**Mycology**

**Mycology** :is the study of the fungi .

Some fungi greatly enhance the quality of life by contributing to the production of food and spirit ,including cheese ,breads and beer.

Other fungi have served medicine by providing useful bioactive secondary metabolism such as antibiotics and immunosuppressive drugs .

All fungi Eukaryotic organisms ,and each fungal cell has at least one nucleus and nuclear membrane ,endoplasmic reticulum ,mitochondria ,and secretary apparatus .most fungi are obligate or facultative aerobes .they are chemotrophic ,secreting enzymes that degrade a wide Varity of organic substrates into soluble nutrients which are then passively absorbed or taken into the cell by active transport .

Fungal infections are **Mycoses** .most pathogenic fungi are exogenous,their natural habitats being water ,soil ,and organic debris.

This mycoses with the highest incidence-candidiasis and dermatophytosis –are caused by fungi that are part of the normal microbial flora or highly adapted to survival on the human host .Mycoses may be classified as superficial ,cutaneous ,subcutaneous ,systemic ,and opportunistic .

**Classification of Mycology**

The fungi are classified in four phyla; chytridiomycota ,zygomycota ,ascomycota ,and basidiomycota .

The largest phylum is the ascomycota (or ascomycetes) ,which includes more than 60% of the known fungi and about 85% of the human pathogens .the remaining pathogenic fungi are zygomycetes or basidiomycetes .a fungal species is assigned to phylum as well as the appropriates class, order ,and family , based on its mode of sexual reproduction ,phenotypic properties ,and phylogenetic relationships

The latter methods are used to classify an-amorphic or asexual species .sexual reproduction typically occurs when mating-compatible strains of a species are stimulated by pheromones to undergo plasmgamy ,nuclear fusion ,and meiosis ,resulting in the exchange of genetic information ,asexual isolates and their spores reproduce clonally. many species have been given different names that reflect their sexual (teleomorphic) and asexual (anamorphic) reproductive forms.

**A.Zygomycota**:

Sexual reproduction results in a zygospore ;asexual reproduction occurs via sporangia .vegetative hyphae are sparsly septate .Eg. *Rizopus,absidia ,Mucor ,Pilobolus* .

**B.Ascomycota** :

Sexual reproduction involves a sac or ascus in which karyogamy and meiosis occur .producing ascospores .asexual reproduction is via conidia .molds have septate hyphae .Eg *Saccharomyces ,Candida*  and molds *Coccidioides ,Blastomyces ,Trichophyton .*

**C.Basidiomycota (Basidiomycetes )**

Sexual reproduction results in four progeny basidiospores supported by club –shaped basidium .Hyphae have complex septa .Eg Mushrooms ,*Cryptococcus .*

**Hyphae:** tubular ,branching filaments of fungal cells ,the molds form of growth .

Most the hyphal cells are separated by porous cross walls or septa ,zygomycetous hyphae are characteristically sparsely septate .vegetative or substrate hyphae anchor the colony and absorb nutrients .aerial hyphae project above the colony and bear the reproductive structure .

**Basidiospores** :following meiosis ,four meiospores usually form on the surface of a specialized structure ,a club –shaped basidium .

**Septum**: Hyphal cross-wall ,typically perforated .

**TYPES OF FUNGAL REPRODUCTION**

Fungi also have 3 types of reproductions:

A. Vegetative

B. Asexual

C. Sexual

**VEGETATIVE REPRODUCTION**

It is the type of reproduction which involves the somatic portion of the fungal thallus where new individuals are formed without the production of seeds or spores by meiosis or syngamy.

Vegetative reproduction takes place by the following methods:

 1. Fragmentation

2. Fission

3. Budding

4. Oidia

5. Chlamydospores

6. Rhizomorphs and

7. Sclerotia.

**Asexual reproduction**

In fungi asexual reproduction is a more common method than sexual reproduction. It is usually repeated several times in a season. It takes place by the formation of special reproductive cells called spores. The formation of spores in fungi is called sporulation. Each spore develops into a new mycelium. These spores are produced as a result of mitosis in the parent cell and hence they are also called mitospores. The spores vary in color, shape and size, number, arrangement on hyphae and in the way in which they are borne. They may be hayline, green, yellow, orange, red, brown to black in color and are minute to large in size. In shape they vary from globose to oval, oblong, needle-shaped to helical. Thus an infinite variety of spores can be observed in fungi and you will find them very fascinating under the microscope. Usually the spores are unicellular. They may be uninucleate or multinucleate. In some fungi like Alternaria and Curvularia they are multi-cellular. The mitospores produced in fungi are of three types

1. Sporangiospores

2. Zoospores

3. Conidiophores

**SEXUAL REPRODUCTION**

 The sexual stage in fungi is called the perfect state in contrast to the imperfect state which is the asexual stage. Sexual reproduction involves the fusion of two compatible sex cells or gametes of opposite strains. Fungal sex organs are called gametangia. They may be equal in size. In many higher ascomycetes morphologically different gametangia are formed. The male gametangia are called antheridia and the female ones ascogonia. The fungus may be homothallic, that is, the hosing gametes come from the same Mycelium or may be heterothallic, that is, the fusing gametes come from different strains of mycelia. In fungi, sexual reproduction involves the following three phases:

1. Plasmogamy

2. Karyogamy and

3. Meiosis

These three processes occur in a regular -sequence and at a specific time, during the sexual stage of each species.