UNIT -I
DIVERSITY IN THE LIVING WORLD
CHAPTER – 2
BIOLOGICAL CLASSIFICATION

2.1 KINGDOM MONERA
2.2 KINGDOM PROTISTA
2.3 KINGDOM FUNGI
2.4 KINGDOM PLANTAE
2.5 KINGDOM ANIMALIA
2.6 VIRUSES, VIROIDS & LICHENS

Vikasana – Bridge Course 2012
WHAT IS CLASSIFICATION?

Anything which is grouped into convenient category based on easily observable characters.

Arrangement of organized information on the basis of similarities.
WHAT IS BIOLOGICAL CLASSIFICATION?

It is the systematic grouping of organisms. It is also called biosystematics.

Biosystematics deals with the identification, nomenclature & classification of organisms based on their similarities & differences.
DIFFERENT SYSTEMS OF CLASSIFICATION

1) ARTIFICIAL SYSTEMS
2) NATURAL SYSTEMS
3) PHYLOGENETIC SYSTEMS (CLADISTICS)
1. ARTIFICIAL SYSTEMS:

It is a system of classification based on one or two easily recognizable characters.

Example: *Theophrastus (370-300 BC)* classified plants into:

- Trees
- Shrubs
- Undershubs
- Herbs
Example 2:

*Aristotle* (*384-322 BC*) classified animals into:

- Enaima (Animals with red blood)
- Anaima (Animals without red blood)
- Ovipary (Egg laying)
- Vivipary (Giving birth to young ones)
2. NATURAL SYSTEM OF CLASSIFICATION

It is a system of classification based on natural similarities of vegetative & floral characters.

Example: *George Bentham & Joseph Dalton Hooker* classified plants into:

- **Cryptogams** (non flowering plants)
- **Phanerogams** (seed bearing plants)

Vikasana – Bridge Course 2012
3. PHYLOGENETIC SYSTEM (CLADISTICS)

It is a system of classification based on evolutionary & genetic relationship of organisms in addition to natural characters. Example: *Adolf Engler & Karl Prantle* classified bacteria & all plants under 14 divisions. The 14th divisions is *Embryophyta siphanogama* that includes gymnosperms & angiosperms.

Vikasana – Bridge Course 2012
TWO KINGDOM SYSTEM:
(CAROLUS LINNAEUS-1758)

• KINGDOM PLANTAE: It includes Bacteria, Mycoplasma, fungi & photosynthetic plants.

• KINGDOM ANIMALIA: It includes unicellular & multicellular animals.
THREE KINGDOM SYSTEM:
*ERNEST HAECKEL-1866*

- **KINGDOM PROTISTA:** It includes unicellular & colonial eukaryotes such as bacteria, algae, fungi & protozoans.
- **KINGDOM PLANTAE:** It includes multicellular photosynthetic plants.
- **KINGDOM ANIMALIA:** It includes multicellular animals.
FOUR KINGDOM SYSTEM:
(COPELAND-1956)

- KINGDOM MONERA: It includes unicellular or filamentous prokaryotes such as Bacteria, mycoplasma & cyanobacteria.
- KINGDOM PROTISTA: It includes unicellular eukaryotes.
- KINGDOM PLANTAE: Multicellular autotrophic eukaryotes
- KINGDOM ANIMALIA: Multicellular heterotrophic eukaryotes
FIVE KINGDOM SYSTEM:
*(R H WHITTAKER - 1969)*

Classification based on:

- Complexity of cell structure - prokaryote or eukaryote
- Complexity of organisms body – unicellular or multicellular
- Mode of nutrition – Autotrophic or Heterotrophic
• Major ecological role – Producer, Consumer, Decomposer
• Phylogenetic relationship – simple to complex
PROKARYOTE:
• Incipient nucleus
• Nucleoid has only DNA
• May have plasmid
• Absence of membrane bound cell organelles
• 70S ribosomes

Example: Bacteria, Nostoc, Mycoplasma.

