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NOMENCLATURE OF BACTERIA

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INTRODUCTION

Bacterial nomenclature is the scientific system of giving names to bacteria. Since there are thousands of different bacterial species, a standard naming system is necessary to avoid confusion and ensure clear communication among scientists worldwide. Each bacterium is given a unique binomial (two-word) name based on internationally accepted rules. This system helps in the proper identification, classification, and study of bacteria.

Nomenclature

The procedure of assigning names to the kinds and groups of organisms listed in a taxonomic classification.

- Developed in the eighteenth century by Carolus Linnaeus (Swedish botanist).
- Bionomial nomenclature:
  1. Genus and specific epithet(species)
  2. Eg. Escherichia coli, Salmonella typhi, Bacillus subtilis

Rules for naming are set by international committee's

- International Code of Zoological Nomenclature.
- International Code of Botanical Nomenclature.
- Bacteriological Code and Bergey's Manual.

Bacterial Phylogeny

Phylogeny of domain Bacteria

The 2nd edition of Bergey's Manual of Systematic Bacteriology divides domain Bacteria into 23 phyla.
It has following volumes:

- Volume I (1984) has sections 1-11, which are gram negative bacteria.
- Volume II (1986) has sections 12-17, that are gram-positive bacteria & mycobacterium.
- Volume III (1989) has sections 18-25, it contains phototrophic and photosynthetic bacteria and Archaebacteria.
- Volume IV (1989) has sections 26-33, it contains Mycology and Actinomyces.

Rules Of Nomenclature

- Use Binary Names - Binary names (invented by Linnaeus), consisting of a generic name and a species epithet (e.g., Escherichia coli).
- When to Capitalize – The first letter of genus name is always capitalized, the species name is never capitalized, e.g. Bacillus anthracis
- When to Italicize - Names of all taxa (kingdoms, phyla, classes, orders, families, genera, species, and subspecies) are printed in italics and should be underlined if handwritten.
- When to use Initials - A specific epithet must be preceded by a generic name, written out in full the first time it is used in a paper. Thereafter, abbreviated to the initial capital letter (e.g., E. coli).
- Common Names - Vernacular (common) names should be in lowercase roman type, non-italic (e.g., streptococcus, brucella).
- Subspecies and Serovars –
  1. For Salmonella, genus, species, and subspecies names should be rendered in standard form: Salmonella enterica at first use, S. enterica thereafter; Salmonella enterica subsp. arizonae at first use, S. enterica subsp. arizonae thereafter.
  2. Names of serovars should be in roman type with the first letter capitalized: Salmonella enterica serovar Typhimurium. After the first use, the serovar may also be given without a species name: Salmonella serovar Typhimurium.

- Abbreviations for Species – use “sp.” for a particular species, “spp.” for several species (“spp” stands for “species plural”). These abbreviations are not italicized; e.g. Clostridium sp. or Clostridium spp.
- Plural Forms
  Plural of genus is genera
  Plural of species (sp.) is species (spp.)

Origin Of Names

- Descriptive – For example Staphylococcus aureus (grape-like cluster of spheres, golden in color), Streptococcus viridans (chains of spheres, green in colony color), Proteus vulgaris (first and common), Helicobacter pylori (spiral shaped rod at the entrance to the duodenum)
- Scientist’s names – e.g., Escherichia coli (Theodor Esherich), Nessieria (Albert Neisser), Listeria (Joseph Lister), Pasteurella (Louis Pasteur), Yersinia (Alexandre Yersin)
- Geographic places – e.g., Legionella longbeachiae (Long Beach, California), Pasturella tularensis (Tulare County, California), Pseudomonas fairmontensis (Fairmount Park, Pennsylvania), Mycobacterium genavense (Geneva, Switzerland), Providencia spp. (Brown University, Providence, RI)
- Organizations – e.g., Legionella (American Legion), Afipia felis (Air Force Institute of Pathology), Cedecea spp. (Centers for Disease Control), Bilophila wadsworthia (VA Wadsworth Medical Center in Los Angeles).

CONCLUSION

Bacterial nomenclature provides a universal and standardized system for naming and classifying bacteria, ensuring clear scientific communication across the world. The binomial nomenclature introduced by Carolus Linnaeus, together with internationally accepted naming rules, helps maintain consistency and accuracy in microbiology. Resources such as Bergey’s Manual and the Bacteriological Code play a vital role in bacterial identification, taxonomy, and phylogenetic classification. Understanding these principles is essential for researchers, clinicians, and students involved in microbiological research, diagnosis, and education.