

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

**Soln.** A lichen is structurally organised 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. Organise a discussion in your class on the topic – ‘Are viruses living or non-living’?

**Soln.** Viruses are regarded as intermediate between non-living entities and living organisms. It is very difficult to ascertain whether they are living or non-living. Some characters of viruses suggest their non-living nature whereas many other characters suggest their living nature. They resemble non-living objects in –

- (i) Lacking protoplast.
- (ii) Ability to get crystallised.
- (iii) Inability to live independent of living cell.
- (iv) High specific gravity which is found only in non-living objects.
- (v) Absence of respiration.
- (vi) Absence of energy storing system.
- (vii) Absence of growth and division. Instead different parts are synthesized separately.

Viruses resemble living beings in –

- (i) Being formed of organic macromolecules which occur only in living beings.
- (ii) Presence of genetic material.
- (iii) Ability to multiply or reproduce although only inside living cell.
- (iv) Occurrence of mutations.
- (v) Occurrence of enzyme transcriptase in most viruses.
- (vi) Some viruses like Pox virus contains vitamins like riboflavin and biotin.
- (vii) Infectivity and host specificity.
- (viii) Viruses are ‘killed’ by autoclaving and ultraviolet rays.
- (ix) They breed true to their type. Even variations are inheritable.
- (x) They take over biosynthetic machinery of the host cell and produce chemicals required for their multiplication.
- (xi) Viruses are responsible for a number of infectious’ diseases like common cold, epidemic influenza, chicken pox.

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

**Soln.** 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.**

**Soln.** Virus (L. poisonous fluid) is a group of ultramicroscopic, non-cellular, highly infectious agents that multiply only intracellularly- inside the living host cells without involving growth and division. Outside the host cells, they are inert particles. They are nucleoproteins having one or more nucleic acid molecule, either DNA or RNA, encased in a protective coat of protein or lipoprotein. A virus consist of two parts – nucleoid (genome) and capsid. An envelope and few enzymes are present in some cases,

(i) Nucleoid : The nucleic acid present in the virus is called nucleoid and it represents viral chromosome. It is made up of a single molecule of nucleic acid. It may be linear or circular and nucleic acid can be DNA or RNA. It is the infective part of virus which utilizes the metabolic machinery of the host cell for synthesis and assembly of viral components.

(ii) Capsid : It is a protein covering around genetic material. Capsid have protein subunits called capsomeres. Capsid protects nucleoid from damage from physical and chemical agents. ,

(iii) Envelope : It is the outer loose covering present in certain viruses like animal viruses (e.g., HIV) but rarely present in plant and bacterial viruses and made of protein of viral origin and, lipid and carbohydrate of host. Outgrowths called spikes may be present. Envelope proteins have subunits called peplomers. A virus without envelope is naked virus.

(iv) Enzymes : Rarely, lysozymes are found in bacteriophages. Reverse transcriptase enzyme (catalyses RNA to DNA synthesis) is found in some RNA viruses like HIV. Some common viral diseases are – influenza, polio, measles, chickenpox, hepatitis, AIDS, bird flu, SARS (Severe Acute Respiratory Syndrome) etc.

### **12. Give a comparative account of the classes of Kingdom Fungi under the following:**

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

**Soln.**

| Class of fungi                                     | Mode of nutrition  | Mode of reproduction  |
|--|--|---|
| Phycomycetes<br>(Includes oomycetes & zygomycetes) | <p>Oomycetes are mostly parasitic (obtain their nourishment from the protoplasm of living plants or animals <i>e.g.</i>, <i>Phytophthora infestans</i>).</p> <p>Zygomycetes are mostly saprophytes (absorb food from dead or decaying organic matters <i>e.g.</i>, <i>Rhizopus</i>), parasitic (<i>Absidia cornealis</i>), some are coprophilous (fungi which grow on dung <i>e.g.</i>, <i>Mucor</i>).</p> | <p>In oomycetes asexual reproduction is by zoospores (aquatic form), aplanospore (terrestrial form).</p> <p>Sexual reproduction may be isogamous or oogamous, sexual fusion is gametangial contact type. Male sex organ is antheridium and female sex organ is oogonium. Plasmogamy is followed by karyogamy and meiosis (oospore formation).</p> <p>In zygomycetes asexual reproduction occurs by thin walled non motile sporangiospores inside sporangia. Sexual reproduction takes place by gametangial copulation (two identical gametangia) known as conjugation. Sexual reproduction forms diploid zygospore.</p> |

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|----------------------------|---|--|
| Ascomycetes<br>(Sac fungi) | Most are terrestrial and occur as saprophytes ( <i>e.g.</i> , <i>Aspergillus</i> ), parasitic ( <i>Claviceps</i> ). Some grow in deciduous forests on humus rich soil ( <i>Morchella</i> ).   | Asexual reproduction by conidia or conidiospores ( <i>Aspergillus</i> ), budding ( <i>Saccharomyces</i> ), fission ( <i>Schizosaccharomyces</i> ). Sexual reproduction by gametic copulation <i>e.g.</i> , yeast), gametangial contact ( <i>e.g.</i> , <i>Pyrenema</i> ), spermatization ( <i>Ascobolus</i> ), somatogamy ( <i>Peziza</i> ). Sexual reproduction takes place in three stages plasmogamy (fusion of protoplast), karyogamy (fusion of nucleus) and meiosis. Ascospores are formed in ascus. Generally each ascus consists of eight ascospores. Fructification are known as, ascocarp (cleistothecium, <i>e.g.</i> , <i>Penicilium</i> , perithecium <i>e.g.</i> , <i>Neurospora</i> , and apothecium <i>e.g.</i> , <i>Peziza</i> ). |
| Basidiomycetes             | Mostly saprophytes ( <i>Agaricus</i> ), on humus, bark, decaying wood etc. Some are obligate parasites ( <i>e.g.</i> , rusts, powdery mildews, which live entirely on the living protoplasm of their hosts and can never grow on dead tissue), some are facultative saprophytes (some smuts, which are usually parasitic in their mode of life but later may pass their mode of life as saprophytes). | The asexual spores are generally not found, but vegetative reproduction by fragmentation is common. The sex organs are absent, but plasmogamy is brought about by fusion of two vegetative or somatic cells of different strains or genotypes. The resultant structure is dikaryotic which ultimately gives rise to basidium. Karyogamy and meiosis take place in the basidium producing four basidiospores. The basidiospores are exogenously produced on the basidium ( <i>pl.</i> : basidia). The basidia are arranged in fruiting bodies called basidiocarps.  |
| Deuteromycetes             | Mostly parasitic.   | Asexual reproduction by conidia and some other spores. Sexual reproduction is either absent or yet to be discovered.   |