

Fungi

CLS 311

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Outlines

- **Intruduction**
- **General Characteristics of Fungi**
- **beneficial & harmful effect of fungi**
- **Classification of fungi**
- **structure of fungi**
- **Reproduction of fungi**
- **important terms**
- **Mold**
- **Yeast**
- **Fleshy fungi**
- **Imperfect Fungi**
- **Fungal infections (mycoses)**
- **Diagnosis and treatment**

Introduction

- ***Mycology***
- All fungi are **Eukaryotic** organisms living everywhere on earth.
- Fungi are **Heterotrophic** , different from plants which are ***“Autotrophic***

General Characteristics of Fungi

◆ Heterotrophic organisms are 3 kinds:

A) Saprophytic

B) Symbiotic

C) Parasitic

beneficial & harmful effect of fungi

- Beneficial fungi
- Harmful fungi.



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Plant vs. fungi

- They are not plants (see page 75)

	PLANT	FUNGUS
FOOD	Autotrophic	Heterotrophic
PIGMENTS		
CELL WALL		

Classification of Fungi

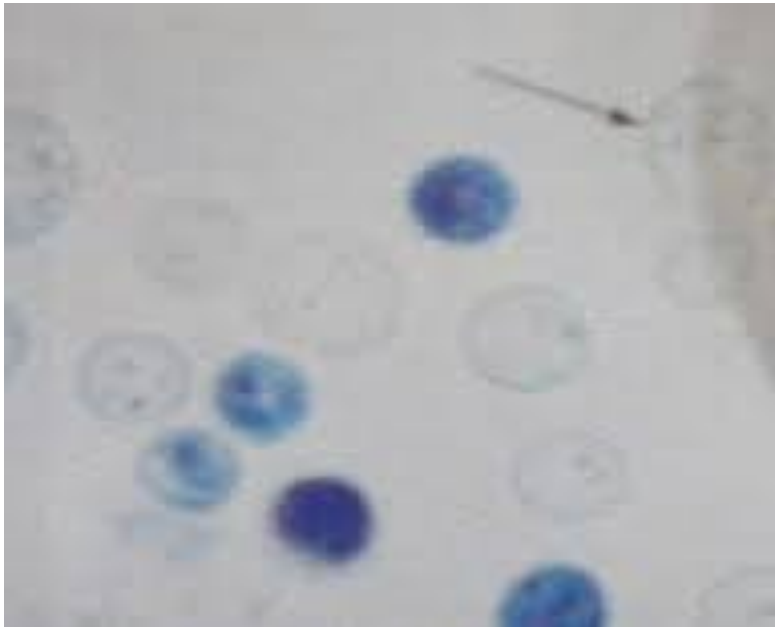
<i>Life's 5 Kingdoms</i>				
Monera	Prokaryotic	one-celled	some move	some make own food, others get food from other organisms
Protist	Eukaryotic	one celled many celled	some move	some make own food, others get food from other organisms
Plant	Eukaryotic	many-celled	don't move	make own food
Fungi	Eukaryotic	one celled many celled	don't move	get food from other organisms
Animal	Eukaryotic	many celled	move	eat plants or other animals
	Cell Type	Structure	Movement	Nutrition

Structure of Fungi

Fungi can be

Unicellular

Multicellular




Reproduction

- Depending on the species :

- budding

- Hyphal extension

- Spore formation >>>> a- sexual spores
b- asexual spores
(conidia)



Some fungi
produce both
sexual and
asexual spores

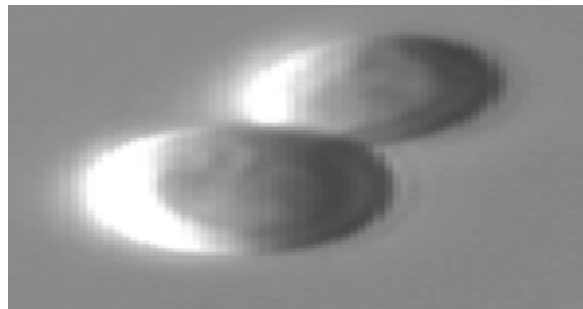
Reproduction of Fungi

Fungi can reproduce by two different ways:

1. Asexual reproduction.
2. Sexual reproduction

I- Asexual Reproduction

1. **Somatic:** **in yeasts** reproduce by **Budding**
in molds reproduce by **Hypha Fragmentation**
2. **Spore Formation:** the end product is spore.

