

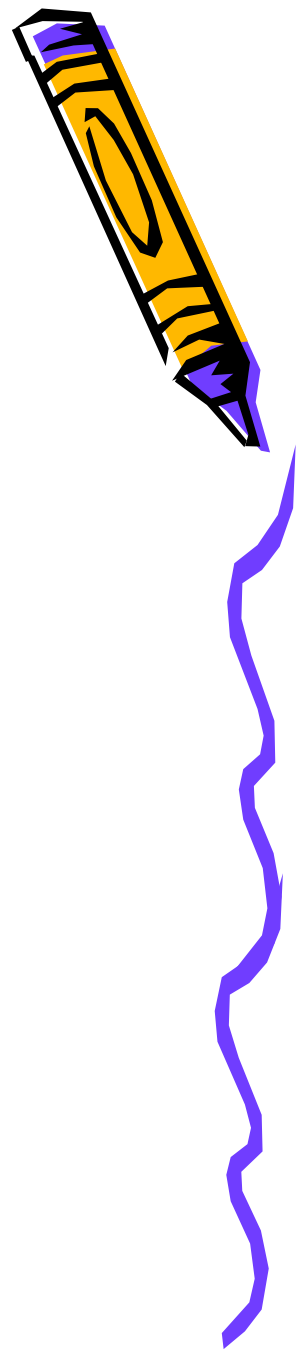
INTRODUCTION TO CLINICAL MYCOLOGY

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- Fungi (yeast & molds) are **eukaryotic** organisms whereas bacteria are **prokaryotic**, they differ regarding;



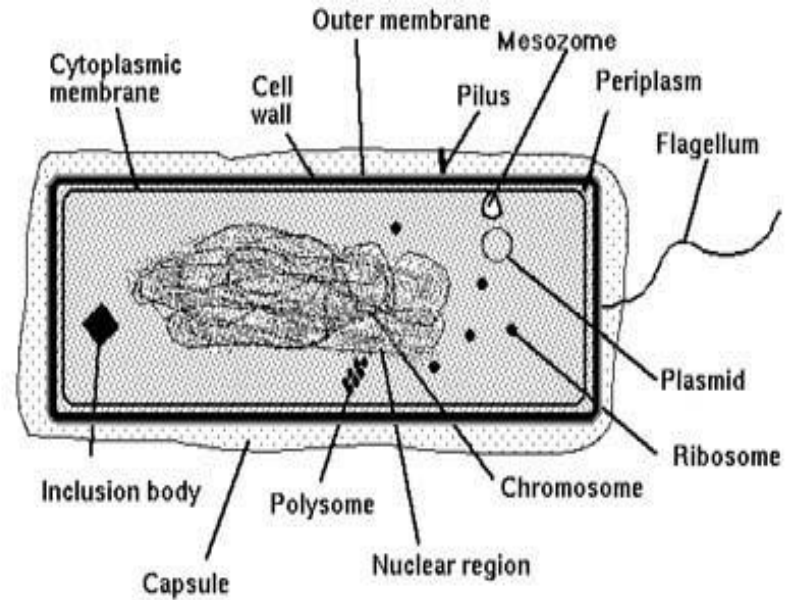
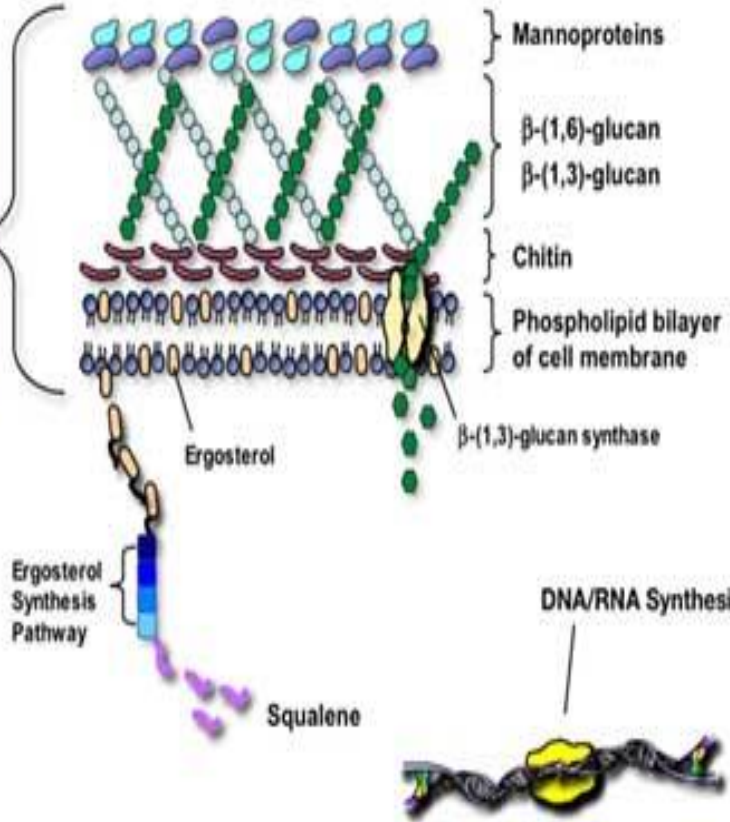