EUKARYOTE:
• True nucleus
• Chromatin has DNA & histones
• Plasmid absent
• Presence of membrane bound cell organelles
• 70S & 80S ribosomes present

Example: Higher plants & animals
FIVE KINGDOM SYSTEM CLASSIFICATION OF R H WHITTAKER:

- KINGDOM MONERA
- KINGDOM PROTISTA
- KINGDOM FUNGI (MYCOTA)
- KINGDOM PLANTAE (METAPHYTA)
- KINGDOM ANIMALIA (METAZOA)
KINGDOM MONERA: (Characteristics)

- Unicellular or filamentous prokaryotes
- Omni present (air, soil, hot springs, deserts, deep sea, snow & as parasites)
- Cell wall is composed of polysaccharides & amino acids (peptido glycons or murein)
- Autotrophic (photo & chemosynthetic) & heterotrophic (saprophytic & parasitic)
- Reproduce by vegetative, asexual & sexual methods
MAJOR GROUPS OF MONERA:

1. **Archaebacteria**: Methanogens, Halophyles, thermoacidophyles

2. **Eubacteria**: Vibrio, mycobacteria

3. **Cyanobacteria**: Nostoc, Anabena

Vikasana – Bridge Course 2012
KINGDOM PROTISTA: (Characteristics)

- Unicellular eukaryotes.
- Fresh water, marine or parasitic forms.
- Cell wall is usually absent, if present it is impregnated with silica (diatoms).
- Photosynthetic or non photosynthetic.
- Locomotory structure may be cilia, flagella, pseudopodia or absent.
- Reproduce by sexual & asexual methods.
MAJOR GROUPS OF KINGDOM PROTISTA:

1. CHRYSO PHYTA:  
   - Diatom, 
   - Pinnularia

2. DINOFLAGELLATES:  
   - Gonyaulax, 
   - Noctiluca

Vikasana – Bridge Course 2012
3. EUGLENOIDs:

Euglena, Peranema

4. SLIME MOULDS:

Physarum Stemonitis,

Vikasana – Bridge Course
5. PROTOZOA:

- Amoeba
- Paramoecium
- Trypanosoma
- Plasmodium

Vikasana – Bridge Course 2012
KINGDOM FUNGI: (Characteristics)

- Unicellular or multicellular eukaryotes
- Achlorophyllus heterotrophs
- Some are parasites (Puccinia), saprophytes (Yeast, Agaricus), Symbionts (Parmelia in lichens) & associated in the roots of higher plants (mycorrhiza)
- The thalloid plant body is called mycelium
- Mycelium is made up of tubular thread like hyphae
Cell wall has chitin.

They reproduce by the following methods:
- Vegetative (fragmentation, fission, budding)
- Asexual (sporangiospores, conidia)
- Sexual (Plasmogamy & Karyogamy & meiosis resulting in the formation of haploid spores like oospore, ascospore & basidiospore)
MAJOR GROUPS OF KINGDOM FUNGI:

1. PHYCOMYCETES: Mucor Rhizopus

2. ASCOMYCETES (SAC FUNGI):
   Pencillium Yeast

Vikasana – Bridge Course 2012
3. BASIDIOMYCETES (CLUB FUNGI):
   Agaricus

4. DEUTEROMYCETES (FUNGI IMPERFECTI):
   Cercospora

Vikasana – Bridge Course 20
The following are not mentioned in the R. H. Whittaker five kingdom system of classification.

• PRIONS
• VIROIDS
• VIRUSES &
• LICHENS
PRIONS: These are intracellular, infectious protein particles that cause disease in animals. They were discovered by Stanley Prusiner (1970).

DISEASES:
- Scrapie in sheeps
- Kuru in Malaysian tribes
- Creutzfeldt-Jacob disease (CJD)
- Bovine spongiform encephalopathy

Vikasana – Bridge Course 2012
VIROIDS: These are intracellular infectious single stranded RNA particles that cause diseases in plants. They were discovered by T.O Diener (1971).

DISEASES:
- Potato spindle tuber
- Citrus exocortis
- Cucumber pale fruit
- Tomato bunchy top
VIRUSES: These are intracellular, infectious, poisonous nucleoproteins having DNA or RNA as genetic material. These are obligate parasites that do not have cellular structure. They were discovered by Ivanowskı (1892).

Vikasana – Bridge Course 2012
Example:  
*TMV*

DISEASES: Tobacco mosaic, banana bunchy top, rabies, brain fever & AIDS

Vikasana – Bridge Course 2012
LICHENS: These are symbiotic association between algae & fungi. The algae component is called *phycobiont* (autotrophic) & fungal component is called *mycobiont* (heterotrophic). Lichens are good pollution indicators.

Example:

*Parmelia*  

*Cladonia*