

CHAPTER NO. 7

PROTISTA AND FUNGI

KEY POINTS

- Total number of species present in Kingdom Protista is 60,000 – 200,000.
- Study about Protista is called Protistology.
- Protists are the oldest form of Eukaryotes.
- Kingdom Protista consists of three groups:
 - (1) Animal like protists (2) Plant like protists (3) Fungi like protists.
- Protists have three phylums:
 - (1) Protozoans (2) Protophyta (3) Protomycota.
- Kingdom Protista is also known as "Trash can" Kingdom.
- Animal like protists are classified on the basis of their Locomotory organ.
- Animal like protists consist of four sub-phylums including phylum zooflagellate or mastigophora or kinetoplastids, sub-phylum sarcodina, sub-phylums sporozoa or apicomplexon and sub-phylum ciliata.
- The locomotory organ of phylum mastigophora / zooflagellate / kinetoplastids is Flagella.
- Trypanosoma and Trachonymph belong to phylum Zooflagellate.
- Trypanosoma cause trypanosomiasis also called African sleeping sickness.
- Trachonymph is present in the gut of Termites to produce cellulase enzyme and is the example of commensal.
- The locomotory organ of phylum sarcodina or amoeba is called Pseudopodia.
- Amoeba is present in fresh water, soil and in marine water.
- Amoeba reproduce through Binary fission.
- Entamoeba histolytica causes Amoebic dysentery.
- Order Foraminifera belong to phylum Sarcodina.
- The shells of foraminifera are used for Geological age of strata.
- The shells of foraminifera are made up of Calcium carbonate or lime stone.
- Locomotory organ is absent in Phylum sporozoa or apicomplexon.
- Plasmodium belong to phylum Sporozoa / apicomplexon.
- Plasmodium causes Malaria and is carried by Female anopheles mosquito.
- Asexual reproduction of plasmodium occurs in Human body.
- Sexual reproduction of plasmodium occurs in Female anopheles mosquito.
- Sporozoite, merozoite, schizonte, gametozoite, trophozoite are the Haploid stages of plasmodium.
- Ookinete, oocyst and oospore or zygote stages of plasmodium is Diploid.
- Fertilization of plasmodium occur in Female anopheles mosquito.
- Sporozoite stage of plasmodium is common in both mosquito and human.
- A non carrier female anopheles mosquito gets "Gametozoites", if it bites an infected human and a carrier mosquito injects sporozoites to a healthy human.
- Plasmodium reproduce in the Liver of a human body.
- High fever, chill, nausea and vomiting are the symptoms of Malaria.
- The locomotory organ of sub-phylum ciliate is Cilia.
- Paramecium and balantidium coli belong to sub-Phylum ciliate.
- Balantidium coli (B.coli) is present in the gut of Pigs and rats.
- In Paramecium outer protective covering is called Pellicle.
- Single paramecium contains two nuclei.
- Micronucleus of paramecium is involved in Reproduction.

- Microscopic of paramoecium is involved in Physiological activity.
- Paramoecium reproduce asexual by the process of Transverse fission.
- Microscopic take parts in conjugation.
- Paramoecium reproduce sexually by the process of Conjugation.
- Plant like protists are classified on the basis of their photosynthetic pigment.
- Plant like protists contain 6 sub-phyta including sub-phyllum euglenophyta or euglenoids, sub-phyllum pyrrophyta or diatoms, sub-phyllum phaeophyta or brown algae, sub-phyllum rhodophyta or red algae and sub-phyllum chlorophyta or green algae.
- Chlorophyll a, b and carotenoid are present in Phylum euglenophyta and phylum chlorophyta.
- Cellule is present on inner side of the euglena cell membrane.
- Euglena store food in the form of Paramylum (starch).
- About 40 genera of euglenoids possess chlorophyll and are autotrophic.
- Two unequal flagella are present in phylum Euglenophyta.
- Eye spot or stigma is sensitive to Sunlight.
- Cell wall of phylum pyrrophyta or dinoflagellate is generally missing if present it is made up of cellulose.
- Dinoflagellate moves like a top.
- Harmful blooms or red tides are formed in water by Dinoflagellate.
- The shell of Diatoms is made up of two pieces of silica.
- Diatomaceous earth is made by Diatoms.
- Diatomaceous earth is used in water filter, paints and nail polish.
- Air bladder or swim block is used in Buoyancy.
- The size of kelp is 100 meters.
- The roots like structures of kelp are called holdfast.
- Kelp is the largest sea weed.
- Phycoerythrin is red color pigment which cover the chlorophyll and give red color is present in Rhodophyta.
- Agar and carrageenan are extracted from Red algae.
- Agar is used in Growth media.
- Carrageenan is used in thickening of ice cream.
- Rhodophyta help in formation of coral Reefs.
- Unicellular Chlorophyta is Chlamydomonas.
- Colonial Chlorophyta is Volvox.
- Simple multi-cellular is Spirogyra of phylum Chlorophyta.
- Stored food of phylum Chlorophyta is Starch.
- The cell wall of phylum Chlorophyta is made up of Cellulose.
- Phylum Chlorophyta is considered to be the possible ancestors of Plants.
- Chloroplast of spirogyra is Spiral.
- Asexual reproduction occurs in phylum Chlorophyta by zoospores while sexual reproduction occurs by conjugation.
- Cell wall of fungi like protist is made up of Cellulose.
- Fungus like protist consist Plasmodial slime mold / slime molds or phylum Gymnomycota and phylum Oomycota/water mold (True slime molds are called Myxomycota).
- Phytophthora infestans belong to the phylum Oomycota and causes Late blight in potato.
- Damp, cool and windy environment is required for the spread of Phytophthora.
- 400,000 people have died in 1845-1847 due to Irish famine.
- Biflagellated zoospores are present in phylum Oomycota.
- One quarter of the world photosynthesis is performed by Algae.