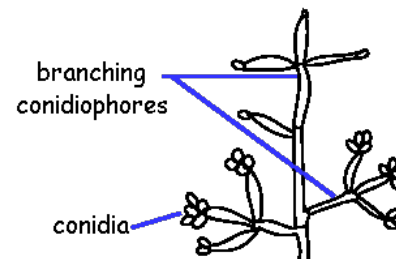
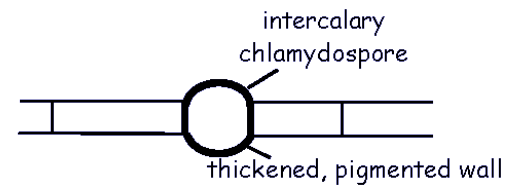
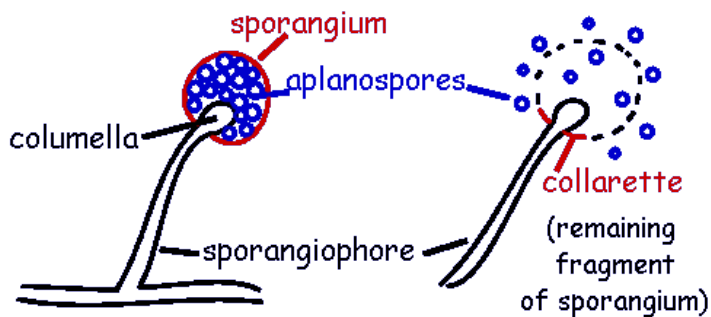


Budding in yeast

I- Asexual Reproduction

Types of Asexual Spore Formation:

- a. Sporangiospores in sporangium.
- b. Chlamydo spores in or on hyphae
thick walled, resistant spore, terminal.
- c. Conidia on hypha or on conidiophores



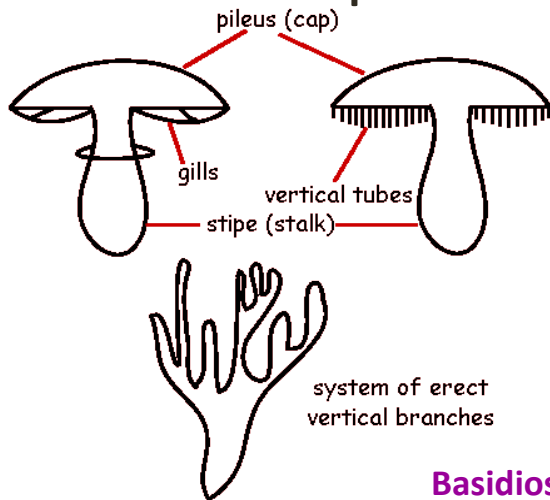
II- Sexual Reproduction

Sexual Reproduction happen by 3 stages:

1. fusion
2. mitosis
3. miosis

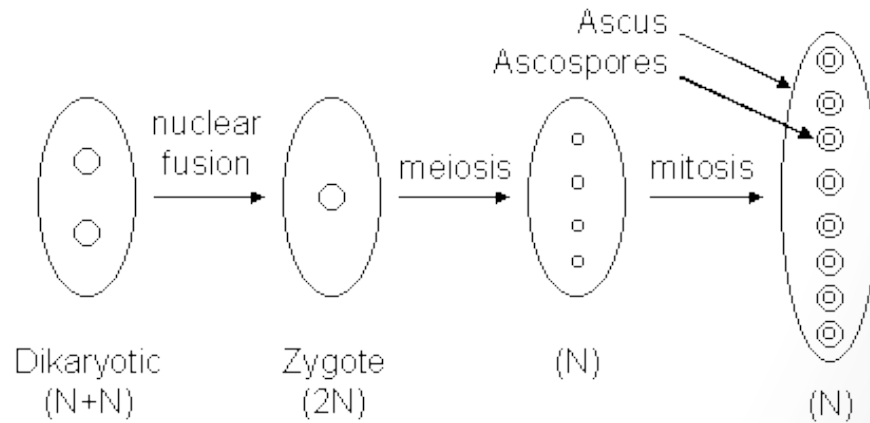
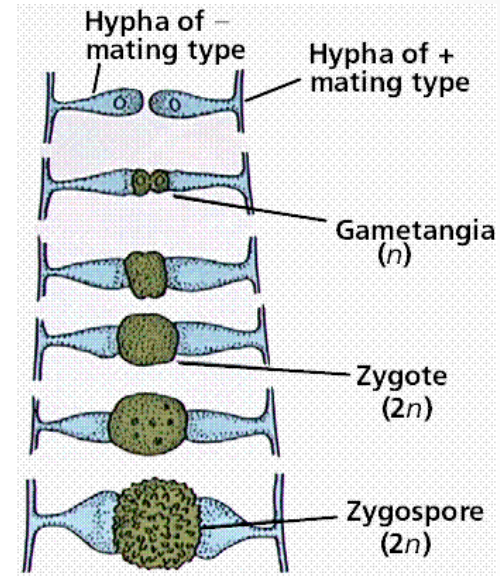
Types of Sexual Spores:

1. Oospore
2. Zygospore
3. Ascospore
4. Basidiospore



Basidiospore

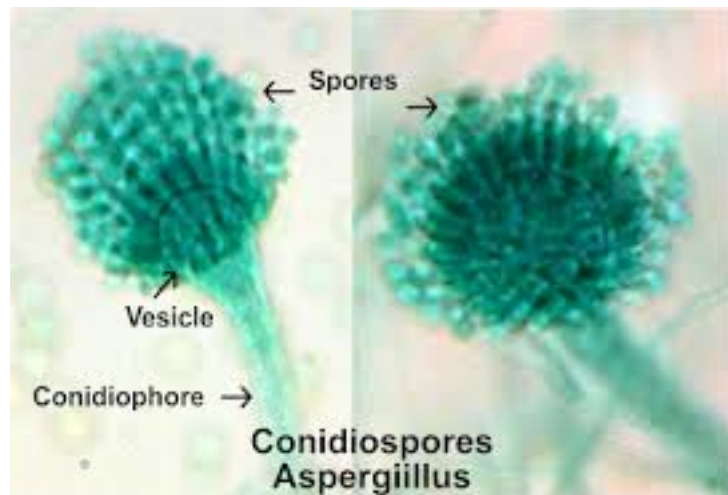
zygospore



Ascospore

Spores

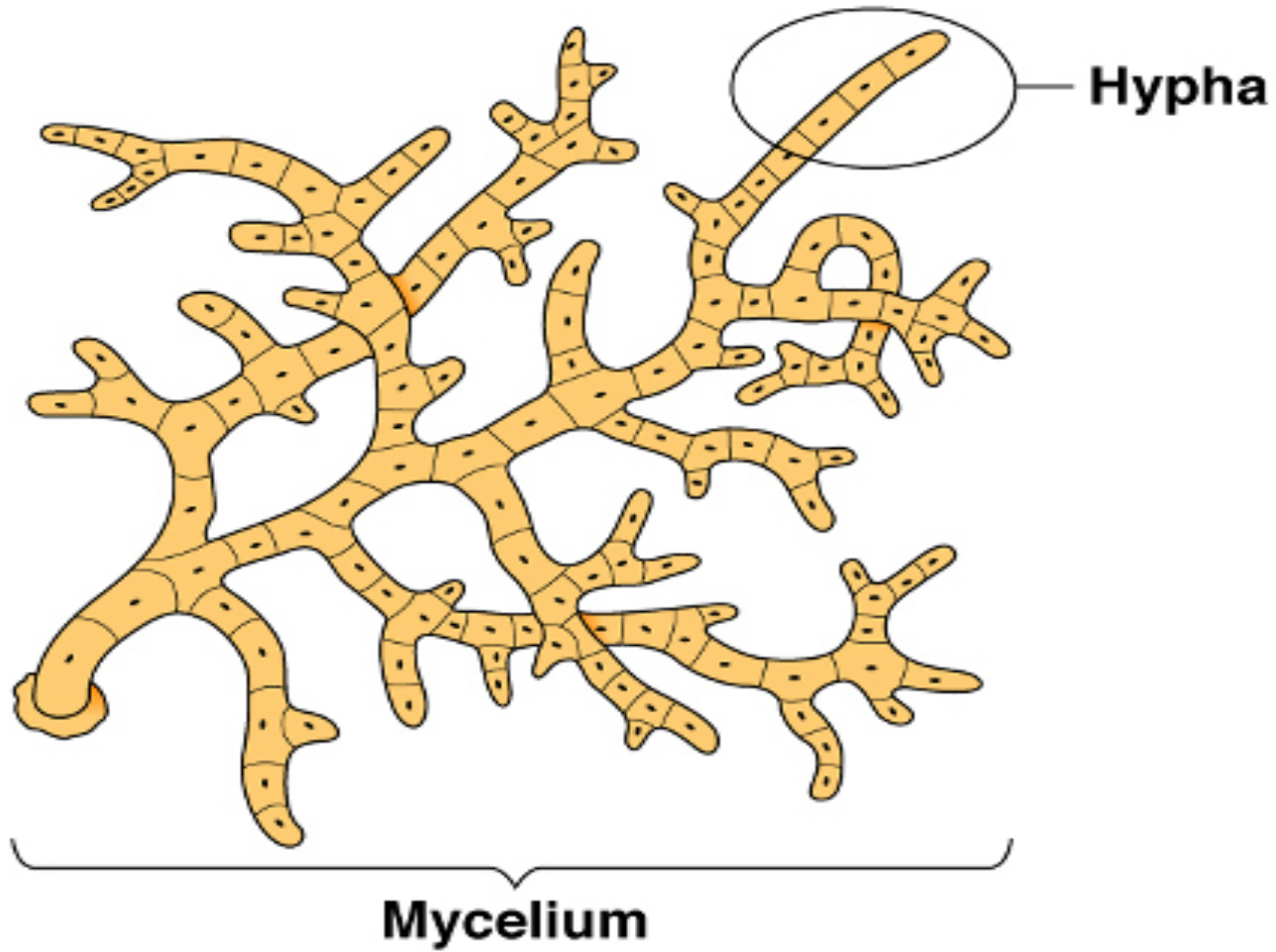
- ◆ Produce both sexual and asexual
- ◆ Resistant
- ◆ Asexual spore called conidia



