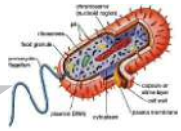

Chapter - 2

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, Chemosyn thetic 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 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 aniamls 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.

- Cell walls have silica which makes it indestructible and cell walls overlap to fit together like a soap box.
- Their accumulation forms 'Diagomaceous 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 trnasverse 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 fruting bodies bearing spores at their tips.
- Spores have true walls which are exrtremely resistant and survive for many years and dispersed by air currents.

(v) **Protozoans :** Are heterotrops and live as predators or 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 multinucleate 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 disesae), ***Penicillium,*** Yeast is a unicellular fungus.
8. Reprouction 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) Karyagamy (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 repdouction 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, Sacharomyces (Unicellular fungi), Claviceps, morels, truffles***

(iii) Basidiomycetes :

- Mycelium septate and branched.
- Generally asexual sprors 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 t o 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 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 of 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 crystatls 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.

Questions

Very Short Answer Question (1 mark each)

1. ***Nostoc*** and ***Anabaena*** have specialized 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 ?
6. What is the principle underlying the use of cyanobacteria in agriculture ?

Short Answer Question-I (2 marks each)

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

Short Answer Question-II (3 marks each)

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

VBQ (4 marks)

15. Vineeta went to the marked alongwith Roshan, her younger brother bought a packet of mushroom. Roshan thinks that mushrooms is a product of plants.
    (a) What does Vineeta explain ?
    (b) Name any two edible products from this group (scientific name.)
    (c) What values are displayed by Vineeta.

Long Answer Questions (5 mark each)

16. Some primtive relatives of animals live as predators or parasites and are divided into four major groups. Elaborate.

17. differentiate between various classes of kingdom Fungi on the basis of their (i) Mycelium, (ii) Types of spores and (iii) Types of fruiting body. Also give two examples for each class.
18. Describe sexual reproduction in fungi.

Answers

Very Short Answers (1 mark each)

1. Help in nitrogen fixation.
2. Kingdom Protista.
3. Diatoms
4. (i) *Puccinia,* (ii) *Ustilago*
5. *Neurospora*
6. Capability of nitrogen fixation

Short Answers-I (2 marks each)

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

Short Answers-II (3 marks each)

12. R.H. Whittaker, Criteria for classification : Cell structure, thallus organisation, mode of nutrition, reproduction and phylogenetic relationships.
13. Saprophytes, Parasites, Symbionts-Lichens and Mycorrhiza.
14. Lichens, Refer 'Points to Remember'

VBQ (4 marks each)

15. (a) Mushrooms belong to Kingdom Fungi.They are saprotrophic, with cell wall made of chitin-heterotrophs.
    (b) Agaricus, Morchella
    (c) Scientific attitude, observant, will to disseminate knowledge to younger people.

Long Answers (5 marks each)

16. Protozoans. Refer page no 21-22, NCERT Text Book of Biology for Class XI.
17. Refer NCERT Text Book of Biology for Class XI, Page no. 23-24.
18. Refer NCERT text book of Biology for Class XI Page 23. (Plasmogamy, Karyogamy, Meiosis in zygote, Dikaryophase)

    The steps are :

    (i) Plasmogamy : fusion of protoplasm of two motile or non-motile gametes.

    (ii) Kayogamy : 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.