



# MICROBIOLOGY

- microorganisms -

- **Microbiologist**: The study of microscopic organisms (Teeny tiny!)  
(Dimension)
- **Microorganisms**: living organisms that are usually too small to see clearly with naked eye

- **Microbes**: They are **Omnipresent** (nearly every where in nature)

○ **Important of it's why we study it's** ٥<sup>٥</sup>

- In all environments (expect mother's belly)
- Most of our problems because of it's (-)
- Minority are pathogenic (-) (ex: Capsulated ↑)
- Related to life process [food chain + nutrient cycling] (+)
- Many beneficial aspects (+)

↓  
- Get food moisture  
- temperature suitable

- Air
- Soil
- Oceans
- Food we eat
- Surface of our body
- Inside alimentary Canal

## Effects

Beneficial (+)

- **Food (Fermentation)**: wine - yoghurt - cheese - Vinegar - Bread  
ATP → Alcohol  
↑  
⑤
- **Agriculture**: Nitrifying bacteria (fixation of N) - Recycling of Elimination  
زراعية
- **Industrial applications**: Enzymes - a.a - Vitamins - Anti-biotics - Vaccins  
عس كس  
⑧  
pharmaceutical - industries - sewage treatment

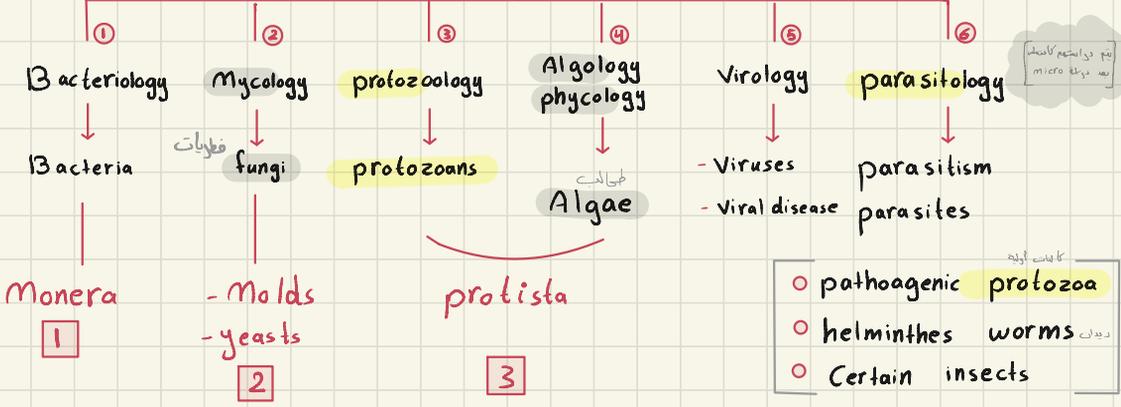
Harmful (-)

- food spoils
- Diseases

٥  
Arabic Bacteria ← ٥

# Microbiology

- Field - Branches -  
Study of



smallest ① → ⑥ Biggest

## Five Kingdoms Classifications

④ plantae

⑤ Animalia

(Living organisms)



## Shapes





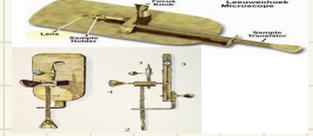
⑥	Structure	practical significance
Bacteria	Simple internal structure	—
Viruses	Need an electronic microscope to observe (It has just one of D, R-NA)	<ol style="list-style-type: none"> <li>1) Cause diseases in human, plants, Animals Ex → Influenza</li> <li>2) Infect microorganisms Ex → Bacteriophage</li> </ol>
fungi yeasts	—	<ol style="list-style-type: none"> <li>1) Cause diseases</li> <li>2) food supplements</li> <li>3) Manufacture of Alcoholic beverages</li> </ol>
fungi molds*	Many distinctive structural features	<ol style="list-style-type: none"> <li>1) Cause diseases</li> <li>2) Decomposition of many materials</li> <li>3) Industrial production of many chemicals Ex → Anti-biotics</li> </ol>
protozoa	—	<ol style="list-style-type: none"> <li>1) Cause diseases</li> <li>2) Food for aquatic animals</li> </ol>
Algae	البناء الضوئي photosynthetic	<ol style="list-style-type: none"> <li>1) produce toxic substances</li> <li>2) production of food in aquatic environment</li> </ol>



# The history of Microbiology

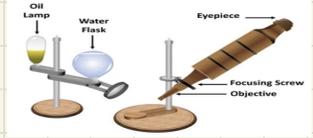
## 1 Discovery period (Pioneers) :-

### 1 Antony Van Leeuwenhoek :-



- The way :-
- Because he is a tailor
  - Used a lenses to examine cloth (his interest)
  - He assembled a hundreds of microscopes which magnified 50-300 times
  - He called them (Animalcules)
  - First discovered - Bacteria
  - protozoans

### 2 Robert hooke :- (1678)



- The way :-
- Developed Compound microscopic
  - Use the term (Cell) to Composed
  - The Cell theory :- All living things are composed of cells

### 3 Ingaze Semmelweis :- (1846)

- The way :-
- Notice the puerperal sepsis was transmitted by Contaminated hands of - Obstetricians
  - Nurses
  - Could be prevented by washing hands in antiseptic - Medical students

الطبيب الذي يتحقق من الميعة  
إلى خوف الولادة يكون لها نسبة الوفيات 80%  
لها نسبة الوفيات في الثالث الذي قد يسهل العقب  
مقالة دكتور 028  
(بعدما غسلت أو نظفت مع الأيدي مع نسبة وفيات المواليد)