Mold (Filamentous)

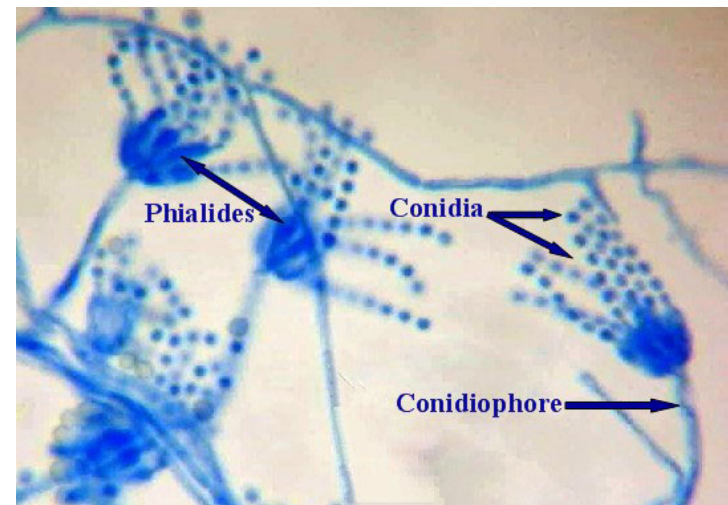
◆ Important terms :

