

Core Course I: Biodiversity  
Course Code: BOTGCOR02T

Unit: 1                      Microbiology                      (Part 1)

- ❖ **Microorganisms:** Unicellular / multicellular organisms which are not visible in naked eyes known as microorganisms.  
E.g. Bacteria, Virus, Protozoa, some members of Algae, some members of Fungi etc.



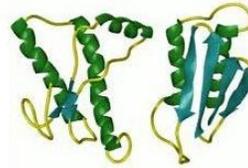
- ❖ **Microbiology:** The branch of science which deals with those microbes which are mainly placed under Kingdom Monera and Protista (according to the five kingdom classification) along with some non cellular biotic components having capacity to make disease (like Virus, Viroid, Prion etc.), is known as Microbiology.

**Viroids**

- Infectious RNA molecules
  - Plant diseases (interfere with metabolism)
- Transmitted like viruses

**Prions**

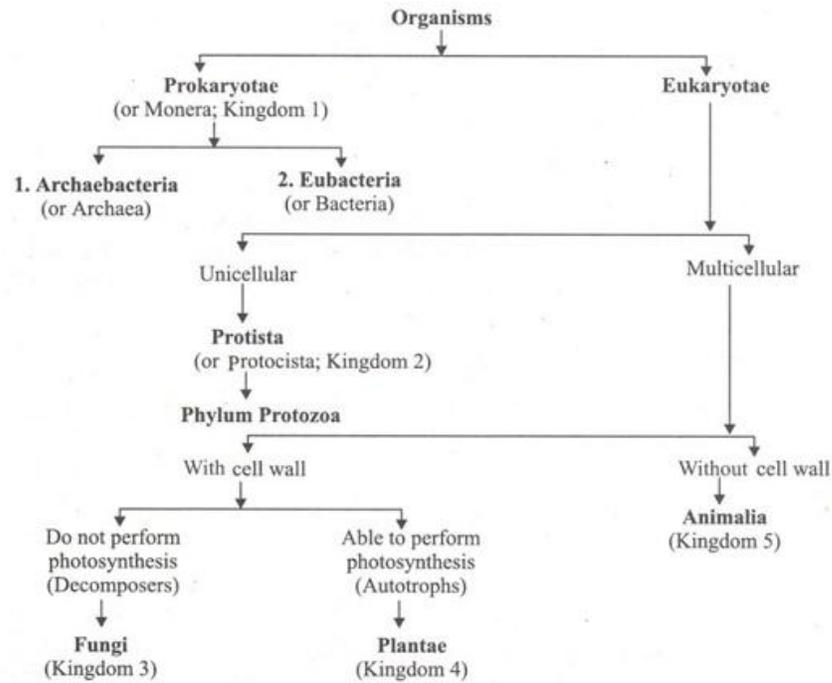
- Infectious protein molecules
- Animal/human diseases
  - Insomnia, mad cow disease



- ❖ **Brief history about discovery of Microbes:**

Name of Discoverer	Year of discovery	Discovery / Proposal
Leonardo de Vinci	-	Discovery - Lens.
Francis Janssen & Zacharis Janssen	1590	Discovery - compound microscope.
Galilio Galilei	1613	Discovery - microscopic plants and animals.
Leeuwenhoek	1831	Discovery - microbes (bacteria, protozoa etc.)
Hoeckel	1896	Proposal - group Protista (Including all microbes like algae, fungi, bacteria, protozoa etc.)
Whittaker	1969	Proposal - Five Kingdom Classification.
Carl Woese	1977	Proposal - Three Domains of Life.

