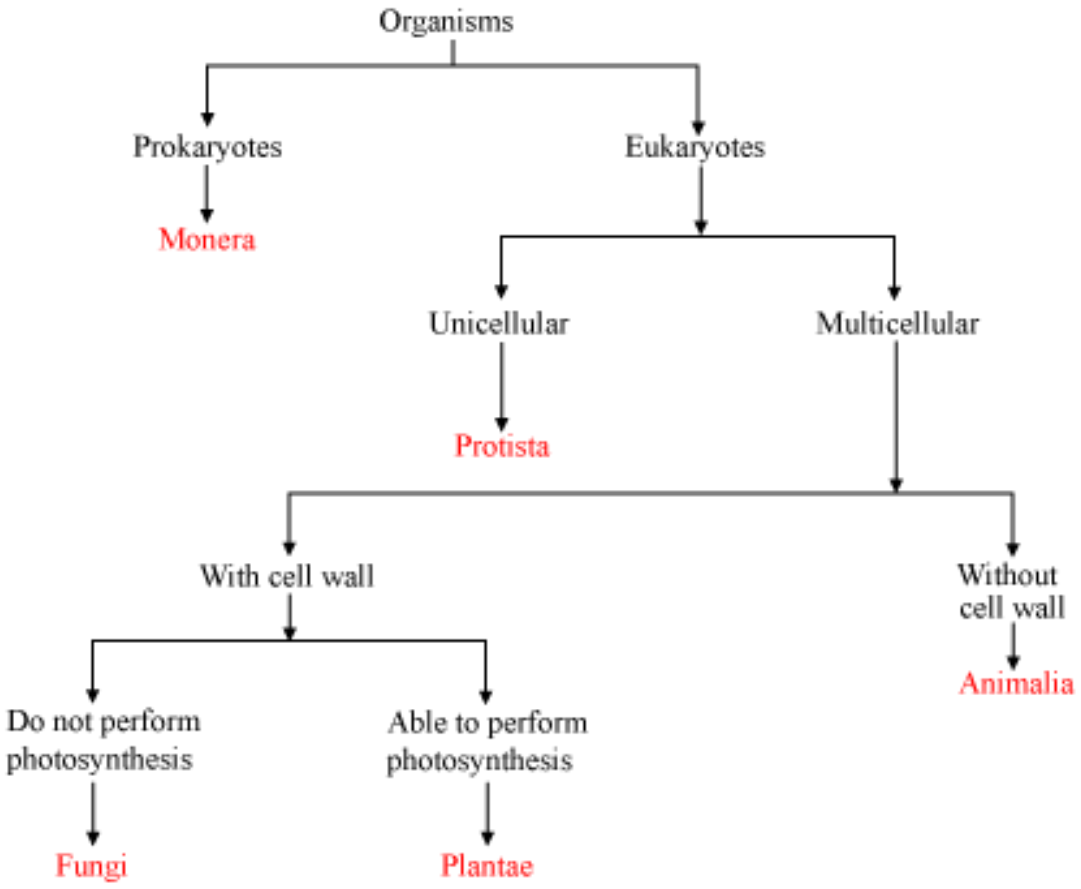
Classification of Plants

- R.H. Whittaker (in 1969) proposed a five-kingdom classification of living organisms
- The five kingdoms proposed by Whittaker are: Monera, Protista, Fungi, Plantae, and Animalia



Kingdom Monera: It includes mainly bacteria, blue-green algae, or cyanobacteria

- **Important features of Monera**:
    - Absence of well-defined nucleus or membrane-bound organelles- prokaryotic organisms.
    - All of them are unicellular
    - Can be autotrophic or heterotrophic

Kingdom Protista: It Includes protozoans such as, *Amoeba*, *Paramecium*, diatoms etc

- **Important features of protista**:
    - Unicellular, eukaryotic organism
    - Can be autotrophic or heterotrophic

Kingdom Fungi: Commonly known fungi are *Yeast*, mushroom, *Penicillium*, *Aspergillus*, etc.

