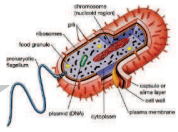

Chapter - 2

Biological

Classification

Points to Remember

Systems of Classification :

- Earliest classification was given by Aristotle. Divided plants into herbs, shrubs and trees.

  Animals into those with red blood and those who do not have it.

- **Two kingdom classification :** Given by Carolous Linneaeus–Kingdom–plantae and kingdom–Animalia.
- **Five kingdom classification :** By R.H. Whittaker, Monera, Protista, Fungi, Plantae and Animalia are the five kingdoms.
- The main criteria for classification of organisms into five kingdoms include cell structure, thallus organisation, mode of nutrition, reproduction and phylogenetic relationships.

Kingdom Monera :

- Has bacteria as sole members.
- Bacteria can have shapes like : Coccus (spherical), Bacillus (rod-shaped), Vibrium (comma shaped) and spirillum (spiral shaped).
- Bacteria found almost everywhere and can be Photosynthetic autotrophs, Chemosynthetic autotrophs or Heterotrophs.

Bacteria → **Archaebacteria**, **Eubacteria**

- Halophiles (salt-loving)
- Thermoacidophiles (in hot springs)
- Methanogens (in marsh and in gut of ruminant animals. Produce methane gas.)
- Photosynthetic autotrophs like Cyanobacteria (Blue-green algae BGA). Some like *Anabaena* and *Nostoc* have specialized cells called heterocysts for nitrogen fixation.
- *Algae bloom* is rich growth of blue green algae over the surface of polluted water bodies.
- Algae bloom releases neurotoxins, deplete oxygen and makes water unfit for use.
- **Chemosynthetic autotrophs :** Oxidise various inorganic substances like nitrates/nitrites, ammonia and use released energy for their ATP proudction. They helps in nutrients recycling of N, P, Fe and S.
- **Heterotophic bacteria :** Decomposers help in making curd, production of antibiotic, N_2 fixation, casuse disesaes like cholera, typhoid, tetanus and citrus canker.

Mycoplasmas : Completely lack cell wall. Smallest living cells. Can survive without oxygen. Pathogenic in animals and plants.

Kingdom PROTISTA

(Comprises of all single celled eukaryotes)

- Forms a link between plants, animals and fungi.

(i) **Chrysophytes** (Has diatoms and golden algae/desmids)

Fresh water/marine, photosynthetic, microscopic plankton.

- Chief producers in Ocean.
- Cell walls have silica which makes it indestructible and cell walls overlap to fit together like a soap box.
- Their accumulation forms ‘Diatomaceous Earth” (gritty soil)
- Used in polishing, filtration of oils and syrups.

(ii) **Dinoflagellates :**

- Marine, photosynthetic, cell wall has stiff cellulose plates.
- Two flagella–one longitudinal and other transverse in a furrow between wall plates.
- **Example :** *Gonyaulax multiples rapdily, make sea appear red (red tides) and produce toxins to kill marine animals.*

(iii) **Euglenoids :**

- Found in stagnant fresh water.

  Have protein rich layer 'pellicle' which makes body flexible.
- Photosynthetic in presence of sunlight but become heterotrophs if they do not get sunlight. (Mixotrophic nutrition)
- **Example :** *Euglena*

(iv) **Slime Moulds :**

- Saprophytic protists
- Under suitable conditions form an aggregates called plasmodium, grows on decaying twigs and leaves.
- During unfavourable conditions, plasmodium differentiates and forms fruiting bodies bearing spores at their tips.
- Spores have true walls which are extremely resistant and survive for many years and dispersed by air currents.

(v) **Protozoans :** Are heterotrops and live as parasites. Have four major groups.

Amoeboid : Catch prey using pseudopodia, *e.g., Amoeba. Entamoeba* are parasite.

Flagellated : Have one or more flagella. Cause disease like Sleeping Sickness *e.g., trypanosoma.*

Ciliated : Have clilia to move food into gullet and help in locomotion. *e.g., Paramoecium.*

Sporozoans : Have infective spore like stage in life cycle, *e.g.,* Plasmodium which causes malaria.

