

Lecture Title:

Fungi and their pathogenesis

(Foundation Block, Microbiology)



Lecture Objectives..



- To describe the general characteristics of fungi and recognize a fungus from all other living organisms
- To establish familiarity with the terminology needed by medical students
- To know certain fundamental facts about classification reproduction and identification of fungi

What is Mycology?..



Mycology: Study of fungi
Kingdom myceteae (= Kingdom fungi)

Medical mycology : Study of medically important fungi and the mycotic diseases.

Mycoses: A disease caused by a fungus

What is a Fungus ?



Characteristics (distinguishing features)

- 1) All Eukaryotic organisms (a true nucleus)
- 2) Heterotrophic (Saprobic, symbiotic, parasitic)
- 3) Do not have chlorophyll (Achlorophyllous)
- 4) The cell is surrounded by rigid cell wall made of chitin & complex carbohydrates (**Mannan, glucan**)
- 5) Cell membrane : (**sterol, ergosterol**)

What is a Fungus ?



Characteristics (distinguishing features)

Saprobic

feed on dead tissues or organic waste (decomposers)

Symbiotic

mutually beneficial relationship between a fungus and another organism

Parasitic

feeding on living tissue of a host. (disease)

MORPHOLGY



1. **Yeasts** : are unicellular organisms

2. **Filamentous fungi** (Hyphae, mycelium)

Hyphae are multicellular filamentous structures, constituted by tubular cells with cell walls.

3. **Dimorphic**

- Yeast : Parasitic form, Tissue form, Cultured at 37° C
- Filamentous : Saprophytic form, Cultured at 25 C

Dimorphic: Have two forms depending on change in the environmental factors

Mold form $\xrightarrow{\hspace{1cm}}$ Yeast form
 $\xleftarrow{\hspace{1cm}}$

MORPHOLGY

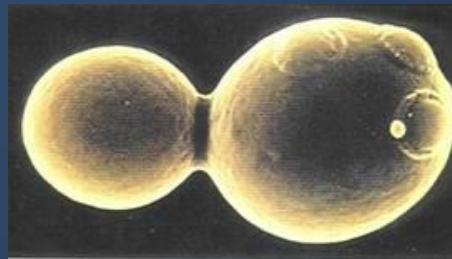


➤ Yeast:

Colony morphology (Culture)



Have same appearance
How do we differentiate between them?



Budding yeast cell



In Clinical samples
Budding yeast cells
+/- Pseudohyphae

Examples : *Candida albicans*,
Saccharomyces cerevisiae

MORPHOLGY



➤ Filamentous fungi (Mould=Mold)

A hypha (plural hyphae)

is a long, branching filamentous cell. hyphae are the main mode of vegetative growth.

Mycelium:

The intertwined mass of hyphae that forms the fungal colony.

Conidia/ Spore (singular = conidium):

asexual spores borne externally on hyphae or on a conidiophore.

Examples:

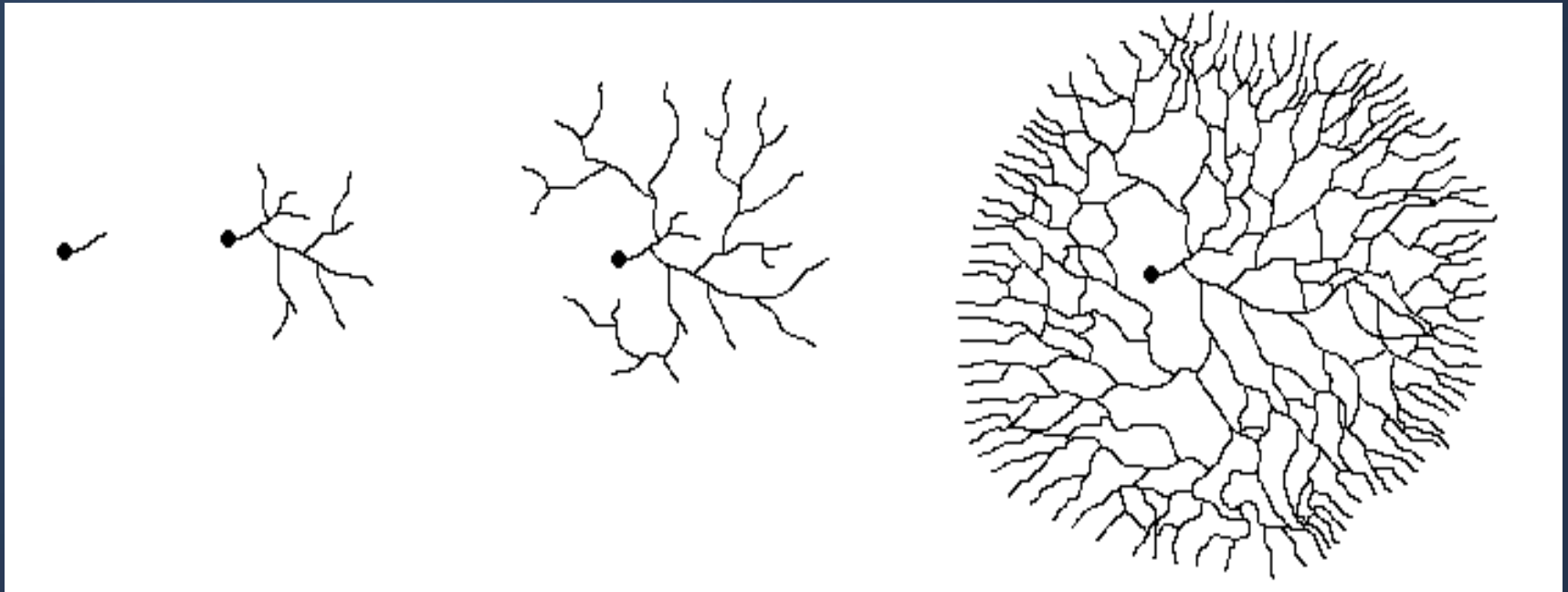
Aspergillus,
Penicillium,
Rhizopus

MORPHOLOGY



➤ Filamentous fungi

Hyphal growth from spore



