

Characteristics of Kingdoms

1. Kingdom Bacteria or Monera

- organisms are:
 - Unicellular
 - Reproduction is asexual by **Binary Fission**
 - Cell walls composed of *peptidoglycan*
 - Prokaryotic (no true nucleus present)
 - Some are Saprophytic or Parasitic
 - Saprophytic = feeding on dead substances
 - Parasitic = feeding on living organisms.
 - Autotrophic (cyanobacteria) or heterotrophic.
 - Microscopic
 - Nonmotile and motile
 - Motility accomplished by means of a flagellum.
 - Found in THREE shapes:
 - **Round** = Coccus (cocci - plural)
 - **Spiral** = Spirillus (Spirilli – plural)
 - **Rod** = Bacillus (bacilli – plural)

Example of Life Cycle of Monera and Archaeobacteria :

The bacterial cell, (E. coli), reproduces by binary fission. (See Figure 5.4, p. 134).

Binary Fission

1. As the bacterial cell grows, it makes a copy of its original, single chromosome.
2. The cell elongates and separates into the two chromosomes.
3. Cell partition or septum forms between the two chromosomes.
4. The septum completes itself and distinct walls form.
5. The cells separate and two new cells are produced.

2. Kingdom Archaea or Archaeobacteria

- Similar to bacteria
- Reproduction is asexual by **Binary Fission**
- Survive in *extreme* environments. (volcanoes, hot springs, ocean vents)
- Biochemically and genetically different than bacteria
- Has same shapes as other bacteria
- Found as three types:
 - Methanogens = Producers of methane.
 - Halophiles = “salt loving” bacteria
 - Thermophiles = “heat loving” bacteria

3. **Kingdom Protista** organisms are:

- Unicellular (one cell)
- Colonial (living in groups) or multicellular
- Autotrophic (euglena) and heterotrophic (by ingestion)
- Some are motile
- Reproduction is both Sexual and Asexual.
- Eukaryotic
- Exist as one of three types
 - i. *Protozoans (Animal-like) → ingest food (heterotrophs)*
 - ii. *Algae (Plant-like) → carry out photosynthesis*
 - iii. *Slime/Water moulds*

Ex: Paramecium, Euglena, Volvox, Amoeba

Reproduction in Protists/ Protist Life Cycle

Example of a Protist Life Cycle: (See Figure 5.15, p. 146).

Plasmodium vivax (a human parasite), causes one type of **malaria** in humans.

Stages of Plasmodium Life Cycle

1. A mosquito bites an infected person and ingests the reproductive cells of the Plasmodium present in red blood cells.
2. The gametes (reproductive cells) fuse to form a (diploid) zygote inside the gut wall of the mosquito and divide many times to form numerous spore-like fragments or sporozoites. The zygote breaks open releasing the sporozoites (spore cells).
3. The sporozoites migrate and invade the salivary glands of the mosquito. From here, they will be injected into a new human host when bitten by the mosquito.
4. Once inside the new human host, sporozoites will reproduce asexually in the liver to form a second type of sporelike cell. The cells leave the liver and enter the bloodstream where they invade red blood cells. Once inside the red blood cells, they multiply at a very rapid rate.
5. Red blood cells rupture releasing toxic substances and spores. These spores infect other red blood cells. The cycle repeats itself when a mosquito bites the infected person.

4. **Kingdom Fungi** organisms are:

- Unicellular or Multicellular
- Heterotrophic (obtain food by absorption)
- Non motile
- Reproduction is both sexual and asexual
- Saprophytic or parasitic
- Made up of Hyphae/mycelium
 - i. Mycelium = a mass of hyphae
- Eukaryotic
- Cell walls composed of *chitin*
 - i. *Chitin* – skeletal – like material found in the cell walls of fungi.

Ex: Unicellular = yeast, multicellular = mushroom

Reproduction in the Fungi/Fungi Life Cycle

(See Figure 5.28, p. 154).

