

# NCERT Solutions for Class-XI Biology

## Chapter-2

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

1. The classification systems have undergone several changes with time. The first attempt of classification was made by Aristotle. He classified plants as herbs, shrubs, and trees. Animals, on the other hand, were classified on the basis of presence or absence of red blood cells. This system of classification failed to classify all the known organisms. Therefore, Linnaeus gave a two kingdom system of classification. It consists of kingdom Plantae and kingdom Animalia. However, this system did not differentiate between unicellular and multicellular organisms and between eukaryotes and prokaryotes. Therefore, there were large numbers of organisms that could not be classified under the two kingdoms.

To solve these problems, a five kingdom system of classification was proposed by R.H Whittaker in 1969. On the basis of characteristics, such as cell structure, mode of nutrition, presence of cell wall, etc., five kingdoms, Monera, Protista, Fungi, Plantae, and Animalia were formed.

2. State two economically important uses of:

- (a) Heterotrophic bacteria
- (b) Archaeobacteria

2. (a) Heterotrophic bacteria: They include saprotrophic, symbiotic and parasitic bacteria. They act as natural scavengers as they dispose off the dead bodies, organic wastes, release raw materials for reutilisation. They also help in sewage disposal, manure production etc. Symbiotic bacteria help in nitrogen fixation. Some bacteria are employed in the production of a number of industrial products like lactic acid, curd, cheese, butter, vinegar etc. Some bacteria are used in preparation of serum, vaccines, vitamins, enzymes, antibiotics etc. e.g., Pseudomonas, Xanthomonas, etc.

(b) Archaeobacteria : Archaeobacteria are employed in the production of gobar gas from dung and sewage and in ruminants, they cause fermentation of cellulose.

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

3. The cell walls of diatoms are made of silica. Their cell wall construction is known as frustule. It consists of two thin overlapping shells that fit into each other such as a soap box. When the diatoms die, the silica in their cell walls gets deposited in the form of diatomaceous earth. This diatomaceous earth is very soft and quite inert. It is used in filtration of oils, sugars, and for other industrial purposes.

4. Find out what do the terms 'algal bloom' and 'red-tides' signify.

4. The rapid increase in populations of algae and other phytoplanktons, in particular cyanobacteria, in water bodies rich in organic matter is called algal bloom. The density

of the organisms may be such that it may prevent light from passing to lower depths in the water body. Algal blooms are caused by an increase in levels of nitrate, a mineral ion essential for algal and bacterial growth.

The source of increased nitrate may be from agricultural fertilizers, which are leached – into water systems from the land, or sewage effluent.

Red tides are caused by a sudden, often toxic proliferation of marine phytoplankton, notably dinoflagellates, that colour the sea red, brown, or yellowish due to the high concentration of the photosynthetic accessory pigments. Some dinoflagellates, such as *Gonyaulax*, produce potent toxins, which may kill fish and invertebrates outright or accumulate in the food chain, posing a hazard to humans eating shellfish and other seafood. These phytoplanktonic blooms may be related to nutrient-rich inputs from the land, or upwelling oceanic waters, and are initiated by the activation of cyst-like forms lying on the sea bed.

5. How are viroids different from viruses?
5. Viroids were discovered in 1917 by T.O. Denier. They cause potato spindle tuber disease. They are smaller in size than viruses. They also lack the protein coat and contain free RNA of low molecular weight.
6. Describe briefly the four major groups of Protozoa.
6. All protozoans are heterotrophs and live as predators or parasites. They are believed to be primitive relatives of animals. They are classified into four groups on the basis of locomotory organelles.
  - (i) Amoeboid protozoans : These organisms live in fresh water, sea water or moist soil. They move and capture their prey by developing pseudopodia (false feet) as in *Amoeba*. Some of them such as *Entamoeba* are parasites.
  - (ii) Flagellated protozoans : The members of this group are either free-living or parasitic. They have flagella for locomotion. The parasitic forms cause diseases such as sleeping sickness e.g., *Trypanosoma*.
  - (iii) Ciliated protozoans : These are aquatic, actively moving organisms because of the presence of thousands of cilia. They have a cavity (gullet) that opens to the outside ‘of the cell surface. The coordinated movement of rows of cilia causes the water laden with food to be steered into the gullet e.g., *Paramecium*. ~
  - (iv) Sporozoans: This includes diverse parasitic organisms that have an infectious spore-like stage in their life cycle. Locomotory organs are absent. The most notorious N . is *Plasmodium* (malarial parasite) which causes malaria which has a staggering effect on human population.
7. Plants are autotrophic. Can you think of some plants that are partially heterotrophic?
7. Plants have autotrophic mode of nutrition as they contain chlorophyll pigment. Thus, they have the ability to prepare their own food by the process of photosynthesis. However, some insectivorous plants are partially heterotrophic. They have various means of capturing insects so as to supplement their diet with required nutrients derived

from insects, causing proliferation of growth. The examples include pitcher plant (*Nepenthes*), Venus fly trap, bladderwort, and sundew plant.

