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 carbohydates (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)

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

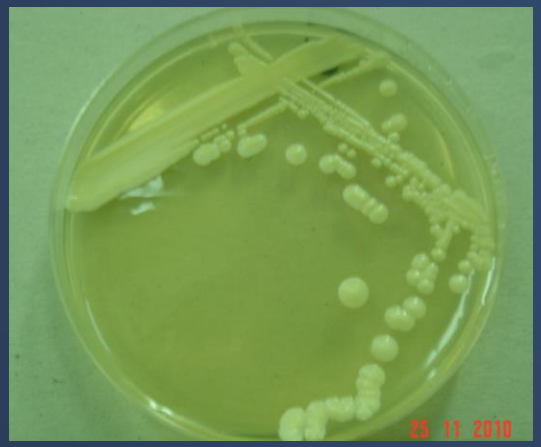
3. Dimorphic
   - Yeast : Parasitic form, Tissue form, Cultured at 37° C
   - Filamentous : Saprophytic form, Cultured at 25 C

   Dimorphic: Have two forms depending on change in the environmental factors Mold form ⇄ Yeast form

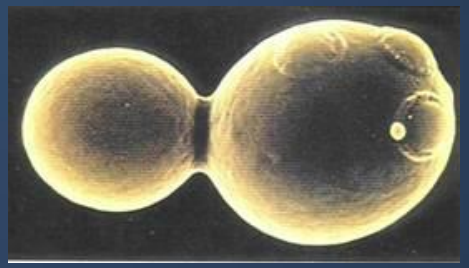
MORPHOLGY

➢ Yeast:

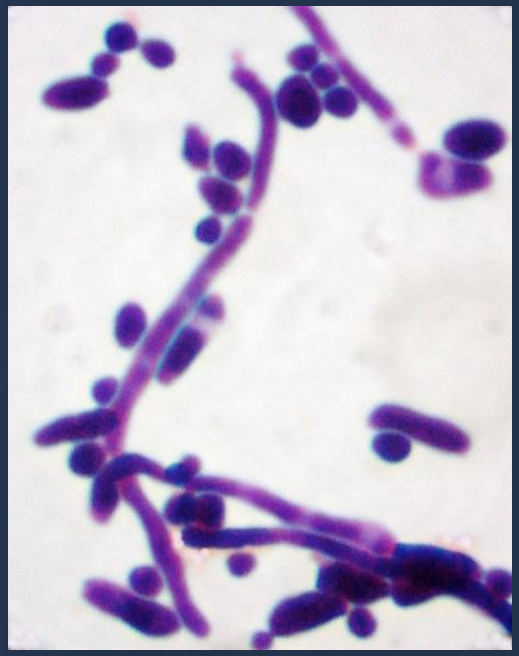
Colony morphology (Culture)



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.