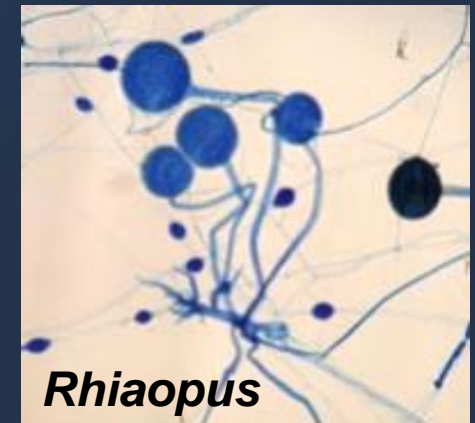
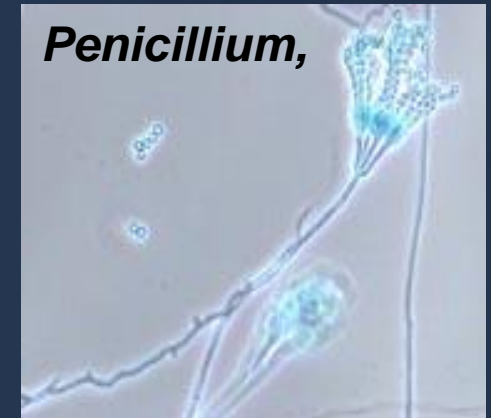
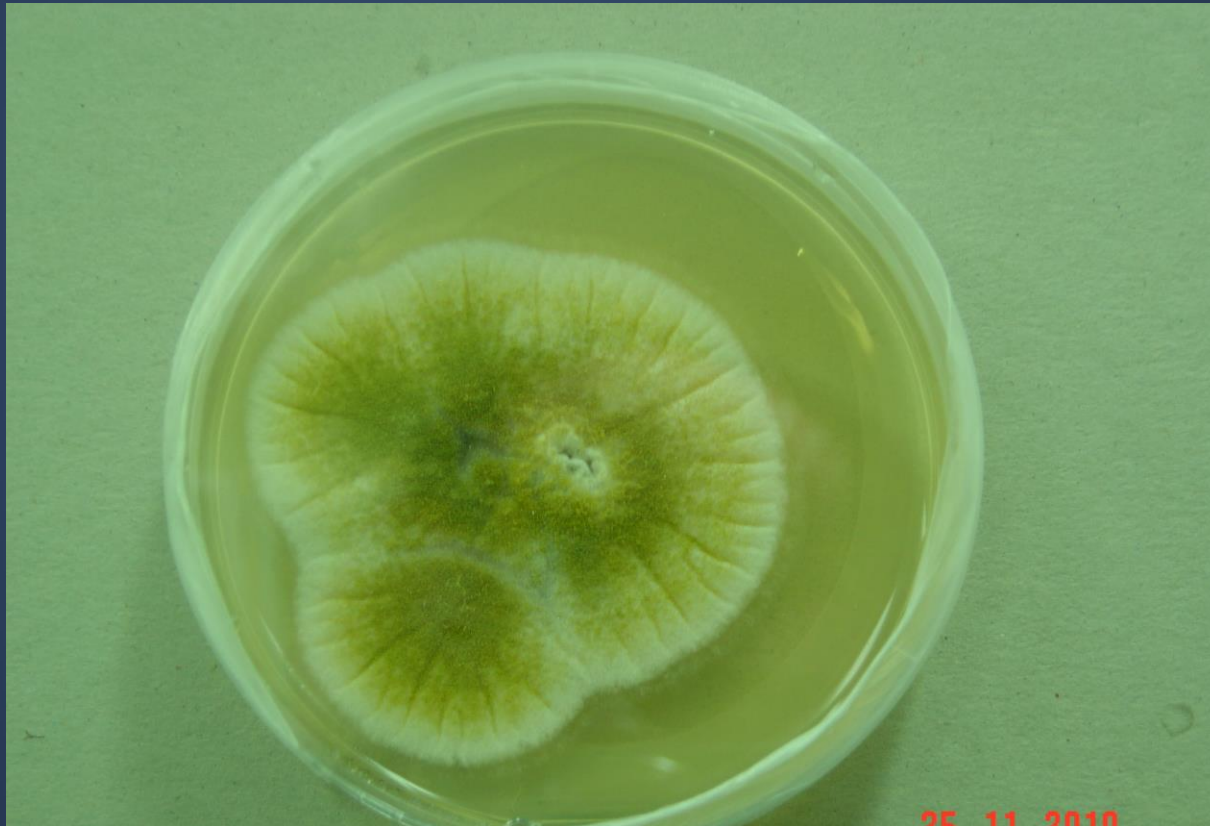
Spore/ conidia

