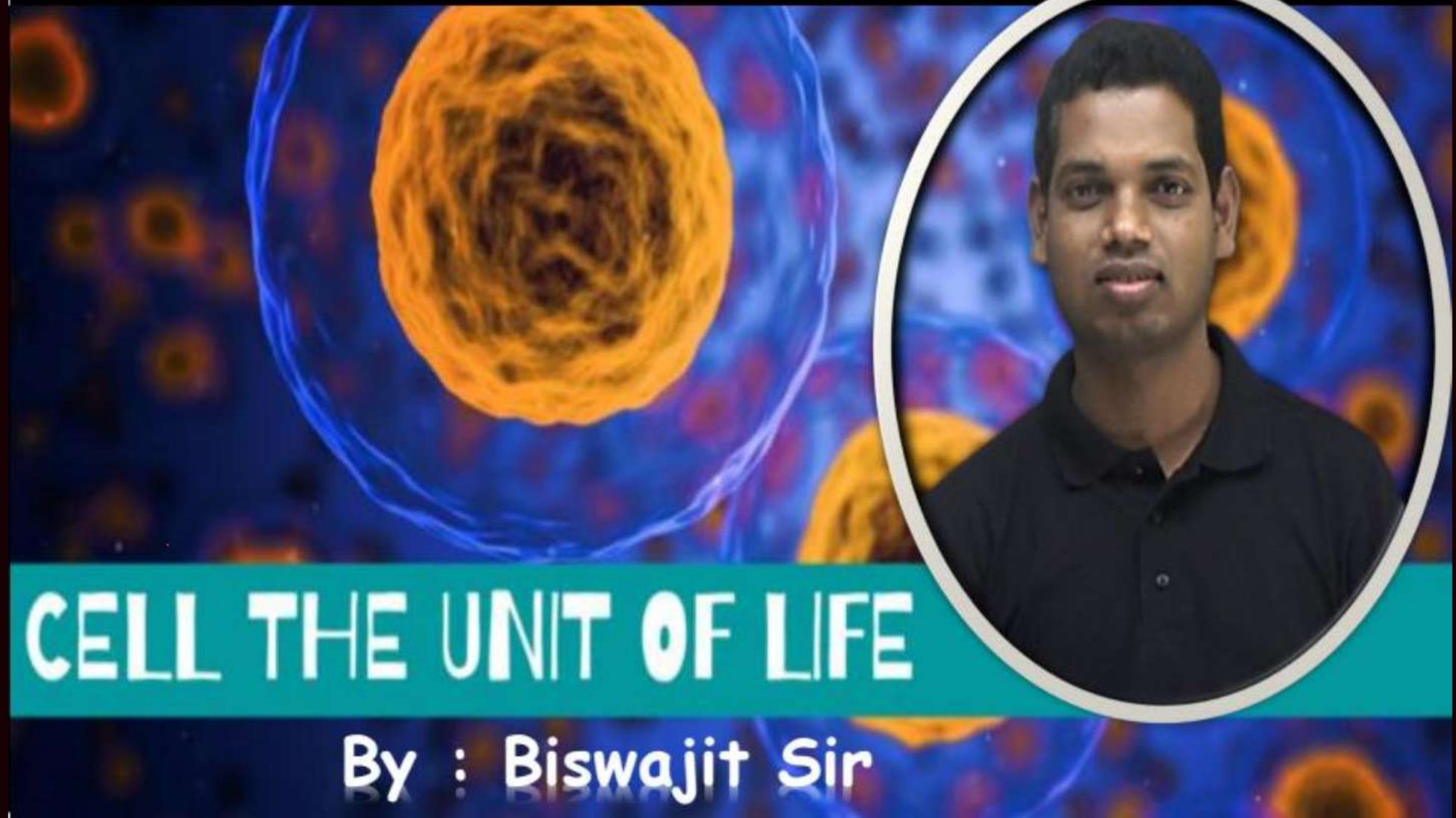
ARJUNA NEET BATCH



CELL THE UNIT OF LIFE

By : Biswajit Sir

(ii) Cell Wall :

- ❖ Rigid, Nonliving
- ❖ Made of Peptidoglycan (Murein)

⬇

(Provides rigidity to cell wall).

