B.Sc. Botany – 3rd SEM

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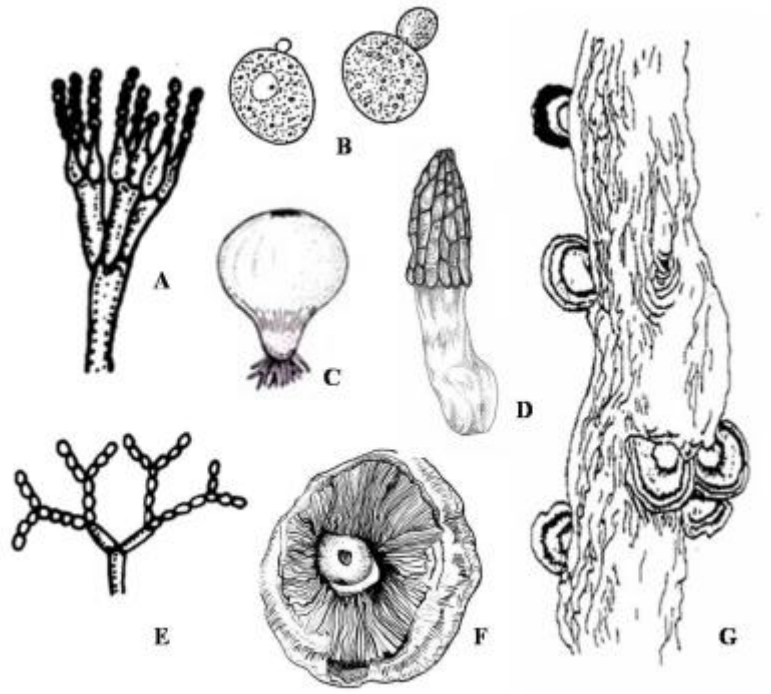
FUNGI

Introduction

Fungi constitute a large and diverse group of plant kingdom. The Latin word 'fungus' means mushroom. Fungi are achlorophyllous and heterotrophic thallophytes. These resemble algae in various aspects thus have been placed under group Thallophyta. The study of fungi is known as mycology (mykes = mushroom; logos = study) and the scientists concerned with the study of fungi are known as mycologist. Worldwide there are about 50,000 to 100,000 species known species of fungi. At present there are about 5100 genera and 50,000 species of fungi. This number is constantly increasing because of the ongoing research throughout the world.



Various fungi and their fruiting bodies. A: *Penicillium*, B: *Saccharomyces cerevisiae* (Yeast), C: *Lycoperdon* (Puff ball), D: *Morchella* (Morel), E: *Neurospora*, F: *Agaricus* (Mushroom), G: Bracket fungi on tree trunk

Various large species of fungi like mushroom, morels, smuts, rots and rusts were known to man since time immemorial. However, their nature, origin and development were not known at that time. They grow in variety of habitats and show high diversity in their form, structure of plant body, physiological functions and means of reproduction. The plant body is mainly

made up of hyphae which together form the mycelium; except for a few cases where mycelium is either completely absent (Synchytrium) or plant body is unicellular (Saccharomyces species). Their cell wall is not made up of true cellulose. It is either made up of chitin or fungal cellulose. Since, the fungi cannot synthesize their food from carbon dioxide and water in the presence of sunlight their mode of nutrition is saprophytic, parasitic and symbiotic. As a saprobe they are responsible for decay of organic material, as a parasite they attack living protoplasm and cause disease of plants, animals and human beings. The chief reserve food is glycogen and oils. They lack chlorophyll so starch is not synthesized. Reproduction takes place by means of vegetative, asexual and sexual reproduction.

1. Occurrence and Distribution

Fungi are cosmopolitan and most diversified in nature. They are found in almost all habitats where life is possible. Some fungi are terrestrial; some are airborne while some occur in fresh as well as marine water. Members of Phycomycetes are found in water and are known as aquatic fungi. Fungal species are also found in epiphytic state on algae and some other aquatic plants. Some of the fungal species grow on dead organic material present in water. Some species are found under the surface of earth and are sub-terranean in nature. A few fungi are also found as endophytes in leaves and stem of healthy plants. These fungi can be categorized between beneficial and harmful species. Some produce secondary metabolite which protect the host from insect and grazing animals while others can be toxic and reduce the crop yield. Fungi are microscopic as well as macroscopic. Macroscopic fungi such as mushrooms, puff balls, bracket fungi, cup fungi and morels etc are recognizable with naked eye even from a distance. However, the microscopic fungi can only be identified with the help of compound microscope by subject experts. Various species of fungi are parasitic also and infect a variety of plants, animals and human beings. The parasitic fungi which grow on vascular plants causes various diseases in them for example brown patch, canker, downy mildew, club root, damping off, anthracnose bottom rot, crown wart etc and are responsible for economic loss. Alimentary canal of human beings and mammals are also occupied with fungal species where they cause stomach disorders. Some of the fungal species cause skin diseases such as Athlete's foot, mycosis, ringworm, onychomycosis, candidiasis etc. In this way fungus are diversified and accustomed to unusual habitats.

2. Characteristics of Fungi

There are a number of characteristics that makes fungal kingdom different from plant, animal and other kingdoms. Some of them are as follows:

(i) Fungal body is unicellular or multicellular, and is more often composed of microscopic threads called hyphae;

(ii) They are non-vascular due to the absence of any specialized transport tissue;

(iii) They are heterotrophic and feed on preformed organic material;

(iv) Like animals their stored food material is glycogen whereas plants store food as starch;

(v) Unlike animals fungi first digests the food with the help of co-enzymes and then ingests it;

(vi) Majority of fungi reproduces by means of spores that are wind-dispersed;

(vii) Depending upon the environmental conditions, both asexual (mitotic) and sexual (meiotic) spores are produced;

(viii) In the life cycle of fungi only a few stages are motile such as zoospores;

(ix) Structurally cell wall of fungi is similar to plants but its chemical composition is different. Fungal cell wall are made up of chitin that are β-1,4 linkages of N-acetylglucosamine in contrast to plant cell wall which are composed β-1,4 linkages of glucose;

(x) Fungal cell membrane have unique sterol and ergosterol in contrast to animals which have cholesterol;

(xi) Ultra-structure of cytoplasm is quite similar to plant cells but there are differences in types and structure of organelles;

(xii) Nuclei of fungi is very small and it has only a few chromosomes;

(xiii) Meiosis and mitosis occurs inside the nuclear envelope.