



FUNGI

MORPHOLOGY, REPRODUCTION, CLASSIFICATION

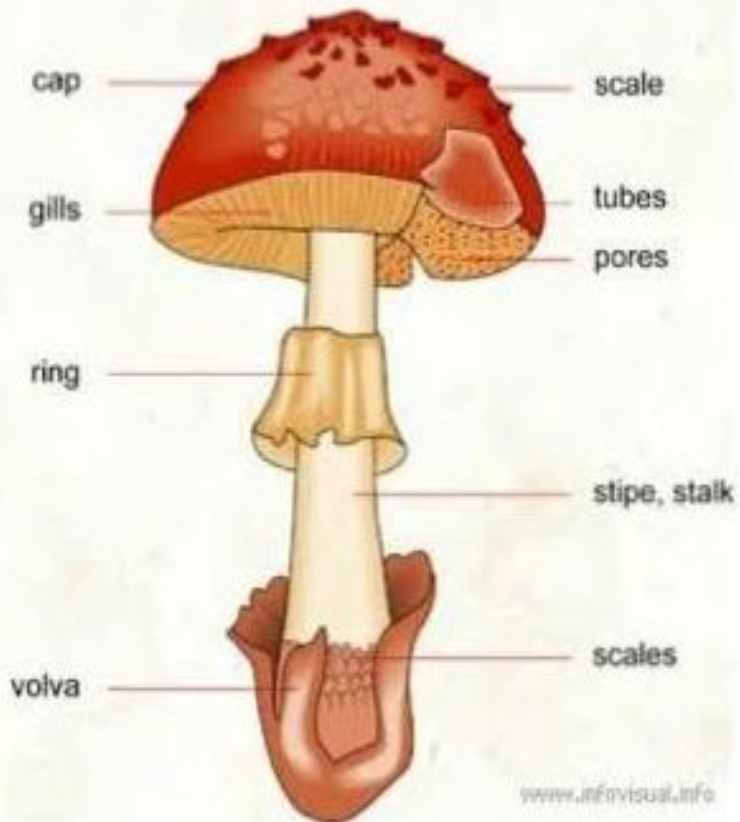
INTRODUCTION

- Fungi are **heterotrophic** organisms which means they require organic compound for nutrition or growth.
- Fungi are **spore-bearing** eukaryotes.
- Fungi may be unicellular or multicellular.
- Fungi includes **moulds** and **yeast**.
 - **Molds**– filamentous, multicellular.
 - **Yeast**– unicellular.
- Study of fungi is generally known as **mycology**.

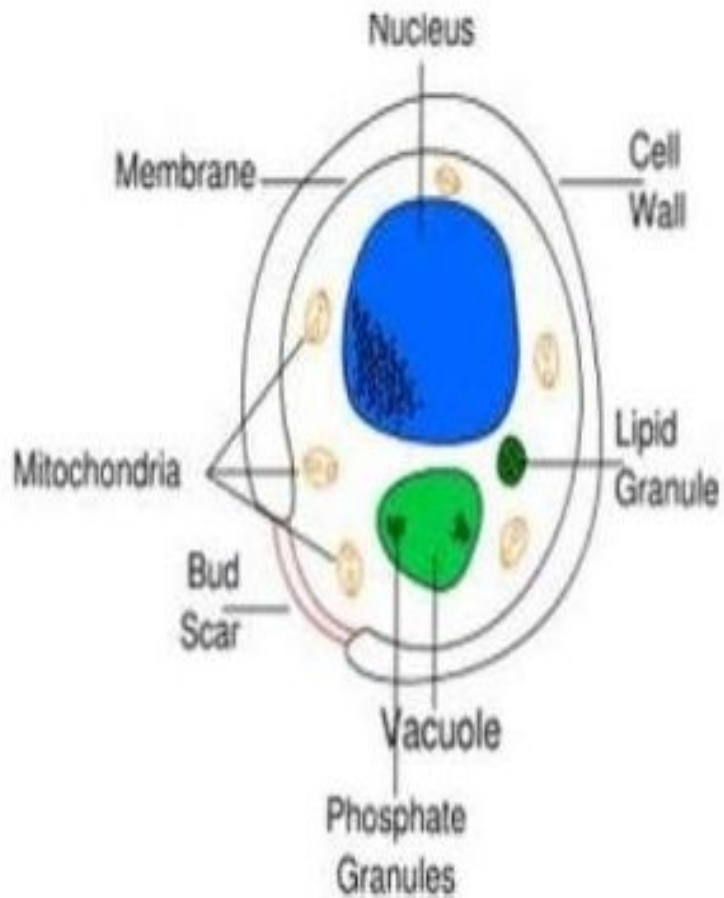
Difference between fungi, bacteria and viruses