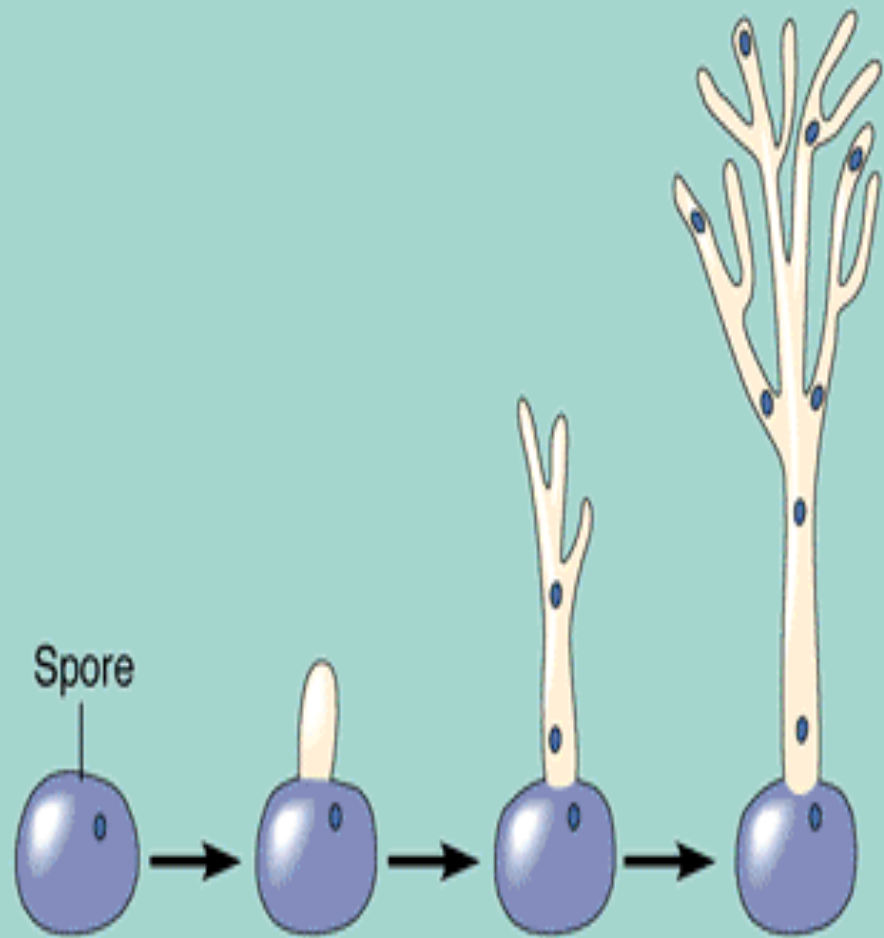
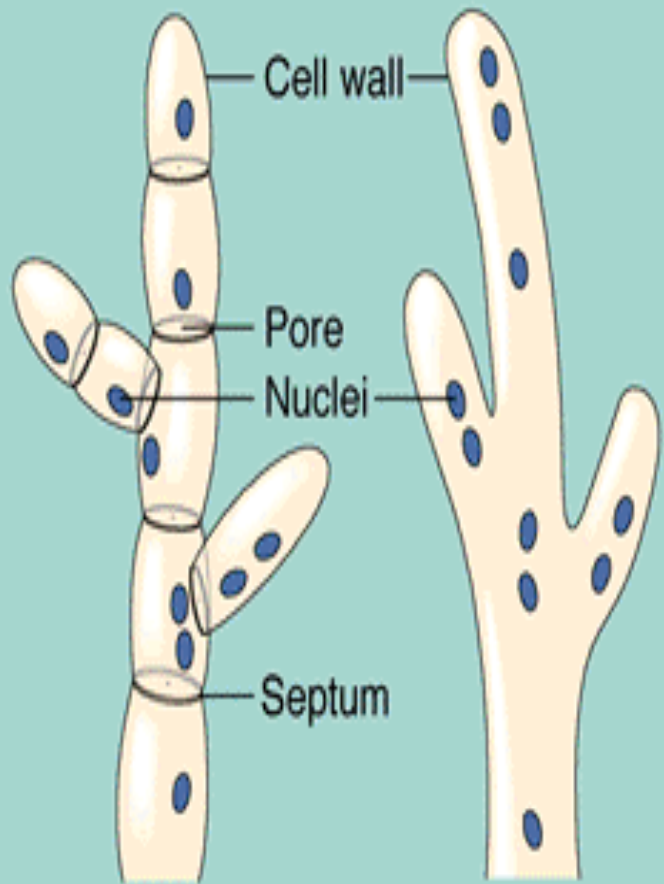
- Hypha
- Hyphae
- Septate hyphae
- Aseptate hyphae
- Mycelium



Molds

- Molds are multicellular fungi which are more complex than yeasts.
- The fungus form microscopic tubes or filaments called **hyphae** that contain cytoplasm & nuclei.
- **Hyphae can be:**
 - Septate hyphae
 - Non-septate hyphae





