BIOLOGY FOR NEET & AIIMS

KINGDOM PROTISTA

Protista are unicellular eukaryotes. They do not form tissues. Characteristics of Protista:

- 1. They are mostly acquatic organisms.
- 2. There cell structure is eukaryotic type that have membrane bound organelle. They have 80 s cytoplasmic ribosomes and they may posses cellulosic cell wall.
- 3. There movement is by flagella or cilia or pseudopodia where ciliary mode is fastest.
- 4. Reproduction in protista occurs by both sexual and asexual means.
- 5. They bear two types of life cycle:
 - **a.** Showing zygotic meiosis **b.** Showing gametic meiosis
- 6. They are parasitic decomposers and also photosynthetic.

Living organisms included in Protista are as follow Dinoflagellates, Diatoms, Euglenoids, Slime molds, Protozoans All the organism included in Protista are unicellular (acellular) eukaryotes.

NUTRITION:

Mode of nutrition in protist is of different types

(1) Holophytic or Photosynthetic :-

They synthesize their own food through photosynthesis.

(2) Holozoic :-

Some protist have holozoic mode of nutrition, which is similar to animals i.e. food is first ingested and then digested.

(3) Absorptive :-

Some protists obtain their food from dead organic substances. These protists secretes some extracellular enzymes. These enzymes convert the complex organic substances into simpler substances. Now these simple substance can be easily absorbed through the body surface.

(4) Mixotrophic:-

Some Protists have both holophytic and saprophytic type of nutrition.

REPRODUCTION:

Protists reproduce Asexually and Sexually

1. Asexual Reproduction :-

This is the most common method of reproduction in protists. Asexual reproduction takes place in favourable condition.

It is of following types

- (a) **Binary fission :-** Two daughter cells are formed by the division of one mother cell. After this each daughter cell grows to form a normal organism.
- (b) Spore formation :- Some protists have special structure known as sporangia. Spores are formed in this sporangia. The sporangia bursts after sometime and all the spores become free. These spores form a new cell after germination.

2. Sexual Reproduction :

Sexual reproduction was first of all seen in protists. In sexual reproduction two haploid gametes fuse to form a diploid zygote. This process is known as **syngamy**.

Syngamy is of three types

(a) **Isogamy :-** It is the easiest way of sexual reproduction. In isogamy the fusing gametes are morphologically (i.e. shape, size, structure) similar but physiologically (i.e. functionally or genetically) they may be similar or dissimilar. when fusing gametes are physiologically dissimilar, process is called **physiological anisogamy**.

- (b) Anisogamy :- The fusing gametes are morphologically dissimilar (smaller larger, motile immotile) but physiologically they may be similar or dissimilar.
- (c) Oogamy :- It is the developed form of anisogamy. Male gamete is small and motile while female gamete is large and non motile. This female gamete is known as egg. In it the formation of male & female gametes take place in sex organs.

LIFE CYCLE OF PROTISTA

(1) Life cycle showing zygotic meiosis :-

When Protist is haploid and meiosis occurs in zygote then it is known as zygotic meiosis.

In this type of life cycle during sexual reproduction gametes are formed by mitosis. These gametes are haploid. These gametes fuse to form a diploid zygote. After that meiosis takes place in zygote, as a result haploid cells are formed again. **Note :** In this type of life cycle the zygotic phase is only diploid and remaining all the phases are haploid so this type of life cycle is known as **haplontic life cycle**.



(2) Life cycle showing gametic meiosis :-

When Protist is diploid and meiosis takes place during gamete formation, then it is called gametic meiosis.

In this type of life cycle during sexual reproduction, meiosis takes place in diploid cell, due to which haploid gametes are formed. Now haploid gametes fuse to form diploid zygote. And after that mitosis takes place in zygote, due to which diploid cells are formed again.



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Note : In this type of life cycle only gametic phase is haploid and remaining all phases are diploid so this type of life cycle is known as **diplontic life cycle**.

Division - Pyrrophyta - DINOFLAGELLATES

"Protists with two flagella"

- 1. Dinoflagellates are mainly marine. They are found on the surface of water. These are golden brown in colour.
- 2. In Dinoflagellates, the nutrition is mainly holophytic, because they have chloroplast.
 - eg. of dinoflagellates -

Noctiluca, Ceratium, Gonyaulax, Gymnodinium, Pyrocystis

- Noctiluca It is an exception in Dinoflagellates because -
- It is colourless
- Chloroplast is absent
- Photosynthesis is absent in it therefore it has holozoic mode of nutrition.
 But yet it is placed in Dinoflagellates because
- Two flagella are present
- Plated cell wall.

