


Bacteria (staining of bacteria)

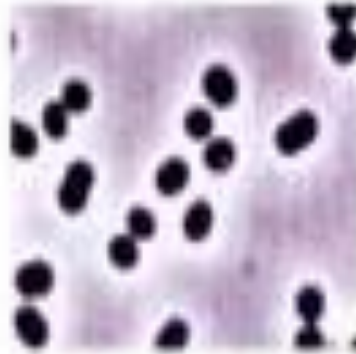
Morphology of bacteria:

Bacteria is a prokaryotic cells.

- 1) Spherical or round called: **cocci** 
- 2) Rod called: **bacilli** 
- 3) Coiled or spiral. 



Coccus



Rod








spillum








Arrangements of bacteria:




Cocci:

- ▶ Single ----→ coccus 
- ▶ Pairs of cocci ----→ diplococci 
- ▶ Chain of cocci ----→ streptococci 
- ▶ Cluster of cocci ----→ staphylococci 
- ▶ Packet of 4,6,8 cocci ----→ micrococci 

Bacilli:

- ▶ Single ----→ bacillus 
- ▶ Pairs ----→ diplobacilli 
- ▶ Chains ----→ streptobacilli 
- ▶ Narrow bacilli ----→ fusiform 
- ▶ Very short bacilli----→ cocco bacilli 

Spiral bacteria:

- ▶ One rigid curve ----→ spirilla 
- ▶ Several curves (waves)----→ spirochaetes 
- ▶ Short, curved bacteria ----→ comma shape 

Pleomorphism: when there are variation in sizes and shapes of bacteria

Staining of bacteria

Stain (dye):

Stains are generally salts in which one of the ions is colored.

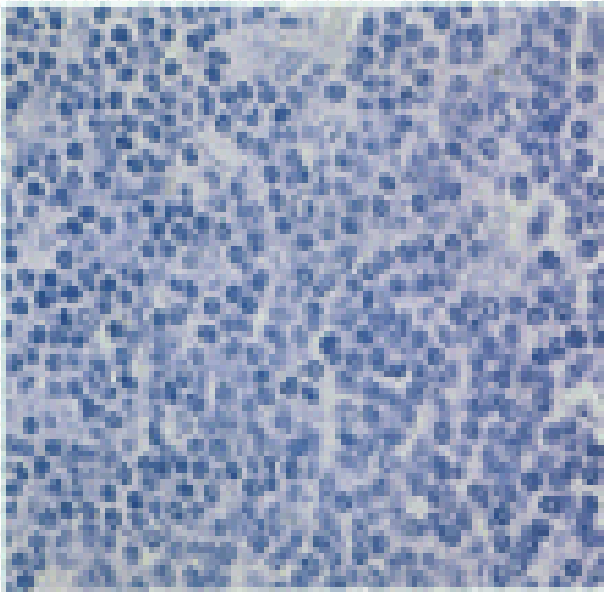
(A salt is a compound composed of a positively charged ion and a negatively charged ion.)

Ex. : Methylene blue (MbCl).

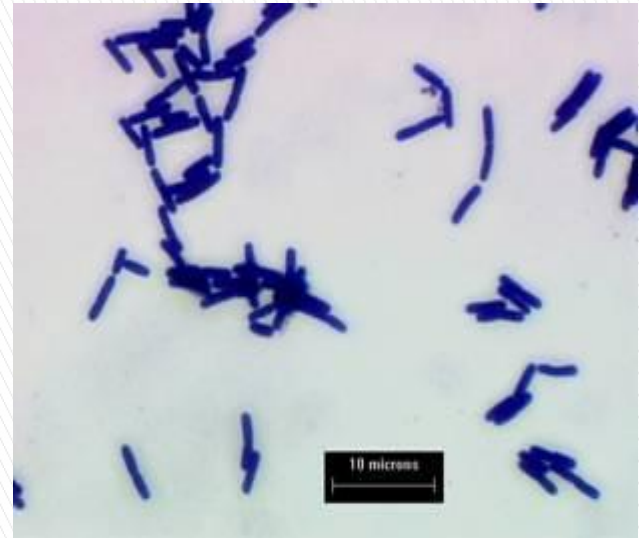
Basic dye: if the color is in the +ve ion of the dye.

Acidic dye: : if the color is in the -ve ion of the dye.

Bacteria stained by Methylene blue (MB)

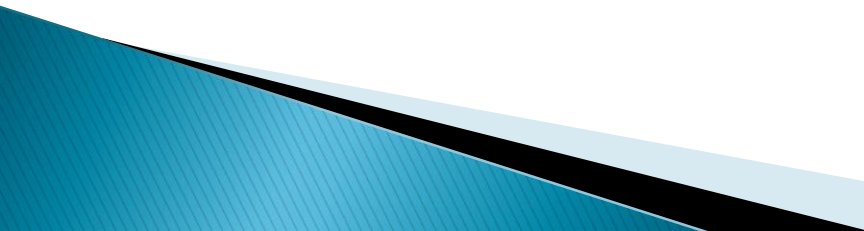


staphylococci stained by MB



streptobacilli stained by MB

How to make bacterial smear?