Function of Cell wall :

- ❖ Shape to cell
- ❖ Provides strong structural support

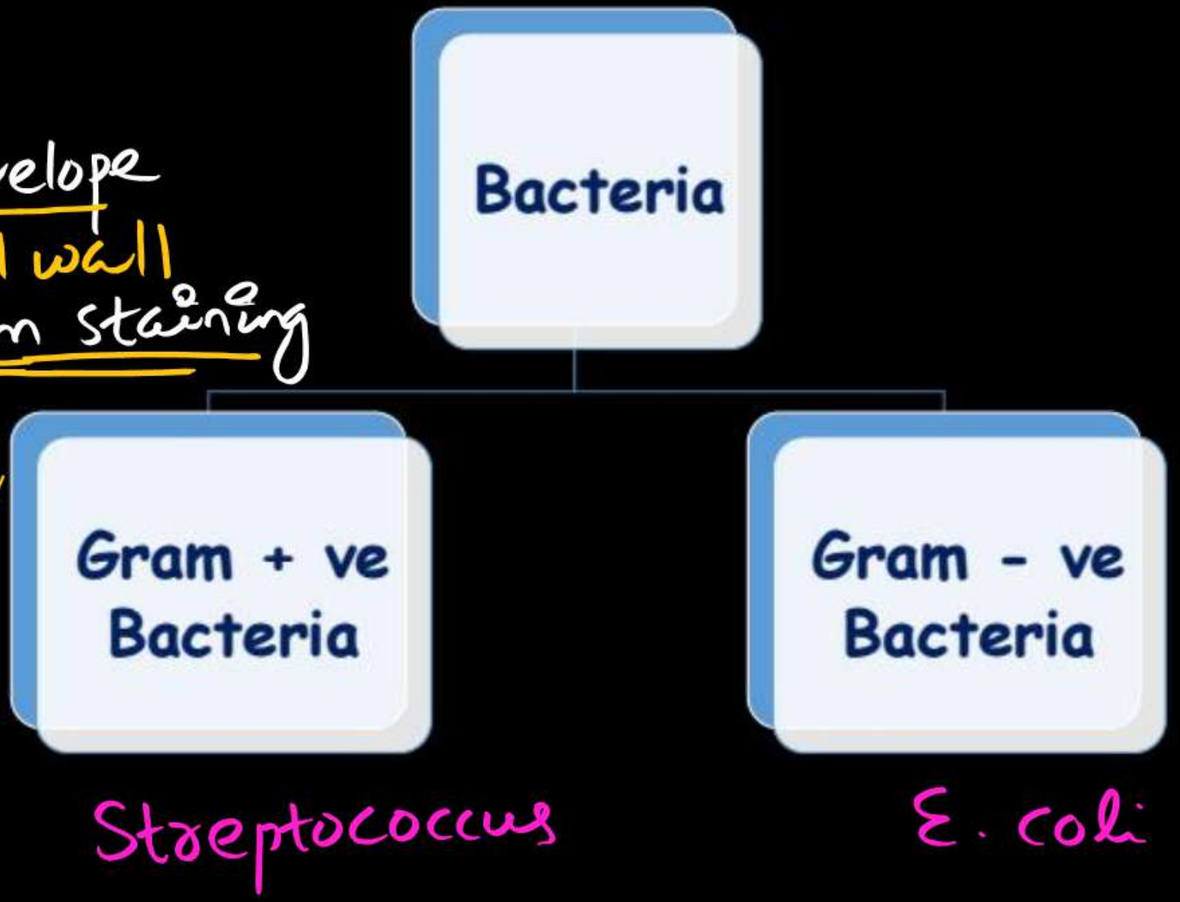
⬇ Result

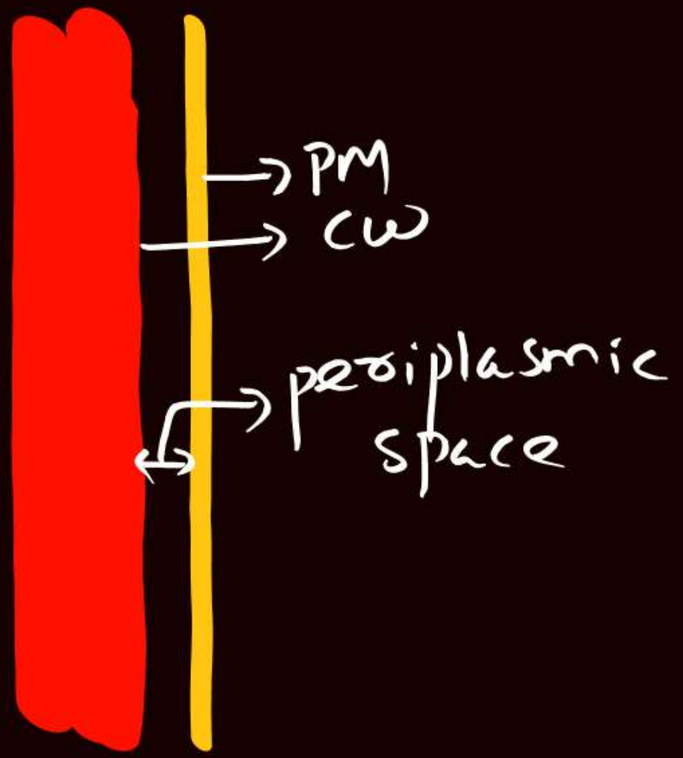
CW prevents bursting and collapse of cells

CW is present in all PKs except Mycoplasma.

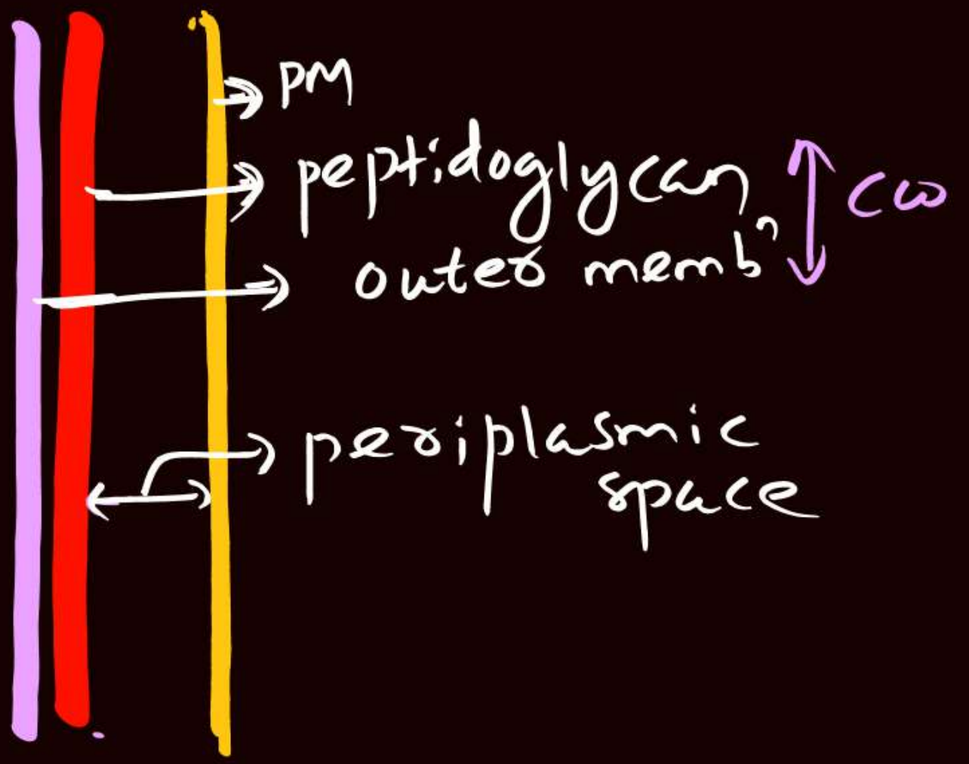
Basis:

- nature of cell envelope
  - ↳ cell wall
- response to Gram staining
  - developed by Christian Gram





gram +ve bacterial cell wall



gram -ve bacterial cell wall

Add Coystal violet to bacterial smear

↳ basic dye / primary stain

↓

Add iodine solution

↓

wash gently with tap water

↓

add decolorizing agent

↳ ethanol + acetone

↓

wash gently with tap water.

