



BIODIVERSITY

The overview

1.1 Classification

1.2 Domain bacteria and domain archaea

1.3 Diversity of bacteria

1.4 Domain Eukarya: Kingdom Protista

1.5 Domain Eukarya: Kingdom Fungi

1.6 Domain Eukarya: Kingdom Plantae

- ❖ **Bryophytes**
- ❖ **Pteridophytes**
- ❖ **Gymnosperms**
- ❖ **Angiosperms**
- ❖ **Evolutionary relationship in Kingdom plantae**

1.7 Domain Eukarya: Kingdom Animalia



1.1 BIOVERSITY AND CLASSIFICATION

LEARNING OUTCOMES



- a) State the types of biodiversity (genetic, species and ecosystem).
- b) State hierarchical classification
- c) Explain briefly the classification systems:-
 - i. Five-kingdom system (Robert Harding Whittaker, 1969) based on level of cell organization, types of organism and modes of nutrition.
 - ii. Three-domain system (Carl Woese, 1977) - Bacteria, Archaea and Eukarya based on rRNA base sequence.

a) Types Of Biodiversity



Genetic Diversity

The variety of genes within a given species



Species Diversity

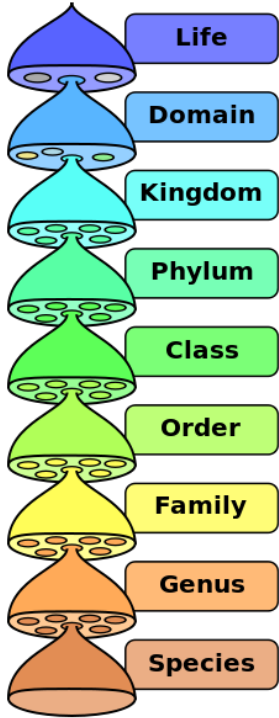
The variety of species in a given ecosystem



Ecosystem Diversity

The variety of ecosystem within a given region

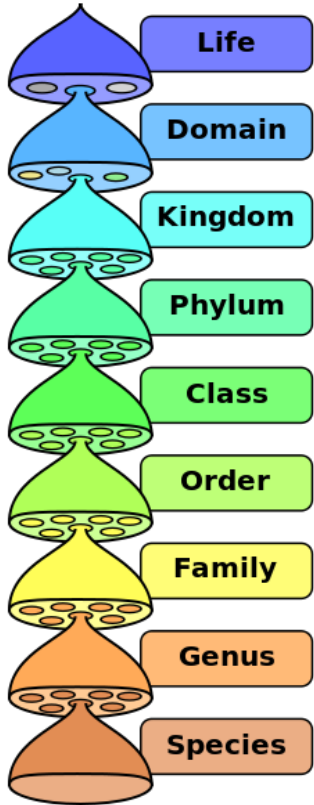
b) Hierarchical classification



Domain	Eukarya
Kingdom	Animalia
Phylum	Chordata
Class	Mammalia
Order	Primates
Family	Hominidae
Genus	<i>Homo</i>
Species	<i>Homo sapiens</i>

The hierarchical classification (Linnaean System)

b) Hierarchical classification

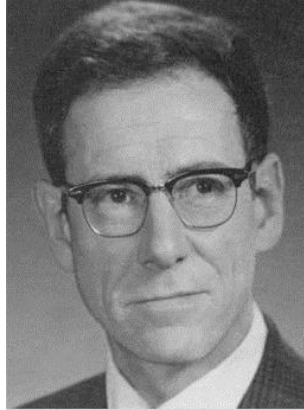


Domain	Bacteria
Kingdom	Monera
Phylum	Proteobacteria
Class	Gammaproteobacteria
Order	Enterobacteriales

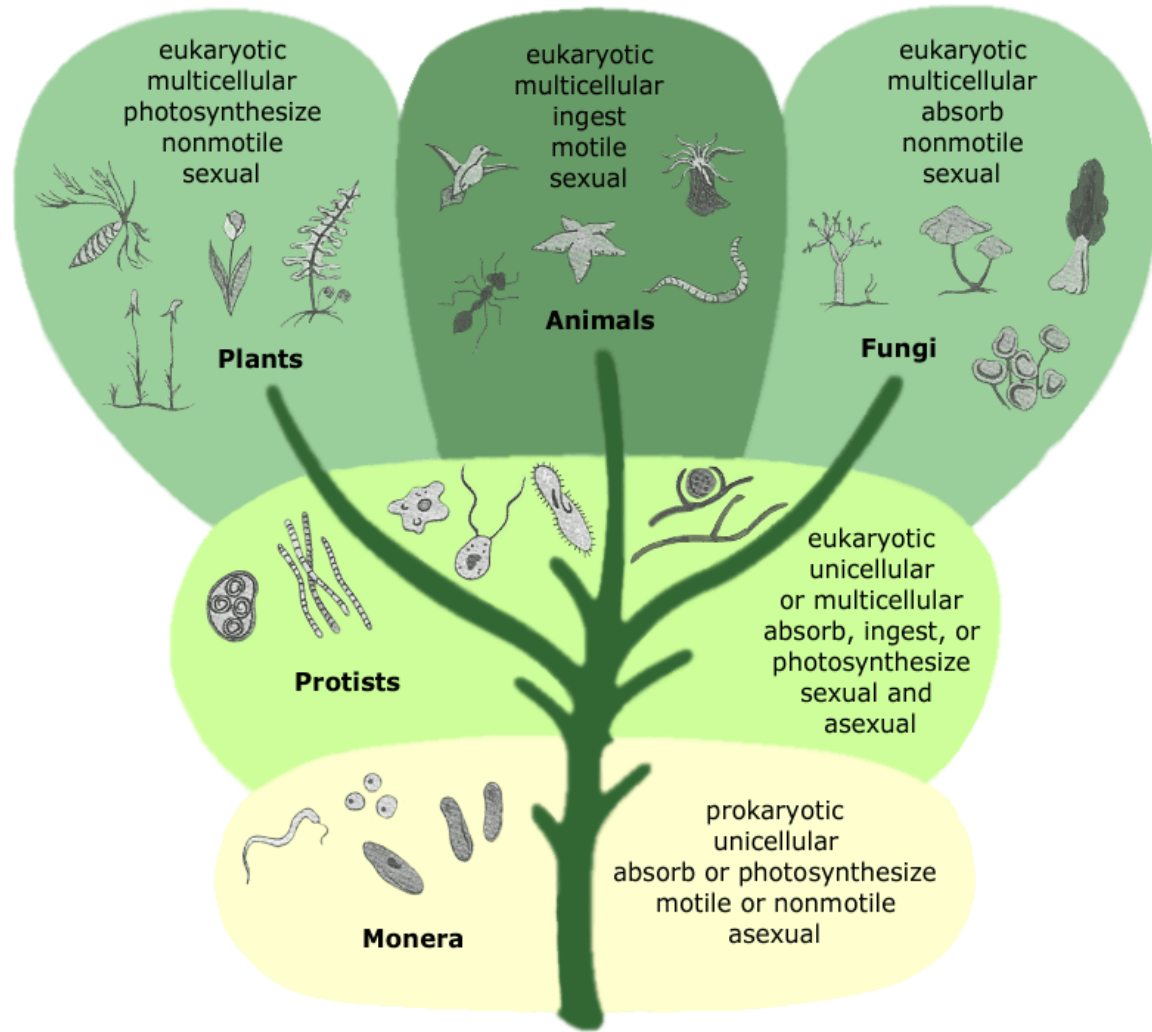
c) The classification system

- i. Five-kingdom system (Robert Harding Whittaker, 1969) based on level of cell organization, types of organism and modes of nutrition.
- ii. Three-domain system (Carl Woese, 1977) - Bacteria, Archaea and Eukarya based on rRNA base sequence.