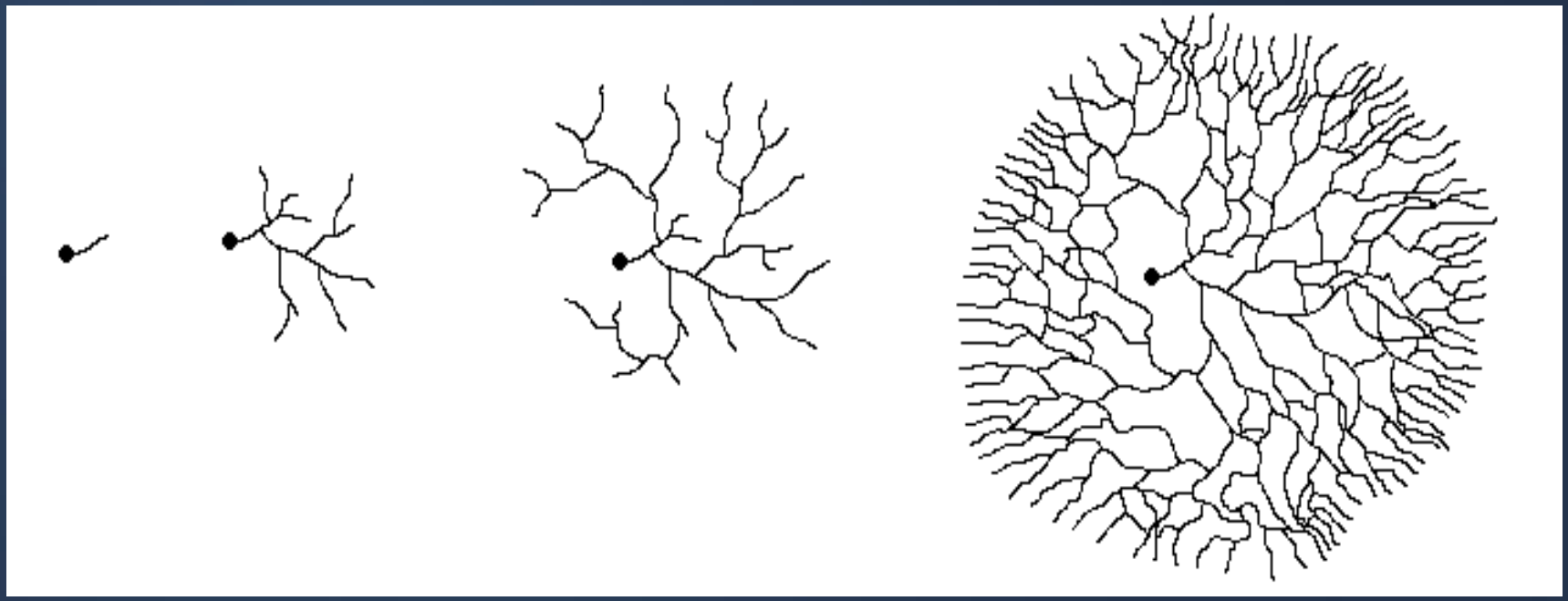
Examples:

Aspergillus,
Penicillium,
Rhizopus

MORPHOLGY

- Filamentous fungi

  Hyphal growth from spore

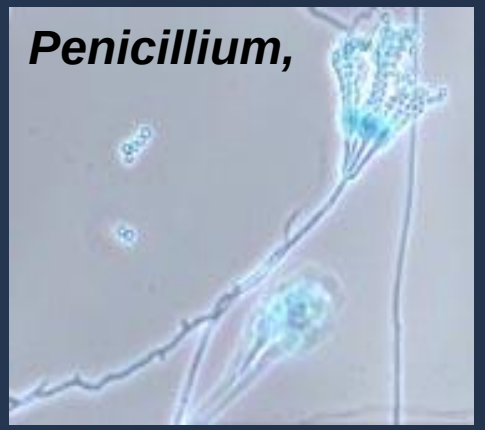


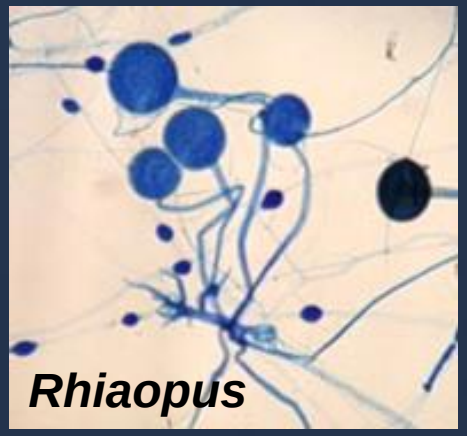
Spore/ conidia

mycelium

MORPHOLGY

- Filamentous fungi



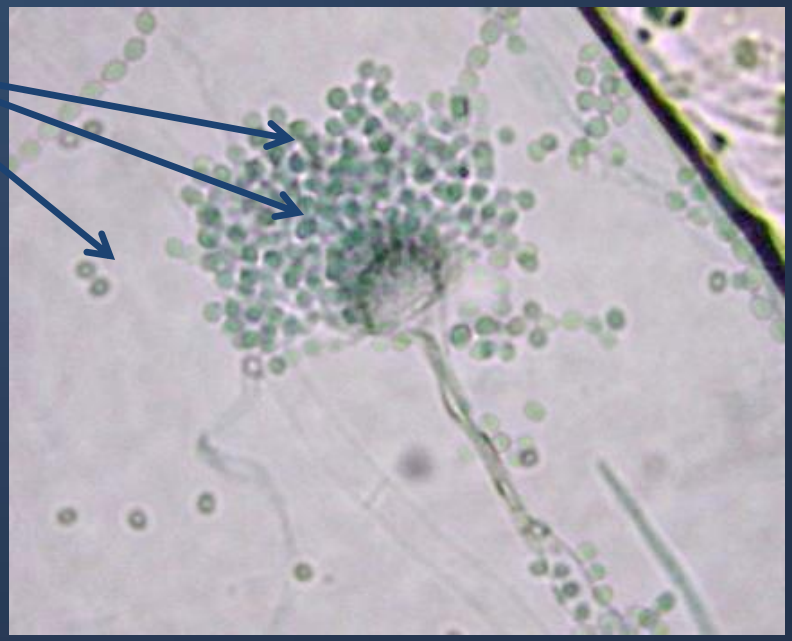


