

Quadrant II – Transcript and Related Materials

Programme: Bachelor of Science (First Year)

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Unit: 03

Module Name: Fungi

Module No: 34

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INTRODUCTION:-

The Fungi is the plural of the word Fungus which is derived from the Latin word Fungour which means “**to flourish**”

Being eukaryotes, a typical fungal cell contains a true nucleus and many membrane-bound cell organelles.

The kingdom Fungi includes an enormous variety of living organisms collectively referred to as **Eucomycota or true Fungi**. While scientists have identified about 100,000 species of Fungi, this is only a fraction of the 1.5 million species of fungus likely to be present on the surface of the earth.

The branch of Botany that deals with Fungi is known as **Mycology** (*Mykes* — Mushroom; *Logos* — Study of). The scientist who is concerned with fungi is called as **Mycologist**. E.g. Mushrooms and *Penicillium notatum*, which belongs to the domain Eukarya.

Definition of Fungi:-

1. Alexopoulos (1962):

Defined Fungi as “nucleated, spore-bearing, achlorophyllous organisms which generally reproduce sexually and asexually and whose usually filamentous, branched somatic structures are typically surrounded by cell walls containing cellulose or chitin or both”.

2. Alexopoulos and Mims (1979):

Defined Fungi as eukaryotic spore-bearing, achlorophyllous organisms that generally reproduce sexually and asexually, and whose usually filamentous, branched somatic structures are typically surrounded by cell walls containing chitin or cellulose, or both of these substances, together with many other complex organic molecules”.

GENERAL CHARACTERISTICS OF FUNGI

1. Habitat

Fungi are found in all types of environments where organic materials are available. For examples, water, air, dead and decaying organic matter, living organisms.

2. Distribution

Fungi are Cosmopolitan in distribution i.e., they can grow in any place where life is possible.

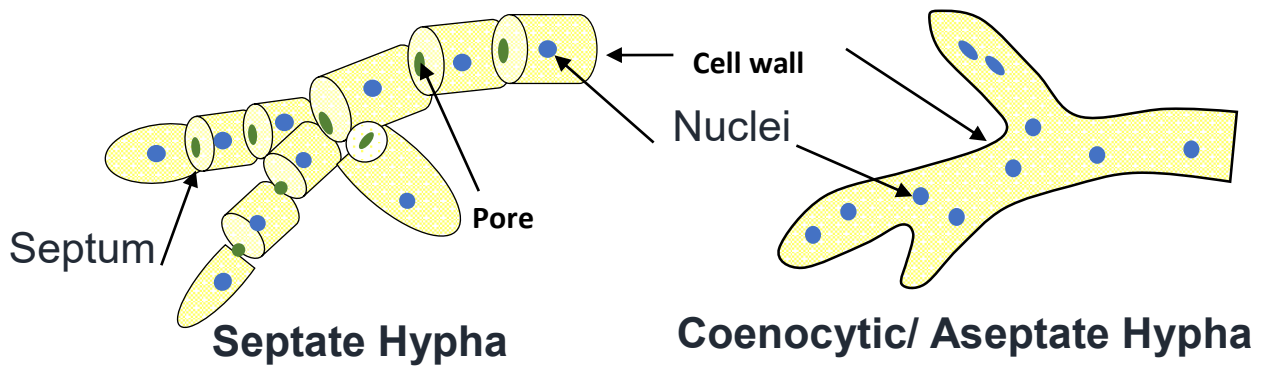
3. Morphology- Size and shape.

It varies in size and complexity, ranging from the single cell microscopic yeast to multicellular molds, puff balls and mushrooms. Moulds are multicellular, threadlike fungi Yeasts are unicellular- oval or spherical appearance

4. Thallus

The body or vegetative structure of fungus is called as thallus. The plant body may be unicellular (*Synchytrium*, *Saccharomyces*) or filamentous (*Mucor*, *Aspergillus*). The thallus of fungi is long and tubular with filamentous branches called as hypha (plural - hyphae). The mass of interwoven hyphae is called mycelium. Mycelium may be unicellular or multicellular. The septa between the cells may have different types of pores: Micropore (*Geotrichum*), Simple pore (most of the Ascomycotina and Deuteromycotina), Dolipore (Basidiomycotina, except rusts and smuts).