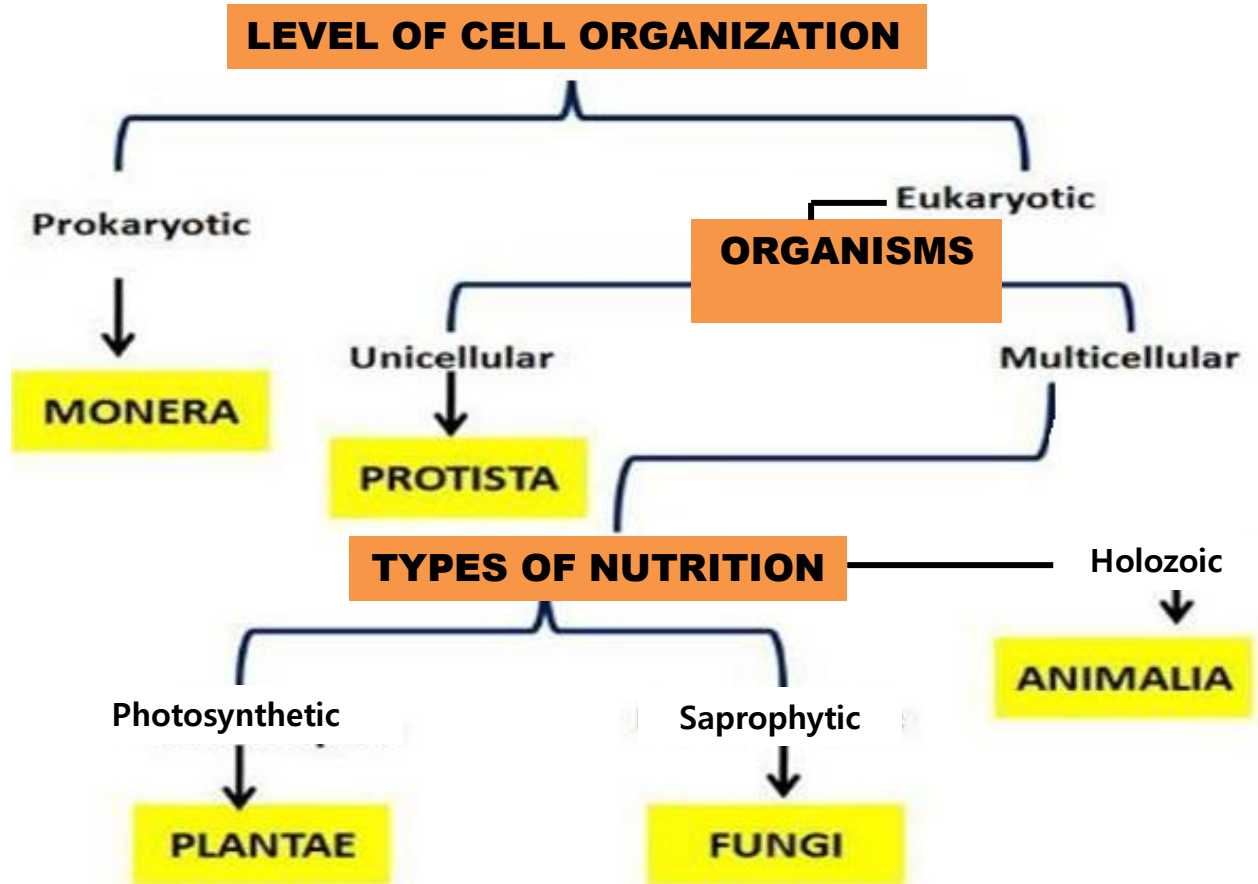
Five-Kingdom Systems



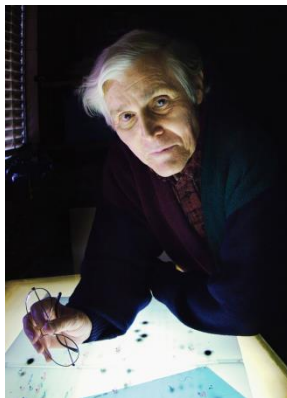
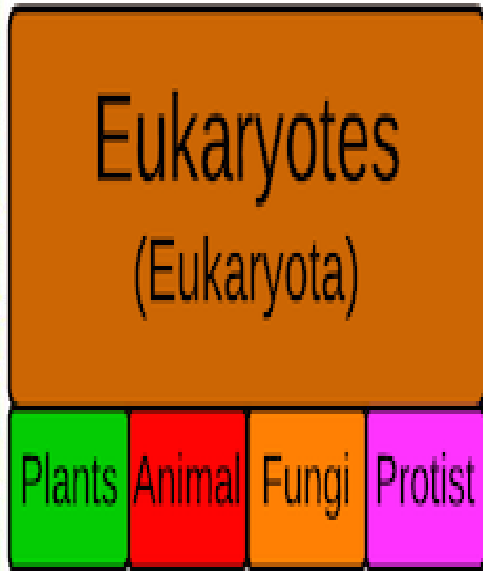
Robert Harding Whittaker
(1969)



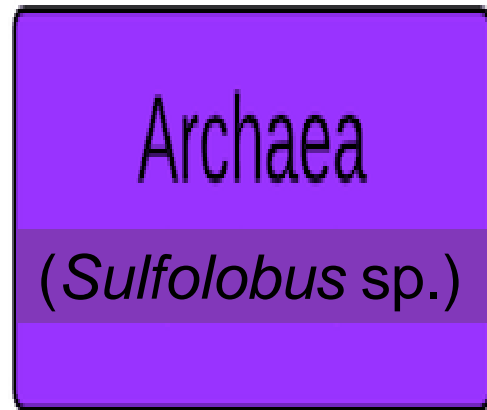
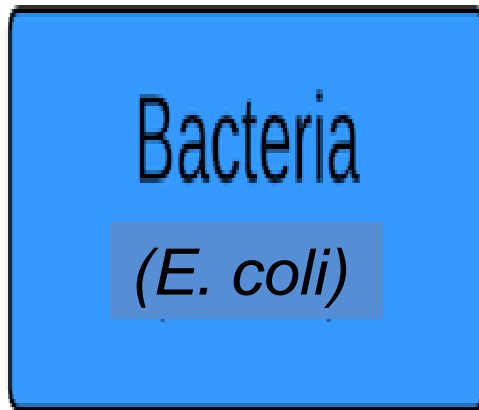
The classification system is based on :



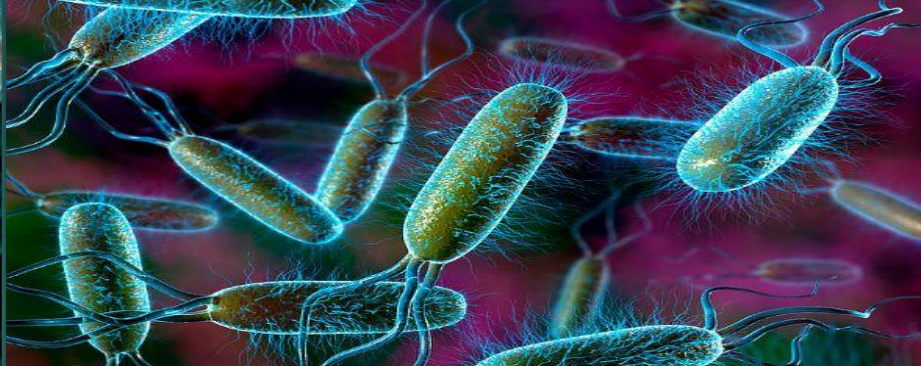
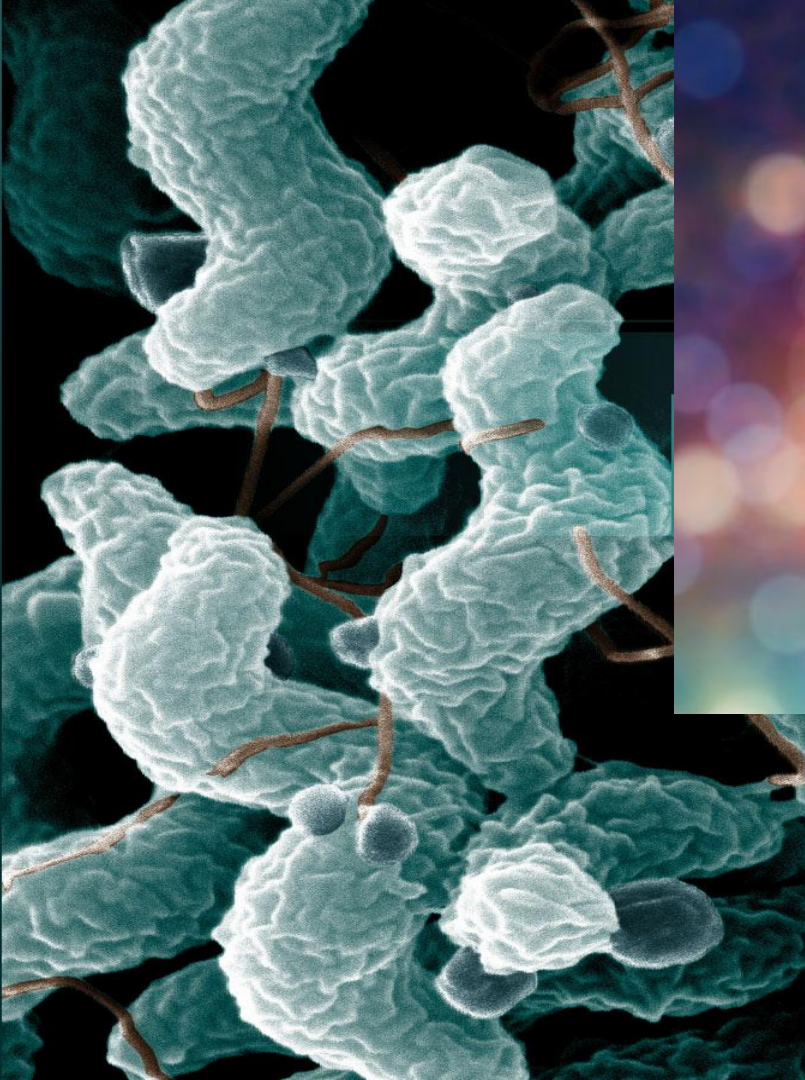
Three-Domain System



