



بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

**222micro**

**Lab 3 : Bacterial Appendages (1)**



# Structures

1

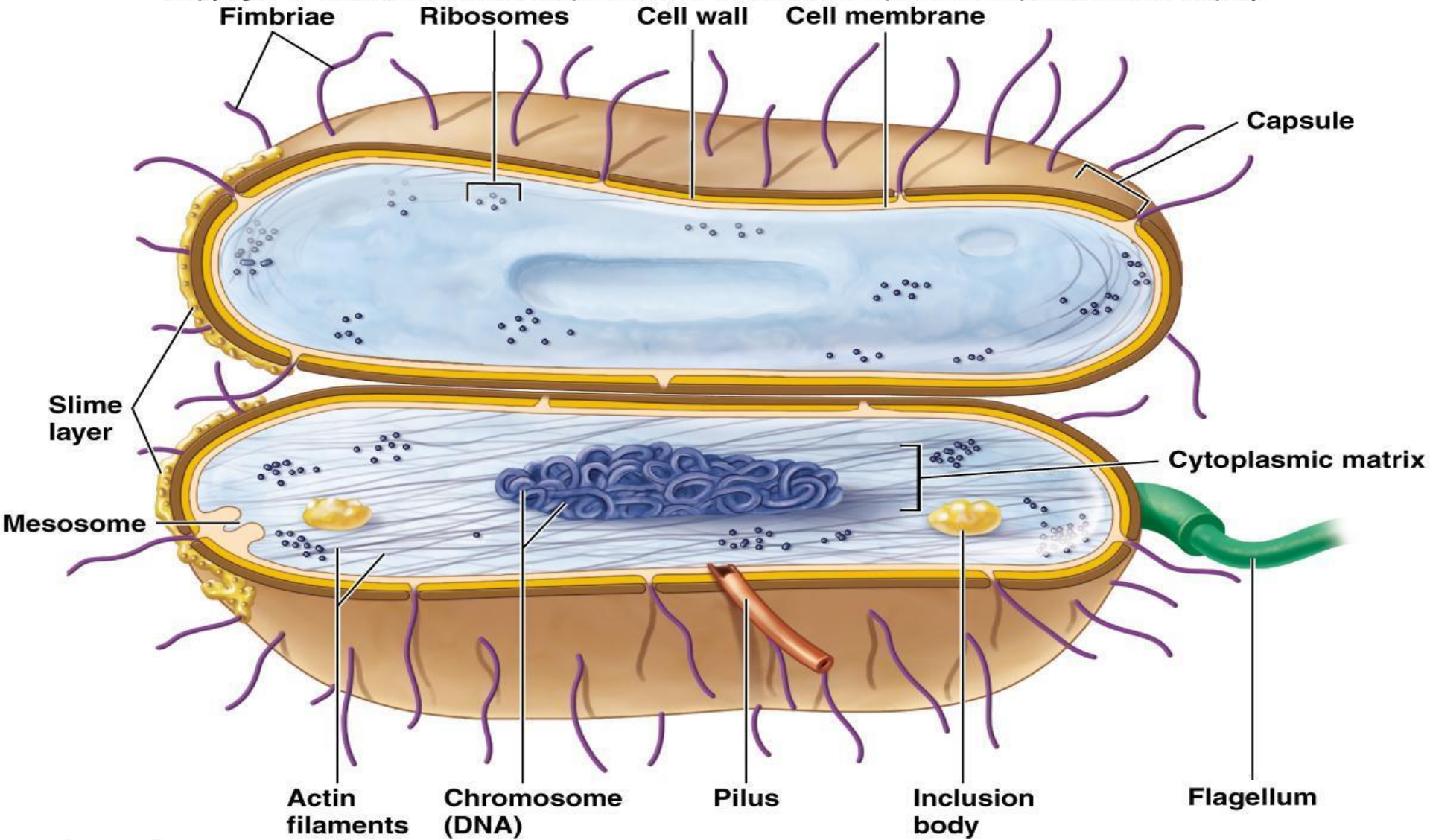
Capsule

2

-Flagella  
-Pilli  
-Fimbriae

3

Endospores



**5** Cells secrete their enzymes in unison to digest food particles.



# CAPSULE

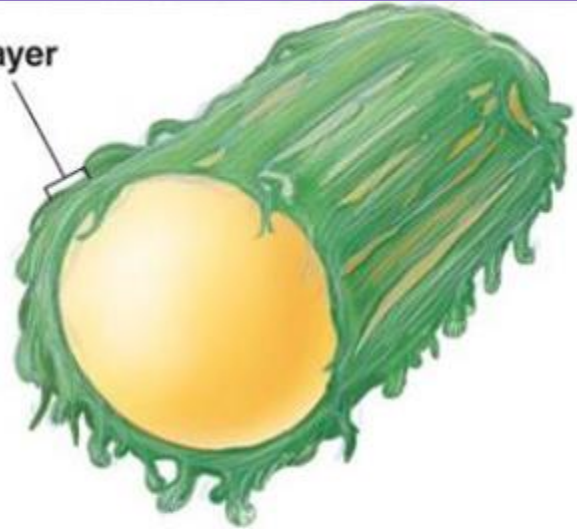


# 1. Bacterial Surface Structure - cell envelope

- ◎ **Glycocalyx** - some extracellular material secreted by many bacterial cells in the form of:
  - ◎ **capsule** - attached tightly to the bacterium and has definite boundaries.
  - ◎ **slime layer** - loosely associated with the bacterium and can be easily washed off
- ◎ **Compositions:**
  - ◎ **layer of polysaccharide**
  - ◎ **proteins** - sometimes

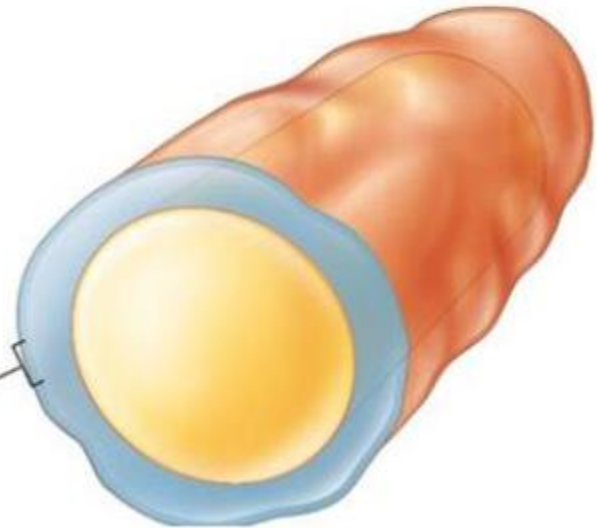


Slime Layer



(a)

Capsule



(b)

Capsule





# Functions of the Capsule

- ◎ Protection from phagocytic engulfment.
- ◎ Identification
- ◎ Vaccine preparation
- ◎ Tissue attachment
- ◎ Depot for waste products
- ◎ Resistance to drying



# Medical Importance

## Rapid serological identification of:

- ◎ Several groups of streptococci
- ◎ Meningococcus
- ◎ *Hemophilus influenzae*
- ◎ *Klebsiella pneumoniae*
- ◎ Some of the coliforms
- ◎ *Yersinia* and *Bacillus* specie





# CAPSULE STAIN



# WHY WE USE CAPSULE STAIN ?

- ◎ Bacterial capsules are **non-ionic**, so neither acidic or basic stains will adhere to their surfaces
- ◎ Because most capsule materials are water soluble, simple stains will not adhere to them



# Note

- ◎ Older cultures are more likely to exhibit capsule production.
- ◎ Make sure the culture you take your sample from is at least five days old.

