Pharmaceutical Botany Practice

Lab-5

FUNGI

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- Fungus is a member of the eukaryotic organisms that includes microorganisms such as yeasts and molds, as well as the more familiar mushrooms. These organisms are classified as a kingdom, Fungi, which is separate from the other eukaryotic life kingdoms of plants and animals.

- Similar to animals, **fungi are heterotrophs**; they acquire their food by absorbing dissolved molecules, typically by secreting digestive enzymes into their environment. **Fungi do not photosynthesise.** In the past, mycology was regarded as a branch of botany, although it is now known fungi are genetically more closely related to animals than to plants.
- Growth is their means of mobility, except for spores which may travel through the air or water.
- Fungi are the principal **decomposers in ecological systems.** These and other differences place fungi in a single group of related organisms, named the **Eumycota** (**true fungi** or **Eumycetes**). This fungal group is distinct from the structurally similar **myxomycetes** (**slime molds**) and **oomycetes** (water molds).

- Most fungi are inconspicuous because of the small size of their structures. They may become noticeable when fruiting.
- Fungi perform an essential role in the **decomposition of organic matter and have fundamental roles in nutrient cycling** and exchange in the environment.

- **Mycelium** is the vegetative part of a fungus, consisting of a mass of branching, thread-like hyphae. The mass of hyphae is sometimes called shiro, especially within the fairy ring fungi. Fungal colonies composed of mycelium are found in and on soil and many other substrates. Mycelium may form fruiting bodies such as mushrooms.
- **Hypha** is a long, branching filamentous structure of a fungus, oomycete, or actinobacterium. In most fungi, hyphae are the main mode of vegetative growth, and are collectively called a **mycelium.** Yeasts are unicellular fungi that do not grow as hyphae.

- **Classis : Eumycetes (True Fungi)**

  Subclassis: Ascomycetes

  Subclassis: Basidiomycetes

- **Ascomycetes:** In ascomycetes the spores are produced within microscopic cells called **asci**. The asci vary in shape from cylindric to spherical. Commonly, each ascus holds eight spores - but there are species with just one spore per ascus and others with over a hundred spores per ascus.

- **The apothecium—**a specialized structure important in sexual reproduction in the ascomycetes—is a cup-shaped fruit body that is often macroscopic and holds the **hymenium**, a layer of tissue containing the spore-bearing cells.
- The fruit bodies of the basidiomycetes (basidiocarps) and some ascomycetes can sometimes grow very large, and many are well known as **mushrooms.**

Hymenium yields fructification together with other vegetative structures.

Microscopic examination

Subclassis: Ascomycetes
Family: Aspergillaceae
Penicillium notatum (Küf mantarı)
Investigation Medium: Distile su
Magnification: 10x40

- **Conidia**, non-motile spores of a fungus. Asexual reproduction in Ascomycetes is by the formation of conidia, which are borne on specialized stalks called **conidiophores**.

Penicillium is a fungus with brush like sterigma at the tip of hyphae. (Penicillus: brush)

The spores are green colored and are arranged at the tip of the sterigmas.

- **1- Conidiophores, conidi chain**
- **2-Sterigma**
- **3-Conidiophore**

- The cap is pale brownish cream, yellow to tan or pale brown to grayish brown.
- The edges of the ridges are usually not darker than the pits, and somewhat oval in outline, sometimes bluntly cone-shaped with a rounded top or more elongate.
- Caps are hollow, and attached to the stem at the lower edge, and typically about 2–7 cm (0.8–2.8 in) broad by 2–10 cm (0.8–3.9 in) tall.
- The flesh is brittle. The stem is white to pallid or pale yellow, hollow, and straight or with a club-shaped or bulbous base. It is finely granular overall, somewhat ridged, generally about 2–9 cm (0.8–3.5 in) long by 2–5 cm (0.8–2.0 in) thick.
- In age it may have brownish stains near the base.
- Slit-like hymeniums are found in the fruiting body and the spores are placed in them.

Basidiomycetes: In basidiomycetes the spores develop on projections that grow out from microscopic cells called **basidia**, rather than being enveloped within cells. In most cases the basidia are elongated and club-like, though there is variation in shape. Commonly, each **basidium** has four projections and four spores - but some species may have just one projection and spore per basidium and others up to eight. In most basidiomycetes the basidia have no dividing walls (or **septa**), but in a small number of genera the basidia are septate. The projections from the basidia are called **sterigmata** (singular: sterigma).

