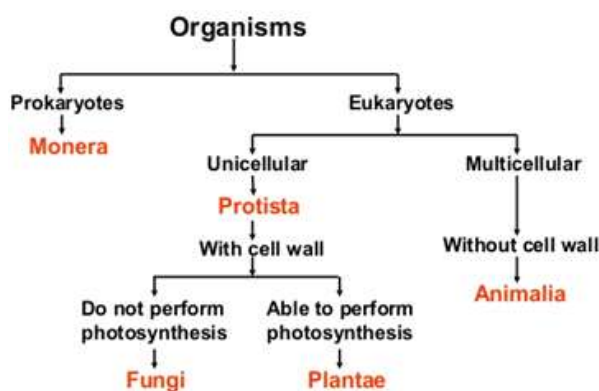


DIVERSITY IN LIVING ORGANISMS

CDF-1

1. **Classification** is the process by which anything is grouped into convenient categories based on some easily observable characteristics.
2. **Taxonomy** is the science of naming, defining and classifying group of biological organisms on the basis of shared characteristics.
3. **Hierarchy** of biological classification includes –**Kingdom, Phylum, Class, Order, Family, Genus, and Species.**
4. **Prokaryote cells** are cells that do not have true nucleus and membrane bound organelles.
5. **Prokaryotes** are the organisms that are unicellular and lack distinct nucleus due to the absence of internal membranes.
6. **Eukaryotic cells** have distinct nucleus surrounded by nuclear membrane and membrane bound organelles.
7. **R. H. Whittaker** proposed **five kingdom classification.** The kingdoms defined by him are

- 1) Monera: Bacteria
- 2) Protista: Protozoans, Algae, Diatoms
- 3) Fungi: Bread mould, Mushroom, Yeast
- 4) Plantae: Plants
- 5) Animalia: Animals



8. LEVELS OF ORGANISATION

Cellular level: It is loose association or aggregation of cells that are functionally differentiated.

Tissue level: An aggregation of cells that work in coordination. In this, cells performing similar function are arranged into tissue.

Organ level: Tissues aggregate to form a particular organ, each of which is specialized in a particular function.

Organ System level: Organs work together to perform a similar function such as digestion, respiration, circulation etc. They are called organ systems.

SYNOPSIS 5

DIVERSITY IN LIVING ORGANISMS

INTRODUCTION

- Diversity is the variety of living beings on earth.
- Diversity is a feature of living forms.
- Comparative study makes biology more efficient.
- Considering these diverse features i.e. similarities and dissimilarities, living organisms are classified.

DIVERSITY IN PLANTS

- Diversity is observed in plant form by observing the variations in types of roots, stem, leaves, flowers, fruits, seed etc. in different plants.

Example: i. The fruit of mango differs from the fruit of citrus.

ii. The flower of hibiscus differs from the flower of an orchid plant.

- Seeds also show a lot of diversity in plant.
- Plants having single cotyledons are named as **Monocotyledons** and they show **parallel venation**.
- Plants having double cotyledons are named as **Dicotyledons** and they show **reticulate venation**.
- In **Reticulate venation** arrangement of veins looks like a **network**.
- In **Parallel venation** veins are **parallelly** arranged in the leaf.

DIVERSITY IN ANIMALS:

- Diverse forms were evolved in animals during the course of evolution.
- Animals have characteristics based on which they are identified and classified.
- For example, differences is seen in the size, shape, colour, movement and other features of animals.

WHAT IS THE NEED OF CLASSIFICATION?

