علم الأحياء الدقيقة
Microbiology
Introduction to Mycology

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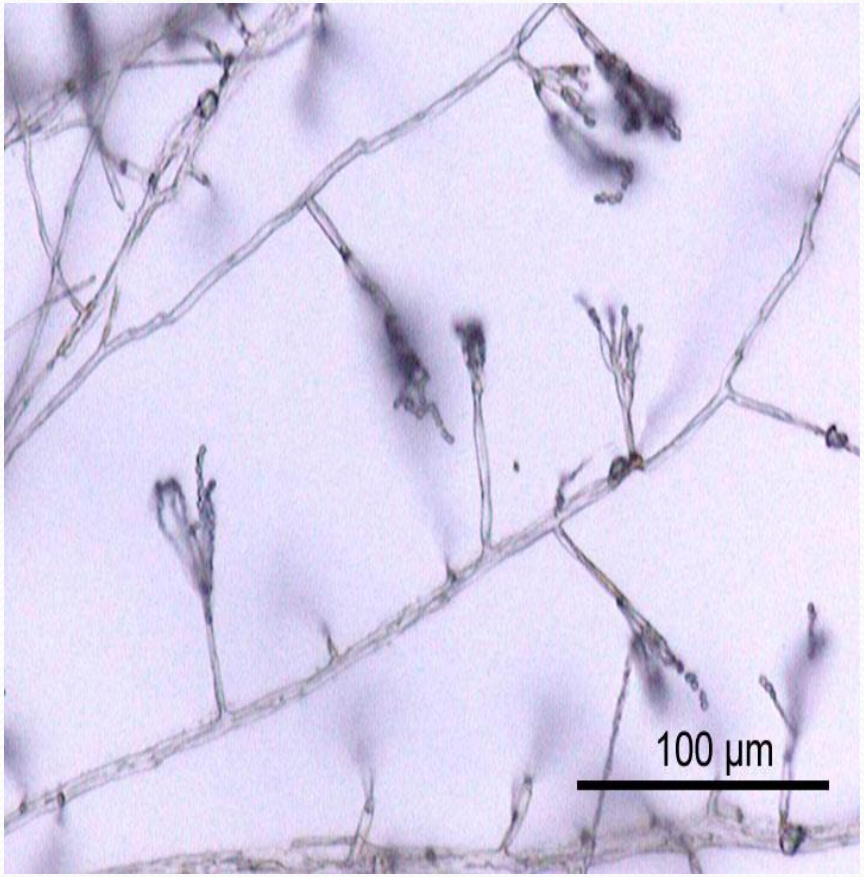
مكتب ٢ بـ ٤٥

