

# RIZVI COLLEGE OF ARTS SCIENCE AND COMMERCE

Chap 3 – Kingdom Plantae

Chap 2 – Diversity In Organisms

**Class : FYJC Science**

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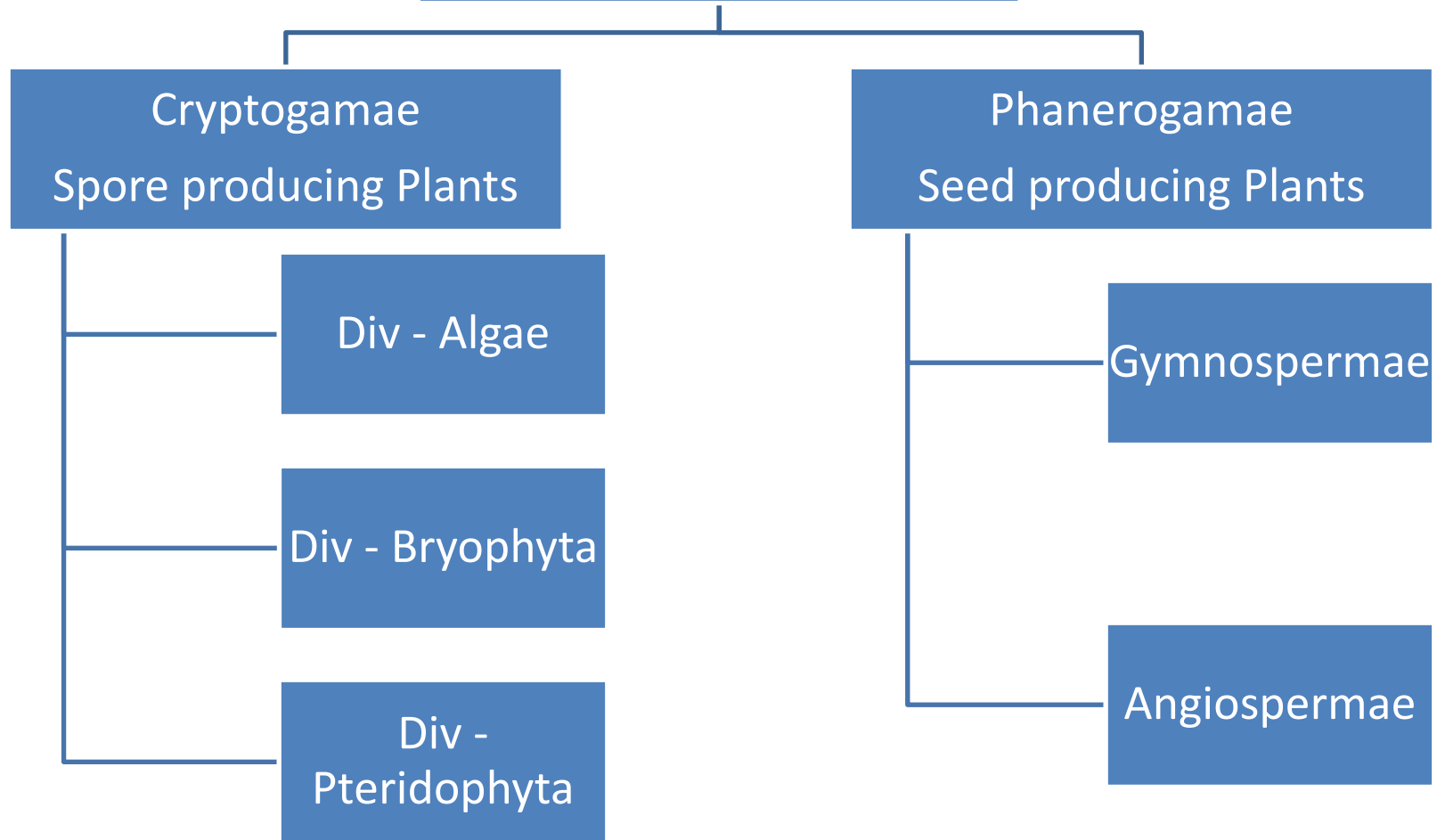
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# KINGDOM PLANTAE

# Kingdom Plantae



# Division - Thallophyta

1. Mostly **aquatic**, some are **terrestrial**.
2. **Epiphytic** - Few algae **grow** on other **plant** .  
**Epizoic** – Growing on other **living organism**.
3. Aquatic algae grow in **marine water** or **fresh water**.
4. Some are **free living** while some are **symbiotic**.
5. Vegetative Structure (**thallus**) of algae:
  - **Small, unicellular, microscopic** – eg. Chlorella
  - **Multicellular unbranched filamentous** – eg. Spirogyra
  - **Branched filamentous** – eg. Chara
  - **Huge macroscopic sea weeds** – eg. Sargassum
6. Algal cell wall- **Polysaccharides like cellulose, glucose and proteins**.

7. Photosynthetic **pigments** –
  - **Chlorophyll-a** -- (essential pigm.) –present in all algae
  - **Chlorophyll-b, chlorophyll-c and chlorophyll-d, carotenes, xanthophylls, and phycobilins.**
  - Phycobilins – two types – **Phycocyanins**
8. Reserve food material – **Starch and other forms of starch.**
9. Reproduction – **vegetative , asexual and sexual reproduction**

### **Types of Algae – Depending on predominant Photosynthetic pigment**

1. Chlorophyceae (**Green algae**)
2. Phaeophyceae (**Brown algae**)
3. Rhodophyceae (**Red algae**)

## 1. Chlorophyceae (Green algae)

- ❖ Photosynthetic pigment – Chlorophyll a and b.
- ❖ Reserved food material – Starch
- ❖ Cell wall – Cellulose
- ❖ Habitate – Mostly fresh water , rarely marine or brackish water.
- ❖ Eg. Spirogyra, Chara etc.

## 2. Phaeophyceae (Brown algae)

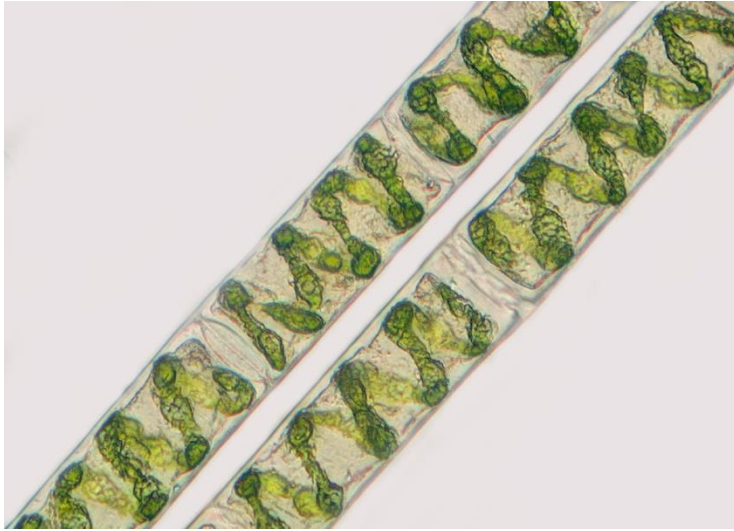
- ❖ Photosynthetic pigment – Chlorophyll a and c, and fucoxanthin.
- ❖ Reserved food material – Mannitol and laminarin.
- ❖ Cell wall – Cellulose associated with algin.
- ❖ Habitate – Mostly marine and brackish water, rarely fresh water.
- ❖ *Many species of marine algae are used as food.*
- ❖ Eg. Sargassum, Fucus etc.

### 3. Rhodophyceae – (Red Algae)

- ❖ Photosynthetic pigment – Chlorophyll a , d and phycoerythrin.
- ❖ Reserved food material – Floridean starch.
- ❖ Cell wall – Pectin in addition to cellulose and carbohydrates.
- ❖ Habitate – Mostly marine and brackish water, rarely fresh water.
- ❖ *Agar – solidifying agent in tissue culture.*
- ❖ Eg. Chondrus, Gelidium etc.



# Spirogyra, Chara & Sargassum, Fucus



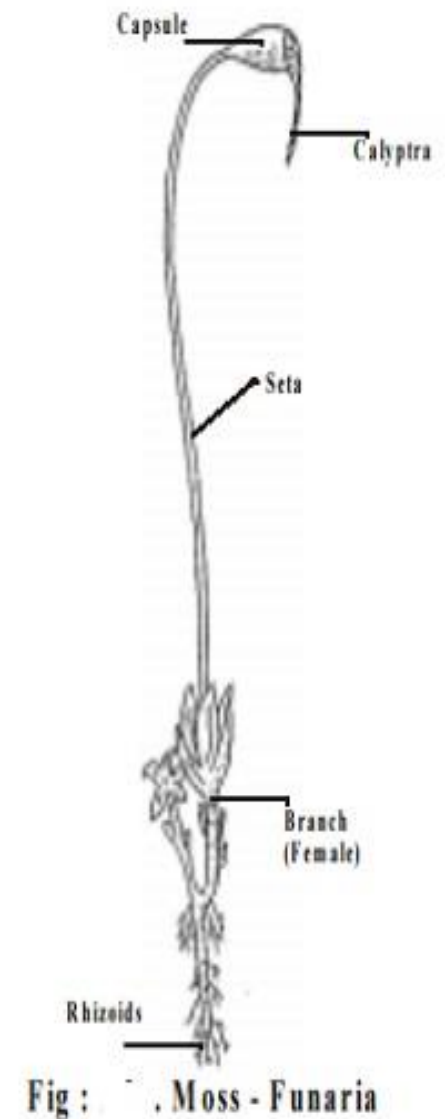
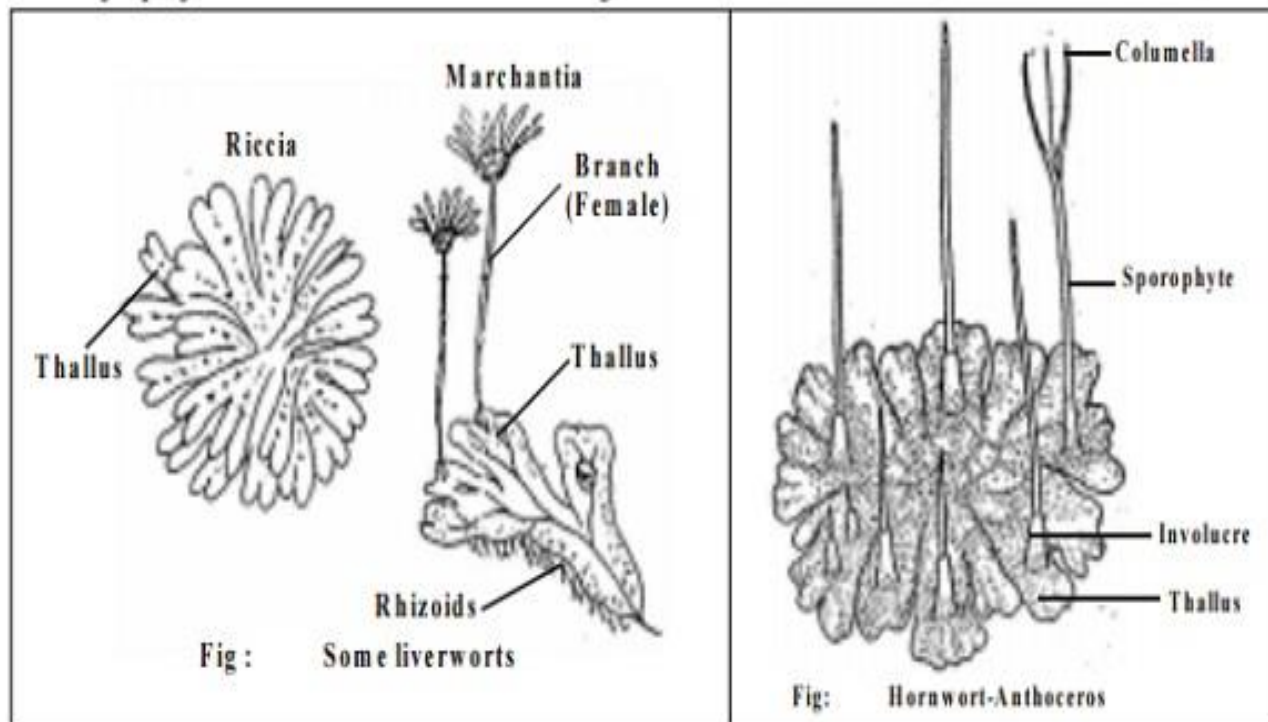
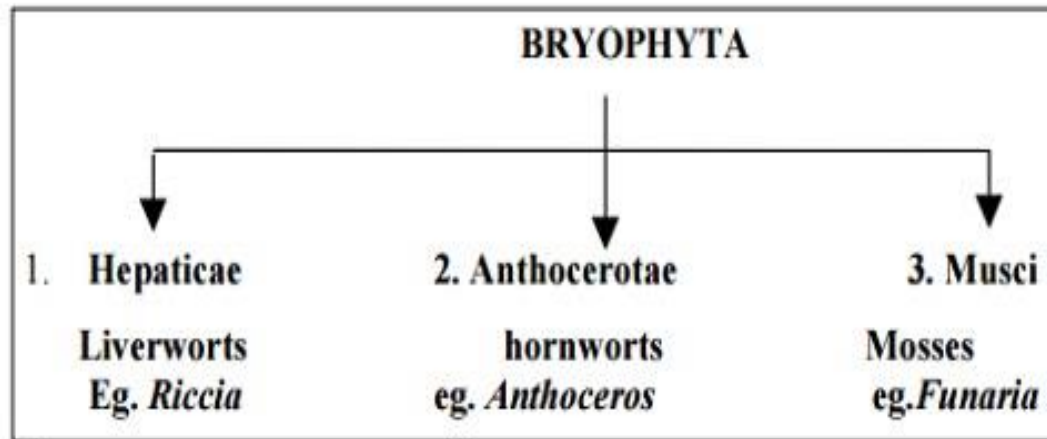


