

# **Eukaryotic Microorganisms and Parasites**

Lecture# 4

## **Pharmaceutical Microbiology**

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# Introduction

- A **parasite** is an organism that lives at the expense of another organism, called the **host**.

**Parasites** may cause moderate to severe damage. Parasites that cause disease are called **pathogens**.

- **Parasitology** is the study of parasites.

الطفيليات هي مخلوقات بتعيش على حساب غيرها (بتنفع حالها وبتضر غيرها)  
اغلبها بسببوا امراض وبسميهم pathogens

# Parasites in Relation to Their Hosts

Are divided to:

- **Ectoparasites:** such as ticks and lice, which live on the surface of other organisms.  
مثل البراغيث والقمل، بتعيش على السطح الخارجي للمخلوق
- **Endoparasites:** as some protozoa and worms, which live within the bodies of other organisms.  
مثل الديدان، بتعيش جوا
- **obligate parasites:** They must spend at least some of their life cycle in or on a host as causes malaria (*Plasmodium*) must invade red blood cells  
بتحتاج لجسم الهوست في مرحلة من مراحل حياتها وإلا ما بتعيش obligate:
- **facultative parasites:** They normally are free-living, such as some soil fungi, but they can obtain nutrients from a host, as many fungi do when they cause skin infections.  
مثل اغلب الفطريات، بتقدر تعيش لحالها بدون ما تطفل على facultative:  
اي مخلوق، بس في حال كان في فرصة تطفل بتستغلها دغري

# Parasites in Relation to Their Hosts

According to the duration of their association with their hosts:

- **Permanent parasites:** remain in or on a host once they have invaded it as tape worms. هاد النوع مثل الدودة الشريطية ، لو ما تعالجت رح تبقى داخل الجسم دائماً
- **Temporary parasites:** feed on and then leave their hosts **such as many biting** insects. تطفلها مؤقت، بتروح لحالها
- **Accidental parasites :**invade an organism other than their normal host. Such as Ticks that ordinarily attach to dogs or to wild animals sometimes attach to humans.  
حشرات القراد الهوست الطبيعي الها هو الحيوانات بس ممكن عن طريق الصدفة تنتقل للانسان، وهون الطفيلي ما يكون بحاجة لل host زي اول نوعين بهاد السلايد

# Parasites in Relation to Their Hosts

**Hyperparasitism** refers to a parasite itself having parasites. Some mosquitoes, which are temporary parasites, harbor the malaria parasite or other parasites.

أحيانا الطفيلي يكون نفسه حامل طفيلي آخر، زي الناموس اللي بيحمل الملاريا  
وبينقلها للانسان

- An organism that transfers a parasite to a new host is a **vector**.
- **biological vector**: A vector in which the parasite goes through part of its life cycle as **The malaria mosquito** is both a host and a biological vector.
- A **mechanical vector** is a vector in which the parasite does not go through any part of its life cycle during transit. E.g Flies that carry parasite eggs, bacteria, or viruses from feces to human food are mechanical vectors.
- These insects serve as **vectors of many human parasitic diseases**

ال vector هو الناقل ، لو كان هاد الناقل سواء حشرة او اي اشئ يحصل  
فيه جزء من حياة الطفيلي اللي حامله بسميه biological

ولو كان مجرد ناقل بدون ما الطفيلي يستفيد منه

ابدا يكون فقط mechanical

# Parasites in Relation to Their Hosts

## Host classification

- **definitive hosts** if they harbor a parasite while it reproduces sexually.  
E.g The mosquito is the definitive host for the malaria parasite.
- **intermediate hosts** if they harbor the parasite during some other developmental stages  
اي مرحلة غير عن ال sexually
- E.g: The mosquito is the definitive host for the malaria parasite because that parasite reproduces sexually in the mosquito; the human is an intermediate host.  
والناموس بالنسبة النا biological
- **Reservoir hosts** are infected organisms that make parasites available for transmission to other hosts. e.g. wild or domestic animals acting as reservoir hosts for human parasitic diseases.  
reservior= accidantal: non of developmental life  
وهاد النوع بمثابة مخز او حافظة للطفيلي, occur in the host  
وبرضه زي ال mechanical ^^
- **Host specificity:** refers to the range of different hosts in which a parasite can infect mature. Some parasites are quite host specific-they mature in only one host

## Harmful Effects of Parasites

- All parasites rob their hosts of **nutrients**..
- Many parasites cause significant trauma to host tissues as they cause open sores on the skin, destroy cells in tissues and organs.  
زي لما القمل يسبب حكة بالراس ويخرب ال tissue
- trigger severe inflammatory and immunological reactions.  
حكة + حرارة + احمرار .....

