

## Objective

- 1) **Definitions**
- 2) **History**
- 3) **Branches\ Fields**
- 4) **Organisms**
- 5) **Structure of bacterial cell**
- 6) **Classification of bacteria**
- 7) **Naming of bacteria**

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### 1) **Definitions:**

- **Microbiology:** Is the study of microorganisms which are of microscopic dimensions.
  
- **Microorganisms:** Are living organisms that are usually too small to be seen clearly with the naked eye.

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### 2) **History:**

- **The period of microbiology:**
  - 1- **Discovery period**
  - 2- **Transition Period**
  - 3- **Golden period**

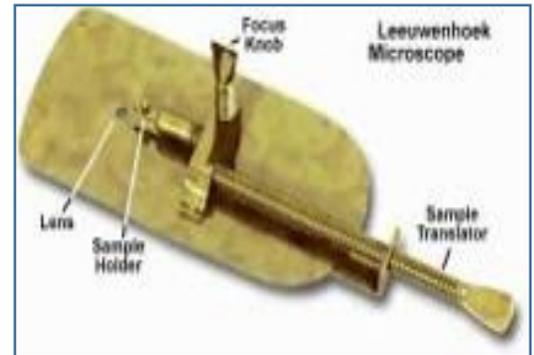


## Discovery period :

### Antony Van :

The way :

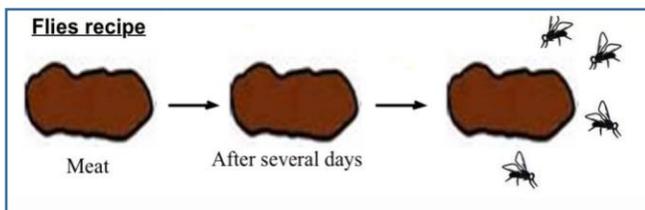
- # As a tailor (خياط)
- # lens making.
- # assembled hundreds of microscopes
- # discovered “micro” organisms
- # called them “animalcules”.
- # Described: **bacteria** and **protozoans**.



## Transition Period :

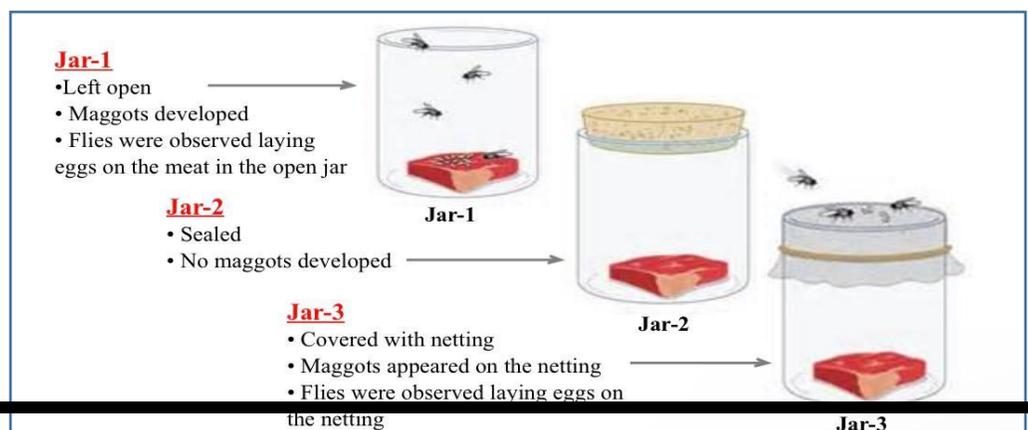
### Aristotle :

- # Discovered The theory of spontaneous generation and give example (mice and flies)



### Francisco redi :

- # Make experiment (put meat into three separate jars)