# Chondrus and Gelidium



# Division - Bryophyta

1. Terrestrial plants – depends on external water for fertilization.
2. Hence called '*Amphibian plants*' .
3. Grow – moist wall, damp rocks, moist soil and decaying logs.
4. Plant body – Thalloid or leafy.
5. True roots absent but rhizoids present.
6. Rhizoids are unicellular in liverworts while multicellular in mosses.
7. They absorb water and minerals and also help in fixation of thallus.
8. Vascular tissues absent(xylem and phloem) but conducting strands present in mosses.
9. Heteromorphic alternation of generation – Gametophyte is dominant, green, haploid and Sporophyte is recessive, diploid.
10. Reproduction – Vegetative method – Tuber and Gemmae  
Asexual reproduction – Spore formation  
Sexual reproduction - Gametes.



## Bryophyta are divided into two groups

### 1. Liverworts (*Hepaticae*) – Eg. Riccia, Marchantia.

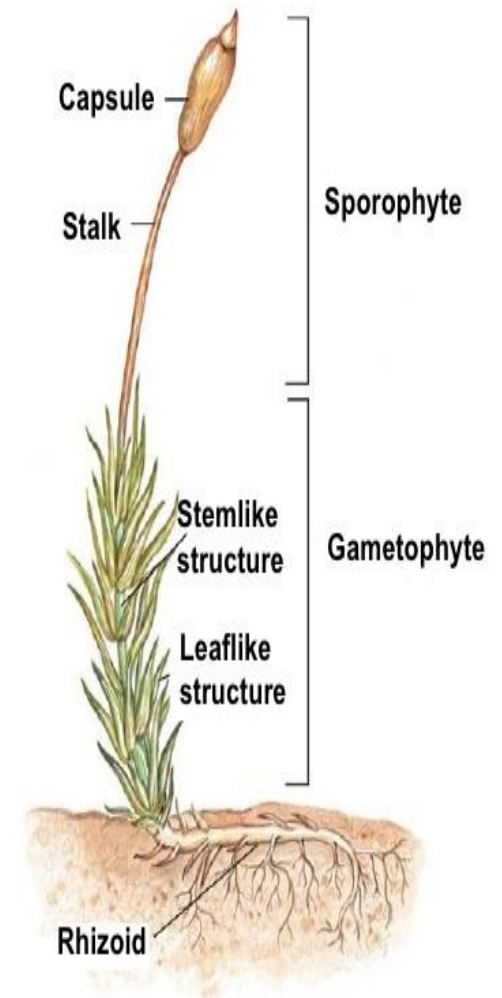
- ✓ Lower member of **Bryophyta**
- ✓ Possess **prostrate** plant body.
- ✓ Found in **moist shady** places.
- ✓ Thallus is **dorsiventral**, **prostrate** and with **unicellular rhizoids**.