mycelium

MORPHOLOGY



➤ Filamentous fungi



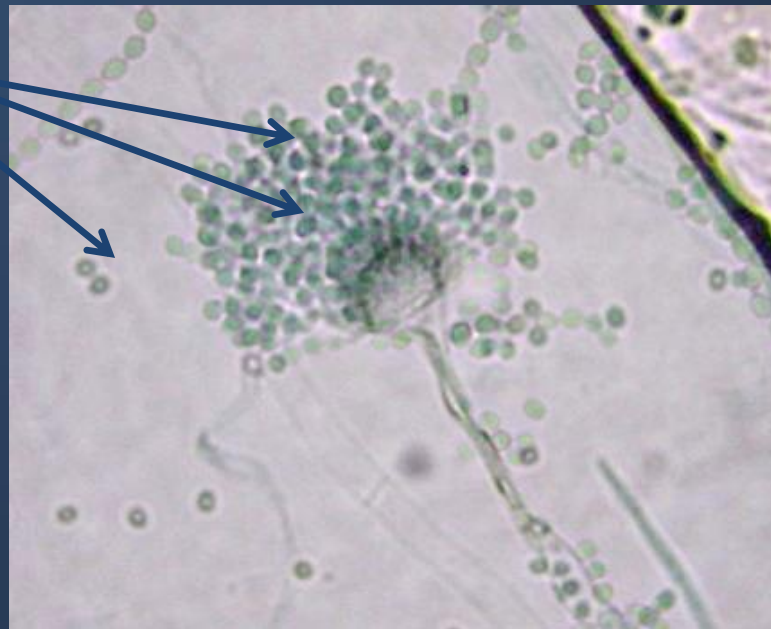
MORPHOLOGY



➤ Filamentous fungi

Conidia / spore (singular = conidium): asexual spores borne externally on hyphae or on a conidiophore.

Conidia



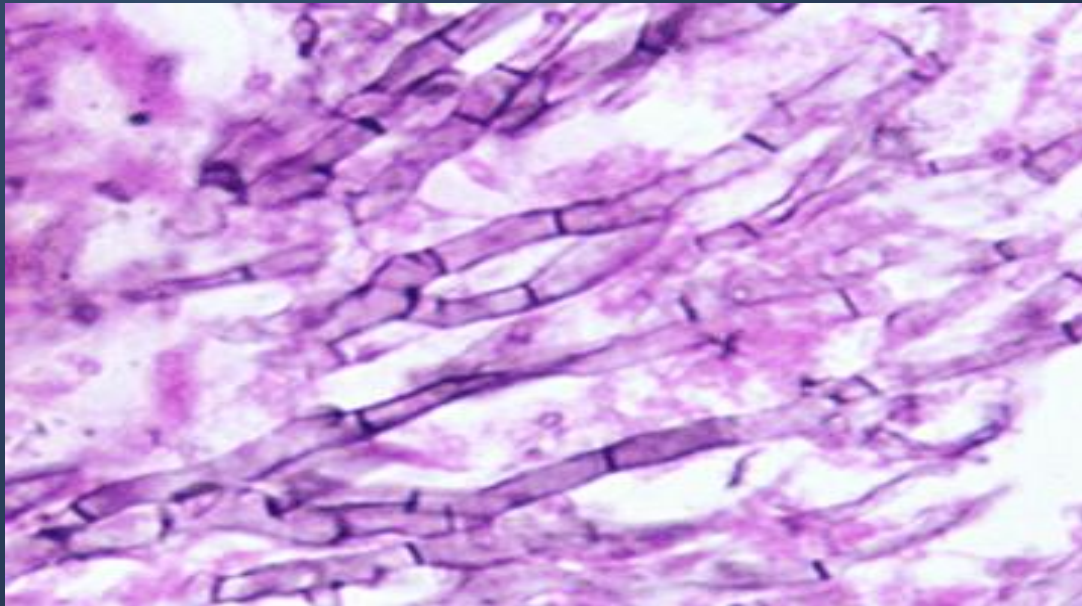
Fungal Hypha

➤ Filamentous fungi

Septa:

Cross-walls (septa) that divide hyphae into segments. (septate hypha)

If there are no cross-walls, the hyphae are considered to be non-septate.



MORPHOLGY



➤ Filamentous fungi (mold)

