

CHAPTER 2

BIOLOGICAL CLASSIFICATION

VEDA
ACADEMY

CLASS 11TH

NCERT EXERCISE AND SOLUTIONS - BIOLOGY

Q. 1. Discuss how classification systems have undergone several changes over a period of time?

ANSWER:-

Classification systems have evolved over time. The first attempt at classification was made by Aristotle, who categorized plants into herbs, shrubs, and trees. Animals were classified based on the presence or absence of red blood cells. However, this system was unable to classify all known organisms. To address this, Linnaeus introduced the two-kingdom system, dividing organisms into kingdom Plantae and kingdom Animalia. However, this system did not distinguish between unicellular and multicellular organisms or between eukaryotes and prokaryotes, leading to many organisms being unclassified. To resolve these issues, R.H. Whittaker proposed a five-kingdom system of classification in 1969. Based on characteristics such as cell structure, mode of nutrition, and presence of a cell wall, five kingdoms were established: Monera, Protista, Fungi, Plantae, and Animalia.

Q. 2. State two economically important uses of:

- (a) heterotrophic bacteria
- (b) archaeobacteria

ANSWER:-

(a) **Heterotrophic Bacteria**

- i. They function as decomposers, aiding in the formation of humus.
- ii. They assist in the production of curd from milk.
- iii. Some bacterial species are sources of antibiotics.
- iv. Several soil bacteria contribute to the fixation of atmospheric nitrogen.

(b) **Archaeobacteria**

- i. Methane gas is produced from the dung of ruminants by methanogens.
- ii. Methanogens also play a role in biogas production and sewage treatment.

Q. 3. What is the nature of cell-walls in diatoms?

ANSWER:-

The Cell wall of diatoms is made of silica. Their cell wall construction is known as frustule. Diatoms



have two thin, overlapping shells that fit together like a soapbox. When they die, the silica in their cell walls accumulates as diatomaceous earth. This material is soft, highly inert, and widely used in industrial applications such as filtering oils, sugars, and other substances.

Q. 4. Find out what do the terms ‘algal bloom’ and ‘red tides’ signify.

ANSWER:-

Algal Bloom

An algal bloom is the rapid increase of algae or blue-green algae in a water body, causing its discoloration. This leads to a rise in biological oxygen demand (BOD), which can result in the death of fish and other aquatic organisms.

Red Tides

Red tides occur due to the rapid multiplication of red dinoflagellates, such as *Gonyaulax*. Their high population turns the sea red in color. These organisms release significant amounts of toxins into the water, which can cause mass fish mortality.

Q. 5. How are viroids different from viruses?

ANSWER:-

Viroids were discovered by T.O. Diener in 1917. They are the causative agents of potato spindle tuber disease. Viroids are smaller than viruses, lack a protein coat, and consist of free RNA with low molecular weight.

Q. 6. Describe briefly the four major groups of Protozoa.

ANSWER:-

Protozoa are microscopic, unicellular protists with a heterotrophic mode of nutrition. They can be holozoic, saprobic, or parasitic and are classified into four main groups:

(1) Amoeboid Protozoa (Sarcodina): These unicellular, jelly-like protozoa inhabit freshwater, seawater, or moist soil. Their bodies lack a periplast, making them either naked or covered by a calcareous shell. They typically lack flagella and move using temporary protoplasmic extensions called pseudopodia, which also aid in capturing prey. Examples include free-living *Amoeba* and parasitic *Entamoeba*.

(2) Flagellated Protozoa (Zooflagellates): These non-photosynthetic protozoa are free-living and lack a cell wall. They use flagella for locomotion and prey capture. Parasitic forms, such as *Trypanosoma*, which causes sleeping sickness in humans, are included in this group.

(3) Ciliated Protozoa (Ciliates): Ciliates are aquatic protozoa characterized by numerous cilia covering their body surface and the presence of two types of nuclei. The coordinated beating of the cilia moves food-laden water into a specialized cavity called the gullet. Examples include *Paramecium* and *Vorticella*.



(4) Sporozoans: Sporozoans are disease-causing endoparasites and pathogens. They are uninucleate, with a body covered by a pellicle, and lack cilia or flagella. This group includes *Plasmodium*, the parasite responsible for malaria.

Q. 7. Plants are autotrophic. Can you think of some plants that are partially heterotrophic?

ANSWER:-

Plants primarily exhibit an autotrophic mode of nutrition due to the presence of chlorophyll, enabling them to synthesize their own food through photosynthesis. However, certain insectivorous plants are partially heterotrophic. They have specialized mechanisms to capture insects, which provide additional nutrients necessary for their growth and development. Examples include the pitcher plant (*Nepenthes*), Venus flytrap, bladderwort, and sundew plant.

