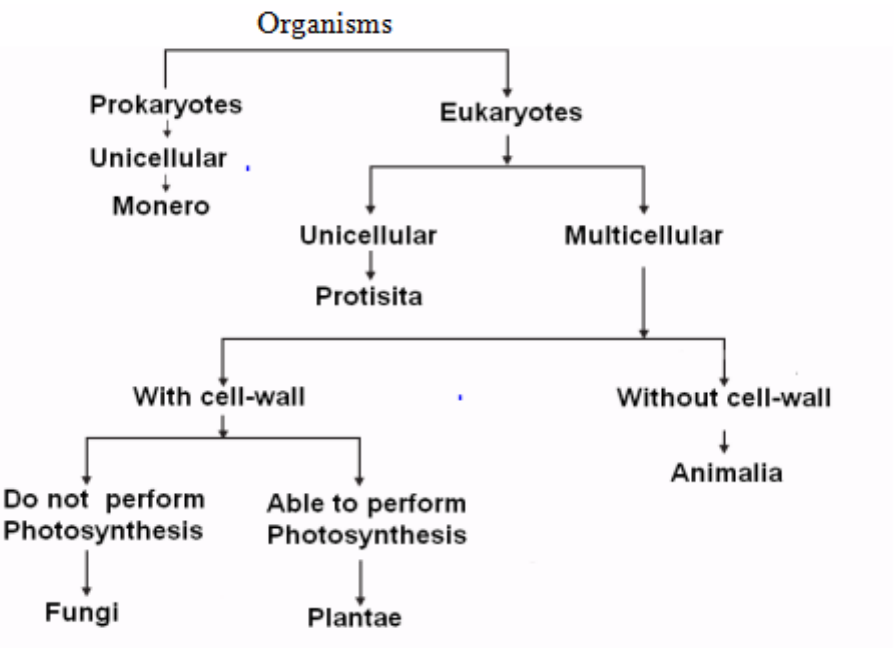
For XAT , CMAT , MAT , IIFT Exam

DIVERSITY IN LIVING ORGANISMS

- Classification helps us in exploring the diversity of life forms.
- The major characteristics considered for classifying all organisms into five major kingdoms are:
  1. Whether they are made of prokaryotic or eukaryotic cells
  2. Whether the cells are living singly or organised into multi-cellular and thus complex organisms
  3. Whether the cells have a cell-wall and whether they prepare their own food.
- All living organisms are divided on the above bases into five kingdoms, namely Monera, Protista, Fungi, Plantae and Animalia.
- The classification of life forms is related to their evolution.
- Plantae and Animalia are further divided into subdivisions on the basis of increasing complexity of body organisation.
- The binomial nomenclature makes for a uniform way of identification of the vast diversity of life around us.
- The binomial nomenclature is made up of two words – a generic name and a specific name
- The system of scientific naming or nomenclature we use today was introduced by **Carolus Linnaeus**
- **Carolus Linnaeus** called as father of taxonomy



The five kingdom classification

MONERA

- Prokaryotic (organisms do not have a defined nucleus), Unicellular.
- These organisms do not have a defined nucleus or organelles, nor do any of them show multi cellular body designs.
- The mode of nutrition of organisms in this group can be either by synthesising their own food (autotrophic) or getting it from the environment (heterotrophic).
- Some of them have cell walls while some do not
- This group includes bacteria (heterotrophic), blue-green algae or cyanobacteria(autotrophic), and mycoplasma

PROTISTA

- This group includes unicellular eukaryotic organisms
- Their mode of nutrition can be autotrophic or heterotrophic
- Examples are unicellular algae, diatoms and protozoans(Paramecium, Amoeba, Euglena)

FUNGI

- These are heterotrophic eukaryotic organisms
- Mostly multicellular but sometimes unicellular
- They have cell walls made of a tough complex sugar called chitin
- Source of food is
    - **Saprophytes** these organisms use decaying material for food
    - They are called **parasites**-organisms live inside body of other living organism to have food and can be disease causing
- Examples are yeasts, molds and mushrooms.

PLANTAE

- These are multicellular eukaryotes with cell walls
- They are autotrophs and use chlorophyll for photosynthesis
- They have cell wall
- Classification among plants depends on whether the plant body has well differentiated, distinct parts. Body is differentiated into leaves, stems, roots, flower, etc.
- There are two types of vascular tissues present in the plants: Xylem helps the transport of water. Phloem helps the transport of food.
- Reproduction through seeds or spores:
    - Phanerogamae: Plants with seeds are called phanerogamae .Contains embryo with stored food and they are multicellular.
    - Cryptogamae: Plants with spores are called cryptogamae .Contains only naked embryo and they are generally unicellular.Those with hidden reproductive organs
- Plants are divided into five groups: Thallophytes, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms

THALLOPHYTA

- Plants that do not have well-differentiated body design fall in this group
- The plants in this group are commonly called algae
- No vascular tissue present and reproduce through sores
- These plants are predominantly aquatic
- Examples are Spirogyra, Ulothrix, Cladophora, Ulva and Char

BRYOPHYTA

- These are called the amphibians of the plant kingdom
- The plant body is commonly differentiated to form stem and leaf-like structures.
- 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
- Vascular tissues present.