↓

add Saffranin

↳ basic dye / Secondary stain

↓

wash gently with tap water → Allow the slide to get dried

↑

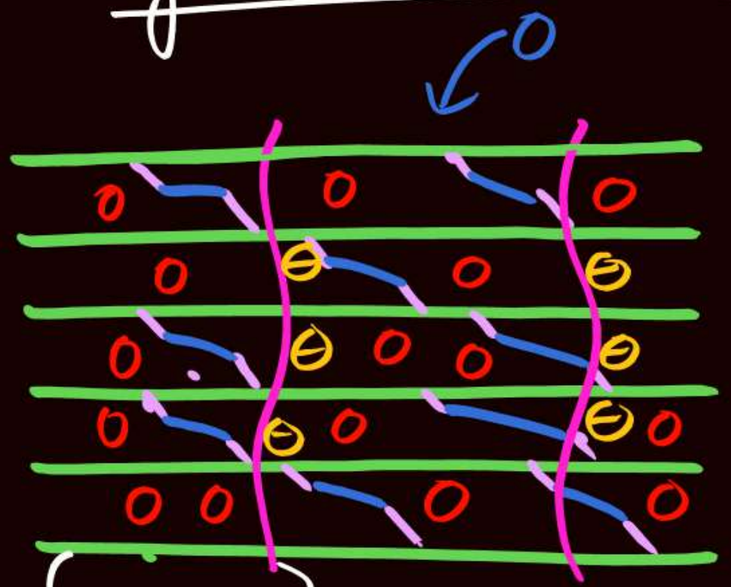
observe under microscope

↑

gram +ve bac → Bluish purple

gram -ve bac. → Red or pink

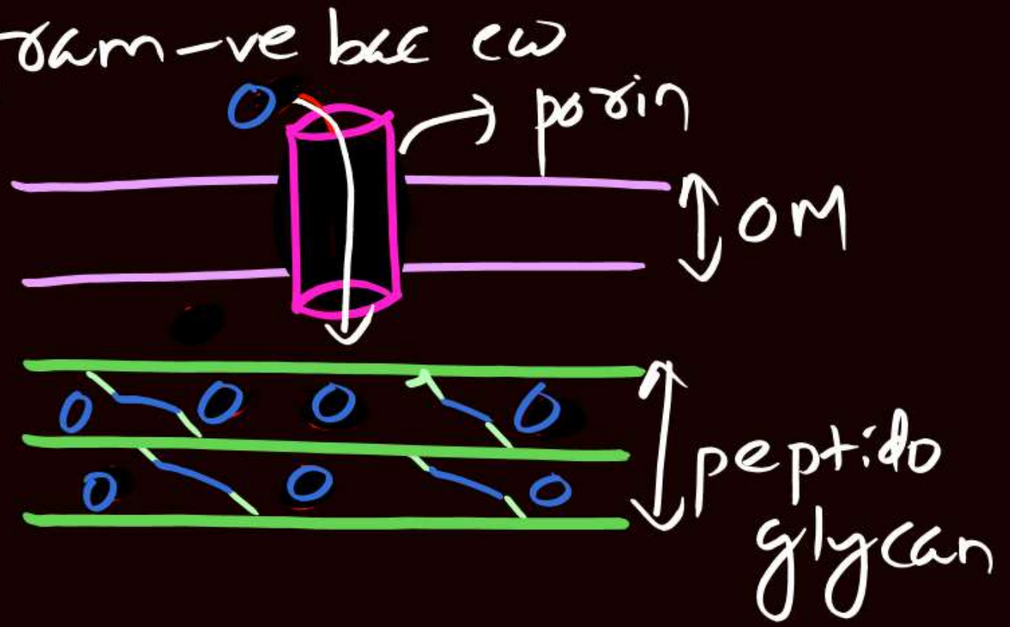
gram +ve bac. cw



peptido glycan

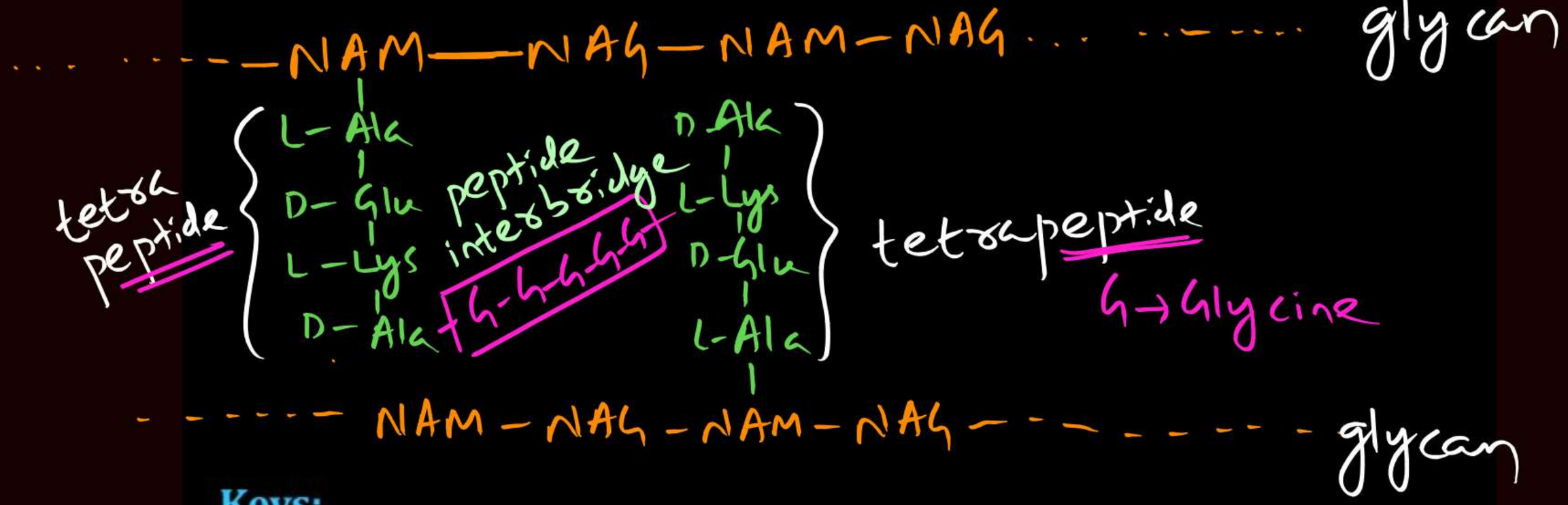
teichoic acid (-vely charged)

gram -ve bac cw



Features	Gram + ve Bacteria CW	Gram – Ve Bacteria CW
Peptidoglycan Content	High (70-80 %) multilayered	LOW (10-20%) few layered
Teichoid acid (-vely charged)	+ve	–ve
Outer membrane	–ve	+ve
Nature	Smooth	Wavy (CW is in contact with PM of several places)
Unique AA	Lysine	DAP (Diamino pimlic acid)
Thickness	20 - 80 nm	8 - 12 nm
No. of layers	Single (Peptidoglycan)	Double (Peptidoglycan + Outer membrane)

