

# **m**icrobiology

● **Sheet**

○ **Slide**

## **number**

1

## **Done by**

**Sara Nadeem & Tayma Ahmed**

## **Corrected by**

**Salam NasrAllah**

**shahd yousef**

## **Doctor**

**Murad Ibrahim & Dina bahader**

## Microbiology

It is the science that studies the microorganisms.

## Mycology

It is the science that studies fungi.

## Protozoology

It is the science that studies protozoa.

### **We will learn:**

1. Classification of micro-organisms.
2. To compare between bacteria and other cells (ch.1).
3. about different bacteria and their functions.
4. Structures of bacteria.
5. about different diseases.
6. Mechanisms of diseases.
7. Treatment of infections (antibiotics).
8. Transmission of diseases.
9. Transfer of bacteria from non-pathogenic (don't have the ability to produce diseases) to pathogenic bacteria.
10. Normal flora (bacteria that live within the body).
11. Control of bacterial cells.

### **Examples of micro-organisms:**

1. Bacteria
2. Fungi
3. Protozoa
4. Viruses
5. Varroids
6. Prions

## **The difference between fungi and bacteria**

- Fungi are multicellular.... bacteria are unicellular
- Fungi are eukaryotic
- Cell wall in fungi consists of chitin but in bacteria it consists of peptidoglycan as a major component (peptide+ carbohydrates).
- Viral particles (inert, nonlife outside the host cells)
- Viruses are called (infectious agents) they are subcellular.

It can duplicate just in the host cells

Host cell could be animal cell, bacteria etc.

## **Comparison between Viral particles and bacteria+ eukaryote:**

Bacteria and eukaryotes have both DNA and RNA

Viral particles have either DNA or RNA.

- Protozoa can be unicellular e.g. amoeba.

They are classified into 3 groups based on how they move:

Protozoa are mobile

Fungi immobile

Bacteria (mobile or immobile)

The human cells called diploid (2n) Bacteria called haploid.

Bacteria are prokaryotes and the rest are eukaryotes.

- **Comparison between bacteria and eukaryotic cells:**

1. Cytoplasm

- A. Presence of organelles in eukaryotic cells.

- Absence of organelles in bacteria.

- B. Presence of true nucleus in eukaryotic cells Which has nuclear material and nuclear membrane.

Absence of nucleus in bacteria.

C. Ribosome is a universal structure (present in both) but differ in size (in eukaryotic cells it is large 80s and in bacteria it is small 70s )

S is a measurement unit

D. Genetics: in bacteria it is a single circular chromosome. In eukaryotic cells it is different on number according to the species.

2. Cell membrane

It is universal structure

3. Cell wall

Presence in bacteria, fungi, plant cells.

Absence in human, animal cells...

4. appendages

Cilia, pili, flagella (in both but different in components)

5. Division

Bacteria give 2 identical cells by the binary fission (simple).

Human cells divide by meiosis and mitosis.

Fungal cells give cells by mitosis or budding (sexual/ asexual).

### **The diseases are divided into:**

- **Infectious** > caused by microorganisms (bacteria, viral, fungi...)

Like: HIV –viral

Hepatitis –viral

Meningitis –viral or bacterial or fungal

Pneumonia –viral or bacterial (infection in lungs)

Tuberculosis –bacterial

Malaria –protozoa

Measles –viral

Mumps –viral

Plasmodium malaria –parasitic protozoa.

CGD - prion

**Noninfectious** > not produced by organisms.

Like: diabetes, hypertension, ischemic heart diseases.

### **Ocular and objective lenses**

- Objective lenses have different magnifications powers (10x .40x.100x 400x) we can't see bacteria clear we need 1000x
- Oil immersion lenses 100x
- Ocular lenses 10x

We use oil to collect light (is not diffracted) it passes via the oil.

We need electron microscopes to see viruses.

Which provide 100000 x magnification.

The homework sheet:

- 1) Amoxicillin is an antibiotic that inhibits cell wall synthesis (Peptidoglycan synthesis) It will affect
- A. Bacterial Cell
  - B. Fungal Cell
  - C. Viral Particle
  - D. Human Cell

Answer is A

- 2) One of the following has DNA or RNA as genetic materials
- A. Bacterial Cell
  - B. Fungal Cell
  - C. Viral Particle
  - D. Human Cell

Answer is C

- 3) Crystal Violet is an important dye using in identification of microorganism we can use to identify Choose the correct answer (more than one answer)
- A. Streptococcus Pyrogens
  - B. Candida albicans
  - C. Mycoplasma Pneumoniae
  - D. Mycobacterium Tuberculosis
  - E. Treponema Pallidum
  - F. Staphylococcus aureus

4) Match

- a) Viral infection
  - b) Bacterial infection
  - c) Both
  - d) Neither a nor b
- i. Meningitis ©
  - ii. Pneumonia ©

- iii. Tuberculosis (b)
- iv. Hepatitis (a)