# Liverworts(*Riccia*) and Mosses(*Funaria*)



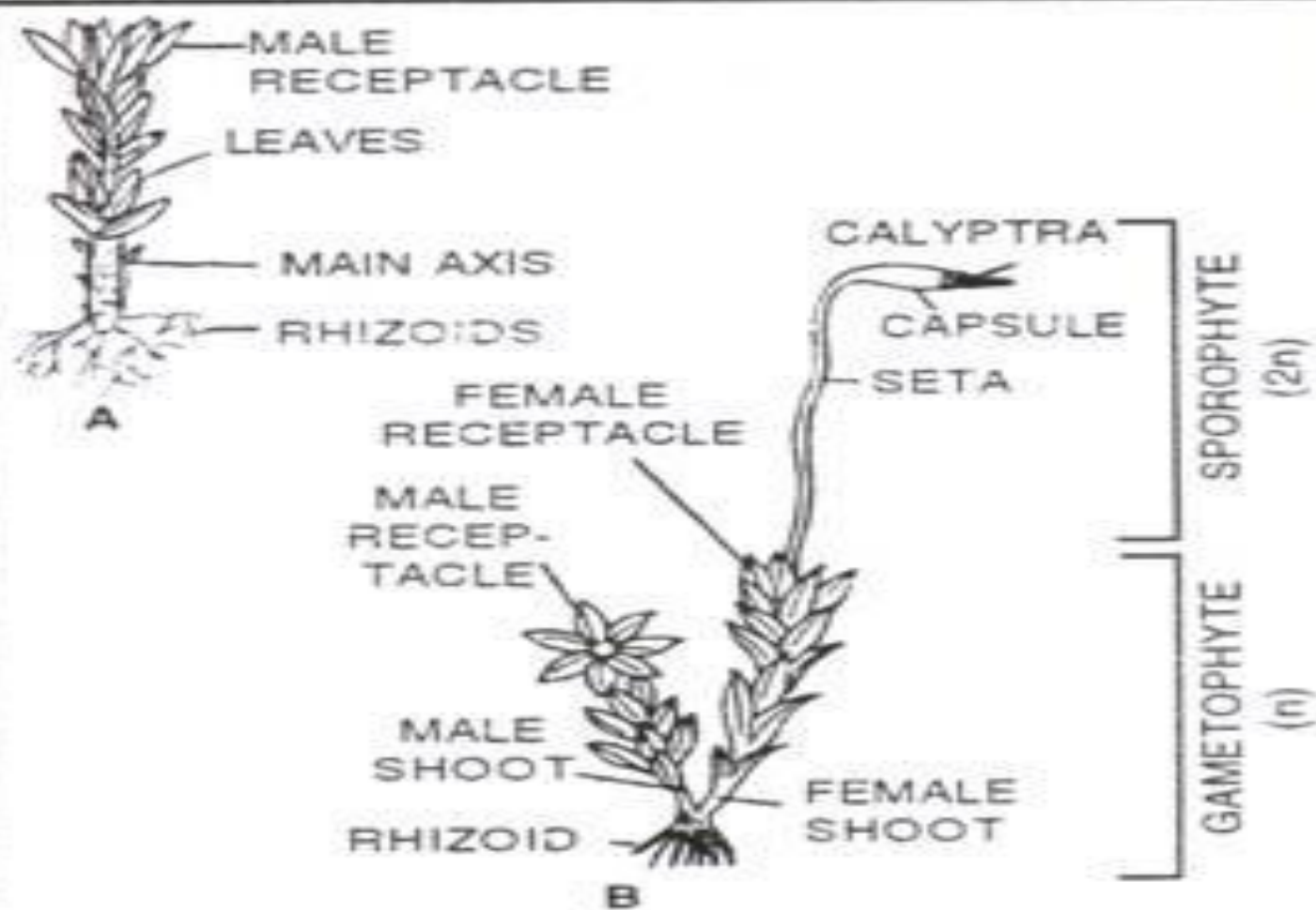
- The Structure of a Moss



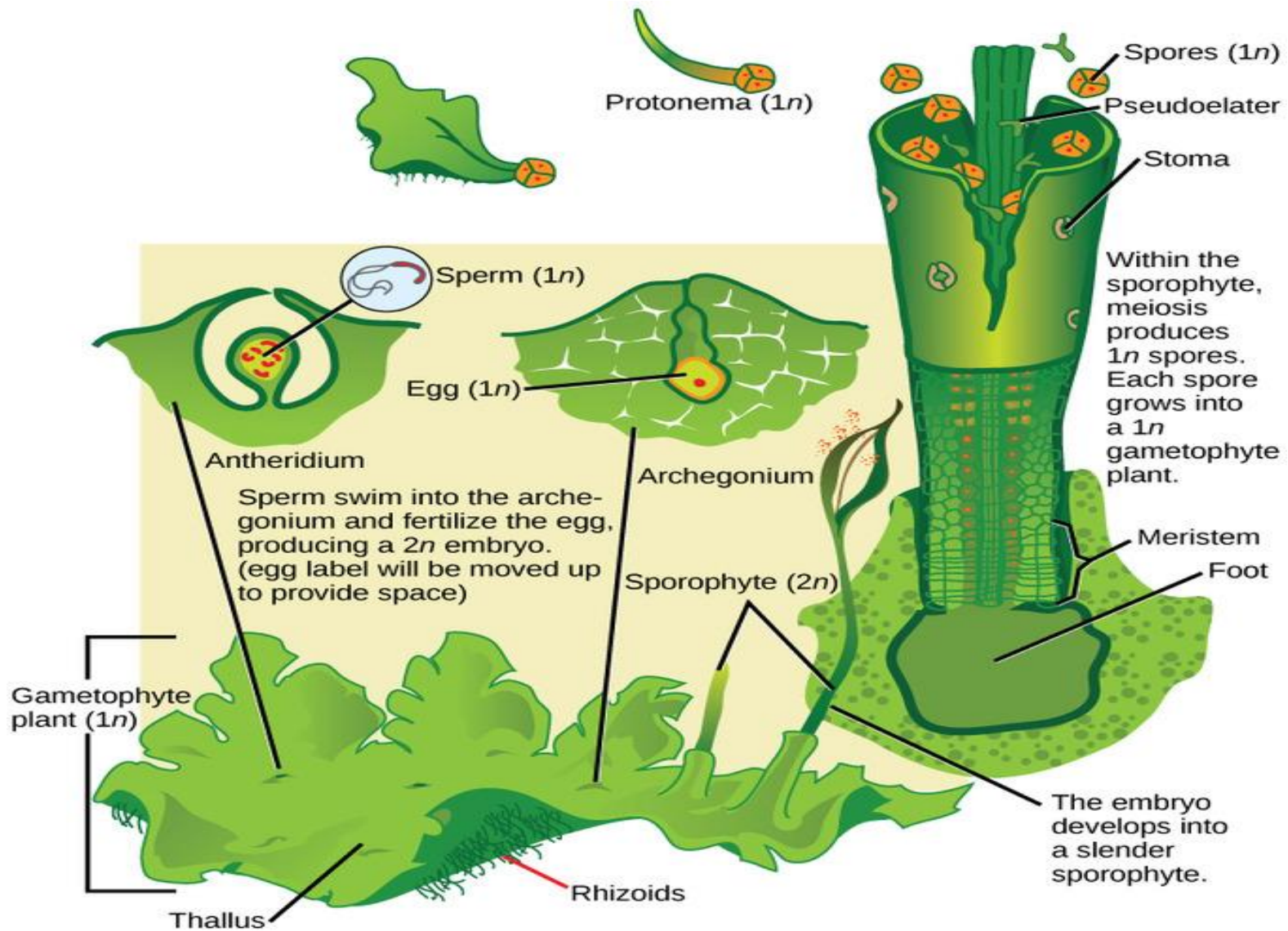


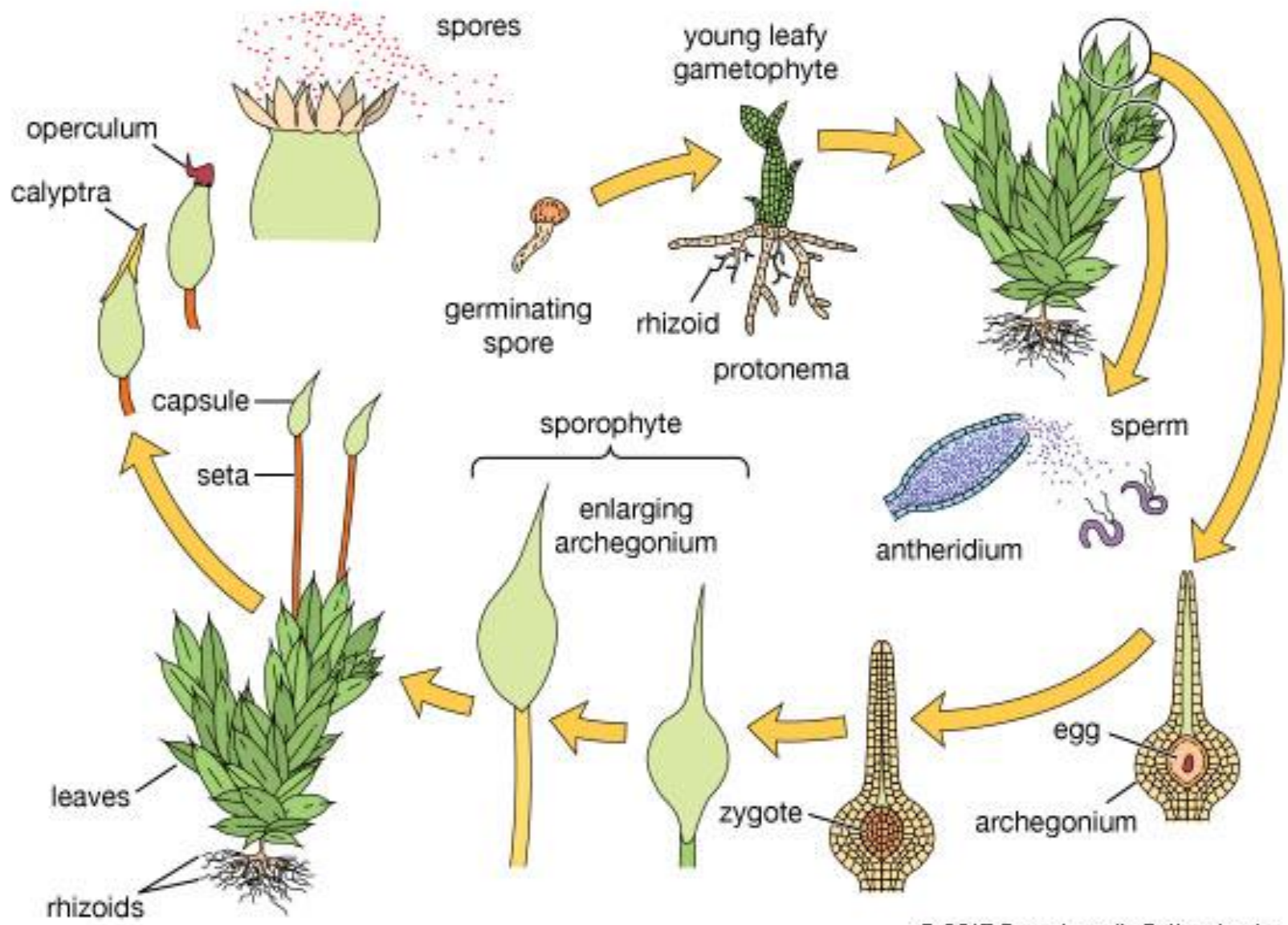
## 2. Mosses (Musci) – Eg. Funaria, Polytrichum

- ✓ Higher members of **Bryophyta**.
- ✓ Possess **erect plant body**.
- ✓ Life cycle include – **Protonema stage & leafy stage**.
- ✓ Protonema – **prostrate, green, branched and filamentous**. (called juvenile gametophyte)
- ✓ It bears **many buds**.
- ✓ Leafy stage is produced from **each bud**.
- ✓ **Protonema** helps in **vegetative propagation**.
- ✓ Leafy stage – **Erect, slender main axis and branch** (stem like) bearing **spiral leaf-like structures**.
- ✓ Fixed in soil by **multicellular branched rhizoids**.
- ✓ Sexual reproduction – **Produce sex organs in clusters at tips of stem like axis**.
- ✓ Cluster is **concealed** by a **whorl of leafy appendage**.



**Figure 7.3** *Funaria* sp. A. Unbranched Gametophyte B. Branched Gametophyte





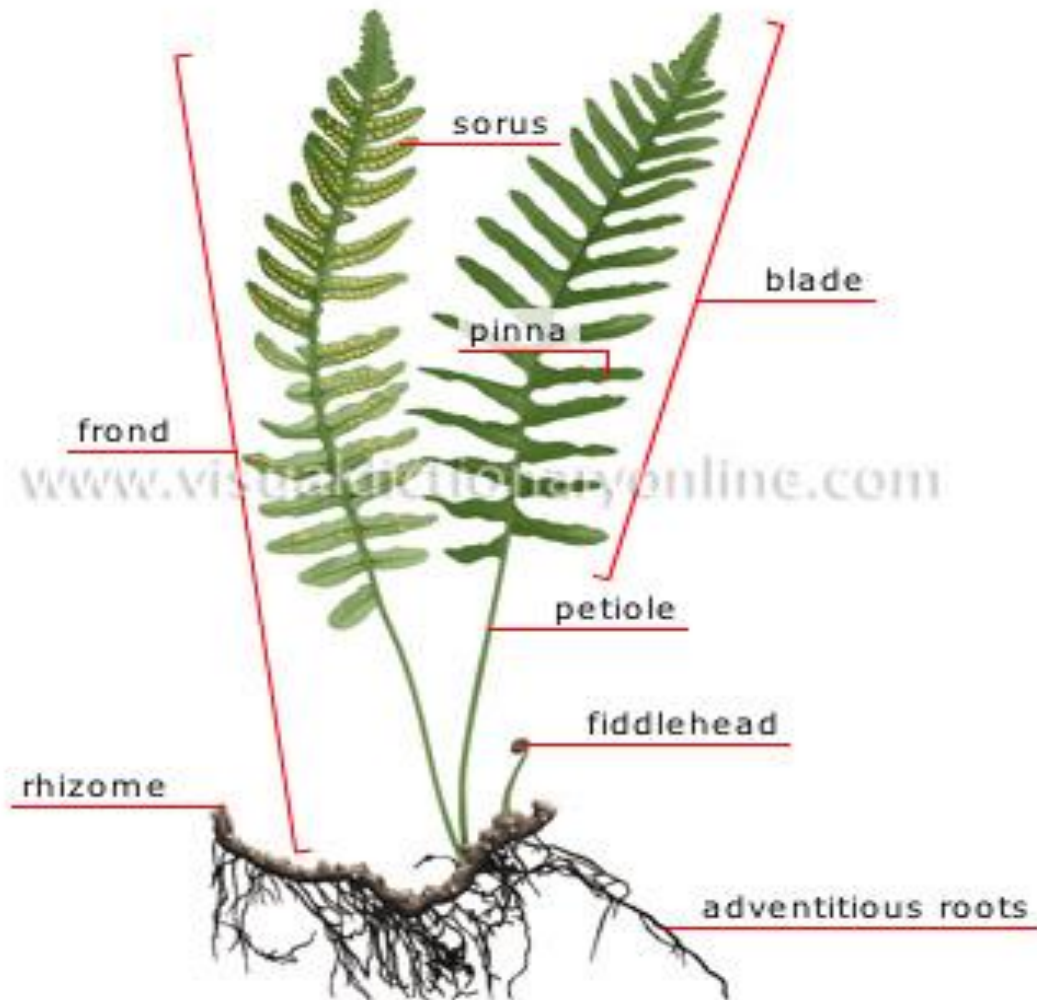
## Division - Pteridophyta

1. First vascular and successful terrestrial plants.(Late paleozoic era)
2. True roots, stem and leaves present.
3. Plant consist of pinnate leaves.(feather like)
4. They have primitive conducting system.
5. Do not produce flowers, fruits and seeds.
6. Pteridophyta – Terrestrial – Eg. Fern  
Aquatic – Eg. Azolla, Marsilea  
Xerophytic – Eg. Equisetum  
Epiphytic – Eg. Lycopodium
7. Heteromorphic alternation of generations –  
Sporophyte – Dominant, diploid, autotrophic.  
Gametophyte – Recessive, haploid



8. Leaves – **Scaly**(Equisetum), **Simple & sessile**(Lycopodium), **large and pinnately compound**(Ferns).
9. Secondary growth not seen.(**Cambium absent**)
- 10 – **Sporophyte**- asexual reprod. – spores – meiosis – **Gametophyte** – sexual reprod. – Zygote – Diploid Sporophyte.
11. Pteridophytes are further classified into 4 types:-
  - **Psilopsida** → Psilotum
  - **Lycopsida** → Lycopodium
  - **Sphenopsida** → Equisetum
  - **Pteropsida** → Nephrolepis

