علم الأحياء الدقيقة

Microbiology

Introduction to Bacteriology

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مكتب ٢ ب ٤٥

Occurrence & distribution of bacteria

- They live everywhere. They occur in water (fresh and salty) , in soil and air. Some types live as **SAPROPHYTES**, others are **PARASITES** on plants ,animals and humans causing diseases, and some are **SYMBIOTIC** organisms. Some of them can survive in ice and others can live in hot water. They can form **spores** which are very resistant to drought , chemical , rays and temperature variations.

Bacterial Cells Morphology

- Eubacteria have three main shape categories:

1- Rod-shaped are known as ***bacilli***. These are short rods and according to their arrangement, they are divided to:

- Mono-bacilli: Some of them have pin-head thickenings and they give an impression of branched structure and they causes diseases in human.

- Diplo-bacilli: They occur in pairs, also causing diseases in humans.

- Strepto-bacilli: That occur in chains of different lengths, arranged in end-to-end chains.

- Coryne-form bacillus: A bacterium with irregularly rod-shaped cells arranged at angles (V- and/or L-shaped).

Bacterial Cells Morphology

2-Spherical are called ***cocci :*** They are divided in six groups depending on the cell arrangement and cell division:

- **Mono-cocci**: They are single celled and lives as saprophytes.
- **Diplo-cocci**: The cell divides in one plane and the pairs remain attached or cells arranged in pairs.
- **Strepto-cocci**: Division of cell in one plane and causes diseases in humans.
- **Tetra-cocci (Tetrad)**: The cell divides in two planes resulting in four cells and causes diseases in humans. Looks almost like a square under the microscope.
- **Sarcinae**: The cell divides in three planes resulting in 8 cells. Look like small cubes and may be difficult to distinguish from tetrads.

Bacterial Cells Morphology

- **Staphylo-cocci**: Division in several planes resulting in cluster of cells like cluster of grape.

3- Spiral are called ***spirilla***. They can be divided into:

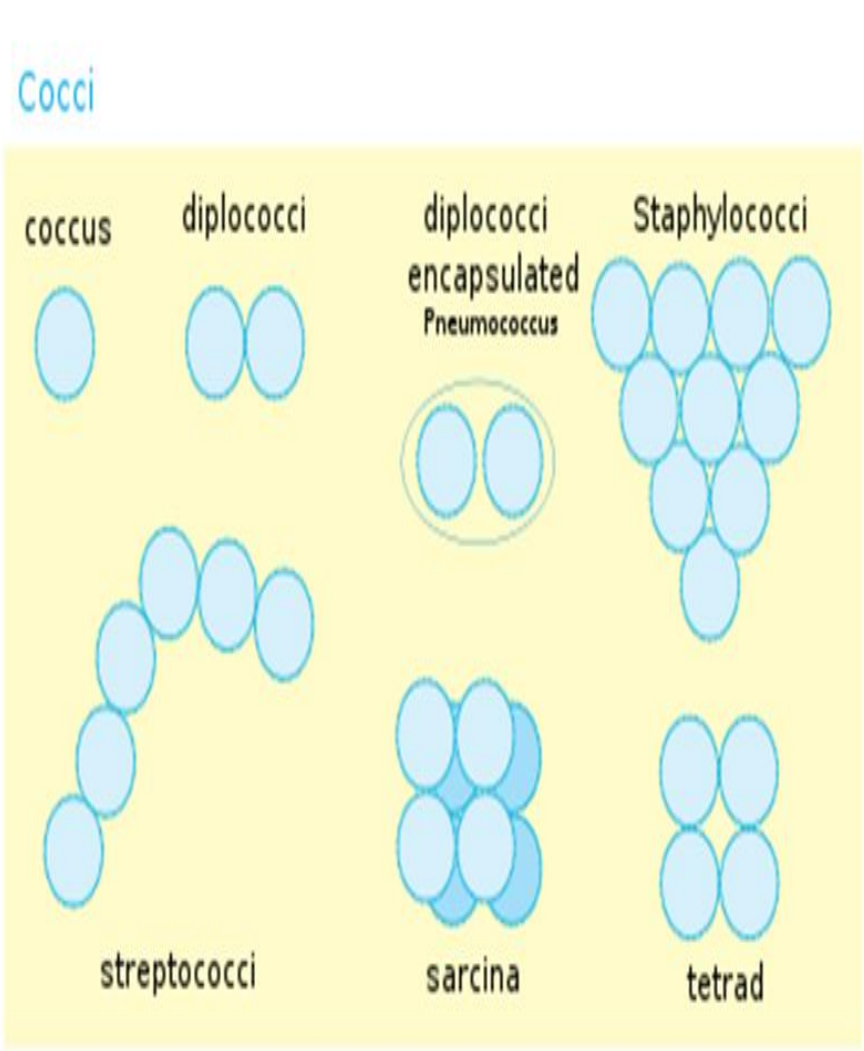
- **Vibrion**: The cell resemble a comma or curved in appearance.
- **Spirillia**: Coiled forms exhibiting twists with one or more turns. They have constant shapes and they move by flagella
- **Spirochaets**: They are intermediate between bacteria and protozoa, they don't have cell wall and flagella. Their movement is like a worm with helical or corkscrew-shaped.