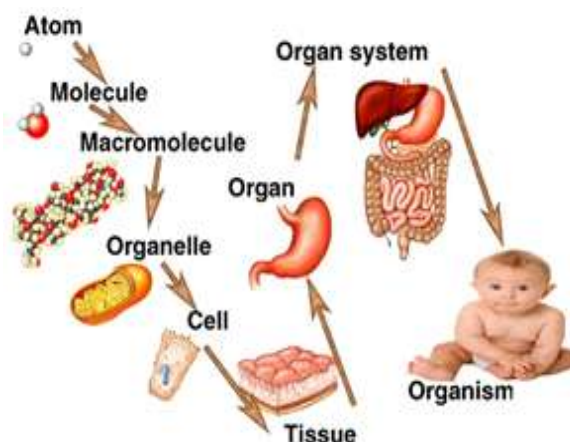
- Huge number of species on earth cannot be studied randomly so that, an orderly scientific approach is required to studying the organisms. For this purpose, classification is needed.
- Classification makes study of living forms simple, clear, efficient and convenient.
- Classifications represent interrelationships and reflect the trend of evolution.

CLASSIFICATION AND EVOLUTION:

- Evolution is the way in which organisms are transformed from simple to complex along timeline. Classification is the science of grouping organisms according to similarities and dissimilarities.
- Thus, evolution is the actual driving force in moulding the form and function of living things along the timeline, while classification is just based on the features existing in current time.
- If the interrelation represented by classification is true, it has to be according to evolution i.e. classification must reflect the trend of evolution only then it will be considered valid.

- Evolution proceeds in the direction of making the organisms more suitable to a particular environment so that, they become more fit in that environment. For that purpose, they gradually evolve from low to highly efficient and hence simple to complex.
- This complex is acquired over time so that older forms of life are simple and newer forms are more complex.

LEVELS OF ORGANISATION:



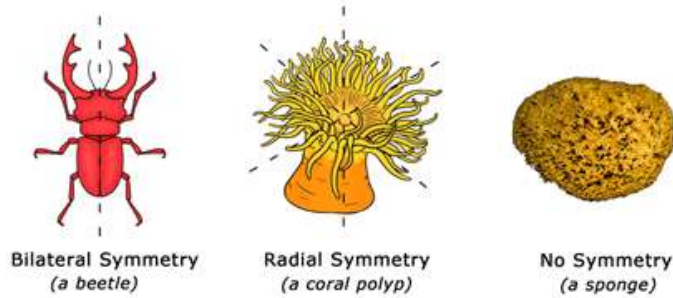
- **Cellular level:** It is a loose association or aggregation of cells that are functionally differentiated.
- **Tissue level:** An aggregation of cells which work in coordination. In this, cells performing similar functions are arranged into tissue.
- **Organ level:** In this level, tissues aggregate to form a particular organ each of which is specialised for a particular function.
- **Organ System level:** In this level, organs work together to perform a similar function such as digestion, respiration, circulation etc.

TYPES OF CIRCULATION

- **Open type of circulation:** Circulation in which the blood is directly pumped out of heart and the cells and tissues are directly bathed is called open circulation. **Example:** Lower chordates i.e. insects, spiders, prawns and molluscs.
- **Close type of circulation:** Circulation in which blood is circulated through a series of vessels i.e., arteries, veins and capillaries is called closed type of circulation. **Example:** Higher chordates i.e. birds, mammals, amphibians, fish, reptiles and invertebrates.