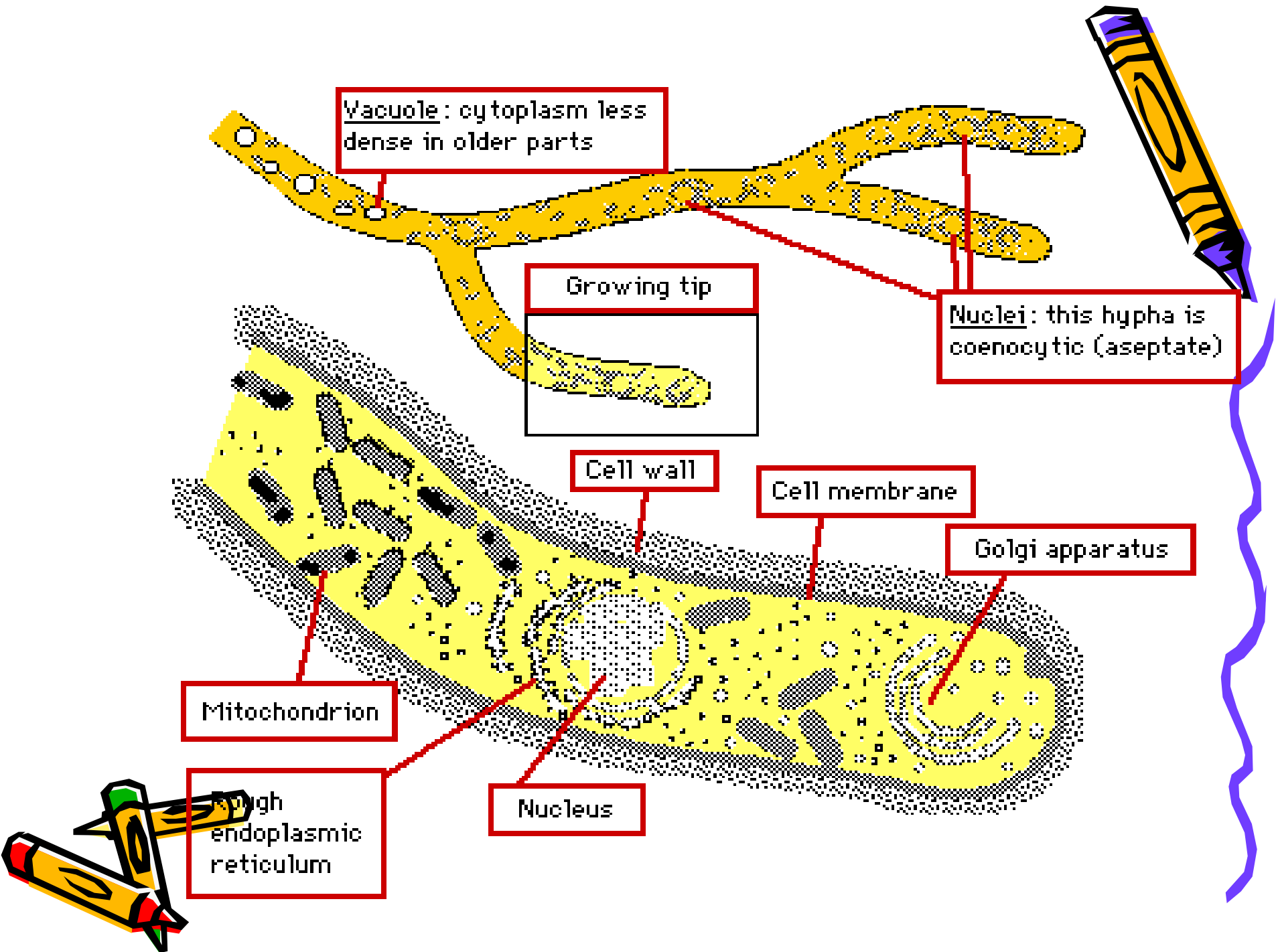
- Size-diameter
4 μm -----1 μm
- Nucleus.
- Cytoplasm
- Cell membrane,
Sterol---absent in bacteria
- Cell wall,
Chitin ----peptidoglycane
- Thermal dimorphism.
- Metabolism.



Fungal cell

Cell membrane and cell wall

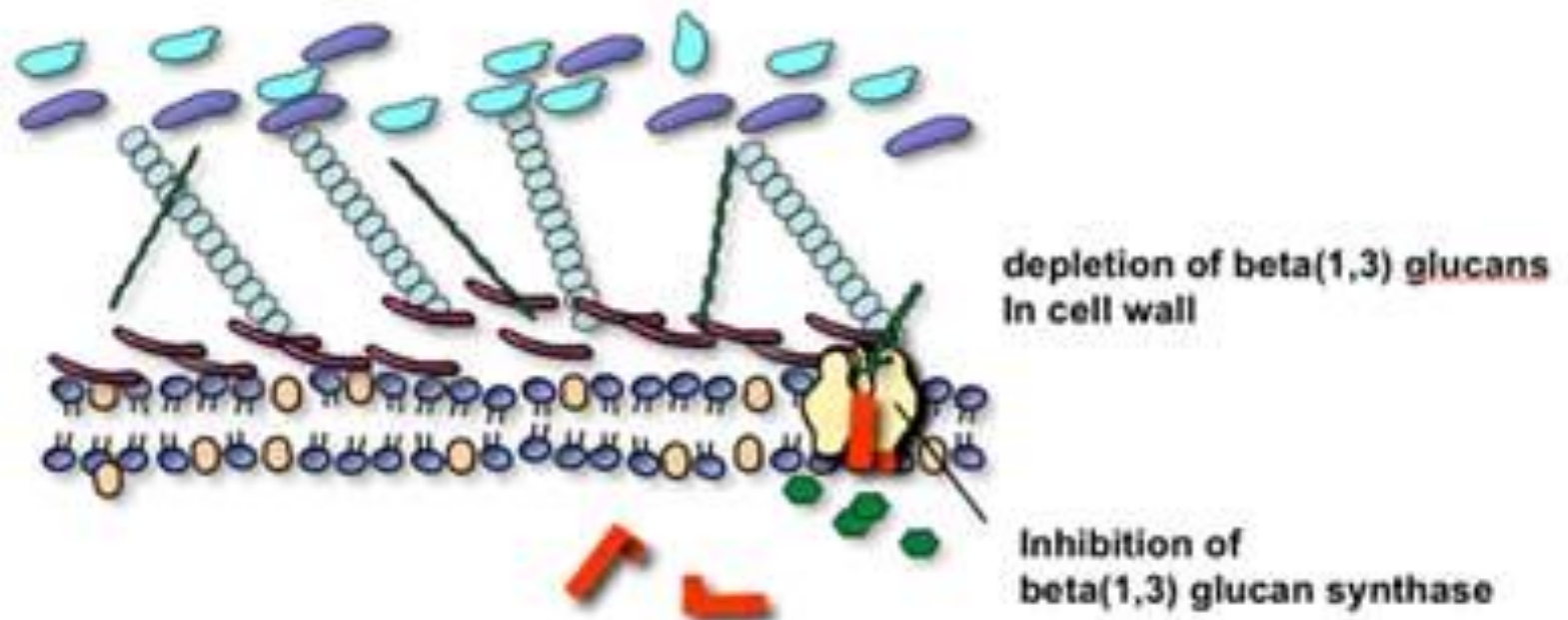
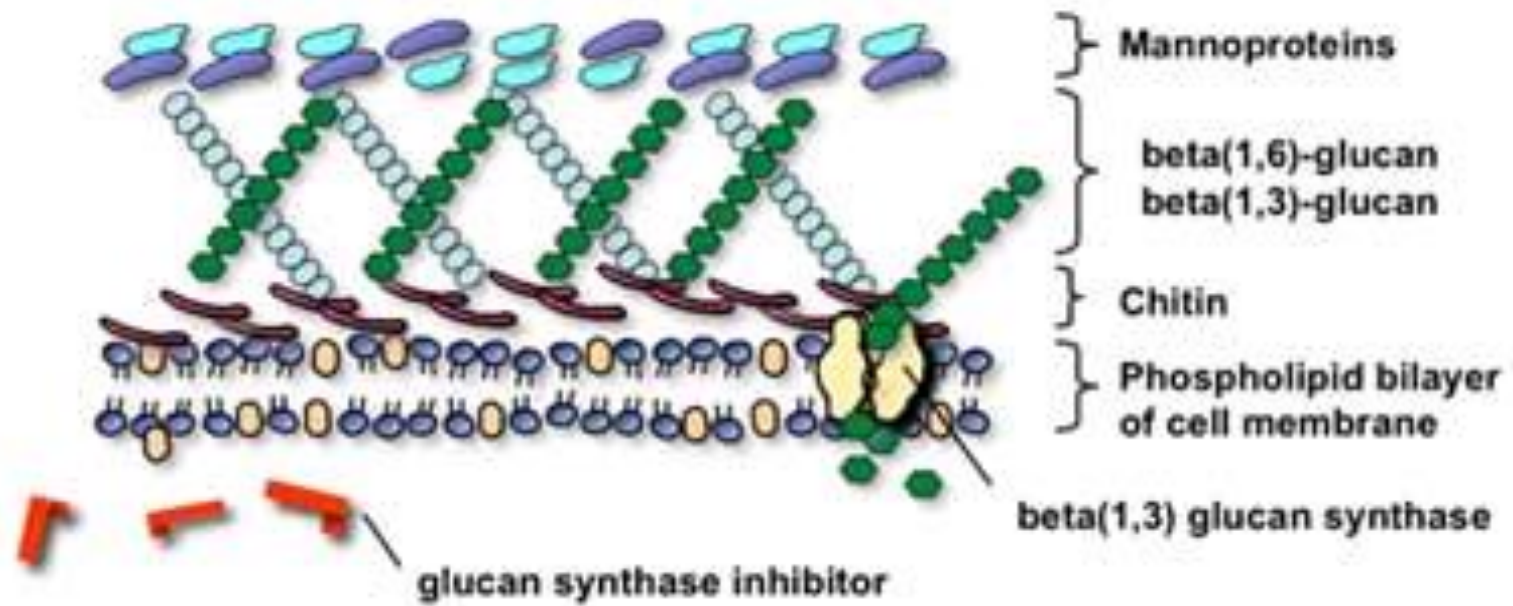