Kingdom Fungi

1. Heterotrophic organisms
2. Non chlorpohyllous hyphae
3. Network of hyphae called mycelium
4. Hyphae which have multinucleated cytoplasm are called coenocytic hyphae
5. Cell wall of chitin and polysaccharides
6. Cosmopolitan. Grow in warm and humid places.
7. Saprophytic, parasitic, symbiotic (Lichen and Mycorrhiza) *e.g.,* ***Puccinia,*** (wheat rust disease), ***Penicillium,*** Yeast (unicellular fungus).
8. Reproduction can take place by vegetative means fragmentation, fission and budding. Asexual reproduction by spores–conidia, sporangiospores or zoospores. Sexual reproduction by Oospores, ascospores and basidiospores–produced in fruiting bodies.
9. **Sexual cycle involves 3 steps :**
   (i) Plasmogamy (fusion of Protoplasms.)
   (ii) Karyogamy (fusion of two nuclei.)
   (iii) Meiosis in zygote resulting in haploid spores.
10. Dikaryophase is a condition of having dikaryon in an intervening dikaryotic stage (n + n *i.e.,* two nuclei per cell) between plasmogamy and karyogamy in fungi like ascomycetes and basidiomycetes.

Classes of Fungi

(i) Phycomycetes :

- grow on decaying wood or as obligate parasites on plants
- Mycelium aseptate and coenocytic
- Spores produced endogenously in sporangium.
- Asexual reproduction by Zoospores or Aplanospores
- Zygospores are formed by the fusion of gametes.

  e.g., ***Rhizopus, Albugo, Mucor***

(ii) Ascomycetes :

- also known as 'sac fungi'
- Are saprophytic, decomposers, parasitic or coprophilous (growing on dung).
- Mycelium branched and septate
- Asexual spores are called conidia produced exogenously on the conidiophores.

  Sexual spores are called ascospores produced endogenously in ascus, produced inside fruiting body called Ascocarp.

  e.g., ***Aspergillus, Neurospora, Saccharomyces (Unicellular fungi), Claviceps, morels, truffles***

(iii) Basidiomycetes :

- Mycelium septate and branched.
- Generally asexual spores are not found.
- Vegetative reproduction by fragmentation.
- Sexual reproduction by fusion of vegetative or somatic cells to form basidium produced in basidiocarp.
- Basidium produces four basidiospores exogenously after meiosis.

  e.g., ***Agaricus, Ustilago, Puccinia***

(iv) Deuteromycetes :

- Called as 'Fungi Imperfecti' as sexual form (perfect stage) is not known for them.
- Once sexual form is discovered the member is moved to Ascomycetes or Basidiomycetes.
- Mycelium is septate and branched.
- Are saprophytic parasitic or decomposers.

  e.g., ***Alternaria, Colletotrichum, Trichoderma.***

Viruses :

- They did not find a place in biological classification.
- Not truly living.

- Non-cellular organisms which take over the machinery of host cell on entering it and become living but as such they have inert crystalline structure appear non-living. So, difficult to call them living or non-living.
- Virus means venom or poisonous fluid. Pastuer gave the term 'virus'.
- D.J. Ivanowsky found out that certain microbes caused Tobacco Mosaic Disease in tobacco plant.
- M.W. Beijerinek called fluid as 'Contagium vivum fluidum' as extracts of infected plants of tobacco could cause infection in healthy plants.
- W.M. Stanely showed viruses could be crystallized to form crystals of protein which are inert outside their specific host.
- Viruses are obligate parasites.

Structure of Virus :

- It is a nucleoprotein made up of protein coat called Capsid. Capsid is made up of capsomeres arranged in helical or polyhedral-geometric forms. Have either DNA or RNA as genetic material which may be single or double stranded.
- Usually plant viruses have single stranded RNA; bacteriophages have double stranded DNA and animal viruses have single or double stranded RNA or double stranded DNA.

Diseases caused in humans :

Mumps, Small pox, herpes, influenza and AIDS etc. In plants, symptoms can be mosaic formation, leaf rolling and curling, yellowing and vein clearing, dwarfing and stunted growth.

Viroids :

- Infectious agent, free RNA (lack protein coat)
- RNA has low molecular weight.
- Causes potato spindle tuber disease.
- Discovered by T.O. Diener.

Lichens :

- Symbiotic association between algal component (Phycobiont) and fungal component (mycobiont). Algae provides food. Fungi provides shelter and absorb nutrients and water for alga.
- Good pollution indicators as they do not grow in polluted areas.