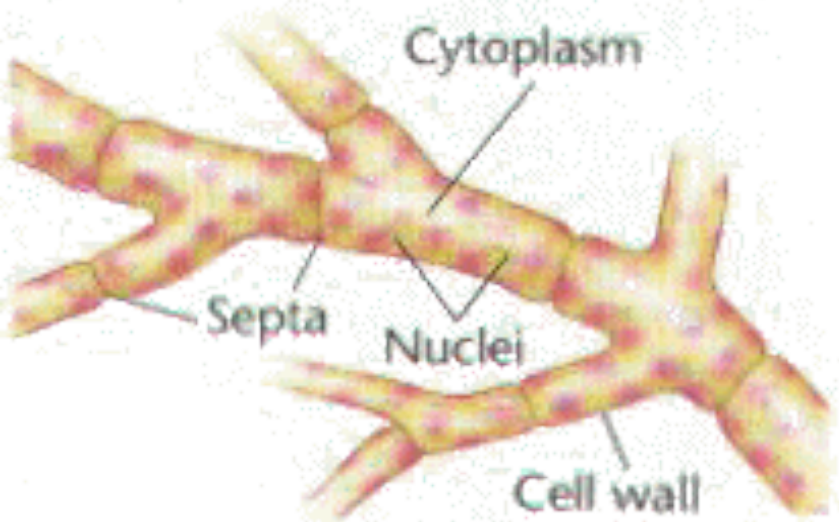
(a) Septate hyphae

(b) Coenocytic hyphae

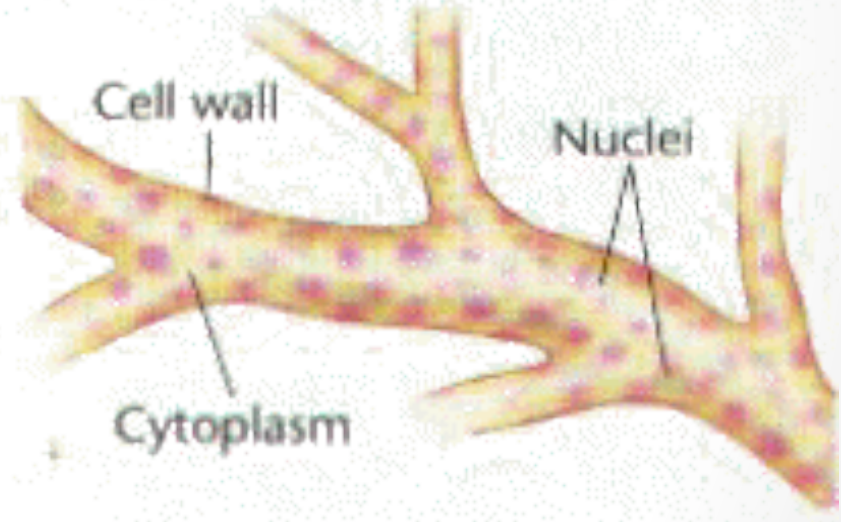
(c) Growth of a hypha from a spore

Hyphae

Hyphae with cross-walls



Hyphae without cross-walls



Molds

Reproduction of Molds

Molds reproduce by **spore formation**, either sexually or asexually.

Uses of Molds

- **Penicillium** used to produce the antibiotic penicillin.
- Some molds are used to produce enzymes and organic acids.
- For the production of different cheeses **e.g.** Blue cheese,



yeast

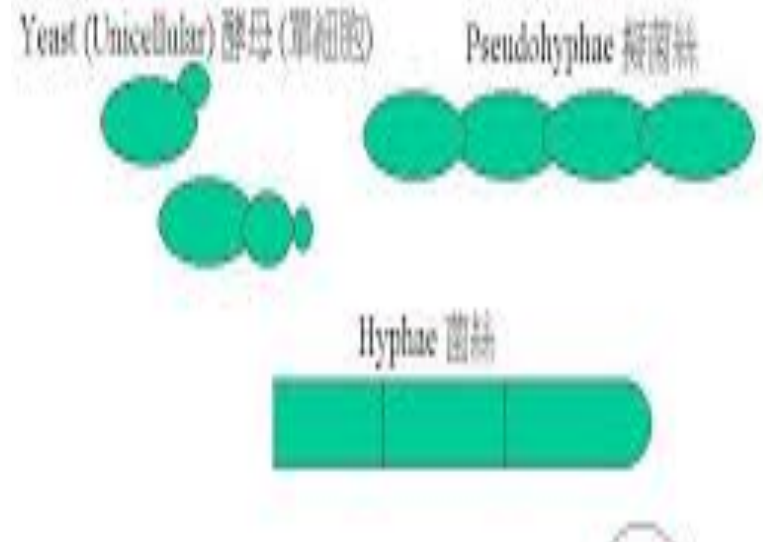
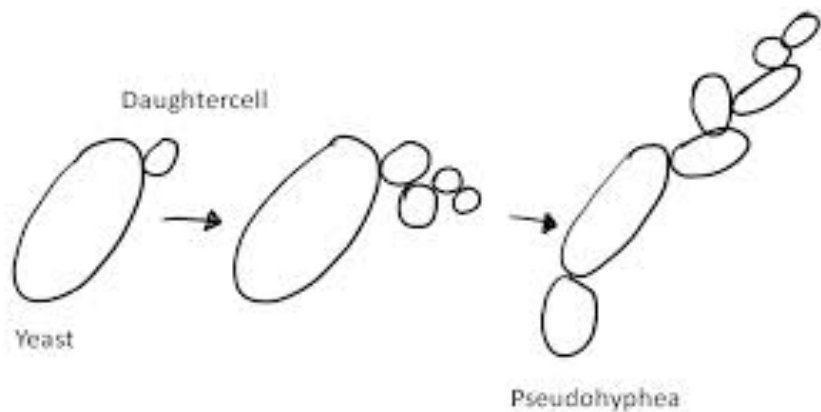
- Yeast are found in soil ,
water and on the skin of many fruits .

