



General Biology Lecture -2 **Fundamentals of Biological Classification**

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Objective: To understand the basic principles of classifying living organisms and their importance in medical sciences.

Introduction: Why Study Biological Classification in Medical Technology?

- ***To understand the origin and basis of microorganisms (bacteria, viruses, fungi) encountered in the medical environment.**
- ***To know the relationship between infectious diseases and specific types of organisms.**
- ***The foundation for sterilization and infection control practices in dialysis units.**
- ***Understanding classification aids in studying drugs (antibiotics) that target specific groups.**

The Concept of "Kingdom" in Biology

 **Definition:** The highest, broadest taxonomic rank where organisms with similar general characteristics are grouped.

 **Purpose:** To divide life into major groups for easier study.

  **Example (Modern Six-Kingdom System):**

1. **Animalia (Animals)**
2. **Plantae (Plants)**
3. **Fungi**
4. **Protista**
5. **Eubacteria (True Bacteria)**
6. **Archaeobacteria (Archaea)**



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	الفطريات اللزجة المختلطة Chytridiomycots (chytrids)
	الفطريات الاقترانية Zygomycota (common molds)
	الفطريات الكيسية Ascomycota (sac fungi)
	الفطريات الدعامة Basidiomycota (club fungi)
	الفطريات الناقصة Deuteromycota (imperfect fungi)



Biological Classification

🌀 **Definition:** The science of arranging living organisms into hierarchical groups based on similarities and differences in traits (morphological, genetic, cellular, biochemical).

♠♠ **Purpose:** To organize biodiversity, facilitate communication among scientists, and predict properties of unknown organisms.

♥♥ **Main Taxonomic Ranks (Broadest to Most Specific):**

Kingdom → **Phylum** → **Class** → **Order** → **Family** → **Genus** → **Species**

♣ **Species - The Basic Unit of Classification**

♣♣ **Definition (Biological):** A group of individuals capable of interbreeding and producing fertile offspring under natural conditions.

♦ **Examples:**

- **Homo sapiens (Humans)**
- **Escherichia coli** – A common bacterium, some strains cause infections.
- **Staphylococcus aureus** – A bacterium causing skin and hospital-acquired infections.

Genus

Definition: A group of closely related species sharing a relatively recent common ancestor.

Scientific Name Format: The Genus is capitalized, followed by the species name in lowercase, both in italics.

Examples:

Genus: *Staphylococcus* (includes many species)

Species: *Staphylococcus aureus*

Species: *Staphylococcus epidermidis*

Genus: *Escherichia*

Species: *Escherichia coli*

Family, Order, and Class

- **Family:** Groups together related genera. (Example: Family *Enterobacteriaceae* includes genera *Escherichia*, *Salmonella*, *Klebsiella*).
- **Order:** Groups together related families. (Example: Order Enterobacterales for the above).
- **Class:** Groups together related orders. (Example: Class Bacilli for Gram-positive bacteria).

▣▣ Phylum and Kingdom - A Broader View

♥♥ **Phylum:** A major grouping of organisms sharing a similar basic body plan or fundamental structural pattern.

♣♣ **Animal Example:** Phylum Chordata (have a dorsal nerve cord).

▣ **Bacterial Example:** Phylum Firmicutes - Gram-positive bacteria.

🌀 **Kingdom:** (As mentioned before) - The highest level.

Applied Example: Classifying *Staphylococcus aureus*

Kingdom: Bacteria

Phylum: Firmicutes

Class: Bacilli

Order: Bacillales

Family: Staphylococcaceae

Genus: Staphylococcus

Species: aureus

Full Scientific Name: *Staphylococcus aureus*

Summary and Relevance to Dialysis Techniques Understanding

♠ **classification helps identify the source of infection in a dialysis unit (bacteria, fungi, virus).**

▶ **Knowing that bacteria from the same genus or family may share antibiotic resistance patterns.**

▶ **The basis for sterilization protocols targeting specific groups of microorganisms.**

▶ **Aids in reading research papers and medical reports that use precise scientific names.**

References

1- Campbell Biology.

2- Bergey's Manual of Systematic Bacteriology.

3- Reliable scientific websites (NCBI Taxonomy).

Rank	Classification
Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Primates
Family	Hominidae
Genus	Homo
Species	Homo sapiens

المرتبة	التصنيف
المملكة	(Animalia الحيوانات)
الشعبة	(Chordata الحبلية)
الطائفة	(Mammalia الثدييات)
الرتبة	(Primates الرئيسيات)
الفصيلة	(Hominidae الإنسانية)
الجنس	(Homo الإنسان)
النوع	<i>Homo sapiens</i>

Rank	Classification
Kingdom	Bacteria
Phylum	Bacillota (formerly Firmicutes)
Class	Bacilli
Order	Caryophanales
Family	Staphylococcaceae
Genus	Staphylococcus
Species	Staphylococcus aureus

المرتبة	التصنيف
المملكة	(Bacteria البكتيريا)
الشعبة	كانت تُعرف سابقًا — (Bacillota باسيلوتا) Firmicutes
الطائفة	(Bacilli العصويات)
الرتبة	(Caryophanales كاروفانالس)
الفصيلة	(Staphylococcaceae عائلة العنقوديات)
الجنس	(Staphylococcus) ((العنقودية))
النوع	(Staphylococcus aureus) ((العنقودية الذهبية))