Moniliaceous mold

hyaline or lightly pigmented conidia or hyphae, colorless

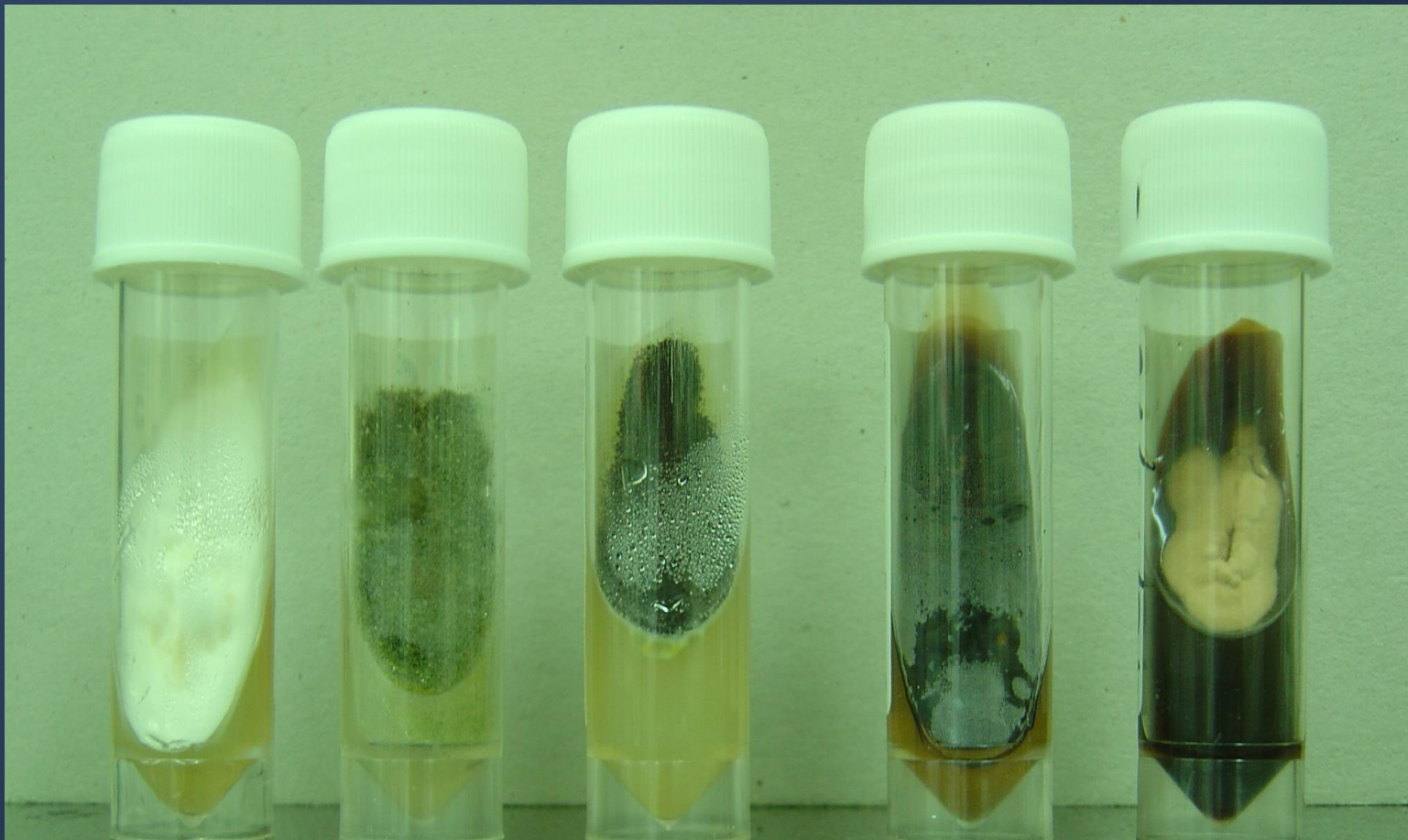
Dematiaceous Mold

Are pigmented.