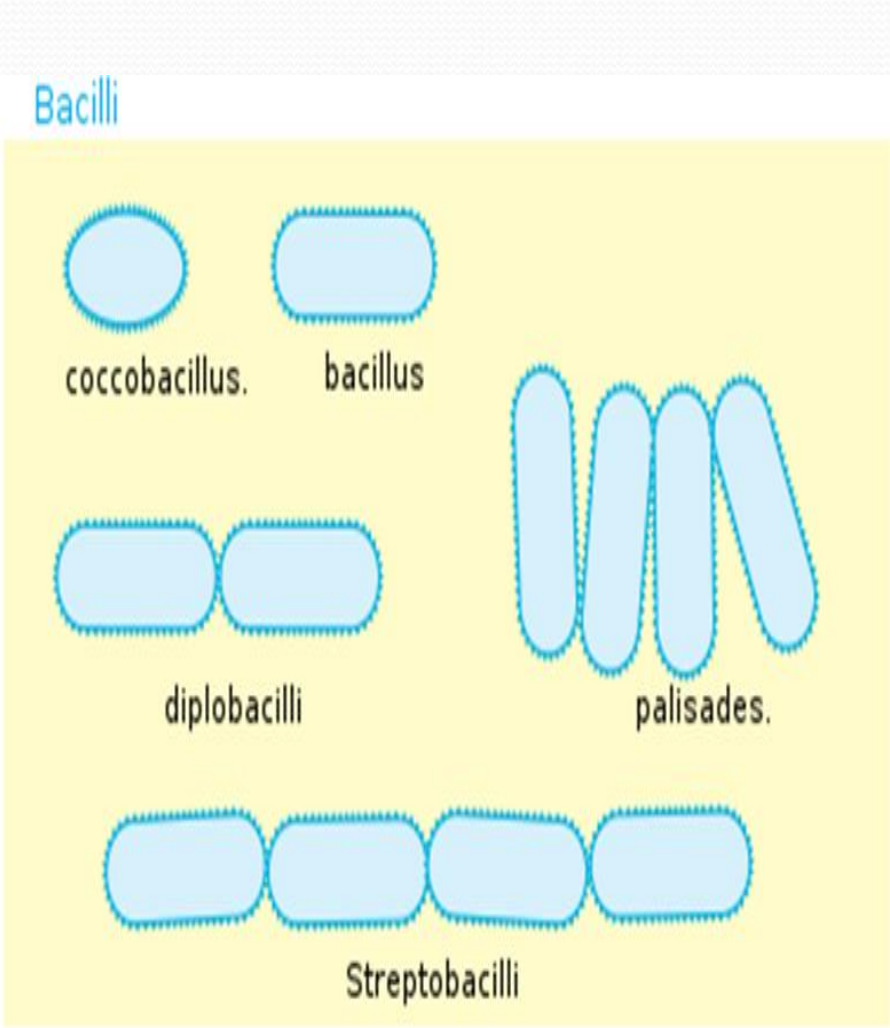
Bacterial Cells Morphology

- Actinomycetes (Filamentous/Mold-like bacteria):