- Fam: **Agaricaceae**

(Toadstool, Şapkalı Mantarlar, Lamelli Mantarlar)

The fruiting body is like a hat, and the hymenium is a lamellar mushrooms.

Junior fructifications are covered with velum.

- **Velum universale**
- A **universal veil** is a temporary membranous tissue that fully envelops immature fruiting bodies of certain gilled mushrooms. The developing Caesar's mushroom (Amanita caesarea), for example, which may resemble a small white sphere at this point, is protected by this structure. The veil will eventually rupture and disintegrate by the force of the expanding and maturing mushroom, but will usually leave evidence of its former shape with remnants. These remnants include the volva, or cup-like structure at the base of the stipe, and patches or "warts" on top of the cap.

- **Velum partiale**
- **Partial veil** (also called an inner veil, to differentiate it from the "outer" veil, or velum) is a temporary structure of tissue found on the fruiting bodies of some basidiomycete fungi, typically agarics. Its role is to isolate and protect the developing spore-producing surface, represented by gills or tubes, found on the lower surface of the cap. A partial veil, in contrast to a universal veil, extends from the stem surface to the cap edge. The partial veil later disintegrates, once the fruiting body has matured and the spores are ready for dispersal. It might then give rise to a stem ring, or fragments attached to the stem or cap edge. In some mushrooms, both a partial veil and a universal veil may be present.

Altsınıf: Basidiomycetes
Familya: Agaricaceae
1. Agaricus campestris (Field mushroom, Adi Mantar)

It has annulus and White stalk.

Agaricus campestris is a widely eaten. The cap is white, may have fine scales, and is 5 to 10 centimetres (2.0 to 3.9 in) in diameter; it is first hemispherical in shape before flattening out with maturity. The gills are initially pink, then red-brown and finally a dark brown, as is the spore print. The 3 to 10 centimetres (1.2 to 3.9 in) tall stipe is predominantly white and bears a single thin ring.[3] The taste is mild. The white flesh bruises a dingy reddish brown, as opposed to yellow in the inedible (and somewhat toxic).

Altsınıf: Basidiomycetes

Familya: Agaricaceae.

2. Amanita muscaria (Fly agaric, Sinek mantarı)

- The lamellas, stalks, annulus and spores are white in color.
- Poisonous.

- Fully grown, the bright red cap is usually around 8–20 cm in diameter.
- Fly agaric **fruiting bodies** emerge from the soil looking like white eggs. After emerging from the ground, the cap is covered with numerous small white to yellow pyramid-shaped warts. These are remnants of the universal veil, a membrane that encloses the entire mushroom when it is still very young.

Subclassis:Basidiomycetes
Family: Agaricaceae

3. *Amanita phalloides* (death cap, Yeşil şeytan, Evcik Kıran,

Amanita phalloides (Death cap, Yeşil şeytan, Evcik Kıran)
Altsınıf: Basidiomycetes
Familya: Agaricaceae

- The large fruiting bodies (mushrooms) appear in summer and autumn; the caps are generally greenish in colour, with a white stipe and gills.
- These toxic mushrooms resemble several edible species commonly consumed by humans, increasing the risk of accidental poisoning.
- *A. phalloides* is one of the most poisonous of all known toadstools. It has been involved in the majority of human deaths from mushroom poisoning.

- The death cap has a large and imposing epigeous (aboveground) fruiting body (basidiocarp), usually with a pileus (cap) from 5 to 15 cm (2–6 in) across, initially rounded and hemispherical, but flattening with age. The color of the cap can be pale-, yellowish-, or **olive-green**, often paler toward the margins and often paler after rain.
- The cap surface is sticky when wet and easily peeled, a troublesome feature, as that is allegedly a feature of edible fungi.
- The remains of the **partial veil** are seen as a skirtlike, floppy **annulus** usually about 1.0 to 1.5 cm below the cap.
- The crowded **white lamellae** (gills) are free. The stipe is white with a scattering of grayish-olive scales and is 8 to 15 cm long and 1 to 2 cm thick, with a swollen, ragged, sac-like white volva (base). As the **volva,** which may be hidden by leaf litter, is a distinctive and diagnostic feature, it is important to remove some debris to check for it.
- Young specimens first emerge from the ground resembling a white egg covered by a universal veil, which then breaks, leaving the volva as a remnant. The spore print is white, a common feature of Amanita.

The hat is 4-12 cm in diameter, open olive is green, lamella, stem, annulus, volva and spores are white color.

- It is especially seen in oak forests in summer and autumn.
- It is known as the most poisonous mushroom.
- It causes close to 90% of fatal mushroom poisoning.