MORPHOLGY

➢Filamentous fungi

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

Conidia



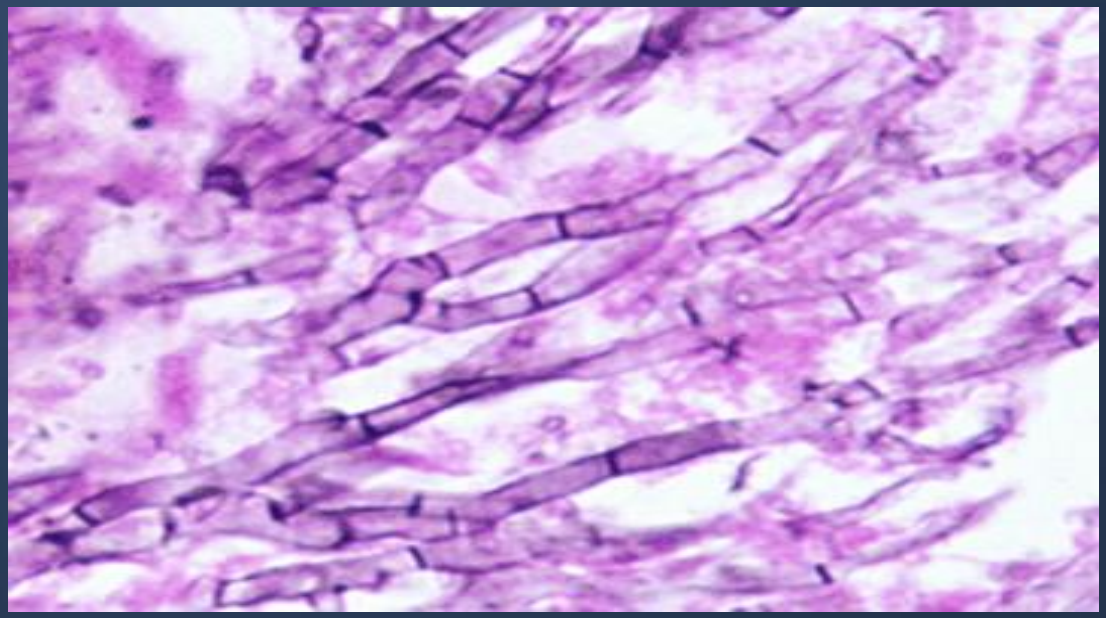
Fungal Hypha

- 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

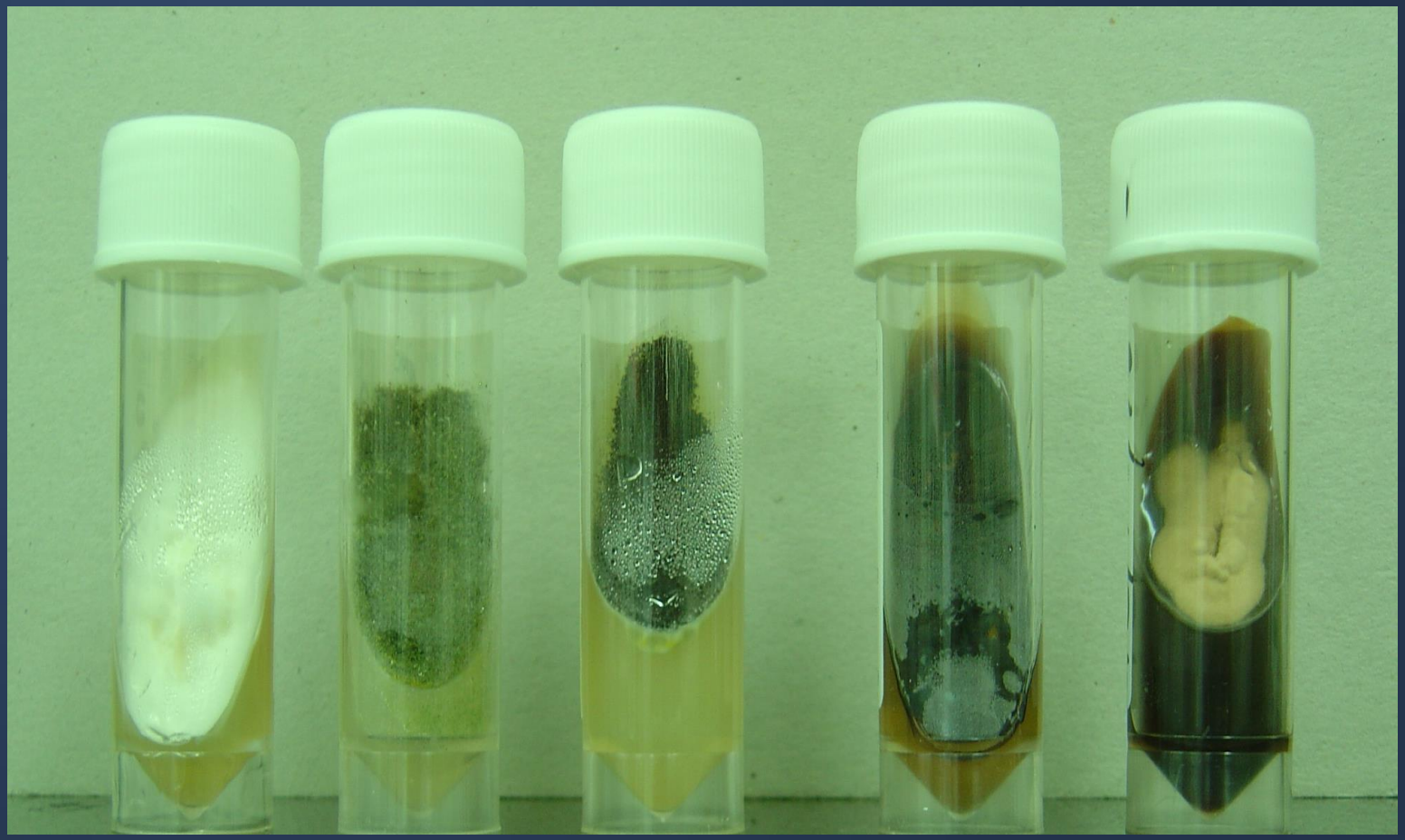
Dematiaceous Mold

Are pigmented.

