HOLY FAITH PRESENTATION SCHOOL

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Term-II ***(Cass 9th – Biology)***

Chapter: diversity in living organisms

Diversity: This earth is full of organisms of various shapes and sizes. The largest Phylum of animal kingdom alone contains over a million species. There are varieties of plants, right from small grasses to tall Eucalyptus trees. This variety in living beings is called diversity.

Biodiversity: The variety of animals and plants living in a given geographical area is called biodiversity of that geographical area.

Need for a System of Classification: Because of the huge diversity in living beings it becomes very difficult task to study each of them one by one. To make their study easier animals and plants were categorized in groups and sub¬groups. Thus the system of classification started.

Classification by Aristotle: Aristotle classified animals according to their living environment. So he categorized them as either aquatic or terrestrial.

Drawbacks of Aristotle's Classification: Both in sea as well as on land we can find animals and plants. Moreover, there are very small animals, like sea-horse, along with large animals, like whale. So, this was not a good basis of classification.

Basis of Classification

(a) Presence or Absence of Nucleus in Cells

Prokaryotes: Those organisms which have cells without well defined nucleus are called prokaryotes.

Eukaryotes: Those organisms which have cells with well defined nucleus are Called eukaryotes. Presence of nucleus and membrane-bound organelles gives better efficiency to cells.

(b) Number of Cells in an Organism

Unicellular: Those organisms having single cell are termed as unicellular organisms. In them the single cell is responsible for carrying out all necessary functions to maintain life.

Multicellular: Those organisms having more than one cell are called multicellular organisms. Because of more number of cells there can be some division of labour to gain more efficiency.

© Mode of Nutrition

Autotrophs: Organisms producing their own food are called autotrophs. All green plants are autotrophs. They have a pigment (chlorophyll) in green parts which facilitates photosynthesis.

Heterotrophs: Organisms dependent on either plants or animals are called heterotrophs.They don't have chlorophylls. All animals, fungi and certain bacteria and protozoa belong to this group.

(c) Level of Organisation in Body

In multicellular organisms which are small, like hydra particular group of cells are assigned a particular function. But in larger organisms, tissues group to form an organ, which in turn make organ system. For example, in human beings there are separate systems for performing specific tasks.

Even in larger plants there is separate root system for conduction of water and minerals, leaf for photosynthesis and flowers for reproduction. Based on these characters organisms can be further classified into various sub-groups.

Evolutionary Relationship or Phylogenetic Relationship

Charles Darwin wrote a book "Origin of Species' in 1859 and gave his theories of evolution. As per his theories all organisms have evolved from unicellular organisms. Primitive body designs came early in evolutionary history leading to more complex designs. This gave rise to such a huge diversity in life forms. Because of common ancestry, all organisms are related. The closer evolutionary relation between two organisms is also one of the basis of classification of organisms.

The Hierarchy of Classification—Groups

Biologists, such as Ernst Haeckel (1894), Robert Whittaker (1959) and Carl Woese (1977) have tried to classify all living organisms into broad categories, called kingdoms.

Whittaker's Five Kingdom Classification:

Monera

Protista

Fungi

Plantae

Animalia.

Further Levels of Classification Beyond Kingdom

Phylum (for animals)/Division (for plants)

Class

Order

Family

Genus

Species

Thus, by separating organisms on the basis of a hierarchy of characteristics into smaller and smaller groups, we arrive at the basic unit of classification, which is a 'species'. Broadly, a species includes all organisms that are similar enough to breed and perpetuate.

Monera

These organisms do not have a defined nucleus or organelles and are unicellular.

Cell walls present in some organisms of this group.

Nutrition: Autotrophic or heterotrophic

Examples: Bacteria and blue-green algae

Protista

Unicellular eukaryotic organisms.

Locomotion: By Jair-like cilia or whip-like flagella for moving around in some members.

Nutrition: Autotrophic or heterotrophic.

Examples: Algae, protozoans {Plasmodium, Entamoeba)

Fungi

Heterotrophic eukaryotic organisms.

Nutrition: Saprophytic they use decaying organic materials as food.

Lichens: Some fungi live in a symbiotic relationship with cyanobacteria. They are called lichens. The algal part provides food and the fungal part provides minerals and substratum.

Plantae

Multicellular eukaryotes with cell walls.

Nutrition: Autotrophs use chlorophyll for photosynthesis.

• Animalia

Multicellular eukaryotes without cell walls.

Nutrition Heterotrophs.