Fungal cell wall

- Consists of chitin not peptidoglycan like bacteria.
- Thus fungi are insensitive to antibiotics as penicillins.







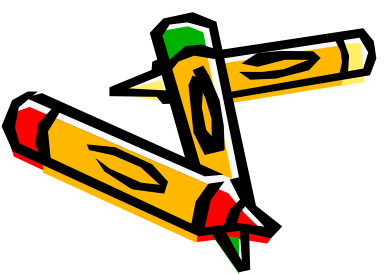
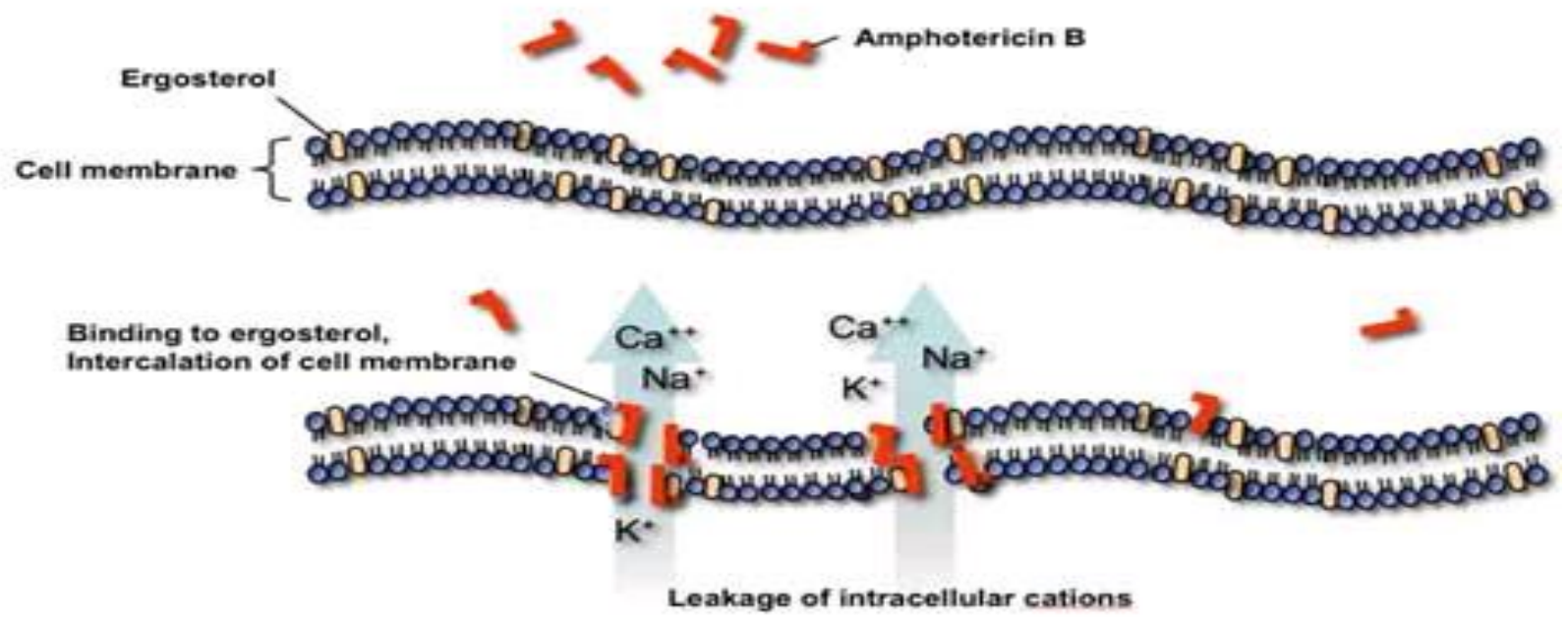
- **Chitin** is a polysaccharide composed of long chain of n-acetyleglucosamine.
- Also the fungal cell wall contain other polysaccharide, **B-glucan**, which is the site of action of some antifungal drugs.



Fungal cell membrane

- Consist of ergosterol rather than cholesterol like human cell membrane.
- Ergosterol is the site of action of antifungal drugs, amphotericin B & azole group





Atmospheric & carbon source requirements

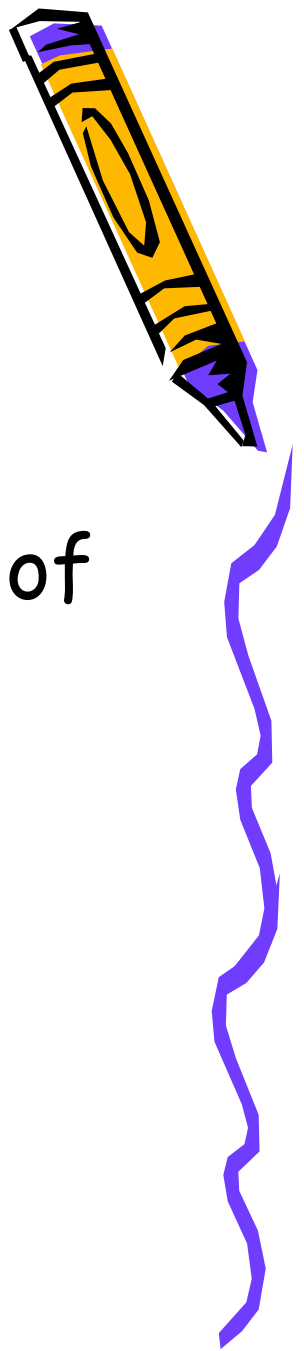


- Most fungi are obligatory aerobes, some are facultative anaerobes, but none are **obligatory anaerobes**.
- All fungi require a performed organic source of carbon -association with decaying matter.



Natural habitat

- The environment.
- Exception *Candida albicans* is part of normal human flora.