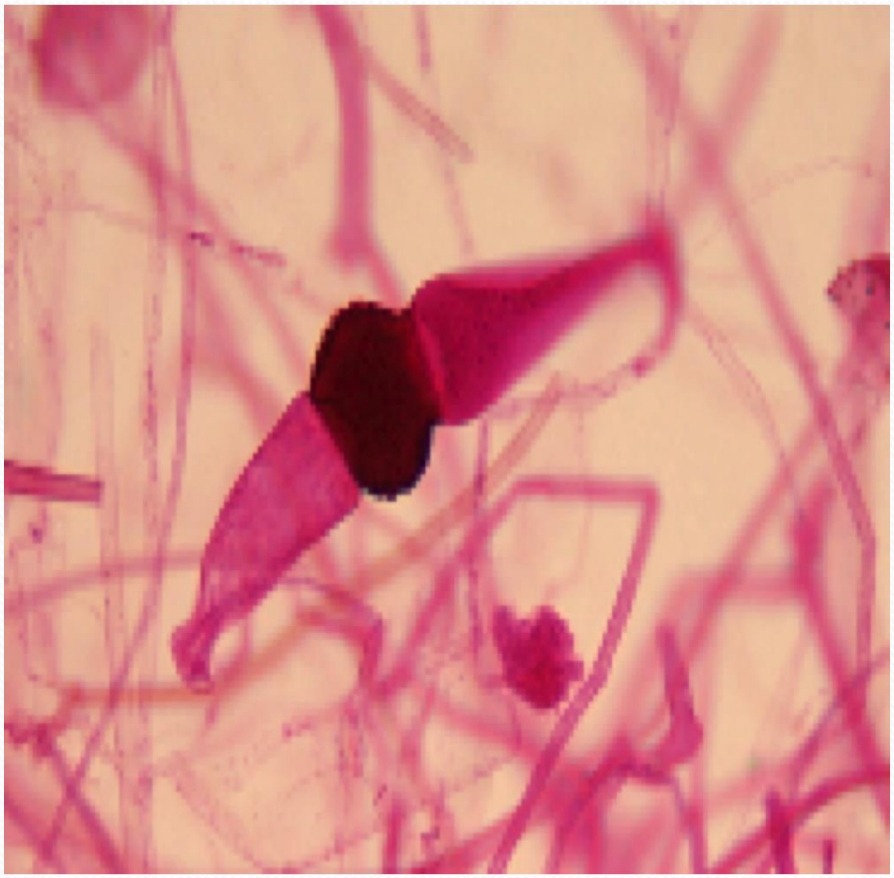
Division Eumycota-True Fungi

Non septated Hyphae
of *Aspergillus niger*

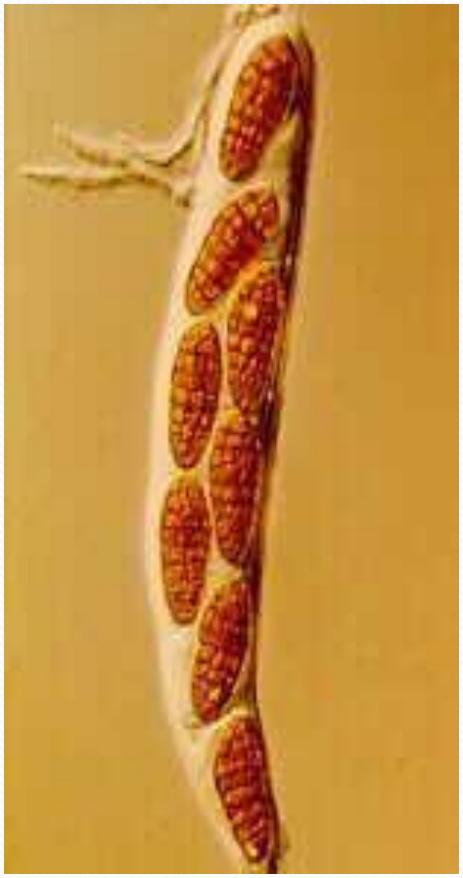


Septated Hyphae
of *Penicillium*

Division Eumycota-True Fungi



Rhizopus
Similar gametangia

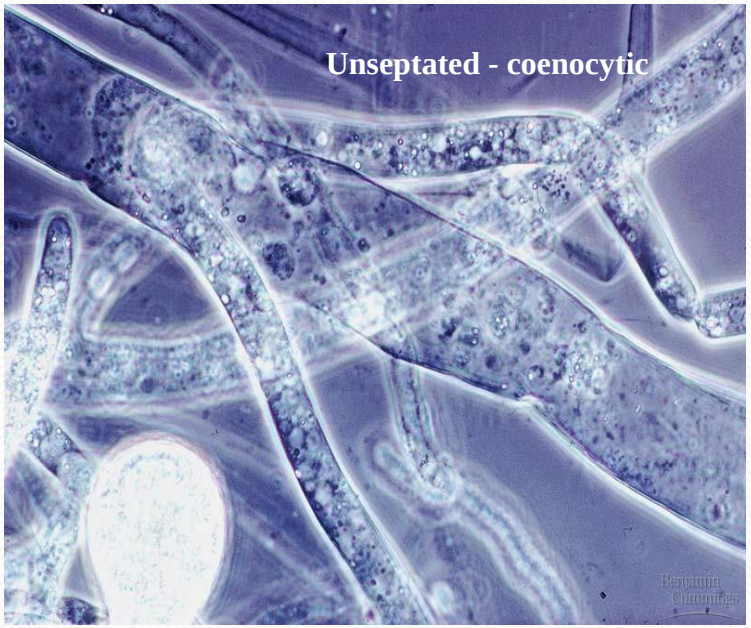


Endogenous Spores (Ascus)