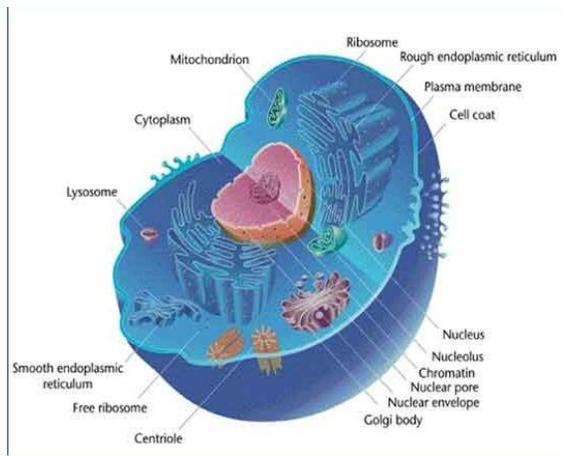
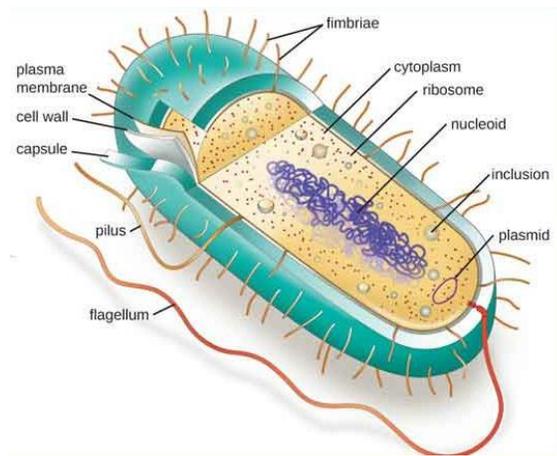
❖ **Five Kingdom Classification:**



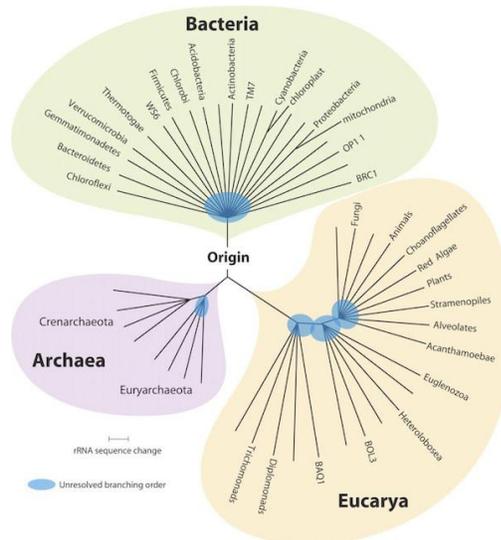
• **Prokaryotic vs. Eukaryotic cell:**

Features	Prokaryotic	Eukaryotic
Shape	Various types – Rod (Bacillus), Round (Coccus), Comma (Vibrio), Spiral etc.	Plant cells have definite structures because of presence of cell wall but animal cells have no definite shape.
Size	1-10 $\mu$	10-100 $\mu$
Cell organization	Mostly unicellular, rarely multicellular.	Mostly multicellular, rarely unicellular.
Cell wall	Present in maximum members, composed of mucopeptide.	Present only in plant cells, composed of cellulose. (In case of fungi chitin)
Nucleus	Absent.	Present.
Genetic material	ds, circular DNA. Present in naked condition at cytoplasm known as nucleoid/ genophore.  In bacterial cell, apart from nucleoid, a small ring like ds DNA present known as Plasmid.	ds, linear DNA. Present inside of nucleus.
Cell division	Binary fission.	Mitosis and Meiosis.
Cell organelles	Only non membrane bound.	Both membrane bound and naked ones present.
Chromosome formation	Absent, because of absence	Present.

	of histone protein in the cell.	
Endocytosis and Exocytosis	Absent.	Present.
Flagella	Simple structure composed of flagellin protein.	Complex structure (9+2 arrangement), composed of tubulin protein.
Photosynthetic pigments	Present in few cells (Photosynthetic bacteria and Cyanobacteria); Chlorophyll a and Bacteriochlorophyll (only in photosynthetic bacteria)	Present only in plant cells; Chlorophyll a & Chlorophyll b.
Respiratory organ	Mesosome. (Part of cell membrane remain in folded condition towards the cytoplasm)	Mitochondria.
Respiratory process	Both Aerobic (O <sub>2</sub> dependent) and Anaerobic (O <sub>2</sub> independent).	Only aerobic.



❖ **Three Domains of Life:**



- Achea vs. Bacteria:

Features		Archea	Bacteria
Growth	Above 100°C	+	-
	At hypersaline solution	+	-
Cell Wall	Muramic Acid	-	+
	Amino Acid	L-amino acids	D-amino acids
Membrane Lipids		Alcohol bounded to glycerol by ether linkage	Techoic acid bounded to glyceol by ether linkage
Protein Synthesis	Initiating amino acid		Methionine
	Inhibitor	Kanamycin	-
		Anisomycin	+
RNA producing enzyme (DNA dependent RNA polymerase)		One	Several
Methabolic activity (Photosynthesis)		-	+