Medical mycology is the study of mycoses of man and their etiologic agents. **Mycoses** are the diseases caused by fungi. Of the several thousands of species of fungi that are known, less than **100** are pathogenic to man.



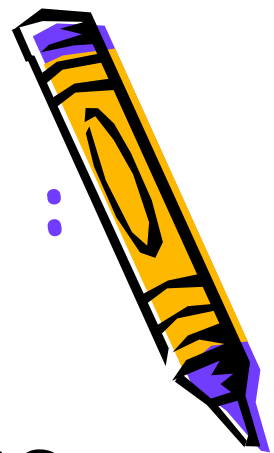


In addition to those species which are generally recognized as pathogenic to man it is firmly established that under unusual circumstances of abnormal susceptibility of patient, or the traumatic implantation of the fungus, other fungi are capable of causing lesions. Those are called (Opportunistic Fungi.)



These circumstances may be :

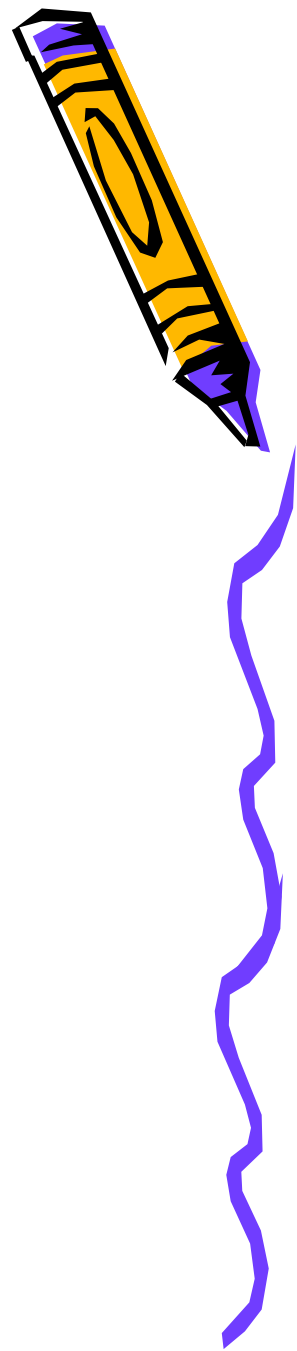
1. A debilitating condition of the host, as Diabetes.
2. A concurrent disease such as leukaemia.
3. Prolonged treatment with corticosteroids.
4. Immunosuppressive drugs or an antibiotic for long duration.



Morphology of Fungi



Morphology of Fungi



1. Filamentous fungi (molds)

2. Yeasts

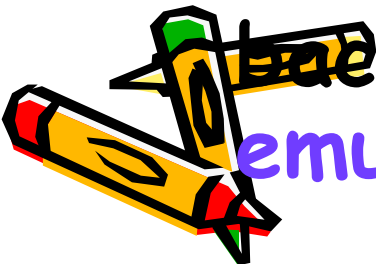
3. Yeast-like fungi

Dimorphic fungi

Filamentous Fungi

1. The basic morphological elements of filamentous fungi are long branching filaments or **hyphae**, which intertwine to produce a mass of filaments or **mycelium**

2. Colonies are strongly **adherent** to the medium and unlike most bacterial colonies **cannot be emulsified** in water.