- *Giardia* causes *Giardiasis* belong to phylum zooflagellate.
- Study about fungi is called Mycology.
- Total number of species present in Kingdom fungi are 80,000.
- Cell wall of fungi is made up of Chitin.
- World largest organism on the basis of its area is *Armillaria ostoyae* (Honey mushroom).
- Total area covered by honey mushroom is 1.5 km^2 .
- The weight of honey mushroom is 100 tons.
- Honey mushroom is 1000 years old.
- Nuclear mitosis occurs in fungi due to the absence of centriole in which nuclear membrane remain intact or do not disappear.
- Zygospores are produced in Zygomycota.
- Zygomycota is called conjugating fungi.
- Kingdom fungi consists of 4 phyla including phylum zygomycota, phylum Ascomycota, phylum Basidiomycota, phylum Deuteromycota (imperfect fungi \rightarrow lack sexual reproduction).
- The hyphae of phylum zygomycota is Unseptate or coenocytic.
- *Mucor* and *Rhizopus stolonifer* (Black bread mold) belong to phylum Zygomycota.
- 8-Ascospores are produced by Ascomycota.
- Ascomycota is called Sac or cup fungi.
- Ascomycota also reproduce through asexual reproduction called Conidiophores in Conidia.
- 40% of Ascomycota species are involved in symbiotic association.
- The association between two different species is called symbiosis.
- The example of symbiosis (Mutualism) of phylum Ascomycota in Lichen and Mycorrhizae.
- The association between algae and fungi is called Lichen.
- Most visible part in lichen is that of Fungi.
- The association between fungi and roots of higher plants e.g. *Pinus* is called Mycorrhizae.
- Mushroom, Puffballs, Shelf fungi, Puccinia, Ustilago and bracket fungi are the examples of Basidiomycota.
- Basidiomycota is also known as Club fungi.
- The fusion of cytoplasm of two fungi is called Plasmogamy.
- The fusion of two nuclei of fungi is called Karyogamy.
- No sex organs are present in kingdom fungi like Antheridium and archegonium.
- Pear leaf spot, cotton leaf curl and powdery mildew are the diseases caused by Ascomycota fungi species.
- Yeast and penicillium belong to phylum Ascomycota.
- First antibiotic penicillin was extracted from *Penicillium chrysogenum*.
- The scientific name of yeast is *Saccharomyces cerevisiae*.
- Yeast body consists of 50% of protein and vitamin B.
- 4-haploid-basidiospores are produced in basidiocarp of phylum Basidiomycota.
- *Puccinia graminis* causes Rust in sugar cane.
- *Listilago tritici* causes Smut in wheat.
- Ergotamine is used in delivery and migraine is extracted from *Claviceps purpurea*.
- Cephalosporine (Antibiotic) is extracted from *Cephalosporins acremonium*.
- Cyclosporine is used as an immunosuppressant during organ transplantation.
- Total number of genes present in yeast are 6000.
- Truffle is also called Tuber *Melanosporum*.



Fig 7.1: Structure of Ascocarp



Fig 7.2: Basidiocarp

- Morchella is also called Morchella esculenta.
- Truffle and mores are used in Pizza.
- Trichosporon in dogs and horses are caused by Trichophyton and Microsporum.
- Aspergillus cause aspergilliosis whose symptoms is similar to TB.
- Saprolegnia parasitica is the parasite of Carp and Salmon fish.
- Microsporum furfur cause Dandruff.
- Sporospora and fusarium cause infection of Corneal tissue of eye.
- Some euglenids become heterotrophic in dark and their chloroplast become nonfunctional. When they are brought in light, they became green in few hours and start preparing food.
- Parasitella, euglena changes its shape.
- Roots of about 80% of all known species of vascular plants normally are involved in mutualism with fungi (Mycorrhiza)
- 60% of the known species roots form Mycorrhiza.
- Sexual spores in Ascomycota are produced in fruit bodies these fruit bodies are called Ascocarp.
- Mycelium in Basidiomycota exists in three forms i.e. primary, secondary and tertiary.
- Primary has 1 haploid (n) nucleus while Secondary has 2 haploid nuclei (n+n).
- Tertiary is having fruit bodies (basidiocarp) and is more complex (n+n).
- Alveolata contain Dinoflagellates, Apicomplexa and Ciliates (DAC)
- Alveolata has a common feature: the presence of alveoli or a space below their plasma membrane
- Choanoflagellate are most likely the common ancestors of both sponges and animals
- Choanoflagellate contain plasmodial slime molds, Amoeba, and Foraminifera.
- Ergotamine is used to facilitate delivery of babies and relieve migraine pain.
- Grisofulvin is an antibiotic used effectively against fungal infections of hair, nail, skin and athlete's foot and ringworm
- Grisofulvin is obtained from Penicillium
- Cyclosporine is obtained from Trichoderma polysporum
- The most vulnerable part of body to fungi is skin.
- Rhizopus and Mucor causes the infection of lung, brain and gastric tissues.
- Plasmodium super cell (fungi like protist) contain many diploid nuclei.
- Yeast is used in research because of rapidly increasing generation times and pool of genetics