Types of Hyphae:- The hypha may be aseptate i.e., coenocytic (without septa and containing many nuclei) or septate. The septate mycelium in its cell may contain only one (monokaryotic), two (dikaryotic) or more nuclei. Yeasts are unicellular fungi that do not produce hyphae.



5. Cell Type:-They are Eukaryotic cells that contain membrane bound cell organelles including nuclei, mitochondria, golgi apparatus, endoplasmic reticulum, lysosomes etc. They are non-vascular organisms.

6. Cell wall: - It is rigid and made up of Fungal Chitin and therefore non-motile - a feature that separates them from animals. In lower fungi (members of Oomycetes), the cell wall is composed of cellulose or glucan. Chitin ($C_8H_{13}O_5N$)_n is a nitrogenous material containing polysaccharide. Other components of the fungal cell wall may be cellulose-glycogen, cellulose-glucan (found in oomycetes), Cellulose-chitin, chitin-chitosan (found in zygomycetes), Chitin-glucan (found in ascomycetes and basidiomycetes) etc.

7. Cytoplasmic Membrane: - The cell membrane of a fungus has a unique sterol and ergosterol.

8. Nutrition: They are Saprophytes (gets energy from dead and decaying matters), or Parasites (lives in a host, attack and kill) or Symbionts (mutually beneficial). They are Chemo-heterotrophs (require organic compounds for both carbon and energy sources). Fungi are achlorophyllous and are therefore not autotrophic.

9. Digestion: - Fungi digest the food first and then ingest it with the help of exoenzymes like Hydrolase, Lyase, Oxidoreductase, Transferase, etc.

10. Reproduction: - They reproduce by means of spores - Sexual and Asexual spores. Sexual spores are Oospores, Zygosporangia, Ascospores, Basidiospores, etc. Asexual spores are Sporangiospores, Aplanospores, Zoospores, Conidia, etc. Depending on the species and conditions both sexual and asexual spores may be produced. Fungi exhibit the phenomenon of alteration of generation. They have both haploid and diploid stages.

10. Types of Reproduction

(a) Vegetative reproduction.

- Fragmentation (*Mucor, Penicillium, Fusarium*).
- Budding (*Saccharomyces, Ustilago*).
- Fission (*Saccharomyces*).

(b) Asexual reproduction - different types of spores.

- Zoospores (*Synchytrium*).
- Conidia (*Pythium, Aspergillus*).
- Oidia (*Rhizopus*).
- Chlamydospore (*Fusarium*), etc.
- The spores may be unicellular (*Aspergillus*) or multicellular (*Alternaria*).
- Asexual state is referred to as Anamorph (mold like).

(c) Sexual Reproduction - Five Processes:

- Gametic copulation (*Synchytrium*).
- Gametangial contact (*Pythium, Phytophthora*).
- Gametangial copulation (*Rhizopus, Mucor*).
- Spermatization (*Puccinia, Podospora*).
- Somatogamy (*Polyporus, Agaricus*).
- Sexual state is referred to as Teleomorph (fruiting body).

Other Characteristics:

- Fungi grow best in acidic environment (tolerate acidic pH).
- All fungi require water and oxygen & there are no obligate anaerobes.
- The reserve food material of the fungi is glycogen, fats or lipid globules & starch.
- The cells are haploid, dikaryotic or diploid. The diploid phase is ephemeral (short-lived).
- During mitosis the nuclear envelope is not dissolved.
- Optimum temperature of growth for most saprophytic fungi is 20-30°C while 30-37°C for parasitic fungi.
- The unicellular fungi, where entire plant body becomes converted into reproductive unit, are known as holocarpic fungi (e.g., *Synchytrium*).

- Only a part of the mycelial plant body is converted into reproductive unit, thus they are called eucarpic fungi (e.g., *Pythium*, *Phytophthora*).