

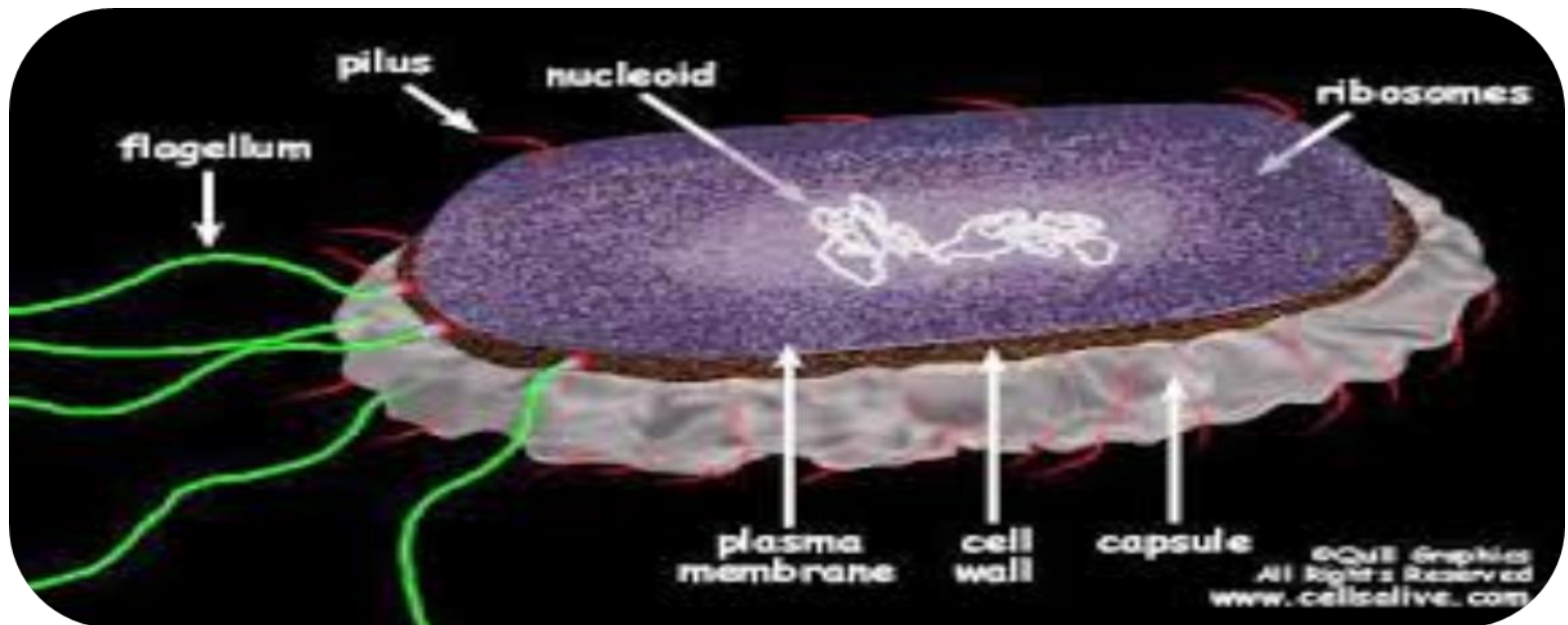
Capsule staining technique



By
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Capsule staining technique

- Capsules are viscous substance that form a covering layer around the cell.



Capsule staining technique

➤ ***Nature of bacterial capsule:***

Sugar (polysaccharides)

Amino acids (amino acid polymers)

➤ ***Examples of capsulated bacteria:***

Klebsiella pneumoniae (gm-ve) >>>>> polysaccharide

Bacillus anthracis (gm+ve) >>>>>>> polypeptide

Streptococcus pneumoniae (gm+ve) >>>> hyaluronic acid

➤ **Polysaccharide capsule is the most common type.**

Capsule staining technique

➤ **Capsule functions:**

- 1) Protect the cell from phagocytosis >>> virulence factor(enhance bacteria to cause disease)
- 2) Protect the cell from drying>>> contain water
- 3) Act as binding or adhesion agents for sticking cells together
- 4) Provide a food reserve when certain organic compounds are in excess.

