

# \* Classification of Bacteria -

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## \* Classification of Bacteria:

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⇒ Bacteria are classified and identified to distinguish one organism from another and to group similar organisms by its criteria.

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⇒ The classification of Bacteria serves a variety of different functions.

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⇒ The classification of Bacteria serves a variety of different groups using many different typing schemes.

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⇒ The grounds for the classification commonly used may be:-

\* Morphologic characteristics :- Both wet-mounted and properly stained bacterial-cell suspensions can yield a great deal of information.

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⇒ These simple tests can indicate: the Gram reaction of the organism, whether it is acid-fast, its motility, the arrangement of its flagella, the presence of spores, capsules, and inclusion bodies, and of course its shape.

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⇒ This information often can allow.

identification of an organism to the genus level, or can minimize the possibility that it belongs to one or another group.

Growth Characteristics :- A primary distinguishing characteristic is whether an organism grows aerobically, anaerobically, facultatively (i.e. in either the presence or absence of oxygen), or microaerobically (i.e. in the presence of a less-than-atmospheric partial pressure of oxygen).

⇒ The proper atmospheric conditions are essential for isolating and identifying Bacteria.

⇒ Other important growth assess ment includes the incubation temperature, pH, nutrients required, and resistance to antibiotics.

⇒ For eg. one diarrhoeal disease agent, Campylobacter jejuni, grows well at 42°C in the presence of several antibiotics.

⇒ Enterobacteriaceae can grow on minimal media.

⇒ C. Legionella requires specific growth factors, E. coli can grow on minimal media.

### \* Antigens and Phage Susceptibility :-

⇒ Cell-wall, flagellar and capsular antigens are used to aid in classifying certain organisms of the special level.



\* Biochemical Characteristics :- Most Bacteria are identified and classified largely on the basis of their reactions in a series of biochemical tests.



⇒ Some tests are used routinely for many groups of Bacteria (oxidase, nitrate reduction, amino acid degrading enzymes, fermentation or utilization of carbohydrates). Others are restricted to a single family, genus or species (Coagulase test for Staphylococci, pyroglutaminyl arylesterase test for Gram +ve Cocci).

### \* Classification on the basis of Gram stain and Bacterial Cell-wall :-

The Gram stain has withstood the test of time. Discovered by H.C. Gram in 1884 it remains an important and useful technique to this day. It allows a large proportion of clinically important bacteria to be classified as either Gram positive or negative based on their morphology and differential staining properties.

⇒ Slides are sequentially stained with crystal violet, iodine (then destained with alcohol) and counter-stained with Safranin.

⇒ Gram-positive bacteria stain blue-purple and Gram-negative bacteria stain red.

⇒ The difference between the 2 groups is believed to be due to a much larger peptidoglycan (cell wall) in Gram-positives.

⇒ As a result of the iodine or crystal-violet precipitate in the thickened cell-wall and are not eluted by alcohol in contrast with the Gram-negative where the crystal violet is readily eluted from the bacteria.

⇒ As a result bacteria can be distinguished based on their morphology and staining properties.

⇒ Bacteria are classified into 5 groups according to their basic shapes -

- Spherical (Cocci)
- Rod (Bacilli)
- Spiral (Spirilla)
- Comma (Vibrios) or
- Corkscrew (Spirochaetes) etc.