Fungi and their pathogenesis

-Important -Extra -Notes

-In boy's slides -In girl's slides

In this link, you will find any correction or notes unmentioned in the team's work. Please check the link below Frequently.
https://docs.google.com/document/d/1WvdeC1atp7J-ZKWOUSukSLsEcosjZ0AqV4z2VcH2TA0/edit?usp=sharing

Reviewed by Razan AlRabah & Khalid Alkhani

MICROBIOLOGY TEAM 438

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.

There are five kingdoms.

KINGDOM	CHARACTERISTIC	EXAMPLE
Monera	Prokaryocyte	Bacteria Actinomycetes
Protista	Eukaryocyte	Protozoa
Fungi	Eukaryocyte *	Fungi
Plantae	Eukaryocyte	Plants, Moss
Animalia	Eukaryocyte *	Arthropods Mammals Man

What is a Fungus ?

Mannan , glucan and ergosterol are targets of antifungals

Characteristics (distinguishing features)

1) All Eukaryotic organisms (a true nucleus)

2)Do not have chlorophyll (Achlorophyllous)

3)Heterotrophic (Saprobic, symbiotic, parasitic)

4)Cell membrane : (sterol, ergosterol)

5)The cell is surrounded by rigid cell wall made of chitin & complex carbohydrates (Mannan, glucan) -> We use them as marker for infection 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)

MORPHOLOGY

Yeasts : are unicellular organisms.

Filamentous fungi (Hyphae, mycelium)
Hyphae are multicellular filamentous structures, constituted by tubular cells with cell walls.

Dimorphic قبل الي عكس هنا الحرارة درجة مهم.

• Yeast : Parasitic form, Tissue form, Cultured at 37° C

• Filamentous : Saprophytic form, Cultured at 25 C (at room temp).
Dimorphic: Have two forms depending on change in the environmental factors, Mold form ⇄ Yeast form

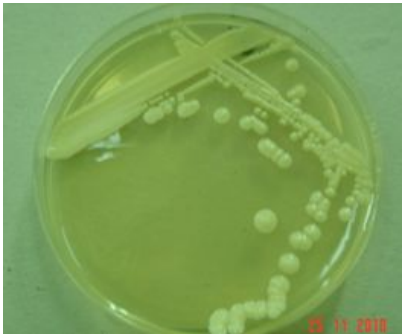
Yeast: (Morphology)

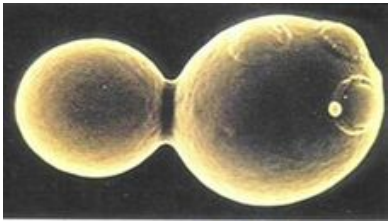
Candida albicans is #1 infectious (pathogen) Fungi.

Have same appearance
How do we differentiate between them?

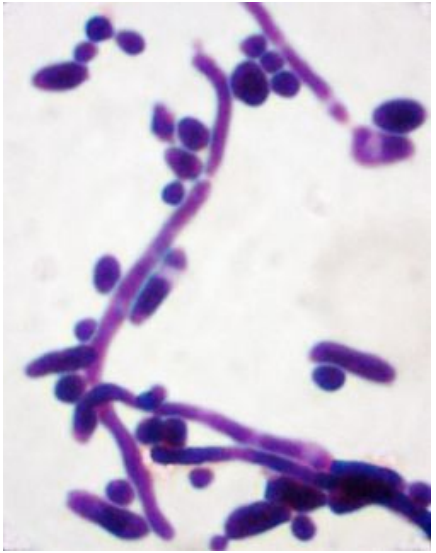
Examples : Candida albicans, Saccharomyces cerevisiae

Colony morphology (Culture)





Budding yeast cell
They produce buds.



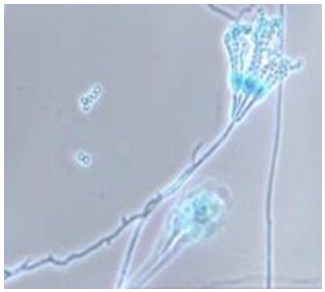
In Clinical samples
Budding yeast cells
+/- Pseudohyphae

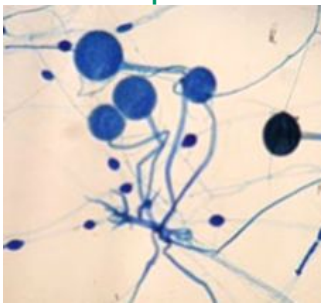
Filamentous fungi (Mould=Mold): (Morphology)

Aspergillus is #2 pathogen Fungi.
*remember, Candida albicans is a yeast, and Aspergillus is a mold.

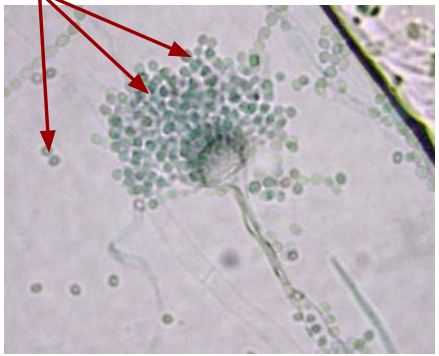
- ★ **A hypha (plural hyphae)**: is a long, branching filamentous cell. hyphae are the main mode of vegetative growth.
- ★ **Mycelium**: The intertwined mass of hyphae that forms the fungal colony.
- ★ **Conidia/ Spore (singular = conidium)**: asexual spores borne externally on hyphae or on a conidiophore.
- ★ **Examples:**

Aspergillus, Penicillium, Rhizopus.