Note : It is also classified in protozoa due to its holozoic mode of nutrition and colourless body.

• Ceratium - It is also an exception because, mode of nutrition is mixotrophic in it.

Structure :

- (A) Their cell wall is divided into plates, which is made up of cellulose. Therefore the covering of Dinoflagellates is seen as armoured so they are called as armoured algae.
- (B) Dinoflagellates are yellow-brown or golden brown in colour. These colour of Dinoflagellates are due to the pigments present in them Chlorophyll 'a', Chl. 'c' and Xanthophylls (Dinoxanthin & Didinoxanthin).
- (C) Dinoflagellates have two flagella one is *transverse* and other is *longitudinal*.Dinoflagellates shows a special type of movement which is like whorling whips, therefore they are called as "whorling whips".
- (D) They have an osmoregulatory structure which is called as 'pusule'.
- (E) Dinoflagellates are haploid. Histone protein is absent in its chromosome. Due to this reason Dinoflagellates are called as mesokaryote.
- (F) They have starch as stored food.

Reproduction :-

- (A) Mainly Asexual Binary fission.
- (B) Sexual reproduction is very rare in them. Dinoflagellates are haploid so they reproduce by zygotic meiosis. Therefore their life cycle is haplontic type.

Note : exceptionally Noctiluca is diploid so it reproduce by Gametic meiosis, therefore its life cycle is diplontic type.

SOME INFORMATIONS OF DINOFLAGELLATES -

- 1. Dinoflagellates are also called "fire algae". Because they appear as glowing light due to bioluminescence.
- Maximum Dinoflagellates (eg. Noctiluca, Gonyaulax, Pyrocystis) show 'bioluminescence'. Their protoplasm has
 photogenic granules. These granules are made up of luciferin protein. Energy is released by the oxidation of
 luciferin. This energy is liberated in the form of light during night. This is known as "bioluminescence. So that these
 dinoflagellates are also known as 'night light'.
- **3. Gonyaulax** spreads on the surface of sea water, through rapid multiplication due to which the sea water appears red. It is called as **red tide**. It is also responsible for water bloom.
- 4. Both Gymnodinium & Gonyaulax are toxic. They secrete toxins, which are known as "saxitoxin". These toxins cause paralysis in human beings. Humans acquire these toxins through food chain. These algae also affect the marine animals.
- 5. Noctiluca is known as 'sea ghost' because it glows in night.

DIVERSITY IN THE LIVING WORLD

Division - Chrysophyta/Bacillariophyta - DIATOMS "Golden algae or Jewells of Sea"

The members of Division - Bacillariophyta are known as Diatoms. Diatoms means-"Cut in to two". This name is based on the cell wall of diatoms which is divided in to two parts. They have Holophytic mode of nutrition because they possess chloroplast. eg. of Diatoms - Navicula, Cyclotella, Pinnularia

Structure :

- 1. They are found in different shapes such as circular, rectangular, triangular, elongated and boat shaped.
- 2. Diploid nucleus is present in Diatom.
- 3. The cell wall of diatoms is made up of cellulose in which silica particles are embedded in at many places. Due to which the cell wall appears to be made up of silica. This silicated cell wall is called "shell" or "frustule".

Their cell wall is made up of *two halves*, which are arranged like the lids of a soap box. These half parts are collectively known as *theca*. In this, the part which is present on the upper side acts as lid and known as *epitheca*. And the other basal part is known as *hypotheca*. The place where there two parts overlaps each other is called *girdle*.

Note : Their cell wall have silica in very large quantity. Due to this reason their cell wall is hard. The cell wall does not get destroyed after their death so at the bottom of sea, very huge rocks of dead diatoms are formed which are known as **"diatomite"** or "diatomaceous earth" or "keiselgurh".

4. Their cells have chloroplasts, in which pigments are present, Chlorophyll 'a', Chl 'c', and xanthophyll (fucoxanthin). Due to these pigments it appears golden coloured.

Note :

- (1) Stored food Leucosin (Chrysolaminarian) & fats (Oil).
- (2) Movement They are immotile, because flagella are absent in them. They float on the surface of water with the help of low molecular weight stored fats.

Reproduction :

- (A) Mainly asexual binary fission.
- (B) Sexual reproduction Very rare by gametic meiosis.

Note : The zygote formed during sexual reproduction is called as "Auxospore". Auxospare is a asexual structure.