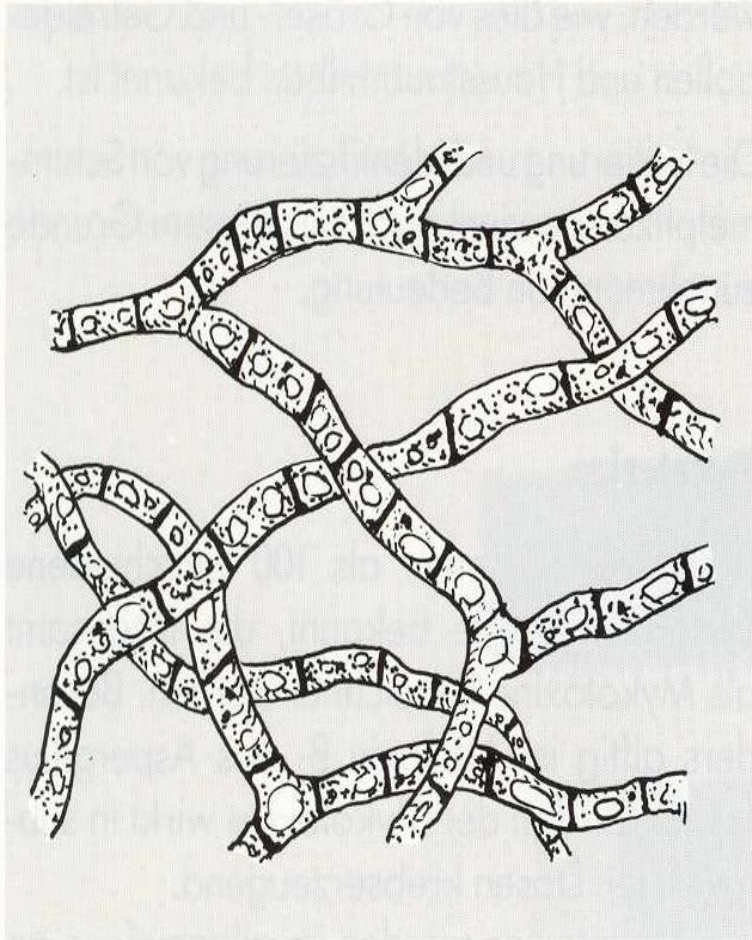


Abb. 47: Septiertes Myzel
mycelium: septate

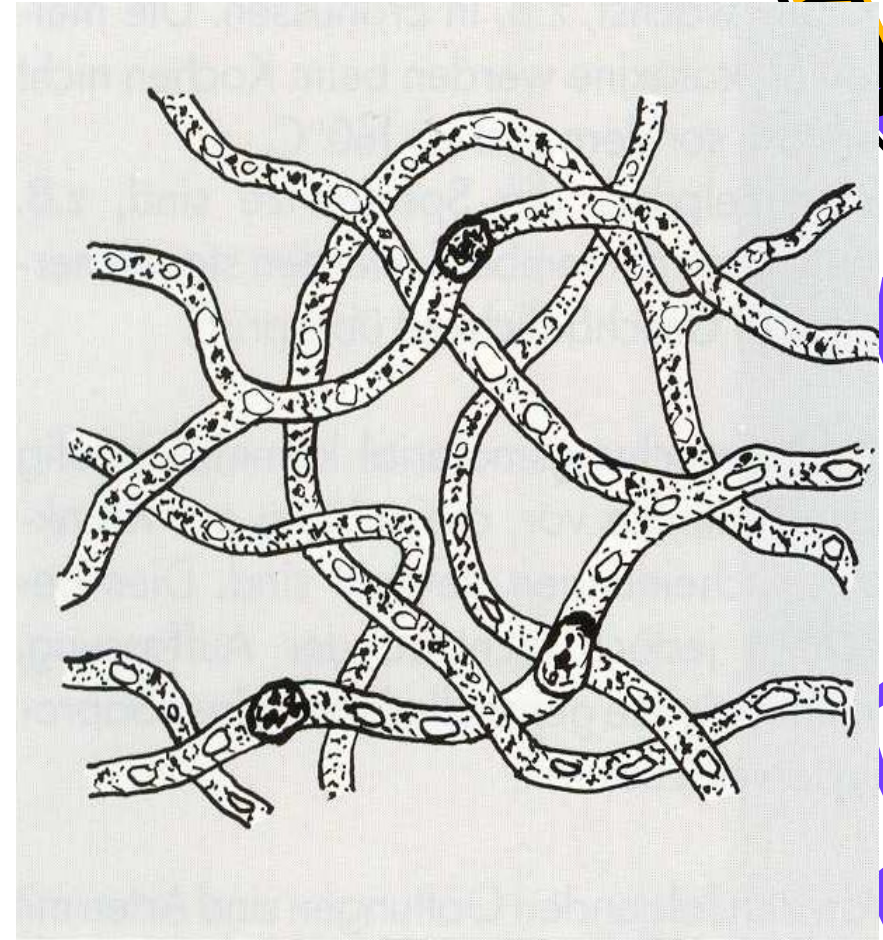
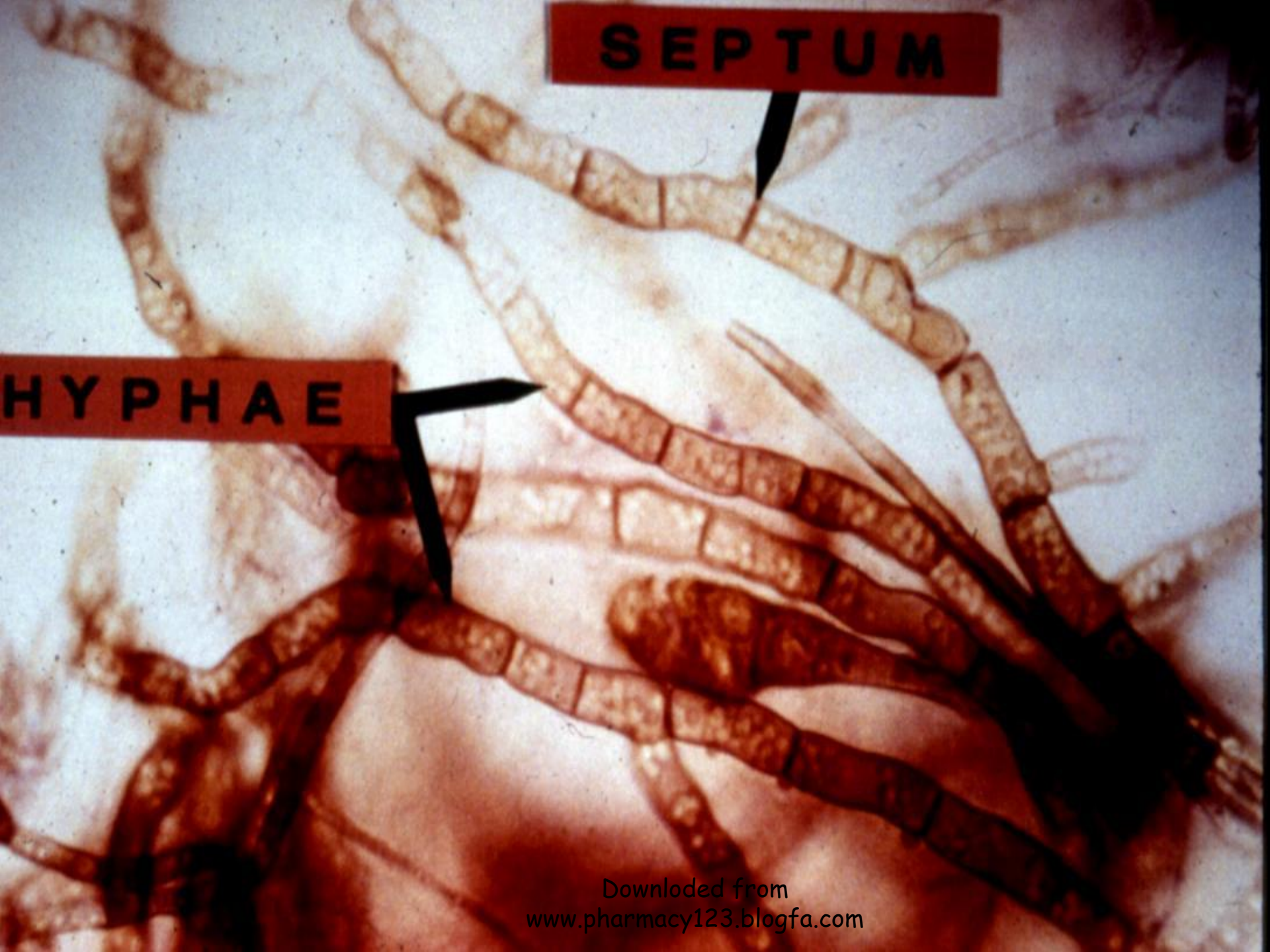


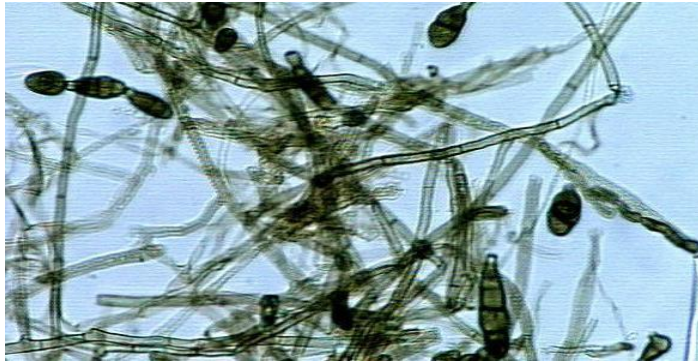
Abb. 48: Unseptiertes Myzel
mycelium: non septate

SEPTUM

HYPHAE



Mycelia & Conidia



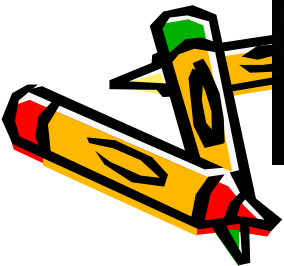
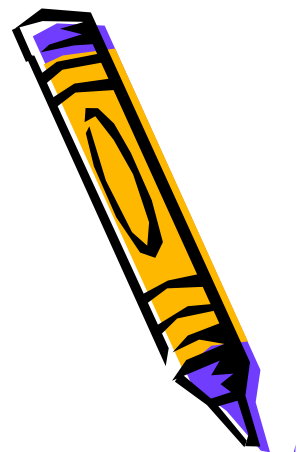
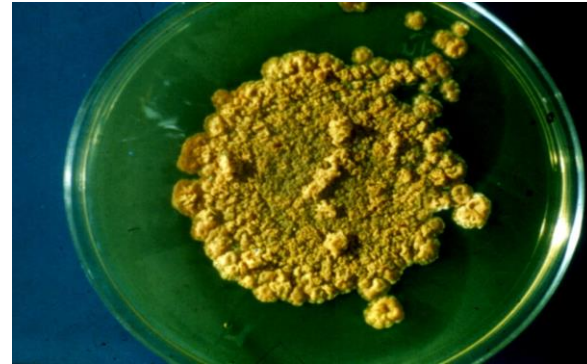
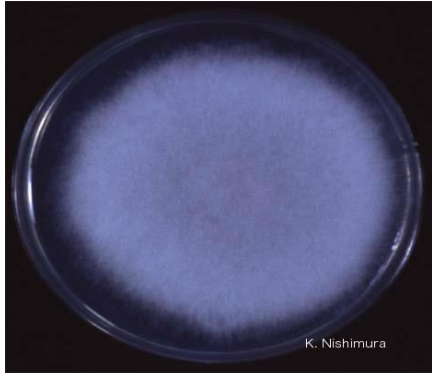