Rhizopus stolonifera is the common **black bread mould**. The small black dots or fuzz on bread are the reproductive structures of the bread mould. The bread mould reproduces by asexual reproduction, but can also reproduce by sexual reproduction when times are unfavourable (producing zygospores). These are **diploid cells** that contain two copies of every chromosome.

Sexual Reproduction Phase of Bread Mould:

Specialized hyphae called *stolons* grow out toward each other. These stolons are of opposite types (+ and -). When they meet they exchange DNA and produce a **zygospore**. The zygospore is able to remain dormant until conditions are favourable. When conditions are right, the zygospore splits open and releases new spores that will undergo meiosis to form new bread mould.

Asexual Reproduction Phase of Bread Mould:

The bread mould will develop **sporangiophores**. **Sporangia** or **spore-bearing capsules** are located at the ends of the sporangiophores. Spores develop inside the sporangia and are released when the capsules split open.

- Sporangiophore:*** Stalk in a bread mould that grows up from the surface of the bread mould. It holds up the sporangium.
- Sporangium:*** Capsule at the end of a sporangiophore that contains spores.
- Spores:*** Reproductive structures inside a sporangium that will become new bread mould.

5. **Kingdom Animalia** organisms are:

- Multicellular
- Contain specialized tissues and cells.
- Heterotrophic (must obtain food from outside sources).
- Motile
- Eukaryotic
- Reproduce sexually (higher animals) and asexually (lower animals)
- Divided into TWO groups according to presence or absence of a backbone:
 - i. **Invertebrates** : Without backbone
 - ii. **Vertebrates** : With a backbone

6. **Kingdom Plantae**

Botany is the study of plants. All plants are said to have a common ancestor; (ie.) it is thought that plants have evolved from an ancient group of green algae. Plants and green algae share a common evolutionary ancestry.

Characteristics of Plants

- Multicellular
- Contain specialized tissues and cells.
- Photosynthetic
- Autotrophic (capable of making own food)
- Non-motile or sessile (non moving)
- Eukaryotic
- Reproduce sexually and asexually.
- Cell walls composed of ***Cellulose***
 - i. ***Cellulose*** – glucose based material found in cell wall of plants.
- Divided into two groups:
 - ii. ***Non vascular plants (Bryophytes)***
 - iii. ***Vascular plants (Tracheophytes)***

Plants can be classified according to the presence or absence of vascular tissue.

Vascular tissue: Tissue that transports water and food (glucose) throughout a plant.

Vascular tissue is made up of **xylem** and **phloem** cells.

Xylem carries water and minerals to the leaves of plants.

Phloem transports food created in leaves throughout the plant.

Plants lacking vascular tissue are called **bryophytes**.

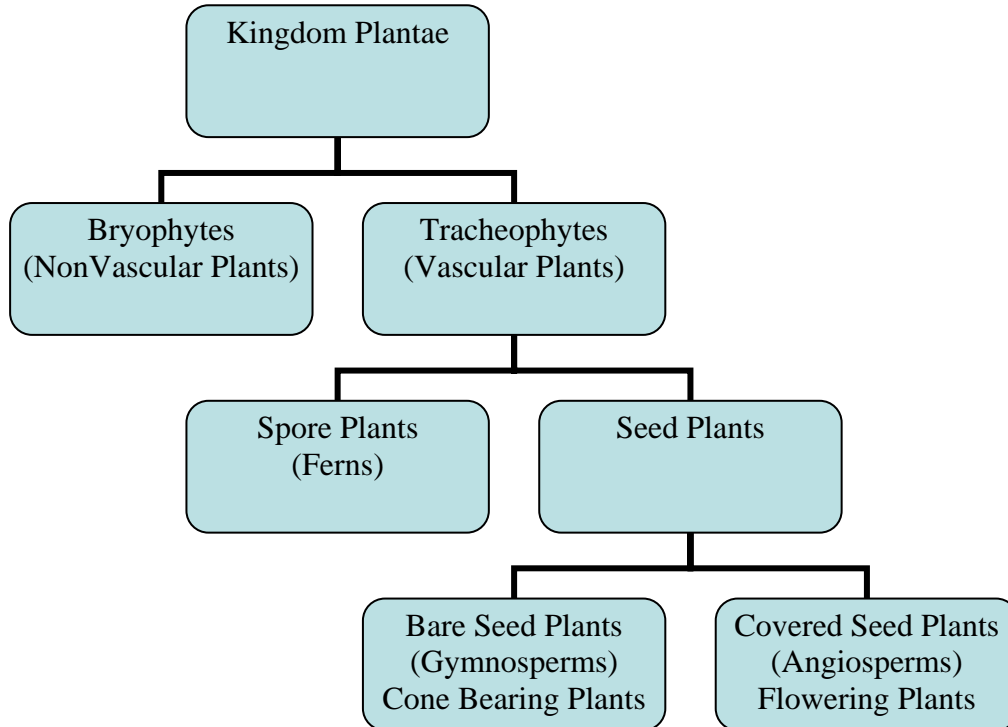
Plants which have vascular tissue are called **tracheophytes**.