- ▶ The slide we use for doing the smear should be clean (no dust or oil on top of it).
 - ▶ Place the slide on the **slide warmer**:
 1. To kill the bacteria.
 2. Fix the bacteria on the slide by coagulate the protein substance of the bacterial cells.
- 

Simple stain

Consist of one stain

Show shape and arrangement of bacteria only

Ex. : Methylene blue

Differential stain

Consist of 2 or more stain

Show shape, arrangement, spores, capsule and give different colors

Ex. : gram stain
Spore stain
Capsule stain

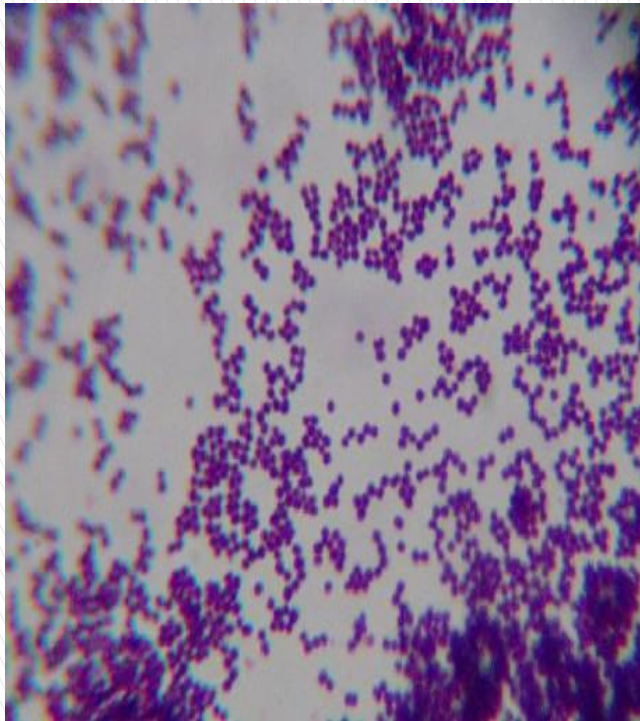
Gram stain:

Consist of 4 reagents:

1. Crystal violet: primary stain./ 1 min
2. Iodine: mordant./ 1 min
3. Alcohol or acetone: decolorizer. / 7sec
4. Safranin: counter stain./ 1 min

- ❖ We will see in the slide:
 - Violet bacteria: gram +ve bacteria.
 - Red bacteria: gram -ve bacteria

Gram +ve bacteria

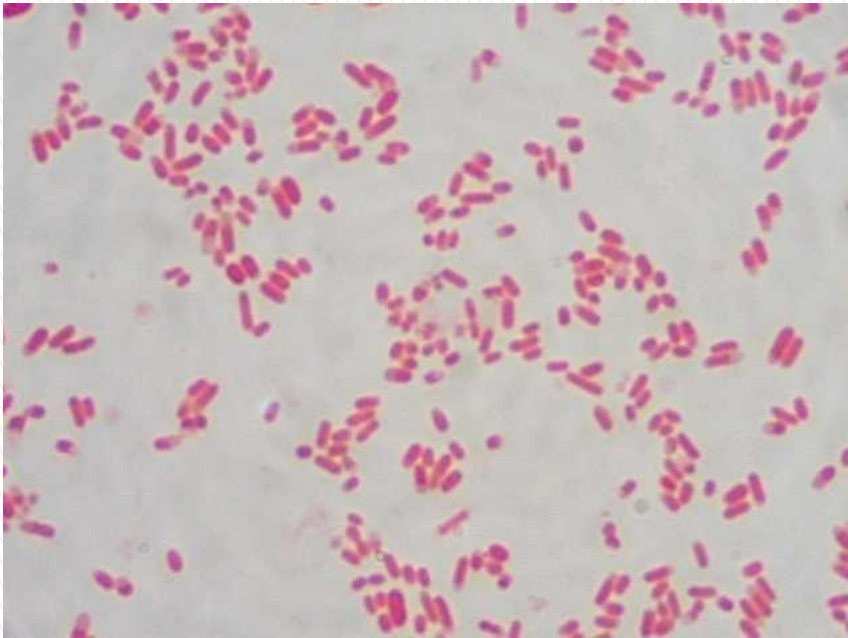


Gram +ve staphylococci (cocci in cluster)