3. The surface of these colonies may be **velvety**, **powdery**, or may show a **cottony** aerial mycelium.

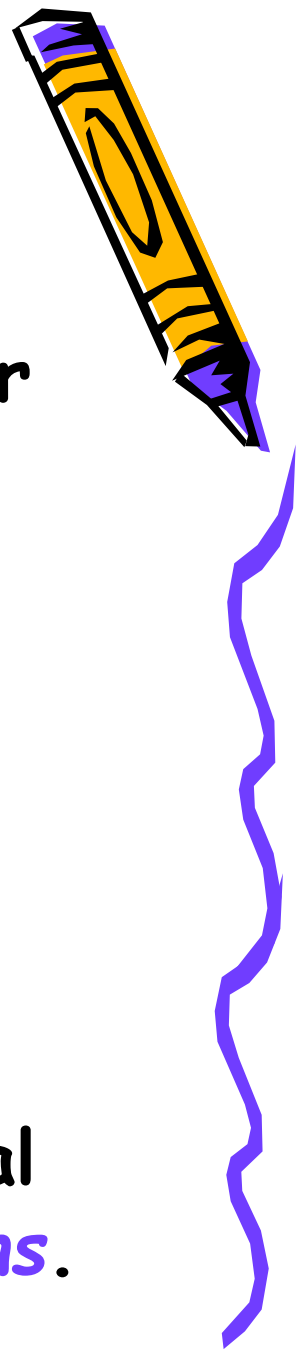
4. **Pigmentation** of the colony itself and of the underlying medium is frequently present.



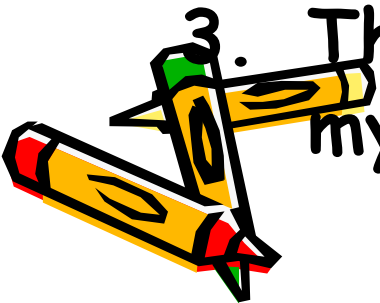
Colony Morphology



Yeasts

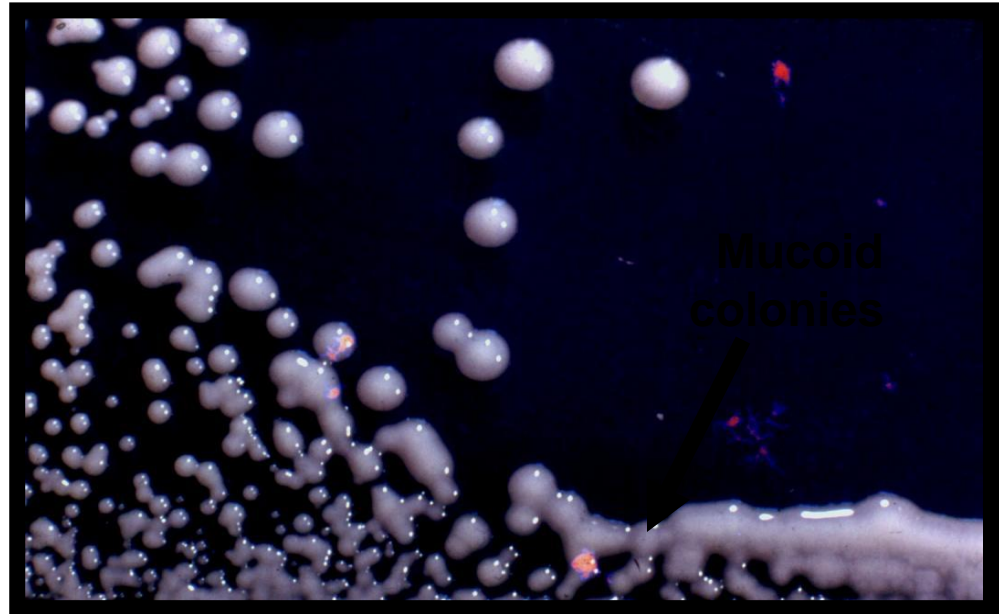


1. These occur in the form of round or oval bodies which reproduce by the formation of buds known as **blastospores**.
2. Yeasts colonies resemble bacterial colonies in appearance and in **consistency**.
3. The only pathogenic yeast in medical mycology is ***Cryptococcus neoformans***.



Yeast colonies

Cryptococcus neoformans




Cryptococcus neoformans



Yeast-Like



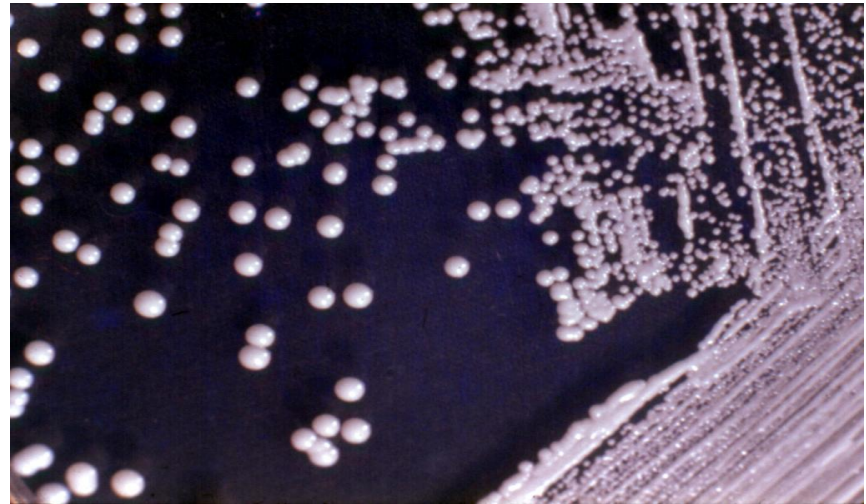
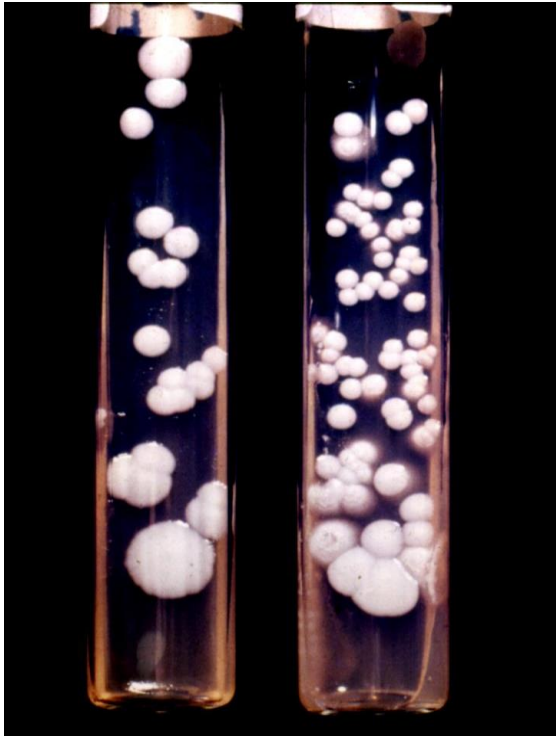
1. These are fungi which occur in the form of budding **yeast-like cells** and as chains of elongated unbranched filamentous cells which present the appearance of broad septate hyphae. these hyphae intertwine to form a **pseudomycelium**.