# Fern

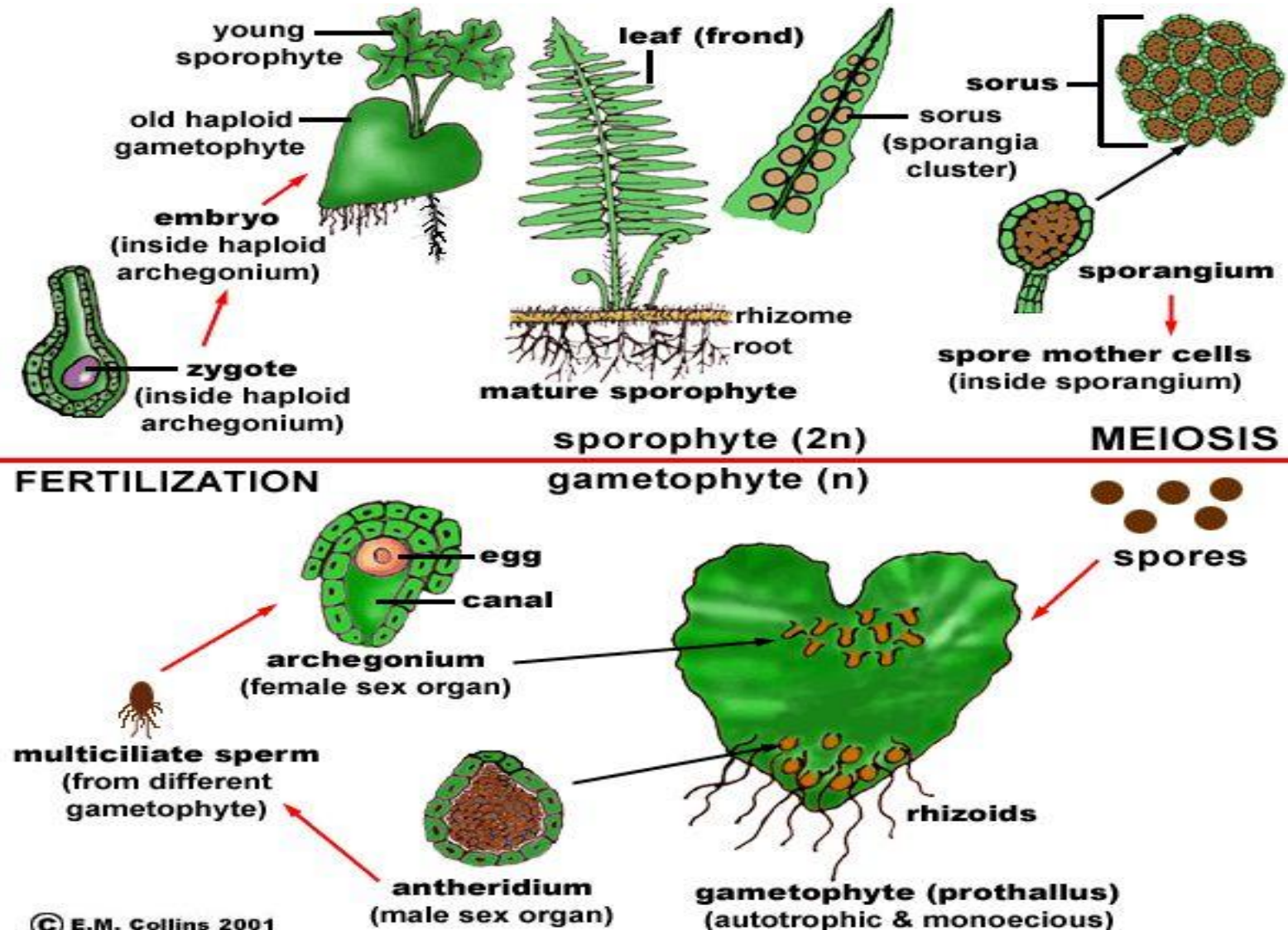


# Fern – *Dorsal and Ventral side of leaf*

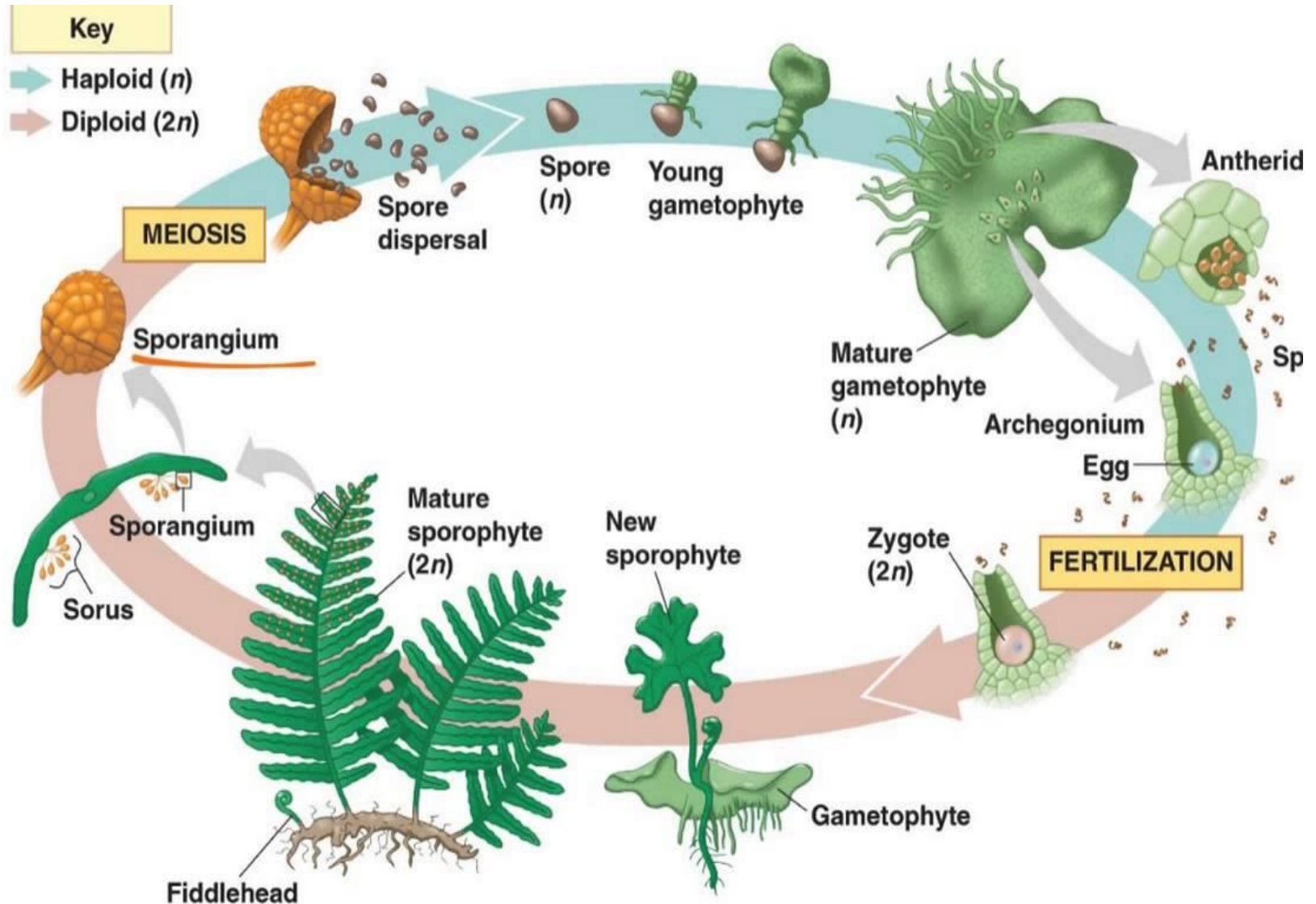




# **Fern** - **Alternation of generation**

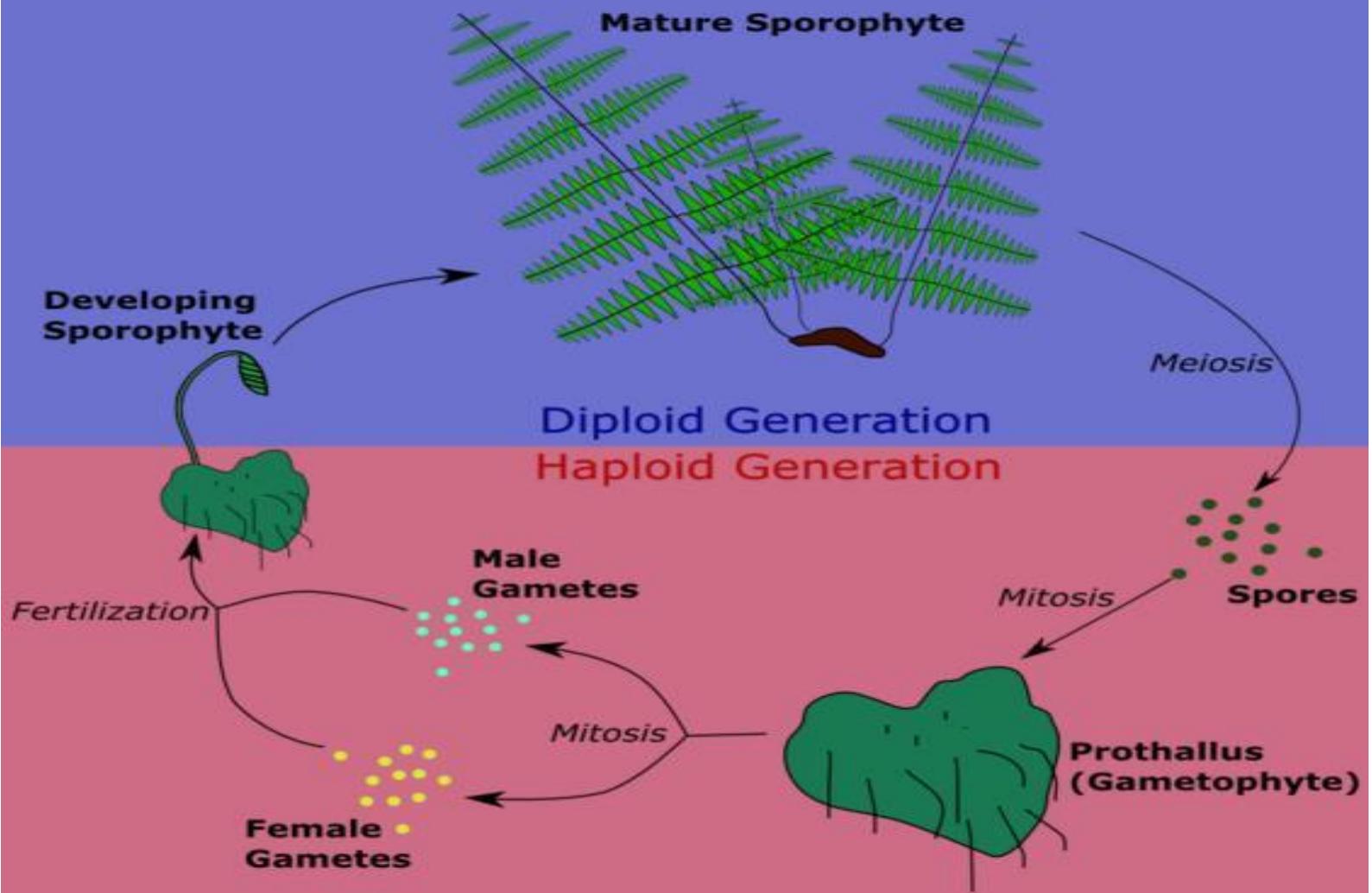


# Fern – *Alternation of Generation*





## Alternation of Generations in Ferns



# Division - Gymnospermae

1. Gymnos – **naked**, Spermae – **Seed**.
2. Simple members of Phanerogamae. “***Phanerogams without ovary***”.
3. Term Gymnosperma – **Theophrastus(300 B.C)** in his book ‘**Enquiry into plants**’.
4. Gymnosperm – **Evergreen, perennial woody trees** or **shrubs**.
5. Vascular plants having **xylem(tracheids)** and **phloem(sieve cells)**.
6. Non-flowering plants producing **naked seeds.(fruits are not produced)**.
7. *Heteromorphic alternation of generation* – **Sporophyte** : diploid, dominant, autotrophic, independent. **Gametophyte** : haploid, recessive and dependent.
8. Sporophyte – **Root, stem and leaves**.

