

# Bacteria's shapes

## Spherica - Cocci

\* kokkos = seed.

- Micrococci = single
- Diplococci = pairs.
- streptococci = rows, chains.
- staphylococci = irregular clusters.
- Tetrads = four.
- Sarcinae = cuboidal, different geometrical.

## Rod shaped - Bacillus

\* bacilli = rod, stick.

\* their ends → rounded flat  
→ pointed.

\* → flagellated  
↳ non flagellated

- Monobacillus = single
- Diplobacillus = group of two.
- streptobacillus = chain.
- palisade = rare, palisade arrangement

## Spiral - Helical

\* spira = coiled.

\* Single spirillum has more than one turn of helix.

\* flagellated.

## Vibrio - Coma

\* bear flagella at their end.

\* example = vibrio cholerae.



## spirochaeta

\* like corkscrew.

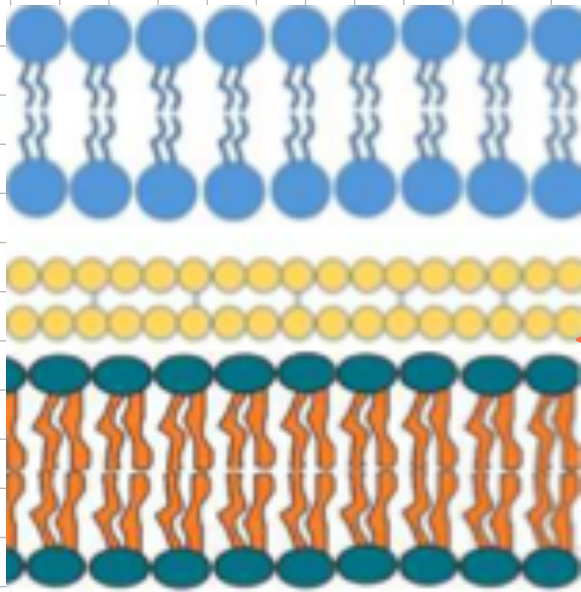
\* length > diameter

\* their body more flexible.

# Gram Negative

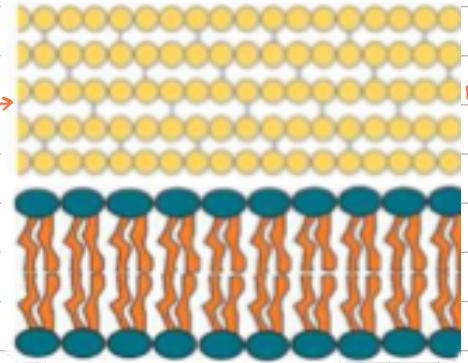
VS

# Gram Positive



5-10%

← peptidoglycan →



40-80%

\* تلوية من اثني مرة .

\* 2 membranes : اثني غشائين

\* inner + outer.

\* تلوية من أول مرة

\* 1 غشاء واحد .  
membrane

inner only.

\* Harder to treat  
with antibiotics.

\* More easily treatable  
with antibiotics.

# \* $\beta$ peptidoglycan :

AA = Amino Acid

rigid mesh made up of ropelike linear

polysaccharide chains made up of

repeating disaccharides of  $\rightarrow$  N-acetylglucosamine

NAG

$\rightarrow$  N-acetylmuramic acid

NAM

\* Tetrapeptide attached to NAM.

●●●● Peptidoglycan bridge

G N-acetylglucosamine

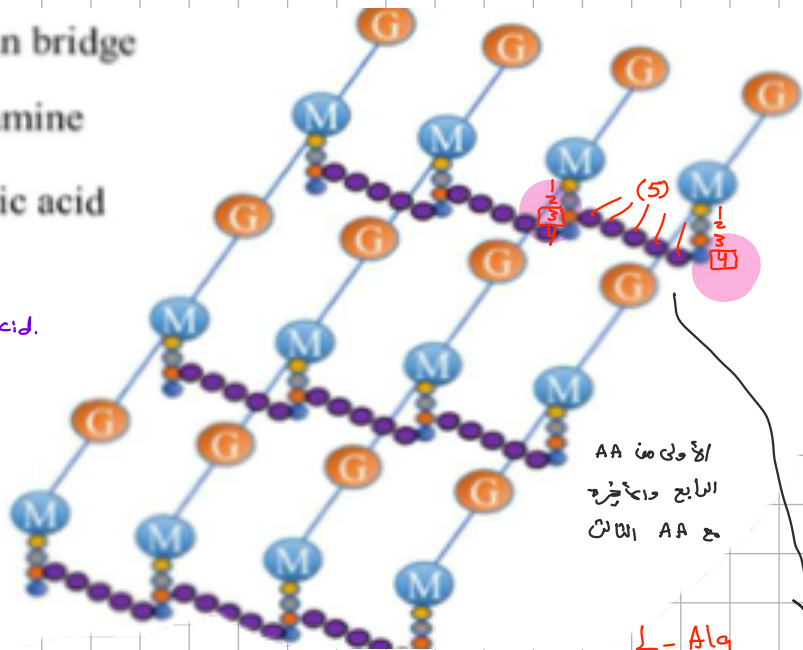
M N-acetylmuramic acid

● L-Ala = Alanine

● D-Glu = Glutamic acid.