The yeast like fungi are grouped together in the genus **Candida**.

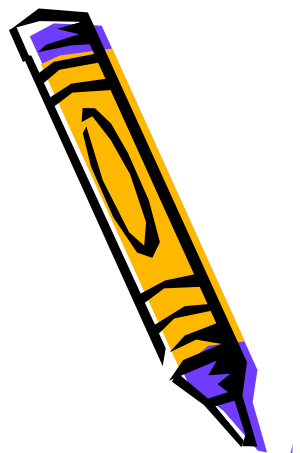


Candida Colonies

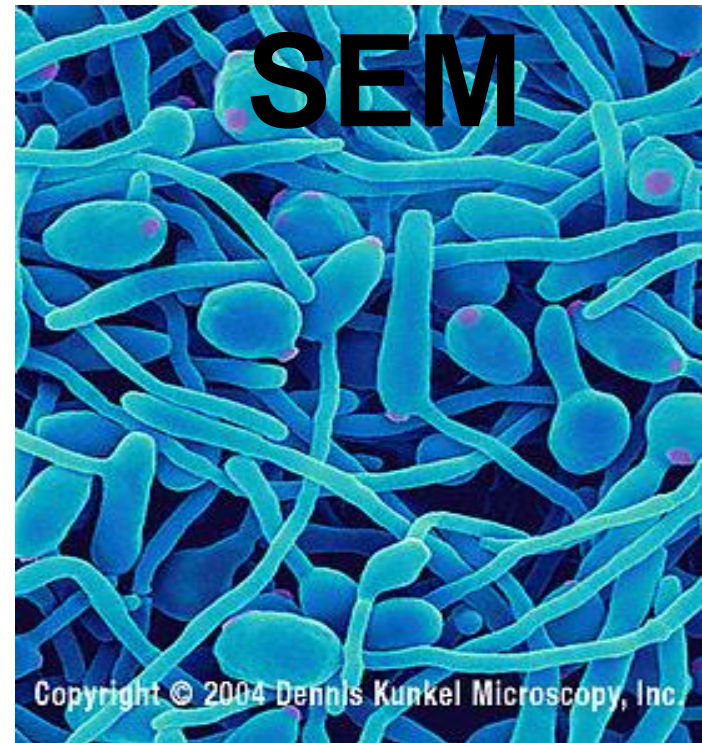
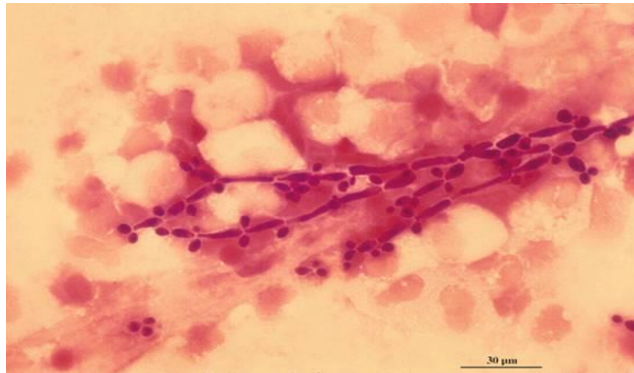


Candida albicans





Candida albicans



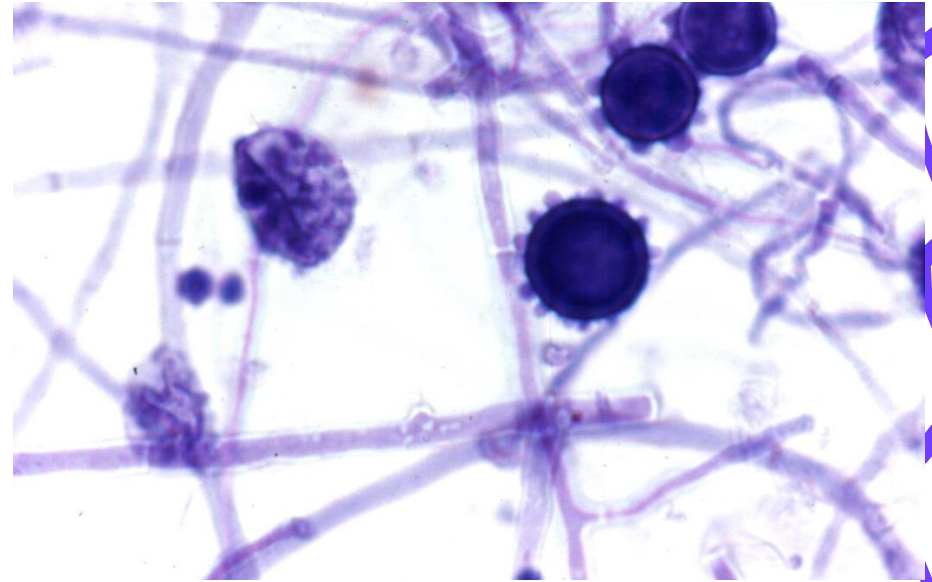
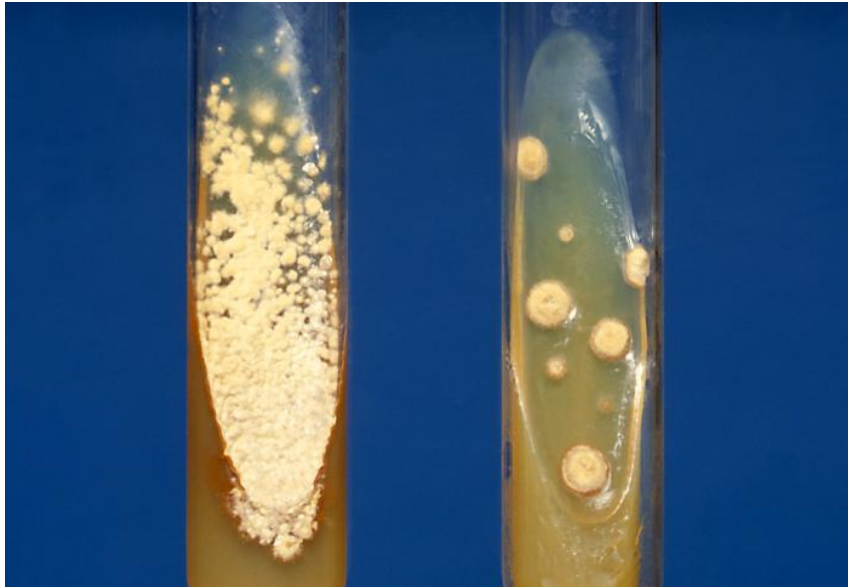
Thermally Dimorphic Fungi

These are fungi which exhibit a filamentous **mycelial** morphology (saprophytic phase) when grown at room temperature **27°C**, but have a typical **yeast** morphology (parasitic phase) inside the body and when grown at **37°C** in the laboratory (e.g. Histoplasmosis).