9. Root system – **Tap root system**.  
**Cycas** – **Coralloid roots** – **Association with blue-green algae**  
**Pinus** – **Association with endophytic fungi called *mycorrhizae***
10. Stem – Mostly **erect, aerial, solid and cylindrical**.
11. Cycas – **Unbranched** and conifers – **branched**.
12. Leaves – **Dimorphic**.
13. **Foliage leaves are green needle like pinnately comp.**  
**Scaly leaves are small, membranous and brown.**
12. Secondary growth is seen. (**Cambium present**).
13. Heterosporous –  
**Microspores**(Pollen grain) → **Microsporangia**.  
**Megaspores**(Ovules) → **Megasporangia**.
14. Pollination – **Anemophilous** (Wind pollination).
15. Fertilization through pollen tube → **Siphonogamy**.
16. **Eg. Cycas, Pinus, Ginkgo.**

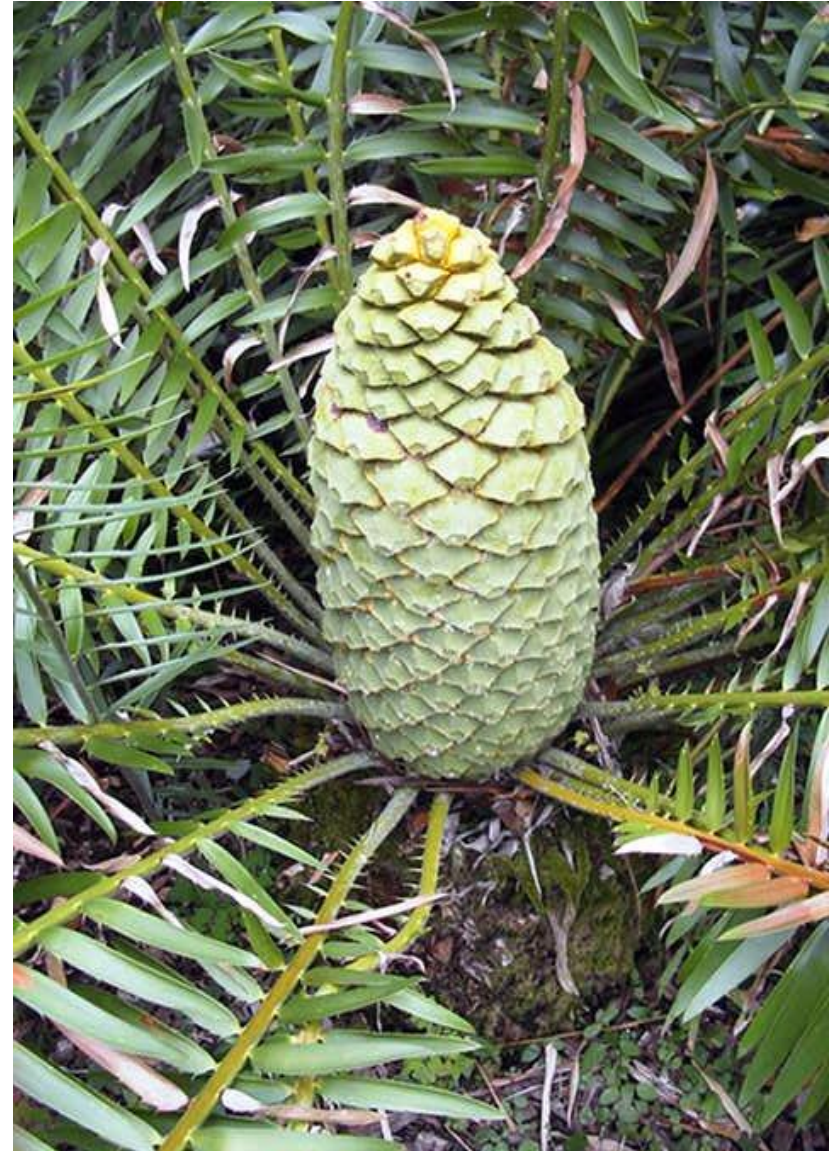


# Cycas plant and Pinus plant





# Microsporophyll & Megasporophyll of Cycas





# Cycas (Coralloid root) & Pinus (Fungi-mychhorizae)



# GYMNOSPERMS

*Ginkgo biloba* – Living fossils.

(Number of fossil form is much more than living form)

*Sequoia sempervirens* – Tallest Gymnosperm  
(Red wood of California) → 366 feet.

*Taxodium mucronatum* – girth of about 125 feet.

*Zamia pygmaea* – Smallest Gymnosperm – 25 cm only

# Division – Angiospermae

1. Most advanced division of **flowering plants**
2. **Seeds** are **enclosed** within the fruit.
3. Adapted for **terrestrial habitate**.
4. Plant body --> **Root, stem and leaves**.
5. **Flowers , fruits and seeds** → Present.
6. **Vascular tissues** → Well developed.  
Xylem (**Vessels and tracheae**)  
Phloem (**Sieve tubes and companion cells**).
7. Heteromorphic alternation of generation –  
**Sporopyte** → diploid, dominant, autotropic and independent.  
**Gametophyte** → recessive, haploid and dependent.
8. **Heterosporous** →  
**Pollen grains** (microsporangia) → Microsporophylls or stamens.  
**Ovules** (megasporangia) → Megasporophyll or Carpels.



9. Flower – **Essential whorl** → Androecium and Gynoecium.

**Accessory** → Calyx and Corolla.

10. Pollination → **Indirect**.

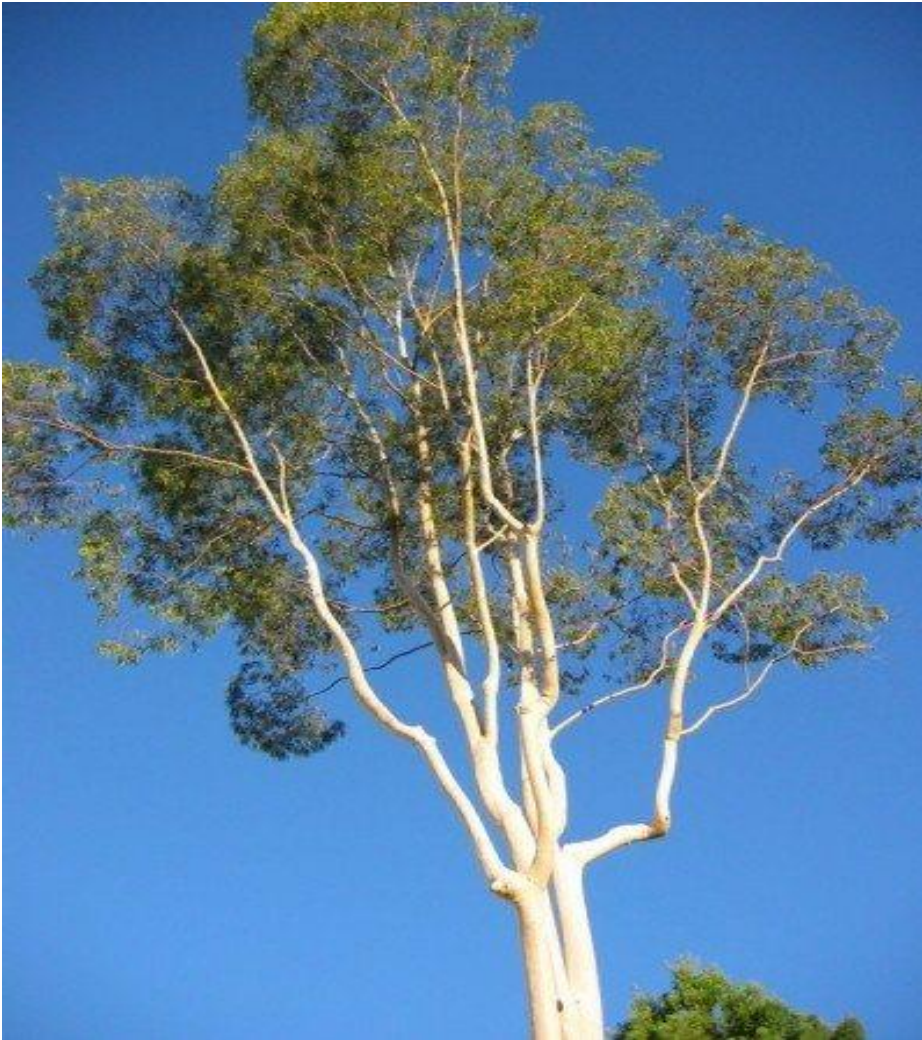
11. Double fertilization.





## **TALLEST ANGIOSPERMS**

– Eucalyptus (360 cm)



## **SMALLEST ANGIOSPERMS**

– Wolfia (1mm)



# Angiosperms divided into two classes

## *Monocotyledonae*

1. **Single** cotyledon.
2. **Adventitious** root system.
3. Stem is **rarely branched**.
4. Leaf shows **parallel venation**.
5. Flowers show **trimerous** symmetry.
6. **Vascular bundle – conjoint, collateral & closed**.
7. Cambium absent.
8. Eg. **Zea mays** (Maize), **Sorghum vulgare**(Jowar).

## *Dicotyledonae*

1. **Two** cotyledon.
2. **Tap** root system.
3. Stem is **profusely branched**.
4. Leaf shows **Reticulate venation**.
5. Flowers show **tetra and pentamerous** symmetry.
6. **Vascular bundle – conjoint, collateral & open**.
7. Cambium present.
8. **Helianthus annus** (sunflower), **Hibiscus rosa-sinensis**(china rose).



# Dicot plant      and      Monocot plant



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# Botanical Garden

## Importance :

1. Records of local flora.
2. Basis for continued monographic work.
3. Provide facilities for collection of living plant material for studies.
4. Supply seeds and material for botanical investigations.
5. May contain herbaria, green house, research laboratory and library.

## Botanical gardens of India

1. The Indian Botanical Garden, **Kolkata**.
2. National Botanical Garden, **Lucknow**.
3. The State Botanical Garden, Lalbagh, **Bangalore**.
4. Botanical Garden, **Saharanpur**.



# Botanical Garden



# Herbaria

- ✓ The **collection** or **deposition** of **dried plant material** by using various techniques of **preservation** and their **arrangement** in the **sequence** of an accepted **classification**, forms **herbaria**.
- ✓ **Succulent plant** or plants **unsuitable** for **drying** and **pressing** technique are fixed in suitable **liquid preservatives** like **formaldehyde, acetic alcohol**, etc.
- ✓ *Herbarium involves collection, drying, poisoning, mounting, stitching, labelling and deposition.*
- ✓ It is associated with **research institutes, scientific societies, botanic gardens, universities** and **colleges**.
- ✓ **Classification** –
  - a. Regional herbaria*
  - b. Local herbaria*
  - c. Educational institutions herbaria.*

## Important Herbaria in India.

1. Central national herbarium, **Kolkata**.
2. Herbarium of the forest Research institute, **Dehradun**.
3. The south circle Herbarium, **Coimbatore**.
4. Western circle herbarium of the botanical survey of India, **Pune**.



# Herbaria







A photograph of a bee in flight near a pink thistle flower. The bee is positioned on the left side of the frame, facing right. The thistle flower is on the right side, with its characteristic spiky green leaves and a dense, pink, feathery head. The background is a clear blue sky. The text "Diversity of organisms" is overlaid on the image in a large, white, sans-serif font with a purple outline.

# Diversity of organisms

# Viruses and Viroids

1. Viruses are **acellular, ultramicroscopic, disease causing entities**.
2. Size – **10 nm to 2000 nm**.
3. Viruses are **smaller than bacteria**.
4. Viruses are **obligatory parasites** and can **multiply** only within the **living host cells**.
5. They have **capacity to transmit the disease** from diseased to healthy organisms.
6. Simple structure i.e. a **nucleic acid core** surrounded by a **protein coat(capsid)** to form nucleocapsid.
7. Genetic material – **either DNA or RNA (but never both)**.
8. Viruses can be **crystallised**.
9. Viruses are **host specific**.
10. They show the characteristics of **both living and non-living**.

# Types of Viruses

There are 3 types of viruses on the basis of their host.