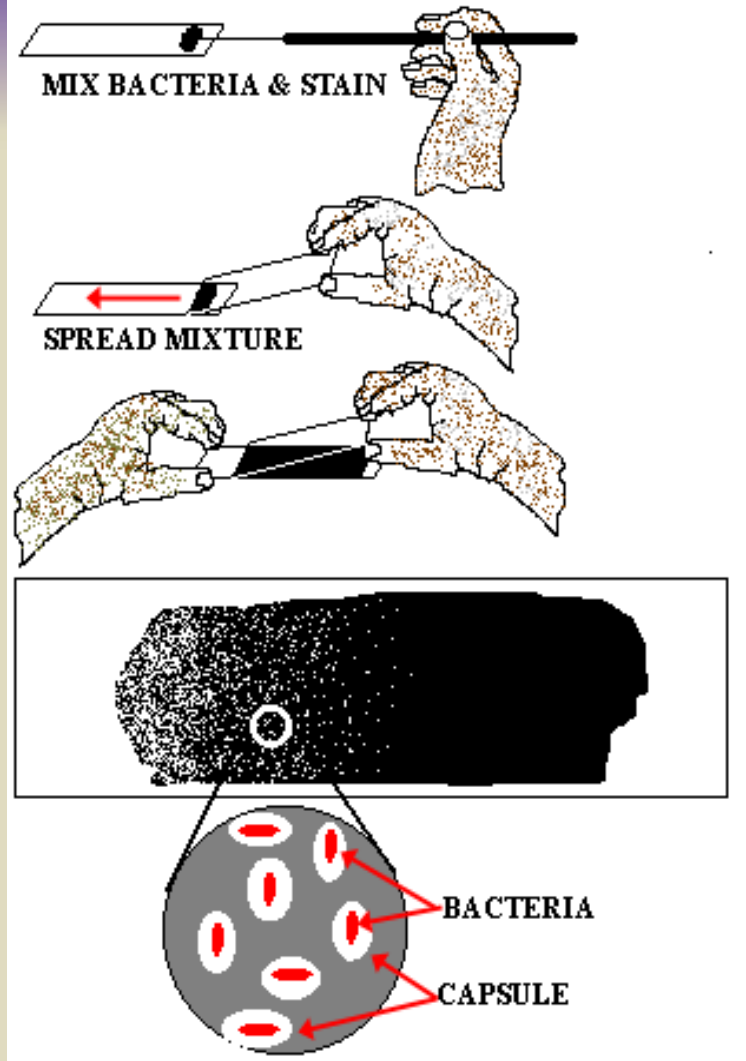


# MATERIALS

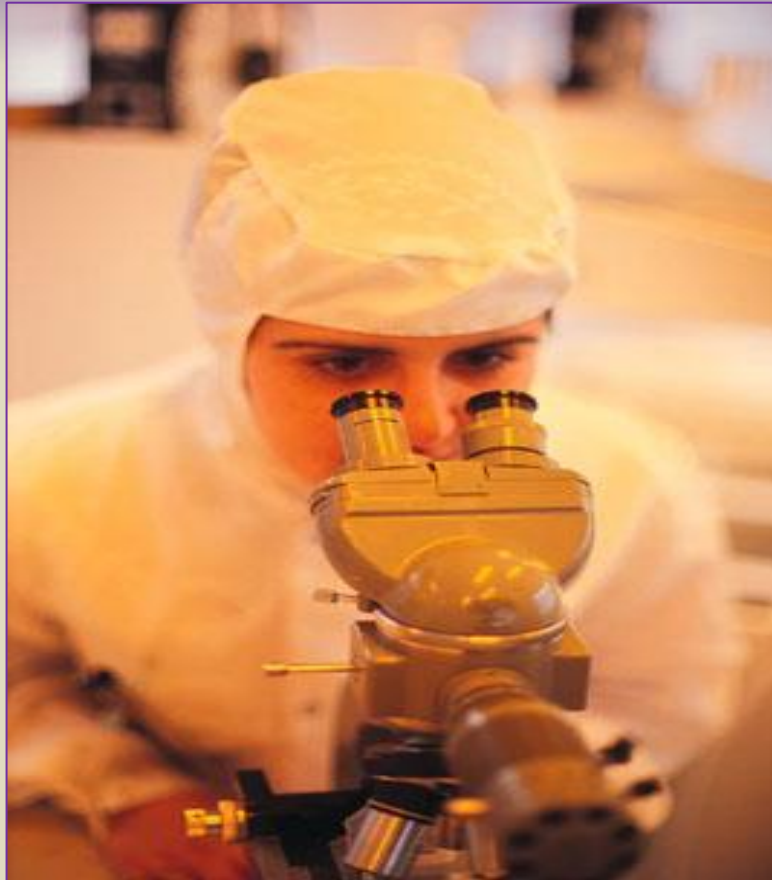
- ◎ Clean slid microscope
- ◎ India Ink (nigrosin) , crystal violet and Copper sulfata ( $\text{CuSO}_4$ )
- ◎ Bibulous paper
- ◎ Culture of bacteria
- ◎ Sterile loop