➤ **Colonies of bacteria growing on agar take a characteristic appearance:**

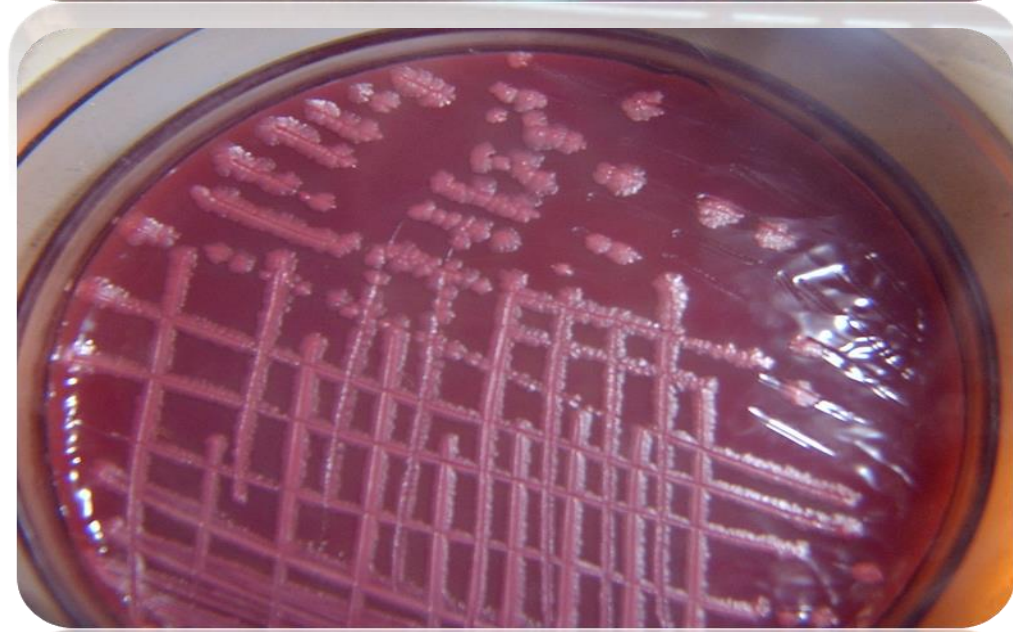
- Smooth (S) >>>> capsulated bacteria.
- Rough (R)>>>> non capsulated bacteria

