

Division: MYCOPHYTA (Fungi)

Fungi are a primitive group of organisms that do not contain real organs like roots, stems, leaves and flowers. Since they do not have chlorophyll, they can not make their own food.

There are various forms of fungi; they can be one or more celled, can live in fresh water, on the land or in the sea.

This taxon contains approximately 60.000 poisonous or edible species

And millions of species are yet waiting to be identified

May live as parasites on other living organisms; may live as saprophytic organisms on non-living substances and some of them form lichenes with certain species of blue-green algae.

Lichenes

Can be found anywhere in the world,
however are more abundant in humid
environment.

**Has been used since ancient times in the making of
bread, wine, etc.**

Fungi other than yeast fungi are usually multicellular.

In most fungi, the thallus is made up of long and slender Filaments called "hyphae"

Mycelium is the mass formed by hyphae

Hyphae lose water under inappropriate conditions, the cell membrane thickens and the mass of mycelium formed by this way is called **sclerotium.**

**A fungus cell contains one or more nuclei
(unlike bacteria)**

Fungi reproduce both asexually and sexually.

Fungi store glycogen and lipids, may also contain mannitol and other substances, however they do not contain chlorophyll

Fungi may be edible or poisonous, may produce antibiotics, produce alcoholic fermentation due to the enzymes that they contain and also may cause diseases in humans, animals and plants.

Fungi are divided into three classes:

- 1) Myxomycetes
- 2) Phycomycetes
- 3) Eumycetes (Real Fungi)

Class: **Myxomycetes**

This is the simplest and most primitive taxon of fungi.

Class: Phycomycetes
(They cause diseases in plants)

They are called “Fungi Like Algae” since the first identified species resemble algae.

Class: Eumycetes (Real Fungi)

This class is divided into two groups in respect to the formation of their spores:

- 1) *Ascomycetes* (Fungi with ascii)**
- 2) *Basidiomycetes* (Fungi with basidia*)**

*** plural for basidium**

1) Ascomycetes

Spores (ascospores) form in a vesicle called ascus.

(ascus: Gr. leather pouch)

4, 8, 16, 32, 64 ascospores may form in an ascus.

These asci form the hymenium with sterile hyphae called paraphyses

Hymenium, forms **fructification** with other vegetative structures.

Fungi found in Ascomycetes class may also reproduce with spores called conidia* (or conidiospores) that form by beading of the mycelium tips

*** plural for conidium**



Order: **Saccharomycetales**

They do not have myceliums. Cells are found alone or in elliptic or spherical orders of cells.

Fam: **Saccharomycetaceae** (Yeast Fungi)

They perform alcoholic fermentation on many types of sugar due to the enzymes that they contain.

Saccharomyces cerevisiae (Brewer's Yeast, Baker's Yeast, Bira Mayası)

**Reproduce rapidly by
budding**

**Used in breweries in the
making of beer**

**This species is known
and has been used
since ancient times**

**Contains:
46-50% protein,
~30-35% carbohydrates (in the
form of glycogen),
2-3% fat**

***Saccharomyces
cerevisiae* gives the drug
named**

**Faecal Medicinalis
(*Cerevisiae Fermentum*).**

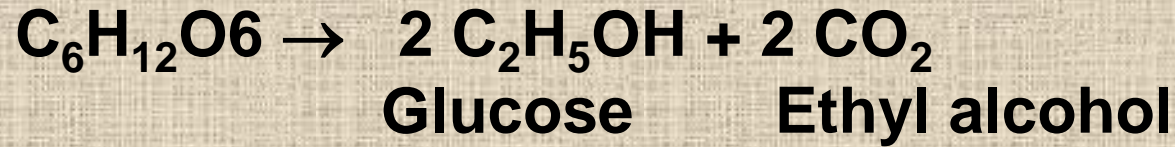
**It is obtained as a by-
product in the making of
beer.**

**Usage: Food
supplement,
antianemic, for skin
inflammations**

Saccharomyces ellipsoideus
(*S. cerevisiae* var. *ellipsoideus*) (wine yeast):

Found in the soil of vineyards and fruit gardens.

Used in the making of wine.



***Saccharomyces kephyr* (kephyr yeast): Kephyr is obtained by the fermentation of milk.**

Kephyr contains some fungi like *Lactobacillus caucasicus* (lactic fermentation)

Other species of importance:

Candida albicans

**Causes Candida infections
(on the skin)**

Order: **Aspergillales**

Fam: **Aspergillaceae** (Green Mould Fungi)

Fungi of this family lives saprophytically on food that are rich in carbohydrates (e.g. bread, cheese, marmelade etc.) and form green colored mould.