SYMMETRY

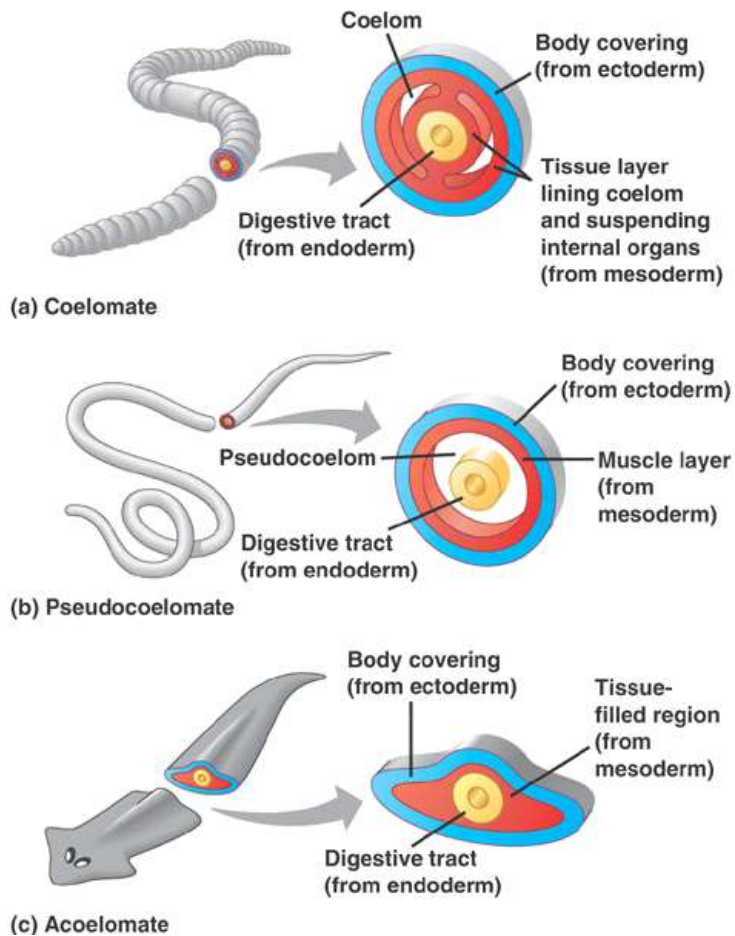
The arrangement of body parts in a symmetrical pattern is called **symmetry**.



- **Bilateral Symmetry:** The property of being divisible into two equal parts by a single median longitudinal plane is called **Bilateral Symmetry**.
- **Radial Symmetry:** The property of being divisible into two equal halves about a central axis, as in a star fish or a Tulip flower is called **Radial Symmetry**.
- **Asymmetry:** When an animal cannot be divided into two equal parts in any plane it is called **asymmetrical**.

COELOM:

The principal body cavity located between the intestinal canal and the body wall is called **Coelom**.



- **Acoelomates:** Animals which lack body cavity or coelom are called **Acoelomates**.
- **Pseudocoelomates:** Organisms with body cavity that is not derived from mesoderm, as in true coelom or body cavity are called **Pseudocoelomates**.
- **Coelomates:** Animals having true coelom or body cavity which is derived from mesoderm are called **Coelomates**.

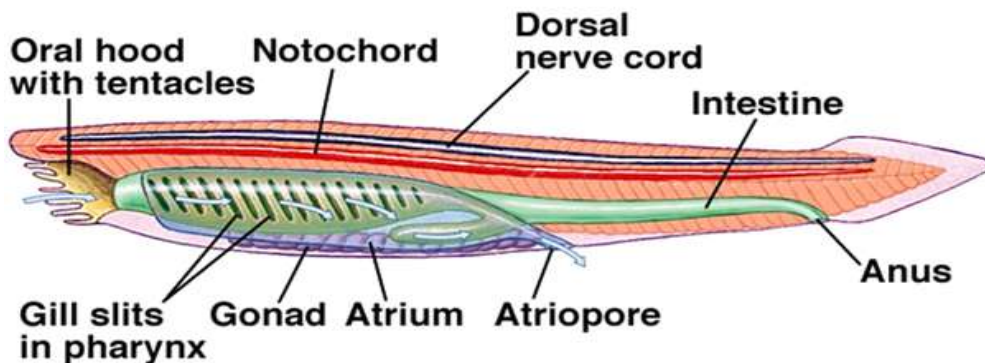
GERM LAYERS

During early stages of embryonic development, the cells differentiate and form germ layers.

- **Diploblastic animals:** Animals having two distinct germ layers i.e., outermost ectoderm and innermost endoderm are called **Diploblastic animals**.
- **Triploblastic animals** Animals having three distinct germ layers i.e., ectoderm, mesoderm and endoderm are called **Triploblastic animals**.

NOTOCHORD

- **Notochord** is the mesodermally derived rod-like structure formed on the dorsal side during embryonic development.