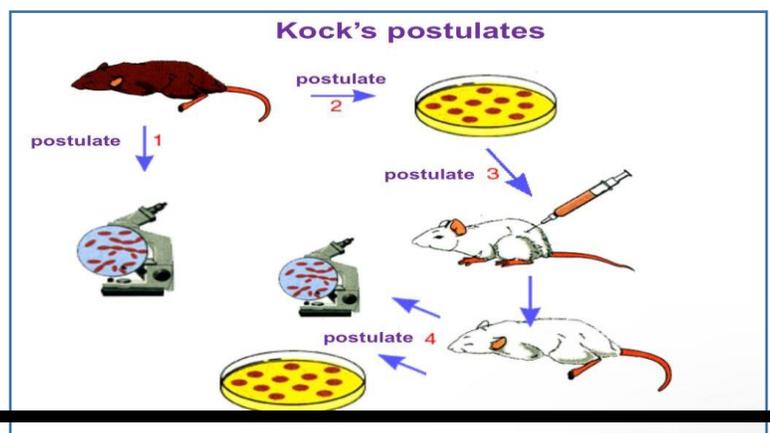
## Golden Period:

### Louis Pasteur

- # Fermentation
- # Pasteurization
- # Vaccine development
- # Proposed the germ theory of disease
- # Proposed aseptic techniques
- # 1880: Develops a method of attenuating a virulent pathogen “the agent of chicken cholera”, so it would immunize and not cause disease. (Vaccine Concept)

### Robert Koch:

- # Proved that the *Bacillus anthracis* is the causative agent of anthrax
- # Developed methods of bacterial fixing and staining
- # Developed method for culturing bacteria on a solid media
- # He established what is known as Koch's postulates
- # Discovered *Mycobacterium tuberculosis* and *Vibrio cholera*



**Kock's postulates: Four criteria designed to establish a causative relationship between a microbe and a disease.**

- The specific causative agent must be found in every case of the disease.
- The disease organism must be isolated from the lesions of the infected case and maintained in pure culture.
- The pure culture, inoculated into a susceptible or experimental animal, should produce the symptoms of the disease.
- The same bacterium should be re-isolated in pure culture from the intentionally infected animal.

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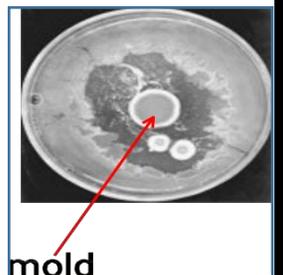
## Molecular Biology period (now) :

### **Dmitri Ivanowski:**

- # Russian Botanist
- # He publishes the first evidence of the filterability of a pathogenic agent
- # the virus of tobacco mosaic disease
- # launching the field of virology.

### **Alexander Fleming :**

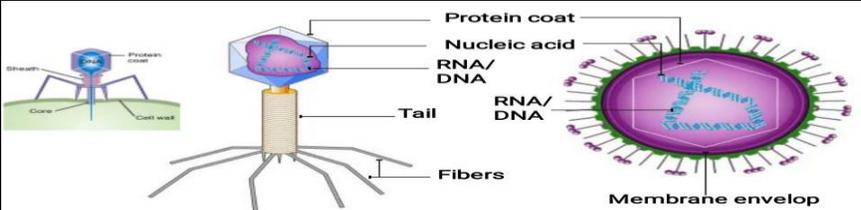
- # publishes the first paper describing penicillin and its effect on gram-positive microorganisms.
- # kept his cultures 2-3 weeks before discarding them. When he looked at one set he noticed that the bacteria seemed to be dissolving and the mold was contaminating the culture.
- # When penicillin is finally produced in major quantities in the 1940s, its power and availability effectively launch the "Antibiotics Era," a major revolution in public.



