="list-style-type: none"> • Four limbed land vertebrates • Cold-blooded animals. • Larval Stages are aquatic and fish like. • 3-chambered heart, • e.g. frogs, toads, salamander, etc.
Class - Reptilia	Class - Aves	Class - Mammalia
<ul style="list-style-type: none"> • Terrestrial, four-limbed land vertebrates with dry scales covering the body • Cold blooded animals with respiratory organ. • 3-chambered heart, oviparous, four legs, breathing through lungs, scales or scutes or bony plates. • e.g. crocodile, turtle, snakes, lizard, etc. 	<ul style="list-style-type: none"> • Warm blooded animals, feathers cover the body. • Forelimbs are modified into wings. Lungs present for respiration, jaws modified into beak without teeth. • 4-chambered heart, endothermic, oviparous, pneumatic bones. • e.g. sparrow, eagle, hawk, etc. 	<ul style="list-style-type: none"> • Warm blooded animals with hairs on the body. • Viviparous animals with mammary glands. • Lungs are the respiratory organ. • 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. man, bat, monkey, elephant, etc.