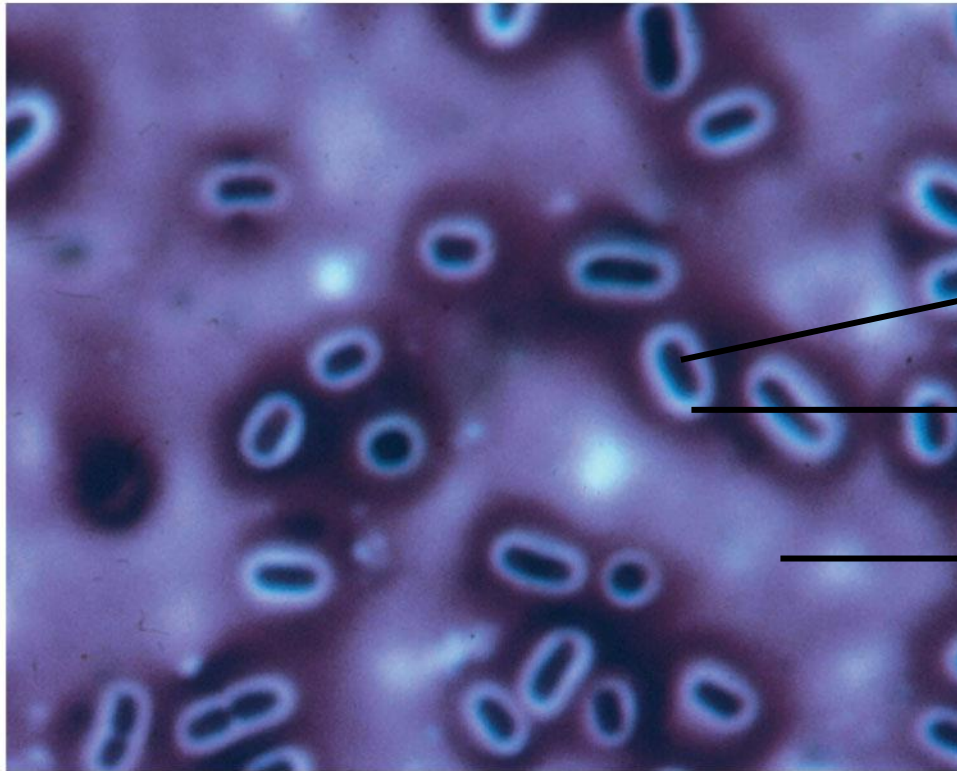
# Capsule Staining Procedure

capsule  
stains are  
not heat-  
fixed



# Pictures of capsule stain





**Bacterium**

**Capsule**

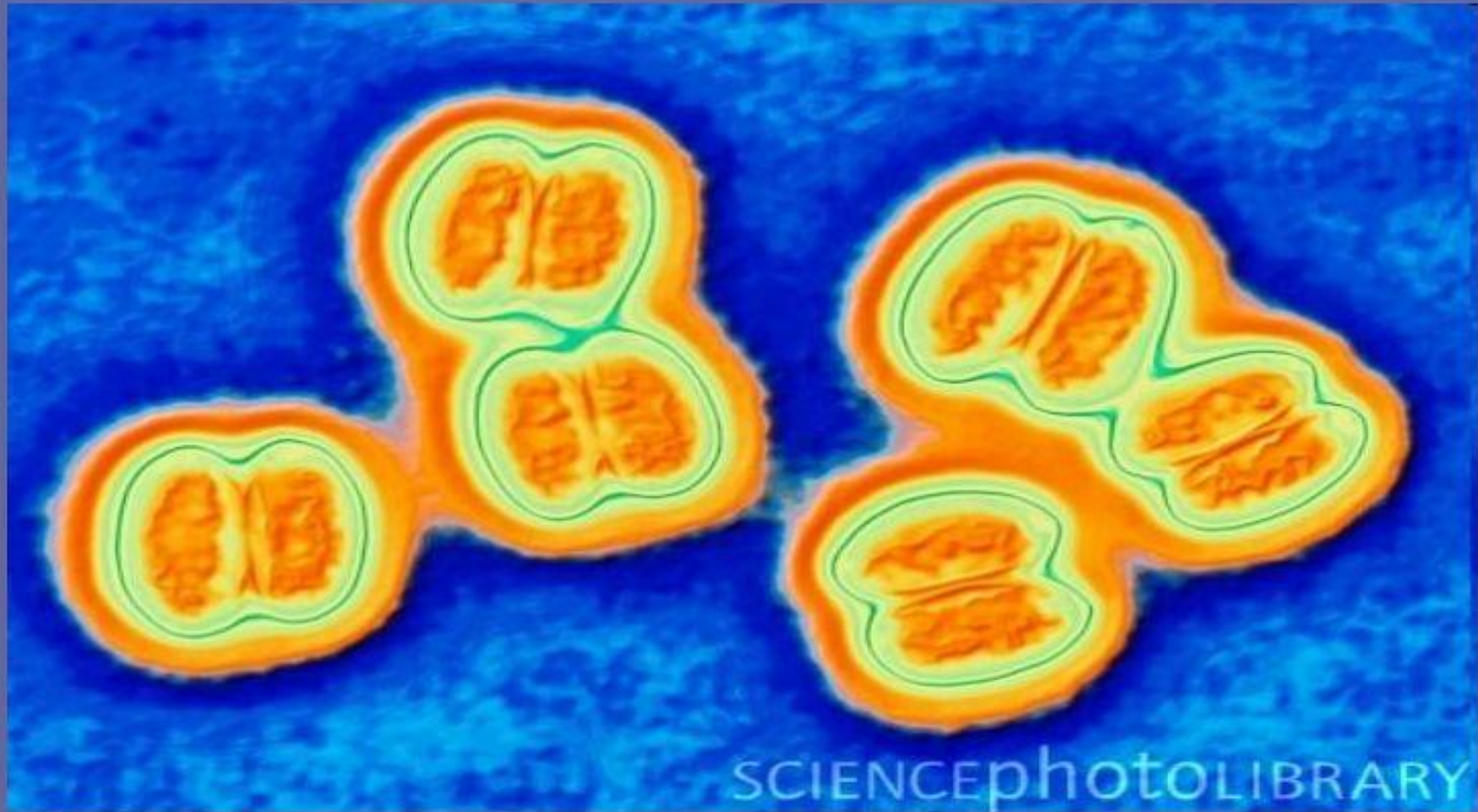
**Background  
stain**

**LM**

**6 μm**



*Neisseria meningitidis* - Gram-negative coccus, non-motile bacteria occur as two cells (orange) in a capsule (yellow)





*Haemophilus influenzae* bacteria in the process of expressing polysaccharide capsules.