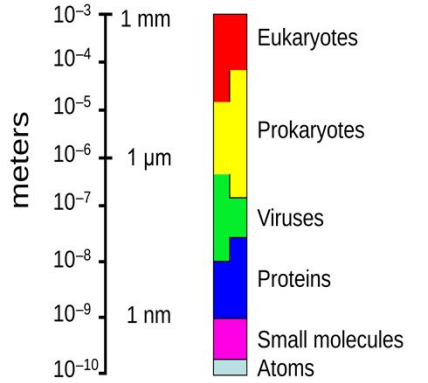


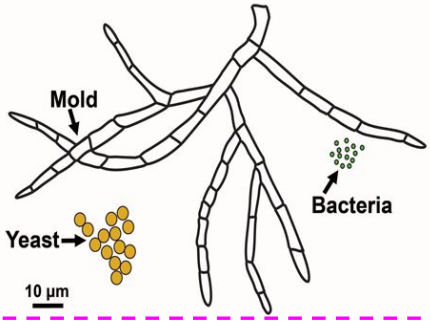


Conidia

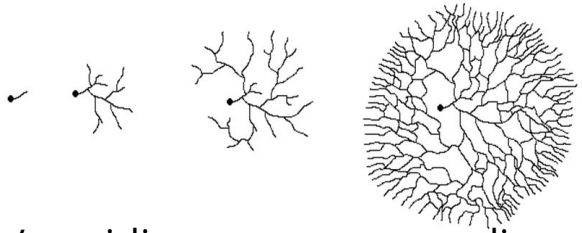


Filamentous fungi: (Morphology)



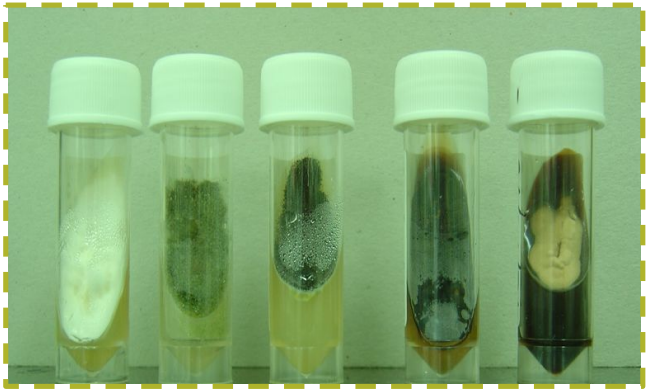


Hyphal growth from spore



Spore/ conidia

mycelium

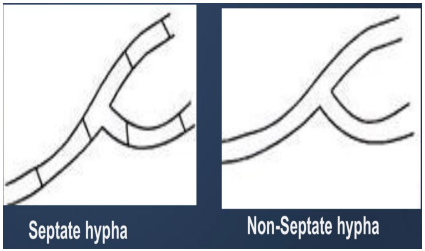


colonial morphology

Filamentous fungi (septa and mold)

Fungal hypha

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).

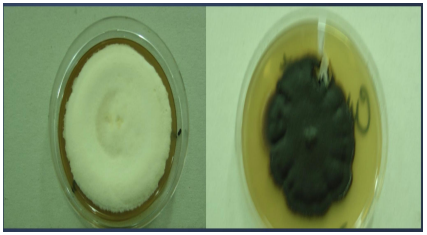


Moniliaceous mold

Hyaline or lightly pigmented conidia or hyphae, colorless.

Dematiaceous mold

Are pigmented, Because of the pigment, the colonies appear dark, brown or black.

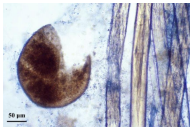


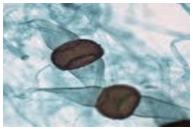
Reproduction in fungi

Sexual → Fusion,mitosis, meiosis.

Asexual
Only mitotic cell division.

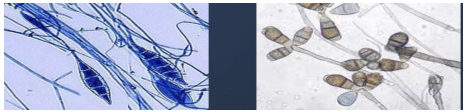
- Somatic:
  -Yeasts by budding
  -Molds by hyphal fragmentation
- Spore formation:
  a)sporangiospores in sporangia
  b)chlamydospores in or on hyphae
  c)conidia(conidium)on hypha or on conidiophores

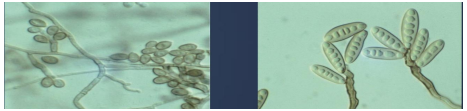




Spores

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





Pathogenicity of fungi

The Fungus cleans the environment.

- Fungi are all around us,
- Widely distributed in nature (air, water, soil, decaying organic debris).

However, fungi can cause diseases to humans ex:

- 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

Questions:

MCQ

Q1)how do fungi produce?
A-sexually B-asexually C-both d-neither

Q2)all fungi are?
A-autrophs B-saprophytes C-parasites D-heterotrophs

Q3)These are the small airborne particles by which fungi reproduce?
A-spores B-mold C-thermotolerance D-mycelium

Q4)A hypha: is a …….. branching filamentous cell.
A-Long B-medium C-short

Q5) which of the following is an example of yeats?
A-Aspergillus B-Candida albicans C-Penicillium D-Rhizopus

True or false

Q6) (Mycology) is A disease caused by a fungus.

Q7) (candida) is asexual spores borne externally on hyphae or on a conidiophore.

Q8) If there are no cross-walls, the hyphae are considered to be (septate).

Q9)Conidia: sexual spores borne externally on hyphae or on a conidiophore.

1-C 2-D 3-A
4-A 5-B 6-F
7-T 8-F 9-F

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