CHAPTER-7

PROTISTS AND FUNGI

Q1. Give the literal meaning of word Protist and define it.

Ans: Literal meaning:

Protist, is a Greek word, meaning **"the very first,"** reflects the idea that protists were the first eukaryotes to evolve.

Definition:

"Protists are defined by exclusion from other groups".

Kingdom Protista consists of a vast assortment of primarily aquatic organisms whose diverse body forms types of reproductions, modes of nutrition, and life styles make them difficult to characterize.

Q2. Give a detailed outline on the evolutionary relationship of Protists.

Ans: Evolutionary relationship of Protists

Protists are eukaryotic cells. Many biologists interpret the protist kingdom broadly to include:

(i) Heterotrophic protists (the protozoa, slime molds, and water molds).

(ii) Autotrophic protists (the algae)

Polyphyletic origin:

The protist kingdom is a **polyphyletic group** of organisms, that is, protists do not share a single common ancestor. Any eukaryotic organism not considered a fungus, animal, or plant is classified in the kingdom Protista solely for convenience.

Variations exhibited by Protists:

(i) Size:

The size varies considerably within the protist kingdom, from microscopic protozoa to giant kelps, which are brown algae that can reach 60 meters (almost 200 feet) in length.

(ii) Organization and structure:

Although most protists are unicellular, some have a colonial organization (a colony is a loose aggregation of cells), some are coenocytic multinucleate but not multicellular), and some are multicellular. Unlike fungi, plants and animals, multicellular protists have relatively simple body forms without specialized tissues.

(iii) Mode of nutrition:

Methods of obtaining nutrients differ widely in kingdom protista. The autotrophic protists, e.g., the algae have chlorophyll and photosynthesize as plants do. Some of the heterotrophic protists, the water molds, obtain their food by absorption as fungi do. Other heterotrophs, i.e., the protozoa and slime molds resemble animals i.e., they ingest food derived from the bodies of other organisms.

(iv) Mode of life:

The mode of life shows that many protists are free living while others form symbiotic association with different organisms. These associations range from mutualism, a more or less equal partnership in which both organisms' benefit, to parasitism in which one organism lives on or in another and is metabolically dependent on it. Most protists are aquatic and live in oceans or freshwater. They make up a part of the plankton.

(v) Reproduction:

Reproduction is quite varied in the kingdom protists. All protists reproduce asexually and many also reproduce sexually with both meiosis and syngamy (the union of gametes). However, most protists do not develop multicellular sex organs, nor do they from embryos.

(vi) Locomotion

Most protists are motile at some stage of their life cycle and have various means of locomotion. Movement may be accomplished by amoeboid motion, i.e., extending cell protrusions, by waving cilia or by lashing flagella. Many protists use a combination of two or more means of locomotion, e.g., both flagellar and amoeboid motion.

Q3. Name the major groups of Protists.

Ans: Protists include four major groups

(i) Protozoa **(ii)** Algae

(ii) Myxomycota **(iv)** Oomycota

Teacher's Point

Teachers would ask the students to explain that what clues protists provide with respect to the evolution of the three kingdoms of eukaryotes.

Did you Know?

Naegleria fowleri, an amoeba found in rivers, lakes, springs, drinking water networks and poorly chlorinated swimming pools. It causes primary amoebic meningoencephalitis. The "brain-eating" Amoeba has killed 10 persons in 2012, 8 in 2015 and 3 in 2016 in Karachi. Cases have also been reported from Islamabad and other parts of Pakistan.

Science Titbits

Trichonympha

Trichonymphas are complex specialized flagellates with many flagella. They live as symbionts in the gut of the termites. It contains a bacterium that enzymatically converts the cellulose of wood to soluble carbohydrates that are easily digested by the insect.

Teacher's Point

Teachers would guide the students to find out precautionary measures against harmful protozoans.

Science Titbits

All animals are believed to have evolved from a protistan ancestor, most likely a protozoan, because protozoans are heterotrophic, ingest food and are motile.

Did You Know?

Slime molds are organisms that are fungus like in one phase of their life cycle and amoeba like in another phase of their life cycle. Slime molds are similar in some respect to fungi i.e., body is filamentous, saprotroph, formation of

zygote, and having nonmotile spores. Slime molds differ from fungi due to the presence of motility in the life cycle.

Teacher's Point

Teacher would guide the students to draw charts to show differences between animal like protists and fungi like protists.

Science Titbits

The ancestry of fungi which evolved about 570 million years ago, has not been determined. It has been suggested, that fungi evolved from red algae because both fungi and red algae lack flagella in all stages of their life cycle.

Information

Rusts are called so because of numerous rusty and orange-yellow coloured disease spots on their host surface (mostly stem, leaves), later revealing brick/rust-red spores of the fungus. **Smuts** are called so because of their black, dusty spore masses that resemble soot or smut; these spore masses replace the grain kernels such as those of wheat, corn etc.

Science, Technology and Society Connections

- **Describe how helpful fungi have been for us as source of antibiotics and other useful chemicals.**

Often the first choice eukaryotic organisms for protein production are the yeast *(Saccharomyces cerevisiae)*. Yeast cells can take up foreign DNA and integrate into their genomes. Yeasts also have plasmids that can be used as gene **vectors** and sometime yeasts are better than bacteria at synthesizing and secreting eukaryotic protein. Yeast is currently used to produce a number of proteins. In some cases, the same product, for example interferons used in cancer research can be made in either yeast or bacteria. In other cases, such as hepatitis B vaccine, yeast alone is used.

Teacher's Point

Teachers would guide the students to write a brief research paper on use of fungi in biological research.

Did You Know?

Poisonous fungi: Edible and poisonous can look very much alike may even belong to the same genus. There is no simple way to tell them apart. They must be identified by an expert. Some of the most poisonous mushrooms belong to the genus **Amanita**. Toxic species of the genus have been appropriately called such names as "destroying angel" *(Amanita virosa)* and "death cap" *(Amanita phalloides)* Eating a single mushroom. Ingestion of certain species of mushrooms causes intoxication and hallucinations

Amanita

Jack O'Lantern

Teacher's Point

Teachers would guide the students to write about precautionary measures for human diseases caused by fungi.

Activity

1. Observation and drawing of representative numbers of each group of protists.
2. Observation and drawing labeled diagrams of the life cycle of black bread mold and *penicillium* from fresh culture and prepared slides.