Q. 8. What do the terms phycobiont and mycobiont signify?

ANSWER:-

The algal component of lichens is called the phycobiont, while the fungal component is known as the mycobiont. The algae, containing chlorophyll, produce food for the fungi, whereas the fungi provide shelter to the algae and absorb water and nutrients from the soil. This mutually beneficial association is known as a symbiotic relationship.

Q. 9. Give a comparative account of the classes of Kingdom Fungi under the following:

- (i) mode of nutrition
- (ii) mode of reproduction

ANSWER:-

(A) Phycomycetes

Examples: *Rhizopus*, *Albugo*

1. Mode of Nutrition:

- They are obligate parasites on plants or saprophytes on decaying matter like wood.

2. Mode of Reproduction:

- Asexual reproduction occurs through motile zoospores or non-motile aplanospores, formed endogenously in the sporangium.
- Sexual reproduction can be isogamous, anisogamous, or oogamous, leading to the formation of thick-walled zygospores.

(B) Ascomycetes

Examples: *Penicillium*, *Aspergillus*, *Claviceps*, *Neurospora*

1. Mode of Nutrition:

- They can be saprophytic, decomposers, parasitic, or coprophilous (growing on dung).



2. Mode of Reproduction:

- Asexual reproduction occurs via exogenously produced spores like conidia, formed on conidiophores.
- Sexual reproduction takes place through ascospores, formed endogenously within sac-like asci, which are arranged in ascocarps.

(C) Basidiomycetes

Examples: *Ustilago*, *Agaricus*, *Puccinia*

1. Mode of Nutrition:

- They act as decomposers in soil, on logs, or tree stumps and can also parasitize plants, causing diseases like rusts and smuts.

2. Mode of Reproduction:

- Asexual reproduction primarily occurs through fragmentation, as asexual spores are absent.
- Sexual reproduction involves plasmogamy, where two different hyphal strains fuse, forming a dikaryon. This develops into a basidium, which produces four basidiospores.

(D) Deuteromycetes

Examples: *Alternaria*, *Trichoderma*, *Colletotrichum*

1. Mode of Nutrition:

- Some species are saprophytes, others are parasites, and many decompose leaf litter.

2. Mode of Reproduction:

- Asexual reproduction occurs exclusively through conidia.
- Sexual reproduction is absent in deuteromycetes.

Q. 10. What are the characteristic features of Euglenoids?

ANSWER:-**Key characteristics of euglenoids include:**

- Euglenoids, such as *Euglena*, are unicellular protists typically found in freshwater.
- They lack a cell wall and instead have a protein-rich membrane called the pellicle.
- Two flagella are present at the anterior end of the body.
- A small, light-sensitive eyespot is present.
- They possess photosynthetic pigments like chlorophyll, enabling them to produce their own food. However, in the absence of light, they exhibit heterotrophic behaviour by capturing small aquatic organisms.
- Euglenoids exhibit both plant-like and animal-like traits, making their classification challenging.

Q. 11. Give a brief account of viruses with respect to their structure and nature of genetic material. Also name four common viral diseases.

ANSWER:-

Viruses are sub-microscopic infectious agents capable of infecting all living organisms. They consist of genetic material encased in a protein coat. The genetic material can be either DNA or RNA.



- Most plant-infecting viruses have single-stranded RNA as their genetic material.
- Animal-infecting viruses may possess single- or double-stranded RNA or double-stranded DNA.
- Bacteriophages, which infect bacteria, typically have double-stranded DNA.

The protein coat, known as the capsid, is composed of subunits called capsomeres, which are arranged in geometric shapes such as helical or polyhedral forms.

Common viral diseases include AIDS, smallpox, mumps, and influenza.

Q. 12. Organise a discussion in your class on the topic – Are viruses living or non-living?

ANSWER:-

Viruses are microscopic entities exhibiting traits of both living and non-living organisms. Each virus consists of a strand of DNA or RNA encased in a protein coat. The presence of genetic material (DNA or RNA) implies that viruses possess some characteristics of life. Additionally, they can interact with their environment, albeit in a limited way, when inside a host cell.

However, certain features, such as their inability to reproduce independently without the machinery of a host cell and their acellular structure, suggest a non-living nature. Consequently, the classification of viruses continues to be a complex and unresolved challenge in modern systematics.

