

**QUICK REVISION NOTES**  
**For NEET**  
**BIOLOGY CLASS 11**

## Biological Classification

The process of grouping together various organisms according to their similarities, dissimilarities and phylogenetic descent is known as biological classification.

There have been various attempts to classify organisms. The earliest was by **Aristotle**, who classified plants into herbs shrubs and trees. He classified animals into two groups, based on the presence and absence of red blood.

Linnaeus gave the Two Kingdom system of classification and divided living organisms into Plantae and Animalia.

**R.H. Whittaker** proposed the Five Kingdom system of classification and classified organisms, based on cellular structure, complexity, mode of nutrition, phylogenetic relationship and ecological role performed by them.

Whittaker divided organisms into Monera, Protista, Fungi, Plantae and Animalia

### Five Kingdom Classification by Whittaker

Attributes	Monera	Protista	Fungi	Plantae	Animalia
Cell type	Prokaryotic	Eukaryotic	Eukaryotic	Eukaryotic	Eukaryotic
Cell wall	Polysaccharide + amino acid	May be present	Chitin	Cellulose	Absent
Organ complexity	unicellular	Unicellular	Multicellular	Multicellular	Multicellular
Mode of Nutrition	Chemosynthetic Autotrophic/ heterotrophic	Autotrophic/ heterotrophic	Heterotrophic Absorption	Autotrophic	Heterotrophic Holozoic

#### 1. Monera

- This group includes all kinds of bacteria, having a prokaryotic cell
- The cell does not contain a nucleus
- There are different shapes of bacteria present; spherical- cocci, rod-shaped- bacillus, comma- vibrio and spiral- spirilla
- They mainly reproduce by fission, spore formation under unfavourable conditions and also by DNA transfer from one bacterium cell to another

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- **Mycoplasma** lack the cell wall and are the smallest cell to survive without oxygen
  - **Archaeobacteria**- These bacteria are present in the harshest environmental conditions such as salty, marshy and in hot springs. They are known as halophiles, methanogens, thermoacidophiles, respectively
  - **Methanogens** are present in the gut of ruminants and produce **biogas**
  - **Eubacteria**- These are true bacteria and have a rigid cell wall and motile organisms have flagella
- a. **Photosynthetic Autotrophs**- They include **Cyanobacteria (Blue-green Algae)**. They have **chlorophylls** and carotenoids. They are unicellular, filamentous or colonial and body is covered by a mucilaginous sheath. *Nostoc* and *Anabaena* have heterocysts, where they can fix atmospheric nitrogen.
  - b. **Chemosynthetic Autotrophs**- They play an important role in recycling the nutrients. They get the required energy for ATP generation from the oxidation of various inorganic substances such as ammonia, nitrates and nitrites.
  - c. **Heterotrophic**- There is a wide variety of heterotrophic bacteria. They act as a decomposer. They are used for various purposes such as nitrogen-fixing, curd and antibiotics production. Many bacteria are pathogen causing various diseases of plants and animals, e.g. citrus canker, tetanus, typhoid, cholera.

## 2. Protista

- The group includes unicellular eukaryotes
- A photosynthetic protist is a link between plants and animals
- They contain a well-defined nucleus and other membrane-bound cell organelles
- They include protozoan, slime moulds, chrysophytes, dinoflagellates and euglenoids

### 2.1 Chrysophytes

- Include diatoms and desmids (golden algae)
- They are mostly photosynthetic and have indestructible cell wall due to the presence of silica
- The cell wall makes two thin overlapping shells, which fit like a soapbox on the outer surface
- **Diatomaceous earth** is the deposit of the cell wall that gets accumulated. It is used for filtration and polishing

### 2.2 Dinoflagellates

- They are photosynthetic and marine
- They are found in many colours like yellow, green, red, blue, brown, according to the pigment present

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- Stiff cellulose plates are present on the cell wall
- They multiply rapidly and cause red tide
- Many dinoflagellates emit blue-green light and are bioluminescent