- **Important features of fungi**:
    - Multicellular eukaryotic organisms
    - Always heterotrophic (saprophytes)
    - Cell wall made of chitin

Kingdom Plantae

- **Important features of Plantae**:
    - Multicellular eukaryotic organisms
    - Most of the plants contain chlorophyll. Hence, they are autotrophic
    - Cell wall is made of cellulose

Kingdom Animalia

- **Important features of Animalia**:
    - Multicellular eukaryotic organisms
    - Chloroplast is absent. Hence, they have heterotrophic mode of nutrition
    - Cell wall is absent

Bacteria

- Most primitive, unicellular, prokaryotic organisms
- Are found in almost every nook and corner of the Earth
- On the basis of shape, bacteria are of four types:
    - Cocci
    - Bacilli
    - Spirilla
    - Vibrio

- Their cell wall is made up of peptidoglycan, which may or may not be covered by a slimy protective layer, called capsule.
- They lack most of the cell organelles, except ribosomes and vacuoles.
- Some bacteria contain whip-like flagella that help in movement.
- Most of the bacteria are heterotrophic in nature, and derive their nutrition either from dead and decaying organic matter (saprophytes), or from living organisms (parasites).
- They reproduce asexually through binary fission.
- They have wide scale applications ranging from day to day life to various industries. For example in production of cheese, curd and antibiotics.
- Bacteria are potentially harmful too, as they cause spoilage of food and various kinds of diseases in humans.

Fungi

- Eukaryotic, unicellular or multicellular, non-photosynthetic organisms
- They are found in diverse shapes and sizes.
- Their cell wall is made up of chitin.
- A fungal body is made up of thin transparent thread-like structures, called hypha.
- An entire mass of hypha is known as mycelium.
- Sporangiophores are special hyphae that bear sporangium on the top.
- Sporangia are sac-like enclosed structures that contain spores within them. Once the spores get mature, sporangia burst to release them in the environment.
- Spores, on getting suitable substratum, germinate and give rise to new mycelium.
- Most of the fungi are saprophytic in nature, while some are parasitic on other plants and animals.
- Fungi reproduce asexually through budding and spore formation.
- Fungi are used in the production of antibiotics, in food industry, etc.
- They are responsible for spoilage of food and cause skin infections, like Athlete's foot and ringworm.

General study of *Amoeba*:

Amoeba is a unicellular organism. It belongs the kingdom Protista.

- It is found in ponds, ditches and places where there is stagnant water.
- *Amoeba* shows amoeboid movement with the help of pseudopodia.

- It feeds with the help of pseudopodia forming extensions around the food particles and resulting in the formation of food vacuole.
- It excretes the unwanted material through cell membrane and contractile vacuole.
- Respiration occurs through cell surface.
- It reproduces by binary fission under favourable conditions and by multiple fission under unfavourable conditions.

Kingdom Plantae: It include five divisions:

1. Division Thallophyta: Includes *Spirogyra, Cladophora*, *Ulva*

- Characteristic feature of Thallophyta:
  - Plant body is not differentiated into true root, stem, and leaves
  - Spores are produced as a result of fertilization

2. Division Bryophyta (also called amphibians of plant kingdom): Includes mosses, *Riccia*, *Marchantia*

- Characteristic feature of Bryophyta:
  - Specialised vascular tissues (such as xylem) for the conduction of water are absent
  - Body is differentiated into stem and leaf-like structures
  - Naked embryo i.e. spores are present.

3. Division Pteridophyta: Includes ferns, *Marsilea*, *Equisetum*

- Characteristic feature of Pteridophyta
  - Specialised vascular tissues for the conduction of water are present.
  - Naked embryo i.e. spores are present
  - The plant body is differentiated into roots, stems, and leaves.

4. Division Gymnospermae: Includes *Pinus*, cedar, fir, Juniper, *Cycas*, etc

- Characteristic feature of Gymnospermae:
  - Seed bearing, non-flowering plants.
  - Bear naked seeds, not enclosed inside fruits.

- Vascular bundles are present, but xylem lacks vessels and phloem lacks companion cells.
- Flowers are absent. Instead, male and female cones are found.

5. Division Angiospermae: Includes all flowering plants

- Characteristic feature of Angiospermae:
  - Flowering plants in which seeds are enclosed inside fruits.
  - These plants bear flowers that consist of four whorls – calyx, corolla, androecium, and gynoecium
  - Seeds develop inside the ovary, which develops into a fruit

- Major groups of Angiosperms
  - **Monocotyledons:** Seeds that have one cotyledon. E.g. maize, wheat etc
  - **Dicotyledons**: Seeds that have two cotyledons. E.g. Sunflower, gram etc