



بكتريا طبية 1

Introduction and Classification of Bacteria

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قسم تقنيات المختبرات الطبية

Second Stage

المرحلة / الثانية

محاضرة رقم: 1

الجانب النظري

Lecture No. 1

Theoretical

تدريسي المادة : دكتور معين حسن

(INTRODUCTION)

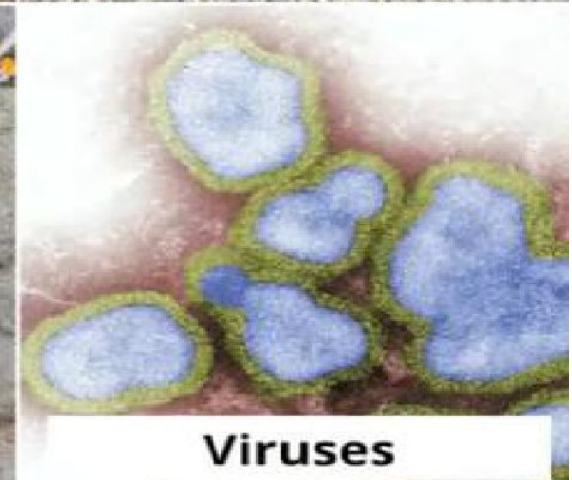
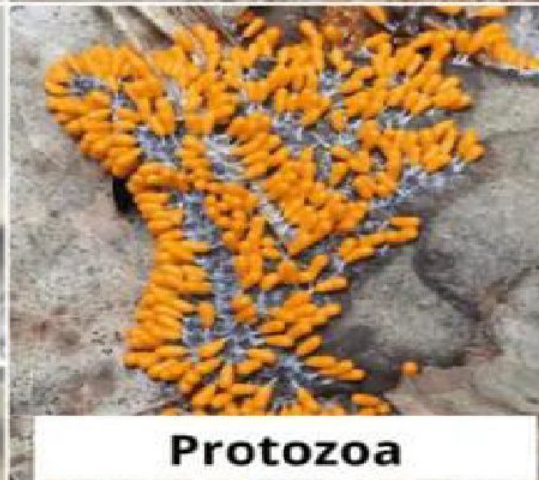
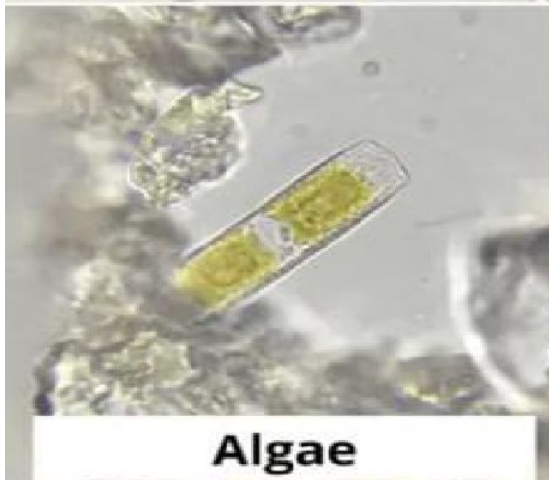
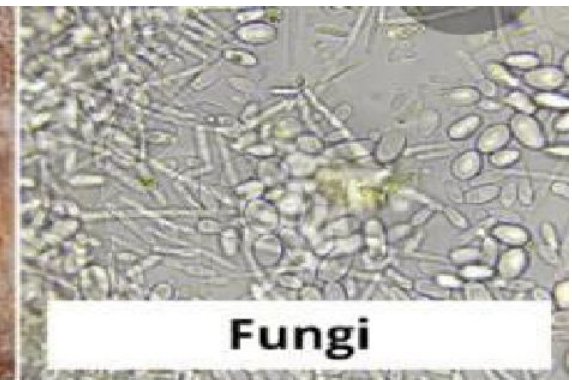
- **Introduction of Bacteria**
- **Classification of Microorganisms**
- **Classification of Bacteria**

❖ Introduction:

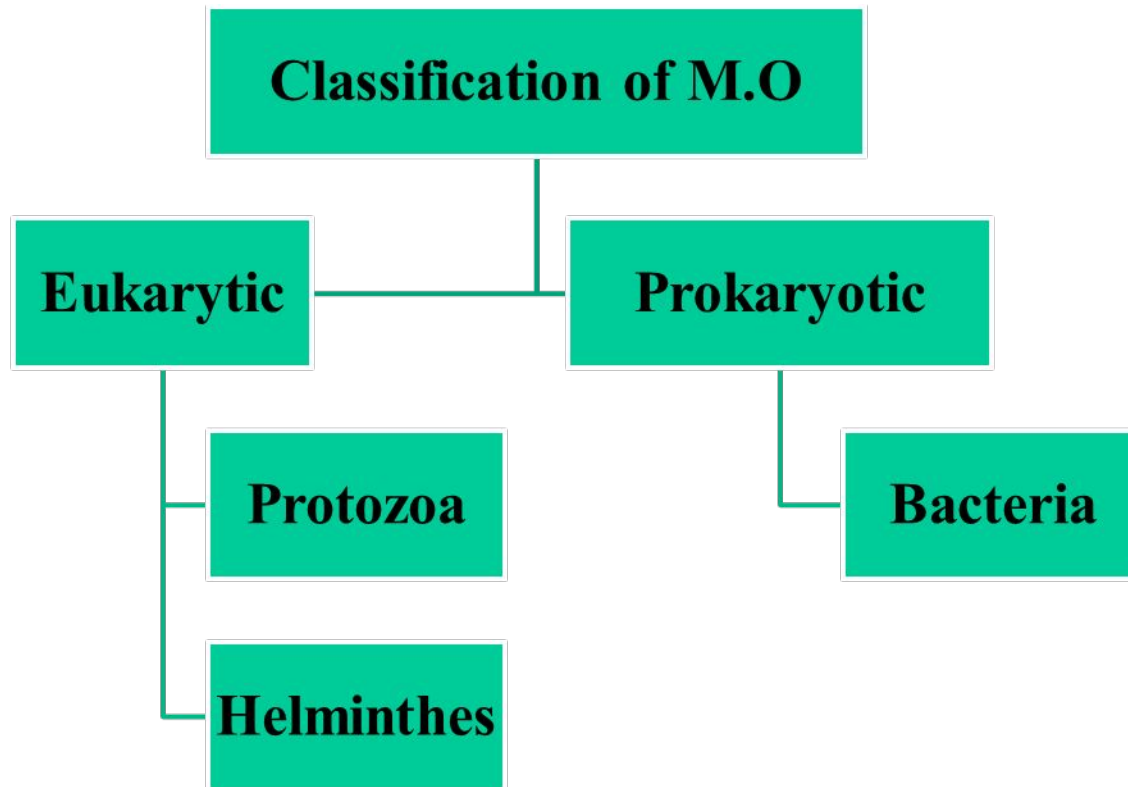
- Microbiology is a specialized area of **biology** that deals with living things, ordinarily too small to be seen without magnification.
- Such **microscopic** also study of **microorganism (M.O)** which are unicellular or cell-cluster microscopic organisms, microbiology involves study in numerous areas involving cell structure, function, genetics, immunology, biochemistry, epidemiology, and ecology.
- Microorganisms, also called **microbes**, are organisms that require a microscope to be readily observed.
- It be found in every ecosystem and in class association with every type of multicellular organisms.

- **M.O** are the oldest organisms, having evolved over the 4 billion years of earth's history to the modern varieties we now observe.
- Microbes are classified into groups according to evolutionary relationships, provided with standard scientific names, and identified by specific characteristics.
- They populate the healthy human and animals body by billions as Normal flora and even participants in body functions, for ex. Bacteria play a role in the degradation in intestinal contents.

- These M.O consist of **archaea**, **bacteria**, **viruses**, **fungi**, **protozoa**, **algae**, and **helminthes**, which caused infection and spread of human diseases.
- Few species of M.O that harmful to human **either by production toxic compounds and enzymes or direct infection** by their virulence factors are characterized as **pathogens**.

