

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 RBC's and those who do not have it.

• **Two kingdom classification** : Given by Carolous Linnaeus – Plant kingdom and Animal kingdom.

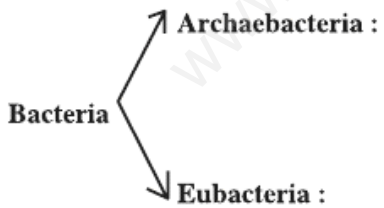
• **Five kingdom classification** : By R. H. Whittaker. Monera, Protista, Fungi, Plantae and Animalia are the five kingdoms.

Kingdom Monera :

• Has bacteria as sole members.

• Bacteria can have shapes like : Coccus (spherical), Bacillus (rod-shaped), Vibrio (comma shaped) and spirillum (spiral shaped).

• Bacteria found almost everywhere and can be Photosynthetic autotrophs, Chemosynthetic autotrophs or Heterotrophs.



Archaeobacteria :

- Halophiles (salt-loving)
- Thermoacidophiles (in hot springs)

- Methanogens (in marsh and in gut of ruminant animals. Produce methane gas.)

Eubacteria :

- Photosynthetic autotrophs like Cyanobacteria. Some like Anabaena have specialised cells called **heterocysts** for nitrogen fixation.

- **Chemosynthetic autotrophs** : Oxidise various inorganic substances like nitrates/nitrites, ammonia and use released energy for their ATP production.

Heterotrophic bacteria : • Decomposers, help in making curd, production of antibiotics, N_2 fixation, cause diseases like cholera, typhoid.

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

Kingdom Prostita

(Comprises of all single celled eukaryotes)

- Forms a link between plants, animals and fungi.
- (i) **Chrysophytes** (Has diatoms and golden algae)
 - Cell walls have silica and cell walls overlap to fit together like a soap box.
 - Their accumulation forms 'Diatomaceous Earth'.
 - Used in polishing, filtration of oils and syrups.
- (ii) **Dinoflagellates** : • Marine, photosynthetic, cell wall has cellulose.
 - Two flagella – one longitudinal and other transversely in a furrow between wall plates.
 - **Example** : Gonyaulax multiples rapidly, make sea appear red (red tides) and produce toxins to kill marine animals.
- (iii) **Euglenoids** : • Have protein rich layer 'pellicle' which makes body flexible.
 - Photosynthetic in presence of sunlight but become heterotrophs if they do not get sunlight.
 - **Example** : *Euglena*
- (iv) **Slime Moulds** : • Saprophytic protists
 - Form aggregates to form plasmodium, grows on decaying twigs and leaves.
 - Spores have true walls which are extremely resistant and survive for many years.
- (v) **Protozoans** :
 - Amoeboid** : Catch prey using pseudopodia, e.g., Amoeba.
 - Flagellated** : Have one or more flagella. Cause disease like sickness e.g., *Trypanosoma*.
 - Ciliated** : Have cilia to move food into gullet and help in locomotion. e.g., *Paramecium*.
 - Sporozoans** : Have infective spore like stage in life cycle, e.g., *Plasmodium* which causes Malaria.

KINGDOM FUNGI

• Non-chlorophyllous hyphae

• Network of hyphae called mycelium

- Hyphae which have multinucleate cytoplasm are called coenocytic hyphae
- Cell wall of chitin and polysaccharides
- Grow in warm and humid places
- Saprophytic, parasitic, symbiotic (Lichen)

e.g., *Puccinia* (rust causing), *Penicillium*, Yeast is a unicellular fungus.

