

Semester-I ①

Subject - Botany

Course - Major-I

By: Dr. Umesh Kumar, Guest Teacher

Question: Describe Gram Positive and Gram Negative Bacteria.

Answer: - Gram Positive Bacteria  
and Gram Negative Bacteria

The grouping is based on the reaction of bacteria to Gram's stain (Christian Gram, 1884). Bacteria are stained first with weakly alkaline solution of crystal violet or gentian violet, when all of them pick up blue colour. They are then treated with 0.5% iodine solution followed by washing with water and then absolute alcohol or acetone. Bacteria which retain blue or purple colour are known as Gram Positive bacteria, such as *Bacillus subtilis*. Bacteria which do not retain any stain and become colourless are termed as Gram Negative Bacteria, such as *Escherichia coli*. Gram Negative Bacteria are commonly stained with safranin. Washing of the stain in Gram (-) bacteria is due to high lipid content of cell wall which gets dissolved in organic solvents like acetone.

# Differences between Gram +ve and Gram -ve Bacteria

Gram +ve Bacteria      Gram -ve Bacteria

- |  |   |
|--|---|
| (i) They remain coloured blue or purple with Gram stain even after washing with absolute alcohol or acetone. | (i) The bacteria do not retain the stain when washed with absolute alcohol. |
| (ii) The wall is single layered. Outer membrane is absent.   | (ii) The wall is two layered. Outer membrane is present.                    |
| (iii) The thickness of the wall is 20-80 nm.   | (iii) The thickness of wall is 8-12 nm.                                     |
| (iv) The lipid content of wall is quite low.   | (iv) The lipid content of wall is 20-30%.                                   |
| (v) Murein or mucopeptide content, is 70-80%.  | (v) It is 10-20%.   |
| (vi) Basal body of the flagellum has two rings of swellings.   | (vi) Four rings of swellings in the basal body.                             |
| (vii) Mesosomes are more prominent.  | (vii) Mesosomes are less prominent.   |
| (viii) They are more susceptible to antibiotics.   | (viii) They are more resistant to antibiotics.                              |
| (ix) Fewer pathogenic bacteria are Gram +ve.   | (ix) Most of the bacteria are Gram -ve.                                     |
| (x) Cell wall contains teichoic acids.   | (x) Teichoic acids are absent.  |