Capsule staining technique

**Smooth colonies
of *K. pneumoniae***



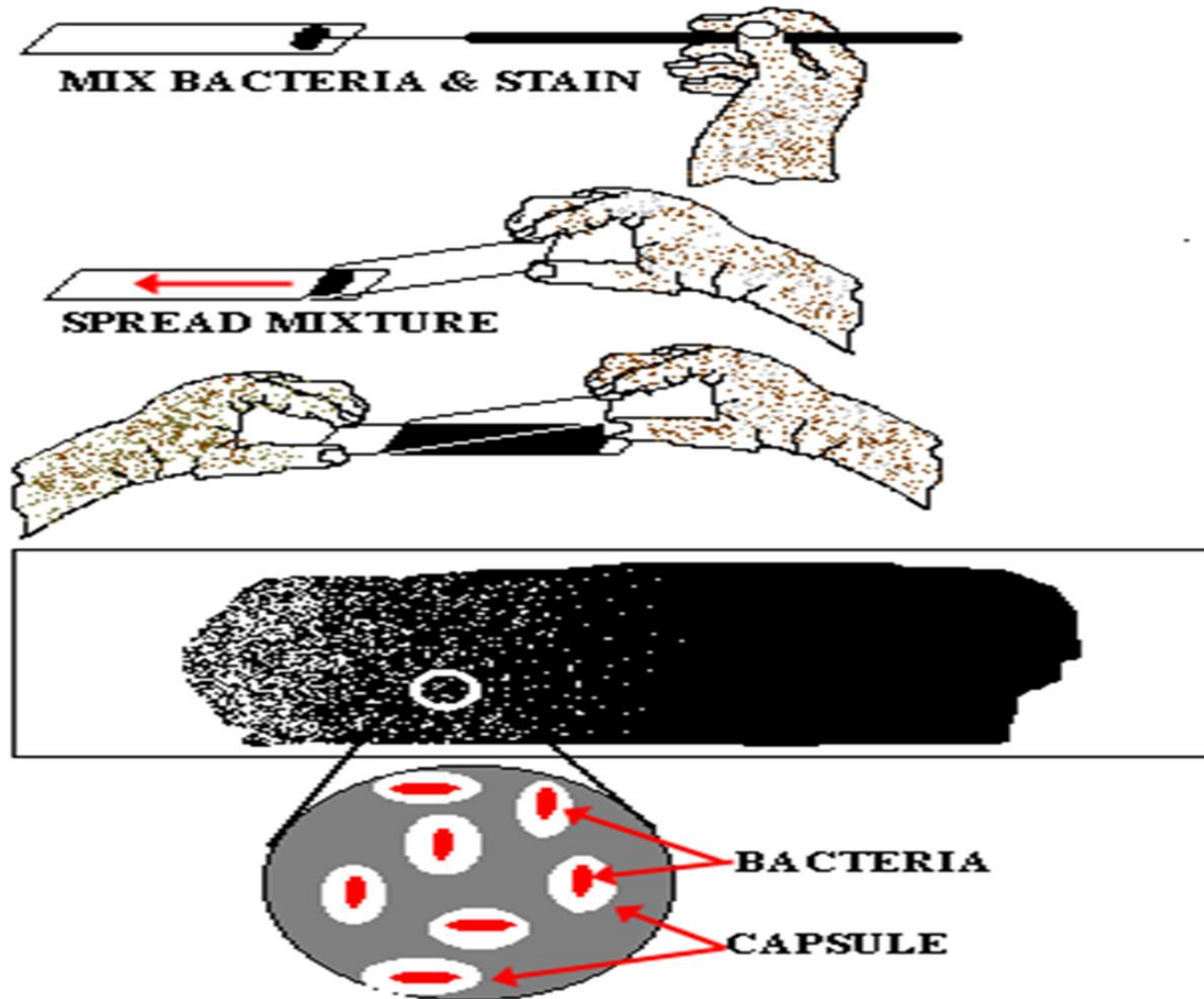
**Rough colonies
of *E. coli***



Capsule staining technique

- 1- Mix a drop of Indian ink or nigrosin and a loopful bacterial suspension on one end of a slide.*
- 2- Use another slide to spread the mixture. Leave it to air-dry.*
- 3- Flood the slide with crystal violet for 1 min. Very gently rinse with water and leave to air dry (no blot drying as it distorts capsules). Observe under oil immersion lens.*
You will see black or grey background and violet bacteria leaving a halo part which is the capsule.