CLASSES OF FUNGI

- (i) **Phycomycetes :**
- grow on decaying wood
 - Mycelium aseptate
 - Spores produced endogenously
 - Asexual reproduction by Zoospores or Aplanospores
 - Zygospores are formed by the fusion of gametes.
e.g., *Rhizopus*, *Albugo*.
- (ii) **Ascomycetes :**
- Also known as 'sac fungi'
 - Mycelium branched and septate
 - Spores : 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*.
- (iii) **Basidiomycetes**
- Mycelium septate.
 - 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 after meiosis.
e.g., *Agaricus*, *Ustilago*.
- (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.*

- Viruses :**
- They did not find a place in classification. 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**.
 - Pasteur gave the term 'Virus' *i.e.*, poisonous fluid.
 - D. J. Ivanowsky found out that certain microbes caused Tobacco Mosaic Disease in tobacco plant.
 - M. W. Beijerinck called fluid as 'Contagium vivum fluidum' as extracts of infected plants of tobacco could cause infection in healthy plants.
 - W. M. Stanley showed viruses could be crystallised to form crystals of protein which are inert outside their specific host.

- Structure of Virus :**
- It is a nucleoprotein made up of protein coat called Capsid. Capsid is made up of capsomeres arranged in helical or polygeometric 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 : Mumps, Small pox, AIDS etc.

- 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 for alga.
 - Good pollution indicators as they do not grow in polluted areas.

QUESTIONS

Very Short Answer Questions (1 mark each)

1. *Nostoc* and *Anabaena* have specialised cells called heterocysts. What is the function of these cells ?
2. Which group comprises of single celled eukaryotes only ?
3. Which organisms are the chief producers in oceans ?
4. Name the fungus which causes disease in wheat (i) rust (ii) Smut.
5. Which Ascomycetes has been used extensively in biochemical and genetic work ?

Short Answer Questions-II (2 marks each)

6. How are bacteria classified on the basis of their shapes?
7. What is the mode of reproduction in bacteria ?
8. Why are red tides caused and why are they harmful ?
9. Viruses and viroids differ in structure and the diseases they cause. How ?
10. Which class of kingdom fungi has both unicellular as well as multicellular members ? When is a fungus called coprophilous ?

Short Answer Questions-I (3 marks each)

11. Who gave five kingdom classification ? What was the criteria used for such classification ?
12. What are the steps in the sexual cycle in kingdom fungi ?
13. Some symbiotic organisms are very good pollution indicators and composed of a chlorophyllous and a non-chlorophyllous member. Describe them.

Long Answer Questions (5 marks each)

14. Some primitive relatives of animals live as predators or parasites and are divided into four major groups. Elaborate.
15. Differentiate between various classes of kingdom Fungi on the basis of their (i) Mycelium, (ii) Types of spores and (iii) Type of fruiting body. Also give two examples for each class.

ANSWERS

Very Short Answers (1 mark)

1. Help in nitrogen fixation.

2. Kingdom Protista
3. Diatoms
4. (i) *Puccinia*, (ii) *Ustilago*
5. *Neurospora*

Short Answers-II (2 marks each)

6. Bacillus (rod-shaped), Coccus (spherical), Vibrium (comma shaped) and Spirillum (spiral shaped).
7. Mainly by fission; Production of spores in unfavourable conditions. Sexual reproduction by DNA transfer.
8. Rapid multiplication of dinoflagellates like *Gonyaulax*. Harmful as they release toxins which kill marine animals.
9. Refer 'Points to Remember'
10. Ascomycetes : Yeast (Unicellular), *Penicillium* (Multicellular), Coprophilous means fungi which grow on dung.

Short Answers-I (3 marks each)

11. R. H. Whittaker. Criteria for classification : Cell structure, thallus organisation, mode of nutrition, reproduction and phylogenetic relationships.
12. The steps are (i) Plasmogamy : fusion of protoplasm of two motile or non-motile gametes.
(ii) Karyogamy : fusion of two nuclei.
(iii) Zygotic Meiosis to form haploid spores.
(iv) Dikaryophase in ascomycetes and basidiomycetes where before karyogamy two nuclei per cell (dikaryon) are found.
13. Lichens. Refer 'Points to Remember'

Long Answers (5 marks each)

14. Protozoans. Refer page no. 21-22, NCERT Text Book of Biology for Class XI
15. Refer NCERT Text Book of Biology for Class XI, page no. 23-24.