Features	Viruses	Bacteria	Fungi
Size	0.02-0.3 μ	0.3-2 μ	3-10 μ may be large i-e mushroom
Cell Type	Acellular	Prokaryote	Eukaryote
DNA/ RNA	Either	Both	Both
Nucleic acid replication	Host cell	Continuous	G & S phase
Replication	Complex	Binary fission	Mitosis/ Meiosis
Organelle	Uses host	Not membrane bound	Membrane bound
Ribosomes	None	70S(30S+50S)	80S(40S+60S)
Cell memb	Env/Non env	No sterol Mycoplasma	Ergosterol
Cell wall	None	Peptidoglycan	Chitin, Glucan

MUSHROOM



Fungus Diagram: Mushroom



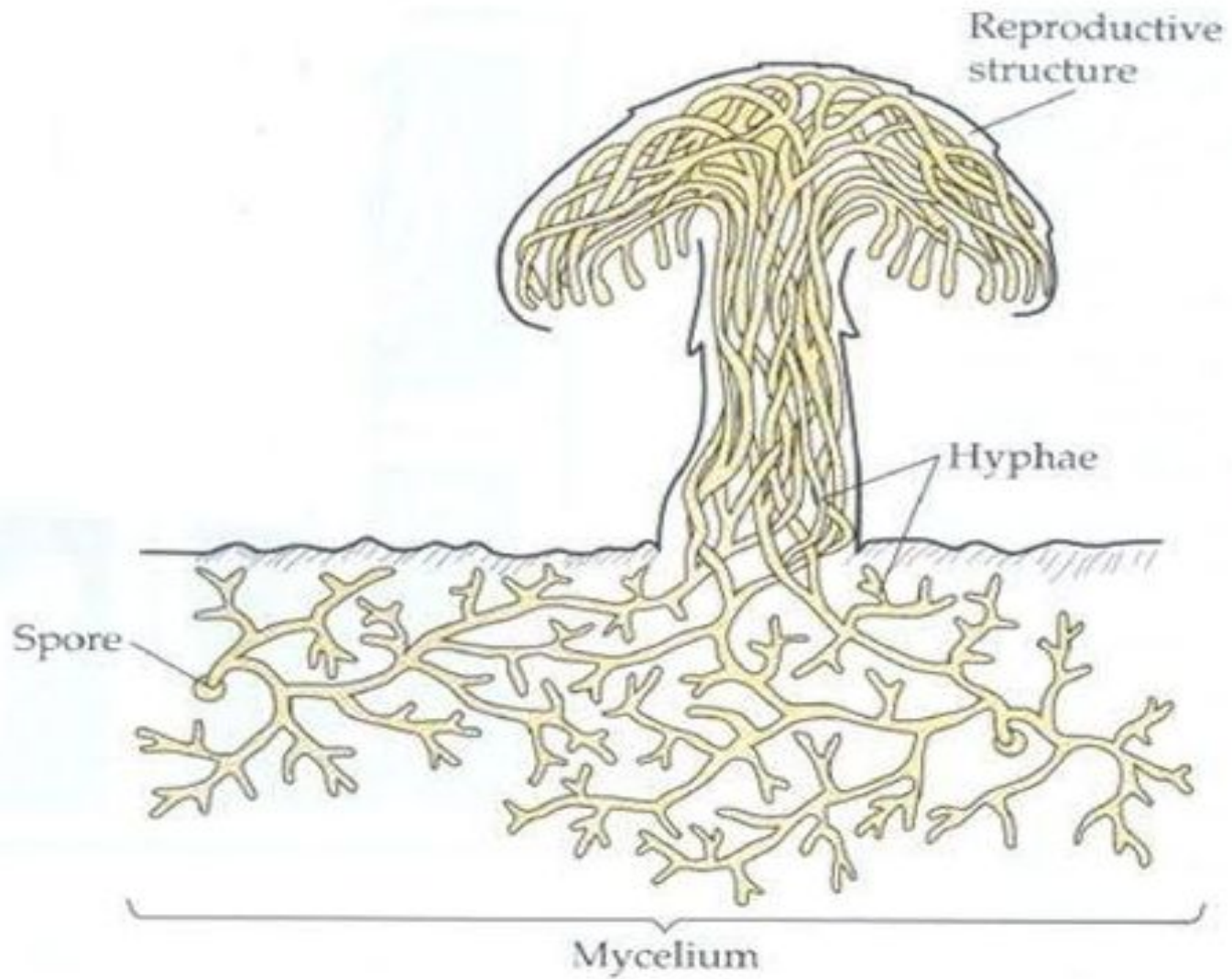
Fungus Diagram: Yeast cell

DISTRIBUTION

- The fungus occurs in all possible habitats i.e. aquatic, terrestrial (which grow in soil, on dead and decaying material).
- Some grow on plants and animals.
- Fungi also present in the air.
- In fungus chlorophyll are absent, so they depend on other for food. That is why fungi may be saprophytes, parasite or symbionts.

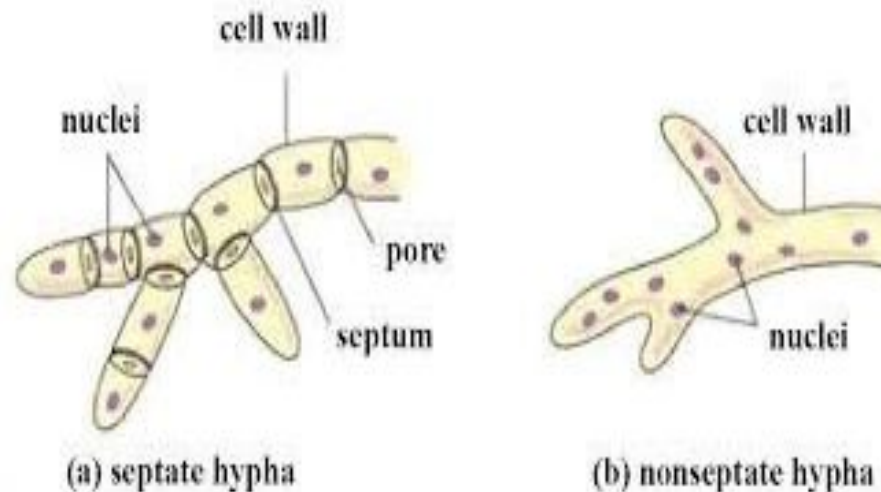
MORPHOLOGY

- Yeasts cells are generally larger than most of the **bacteria**.
- Size of yeast ranging from **1 to 5 micrometers** in width and from **5 to 30 micrometers in length**.
- Flagella or other organelles of locomotion are absent in yeast.
- Cell wall constituents of fungi are mainly **chitin** and **glucans**.
- Multicellular fungi are composed of networks of long filamentous branched structure called **hyphae**.
- The hyphae often aggregate in a thread like dense network known as **mycelium**.
- **The hyphae may be:**
 - Without crosswalls as in the case of lower fungi or, Divided into compartment by formation of septa in the higher fungi.



- **Hyphae occurs in three forms:**

1. **Coenocytic** or **nonseptate**, such hyphae have no septa.
2. Septate with uninucleate cells.
3. Septate with multinucleate cells.



- The mycelium forms tissue like aggregates called the **plektenchyma**, in certain stages, often during transition to the sexual or asexual reproduction phase.