# Protists

هدول السلايدات حفظ

## Characteristics of Protists-they share:

- **eukaryotic** organisms and most are **unicellular**
- Although most protists are microscopic, they vary in diameter from 5  $\mu m$  to 5 mm.

بعضهم ممكن اشوفهم بالعين  
الارقام مش حفظ

- **Classification:**

**Animal-like protists (protozoa)**

**Plant like protists (algae)**

**Fungus like protists (slime molds and water molds)**

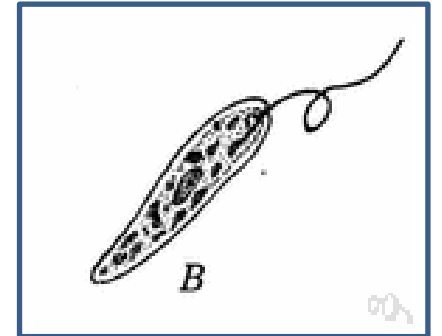
# Protozoa

colonies: group of cells

- Mostly unicellular organisms, but a few form colonies.
- Some are <sup>تعایش</sup> **commensals, which** live in or on other organisms without harming them, other are parasites.
- Classified on the basis of their means of locomotion: <sup>يعني</sup> motility

## 1. Mastigophorans have flagella

- Trypanosomes cause African sleeping sickness.
- leishmanias cause skin lesions or systemic disease with fever
- Giardias cause diarrhea.
- Trichomonads cause vaginal inflammation



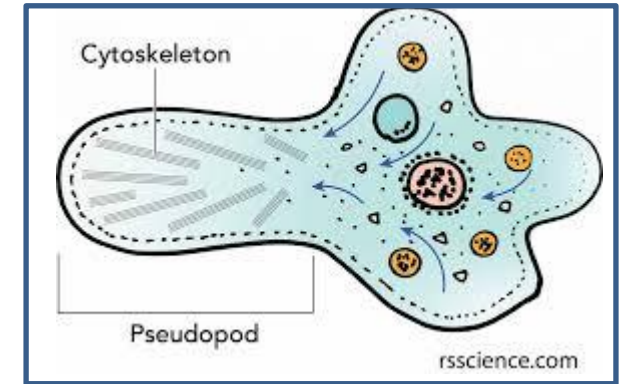
# Protozoa

أقدام كاذبة

## 2. Amebozoa move by means of pseudopodia.

The more commonly observed genera:

- *Entamoeba*, *Dientamoeba*, and *Iodamoeba*—  
cause amoebic dysenteries of varying degrees of severity.
- *Entamoeba gingivalis* is found in the mouth

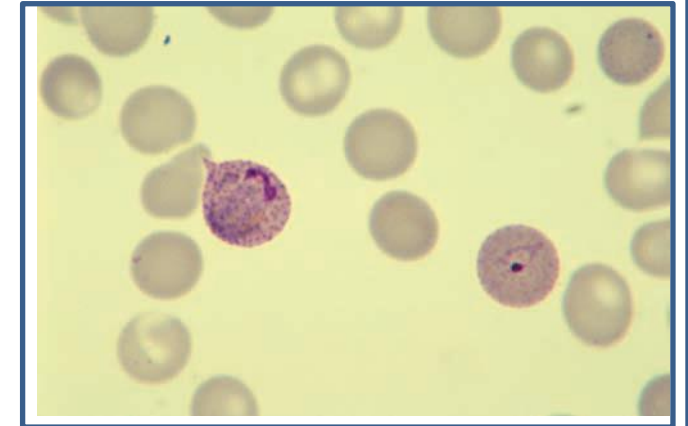


## 3. Apicomplexans.

- They are **immobile** parasites which have **enzymes in groups or complexes of organelles at the tips (apices) of their cells to digest their way into host cells**