### 3) Branches\ Fields of microbiology:

Field	Some Applied Areas:
<b>Bacteriology</b>	<b>Study of bacteria.</b>
<b>Mycology</b>	<b>Study of fungi.</b>
<b>Protozoology</b>	<b>Study of protozoans.</b>
<b>Virology</b>	<b>Study of viruses and viral diseases.</b>
<b>Algology or Phycology</b>	<b>Study of algae</b>
<b>Parasitology</b>	<b>Study of parasitism and parasites (include pathogenic protozoa, helminthes worms and certain insects)</b>

### 4) Organisms:

organisms	Characteristics
<b>Bacteria</b>	<ol style="list-style-type: none"> <li>1- Bacteria are unicellular</li> <li>2- Bacteria are prokaryotes Pro: before(primitive) Karyon: nucleus</li> <li>3- Peptidoglycan cell walls</li> <li>4- Multiply by Binary fission</li> <li>5- For energy, use organic chemicals, inorganic chemicals, or photosynthesis</li> </ol>
<b>protozoa</b>	<ol style="list-style-type: none"> <li>1- Animal like single celled eukaryotic organisms</li> </ol>
<b>viruses</b>	 <p>Viruses infects bacterial cells called Bacteriophage</p> <p>Viruses infects human cells Example: Influenza</p>
<b>Multicellular Animal Parasites</b>	<ol style="list-style-type: none"> <li>1- Eukaryote</li> <li>2- Multicellular animals</li> <li>3- Parasitic flatworms and round worms.</li> </ol>

## 5) Structure of bacterial cell:

- **Microbes**: too small to be seen by unaided eye.
- size of **smallest bacteria**: 200nm.
- size of **protozoa and alga**: 3-4mm (visible by naked eye).
- size of **Viruses**: between 20 to 800 nm.
- size of **Cocci**: about 0.5-2.5  $\mu\text{m}$  in diameter.
- size of **bacilli**: 0.3-15  $\mu\text{m}$  in length and 0.2 -2  $\mu\text{m}$  in diameter.

## 6) Classification of bacteria:

### - Different methods are used to Classify bacteria:

1. Hierarchical classification.
2. Shapes and Forms of Bacteria.
3. Physiology.
4. Molecular techniques: DNA , RNA, and protein analysis.

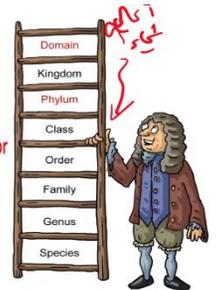
### 1. Hierarchical classification:

- Taxonomy: Defined as the science of classification of organisms.

- ♥ **Species**: It is a group of related isolates or strains.
- ♥ **Genus** : It is a collection of related species.
- ♥ **Family**: A collection of similar genera. The name of the family ends in the suffix-aceae.
- ♥ **Order**: A collection of similar families. The name of the family ends in the suffix-ales.
- ♥ **Class**: It is a collection of similar orders. In prokaryotic nomenclature the name of the class ends in the suffix-ia.
- ♥ **Phylum or Division**: A collection of similar classes.
- ♥ **Kingdom**: A collection of similar phyla or division.
- ♥ **Domain**: A collection of similar kingdom.

Hierarchical classification

Remember: King Philip Came Over For Good Spaghetti



- Example: the taxonomic classification of Escherichia Coli.

Formal rank	Example
Kingdom	Prokaryotae
Division	Gracillicutes
Class	Scotobacteri <b>ia</b>
Order	Eubacteri <b>ales</b>
Family	Enterobacteri <b>aceae</b>
Genus	<i>Escherichia</i>
Species	<i>Coli</i>



الدكتور حكى انه اخر  
ثنتين في الجدول اهم  
شيء

Three Domains:	
Eubacteria	EX: 1. true bacteria 2. peptidoglycan
Archaea	EX: 1. odd bacteria that live in extreme environments, high salt, heat, etc. (usually called extremophiles)
Eukarya	Char: have a nucleus & organelles  EX: humans, animals, plants

## 7) Naming of bacteria:

- Naming Microorganisms:

- Binomial (scientific) nomenclature
- Gives each microbe 2 names:
  - ♣ Genus: always capitalized.
  - ♣ Species: lowercase.
- Both italicized or underlined:
  - ♥ Staphylococcus aureus (*S. aureus*).
  - ♥ Bacillus subtilis (*B. subtilis*).
  - ♥ Escherichia coli (*E. coli*).

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