REPRODUCTION

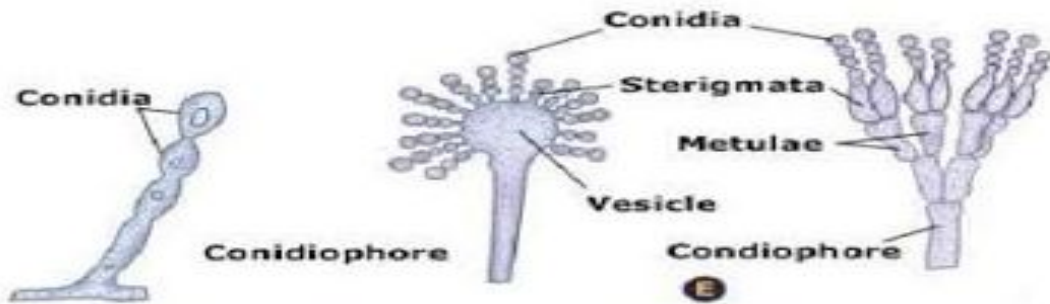
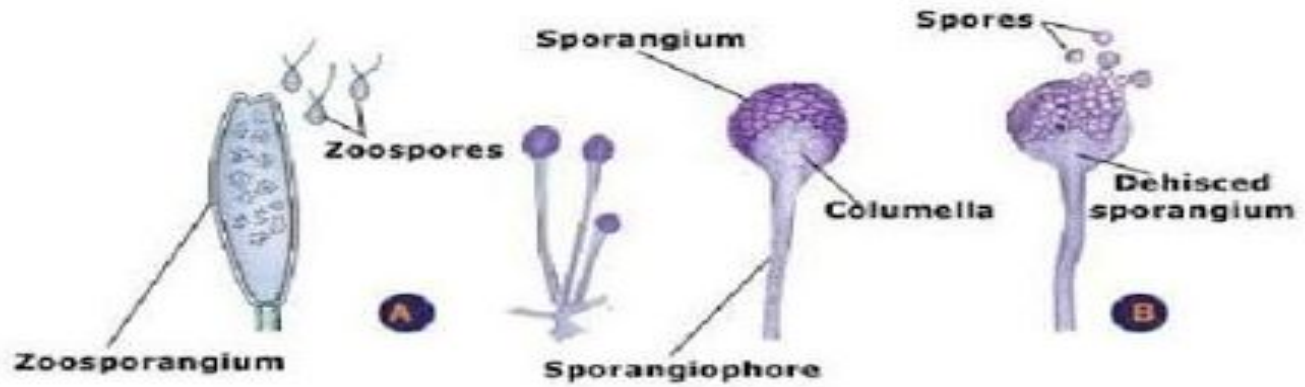
In fungi reproduction maybe **asexual** or **sexual**.

Asexual Reproduction

- Asexual reproduction also known as **somatic** or **vegetative reproduction**.
- It does not involve the sex cells or sex organs and the union of nuclei.
- **Asexual reproduction maybe occurs by:**
 1. Fission of somatic cells.
 2. Budding of somatic cells or spores.
 3. Fragmentation or disjoining of the hyphal cells.
 4. Spore formation.

There are many kinds of asexual spores:

1. **Sporangiospores.**
2. **Conidiospores or conidia(conidium).**
3. **oidia(oidium), arthrospores.**
4. **Chlamydospores.**
5. **Blastospores.**