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

MORPHOLGY

- Filamentous fungi

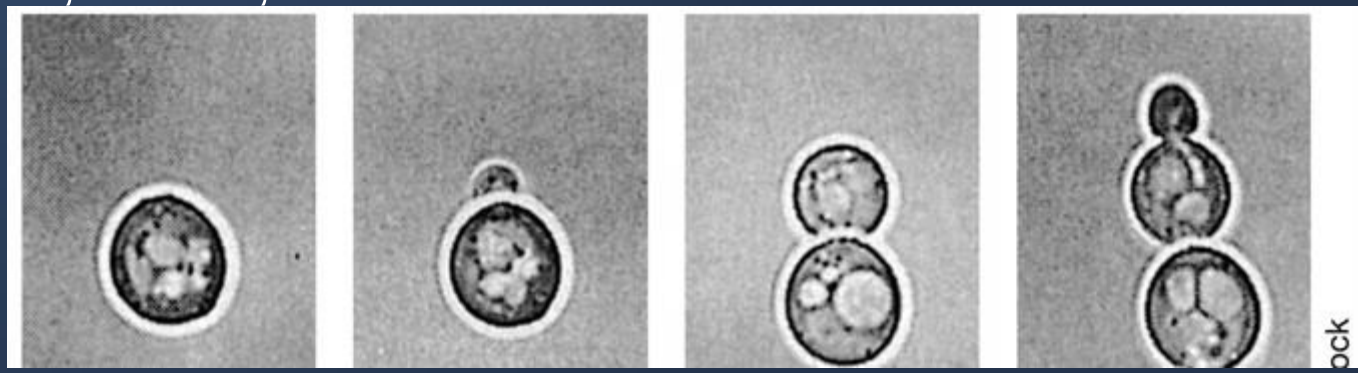


Reproduction in Fungi

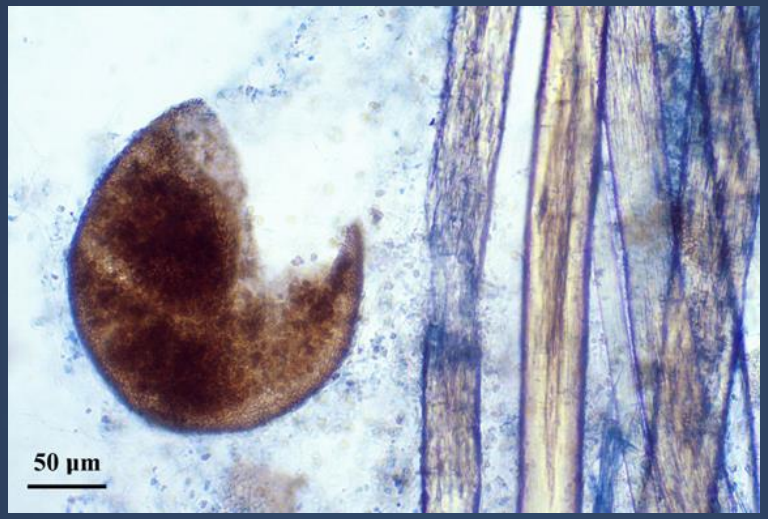
I) **Asexual**: Only mitotic cell division

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

II) Sexual: Fusion, mitosis, meiosis



Reproduction in Fungi

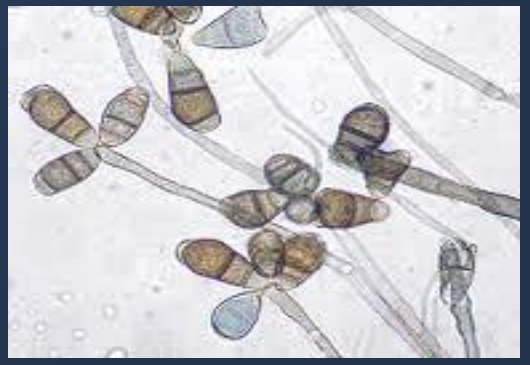


Spores?

-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)