### 2.3 Euglenoids

- They are photosynthetic flagellated protist
- They are a link between plants and animals. They perform photosynthesis but lack a cell wall
- The characteristic feature is the presence of pellicle, a protein-rich layer, which makes their body flexible
- In the absence of sunlight, they feed on small organisms and behave as a heterotroph

Also read: Euglena Classification

### 2.4 Slime moulds

- They are saprophytic protists feeding on organic materials from decaying twigs and leaves
- Aggregation of slime moulds is called plasmodium, which they form under favourable conditions
- Under unfavourable conditions, fruiting bodies containing spores develop at the tip of plasmodium
- These spores can survive for very long under adverse conditions and have true walls

### 2.5 Protozoans

- The group contains all the unicellular, eukaryotic, heterotrophs, which are parasites or predators
- These are divided into 4 major groups:
  1. **Amoeboid-** They are characterised by the presence of pseudopodia, which are used for movement and catching of prey, e.g. Amoeba. Marine amoeboids have silica shells. Some of the amoeboids are parasites, e.g. *Entamoeba histolytica* causes amoebic dysentery
  2. **Flagellated-** They are characterised by the presence of flagella. Some of them are parasites causing various diseases, e.g. *Trypanosoma* causes sleeping sickness
  3. **Ciliated-** They have thousands of cilia on their body surface. The coordinated movement of cilia helps in steering the water having food into the **gullet** (body cavity, which opens outside the body surface), e.g. *Paramecium*
  4. **Sporozoans-** They are characterised by the formation of spores, which is the infectious stage, e.g. *Plasmodium*

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3. Fungi

- Fungi are cosmopolitan and found everywhere
- They are heterotrophic and get the nutrients by absorption
- Their cell wall is made up of chitin or fungal cellulose
- Their mode of nutrition is saprophytic, parasitic or symbiotic and the main food reserve is glycogen
- Vegetative reproduction is by fragmentation, budding or fission
- Asexual reproduction is by spores formation such as conidia, zoospores, sporangiospores
- Sexual reproduction is by oospore, ascospore or basidiospore formation in distinct fruiting bodies
- In sexual reproduction, plasmogamy (fusion of protoplasm) is followed by karyogamy (fusion of nuclei)
- In basidiomycetes and ascomycetes, plasmogamy is not immediately followed by karyogamy, resulting in a distinct **dikaryon (n+n)** cell having 2 nuclei per cell
- Fungi are divided into four major classes on the basis of types and mode of spore formation and the structure of mycelium

Attributes	Fungi			
Class	Phycomycetes	Ascomycetes	Basidiomycetes	Deuteromycetes
Habit and habitat	Moist damp areas or an obligate parasite on plants	Saprophytic, coprophilous, parasite and decomposers	Found in soil, logs or as a parasite in plant bodies causing rust and smuts	Saprophyte, parasite or decomposers help in mineral recycling
Structure of mycelium	Aseptate, <b>coenocytic</b>	Branched, septate	Branched, septate	Branched, septate
Asexual Reproduction	Zoospores (motile) Aplanospores (non-motile)	Conidia (formed exogenously in conidiophores)	Vegetative reproduction is by fragmentation, no asexual spore formation	conidia
Sexual Reproduction	Isogamous, anisogamous or oogamous	Ascospores (formed endogenously in	No sexual organs, basidiospores are formed in the	Imperfect fungi, sexual reproduction is

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	Zygosporos	asci)	basidium Karyogamy after dikaryon phase	not found
Examples	<i>Mucor, Rhizopus, Albugo</i>	Commonly known as sac-fungi. <i>Penicillium, Aspergillus, Neurospora, Claviceps, Yeast</i> (unicellular)	Commonly known as mushroom, bracket fungi or puffballs <i>Agaricus, Ustilago, Puccinia</i>	<i>Trichoderma, Colletotrichum, Alternaria</i>

**Some Important Fungi:**

- Yeast- used in fermentation to make cheese, bread, beer
- *Penicillium*- antibiotics source
- *Puccinia*- causes wheat rust
- *Ustilago*- causes smut disease
- Symbionts- Lichens (symbiotic association of fungi with algae), Mycorrhiza (symbiotic association of fungi with roots of green plants)
- *Rhizopus*- the bread mould
- *Albugo*- the parasitic fungi on mustard
- *Neurospora*- extensively used in genetic and biochemical work
- Truffles and Morels- edible and are considered a delicacy
- *Agaricus*- edible as well as poisonous species