Though they belong to the class Ascomycetes, they propagate by **conidiospores that they form at the tip of their hyphae.**

Two important genera are present in this family:
Penicillium* and *Aspergillus

***Penicillium* is a fungus that has sterigma in the shape of a bifurcated brush at the tips of its hyphae.**

penicillus = brush (fırça)

Some species yield (*P. notatum* and *P. chrysogenum*) the antibiotic substance called **penicillin**

This antibiotic is effective against coccus type bacteria (staphylococcus, diplococcus, streptococcus); these are all Gram (+) cocci

Penicillium notatum

Penicillin has also been synthesized in 1947, however the yield was very low, therefore penicillin has always been obtained from *Penicillium* species

P. roquefortii and *P. camamberti* produces bluish-green mould on cheese. These fungi prevents the propagation of bacteria and also has effect on the fat and caseins of cheese and give the cheese a special taste and aroma. e.g. Roquefort (blue cheese-due to the color of the mould).

Aspergillus sp.

A. glaucus and *A. fumigatus* are very common species.

Though **fumagillin** is obtained from *A. fumigatus*, this antibiotic is not used in practice since it is **toxic!!!**

A. niger has the ability to turn saccharose into citric acid. Therefore it is used to obtain citric acid from molasses.

Order: Pyrenomycetales
Fam : Clavicipitaceae

Claviceps purpurea is an important species that forms disease in the spikes of Graminae (Poaceae) species like wheat, oat.

Claviceps purpurea grows well especially during hot and rainy years.

If the sclerotia (plural of sclerotum) mix with the grinded grains, then the bread made from this flour will lead to ergotismus due to the poisonous alkaloids that are found in this fungus (**ergo alkaloids - lysergic acid and isolysergic acid derivatives**). Ingestion of large amounts of ergot may result in convulsive ergotism and death.

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Ergo alkaloids constrict the vessels, smooth muscles, especially uterine muscles. Therefore the drug is used as hemostatic against bleeding that occurs after delivery or abortion.

Ergometrine (ergobazine, ergonovine) are used for uterine hemorrhages, ergotamine is used for migraine.

Order: **Pezizales** (Discomycetales)

Fructification organs of these fungi are closed when young, then takes the form of a flat pot or plate due to the pressure formed by lateral growth.

Mature fructifications are called **Apothecium**.

Morchella esculenta



**(Common Morel, True Morel,
Kuzugöbeği mantarı)**

**Consists of a hollow stalk and a
hollow cap.**

Gyromitra esculenta

(False Morel)

Toxic due to helvellic acid

Order: **Tuberales**

Fructifications are like tubers and are covered with a fleshy layer.

Tuber brumale
(Musky Truffle)

Subclass: Basidiomycetes

Amanita phalloides

Spores (basidiospores) are formed in basidia.

Basidium is formed by the swelling of the tip of the hyphae, and 4 basidiospores are formed on top of these basidia via budding.

Holobasidiomycetidae

Order: Agaricales (Hymenomycetales)

Fructification organ is in the shape of a cap.

Fam: **Agaricaceae**

Young fructifications are covered with a covering called velum.

MEDICINAL SPECIES ARE NOT PRESENT IN THIS FAMILY, HOWEVER EDIBLE FUNGI AND SOME IMPORTANT POISONOUS FUNGI ARE PRESENT

Edible Mushrooms

***Agaricus campestris* (= *Psalliota campestris*)**

(Field Mushroom)

Armillaria mellea

(Honey Mushroom)

Agaricus bisporus (Button Mushroom)

Boletus edulis

(Penny Bun)

Agaricus bitorquis

(Pavement Mushroom)

Cantharellus cibarius

(Cantherelle, Golden Cantherelle, Cüce Kız)

Lactarius deliciosus

(= Saffron Milk cap, Red Pine Mushroom, Kanlıca Mantarı)

Amanita

caesarea

(Caesar's Mushroom)

Favourite mushroom of Roman Emperors

Poisonous mushrooms

(Death Cap, Yeşil şeytan,
evcik kıran)

Contains toxic substances
called **amanitine**, **phalloidine**
and **phallene**.

Amanita muscaria

(= Fly agaric, Sinek mantarı)

Lethal; contains
muscarine, muscaridine
and **choline**.

***Amanita pantherina* (Panther Cap)**

**Have effects on the
gastrointestinal
system.**

Other poisonous *Amanita* species:

Amanita mappa (Citron Amanita, False Death Cap)

Amanita verna
(Fool's Mushroom, Destroying Angel)

Amanita gemmata
(Gemmed Amanita, Jeweled Deathcap)

Boletus satanas

(Devil's Bolete, Satan's Mushroom, Şeytan mantarı)

Contains **muscarine
Lethal!**

***Agaricus xanthodermus* (= *Psalliota xanthoderma*)**

***Coprinus atromentarius* (Common Ink Cap)**

***Psilocybe semilanceata*
(Liberty Cap)**