Use of Diatoms :

- (A) Sound proofing
- (B) Filteration of oils and syrups
- (C) Stone polishing
- (D) As "Heat insulator" in steam boilers i.e. they are used as thermostate because the keiselgurh bad conductor of heat.

Division - Euglenophyta - EUGLENOIDS

- Previously euglenoids were placed in plant kingdom due to their photosynthetic ability. But due to the absence of cell wall and animals like nutrition some scientists placed them in animal kingdom. But now according to five kingdom classification they are included in Protista.
- They are found as free living organisms in fresh water lakes, ponds, etc. But some times they are also found in damp soil and brackish water.
- On the basis of their mode of nutrition they are called as **mixotrophic** because they have **holophytic**, **holozoic** and saprophytic mode of nutrition. eg. of Euglenoids Euglena, Paranema

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Structure :

- (A) They are unicellular, cell wall is absent around them. They are surrounded by a cell membrane which is made up of lipoprotein and this cell membrane is covered with pellicle. Pellicle is made up of lipoprotein and it is elastic in nature.
- (B) At the anterior end of Euglenoids, a cavity is present, which is known as reservoir. Flagellum is orginated from the base of reservoir. Euglenoids have only one functional flagellum and one non functional flagellum. One eye spot is present at anterior position.
- (C) They have a contractile vacuole. These contractile vacuoles helps in osmoregulation.
- (D) Eulgenoids have a haploid nucleus and chloroplast.
 Chloroplast has following pigments Chl. 'a', Chl. 'b' and Xanthophyll (Zeaxanthin)

Note :

- Stored food Paramylum and fat Paramylum is a carbohydrate, which is formed by the modification of starch.
- Wriggling movement Euglenoids are motile. They are of two type flagellated and Non-flagellated. Flagellated Euglenoids moves with the help of flagella. But non-flagellated Euglenoids are also motile. These non-flagellated euglenoids moves by wriggling movement which is also called as Euglenoid movement. Wriggling movement is due to wave motion of the pellicle.

Reproduction :

- (A) Asexual reproduction by longitudinal binary fission.
- (B) Also reproduce by cyst formation during unfavourable conditions.
- (C) Sexual reproduction has not been seen yet.

SLIME MOULDS

These organisms develop a slimy mass at the time of their vegetative phase, therefore they are called slime moulds. They are also called as **false fungi**. They are found on decaying stem, leaves etc, so these are saprophyte.

Slime moulds have characters of both animals & fungus therefore they are also called **Fungus animal**. Scientist **Anton De Bary** placed them in **Mycetozoa** by relating them with animals. While mycologist **'Ainsworth'** placed them in **Myxomycota** by relating them with fungi.

But now a days modern scientists place them in Class - Gymnomycota (Gymnomycota-naked fungi) of Kingdom Protista and now these are known as Protistan fungi.

Characters similar to Animals		Characters Similar to Fungi	
•	Surrounded by cell membrane	•	Formation of cell wall at the time of reproduction
•	Structure similar to amoeba	•	Formation of sporangia at the time of reproduction
•	Sometimes nutrition is holozoic or Phagotrophic	•	Nutrition is absorptive or saprotrophic

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Structure :

On the basis of structure they are of two types

- (A) Acellular slime moulds :
 - Their body is made up of wall less multinucleated protoplasmic mass. This type of body is known as **plasmodium**. (Plasmodium = wall less coenocyte). During unfavourable conditions plasmodium forms fruiting bodies.
 - They are diploid i.e. every nucleus found in the cell is diploid eg. *Physarum*, *Stemonitis*, *Physarella*, *Fulgio*.

(B) Cellular slime moulds :

- Their body consists of many wall less amoeba like cells (group of amoeba like cells is known as cellular slime mould). These cells are found in groups but they are not fused. Every cell has a haploid nucleus. This type of body is called as myxamoeba or pseudoplasmodium.
- They are haploid because the nucleus found in each cell is haploid.
- eg. Dictyostelium, Protostelium, Acytostelium

Reproduction :

SLIME MOULDS HAVE BOTH ASEXUAL & SEXUAL TYPE OF REPRODUCTION

(1) Asexual reproduction :

It is mainly with the help of spore formation (sporangia). The mucilagenous sporangia of slime moulds is known as **capillitium**.

(2) Sexual reproduction :

- The cell of acellular slime moulds are diploid. So they reproduce by **gametic meiosis**. Therefore their life cycle is **diplontic**.
- The cell of cellular slime moulds are haploid, so they reproduce by zygotic meiosis. Therefore their life cycle is haplontic.

Stored Food – Glycogen & Oil