Because of the pigment, the colonies appear dark, brown, or black

MORPHOLOGY

➤ Filamentous fungi

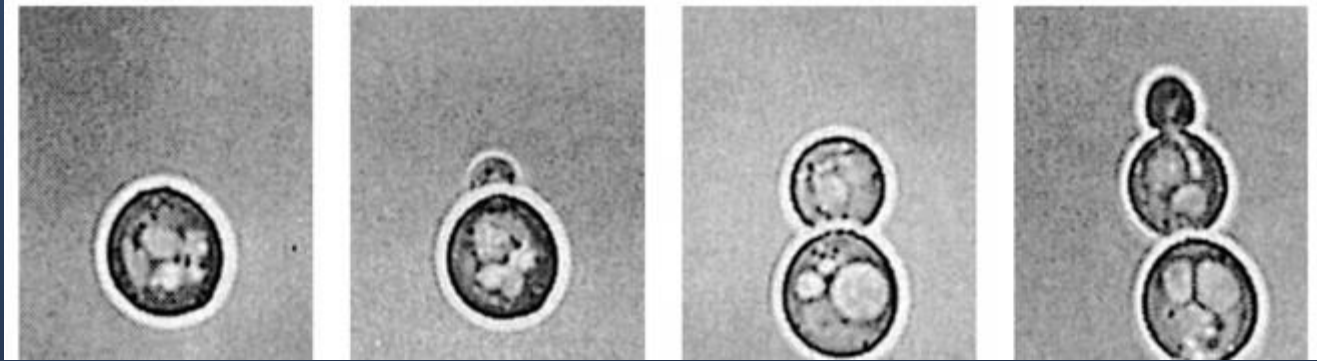


Reproduction in Fungi

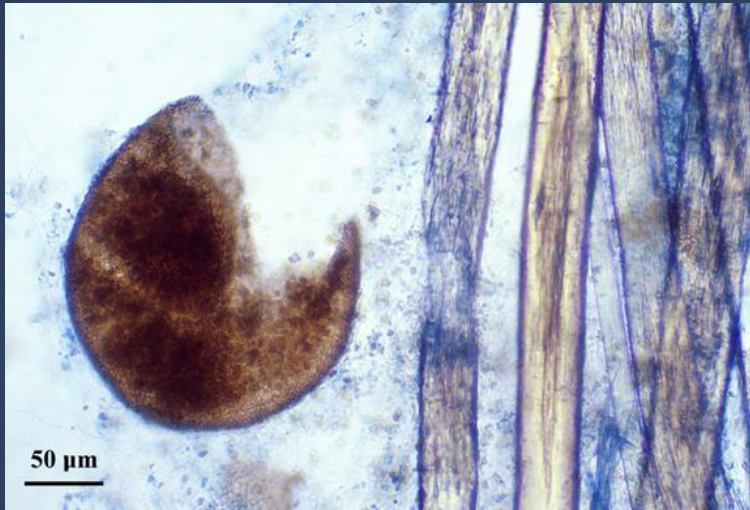
I) Asexual: Only mitotic cell division

- 1) Somatic Yeasts by budding
 Molds by hyphal fragmentation
- 2) Spore formation:
 - a) Sporangiospores in sporangia
 - b) Chlamydo spores in or on hyphae
 - c) Conidia (conidium) on hypha or on conidiophores

II) Sexual: Fusion, mitosis, meiosis



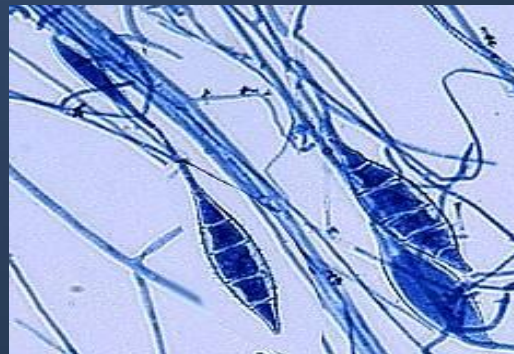
Reproduction in Fungi



Spores?

- These are the small airborne particles by which fungi reproduce.
- They are produced by mitosis and readily disseminate in the air.

SPORES





PATHOGENICITY OF FUNGI

- Fungi are all around us
- Widely distributed in nature (air, water, soil, decaying organic debris)
- However, fungi can cause diseases to human:
 - Cause superficial infections,
 - some can cause allergic reactions
 - Few cause invasive infections

To cause the disease:

1. Thermotolerance
2. Ability to survive in tissue environment
3. Ability to withstand host defenses

Thank You 😊

(Foundation Block, Microbiology)