## 1. Plant Viruses –

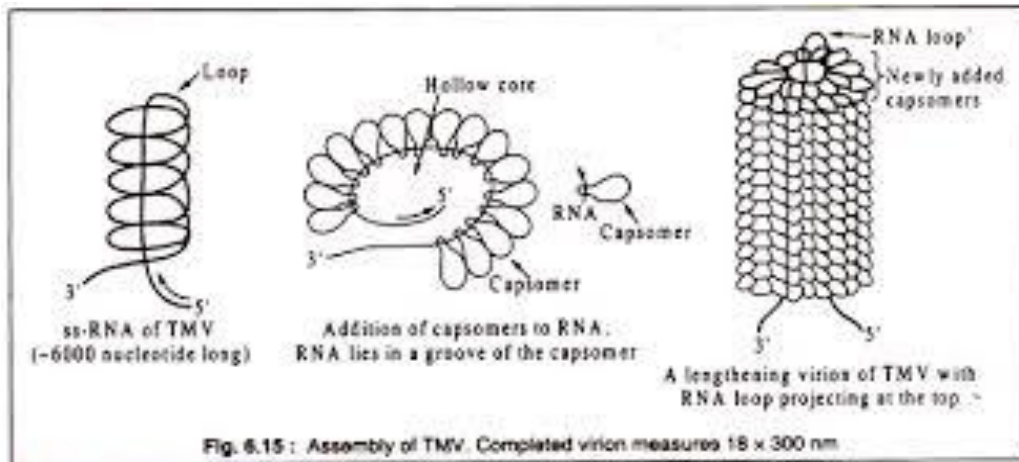
- a) They infect only plants
- b) Genetic material is ss-RNA or ds-RNA.
- c) Mostly rod shaped or cylindrical.

## 2. Animal viruses –

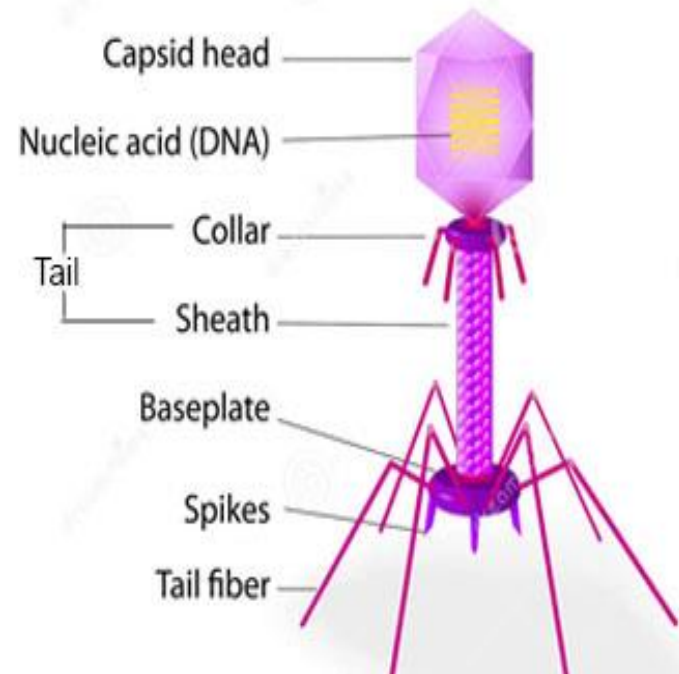
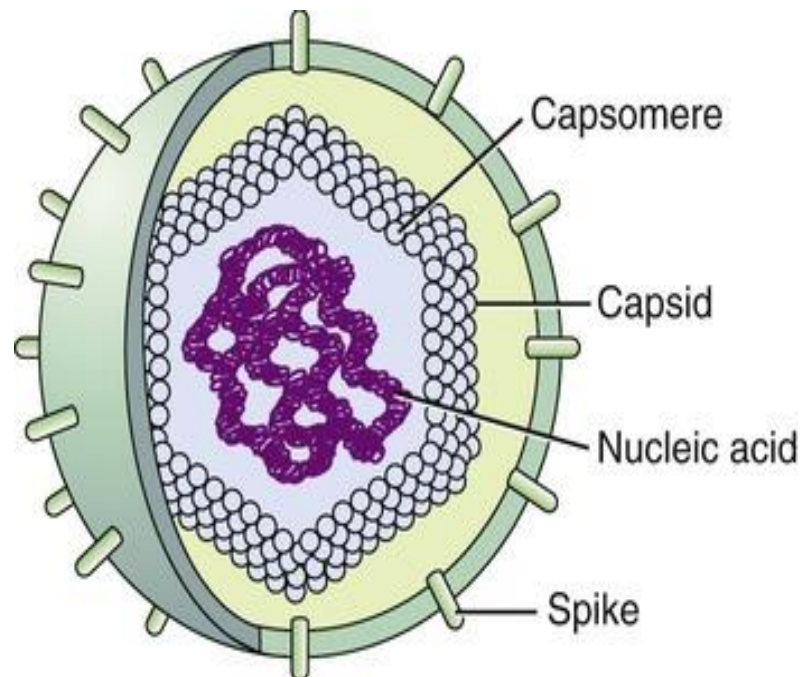
- a) They infect only animals.
- b) Genetic material is RNA or DNA.
- c) Mostly polyhedral in shape.

## 3. Bacterial viruses or Bacteriophages.

- a) They infect bacteria.
- b) Genetic material is DNA.
- c) They are mostly tadpole shape.



## Structure of bacteriophage





## *Plant diseases caused by viruses*

1. Little leaf of brinjal.
2. Yellow vein mosaic of lady's finger.
3. Potato leaf roll.
4. Leaf curl of papaya.
5. Bunchy top of banana.
6. Grasssy shoot of sugarcane.
7. Tobacco mosaic disease.

## *Animal diseases caused by viruses*

### Disease

1. Common cold
2. Influenza
3. Small pox
4. Yellow fever
5. Swine flu
6. AIDS

### Virus

- Rhino virus
- Myxo virus
- Variola virus
- Flavi virus
- H1N1 virus
- Retro virus/HIV

# *Plant diseases caused by Virus*



## Viroids:

1. These are very **small, circular, single stranded RNAs** which are **not complexed with any protein**.
2. They are either **closed circular RNA** or **single stranded linear RNA**.
3. The **first viroid** discovered was the **potato spindle tuber viroid(PSTV)**.
4. It has composed of **359 nucleotides** and has **ten times less genetic material** than the smallest known virus.
5. At least **11 other plants diseases** have been **linked to viroids**.
6. Eg. Citrus exocortis, chrysanthemum stunt, cucumber bale fruit, etc



# LICHENS (Theophrastus-300BC)

1. Lichens are **slow growing, long living** organisms.
2. Lichens are formed by close association of **two different partners(organisms)**.
3. One of which is an **algal component** and the other **fungus component**.
4. The algal component is called **phycobiont or photobiont**. (It mostly belongs to **Chlorophyceae-green algae or Cyanobacteria-BGA**).
5. The fungal component is called **mycobiont**. (It mostly belongs to **Ascomycetes** and rarely **Basidiomycetes** or **Deuteromycetes**).
6. lichens are distributed in **wide variety habitats**.
7. Grow on **tree trunks, decaying logs** and **soil** too.
8. Found in extreme climatic conditions – **Dry exposed rocks** and snow covered **Arctic and Antarctic poles**.
9. Sensitive to **air pollutin** and generally do no grow near the cities.
10. Plant body **thalloid** (**Greenish** or **Bluish green** in colour).
11. Additional pigment **yellow** , **orange** , **brown** and black.

## Types of Lichens on the basis of fungal component.

- A) Ascolichens – Fungal partner belongs to Ascomycetes.
- B) Basidiolichens – Fungal partner belongs to Basidiomycetes.
- C) Deuterolichens – Fungal partner belongs to Deuterolichens. (Sterile lichens producing no spores)

## Types of Lichens on the basis of External forms.

- A) Crustose Lichens – Thin and flat lichens occurring as crust on the bark or rock. Eg. **Graphis**.
- B) Foliose Lichens – Lobed and dorsiventrally flattened, leafy lichens. Attach to substratum by hairy rhizoids like structures called rhizines. Eg. **Parmelia**.
- C) Fruticose Lichens – Commonly called shrubby lichens due to shrub like appearance. Attached to the substratum by basal mucilaginous disc. Eg. **Usnea**.

▼ A fruticose (shrublike) lichen



◀ Crustose  
(encrusting)  
lichens

▼ A foliose  
(leaflike)  
lichen





# Economic Importance Of Lichens.

1. Lichens as Food – Lichens contain a substance Lichenin which is similar to carbohydrate. **Eg. Lecanora.Parmelia** is used in curry powder, chocolates and pestries.
2. Lichens as Fodder – Favourite food for reindeers. **Eg. Parmelia.**
3. Medicinal uses:
  - **Usnic acid** – Antibiotic against Gram positive bacteria.
  - **Lobaria** – Respiratory disease like T.B.
  - **Peltigera** – Useful in hydrophobia.
  - **Parmelia** – Epilepsy
  - **Usnea** – Urinary disease.
  - Some lichens possess **anticarcinogenic** property.
4. Industrial uses of Lichens.
  - Production of **alcohol**.
  - **Tanning** and **Dying** industry.
  - **Litmus paper** as acid base indicator.
  - **Orcein** a **biological stain** (**Orchrolechia** sps.)
  - **Perfumery** & **soaps and cosmetics**.

# *Ecological Importance of Lichens*

- ✓ **Pioneers** of vegetation on rocks.
- ✓ First plant to **settle** on **barren rocks**.
- ✓ Lichens bring about **weathering** of **rocks** by releasing **carbonic** and **oxalic acids**.
- ✓ It leads to formation of soil i.e. **Pedogenesis**.
- ✓ After lichen, some **bryophytes** and then other **higher plants** can grow on such soil.

# Five Kingdom system of Classification

*Two kingdom system of classification* – **Carl Linnaeus.**

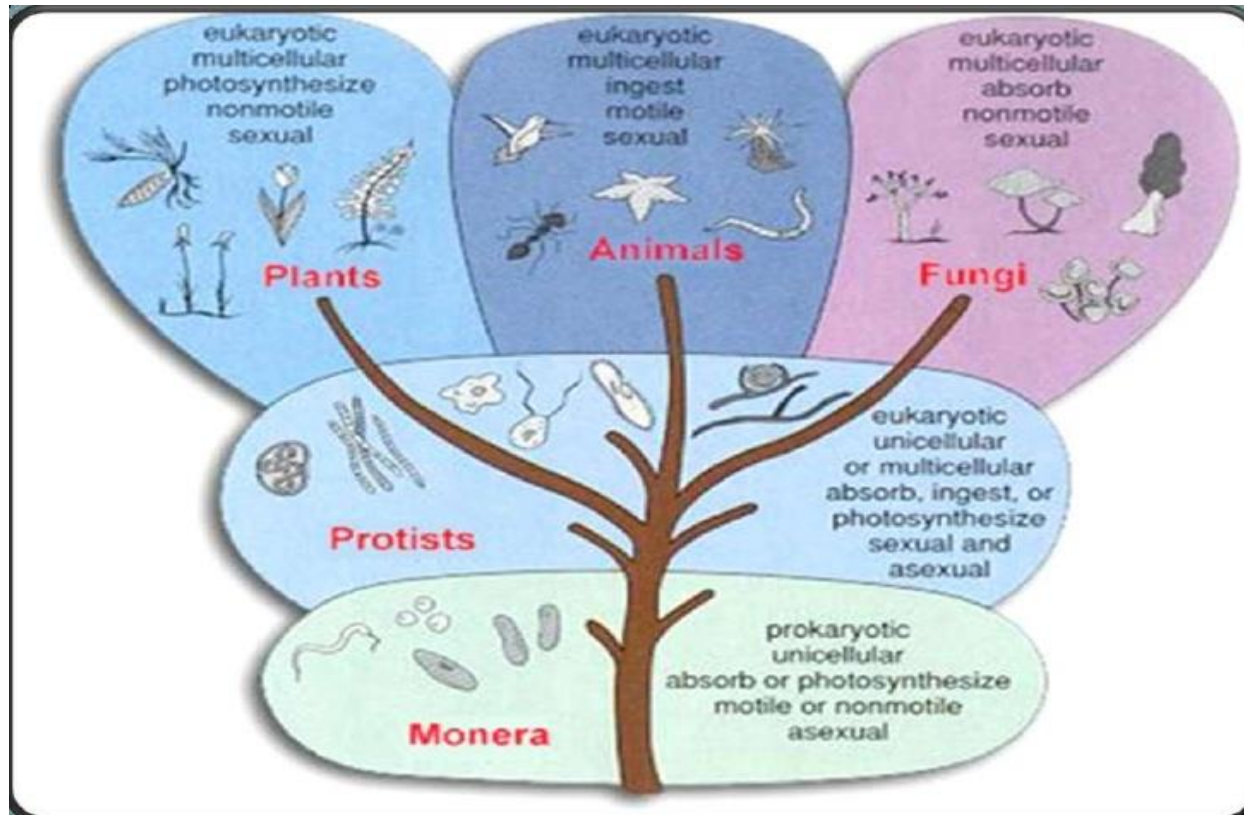
*Five kingdom system of classification* – **R.H. Whittaker (1969)**