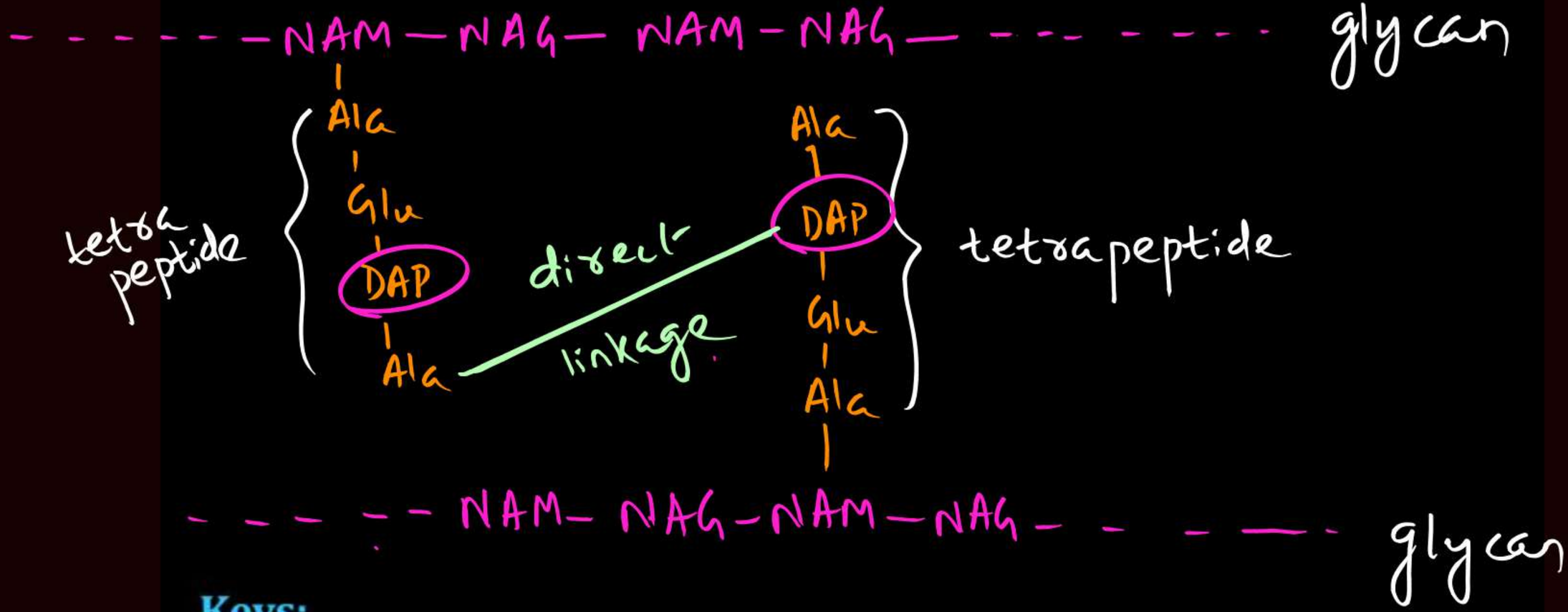
(a) Gram + ve bacterial Cell Wall :



Keys:

NAM = N- acetyl muramic acid
NAG = N- acetyl glucosamine
Glu = Glutamate
Ala = Alanine
Lys = Lysine

(b) Gram – ve bacterial cell wall (Peptidoglycan part)



Keys:

DAP – Diamino pimilic acid

(c) Gram –ve bacterial cell wall (Outer membrane)

- Outer membrane → lipid + protein + polysaccharide
- Peptidoglycan → polysaccharide + peptide
- PM → lipid + protein + oligosaccharide

- ❖ Made of lipid + protein + polysaccharides
- ❖ called lipopolysaccharide (LPS)
- ❖ Has porins hence more permeable than PM

↓

Porins -ve

- ❖ Lies outer to peptidoglycan layer.