Shape of Yeasts

- a) True yeasts:
- b) Psuedohyphae:



Shape of yeast



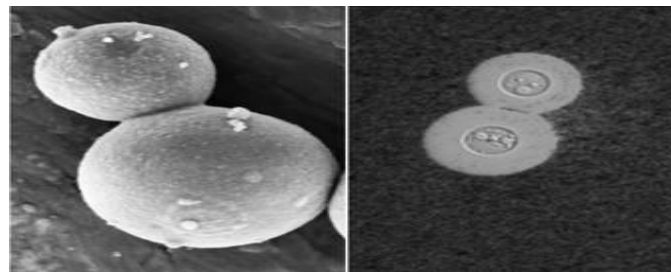
yeast

Reproduction of Yeasts

Usually yeasts reproduce by **Budding** but some by **spore formation**.

Examples of Yeasts

- *Saccharomyces cerevisiae* live on the skin of grapes and other fruits are responsible for the fermentation process of these fruits. This fungi is also used as “**Baker’s Yeast**” in baking and bread production.
- *Candida albicans* and *Cryptococcus neoformans* are human pathogens.



Fungi can be:

1. Monomorphic

Fungi that has only one shape or morphology.

e.g. *Cladosporium bantianum*
Aspergillus fumigatus

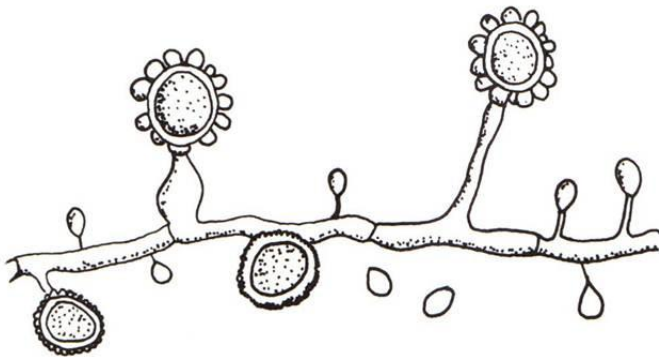
2. Dimorphic (Diphasic) (see page 81)

➤ *Many dimorphic fungi are pathogenic but not all the pathogenic fungi are dimorphic.*

e.g. *Histoplasma*
Blastomyces

e.g. *Histoplasma*

At room temperature (25C)



At 37C



Fleshy fungi



Deuteromycetes

(Imperfect Fungi = Fungi Imperfecti)

A phylum of fungi that are without sexual stage in their life cycle , reproducing only by asexual spores. Also called *imperfecti* because their life cycles are imperfect.

Fungal infections (mycoses)

1. Superficial mycosis:
2. Coetaneous mycosis: **Dermatophytes.**
3. Subcutaneous mycosis.
4. Systemic mycosis.
5. Opportunistic mycosis: **Candidosis.**

Superficial Mycosis

1. Tinea versicolor.(pityriasis versicolor)

Brown or discolored or white patches on the skin.

2. Tinea niger:

dark brown lesion on the palm of the hand or on sole of foot or other.

3. Piedra nodules of the on hair shaft:

A. Black piedra.

B. White piedra.

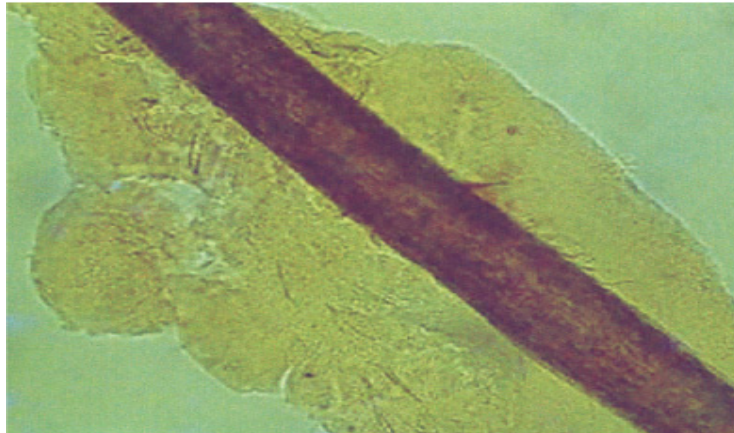
- *Pityriasis versicolor*

- ◆* it is a chronic superficial infection infecting the dead tissue of the stratum corneum (skin)
- ◆ **Etiological agent is :**
Malassezia furfur (yeast)



White Piedra

- Soft, less firm nodules around hair shaft
- White to yellowish cream in color.