*e.g; Plasmodium causes malaria*

*e. g Toxoplasma gondii causes toxoplasmosis*



# Protozoa

## 4. Ciliates.

الاهداب

- **The largest group of protozoans** have cilia over most of their surfaces

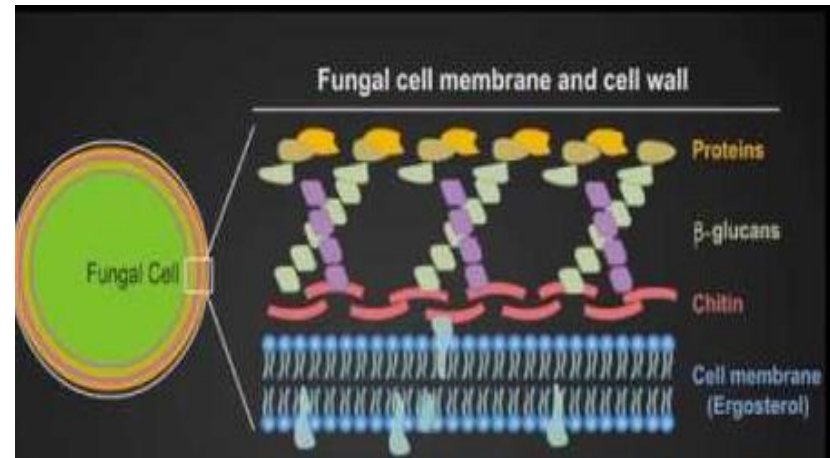


هم facultative

# Fungi

fungi (yeasts and molds) are **eukaryotic organism**

- fungal cell structures are important medically:
  1. The fungal cell wall consists primarily of chitin.
  2. **Chitin is** a polysaccharide composed of long chains of ***N-acetylglucosamine***. *The fungal cell wall contains other polysaccharides as well, the most important of which is  $\beta$ -glucan, a long polymer of d-glucose.*
  3. The fungal cell membrane contains **ergosterol**, in contrast to the human cell membrane, which contains cholesterol.



اللي بعطيه للبكتيريا هو مخصص فقط لتحطيم antibiotic  
ال cell wall تبع البكتيريا، اما الفطريات فالمكونات وال structure  
تبع ال cell wall تبعها مختلف تماما

# Fungi

## Characteristics of fungi:

- Fungi are **heterotrophs** بتعتمد على غيرها بالغذاء
- Many are **saprophytes** (digest dead **organic matter** and organic wastes)
- Some are **parasites that obtain nutrients from the tissues of other organisms** –Parasitic fungi can be destructive when they invade other organisms.

thallus: كل جسم الفطر

mycelium: خيوط رفيعة بتعمل شبكة

hyphae هاي الشبكة اسمها

# Fungi

- The body of a fungus is called a **thallus**. The thallus of most multicellular fungi consists of a **mycelium**. **A mycelium is a network of fungal threads or hyphae**
- The mycelium can be **embedded** in decaying organic matter, soil, or tissues of a living organism .
- **Mycelial cells release enzymes to digest the surfaces of invaded matter and absorb small nutrient molecules.**
- Hyphal cells are separated by cross walls called **septa**

# Fungi-Morphology

## 1. Mold <sup>العفن</sup>

- Multicellular, hyphae, septate & nonseptate, hyaline & dematiaceous, diameter 4-20  $\mu\text{m}$
- Sexual and asexual reproduction