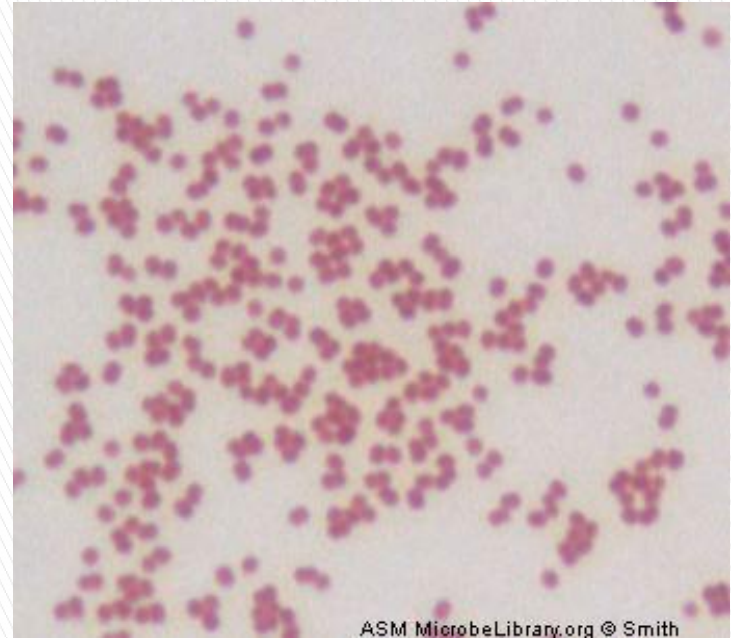


Gram +ve streptobacilli (bacilli in chain)

Gram -ve bacteria



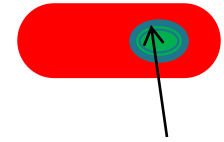
Gram -ve bacilli



Gram -ve cocci

Spore stain:

Spores are formed by some bacteria. Spores resist heat, chemical & difficult to stain.

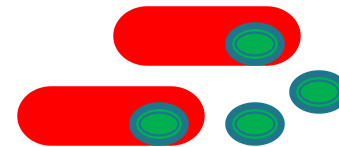


spore

Steps for staining spore are:

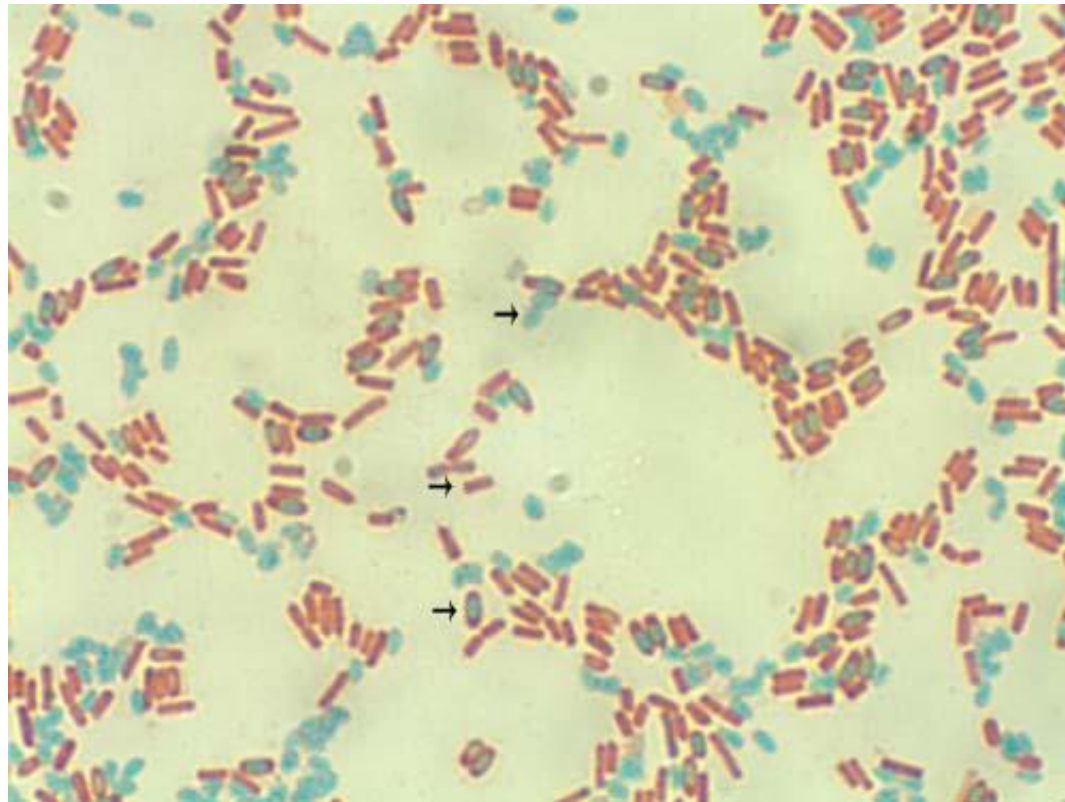
1. Malachite green: primary stain (strong stain).
2. Apply heat (water bath) and leave it for 5–10 min.
3. Safranin: counter stain./ 1 min

❖ We will see in the slide:
Red bacilli with green spores.

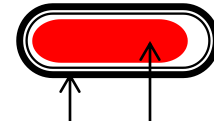


Spore stain

Red bacilli with green spores



Capsule stain:



capsule bacteria

It is called **Negative stain**

Because the capsule made of inert polysaccharide (uncharged) so it will not stained. Only the background and the bacteria will be stained.

To stain the capsule we use:

Black india ink

OR

Nigrosin + safranin.

❖ We will see in the slide:

Dark background (purple) with round uncolored capsule and red bacteria inside the capsule.

Capsule stain

dark background with uncolored capsule and red bacteria inside the capsule