Notes:-

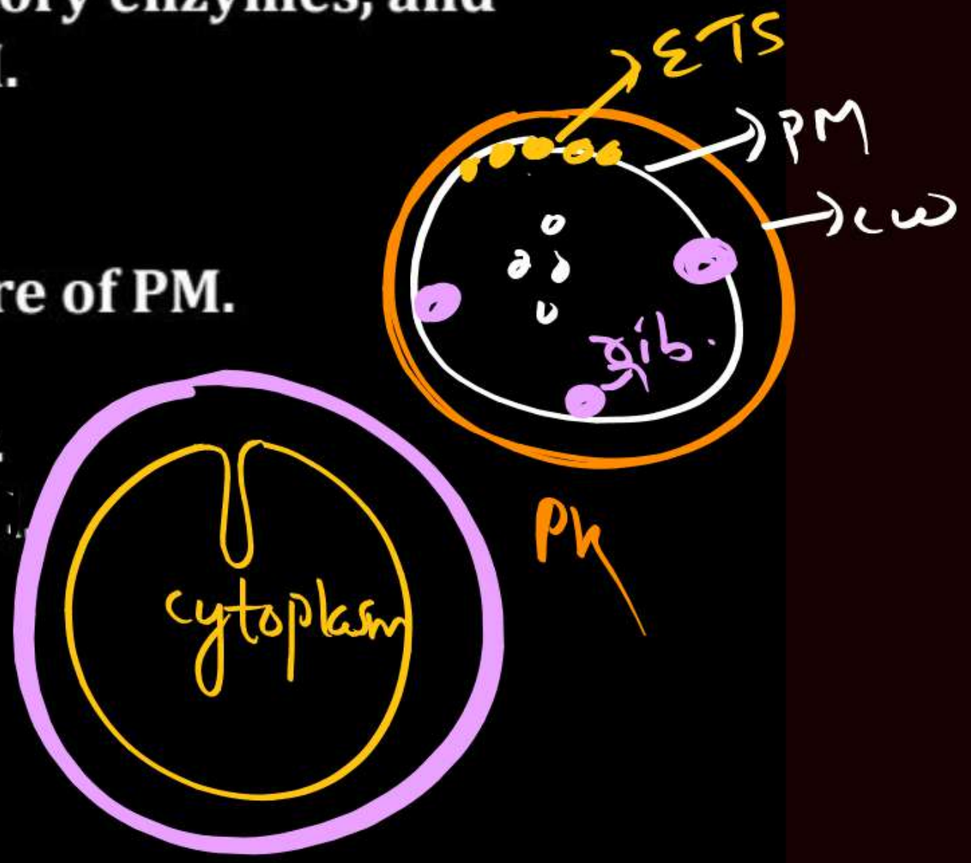
- ❖ Gram + ve bacterial cell wall retains stain and gives bluish purple color.
- ❖ Gram –ve bacterial cell wall does not retain stain (1 stain) and appears red or pink color.

PK Plasma Membrane

(a) Structurally PK PM is similar to EK PM.
(b) Selectively Permeable.
(c) Sterols are absent instead hopanoid (Sterol like compound) are present.
(d) ETS (in aerobic bacteria), respiratory enzymes, and ribosomes are associated with PM.

Mesosome:-

(1) Specialised differentiated structure of PM.
(2) Characteristic feature of PK.
(3) Present in Gram +ve bacteria only.
(4) Membrane extension of PM into cytoplasm
(5) Infolding of PM.



Forms of Mesosome:

Tabules, Vesicles , lamella

tubule vesicle lamella

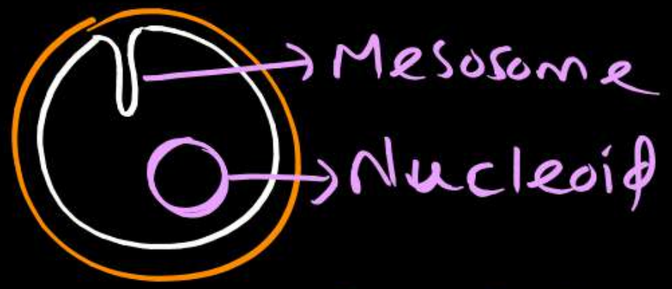
Function of Mesosome:

(a) **Septum formation, CW formation, DNA replication, Respiration, Secreation, Separation of replicating DNAs, to increase surface area and enzymatic content.**

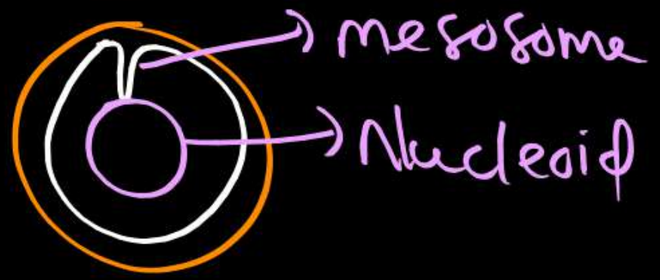
Types of Mesosome:

(a) **Lateral Mesosome**

↳ Respiratory enzymes



(b) **Septal Mesosome**



Lateral Mesosome	Septal Mesosome
Not associated with nucleoid	Associated with nucleoid
Contains respiratory enzymes and equivalent to mitochondria	Involved in DNA replication, separation of replicated DNA, septum formation, CW formation.
Involved in respiration.	

Mesosome

- Special differentiated form of PM.
- Characteristic of bacteria.