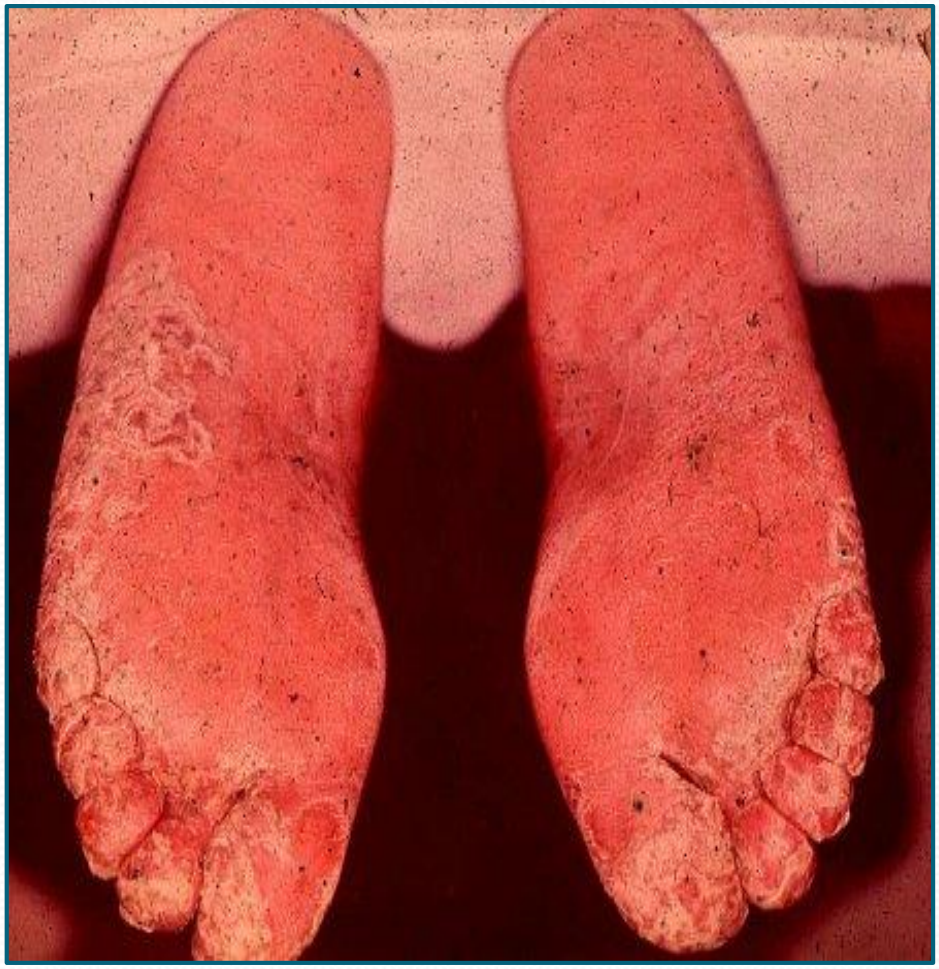
Division Eumycota-True Fungi

- The Primary Structures of a Fungi

- **Spores** (haploid reproductive cell)
- **Hypha** (a single filament)
- **Mycelium** (a mass of hyphae)
- **Fruiting Body** (reproductive and dispersion)