Carl Woese
(1977)



1.2 DOMAIN BACTERIA & ARCHAEA

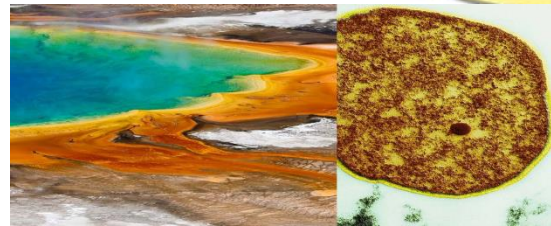
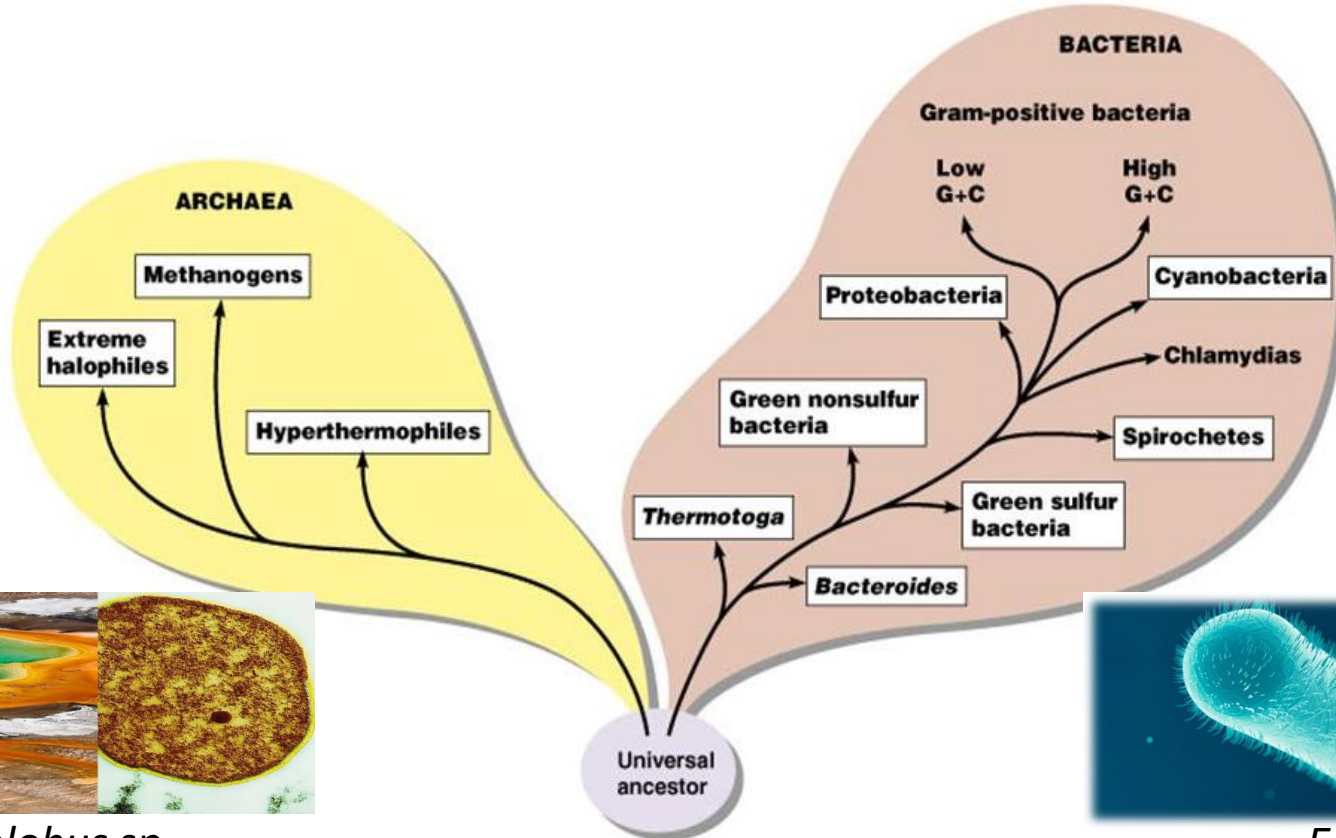
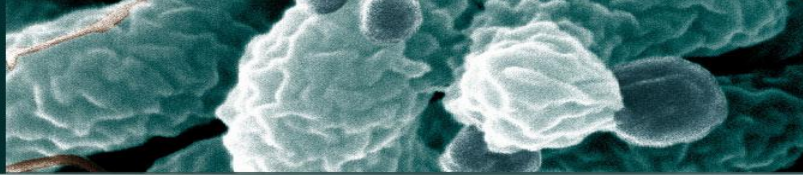




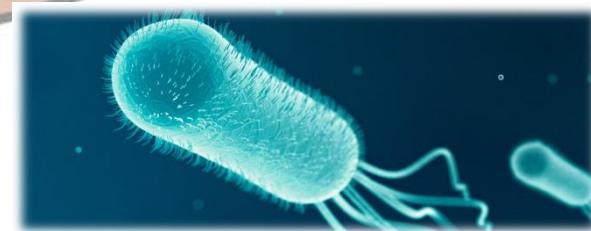
LEARNING OUTCOMES

- a) State the two domain of prokaryotes, bacteria (*E.coli*) and archaea (*Sulfolobus* sp.)
- b) Differentiate between the two domain of prokaryotes, bacteria (*E.coli*) and archaea (*Sulfolobus* sp.) based on :-
 - Cell wall structure
 - Association of histon to DNA
 - Structure of membrane lipids.
- c) Describe the diversity of bacteria (based on cell shapes and Gram-stain)
- d) State the importance of bacteria:
 - Recycling of chemicals elements in ecosystem (nitrogen fixation, as decomposer).
 - Symbiotic (enterobacteria e.g *E coli* in human intestine)
 - Pathogenic e.g. *Salmonella* spp.)
 - In research and technology (bacterial plasmid).

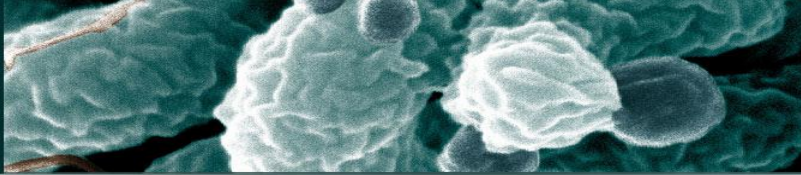
a) The Domain Prokaryotes



Sulfolobus sp.



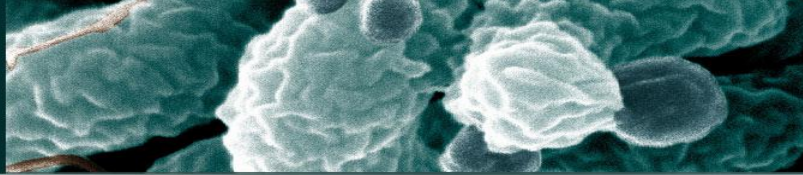
E. coli



b) The differences between Bacteria and Archaea

Characteristic	Bacteria	Archaea
Cell wall structure	Peptidoglycan present in cell wall	Peptidoglycan absent in cell wall
Structure of DNA	Histone proteins not associated with DNA	Histone proteins associated with DNA
Structure of membrane lipids	Membrane lipid involves glycerol-ester linkage	Membrane lipid involves glycerol-ether linkage
Examples	<i>E.coli</i>	<i>Sulfolobus</i>

c) The diversity Of Bacteria



SPHERES (COCCI)



Diplococci
(*Streptococcus pneumoniae*)

The diversity Of Bacteria

CELL SHAPE

RODS (BACILLI)



Chain of bacilli
(*Bacillus anthracis*)

SPIRALS

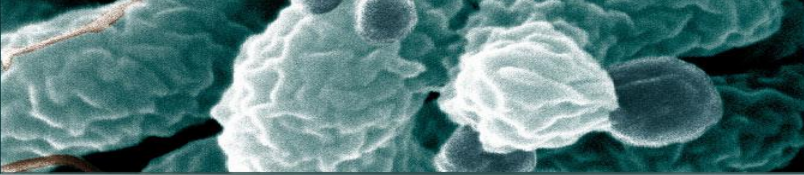


Spirochaetes
(*Treponema pallidum*)