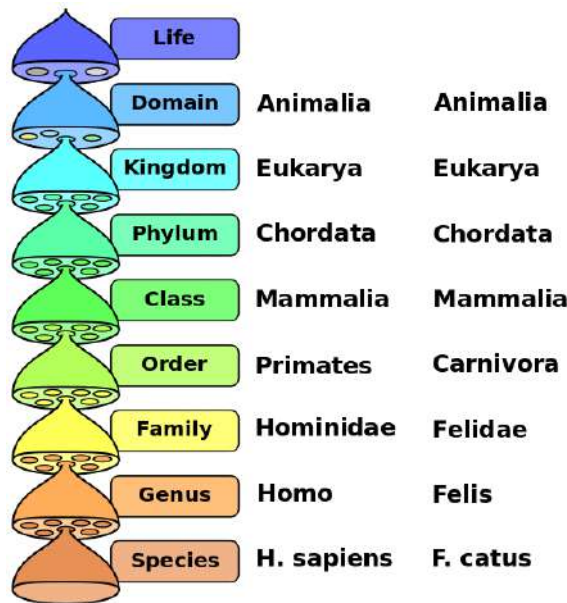
HISTORY OF CLASSIFICATION:



- Ancient Indian system of plant classification is based on the structure of flower.
- In modern times different biologists put forward different systems of classification like two kingdom, three kingdom, four kingdom, five kingdom, three domains and six kingdom classification.
- Two kingdom classification was proposed by **Linnaeus** in 1758 includes Kingdom Animalia and Plantae.
- In this he introduced binominals, the science of naming organisms with two different words and introduced frantc forms like species, genus, family, order classes, etc. that are still in use.
- Among the above systems of classification, **Whittaker's** system of classification is the most accepted one. This five kingdom classification groups the organisms as Kingdom Monera, Kingdom Protista, Kingdom Fungi, Kingdom Plantae and Kingdom Animalia.
- Criteria for **five kingdom classification** are **presence of nucleus** and **mode of nutrition**.
- Though five kingdom classification had advantages over previous systems of classification, modern biology techniques like Microbiology, DNA sequencing discovered some draw backs in five kingdom classification.

HIERARCHY OF CLASSIFICATION:

- Classification systems include some major groups which in turn includes sub groups, subgroups, and soon. This gradual grouping and subgrouping in descending order from kingdom to species level is called hierarchy.
- Hierarchy of biological classification includes – Life, Domain, Kingdom, Phylum, Class, order, family, genus, and species.



MONERA:

- Monera is characterized by **organisms without membrane-bound nucleus** and cell organelle. **Example:** Bacteria
- Monera includes:
 - 1) **Archaeobacteria**
 - 2) **Eubacteria**
 - 3) **Cyanobacteria. (Blue-green bacteria)**

PROTISTA (PROTOCTISTA):