8. What do the terms phycobiont and mycobiont signify?
8. A lichen is structurally organized entity consisting of the permanent association of a fungus and an alga. The fungal component of a lichen is called mycobiont and the algal component is called phycobiont. Both mycobiont and phycobiont are associated in symbiotic union in which the fungus is predominant and alga is subordinate partner. – ; Fungus provides the structural covering that protects alga from unfavourable conditions, i.e., drought, heat, etc. It also traps moisture from the atmosphere and anchors the lichen to a rock, tree bark, leaves and other similar supports. The alga prepares organic food by the process of photosynthesis from carbon dioxide. If the algal component is cyanobacteria (blue-green alga), they fix atmospheric nitrogen in addition to preparation of food.
9. Give a comparative account of the classes of Kingdom Fungi under the following:
  - (i) Mode of nutrition
  - (ii) Mode of reproduction
9. (A) Phycomycetes: This group of fungi includes members such as *Rhizopus*, *Albugo*, etc.
  - (i) Mode of nutrition  
They are obligate parasites on plants or are found on decaying matter such as wood.
  - (ii) Mode of reproduction  
Asexual reproduction takes place through motile zoospores or non-motile aplanospores that are produced endogenously in sporangium.  
Sexual reproduction may be of isogamous, anisogamous, or oogamous type. It results in the formation of thick-walled zygospore.
- (B) Ascomycetes: This group of fungi includes members such as *Penicillium*, *Aspergillus*, *Claviceps*, and *Neurospora*.
  - (i) Mode of nutrition  
They are sporophytic, decomposers, parasitic or coprophilous (growing on dung).
  - (ii) Mode of reproduction  
Asexual reproduction occurs through asexual spores produced exogenously, such as conidia produced on conidiophores.  
Sexual reproduction takes place through ascospores produced endogenously in saclike asci and arranged inside ascocarps.
- (C) Basidiomycetes: This group of fungi includes members such as *Ustilago*, *Agaricus* and *Puccinia*.
  - (i) Mode of nutrition  
They grow as decomposers in soil or on logs and tree stumps. They also occur as parasites in plants causing diseases such as rusts and smuts.
  - (ii) Mode of reproduction  
Asexual reproduction takes place commonly through fragmentation. Asexual spores are absent.

Sex organs are absent but sexual reproduction takes place through plasmogamy. It involves fusion of two different strains of hyphae. The resulting dikaryon gives rise to a basidium. Four basidiospores are produced inside a basidium.

(D) Deuteromycetes: This group of fungi includes members such as *Alternaria*, *Trichoderma*, and *Colletotrichum*.

(i) Mode of nutrition

Some members are saprophytes while others are parasites. However, a large number act as decomposers of leaf litter.

(ii) Mode of reproduction

Asexual reproduction is the only way of reproduction in deuteromycetes. It occurs through asexual spores called conidia.

Sexual reproduction is absent in deuteromycetes.

10. What are the characteristic features of Euglenoids?

10. The euglenoid flagellates are the most interesting organisms having a mixture of animal and plant characteristics. The characteristic features are:

(i) They are unicellular flagellates.

(ii) These protists lack a definite cellulose cell wall. Instead the cells are covered by a thin membrane known as pellicle. The pellicle is composed of protein, lipid and carbohydrates.

(iii) One or two flagella which help these protists in active swimming are present. If two flagella are present, then one is long and other is short. They are tinsel – shaped i.e., with two longitudinal rows of fine hairs. Each flagellum has its own basal granule. The two flagella join with each other at a swelling, called paraflagellar body and finally only one long flagellum emerges out through the cytostome.

(iv) Cell at the anterior end possesses an eccentric mouth or cytostome which leads into a flask-shaped cavity viz. gullet or cytopharynx. Gullet opens into a large basal reservoir.

(v) At one end of the reservoir, the cytoplasm contains an orange red stigma (eye spot). The eye spot is a curved plate with orange-red granules and contains red pigment astaxanthin. Both paraflagellar body and eye spot act as photoreceptors.

(vi) Just below the reservoir is found a contractile vacuole having many feeding canals. The contractile vacuole takes part in osmoregulation. It expands and pumps its fluid contents in the reservoir.

(vii) The mode of nutrition in euglenoids is holophytic or photoautotrophic. Some euglenoids show mixotrophic nutrition (both holophytic as well as saprobic mode).

(viii) Cytoplasm is differentiated into ectoplasm and endoplasm. Nucleus is large and occurs roughly in middle. The envelope and nucleolus persist during cell division.

(ix) Each chloroplast is composed of a granular matrix traversed by 10-45 dense bands and is covered by 3-membraned envelope. They contain the photo-synthetic pigments-chlorophyll – a, b. They store carbohydrates as paramylon bodies, scattered throughout the cytoplasm.

(x) Asexual reproduction occurs by longitudinal binary fission. The flagellum is duplicated before cell division.

(xi) Under unfavourable condition the euglenoids form cysts to perennate the dry period.

(xii) Sexual reproduction is not observed.

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

**11.** Viruses are sub-microscopic infectious agents that can infect all living organisms. A virus consists of genetic material surrounded by a protein coat. The genetic material may be present in the form of DNA or RNA.

Most of the viruses, infecting plants, have single stranded RNA as genetic material. On the other hand, the viruses infecting animals have single or double stranded RNA or double stranded DNA.

Bacteriophages or viruses infecting bacteria mostly have double stranded DNA. Their protein coat called capsid is made up of capsomere subunits. These capsomeres are arranged in helical or polyhedral geometric forms.

A.I.D.S, small pox, mumps, and influenza are some common examples of viral diseases.

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

**12.** Viruses are microscopic organisms that have characteristics of both living and non-living. A virus consists of a strand of DNA or RNA covered by a protein coat. This presence of nucleic acid (DNA or RNA) suggests that viruses are alive. In addition, they can also respond to their environment (inside the host cell) in a limited manner.

However, some other characters, such as their inability to reproduce without using the host cell machinery and their acellular nature, indicate that viruses are non-living. Therefore, classifying viruses has remained a mystery for modern systematics.