GRAM STAINING



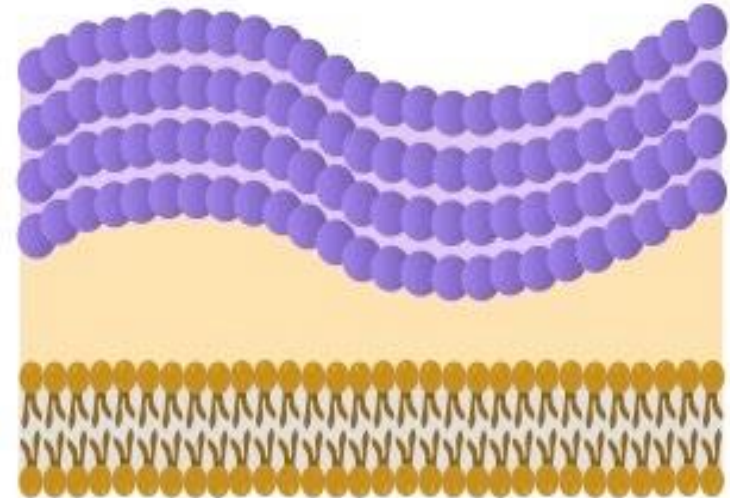
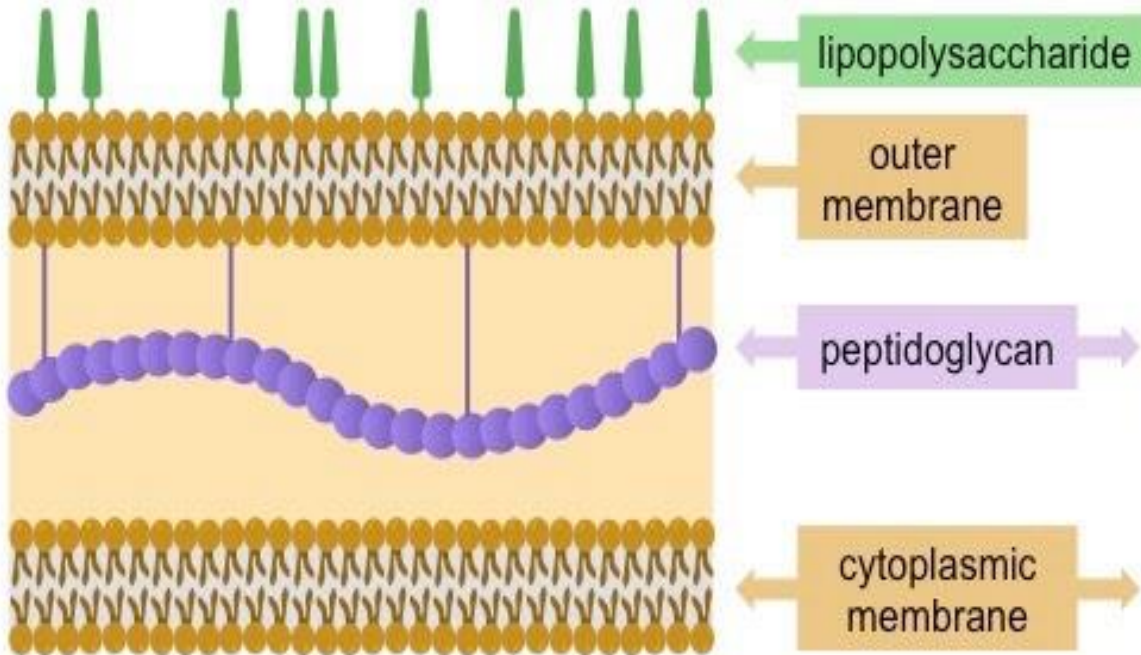
Gram Positive Bacteria vs. Gram Negative Bacteria