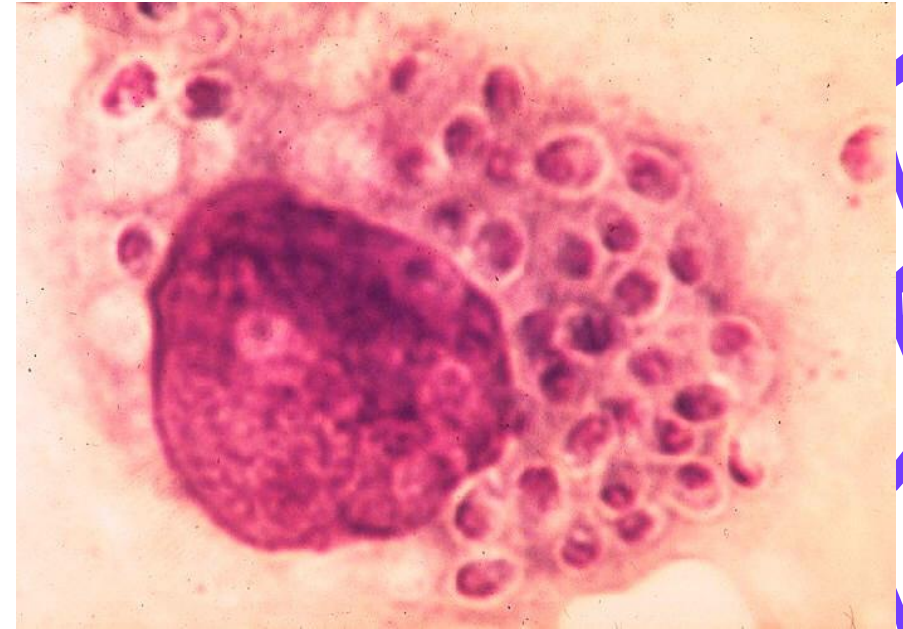
Histoplasma capsulatum

27°C



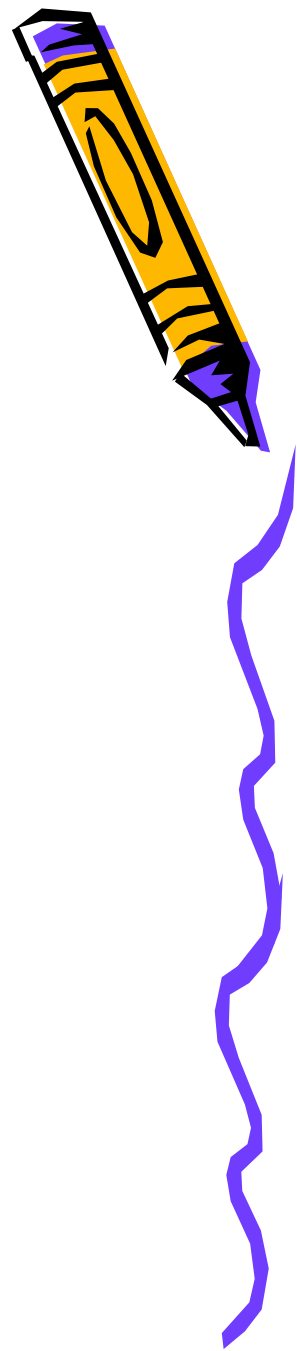
Histoplasma capsulatum

37oc

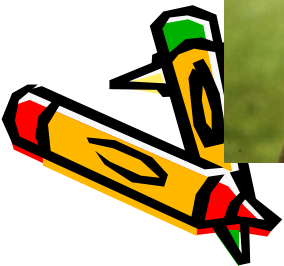


Human fungal infection;

- Superficial
- Subcutaneous
- Systemic



Superficial mycoses



Subcutaneous mycoses

Sporotrichosis



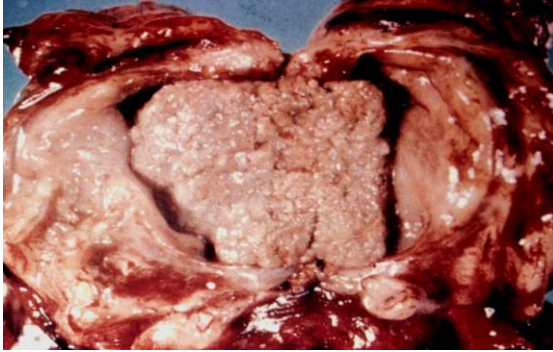
Mycetoma



Chromomycosis



Systemic Mycoses



Systemic Mycoses



Deep mycoses

Brain

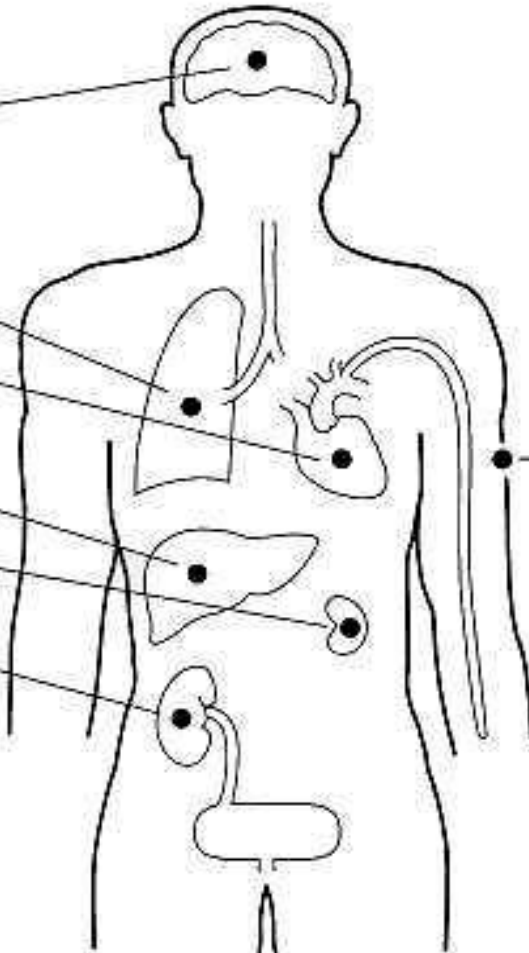
Lungs

Heart

Liver

Spleen

Kidney



Superficial, cutaneous, subcutaneous mycoses

Superficial
(hair, nail, skin)

Cutaneous
(hair, nail, skin)

Subcutaneous



Thank You

