

# 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 of fungi:

- 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 and complex carbohydrates (**Mannan, glucan**)
- 5) Cell membrane : (**sterol, ergosterol**)

# What is a Fungus ?



## Characteristics of fungi

### 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

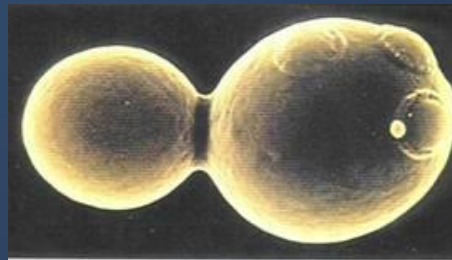


## ➤ Yeast:

### 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:**

asexual spores borne externally on hyphae or on a conidiophore.

**Examples:**

*Aspergillus,*  
*Penicillium,*  
*Rhizopus*

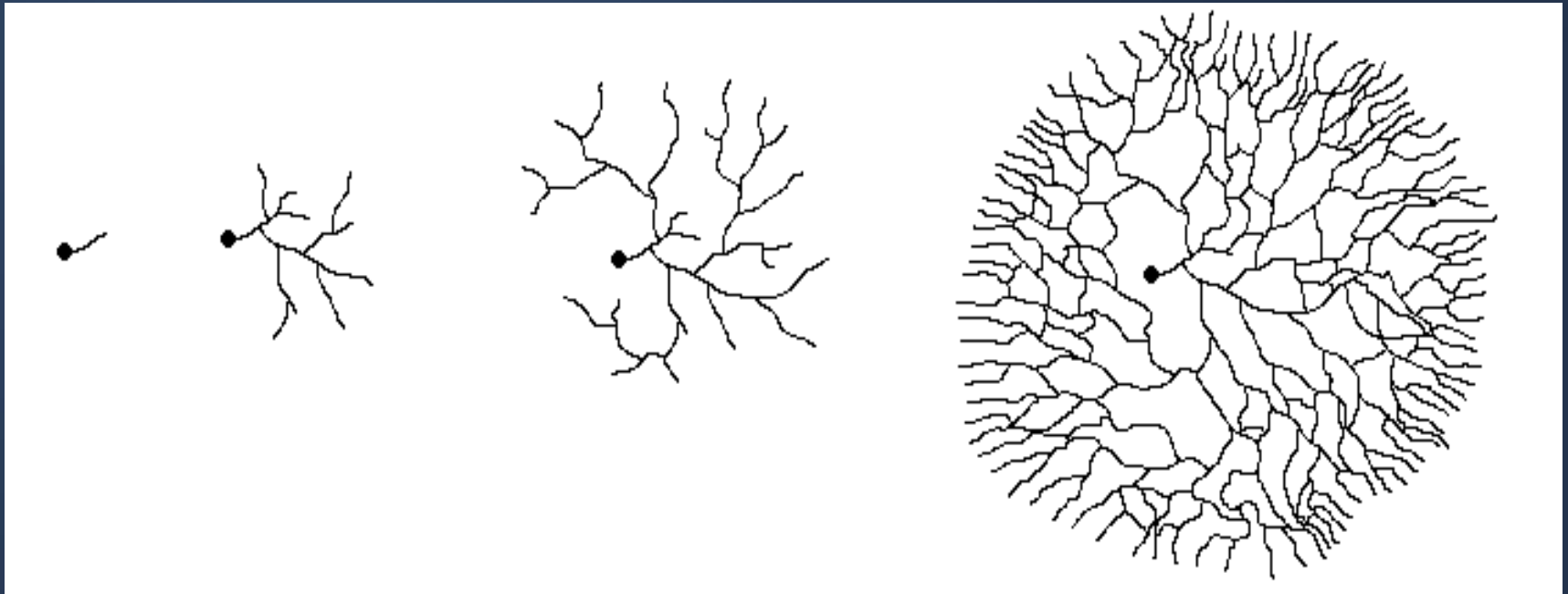


# MORPHOLOGY



## ➤ Filamentous fungi

Hyphal growth from spore



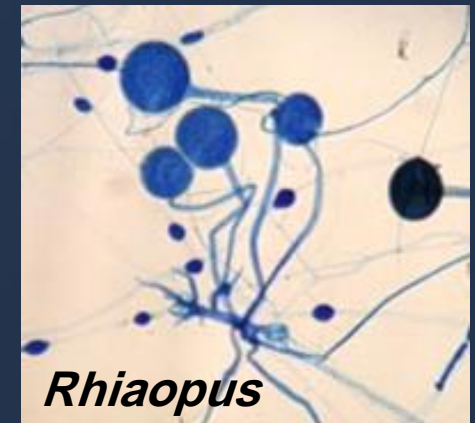
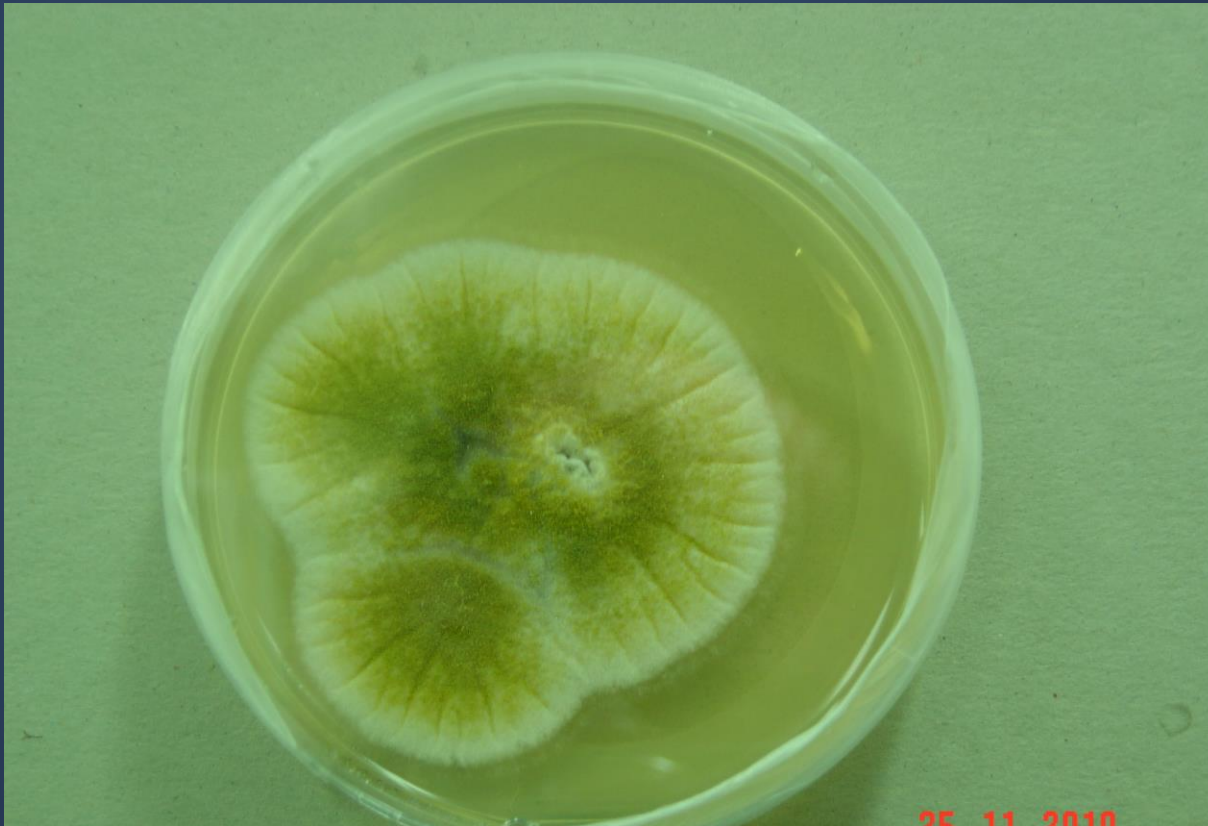
Spore/ conidia

