

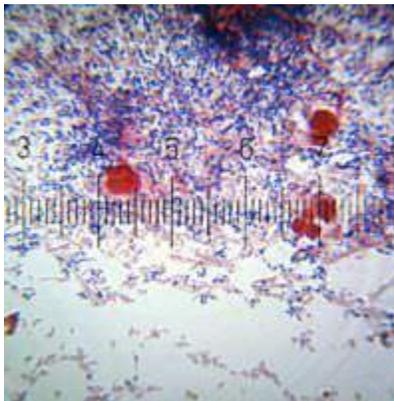
Gram-positive vs. Gram-negative Bacteria

Danish scientist Hans Christian Gram devised a method to differentiate two types of bacteria based on the structural differences in their cell walls. In his test, bacteria that retain the crystal violet dye do so because of a thick layer of peptidoglycan and are called **Gram-positive bacteria**. In contrast, **Gram-negative bacteria** do not retain the violet dye and are colored red or pink. The staining properties have implications ranging from medical treatment to industrial use and Swiss cheese production.

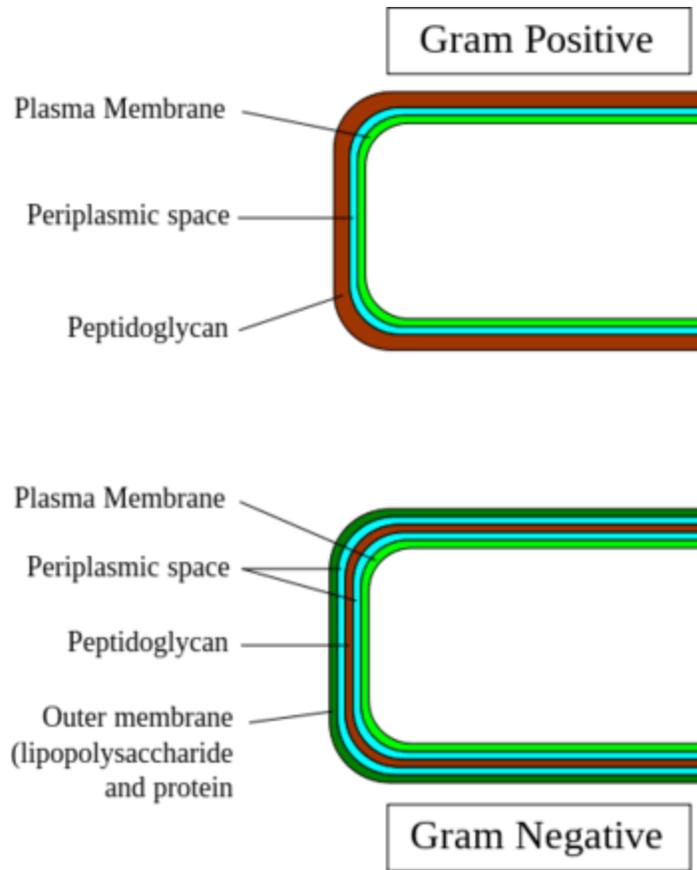
Comparison chart

	Gram-negative Bacteria	Gram-positive Bacteria
Gram reaction	Can be decolourized to accept counter stain (Safranin or Fuchsine); stain red or pink, they don't retain the Gram stain when washed with absolute alcohol and acetone.	Retain crystal violet dye and stain dark violet or purple, they remain coloured blue or purple with gram stain when washed with absolute alcohol and water.
Peptidoglycan layer	Thin (single-layered)	Thick (multilayered)
Teichoic acids	Absent	Present in many
Periplasmic space	present	Absent
Outer membrane	Present	Absent
Lipopolysaccharide (LPS) content	High	Virtually none
Lipid and lipoprotein content	High (due to presence of outer membrane)	Low (acid-fast bacteria have lipids linked to peptidoglycan)
Flagellar structure	4 rings in basal body	2 rings in basal body
Toxins produced	Primarily Endotoxins	Primarily Exotoxins
Resistance to physical disruption	Low	High
Inhibition by basic dyes	Low	High

	Gram-negative Bacteria	Gram-positive Bacteria
Susceptibility to anionic detergents	Low	High
Resistance to sodium azide	Low	High
Resistance to drying	Low	High
Cell wall composition	The cell wall is 70-120 Armstrong thick two layered. The lipid content is 20-30% (High), whereas Murein content is 10-20% (Low).	The cell wall is 100-120 Armstrong thick, single layered. The Lipid content of the cell wall is low , whereas Murein content is 70-80% (Higher).
Mesosome	Mesosome is less prominent.	Mesosome is more prominent.
Antibiotic Resistance	More resistant to antibiotics .	More susceptible to antibiotics



Microscopic view of dental plaque, showing Gram-positive (purple) and negative (red) bacteria



Gram-positive and negative bacteria are chiefly differentiated by their cell wall structure