Land plants have a cuticle and stomata (sing. stoma) present.

Cuticle: A waxy layer secreted by epidermal cells which helps to protect cells from drying out.

Stomata: Pores in the epidermis of a plant, particularly the leaves, which permit the exchange of gases between the plant and the air around it.

Plant Kingdom Classification



BRYOPHYTES (Phylum Bryophyta):

Bryophytes are *nonvascular* land plants that are small in size and grow close to the ground. Examples would be mosses, liverworts and hornworts.

Characteristics :

1. They lack specialized tissue that transports water as in vascular plants. There is a problem of desiccation or drying out in these plants.
2. They lack true roots, stems and leaves
3. Anchored to the ground by structures called rhizoids. A rhizoid is a simple structure (other than a true root) which doesn't channel water to other parts of the plant.
4. They require water for sexual reproduction. Water is needed for fertilization to occur. Sperm must swim through water in order to reach the egg.
5. *Gametophyte (n)* is the dominant generation. (Dominant = one most often seen)
6. Reproduction is by means of Alternation of Generations.

Reproduction in Mosses – Alternation of Generations (See Page 170)

Stages of moss reproduction

1. Within the antheridium of a male moss, sperm (n) are created.
2. Sperm swim from the antheridium to the archegonium of a female moss containing an egg(n).
3. The egg is fertilized. A zygote (2n) forms.
4. The generation now becomes the **sporophyte generation (2n)**.
5. On top of a fertilized female plant grows a long stalk called a **sporangiophore**.
6. At the top of the sporangiophore grows a capsule called a **sporangium**.
7. Inside the sporangium are contained **spores**. The spores undergo **meiosis** to become haploid (n) spores.
8. When conditions are right, the sporangium breaks open and releases the spores. The **gametophyte generation** begins again.
9. The spores are carried back to the ground by wind, water etc where they become new moss plants.

Some Definitions

- A. **Gametophyte:** Structure that produces gametes. (Sperm and egg)
- B. **Sporophyte:** Structure that produces spores (2n).
- C. **Gametophyte Generation:** Time during the life of a moss where only males (n) and females (n) are present. These structures would produce gametes.
- D. **Sporophyte Generation(2n):** Time in the life cycle of a moss dominated by the presence of spores (2n). These structures will become new moss plants.
- E. **Antheridium:** Structure inside a male moss that produces and contains sperm.
- F. **Archegonium:** Structure inside a female moss containing eggs. This is also the site of fertilization in a moss.
- G. **Sporangiophore:** Stalk that grows out of a fertilized female moss plant. It holds up the sporangium.
- H. **Sporangium:** Capsule at the end of a sporangiophore that contains spores.
- I. **Spores:** reproductive structures (2n) that become new organisms.
- J. **Meiosis:** Process whereby the sporophyte generation (2n) is reduced to the gametophyte generation (n)
- K. **Alternation of Generations:** The switching between the gametophyte(n) and sporophyte(2n) generations during the life cycle of an organism.