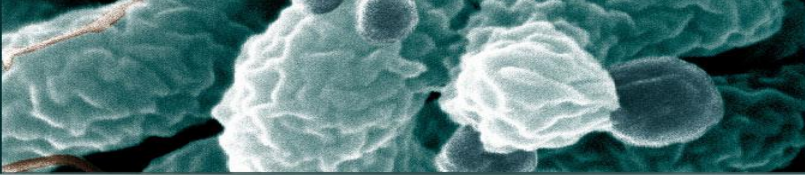


GRAM STAINING

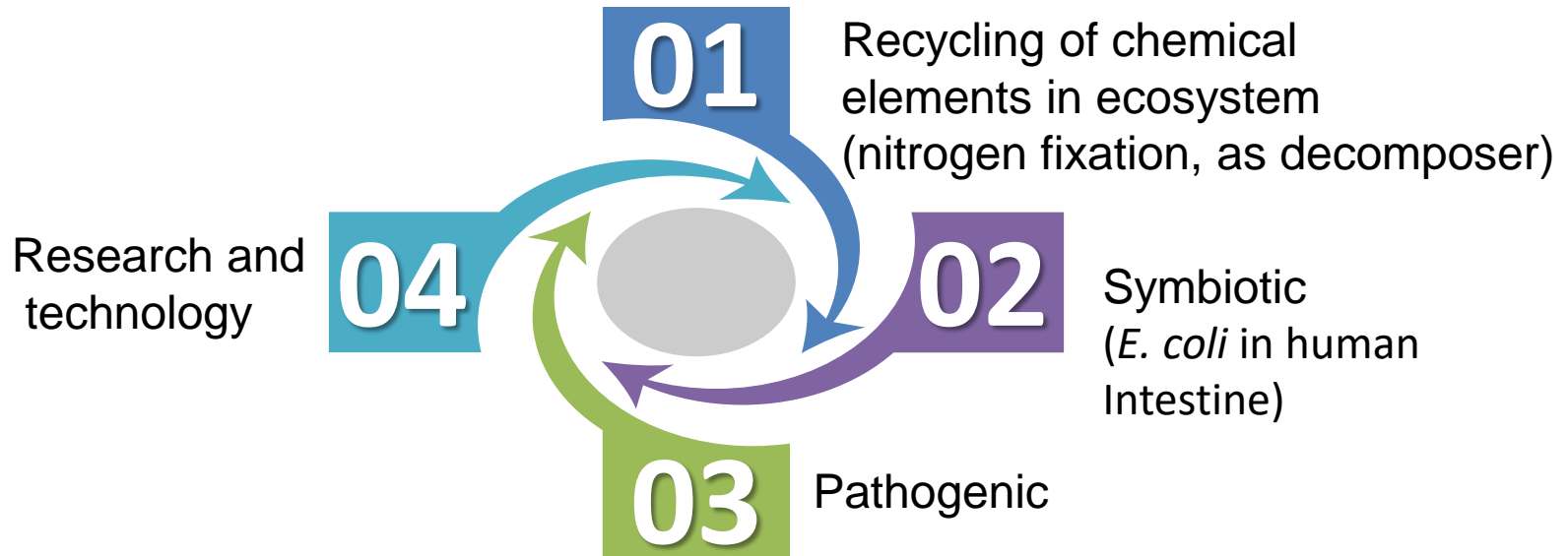
GRAM-NEGATIVE

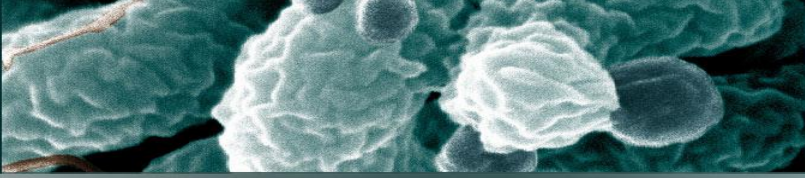
GRAM-POSITIVE



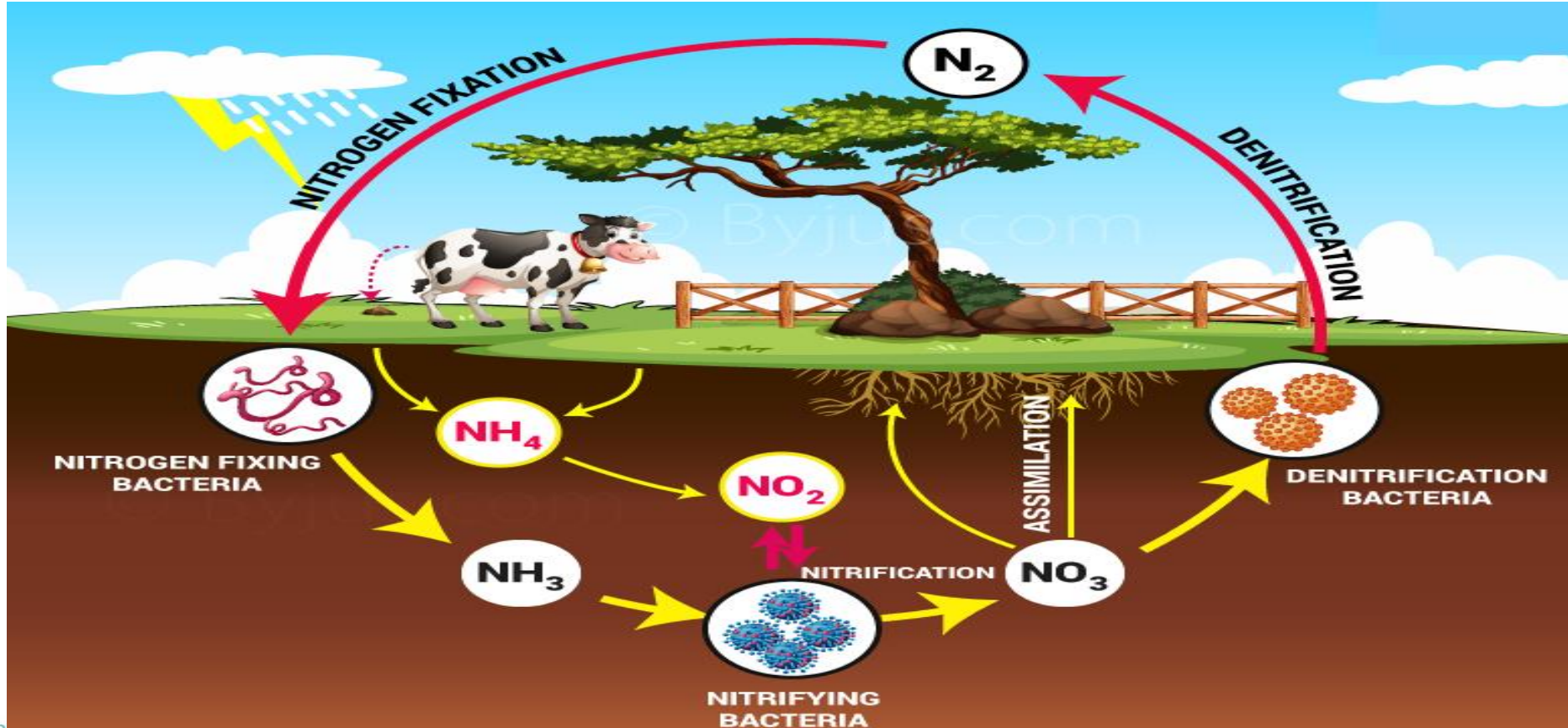


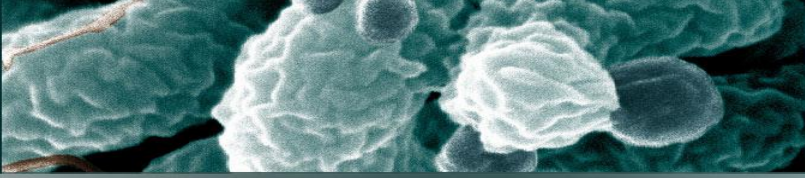
d) The importance of bacteria



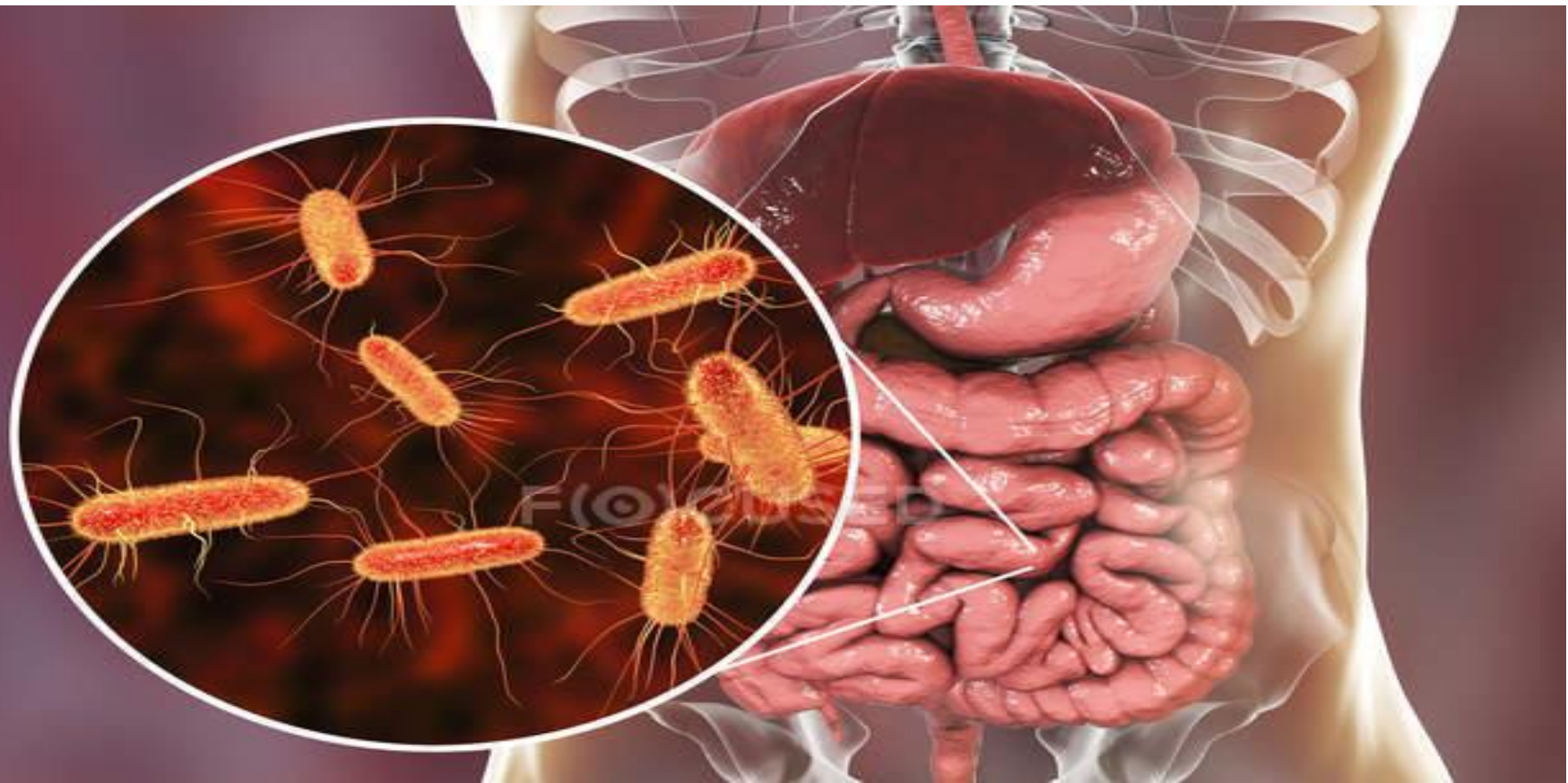


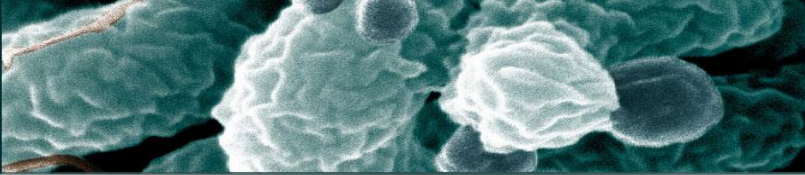
i) Recycling of chemical elements in ecosystem



