KINGDOM - PROTISTA

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 is protist is different types

(1) Holophytic or Photocynthetic :
They prepare their own food through photocynthesis.

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

(3) Absorbtive :
Some protists obtain their food from dead organic substances These protists secretes some extracellular enzymes. These enzymes convert the complex organic substances in to simpler substances. Now these simple substance can be easily absorbed through the body surface.

(4) Mixotrophic :
Some Protists have both holophytic and holozoic type of nutrition.

Reproduction :

Protists reproduce Asexually and Sexually

1. Asexual Reproduction :
This is the most common method or 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) Isogmy :
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 from of anisogamy. Male gamete is small and motile while female gamete is large and immotile. This female gamete is known as egg. In it the formation of male & female gametes take place in **sex organs.**

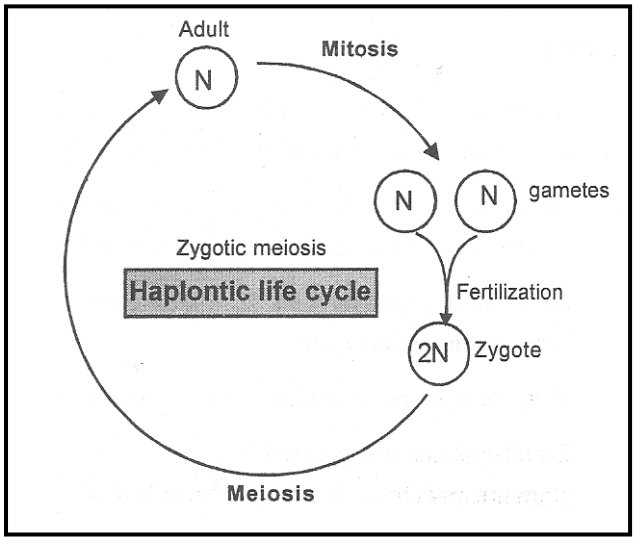
Life cycle of Protist

Life of cycle Protists are of two types

(1) Life cycle showing zygotic meiosis :

When Protist is haploid and meiosis occurs in zygote then it is known as **zygoticmeiosis.** In this type of life cycle during sexual reproduction gametes re formed by mitosis. These gametes are haploid. These gametes fuse to form a diploid zygote. After hat meiosis takes place in zygote, as a result haploid cells are formed again.

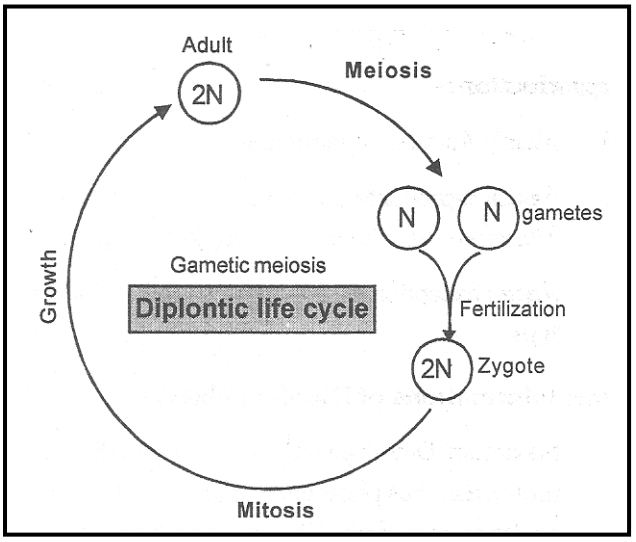
Note : In this type of life cycle the zygotic phase is onlydiploid and remaining all the phases are haploid so this type of life cycle is known as **haplontic life cycle.**



(2) Life cycle showing gametic meiosis :

When Protist is diploid and meisis 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.

Note : In this type of life cycle onlygametic 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 in mainly holophytic, because they have chloroplast.

eg. of dinoflagellates –

Noctiluca, Ceratium, onyaulax, Gymnodinium, Pyrocystis

- ***Noctiluca*** It is an exception if Dinoflagelltes because -
  - It is colourless
  - Chloroplast in 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 holozic mode nutrition and colourless body.