## 2 Transition period:

Disapproved the theory of spontaneous generation



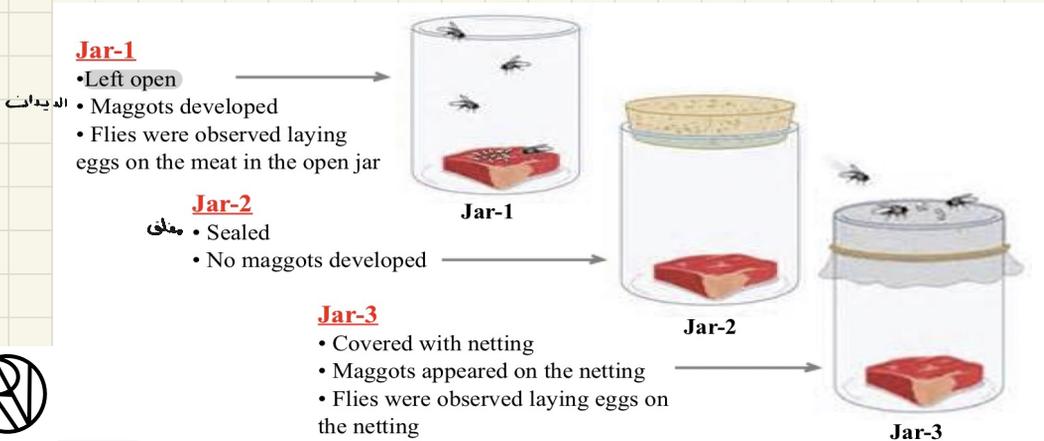
Is a body of thought on ordinary information of living organism without descent from similar organisms

### 1 Aristotle :

1) flies recipe :- Meat → several days → fleis

2) mice recipe :- piles of clothes + wheat <sup>21 days</sup> → mice

### 2 Redi :



### 3 Golden period:

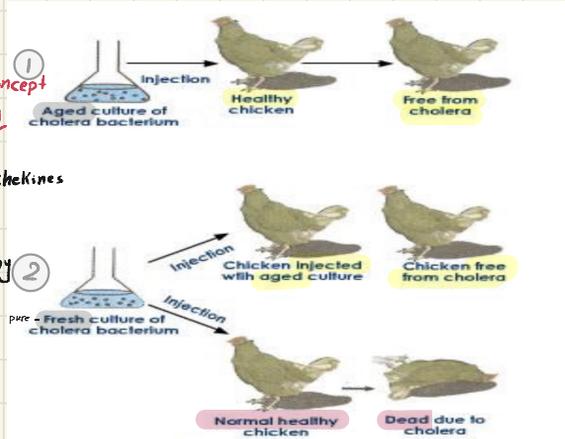
## 1 Louis Pasteur: father of microbiology

### Achievements:

- 1) Studies on **Anthrax + Cholera** <sup>1</sup> <sup>2</sup> <sup>3</sup>
- 2) Introduction of **Sterilization techniques**: Steam sterilizer
- 3) Developed **pasteurization** <sup>4</sup>
  - Hot-air oven
  - Autoclave <sup>5</sup> <sup>6</sup>
- 4) Demonstrated **Anaerobic fermentation** by:
  - 1- Bacteria **produce** → Acid
  - 2- Yeast → **Alcohol**
- 5) Introduced **(live attenuated vaccines)** <sup>1</sup> <sup>2</sup> <sup>3</sup>

**steps:** - Chicken Cholera bacillus cultures - for several weeks

- 1 result ↓ lost their pathogenicity + still have their ability to protect chickens
- 2 - chicken inoculated with pure-fresh culture of cholera (aged) (8 week old): Remain healthy



## 2 Robert Koch:

- 1) Discovered: **Anthrax bacillus** - 1876
- Tubercle bacillus** - 1882
- Cholera vibrios** - 1883

2) Introduced **Methods for Isolation of pure culture**

3) Use **Solid media** to **Isolation of Bacteria staining techniques**

4) Established **Kock's postulates** → **One microbe (specific) caused One disease (specific)**

- 1- The specific **caustive agent** (= suspected pathogen) must be **found-isolated** from the diseased host in **every case**
- 2- The **Disease Organism** must be **isolated** from lesions-diseased hos + **Maintained-Grown** in pure culture
- 3- The pure culture inoculated in experimental-susceptible animal-new healthy host → produce same symptoms
- 4- The same bacterium must re-isolated in pure culture from intentionally infected animal → Same



# 4 Molecular Biology period (now) :-

## 1 Dimitri Ivanowski : 1864 - 1920

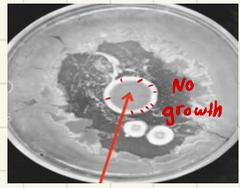
- Russian Botanists *عالم نباتات*
- 1892 published first evidence of the filterability of pathogenic agent
- *result* Discover the virus of tobacco mosaic disease
- launching the field of virology *وتقع الآن علم الفيروسات*

## 2 Alexander Fleming : 1881 - 1955

- 1929 published first paper describing penicillin
- effect on gram(+) microorganisms ← produce from mold penicillium

### o The way :-

- Solid ← *سكنة الصلبة ← semisolid*
- Kept his culture 2-3 weeks → before discarding it
- After he looking → Noticed that the Bacteria seemed
- 1) Dissolving *37°C*
- 2) mold was contaminating the cultur *(Because the culture isn't suitable)*



- Produce in major quantity → 1940s
- launch of Anti-biotic Era *reason* → It's - power - Availability effectively
- *Result* → A major revolution in <sup>1</sup>medicine and <sup>2</sup>public health