GYMNOSPERMS

- The plants of this group bear naked seeds without fruits or flowers
- Usually perennial, evergreen and woody
- Examples are pines and deodar

ANGIOSPERMS

- These are also called flowering plants
- The seeds develop inside an ovary which is modified to become a fruit
- Plant embryos in seeds have structures called 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
- Plants with seeds having a single cotyledon are called monocotyledonous or monocots
- Plants with seeds having two cotyledons are called dicots

ANIMALIA

- These include all organisms which are multicellular eukaryotes without cell walls.
- They are heterotrophs.
- Animals are divided into ten groups: Porifera, Coelenterata, Platyhelminthes, Nematoda, Annelida, Arthropoda, Mollusca, Echinodermata, Protochordata and Vertebrata

PORIFERA

- The word Porifera means organisms with holes. These are non-motile animals attached to some solid support. 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
- These animals are covered with a hard outside layer or skeleton. The body design involves very minimal differentiation and division into tissues
- Examples:Euplectella, Sycon, Spongilla

COELENTERATA

- Coelenterates are aquatic organisms, mostly marine and few fresh water forms.
- Hydra ,Jellyfish and sea anemones are common examples

NEMATODA

- The nematode body is also bilaterally symmetrical and triploblastic. However, the body is cylindrical rather than flattened. There are tissues, but no real organs, although a sort of body cavity or a pseudocoelom, is present.
- Some **examples** are Ascaris, Wuchereria

PLATYHELMINTHES

- The body is bilaterally symmetrical, meaning that the left and the right halves of the body have the same design
- Some examples are free-living animals like planarians, or parasitic animals like liver flukes

ANNELIDA

- Annelid animals are also bilaterally symmetrical and triploblastic, but in addition they have a true body cavity
- These animals are found in a variety of habitats– fresh water, marine water as well as land.
- Earthworms and leeches are familiar examples

MOLLUSCA

- In the animals of this group, there is bilateral symmetry.
- They have an open circulatory system and kidney-like organs for excretion. There is a foot that is used for moving around.
- **Examples** are snails and mussels

ARTHROPODA

- This is probably the largest group of animals.
- These animals are bilaterally symmetrical and segmented. There is an open circulatory system, and so the blood does not flow in welldefined blood vessels. The coelomic cavity is blood-filled. They have jointed legs (the word ‘arthropod’ means ‘jointed legs’).
- Some familiar examples are prawns, butterflies, houseflies, spiders, scorpions and crabs

PROTOCHORDATA

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

- Protochordates are marine animals.
- Examples are Balanoglossus, Herdmania and Amphioxus

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
- Vertebrates are grouped into six classes.
    1. Cyclostomata
    2. Pisces
    3. Amphibia
    4. Reptilia
    5. Aves
    6. Mammalia

CYCLOSTOMATA

- Cyclostomes are jawless vertebrates. They are characterised by having an elongated eel-like body, circular mouth, slimy skin and are scaleless
- Petromyzon (Lamprey) and Myxine (Hagfish) are **examples**.

PISCES

- These are **fish**. They are exclusively aquatic animals. Their skin is covered with scales/ plates. They **obtain oxygen dissolved in water** by using **gills**.
- They are **cold-blooded** and their **hearts** have only **two chambers**, unlike the four that humans have. They lay eggs.

AMPHIBIA

- These animals differ from the fish in the lack of scales, in having mucus glands in the skin, and a three-chambered heart. **Respiration** is through either **gills or lungs**.
- They lay eggs. These animals are found both in water and on land. Frogs, toads and salamanders are some examples
- Frogs, toads and salamanders are some **examples**

REPTILIA

- These animals are cold-blooded, have scales and breathe through lungs. While most of them have a **three-chambered heart**, **crocodiles** have **four heart chambers**
- They lay eggs with tough coverings and do not need to lay their eggs in water, unlike amphibians. Snakes, turtles, lizards and crocodiles fall in this category

AVES

- These are warm-blooded animals and have a four-chambered heart. They lay eggs
- They **breathe** through **lungs**. All birds fall in this category

MAMMALIA

- Mammals are warm-blooded animals with four-chambered hearts. They have mammary glands for the production of milk to nourish their young.
- Their skin has hairs as well as sweat and oil glands.
- Mammalia: Human, Cat, Whale, Rat, Bat

CLASSIFICATION AND EVOLUTION

- All living things are identified and categorized on the basis of their body design in form and function
- The classification of life forms will be closely related to their evolution
- Charles Darwin first described this idea of evolution in 1859 in his book “The Origin of Species”

HEREDITY AND EVOLUTION

- Transmission of character from one generation to next generation is called heredity
- The of Genetics was coined by W.Wattson
- Gregar mental was the first gave the idea of heredity based on his experiment. He is also known as father of Genetics
- Mental chosen pea plant for his experiment
- Human have 23 pair of chromosomes in which 22 pair are autosomes one pair is sex chromosomes
- In human male sex chromosome is XY and female sex chromosome is XX