



Lecture 8. Classification of bacteria

Learning objectives

Upon completion of this lecture, student should be able to:

1. Define classification, identification, species, genus, and binomial nomenclature.
2. Properly use binomial nomenclature in the identification of microorganisms, including syntax, capitalization, and punctuation.

Introduction

Taxonomy is an area of biologic science that comprises three distinct interrelated disciplines: **classification**, **nomenclature**, and **identification** of organisms.

Role of taxonomy in diagnostic microbiology

1. **Establishes and maintains** records of **key characteristics** of clinically relevant microorganisms.
2. **Facilitates communication** among technologists, microbiologists, physicians, and scientists by **assigning universal names** to clinically relevant microorganisms.

Classification is a method for organizing microorganisms into **groups** or **taxa** based on **similar morphologic, physiologic, and genetic traits**.

- The hierarchical classification system consists of the following taxa designations:



1. **Domains (Bacteria, Archaea, and Eukarya)**
2. **Kingdom** (contains similar **divisions** or **phyla**)
3. **Phylum** (contains similar **classes**)
4. **Class** (contains similar **orders**)
5. **Order** (contains similar **families**)
6. **Family** (contains similar **genera**)
7. **Genus** (contains similar **species**)
8. **Species**

A **family** is a group of organisms that may contain **multiple genera** and consists of organisms with a **common attribute**.

- The name of a family is formed by adding the suffix **-aceae** to the root name of one of the group's genera.
- For example, the **Streptococcaceae** family.
- One exception to the rule in microbiology is the family **Enterobacteriaceae**.

Genus (plural, genera), contains **different species** that have **several features in common**.

Species (abbreviated as **sp.**, singular, or **spp.**, plural) is a collection of **bacterial strains** that share **common physiologic and genetic features** and differ notably from other microbial species.

- For example, *Klebsiella pneumoniae* and *Klebsiella oxytoca* are two distinct species within the genus *Klebsiella*.

Nomenclature is the naming of microorganisms according to established rules and guidelines set forth in the International Code of Nomenclature of Bacteria (**ICNB**) or the Bacteriological Code (**BC**).

- In this **binomial (two name) system** of nomenclature, every organism is assigned a **genus** and a **species** of **Latin** or **Greek** derivation.
- Each organism has a scientific “**label**” consisting of two parts:
 1. **The genus designation**, in which the **first letter** is always **capitalized**.
 2. **The species designation**, in which the **first letter** is always **lowercase**.
- The two components are used simultaneously and are printed in **italics** or **underlined** when written in the text.
- For example, the streptococci include *Streptococcus pneumoniae*, *Streptococcus pyogenes*, and *Streptococcus bovis*, among others.
- The name may be **abbreviated** by using:
 - The **uppercase** form of the first letter of the **genus** designation
 - followed by a period (.)
 - followed by the full **species** name, which is never abbreviated
- Frequently an **informal designation** (e.g., staphylococci, streptococci, enterococci) may be used to **label a particular group** of organisms.
- These designations are **not capitalized** or **italicized**.