Capsule staining technique



Capsule staining technique

Capsule staining theory

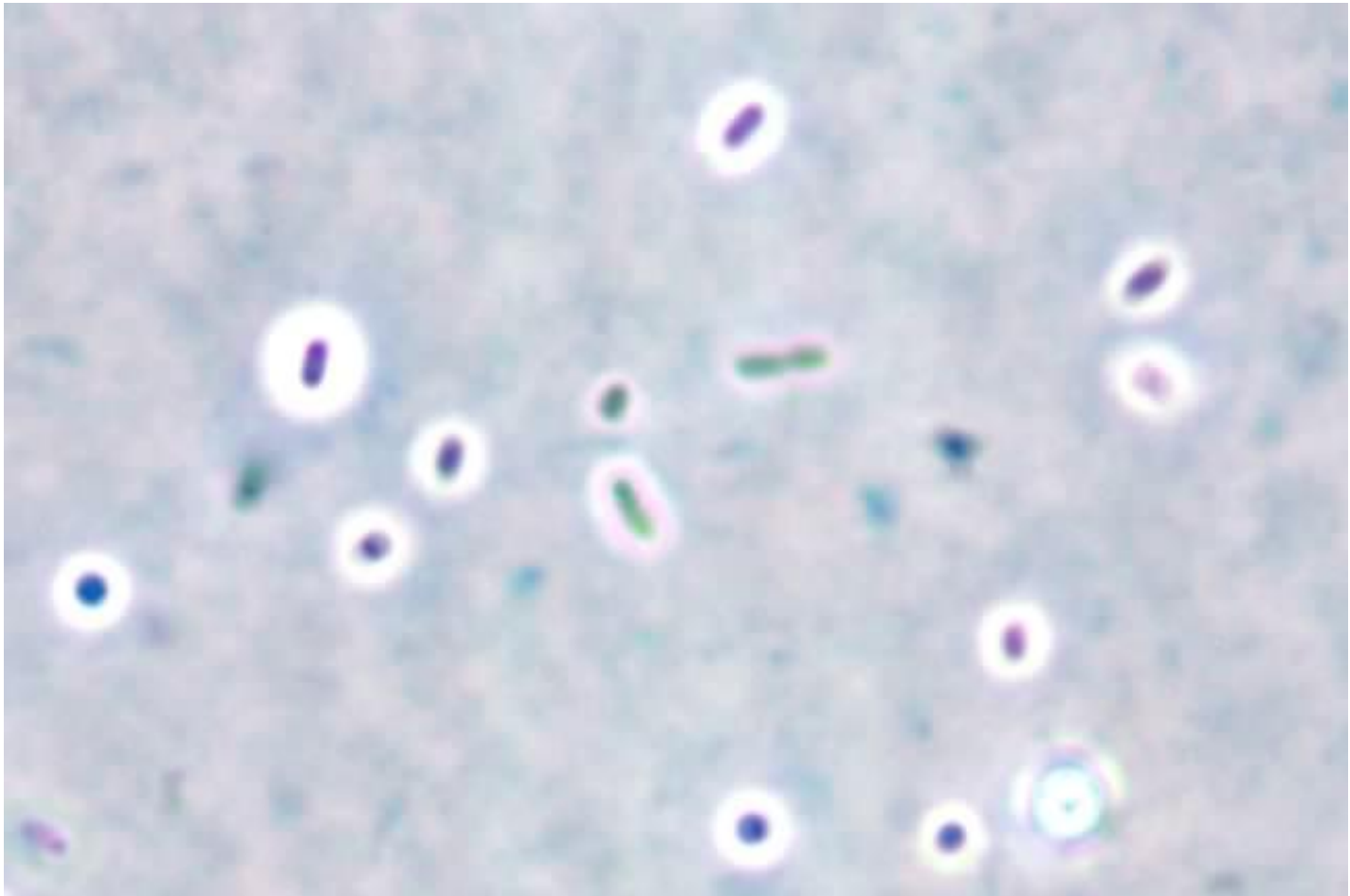
- Capsule staining is a negative stain.
- Most staining techniques are based on formation of ionic bond between the stain & the cell
- Capsules are nonionic >>>> so dyes will not bind to the capsule >>>> so capsule will not be stained
- nigrosin(-ve stain)>>>stain background only

Capsule staining technique



Results

Capsule staining technique



Capsule staining technique

	Capsulated organism	Non capsulated organism
name	<i>Klebsiella pneumoniae</i>	<i>Escherichia coli</i>
Shape	Short rod	Short rod
Arrangement	Single & scattered	Single & scattered
Color	Violet cell – colorless capsule – blue background	Violet cell – no capsule – blue background
Colony on solid media	smooth	rough