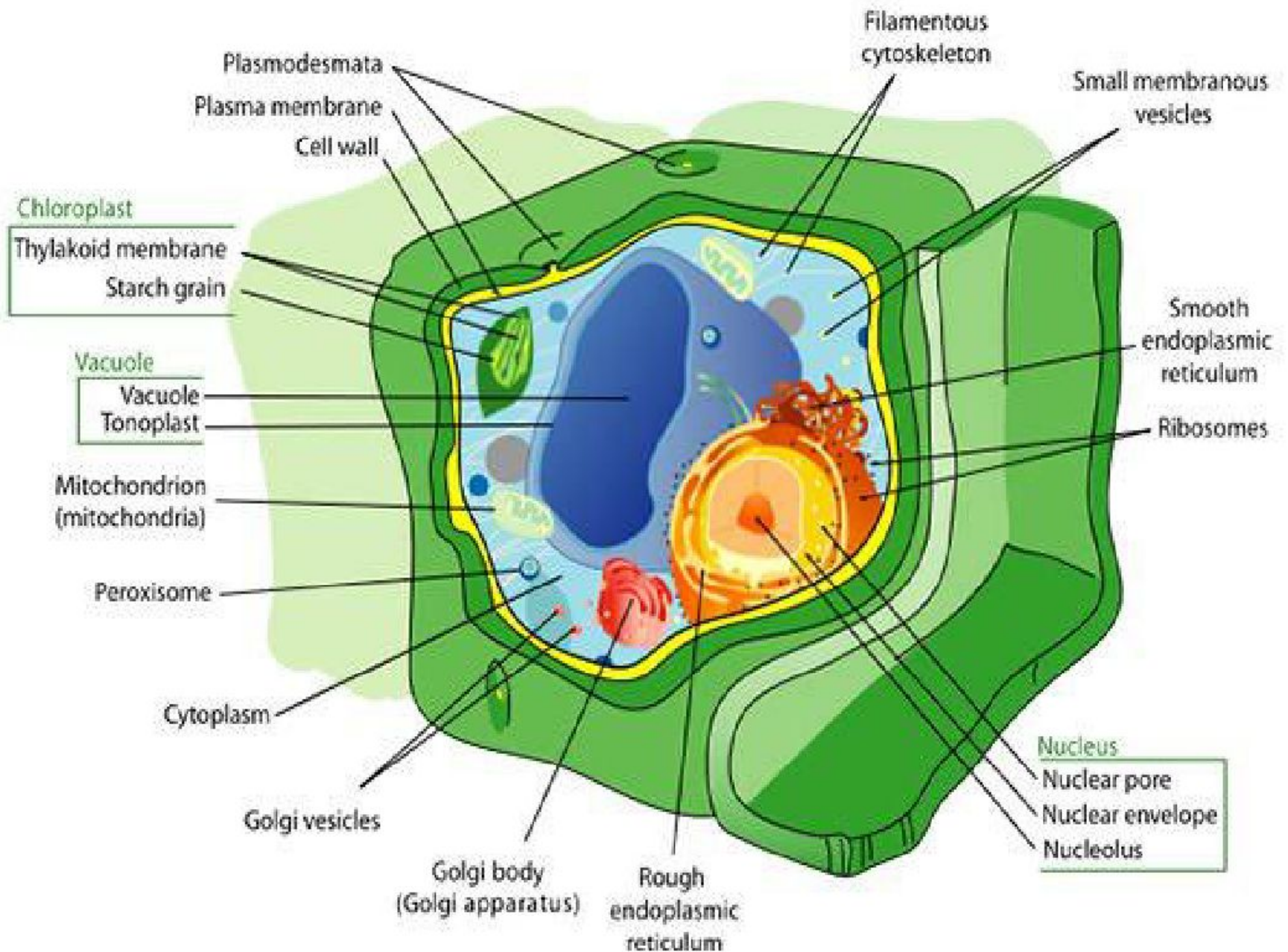


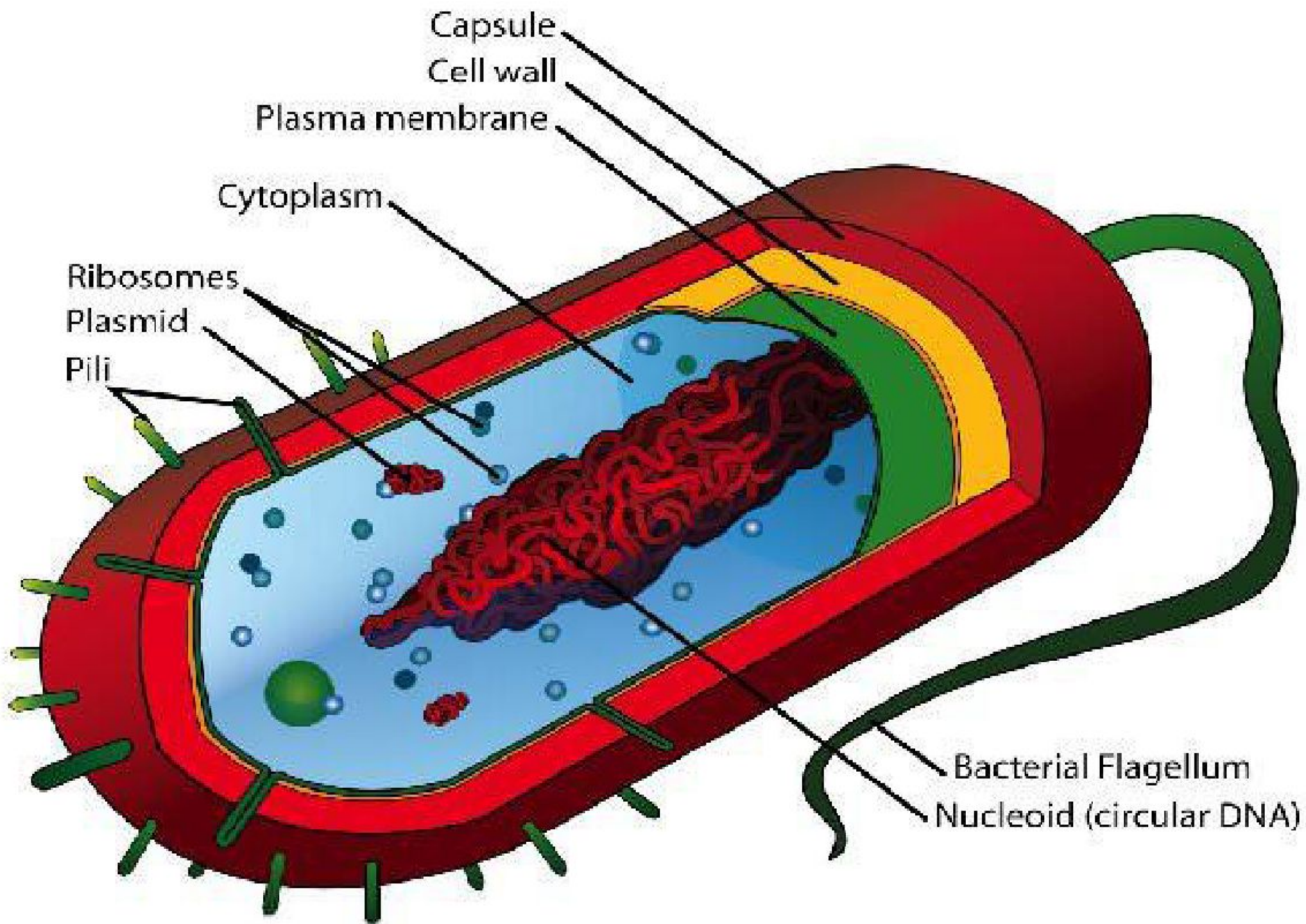
◆ Classification of M.O



- **Bacteria** is an **unicellular** m.o which have **a rigid cell wall** surrounding the cell membrane that **determine the shape of bacteria.**
- **Viruses** are obligate intracellular parasite that don't have a cellular structure.

- **Fungi** are non photosynthetic, generally saprophytic eukaryotic m.o some fungi are multicellular filaments called molds where as other unicellular called yeast.
- **Protozoa** are single called non photosynthetic. organism that found in different sizes and shapes. Many protozoa are among the most clinically important parasite of human.
- **Helminthes** are groups of worms that live as parasites they are multicellular. organisms with complex body organization.