1. **Kingdom Monera**
2. **Kingdom Protista**
3. **Kingdom Fungi**
4. **Kingdom Plantae**
5. **Kingdom Animalia**



## The criteria used by Whittaker in system include:

- I. Cell organization – Prokaryotic or Eukaryotic
- II. Body organization – Unicellular or Multicellular
- III. Mode of Nutrition – Autotrophic or Heterotrophic
- IV. Life cycle – Producer, Consumer or Decomposer



# Kingdom - Monera

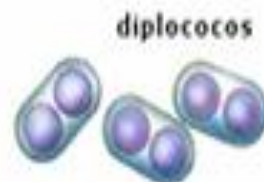
1. They are **microscopic** and **prokaryotic**. .(**Pro-first formed, karyon-nucleus**).
2. **Primitive** type of **nucleus** , not well organized. **i.e. Nucleoid**.
3. Nuclear envelope, nucleolus, nucleoplasm, histone proteins and true chromosomes. (**Only DNA is present**).
4. **Cell wall** – Rigid and composed of **peptidoglycan**.
5. **Membrane bound cell organelles absent**.
6. **Organisms** are – **Unicellular** – Eubacteria  
**Filamentous** – Cyanobacteria.
7. **Motile** (**flagella**) or **Non-motile**.
8. **Mode of Nutrition** – Autotrophic (**Photoautotrophs- Eg.cyanobacteria or chemoautotrophs – Eg. Thiobacillus**), Heterotrophic, Parasitic or saprophytic.
9. **Reproduction** – Vegetative or Asexual .
10. **Examples** -- Archaeobacteria, Eubacteria, Cyanobacteria.



cocos



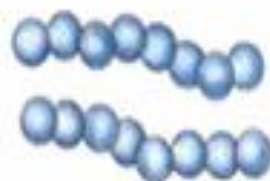
esporos bacterianos



diplococos



bactéria flagelada



estreptococos



estafilococos



vibriões



espirilos



bacilos



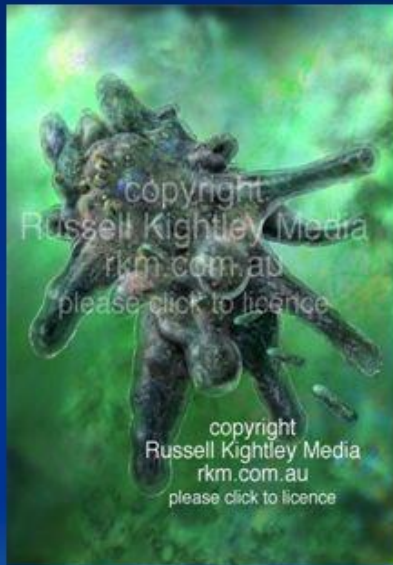


# Kingdom -- Protista

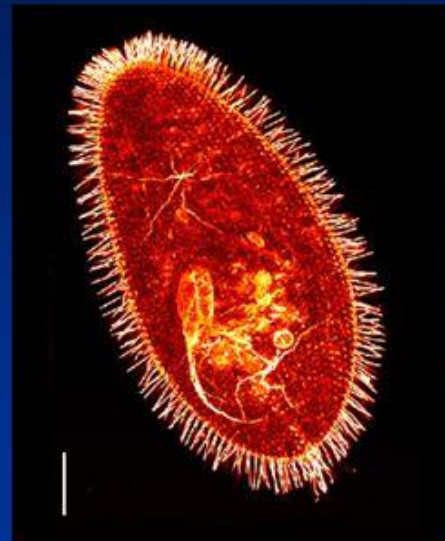
1. **Unicellular, Eukaryotic** and mostly **aquatic**.
2. **Motile** or **non-motile**. (**Cilia, flagella, pseudopodia etc.**).
3. **Cell wall** if present , composed of **cellulose**.
4. **Membrane bound cell organells** present.
5. **Nucleus** is **well-organized**. (**DNA with histone protein**).
6. **Mode of Nutrition** – **Photosynthetic, holozoic, saprophytic** or **parasitic**.
7. **Reserved Food material** – **Glycogen** or **starch** and **fat**.
8. **Reproduction** – **Asexual** or **sexual method**.

# PROTISTA

- Examples:



*Amoeba*



*Paramecium*



**Slime Molds**



**Giant Kelp**

# Protists may further be distinguished into.

## **a) Plant like Protists –**

- i) They are autotroph
- ii) Reserved food material as starch.
- iii) Cell wall-Cellulose.
- iv) Eg. Dinoflagellates, diatoms and desmids.

## **b) Animal like Protists –**

- i) They are heterotrophic.
- ii) Reserved food material as glycogen.
- iii) Cell wall absent.
- iv) Eg. Amoeba, Paramoecium.

## **c) Fungi like Protist –**

- i) They are saprophytic.
- ii) Cell wall absent.
- iii) Eg. Slime moulds.

## **d) Euglenoids –**

- i) Primarily photosynthetic aquatic organisms.
- ii) Heterotrophic in the absence of light.
- iii) Euglena



## PLANT-LIKE PROTIST Cont'd

• they are grouped according to color & structure

A) Euglena



D) Red algae



B) Diatom



C) Dinoflagellates



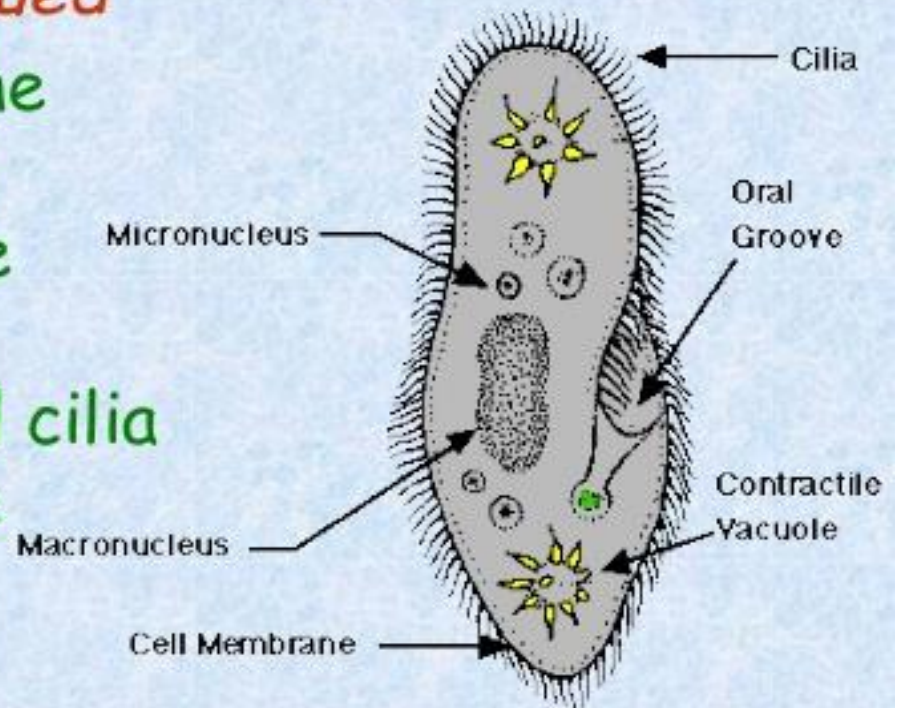
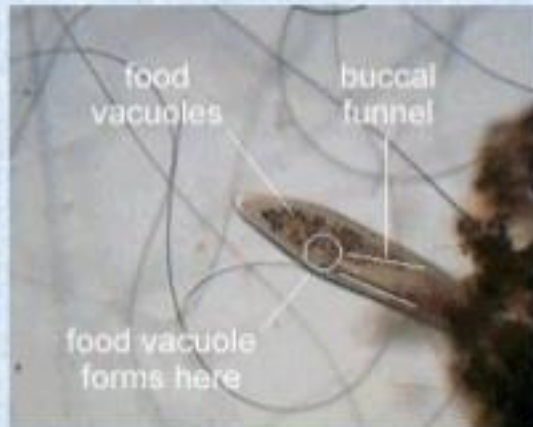
E) Green Algae



## Animal-like protists - *Examples*

### 2. *Paramecium* - continued

• Feeding occurs in the funnel-shaped gullet (buccal cavity) where food is drawn in by external and internal cilia to form food vacuole



• ingests organic detritus and other small organisms like bacteria and other protozoans