- **Etiological agent:** *Trichosporon beigeli*.

Coetaneous Mycosis: *Dermatophytes*

- Affect all keratinized tissue: Hair, Nail and Skin.

Coetaneous Mycosis:

1. Tinea pedis (athlete`s foot)
2. Tinea corpories it affect non hairy parts
3. Tinea capitis (ring worm) affect the scalp of the head.
4. *Candida albican* in the mucouse membrane gastro intestinal , mouth, vagina, and skin

The Clinical Types of Dermatophytes

Tinea exists in any part of the body depending on the location it is given a different name:

Athlete's foot or *Tinea pedis*



Ringworm of the body or *Tinea corpora*



Scalp ringworm or *Tinea capitis*

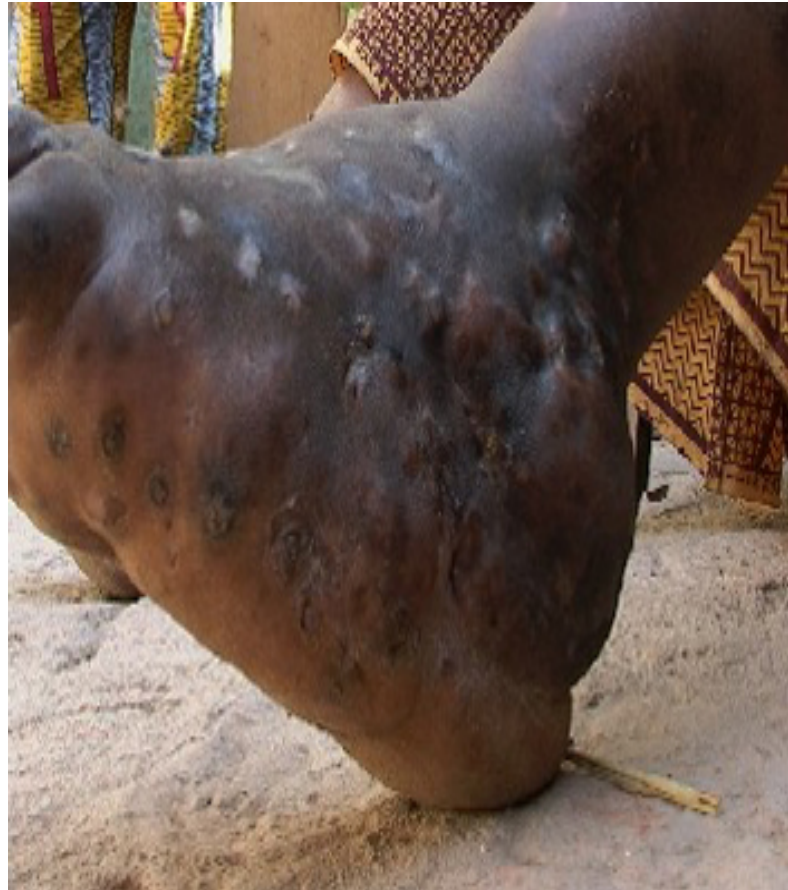


**Ringworm of the nail, Onychomycosis,
or *Tinea unguium***



Subcutaneous and systemic infection

- **Example of subcutaneous mycosis** : Mycetoma (madura foot)



Opportunistic Mycosis: *Candidosis*

- It is any infection caused by species of the fungus *Candida*.
- It is usually opportunistic but there are some forms are not.

1- Oral Thrush

Infection of the mouth surface by candida



2- Diaper or Napkin rash

- **Common in:** Babies who their mothers do not change their diaper frequently.



3- Vaginitis

Infection of vaginal mucosa by *candida*.

Laboratory test

- ◆ **Microscopic examination**

e,g: LPCB , 10% KOH

- ◆ **Culture :**

e,g: SDA , CMA , SDACC

- ◆ **Other test :**

e,g: serological test

Treatment

- Mycoses are most effectively treated with antifungal
- E,g: nystatin , amphotericin B