**4. Plantae**

- Mostly autotrophic, chlorophyll-containing, eukaryotic organisms
- Characterised by the presence of rigid cell wall made up of cellulose
- Some plants are partially heterotrophic such as Insectivorous (Venus flytrap, Bladderwort) and parasites (*Cuscuta*)
- Kingdom Plantae includes Algae, Bryophytes, Pteridophytes, Gymnosperms and Angiosperms

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5. Animalia

- All the heterotrophic, eukaryotic and multicellular organisms are included in the Kingdom Animalia
- They lack a cell wall

Find more details about the Animal Kingdom [here](#)

Some of the acellular organism and lichens, which are not classified in the five-kingdom classification by Whittaker are the following:

Viruses

- Dmitri Ivanowsky gave the name “virus” to the causal organism of tobacco mosaic disease (TMV)
- Beijerinck called the fluid extracted from diseased plants of tobacco, “*Contagium vivum fluidum*” and observed it as being infectious to healthy plants
- Stanley crystallised TMV (tobacco mosaic virus) for the first time
- They are acellular containing nucleic acid core (either DNA or RNA), which is surrounded by a protein coat called the capsid
- Viruses use the host machinery to multiply inside the host cell, they exist in a crystalline form outside the host cell
- They are obligate parasite and cause various diseases in plants and animals, e.g. common cold, AIDS, polio, mumps, measles, chickenpox, etc. in animals and various mosaic diseases in plants such as tobacco, cucumber, tomato, etc. leaf curling, yellowing of vein, etc.
- Viruses that infect plants have single-stranded RNA
- Bacteriophages, viruses infecting bacteria have double-stranded DNA

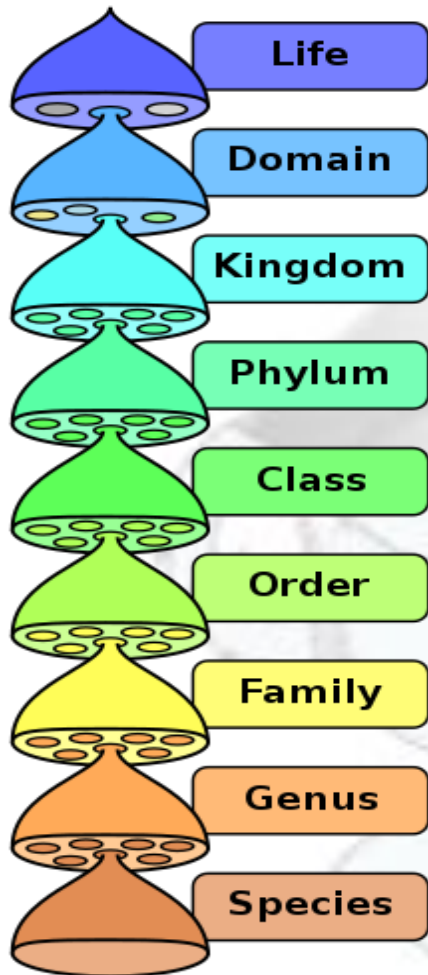
Viroids

- They are the smallest infectious agents found. They consist of nucleic acid but lack a protein coat
- Diener discovered viroids as a causative agent of potato spindle tuber disease, that was a free RNA

Prions

- They contain abnormally folded proteins and have a size similar to viruses
- They can change the shape of normal proteins by transmitting their misfolded proteins

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- They cause many neurodegenerative diseases, e.g. bovine spongiform encephalopathy (BSE) in cattle and Cr-Jacob disease in humans

Lichens

- They are a symbiotic, mutually beneficial association of algae (phycobiont) and fungi (mycobiont). The alga is autotrophic and provides food, whereas the fungus provides protection and shelter

- Lichens do not grow in polluted areas so they are a good pollution indicator