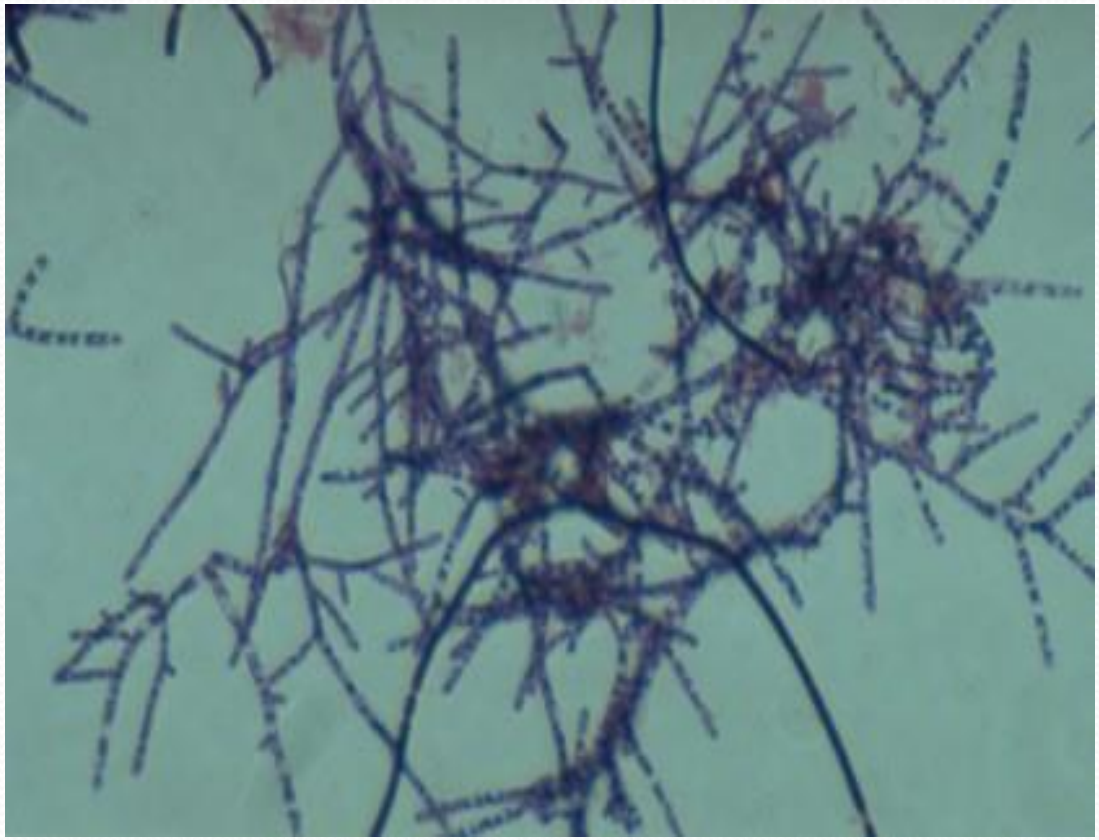
Their body consists of mycelium just like fungi. Streptomyces group belongs to these molds like bacteria. Streptomycin, an antibiotic is produced by Streptomyces.