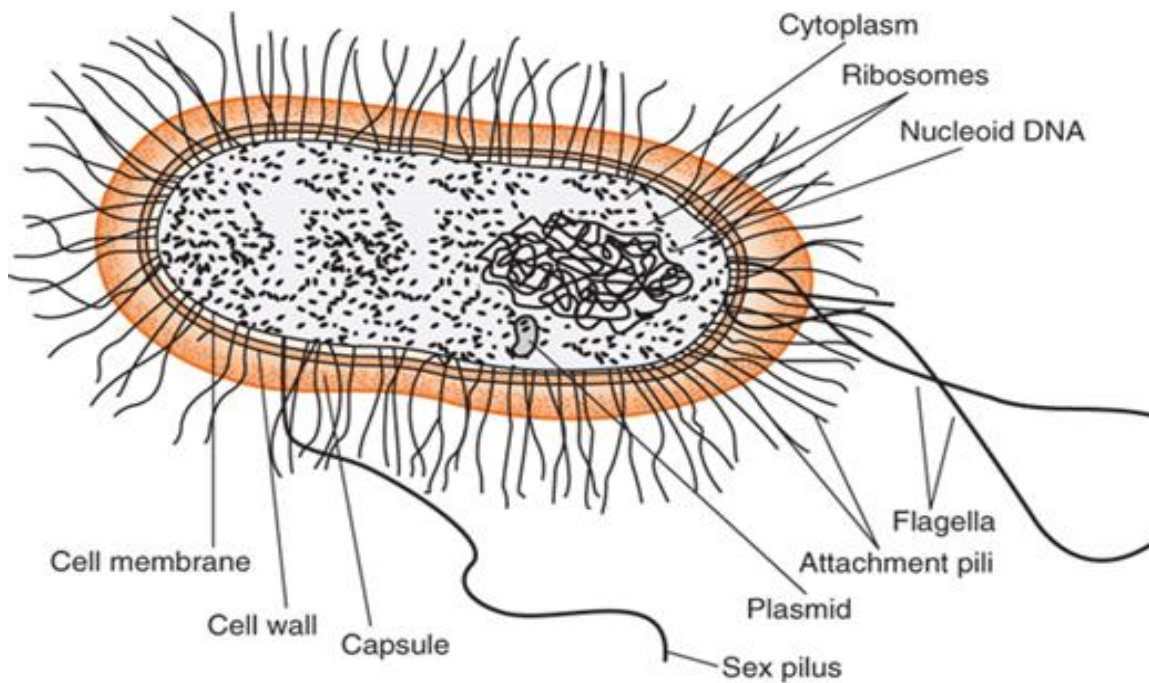
## Comparison of Medically Important Organisms

Characteristic	Viruses	Bacteria	Fungi	Protozoa and Helminths
Cells	No	Yes	Yes	Yes
Approximate diameter ( $\mu\text{m}$ ) <sup>1</sup>	0.02–0.2	1–5	3–10 (yeasts)	15–25 (trophozoites)
Nucleic acid	Either DNA or RNA	Both DNA and RNA	Both DNA and RNA	Both DNA and RNA
Type of nucleus	None	Prokaryotic	Eukaryotic	Eukaryotic
Ribosomes	Absent	70S	80S	80S
Mitochondria	Absent	Absent	Present	Present
Nature of outer surface	Protein capsid and lipoprotein envelope	Rigid wall containing peptidoglycan	Rigid wall containing chitin	Flexible membrane
Motility	None	Some	None	Most
Method of replication	Not binary fission	Binary fission	Budding or mitosis <sup>2</sup>	Mitosis <sup>3</sup>





- The eukaryotic cell has a true nucleus with multiple chromosomes surrounded by a nuclear membrane and uses a mitotic apparatus to ensure equal allocation of the chromosomes to progeny cells.
- The nucleoid of a prokaryotic cell consists of a single circular molecule of loosely organized DNA, lacking a nuclear membrane and mitotic apparatus.



Source: Warren Levinson: Review of Medical Microbiology and Immunology, 14th Edition, [www.accessmedicine.com](http://www.accessmedicine.com)  
Copyright © McGraw-Hill Education. All rights reserved.

<b>Characteristic</b>	<b>Prokaryotic Bacterial Cells</b>	<b>Eukaryotic Human Cells</b>
<b>DNA within a nuclear membrane</b>	<b>No</b>	<b>Yes</b>
<b>Mitotic division</b>	<b>No</b>	<b>Yes</b>
<b>DNA associated with histones</b>	<b>No</b>	<b>Yes</b>
<b>Chromosome number</b>	<b>One</b>	<b>More than one</b>
<b>Membrane-bound organelles, such as mitochondria and lysosomes</b>	<b>No</b>	<b>Yes</b>
<b>Size of ribosome</b>	<b>70S</b>	<b>80S</b>
<b>Cell wall containing peptidoglycan</b>	<b>Yes</b>	<b>No</b>

<b><u>Kingdom</u></b>	<b><u>Pathogenic Microorganisms</u></b>	<b><u>Type of Cells</u></b>
<b>Animal</b>	<b>Helminths (worms)</b>	<b>Eukaryotic</b>
<b>Protists</b>	<b>Protozoa</b>	<b>Eukaryotic</b>
<b>Fungi</b>	<b>Fungi (yeasts and molds)</b>	<b>Eukaryotic</b>
<b>Prokaryote</b>	<b>Bacteria</b>	<b>Prokaryotic</b>
	<b>Viruses</b>	<b>Noncellular</b>