- ***Ceratium*** : it is also an exception because, mode of nutrition is mixotrophic in it.

Structure :

(A) Its well wall is divided in to plates, which is made up of cellulose. Therefore the covering of Dinoflagelltes is seen as armounred so it is called as armounred algae.

(B) Dinoflagellates have two flagella - one is **transverse** and other is **longitudinal**. Dinoflagellates shows a specil type of movement which like whorling whips. therefore they are called as "whorling whips"

(C) Dinoflagellates are haploid. Histone protein is absent in its chromosome. Due to this reason Dinoflagelltes are called as **mesokryote.**

(D) They have an osmoregulatory structure which is called as **'pusule'.**

(E) Dinoflagellates are yellow-brown or golden brown in colour. These colour of Dinoflgellates re due to the pigments present in them **- Chlorophyll 'a', Chl. 'c' and Xanthophylls** (Dinoxanthin & Didinoxanthin).

(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 ***Nactiluca*** is diploid so it reproduce by Gametic meiosis, therefore its life cycle is **diplontic type.**

Some informations of Dinoflagellates –

1. 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 exodation of luciferin. This energy is liberated in the form of light during night. This is known s "bioluminescence". So that these dinoflagellates are also known as **"night light".**

2. **Gonyaulax** spreads on the surface of sea water, due to which the sea water appears red. It is called as **red tide.**

3. Both ***Gymnodinium & Gonyaulax*** are toxic. They secreted 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.

4. ***Noctiluca*** is known as **'sea-ghost'** because it flows in night.

5. Dinoflagellates are also called **'fire algae'.** Because they appear s glowing light due to bioluminescence.

Division - Bacillariphyta - 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 two parts. They have Holophytic mode of nutrition because they posses 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. 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 silicate 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 and 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 was does not get destroy 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"

3. Diploid nucleus present in Diatom.

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

   Note :
   (1) Stored food -Leucosin (Chryolaminarian) & fats (Oil)/
   (2) Movement - They are immotile, because flagella are absent in them. They float on the surface of water. They floats with the help of **stored fats.**

Reproduction :

(A) Mainly asexual - binary fission.
(B) Sexual reproduction - Very rare - by gametic meiosis.
Note : The zygote formed during sexual reproduction is calls as **"Auxospore"**

Use of Diatoms :

(A) Sound proofing (B) Filtration of oils (B) Stone polishing
(D) As "Heat insulator" in steam boilers i.e. they are used as thermostate because the wall of diatoms are bad conductor of heat.

Division - Euglenophyta - EUGLENOIDS

- Previously englenoids 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 **holophitic, holozoic** and saprophytic mode of nutrition.
  eg. of Euglenoids - *Euglena, Paranema*

Structure :

(A) They are unicellular, cell was 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 mate up of lipoprotein and it is elastic in nature.

(B) At the anterior and of Euglenoids, a cavity is present, which is known as reservoir. Flagellum is organited from the base of reservoir. Euglenoids have only one functional flagellum.

(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 carbohyadrate, which is formed by the modification of **starch.**

- **Wriggling movement -** Euglenoids are motile. They are of two type - flagellated and Non-flagellated. Flagellated Euglenoids locomit with the help of flagella. But non-flagellated Euglenoids are also motile. These non-flagellated euglenoids locomote 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 re saprophyte.

Slime moulds have characters of both animals & fungus therefore they are also called **Fungus animal.** Scientist **Anton De Bary** placed them is **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 is **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 of absorbtice or saprotrophic

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)

- They are diploid i.e. every nucleus found in the cell is diploid eg. *Physarum, Stemoitis, Physarella, Fulgioo.*

(B) Cellular slime moulds -

- Their body consist 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 **myxomoeba** or **pseudoplasmodium.**

- they are haploid because the nucleus found in each cell in 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 cells 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