Division Eumycota-True Fungi

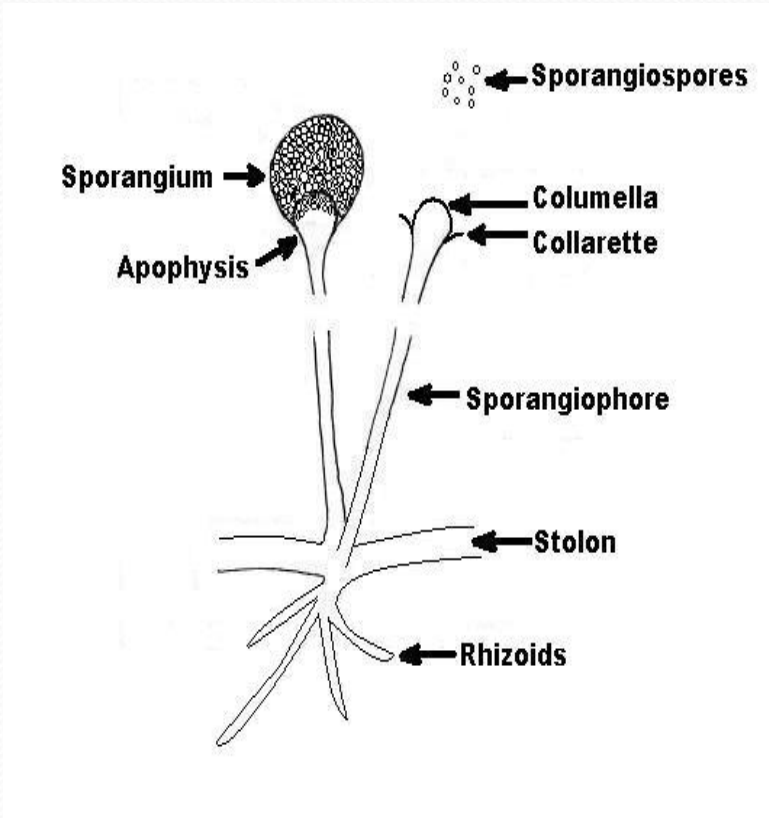


Rhizopus (Black bread mould) عفن الخُبز الأسود

- It is a saprophytic fungus, which can grow on moist bread, stored fruits, vegetables, and synthetic nutritive media.
- It is called bread mold since it is mostly growing on damp bread (moist).

Vegetative structure.

- The mycelium consists of branched non-septate hyphae, which grow creeping upon the substratum and called stolon
- Each stolon sends branched rhizoids to the substratum for absorption of the necessary food material.
- Opposite to the rhizoids, clusters of erect aerial sporangiophores arise, each terminating with a single sporangium.
- The hypha is full of multinucleated protoplasm.



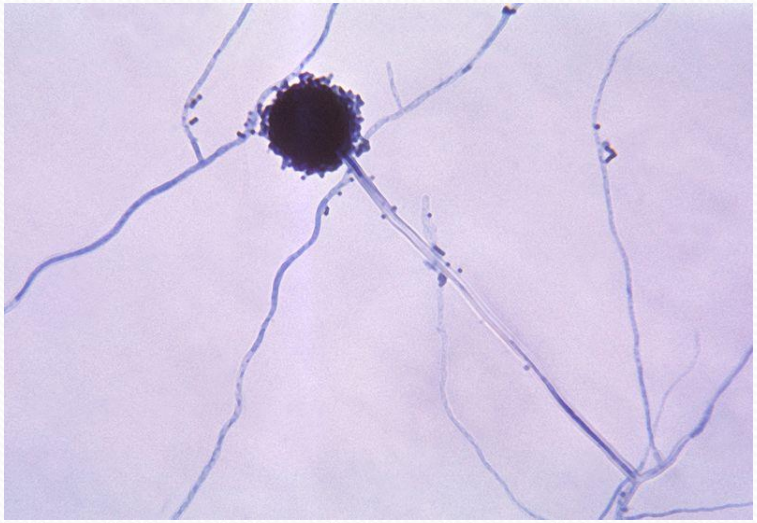
Penicillium and *Aspergillus*

- Theses genera are commonly known as the **black**, **blue** or **green** molds.
- Different species have different other colors such as **blue-green**, **yellow** or **brown**.
- They are very widely distributed in all habitats.

Similar characters for both genera are listed below :

- The mycelium of both genera is branched and septate.
- They grow saprophytically on all kinds of organic materials such as jams, bread, meats, grains and wood.
- They can grow also as saprophytes on stored fruits and vegetables causing their decay.
- They can be sub-cultured easily on synthetic nutritive media.
- Both multiply asexually by conidia, which are carried on conidiophores.
- These conidia are carried by air-currents, and they are capable of immediate germination if they fall upon the proper substratum.
- Sexual reproduction has been observed in several species of both *Penicillium* and *Aspergillus*.

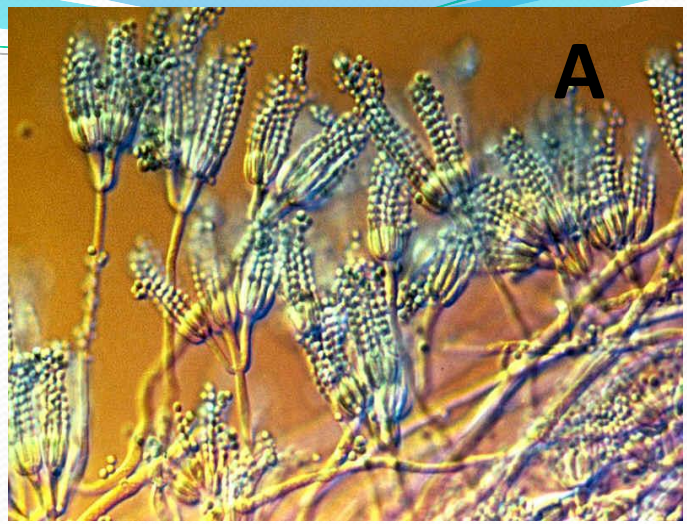
Penicillium sp.