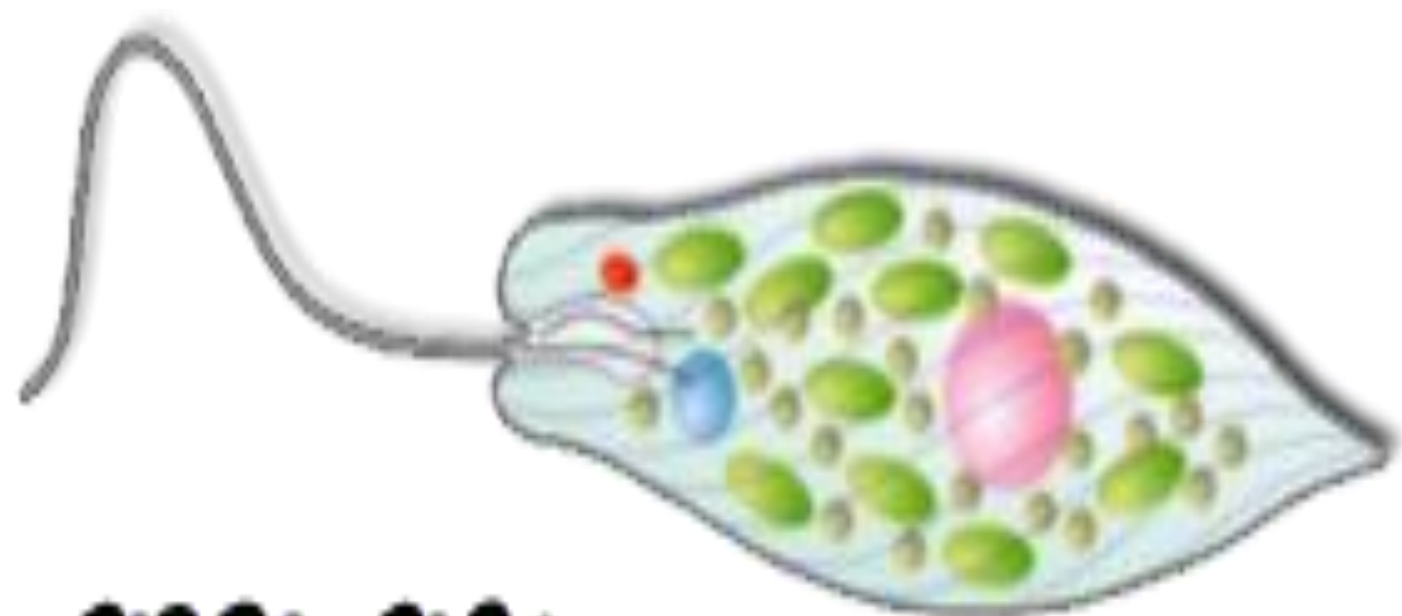
### 3) Fungi-like protists

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- Example:
  - Slime molds







**EUGLENA**

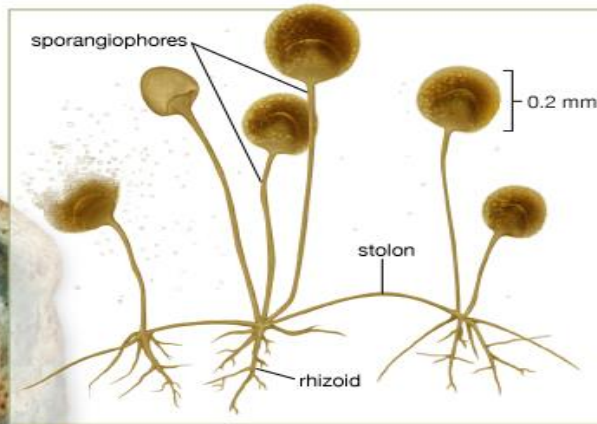
## Kingdom -- Fungi

1. Unique kingdom of **heterotrophic organisms** showing **extracellular digestion**.
2. **Organisms may be :**
  - Unicellular** – Eg. Yeast
  - Multicellular and filamentous** – Eg. Penicillium.
3. **Unicellular organisms –**
  - Protoplast with **many nuclei**. Eg. Rhizopus
  - Protoplast with **single nuclei**. Eg. Yeast.
4. **Filamentous organisms** – Body is called **mycelium** with number of **thread-like** structures called **hyphae** are present.
5. **Hyphae** may be with **septa** or **without septa**.

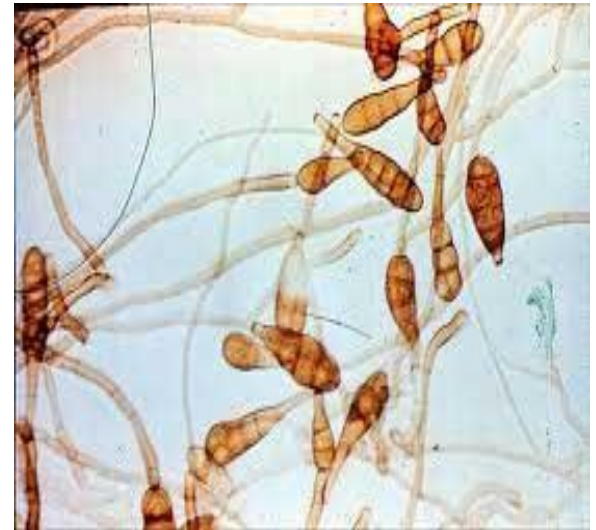
6. **Uni or multi-nucleated.**
7. Non-septate multinucleated hyphae are called **coenocytic hyphae.**
8. **Cell wall – Chitin or fungal cellulose.**
9. **Well organized membrane bound cell organelles.**(except chloroplast).
10. **Mode of nutrition – Saprophytes, parasites , predators or symbiotic.**
11. **Reproduction – Vegetative, asexual or sexual.**



*Rhizopus stolonifer*



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# The fungi are further classified as :

## 1. Phycomycetes :

- Commonly called **algal-fungi** with **coenocytic hyphae**.
- Grow in **moist and damp habitats** on **decaying organic matter**.
- **Reproduction** – **Endogenous spores** in **sporangia**.
- **Eg. Rhizopus.**

## 2. Ascomycetes :

- Commonly called **Sac-Fungi** with branched **septate hyphae**.
- **Reproduction** – Produce **endogenous sexual spores** in Sac like structure.
  - Some produce **fruiting bodies** which enclose asci.
  - Some produce spores called **conidia**.
- **Eg. Penicillium, yeast.**

### 3. Basidiomycetes :

- Commonly called **Club fungi**.(mushrooms, bracket fungi) with **branched septate hyphae**.
- **Asexual reproduction is absent.**
- **Vegetative reproduction by fragmentation.**
- **Sex organs lacking.**
- Fusion of two vegetative cells or somatic cells produce fruiting body called **basidiocarp**.
- It produces **sexual spores**.
- **Eg. Agaricus**

### 4. Deuteromycetes :

- Commonly called **Imperfect fungi**.
- Temporary group of fungi which are known to **reproduce only sexually**.
- They are mostly **decomposers** while a few are **parasitic**.
- **Eg. Alternaria.**



# Kingdom -- Plantae

1. Eukaryotic and autotrophic organisms.
2. Sedentary nature.
3. Cell wall – True Cellulose.
4. Possess photosynthetic pigments.
5. Main producers and provide food to all living organisms.
6. Reserved food material – Starch.
7. Vascular tissues – Absent in lower plants but present in higher plants.
8. Reproduction – Sexual → Gametes  
Asexual → Spores  
Vegetative → Vegetative parts
9. Eg. Algae – Spirogyra  
Bryophyta – Riccia  
Pteridophyta – Fern  
Gymnosperms – Cycas  
Angiosperms – Sunflower.



# Kingdom -- Animalia

1. **Multicellular** and **Eukaryotic** organisms.
2. **Aquatic, terrestrial, amphibious** or **aerial**.
3. Majority of animals are **motile** few are sedentary.
4. **Cell wall, plastids** and **central vacuole** – **Absent**.
5. **Sense organ** and **Nervous system** present and respond to the stimuli.
6. **Mode of nutrition** – **Heterotrophic, mostly holozoic** and some **parasitic**.
7. They are the main **consumers**.(pri, sec. , ter.)
8. **Eg. Fishes, frog, cats, birds etc.**



# KINGDOM ANIMALIA



Sea Sponge



Jellyfish



flatworm



roundworm



Snail



Segmented worm



Insects



Sea Urchins



Butterfly Fish



White Shark



Tree Frog



Salamander



Iguana



Box Turtle



mice



dogs



dolphins



Kangaroo



Lemur



Squirrel Monkey



Gorilla



Homo Habilis



Homo Erectus



Humans

**NOMENCLATURE** (Nomen- Name , Clare- To call)

*The art of naming an object is in fact a science called nomenclature.*

Two main purposes:

→ **As an aid to communicate**

→ **To indicate relationship.**

1. Vernacular names.
2. Scientific names.

# Binomial Nomenclature (Carolus Linnaeus)-

## Species Plantarum

1. A system of nomenclature of plants and animals in which the **scientific name** consists of **two words** or parts is called binomial nomenclature.
2. Eg. *Helianthus annuus*  
*Mangifera indica*  
*Azadirachta indica*
3. Scientific name consist of **two words**.
4. It is written in **Latin** or **Greek**.
5. **First word** indicate **genus**(generic name) and **second name** indicates **species** (specific name).
6. **Generic name** starts with **capital letter** (Helianthus) and **specific name** starts with **small letter**.
7. **Generic name** indicates **simple noun** and **specific name** indicates **descriptive adjective**.



8. **Scientific name** should be **underlined separately** if **hand written** and must be in **Italics** if **printed**.
9. **Generic and specific names** does not have **less than 3 and more than 13 letters**.
10. Name of the **author**, is written in **full** or in **abbreviated** form after the **scientific name**.  
(*Mangifera indica* L. - L stands for Linnaeus)
11. Mention of author's name after the species name is called **Citation**.
12. To avoid confusion, **no two generic names** in any kingdom be same.

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# Advantages of Binomial Nomenclature

1. **Simple, meaningful, precise and standard** as they are accepted universally.
2. **Confusion** and **uncertainty** created by local names is avoided.
3. Easy to **understand** and **remember**.
4. Help to **understand relationships** between organisms.

## Systematics

Scientific study of **similarities** and **differences** among different kinds of organisms and it also includes their identification, nomenclature and classification.

## Taxonomy

Branch of biology which deals with the **collection, identification, nomenclature, description** and **classification** of plants and animals.

### *Objectives of Systematics/Taxonomy:*

- ✓ To know various kinds of plants on the earth.
- ✓ To have the reference system for all organisms.
- ✓ To study diversities of organisms.
- ✓ To give scientific name for each organism.

## Classification:

Coined by A.P. de Candolle.

Arrangement of organisms or groups of organisms in distinct categories in accordance with a particular and well established plan.

## Need for Classification.

1. It helps to explain unity in diversity of the organisms.
2. It gives specific and scientific names to the organisms.
3. Reveals the relationship among various groups of organisms.
4. Classification places an organism amongst those which have common characteristics.



# The three Domain of life.

Carl Woese(1990)

According to this system organisms are classified into :

## THREE DOMAINS AND SIX KINGDOMS.

1. Three Domains – Archaea, Bacteria and Eukarya.
2. Domain Archaea and Bacteria include **prokaryotic organisms** and include only **one kingdom** each ie. **Archaeobacteria** (ancient bacteria) and **Eubacteria** (true bacteria).
3. Domain **Eukarya** include all **eukaryotes**.
4. The four kingdoms under this domain are
  - kingdom Protista
  - kingdom Fungi
  - kingdom Plantae
  - kingdom Animalia
5. All three domains have very **unique ribosomal RNA**.
6. Archaea are known for their **survival in very extreme conditions like high temp., salinity, acidic conditions**, etc..
7. Bacteria, though are prokaryotes differ from Archaea in structure of **cell wall**.

# Taxonomic Hierarchy

**Aim** : To assign each organism an appropriate place in a systematic framework of classification.

## **Defination**

The manner of scientific grouping of different taxonomic categories in a descending order on the basis of their ranks or positions in classification is called taxonomic hierarchy.

**Taxon** – Group of living organisms.

**Category** – Rank or level in the hierarchial classification of organisms.

<u>Category</u>	<u>Taxon</u>	<u>Taxon</u>
Kingdom	Plantae	Animalia
Division	Angiospermae	Chordata
Class	Dicotyledonae	Reptilia
Sub-Class	Polypetalae	Diapsida
Series	Thalamiflorae	-----
Order	Malvales	Squamata
Family	Malvaceae	Elapidae
Genus	Hibiscus	Naja
Species	Rosa-sinensis	naja



### **Species**

A group of individuals with similar morphological characters, which are able to breed among themselves and produce their own kind.

### **Genus**

Group of related species which resemble one another in certain correlated characters. Monotypic genus has only one species whereas polytypic genus may have more than one species.

### **Family**

It includes one or more related genera, differentiated from other related families by certain characteristic differences.

### **Order**

It includes one or more related families.

### **Class**

It includes one or more related orders.

### **Phylum**

It includes all organisms belonging to different classes having a few common characters. Botanists use the term Division for Phylum.

### **Kingdom**

It includes all organisms that share a set of distinguishing common characters. Plants are put in Plant Kingdom while animals are included in Animal Kingdom. This is the highest taxonomic category.



THANK  
YOU

A decorative illustration of a branch with red and pink leaves and small dark berries, framing the text 'THANK YOU'. The leaves are in various shades of red and pink, some with detailed vein patterns. The berries are small and dark, clustered on thin stems. The text 'THANK' is in a large, black, serif font, and 'YOU' is in a similar font, slightly smaller. The entire graphic is set against a plain white background.