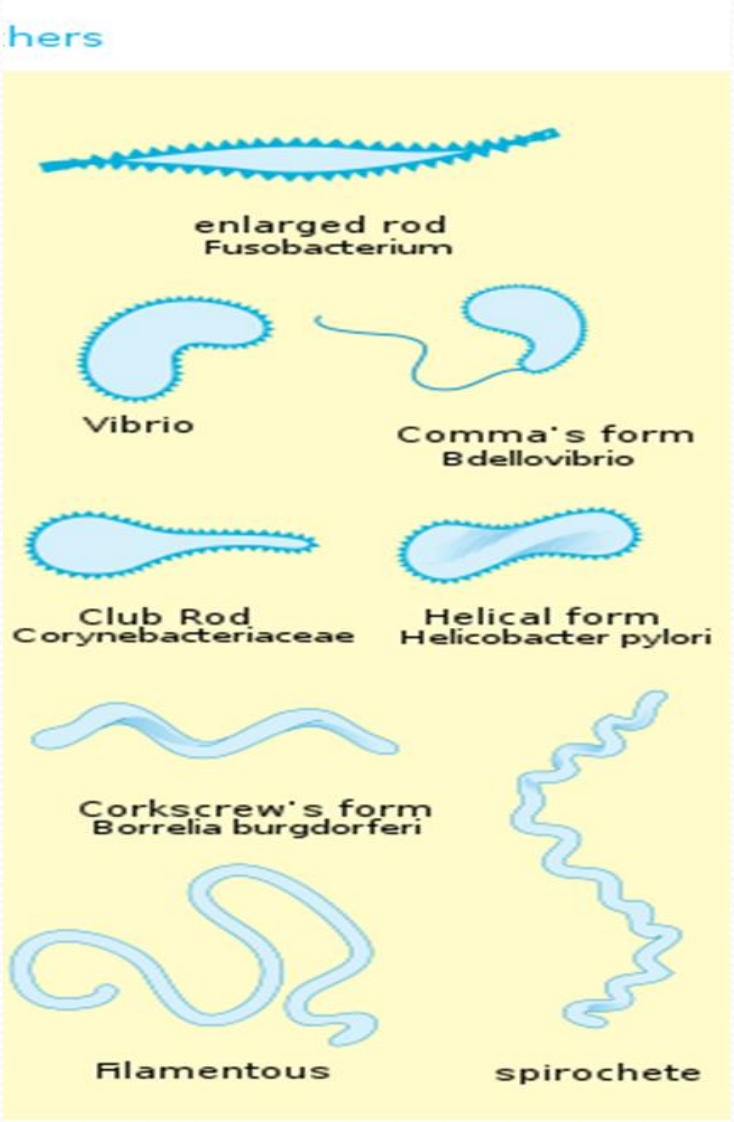
Bacterial Cells Morphology



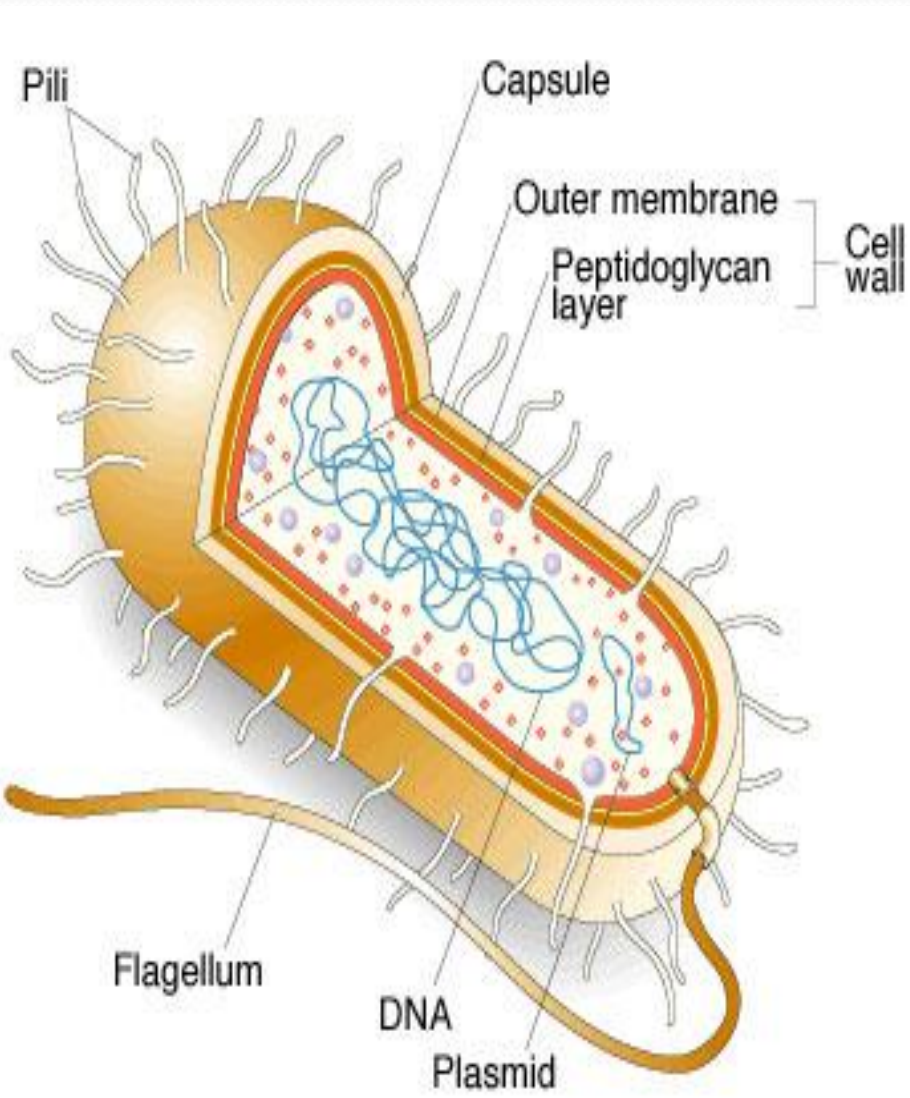


Bacterial Cells Morphology





Bacterial Structures



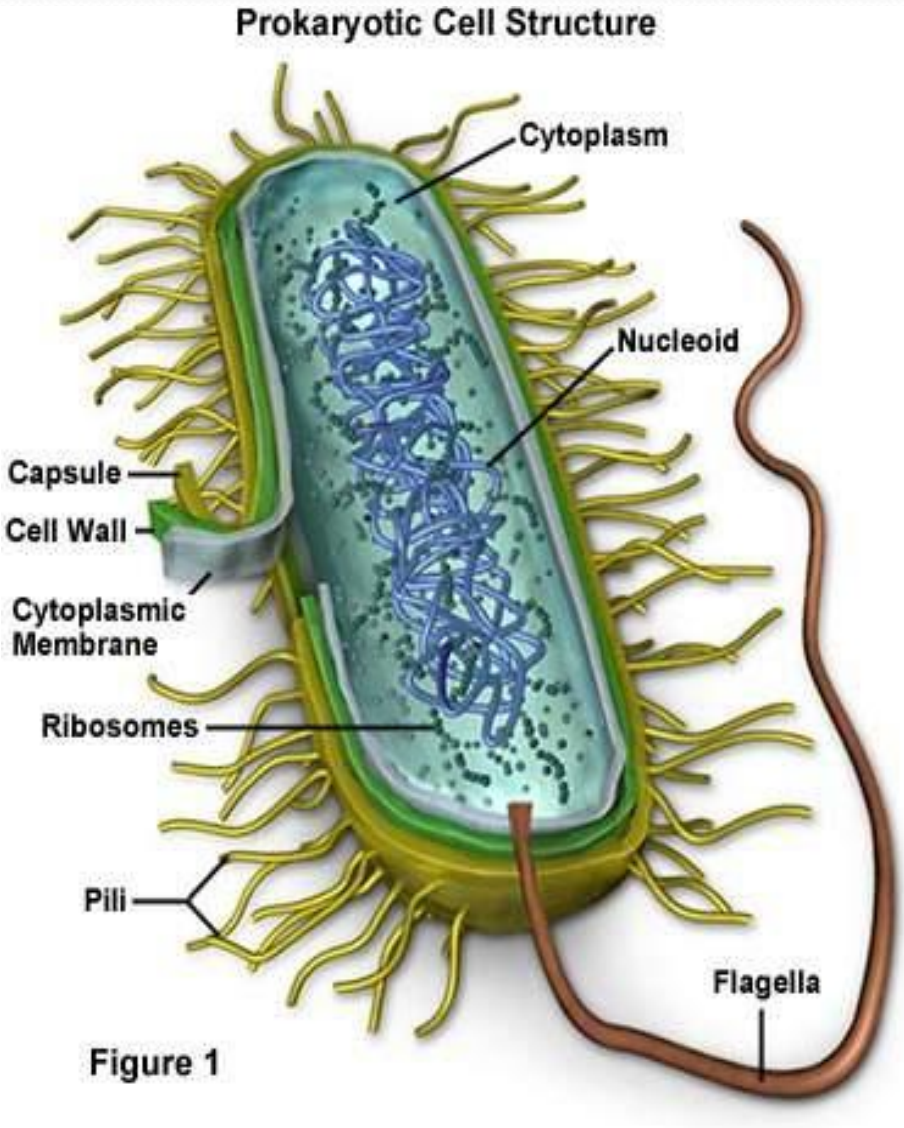


Figure 1

The bacterial structures may be divided into three categories:

- **Essential structures**, present in all bacteria.

- **Structures present in some species** (primary taxonomic characters).

- **Structures present in some strains** of some species.

The bacterial structures may be divided into three categories:

* **Essential structures**, present in all bacteria

- Protoplast (cytoplasm and nuclear body).

- Cytoplasmic membrane.

- Cell wall.