	Eukaryotic Cell	Prokaryotic Cell
Nucleus	Present	Absent
Number of chromosomes	More than one	One. but not true chromosome: Plasmids
Cell Type	Usually multicellular	Usually unicellular (some cyanobacteria may be multicellular)
True Membrane bound Nucleus	Present	Absent
Example	Animals and Plants	Bacteria and Archaea
Genetic Recombination	Meiosis and fusion of gametes	Partial, un directional transfers DNA
Lysosomes and peroxisomes	Present	Absent
Microtubules	Present	Absent or rare
Endoplasmic reticulum	Present	Absent
Mitochondria	Present	Absent
Cytoskeleton	Present	May be absent

	Eukaryotic Cell	Prokaryotic Cell
.DNA wrapping on proteins	Eukaryotes wrap their DNA around proteins called .histones	Multiple proteins act together to fold and condense prokaryotic DNA. Folded DNA is then organized into a variety of conformations that are supercoiled and wound around tetramers of the HU .protein
Ribosomes	larger	smaller
Vesicles	Present	Present
Golgi apparatus	Present	Absent
Chloroplasts	Present (in plants)	Absent; chlorophyll scattered in the cytoplasm
Flagella	Microscopic in size; membrane bound; usually arranged as nine double surrounding two single	Submicroscopic in size, composed of only one fiber
Permeability of Nuclear Membrane	Selective	not present

	Eukaryotic Cell	Prokaryotic Cell
Plasma membrane with steroid	Yes	Usually no
Cell wall	Only in plant cells and fungi (chemically simpler)	Usually chemically complex
Vacuoles	Present	Present
Cell size	um 10-100	um 1-10

❖ **Classification of bacteria**

- 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:

- **Domains** (Bacteria, Archaea, and Eukarya)
- **Kingdom** (contains similar divisions or phyla; most inclusive taxa)
- **Phylum** (contains similar classes; equivalent to the Division taxa in botany)
- **Class** (contains similar orders)
- **Order** (contains similar families)
- **Family** (contains similar genera)
- **Genus** (contains similar species)

❑ **Historically**, bacteria or **prokaryotes** (prenucleus) were included in a single domain.

- However, with the more detailed analysis using modern techniques, this domain has now been separated into the Bacteria and the Archaea (ancient bacteria).
- The Bacteria contain the **environmental prokaryotes** (blue green or cyanobacteria) and the **heterotrophic medically relevant bacteria**.
- The Archaea are environmental isolates that live in extreme environments such as **high salt concentrations, jet fuel, or extreme temperatures**.
- **The second domain, Eukarya**, eukaryotes (true nucleus), also contains medically relevant organisms, including fungi and parasites.
- There are several other taxonomic sublevels below the domains, as noted previously; however the typical application of organism classification in the

□ Family

- A **family** encompasses 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, called the **type genus**; for example, the *Streptococcaceae* family type genus is *Streptococcus*.
- One exception to the rule in microbiology is the family Enterobacteriaceae; it is named after the “enteric” group of bacteria.
- Bacterial (prokaryotic)-type species or strains are determined according to guidelines published by the International Committee for the Systematics of Prokaryotes.
- Species definitions are distinguished using DNA profiling, including a nearly

□ Genus

- **Genus** (plural, genera), the next taxon, **contains different species that have several important features in common.**
- Each species within a genus differs sufficiently to maintain its status as an individual species.
- Placement of a species within a particular genus is based on various genetic and phenotypic characteristics shared among the species.
- Microorganisms do not possess the multitude of physical features exhibited by higher organisms such as plants and animals.

❏ Species

- **Species** (abbreviated as **sp.**, singular, or **spp.**, plural) is the most basic of the taxonomic groups and can be defined as a collection of bacterial strains that share **common physiologic and genetic features and differ notably from other microbial species.**
- Occasionally, taxonomic subgroups within a species, called **subspecies**, are recognized.

❖ Nomenclature

- **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).**
- It provides the accepted labels by which organisms are universally recognized.

• Bacteria, fungi, and viruses are the most commonly used microbiological agents, the

- 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: **the genus designation**, in which the first letter is always capitalized, and **the species designation**, in which the first letter is always **lowercase**.
- The two components are used simultaneously and are printed in **italics** or **underlined** in script.
- For example, the streptococci include ***Streptococcus pneumonia***.

QUIZ

Q1/ WHAT IS MEANING OF MICROBIOLOGY AND MICROORGANISM?



Q2/ MICROORGANISM CONSIST OF,,, ..,,

Q3/ ENUMERATE CLASSIFICATION OF MICROORGANISM.

Q4/ COMPARE BETWEEN EUKARYOTIC CELL AND PROKARYOTIC CELL.

Any questions?

*Thank
You*