

CHLAMYDOMONAS

Q. Describe the systematic position, structure and mode of reproduction of a motile unicellular algae?

Or,

Describe the life cycle of CHLAMYDOMONAS?

Ans. Systematic Position →

Class - ~~Ehlorophyta~~ Chlorophyceae

Order - Volvocales

Family - Chlamydomonadaeaceae

Genus - Chlamydomonas.

Occurrence and Structure → It is a very primitive unicellular, motile

green algae. Its primitive characters are unicellular in structure, motile in habit due to presence of a pair of flagella, contractile vacuole, stigma and cup shaped chloroplast. It is usually found in stagnant fresh water of ponds, lakes, ditches, pools and moist places which may form green surface over the water. It includes 325 species out of that 12 species has been reported from India (Mitra 1951). Some species are found in salty water also.

It is an unicellular, oval shaped or pear shaped or spherical in structure. Its anterior end is pointed with by flagellate structure. The flagella are similar in size, whip like. Each cell is surrounded by a cell wall made up of cellulose. Inside the cell wall there is a cup shaped chloroplast through its shapes varies in some species like C. arachni star shaped chloroplast in C. reticulata - reticulate type

of chloroplast in *C. alpina* - discoid type of chloroplast. The chloroplast contains one pyrenoid (Rare two or three pyrenoids in some species). Pyrenoids are spherical with starchy cover which stores food material as starch. And orange or red coloured stigma (Eyespot is found at the anterior end of the chloroplast). Which act as photo receptive. Just below the cell wall there is thin layer of hyaline cytoplasm with a spherical nucleus in the center.

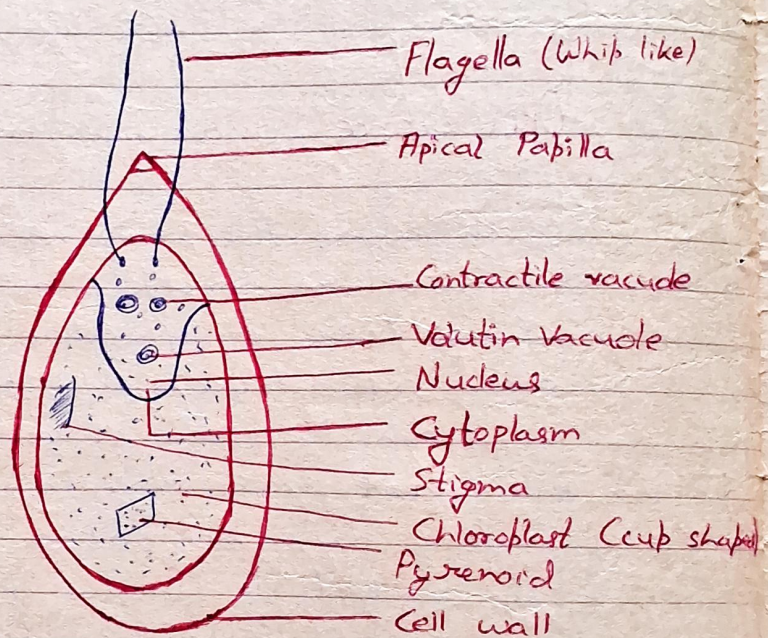


Fig - A *Chlamydomonas* Cell (U.E.M)

The cell generally forms a papilla at the anterior end. Two flagella arises from the two separated basal granules from the anterior end of the cell. Flagella are the locomotory organs and both are of equal in length. But according to Fischer the flagella are thick at the base and tapers towards the apex. Two minute contractile vacuole are present just beneath the base of the flagella or basal granules. They are considered to be

excretory organelles and regulate the water balance of the cell - It is an autotrophic plant.

Reproduction → The reproduction in Chlamydomonas has are of two types.

1. Asexual Reproduction → It takes place under four methods —

① **By Zoospores** → Production of zoospore start under favourable condition and usually during night. During the reproduction of zoospore both the flagella of the parent cell with drawn and cell become rounded, non motile and each cell behaves as zoosporangium which lastly produced four by flagellate zoospores. The number of zoospores may increase up to 8 or even 16.