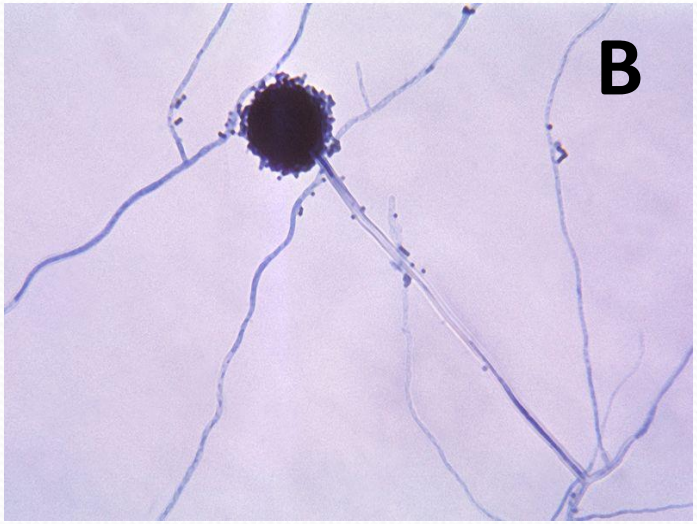


***Aspergillus* sp.**

Differences characters for both genera are listed below :

- In *Penicillium (fig. A)*, the conidiophores are septated and branched. The last branches terminate with the sterigmata (called phialides), which carry the chains of conidia.
- In *Penicillium spp* the sterigmate are in clusters, which may be in the order of primary, secondary and sometimes tertiary sterigmata.
- *In Aspergillus spp*, .the conidiophores are unbranched, non-septate and terminate with swollen heads, each of which carries radiating sterigmata.
- Chains of conidia, arranged in acropetal succession (the larger being terminal) are carried by such sterigmata.
- They allover appearance of *Apergillus* conidiophore is a radiating head while *Penicillium* look like a broom.





Economic importance

- *Aspergillus* and *Penicillum* are utilized in the preparation of food and other materials useful to humans.
- Citric and other organic acids are produced by *Aspergillus* sp. grown on sugar.
- The enzyme, **Taka-Diastase**, used in medicine, is formed by *Aspergillus oryzae*.
- Certain kinds of cheeses, such as Roquefort, Camembert and Gorogonzola have special taste and flavor due to the action of *Penicillium* spp.
- *Penicillin*, the powerful antibiotic, is produced by *Penicillium notatum*.

Class: Basidiomyceteae

- **Characterization:**
- Septated mycelium.
- Production of exogenous basidiospores.
- Basidia are either septated or non-septated.
- Examples: ***Agaricus*** **(Mushroom).**

Agaricus (Mushroom)
فطرة عيش الغراب أو المشروم

Characterization

- **Saprophytic fungus**, appearing initially as mats or masses of subterranean septate hyphae which feed on organic matter.
- Mushrooms grow best around decayed trees or in fertilizied soils. It grows wild in fields and gardens, and a variety of it is cultivated.
- The underground mycelium gives rise to an overground body composed of compact interwoven hyphae called the **fruit body** or **sporophore**.
- In young stages the whole fruit body is covered by a membrane which ruptures due to growth , leaving a remnant of it at the base of the fruit body called **volva**. The fruit body then becomes differentiated into a **stalk** or **stipe** and a **cap** or **pileus**.
- The rim of the pileus is attached to the upper part of the stalk by a membrane which ruptures, due to the horizontal growth of pileus, leaving a remnant on the stalk known as **annulus**.




Economic importance

The economic importance of members of Agaricales is revealed by the following points:

- Some of them are edible by human due to their nice flavor, taste and valuable content of protein and vitamin.
- Mushroom-growing industry has developed in many countries of the world as the United States and France.
- Other members are very poisonous.
- Some are parasitic on higher plants. They cause diseases such as root rot of apple and wood destruction of many forest trees.
- Some mushrooms (hallucinogenic mushrooms) are being used experimentally in medicine as an aid to psychotherapy.
- A substance called psilocybin, extracted from such mushrooms, is being used in the study of schizophrenia.

QUESTIONS??