● L-Lys = Lysine.

● D-Ala



\* كما عفا البنتون  
بالمعارج.

الأولى من  
الباح وابتدأ  
مع AA

L-Ala      L-Ala  
D-Glu      D-Glu  
L-Lys      L-Lys  
D-Ala      D-Ala

L-Ala  
D-Ala } stereoisomers AA

## Techoic acids :

\* Glycerol phosphate  
or  
ribitol phosphate + Carbohydrates.

\* phosphodiester bonds

## Lipotechoic acids (LTA)

\* Long chains of ribitol or glycerol phosphate.

= Functions :

+

Anchor peptidoglycan layers to the plasma membrane

+

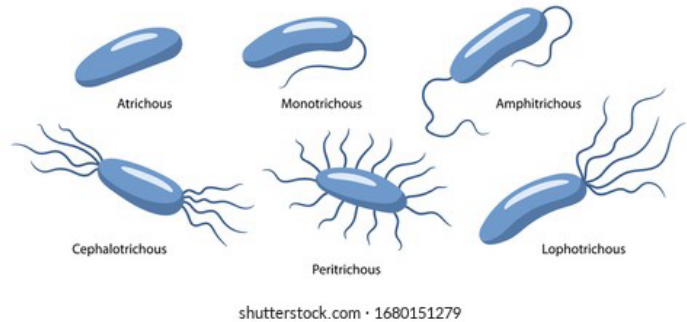
Attachment to other bacteria and to specific receptors on mammalian cell surfaces.

# Ultrastructure of Bacterial Cell

## Flagella.

- \* Flexible - whiplike structure.
- \* protein flagellin
- \* basal body + Hook + shaft
- \* strands called axoneme = 9 + 2 pattern of microtubules.

### Arrangement of bacterial flagellars

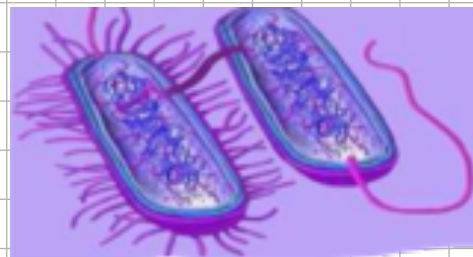


Bacteria can be classified into different types based on the number and location of their **flagella**, the whip-like structures that help them move. The main types are:

1. **Monotrichous:** These bacteria have a single flagellum located at one end (pole) of the cell. An example is *Vibrio cholerae*, the bacterium that causes cholera.
2. **Lophotrichous:** These bacteria have a cluster of flagella at one or both poles of the cell. An example is *Pseudomonas*, which uses this arrangement for rapid movement.
3. **Amphitrichous:** These bacteria have a single flagellum or clusters of flagella at both poles of the cell. *Alcaligenes faecalis* is an example of this type.
4. **Peritrichous:** In these bacteria, flagella are spread all over the surface of the cell. *Escherichia coli* and *Salmonella* are examples of peritrichous bacteria.
5. **Atrichous:** These bacteria lack flagella entirely and do not rely on motility.

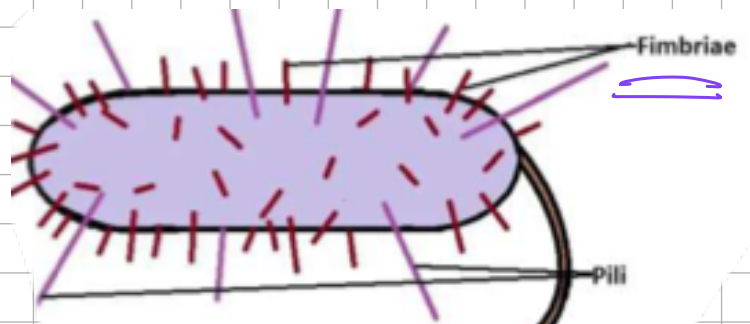
## Pili;

- \* hair like.
- \* in most gram neg. <sup>(-)</sup> and can be found in gram pos. <sup>(+)</sup>
- \* smaller than flagella.
- \* no role in motility of bacteria.
- Somatic pili, = help for attachment to substratum.
- sex, conjugate pili. = allow the transfer of DNA between bacteria.



## Fimbriae.

- \* short pilus.
- \* attach the bacterium to a surface.
- \* called = attachment pili.
- \* Location → spread over the surface, → at the poles of cells



⇒ Raghad Mohammad.