Classification of Kingdom plantae

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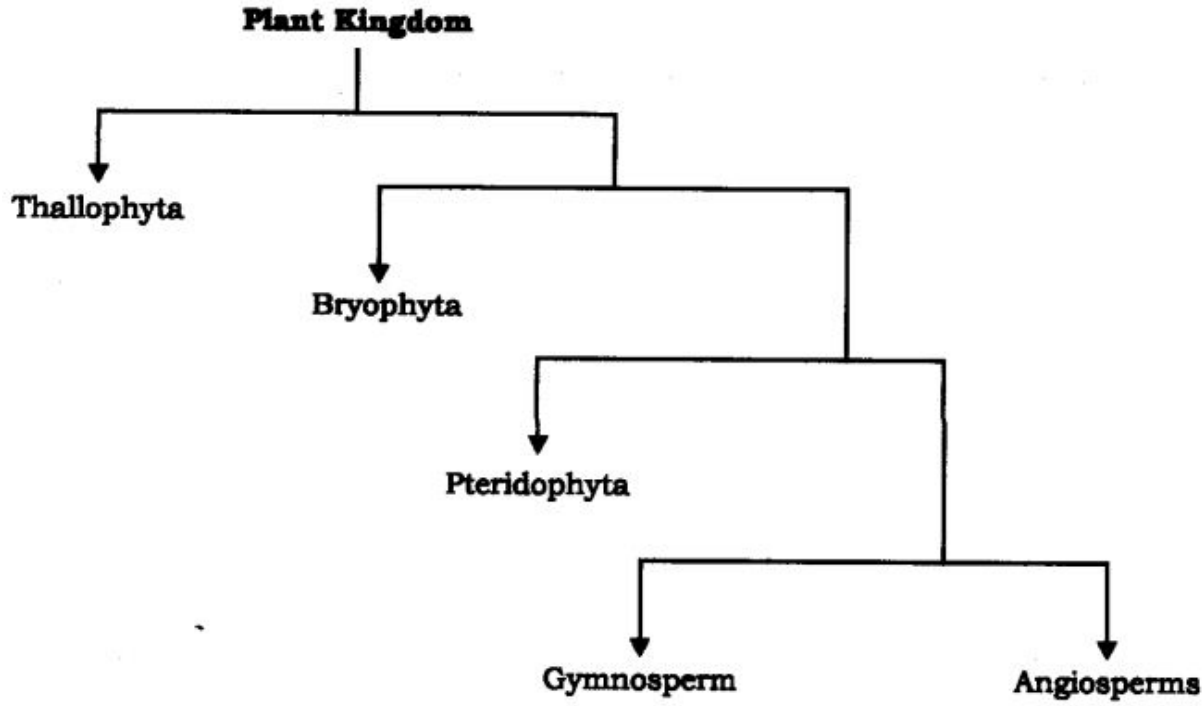

Thallophyta or Algae: Plants that do not have well-differentiated body design fall in this group. The plants in this group are commonly called algae. These plants are predominantly aquatic. Examples are Spirogyra, Ulothrix, Cladophora and Chora.

Bryophyta: These are called the amphibians of the plant kingdom. The plant body is commonly differentiated to form stem and leaf-like structures. However, there is no specialized tissue for the conduction of water and other substances from one part of the plant body to another. Examples are moss (Funaria) and Marchantia.

Pteridophyta: The plant body is differentiated into roots, stem and leaves and has specialized tissue for the conduction of water and other substances from one part of the plant body to another. Some examples are MarsUea, ferns and horse-tails.

Gymnosperms: The plants of this group bear naked seeds and are usually perennial, evergreen and woody. Examples are pines and deodar.

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Angiosperms: This word is made from two Greek words: angio means covered and sperma—means seed. The seeds develop inside an organ which is modified to become a fruit. These are also called flowering plants. Plant embryos in seeds have structures called cotyledons.

Cotyledons: Cotyledons are called 'seed leaves' because in many instances they emerge and become green when the seed germinates.

The angiosperms are divided into two groups on the basis of the number of cotyledons present in the seed.

Monocotyledonous: Seeds have a single cotyledon.

Dicotyledonous: Seeds have two cotyledons.

Classification of Kingdom Animalia: Kingdom Animalia is further classified into several following phylum. Each phylum has it own classes, sub-classes orders, families, etc.

1. Porifera

These are non-motile animals attached to some solid support which comprises of spicules of calcium carbonate, silica.

There are holes or "pores', all over the body. These lead to a canal system that helps in circulating water throughout the body to bring in food and oxygen.