**Hyaline aseptate hyphae**

asepta: متصلة  
septa: متقطعة



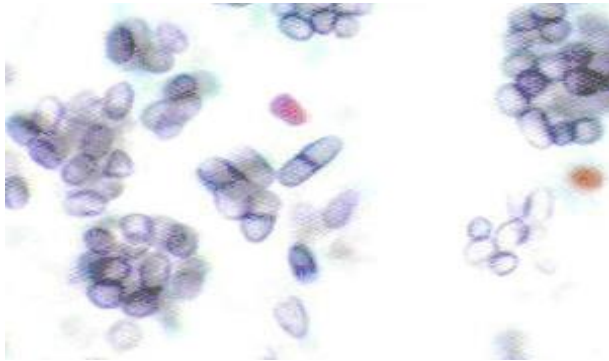
**Hyaline septate hyphae**

# Fungi-Morphology

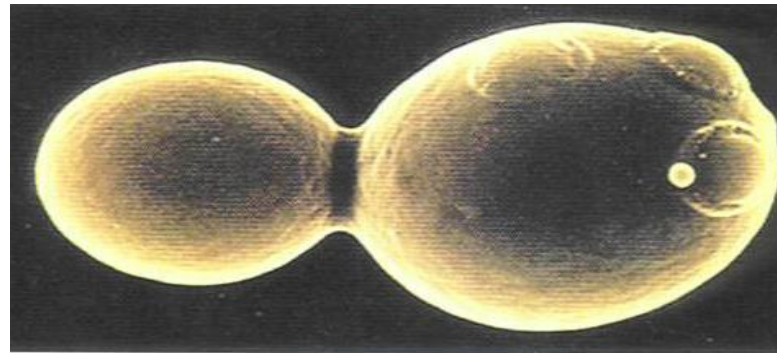
الخميرة

## 2. Yeast

- Unicellular, round or oval, size 8-15 x 3-5  $\mu\text{m}$
- Method of reproduction: budding, binary fission, sexual spores) بالابواغ



Binary fission

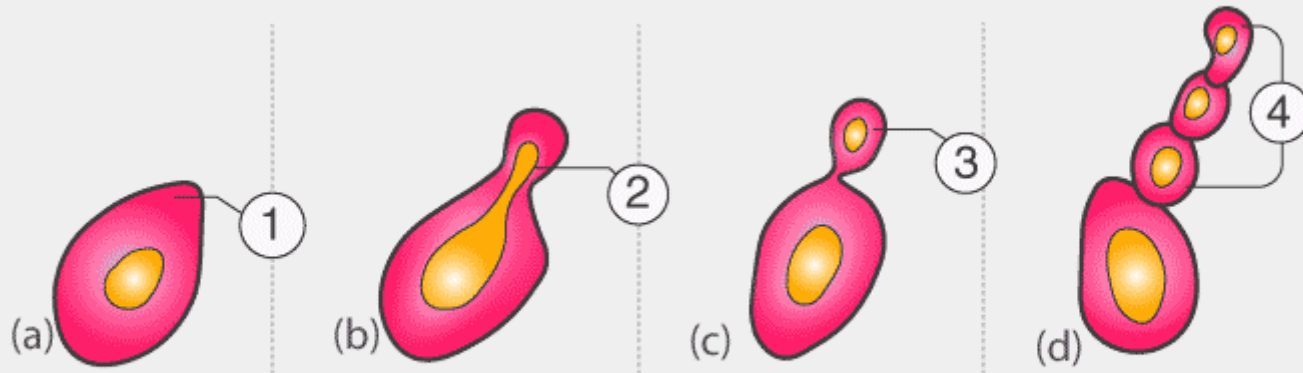


Budding yeasts

الصورة مش كثير مهمة بس للفهم

## REPRODUCTION IN YEAST BY BUDDING

BYJU'S  
The Learning App



1 Yeast Cell

2 Developing Bud

3 New Bud

4 Chain of buds

© Byjus.com

# Comparison of Fungi and Bacteria

| Feature           | Fungi                                           | Bacteria                                       |
|-------------------|-------------------------------------------------|------------------------------------------------|
| Diameter          | Approximately 4 $\mu\text{m}$ (Candida)<br>اکبر | Approximately 1 $\mu\text{m}$ (Staphylococcus) |
| Nucleus           | Eukaryotic                                      | Prokaryotic                                    |
| Cytoplasm         | Mitochondria and endoplasmic reticulum present  | Mitochondria and endoplasmic reticulum absent  |
| Cell membrane     | Sterols present                                 | Sterols absent (except <i>Mycoplasma</i> )     |
| Cell wall content | Chitin                                          | Peptidoglycan                                  |
| Spores            | Sexual and asexual spores for reproduction      | Endospores for survival, not for reproduction  |

بتنتج spores عشان تتكاثر

بتنتج spores عشان تحميهما

Sarah Khader



**Artery Academy**