Periplasmic Space

- Space between cell wall and plasmamembrane
- Contains hydrolytic enzyme

- Functionally equivalent to EK lysosome
- Relatively wider in gram –ve bacteria as compared to gram +ve bacteria

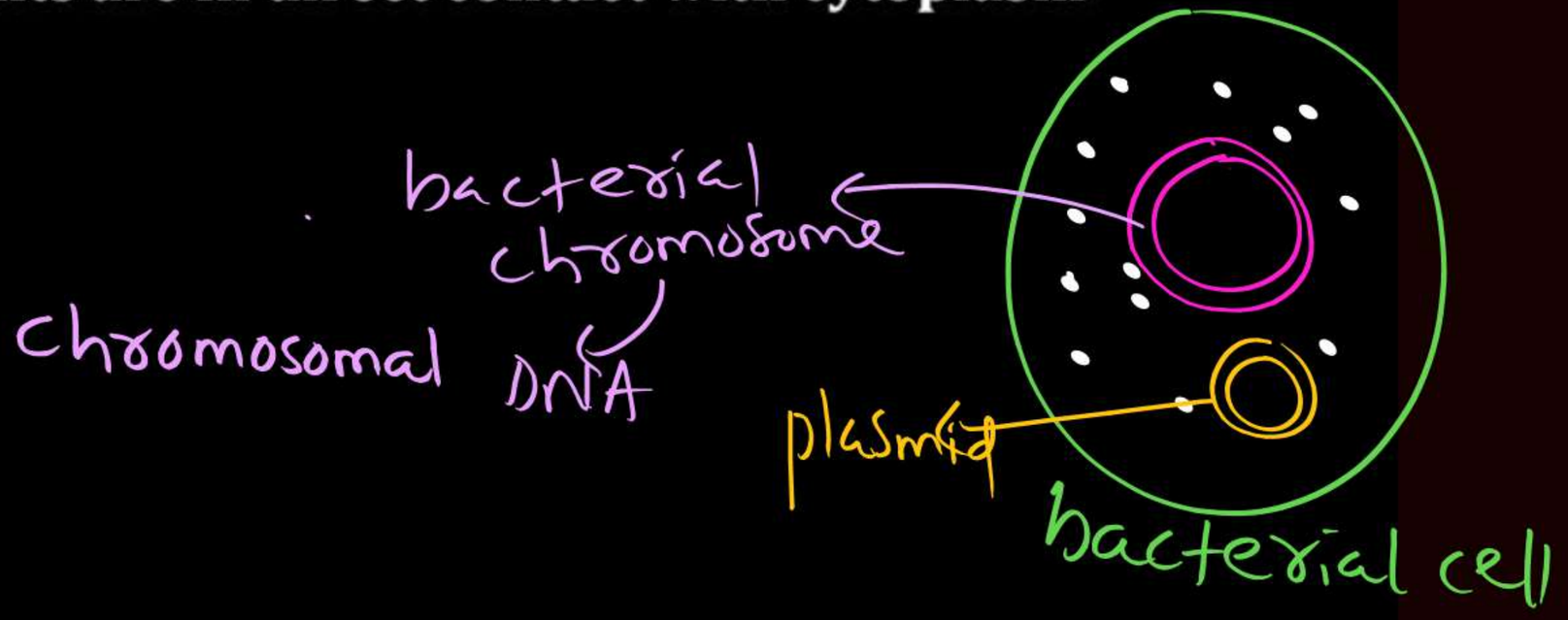
Nucleoid

- called incipient nucleus, primitive nucleus, genophore, bacteria chromosomes, prochromosome.

- Nuclear membrane , nucleolus , histone → – ve

PK ← Archabacteria → histone +ve

- Its components are in direct contact with cytoplasm



- **Nucleoid consists of→**

DNA + **RNA** + **Protein**

→ Copy no. → 1
→ ds
→ Circular
→ GC rich
→ histone -ve
→ Naked DNA
→ genomic DNA/ chromosomal DNA
→ essential genes
→ larger than plasmid

3 types
- mRNA
- tRNA
- rRNA

→ basic protein
→ polyamines

DO NOT STOP
TILL YOU REACH
THE TOP.