* **Structures present in some species**:

- Flagella

- Spores

- Inclusion granules.

Structures present in some strains of some species:

- Fimbriae.

- Pili.

- Glicocalix (capsule, microcapsule, etc.).

Motility in bacteria

Bacteria are either non-motile or motile. Motile forms are either creeping or swimming. Creeping bacteria *(e.g. Myobacterium)* move or creep slowly on a supporting surface as a result of wave-like contractions (contract and relax) of their bodies. Swimming bacteria move freely in a liquid medium due to the presence of flagella.

Flagellated forms differ with respect to number and pattern of attachment of flagella. The following forms can be to:

Motility in bacteria

Flagellated forms differ with respect to number and pattern of attachment of flagella. The following forms can be to:

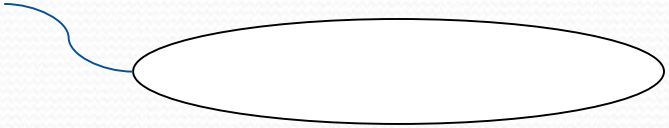
- **Monotrichous**. One flagellum attached to one pole of the cell.

- **Lophotrichous**. A tuft of flagella at one pole of the cell.

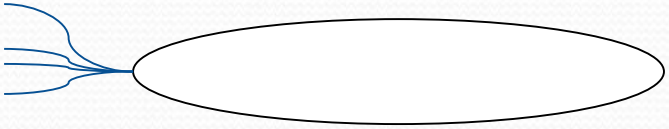
- **Amphitrichous**. A single or a tuft of flagella at the two poles of the cell.

- **Peritrichous.** Many flagella distributed over the whole surface of the cell.

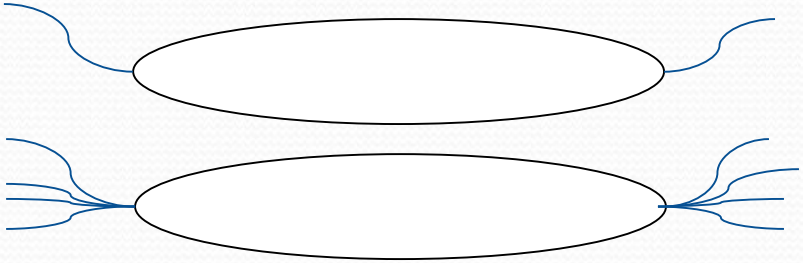
Monotrichous



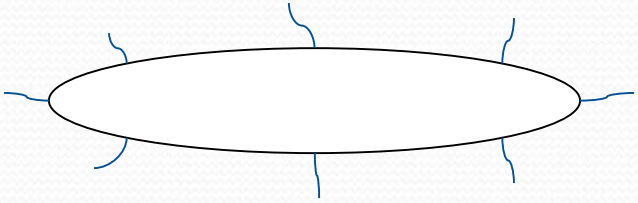
Lophotrichuos



Amphitrichous



Peritrichous



QUESTIONS??