Animals are covered with a hard outside layer or skeleton which comprises of spicules of calcium carbonate, silica.

They have very minimal differentiation and division into tissues.

Examples: Sponges

2. Coelenterata

Aquatic animals.

There is a cavity in the body hence the name Coelenterate (coelom means cavity).

Body is made of two layers of cells.

Examples: Hydra, Jellyfish

3. Platyhelminthes

The body is bilaterally symmetrical, meaning that the left and the right halves of the body have the same design.

There are three layers of cells from which differentiated tissues can be made, which is why such animals are called triploblastic.

There is no true internal body cavity or coelom, in which well developed

Organs can be accommodated.

The body is flattened dorsiventrally, meaning from top to bottom, which is why these animals are called flatworms.

They are either free-living or parasitic.

Examples: Planaria, Liver fluke

4. Nematoda

Body is bilaterally symmetrical and triploblastic.

Body is cylindrical rather than flattened.

False body cavity or a pseudocoelom, is present.

These are very familiar as parasitic worms causing diseases, such as the worms causing elephantiasis (filarial worms) or the worms in the intestines (roundworm or pinworms).

Examples: Ascaris, Wucheraria

5. Annelida

These are bilaterally symmetrical and triploblastic.

True body cavity present.

Body is divided into many ring like segments, hence the name annelida.

Examples: Earthworms, Leech

6. Arthropoda

The largest group of animals.

These are bilaterally symmetrical and segmented.

There is an open circulatory system, and so the blood does not flow in well defined blood vessels.

They have jointed legs (the word ‘arthropod’ means jointed legs’).

Examples: Ants, Cockroach, Grasshopper, Scorpions

7. Mollusca

These are bilaterally symmetrical.

Reduced coelomic cavity.

The soft body is covered with a hard shell made of calcium carbonate.

Examples: Snails, Mussels.

8. Echinodermata

In Greek, echino means hedgehog, and derma means skin. Thus, these are spiny skinned organisms.

Exclusively free-living marine animals.

Triploblastic animals with coelom.

They have a peculiar water-driven tube system that they use for moving around.

Skeleton made of calcium carbonate.

Examples: Starfish and Sea urchins

9. Protochordata

These animals are bilaterally symmetrical, triploblastic and have a coelom.

In addition, they show a new feature of body design, namely a notochord, at least at some stages during their lives.

The notochord is a long rod-like support structure (chord*string) that runs along the back of the animal separating the nervous tissue from the gut. It provides a place for muscles to attach for ease of movement.

Examples: Balanoglossus, Herdemarda and Amphioxus.

10. Vertebrata

These animals have a true vertebral column and internal skeleton, allowing a completely different distribution of muscle attachment points to be used for movement. Vertebrates are bilaterally symmetrical, triploblastic, coelomic and segmented, with complex differentiation of body tissues and organs. All chordates possess the following features:

Notochord

Dorsal nerve cord

Triploblastic

Paired gill pouches

Coelomate

Vertebrates are grouped into five classes:

1. Pisces

Body is streamlined and has fins and tail for swimming.

Skin is covered with scales.

Skeleton can be made of bone or cartilage.

Intake' of oxygen is by gills.

Cold-blooded animals.

The two-chambered heart is present.

Examples: Fishes like Rohu, Tuna, Shark

2. Amphibia

They are adapted to live both on land and water.

Respiration is through either gills or lungs.

The three-chambered heart is present.

Examples: Frogs, Toads, Salamander

3. Reptilia

These are crawling animals.

Skin is rough and modified to withstand extreme temperatures.

The heart is three chambered in most, while four-chambered in crocodiles.

Cold-blooded animals.

Examples: Lizards, Turtles, Snakes

4. Aves

Body is covered with feathers and forelimbs are modified for flying.

Breathing through lungs.

Warms blooded animals.

The four-chambered heart is present.

Examples: Sparrow, Eagle, Crow, Parrot

5. Mammalia

Mammary glands are present which produce milk to nurture young ones.

Skin is covered with hairs and has sweat glands and sebaceous glands.

Warm-blooded animals with four-chambered heart.

Most animals are viviparous (giving birth to live young ones), some are oviparous (producing eggs).

Examples: Man, Horse, Kangaroo, Lion

Conventions for writing the scientific names:

1. The name of the genus begins with a capital letter.

2. The name of the species begins with a small letter.

3. When printed, the scientific name is given in italics.

4. When written by hand, the genus name and the species name have to be underlined separately.