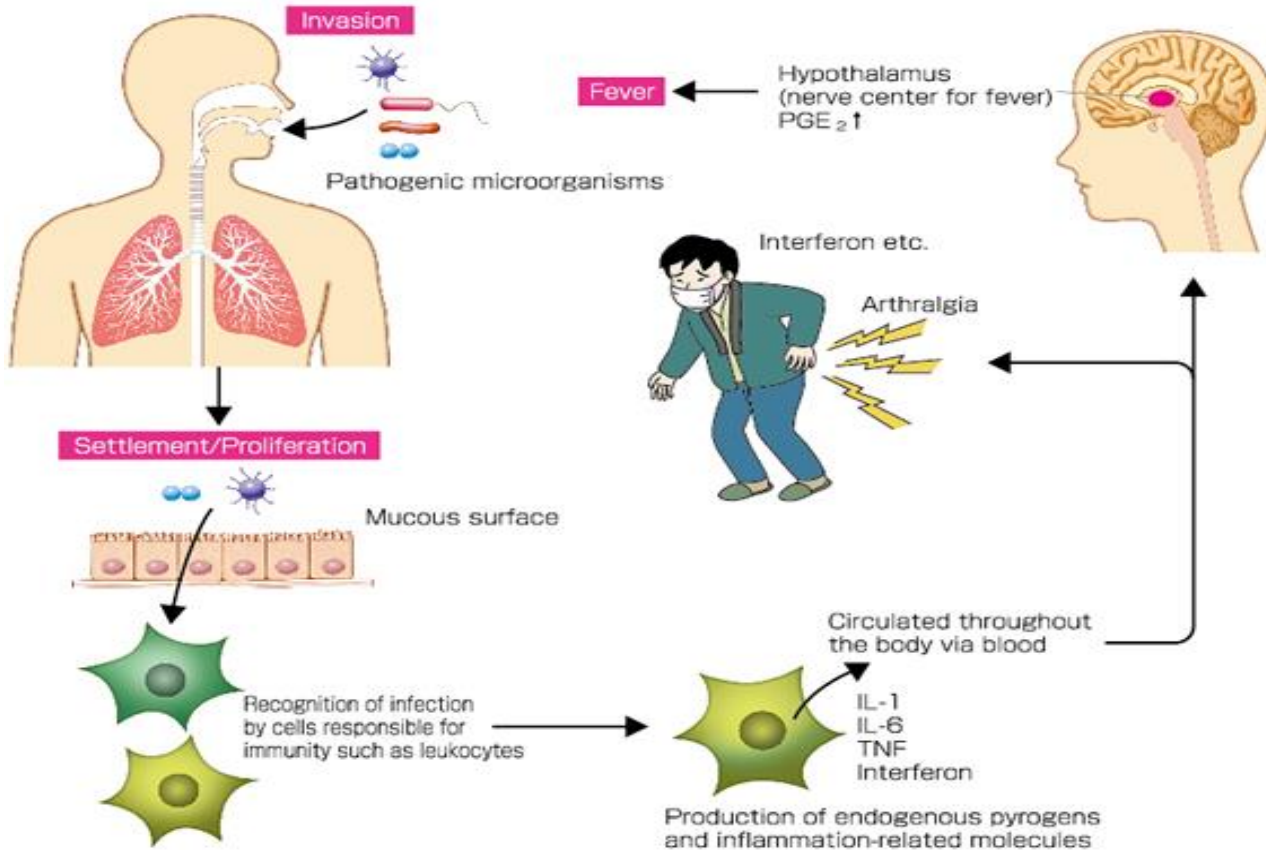


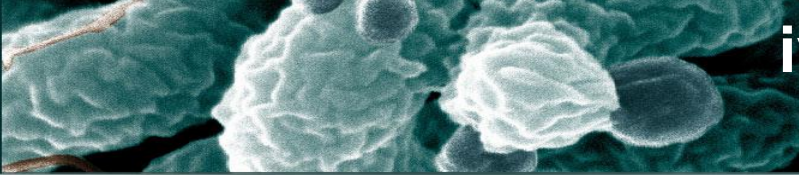
ii) *E. coli* in human Intestine



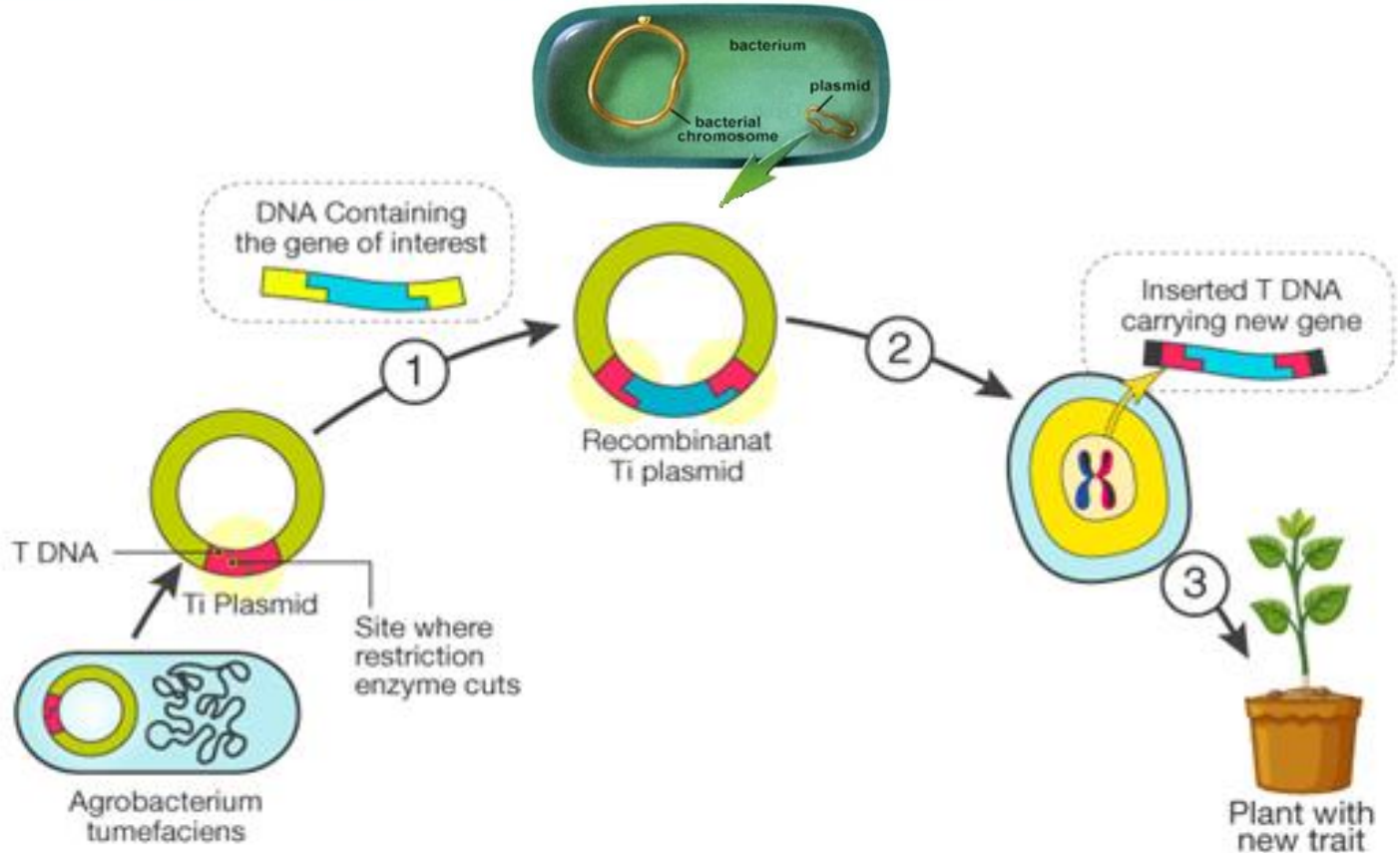


iii) Pathogenic





iv) In research and technology (bacterial plasmid)

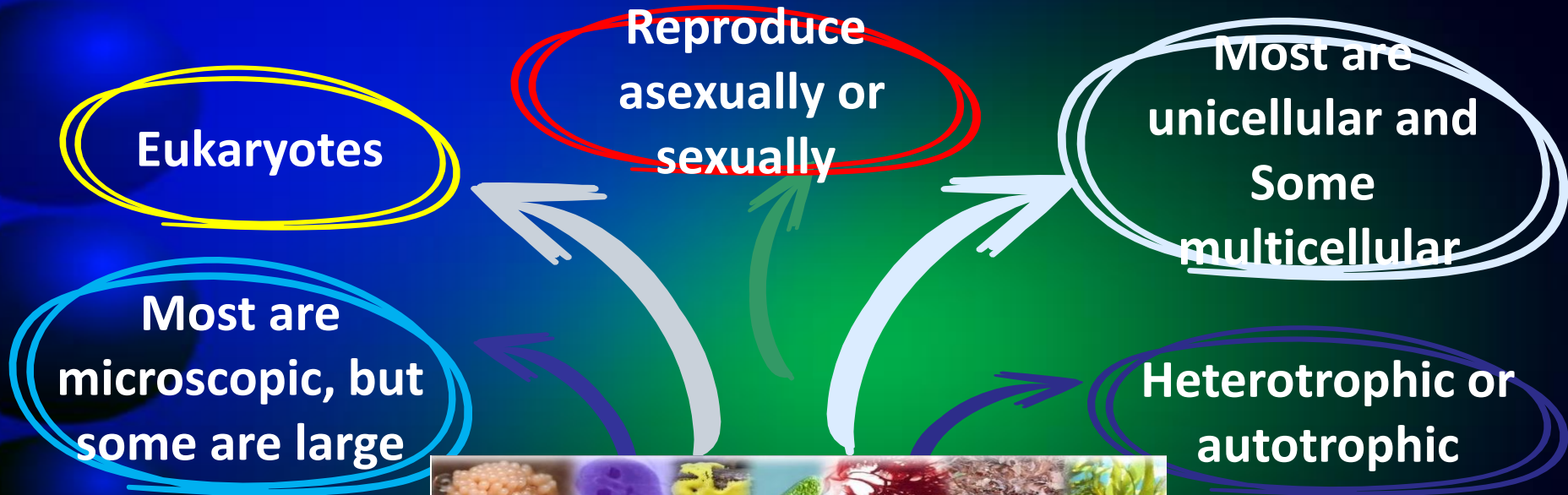




1.4 Domain Eukarya: Kingdom Protista

LEARNING OUTCOMES

- a) State the unique characteristics of Protista
- b) State the classification of Protista based on the unique feature:
 - i. Two major phyla of algae (photosynthetic pigment):
 - Chlorophyta (*Chlamydomonas* sp.)
 - Phaeophyta (*Fucus* sp.)
 - ii. Four major phyla of Protozoa (locomotioa):
 - Euglenophyta (*Euglena* sp.)
 - Rhizopoda (*Amoeba* sp.)
 - Ciliophora (*Paramecium* sp.)
 - Apicomplexa (*Plasmodium* sp.)
- c) Explain the importance of Protista:
 - Roles in CO₂ fixation
 - Food source (*Chlorella* sp.)
 - Eutrophication (algal bloom)
 - Red tide (dinoflagellates)
 - Human health (*Plasmodium* sp. – malaria)
 - Sewage treatment



b) The classification of Protista based on the unique feature:

Algae

**KINGDOM
PROTISTA**

Protozoa

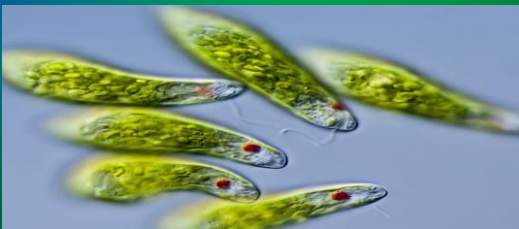
Phylum Chlorophyta
Chlamydomonas sp.



Phylum Phaeophyta
Fucus sp.



Phylum Euglenophyta
Euglena sp.



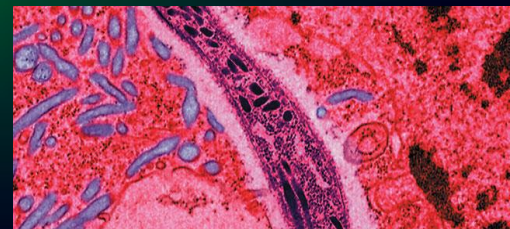
Phylum Ciliophora
Paramecium sp.



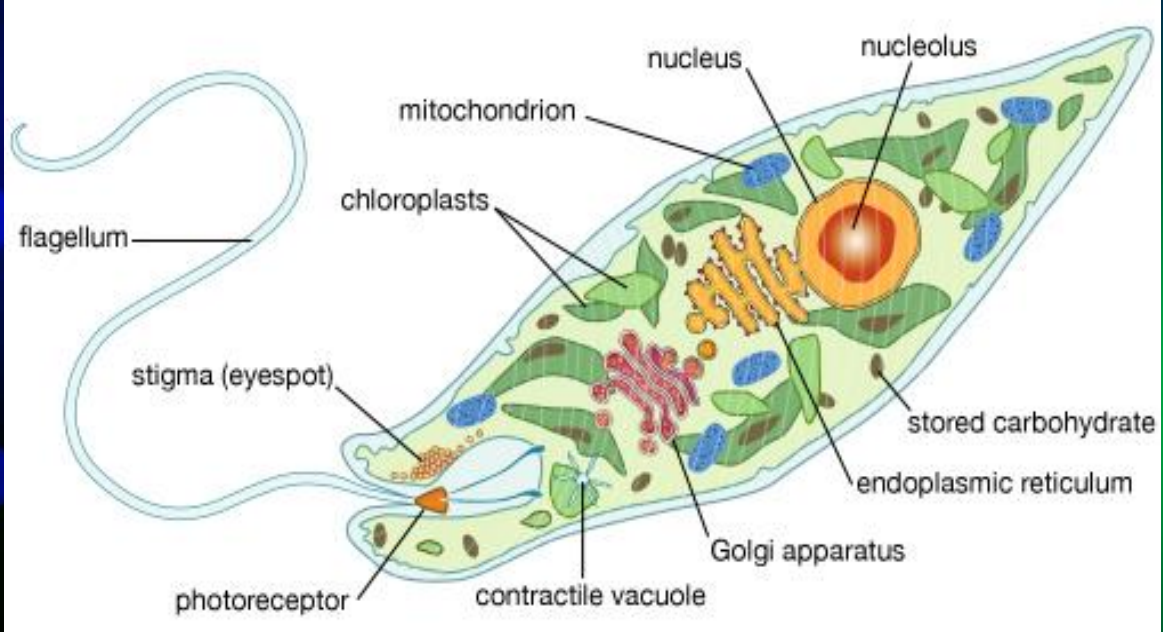
Phylum Rhizopoda
Amoeba sp.



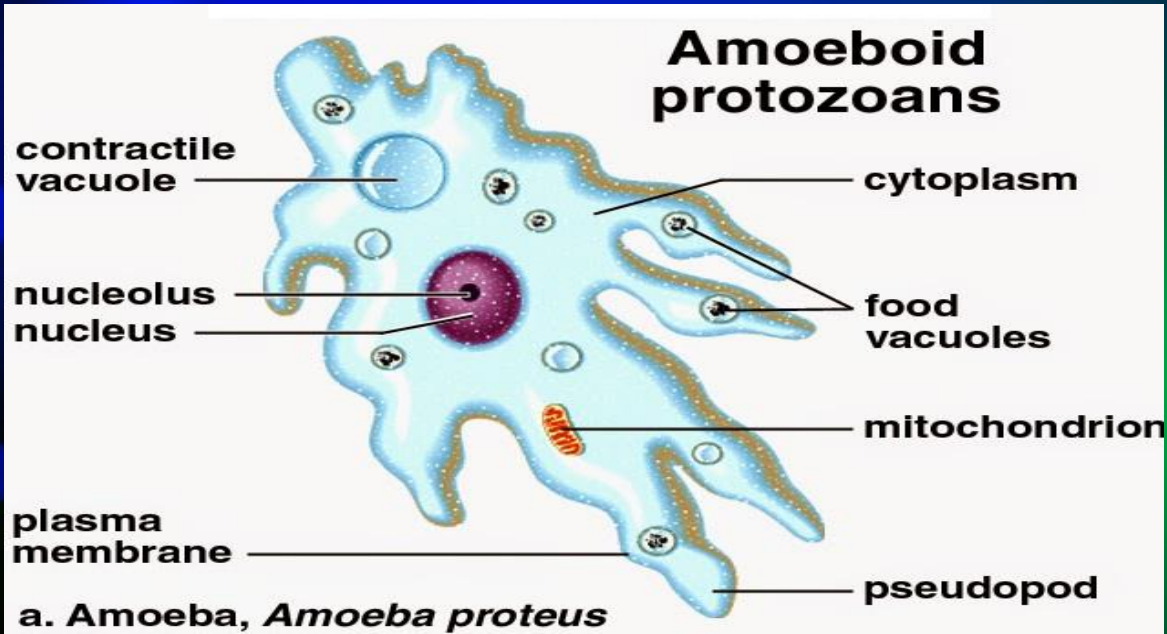
Phylum Apicomplexa
Plasmodium sp.



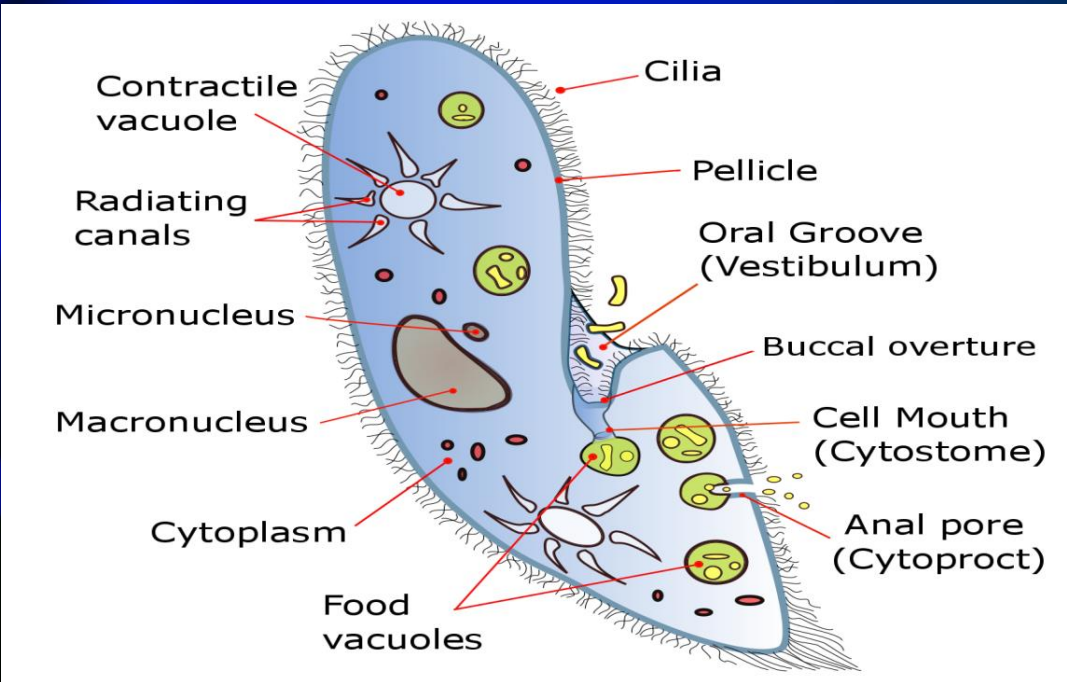
Phylum Euglenophyta (*Euglena* sp.)