A. Zoospores; B. Sporangiospores; C. Chlamydo-spores; D. Oidia; E. Conidia

Sexual Reproduction

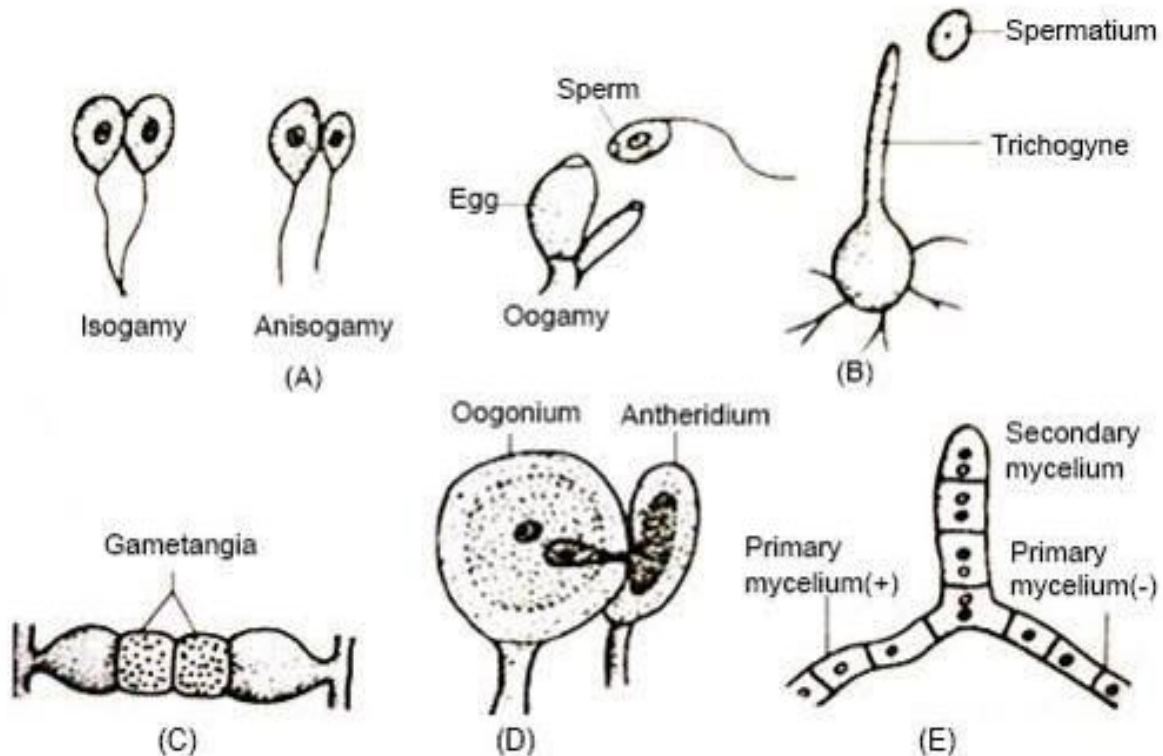
- It is carried out by fusion of genetic materials of two parent's cells.
- **Sexual reproduction can be divided into three phases:**
 1. **Plasmogamy**- Joining of two cells and fusion of their protoplast.
 2. **Karyogamy**- This involved fusion of two haploid nuclei.
 3. **Meiosis**- Reduction of chromosomes to the haploid number.
- **Gametangia**- The sex organelles of fungi (if present).
- **Antheridium**- Male gametangia.
- **Oogonium**- Female gametangia.

There are various types of sexual spores

- **Ascospores**- Single-celled produced in sac known as **Ascus**.
- **Basidiospores**- These spores are single celled and borne on a **club-shaped** structure known as basidium or basidia.
- **Zygospor**- are big in size, thick-walled spores formed by fusion of 2 sexually compatible hyphae or gametangia.
- **Oospores** formed within **Oogonium**, produced by fertilization of oospheres by male gametes.

FRUITING BODIES

- Fruiting bodies are highly organised protective structure in which sexual and sexual spores may be surrounded.
- **Acervulus** and **pycnidium**- asexual fruiting bodies.
- **Perithecium** and **apothecium**- sexual fruiting bodies.



CLASSIFICATION

Fungi are classified in four major divisions:

1. **Chytridiomycota**
2. **Zygomycota**
3. **Ascomycota**
4. **Basidiomycota**

Chytridiomycota

- It is commonly known as **chytrids**.
- **Habitat**- Aquatic or terrestrial.
- **Ploidy**- Diploid.
- **Motile stage**- Present.
- **Asexual spores**- Holocarpic.
- **Pathogenic relationship**- Obligate parasite.

Zygomycota

- These are known as **zycomycetes**.
- **Habitat**– Terrestrial.
- **Ploidy**– Monoploid
- **Motile stage**– Absent.
- **Sexual spore**– Zygosporangia.
- **Asexual spore**– Sporangiospores/Chlamydozoospores.
- **Parasitic relationship**– Facultative parasite.
- **Example**– Black bread mould *Rhizopus stolonifer*.

Ascomycota

- Commonly known as **Ascomycetes** or **sac fungi**.
- **Habitat**– Terrestrial.
- **Ploidy**– Monoploid.
- **Motile stage**– Absent.
- **Sexual spore**– Ascospores.
- **Asexual spore**– Conidia.
- **Pathogenic relationship** is facultative or obligate.

Basidiomycota

- It is commonly Known as basidiomycetes or **club – fungi**.
- **Habitat**– Terrestrial.
- **Ploidy**– Monoploid, dikaryotic.
- **Motile stage**– Absent.
- **Asexual spore**– Arthrospores, oidia, conidia.
- **Sexual spore**– Basidiospores.
- **Pathogenic relationship** is facultative or obligate parasite.