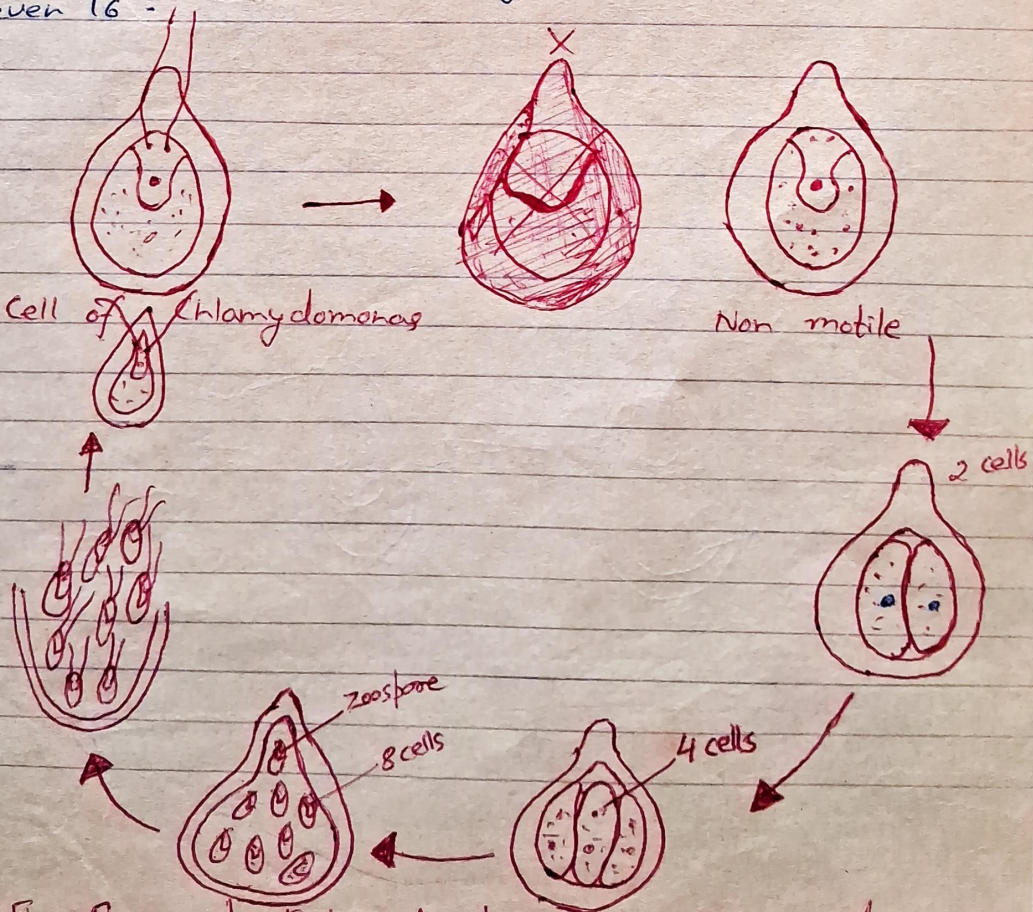
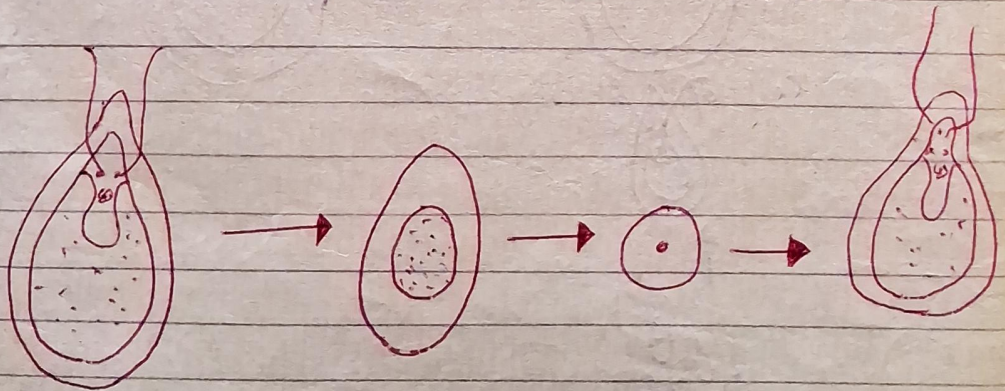


Fig - Asexual Reproduction in Chlamydomonas

The protoplast even (chloroplast, pyrenoids, nucleus) of the cell divides longitudinally in two equal half. This is followed by second transverse division. Thus 4 uninucleate blocks are formed. And all the daughter protoplast then form their own cell wall and develops two flagella ~~in~~ each. In this way 4 zoospores are formed by their mother cell. But the sizes are smaller than the mother cell. After maturity of zoospores they liberated out side in water by dissolving the cell wall of zoosporangium. They slowly grow to full sizes by enlargement and each zoospore forms new unicellular plants. They repeat this process by 24 hours. Thus they multiply in the number rapidly by zoospore formation.

⑥ By Aplanospores → When water is not sufficient than flagellate zoospores are not formed. Only non flagellate thin walled aplanospore formed within the each aplanosporangium (mother cell) are not liberated.



g - Reproduction in Chlamydomonas by Aplanospores