CAPSULE AND SLIME LAYER

Difference Between Capsule and Slime Layer

- **Definition**

Capsule: A glycocalyx layer, consisting of firmly associated polysaccharide molecules with the cell wall is called the capsule.
Slime Layer: A glycocalyx layer that consists of loosely associated polysaccharide molecules is called the slime layer.

- **Composition**

Capsule: Capsule is composed of polysaccharides or may be proteins
Slime Layer: Slime layer is composed of exopolysaccharides, glycoproteins, and glycolipids.

- **Thickness**

Capsule: Capsule is thicker than the slime layer.
Slime Layer: Slime layer is a thin glycocalyx layer.

- **Binding**

Capsule: Capsule is tightly bound to the cell wall.
Slime Layer: Slime layer is loosely bound to the cell wall.

- **Organization**

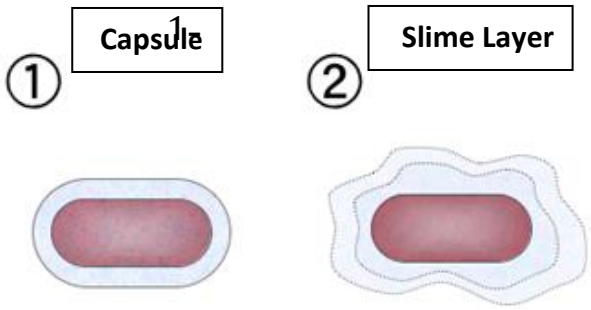
Capsule: Capsule is a well-organized layer. Hence, it is difficult to be washed off.
Slime Layer: Slime layer is an unorganized layer. Hence, it can be easily washed off.

- **Functions**
- **Slime**

- It protects the bacterial cell from physical damage such as antibiotics and survive sterilization by chemicals such as iodine and chlorine, but it cannot escape autoclaving.
- It helps the bacteria in adhering to smooth surfaces.
- A slime layer is mainly composed of polysaccharides therefore used for extra food storage for survival.
- It is also produced in soil dwelling prokaryotes to prevent them from unnecessary drying during annual temperature and humidity shifts.

Capsule:

- It also protects the bacterial cell wall from engulfment by the white blood cells (phagocytosis)
- The presence of a capsule in bacteria determines its virulence factor. For example, *Pseudomonas aeruginosa,* which causes cystic fibrosis, produces a thick capsular layer of alginic acid upon invading the lung cells that makes it difficult for our immune system to eradicate it.
- It also helps the bacteria to adhere to various surfaces.



Detection of Bacterial capsule production methods

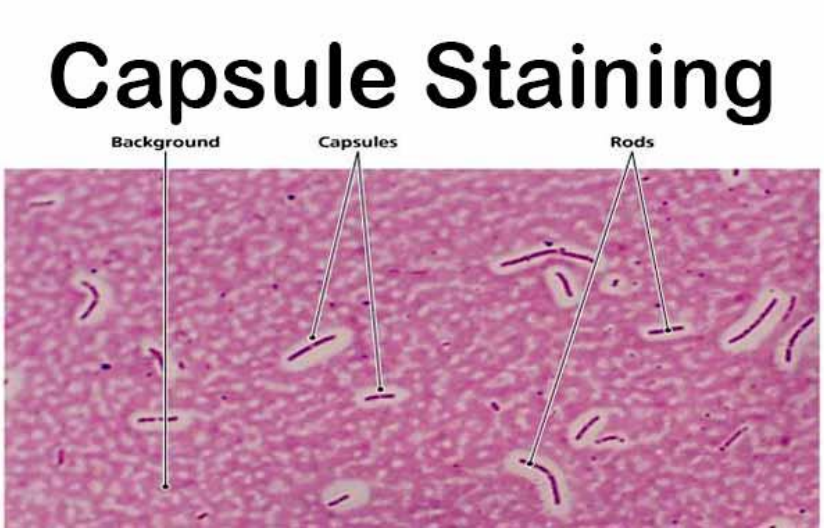
- **Materials**

1- Models of bacterial cultures *Klebsiella pneumoniae*, *Streptococcus pneumonia*
2- Pigments (India Ink, crystal violet).
3- Slides.
4- Benzen lamp.
5- bibulous paper

- **the method of work:**

1- Place a small drop of a negative stain (India Ink, Congo Red, Nigrosin, or Eosin) on the slide.
Congo Red is easier to see, but it does not work well with some strains. India Ink generally works, but it has tiny particles that display Brownian motion that must be differentiated from your bacteria. Nigrosin may need to be kept very thin or diluted.

2- Using sterile technique, add a loopful of bacterial culture to slide, smearing it in the dye.
3- Using another slide, drag the dye-cell mixture in a thin film along the first slide and leave it for 5-7 minutes to air dry (without drying or heat fixation).
4- Immerse the slide in crystal violet for one minute.
5- Get rid of excess dye by tilting the slide at a 45-degree angle and allowing it to air dry.
6- Examining the slide with a microscope at a force of 100X to check for the presence or absence of the capsular, where when it is present it appears as a clear area surrounding the cell.



Detection of Bacterial biofilm production methods (Tube method)

- **Materials**

1- *staph. aureus* and *Staph. epidermidis* culture.
2- Test tubes containing Tryptic Soy Broth (TSB) medium fortified with 1% glucose.
3- phosphate buffer saline (PBS) pH 7.3.
4- crystal violet 0.1%.

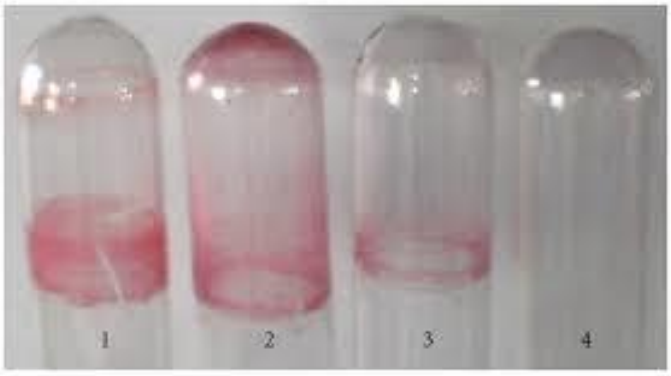
- **The method of work**

1- Test tubes containing 2 ml of Tryptic Soy Broth medium were inoculated with an loop from bacterial isolates, then the tubes were incubated at 37 ° C for 24-48 hours.

2- After incubation, discard the leaves and wash the tubes with phosphate buffer pH7.3, then leave the tubes to dry.

3- The tubes are stained with crystal violet 0.1% dye for 30 minutes, then the dye is removed by washing it with distilled water and leaving the tubes to dry upside down.

Isolates producing biofilm produce a red layer covering the area of bacterial growth around the tube wall and the bottom while the non-producing layer is not on the tube walls.



Isolates producing biofilm

Isolates not producing biofilm