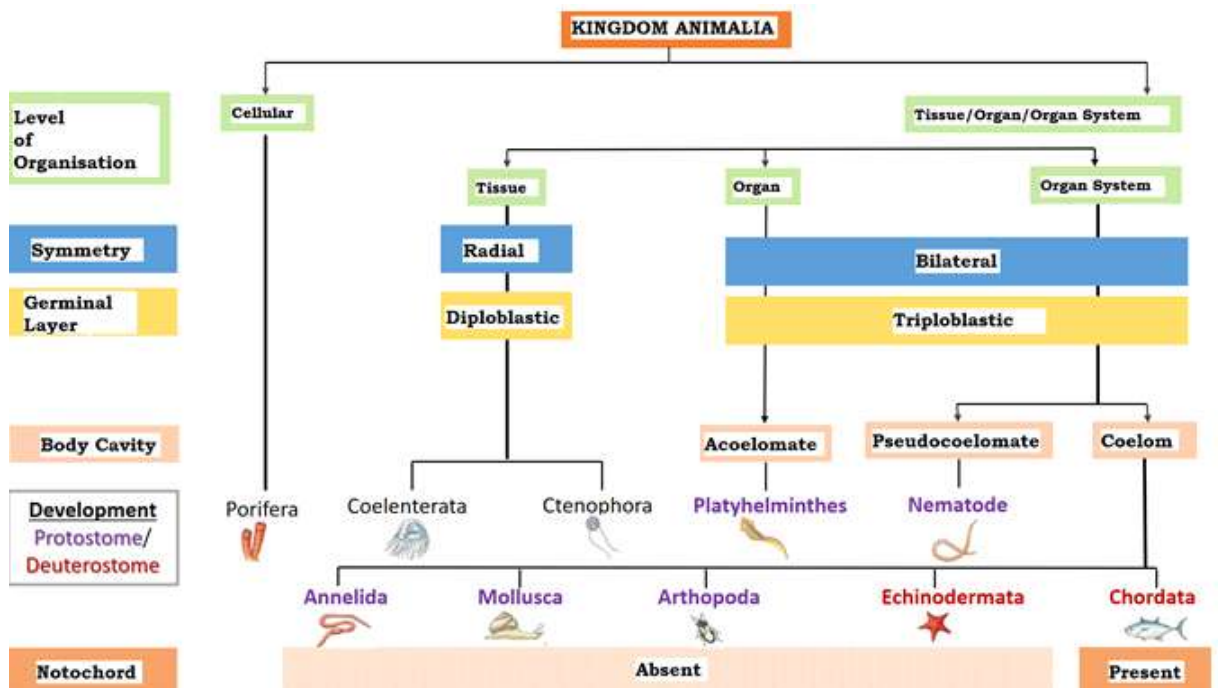
- These organisms are **single-celled eukaryotes** with membrane-bound nucleus and cell organelle. **Example:** Amoeba, Euglena and Paramecium.

FUNGI:

Fungi are multicellular (Rhizopus) and sometimes unicellular (yeast) organisms having net like body known as Mycelium that grow inside the substratum. **Eg:** Yeast, Bread, Mould and Mushrooms.

PLANTAE

- These are **multicellular, eukaryotic and autotrophic organisms**. They are further classified.
- **Thallophyta:** Thallus like body (undifferentiated), mostly autotrophic and aquatic.
- **Bryophyta:** Simple plants with no vascular system. They are amphibious.
- **Pteridophytes:** They are land plants with true vascular system.
- **Gymnosperms:** They are land plants bearing naked seeds.
- **Angiosperms:** They are flowering plants with seeds covered by fruits.

ANIMALIA

- These are **multicellular, eukaryotic and heterotrophic organisms**. They are further classified.
- **Porifera**: Pore bearing organisms.
- **Coelenterata**: Organisms with hollow gut.
- **Platyhelminthes**: Unsegmented flat worms.
- **Nematoda** : Unsegmented round worms.
- **Annelida**: Metamerically segmented worms.
- **Arthropoda**: These are animals with jointed appendages.
- **Mollusca**: Soft bodied animals.
- **Echinodermata**: Spiny skinned animals.
- **Chordata**: Dorsal nerve cord, notochord and gill slits.

WORKSHEET 05

1. Plants having single cotyledons are named as
 - 1) Monocots
 - 2) Dicots
 - 3) Angiosperms
 - 4) Gymnosperms
2. Dicotyledons show
 - 1) Parallel venation
 - 2) Reticulate venation
 - 3) Alternate venation
 - 4) None of these
3. Group of organisms that are structurally similar enough to interbreed are included in
 - 1) Domain
 - 2) Phylum
 - 3) Family
 - 4) Species
4. Coelomate refers to
 - 1) Animals with coelom
 - 2) Animals without Coelom
 - 3) Animals with Gut
 - 4) All
5. Smallest category of classification is
 - 1) Monerans
 - 2) Protista
 - 3) Plantae
 - 4) Species
6. Science of Naming is called
 - 1) Taxonomy
 - 2) Nomenclature
 - 3) Morphology
 - 4) Classification
7. Which of the following Phylum has spiny skinned animals?
 - 1) Mollusca
 - 2) Annelida
 - 3) Echinodermata
 - 4) Arthropoda
8. Eubacteria belongs to
 - 1) Protista
 - 2) Algae
 - 3) Monera
 - 4) Fungi