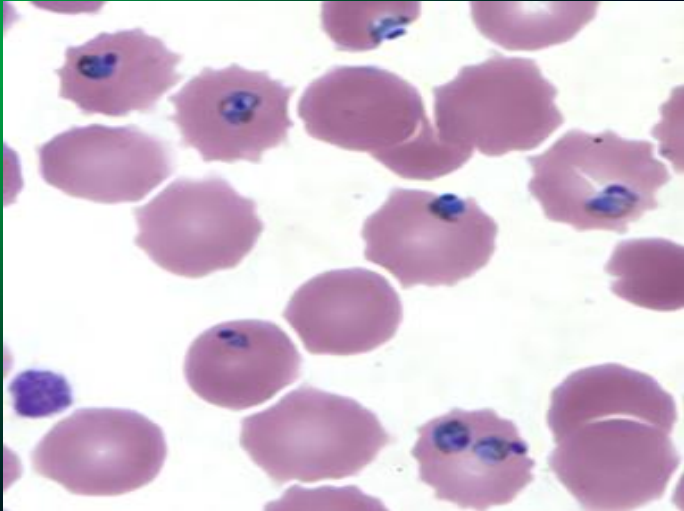
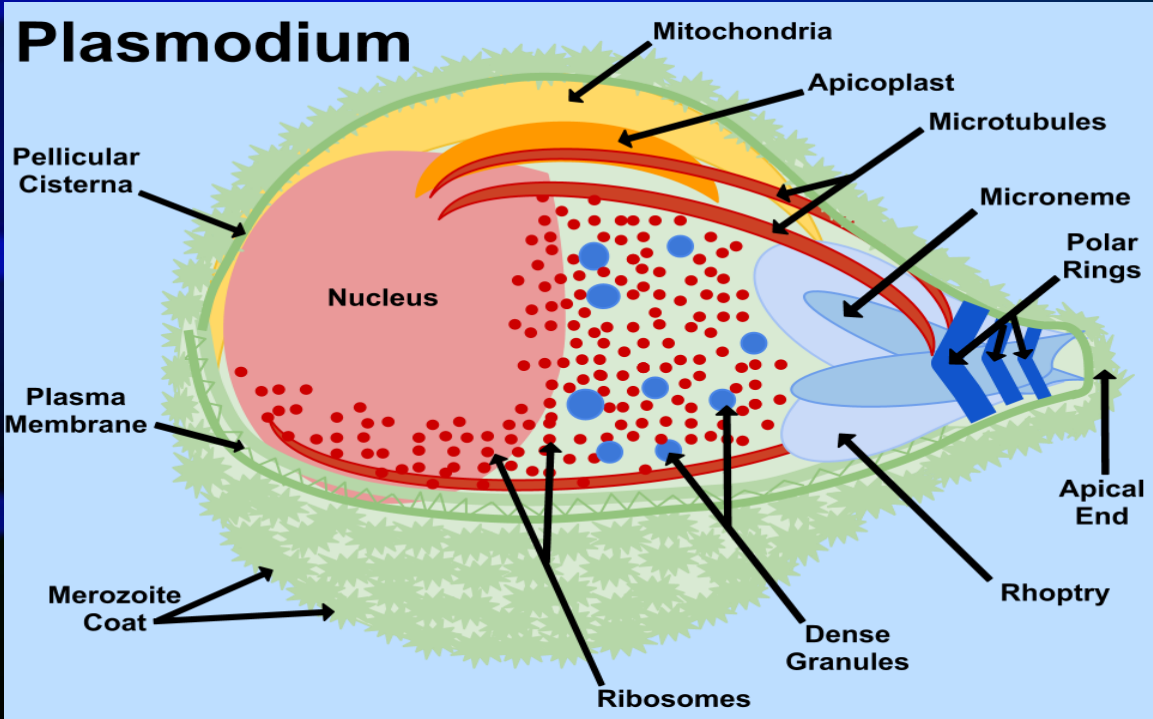
Phylum Rhizopoda (*Amoeba* sp.)



Phylum Ciliophora (*Paramecium* sp.)

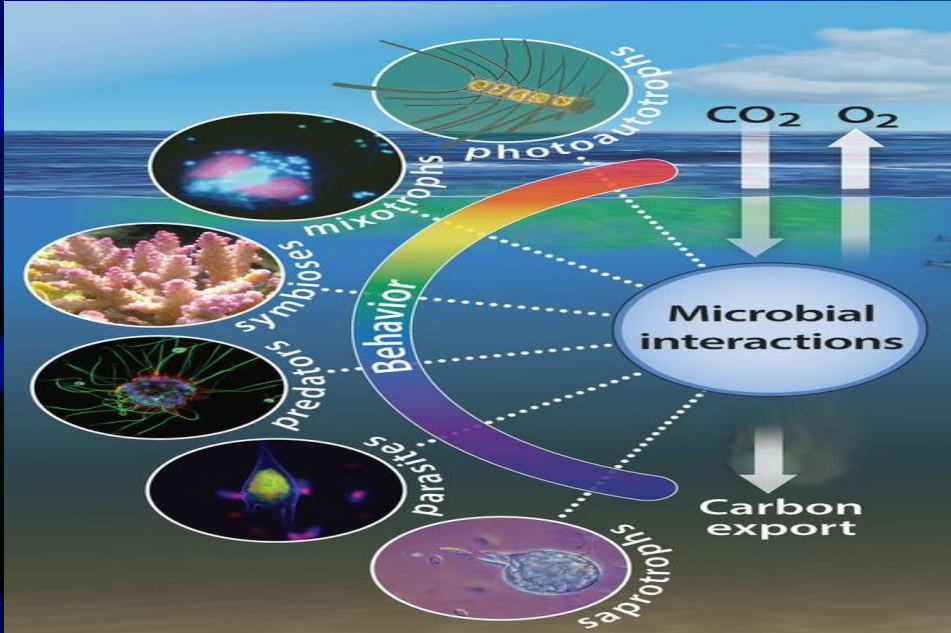


Phylum Apicomplexa (*Plasmodium* sp.)



c) The importance of Protista

(i) Roles in CO₂ fixation



(ii) Food source (*Chlorella* sp.)



BEFORE



AFTER

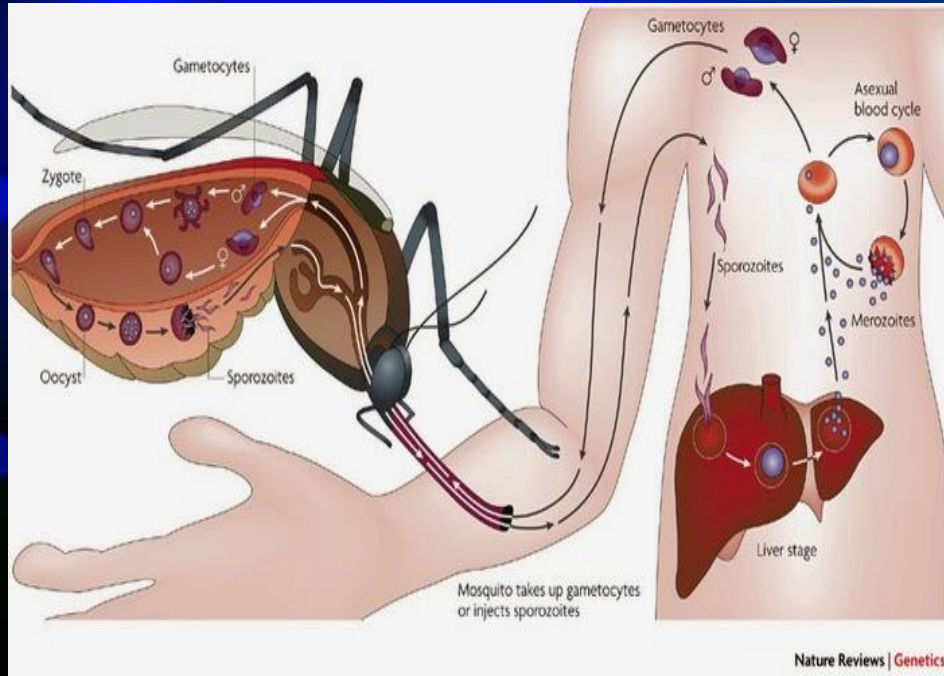


**(iii) Eutrophication
(alga bloom)**



(iv) Red tide (dinoflagellates)

(v) Human health (*Plasmodium* sp.)



(vi) Sewage treatment