mycelium

# MORPHOLOGY



## ➤ Filamentous fungi



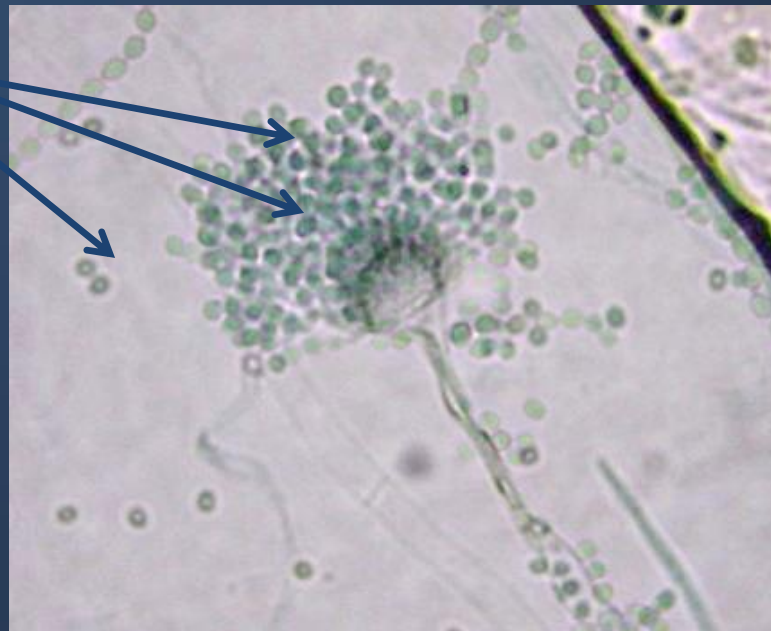
# MORPHOLGY



## ➤ Filamentous fungi

**Conidia / spore** : 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 molds**

hyaline or lightly pigmented conidia or hyphae, colorless

### **Dematiaceous Molds**

Are pigmented.

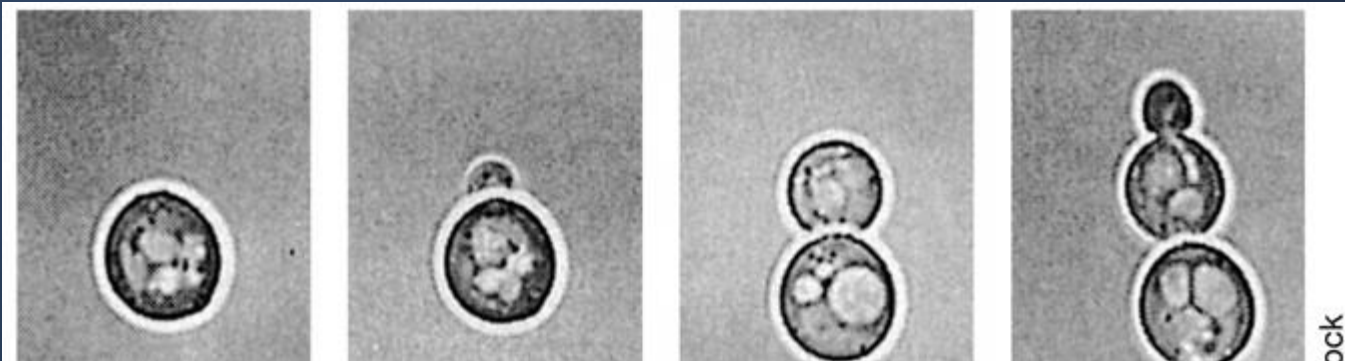
Because of the pigment, the colonies appear dark, brown, or black

# Reproduction in Fungi

## I) Asexual: Only mitotic cell division

- 1) Somatic      Yeasts by budding  
                     Molds by hyphal fragmentation
- 2) Spore formation:

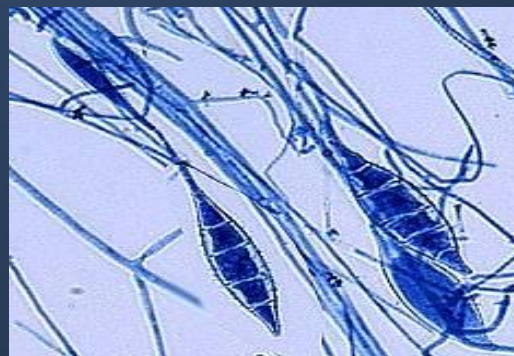
## II) Sexual: Fusion, mitosis, meiosis



# Spores?

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

## SPORES



# Thank You 😊

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