''बेटी बचाओ, बेटी पढ़ाओ''

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

(Format for Preparing E Notes)

Faculty of FEM

Faculty Name- **JV'n Anupama Goyal (Associate Professor)**

Program- M. Sc BOTANY IST/Semester / 23

Course Name - CYTOGENETICS

Session No. & Name – 1.4/ 2023

Academic Day starts with –

- Greeting with saying **'Namaste'** by joining Hands together following by 2-3 Minutes Happy session, Celebrating birthday of any student of respective class and **National Anthem**.

Lecture Starts with-

Review of previous Session- …….

- Topic to be discussed today- Today We will discuss about ……algal cell
  - Introduction & Brief Discussion aboutthe Topic

ALGAL CELL :

The cells constituting the algal thalli are basically of two kinds, prokaryotic and eukaryotic. The prokaryotic cells which constitute thalli of cyanophytes (blue-green algae) have a cell wall which contains a specific strengthening component not found in the cell walls of other algae. It is mucopeptide. The DNA material representing the nuclear body onsists of fibrils which may

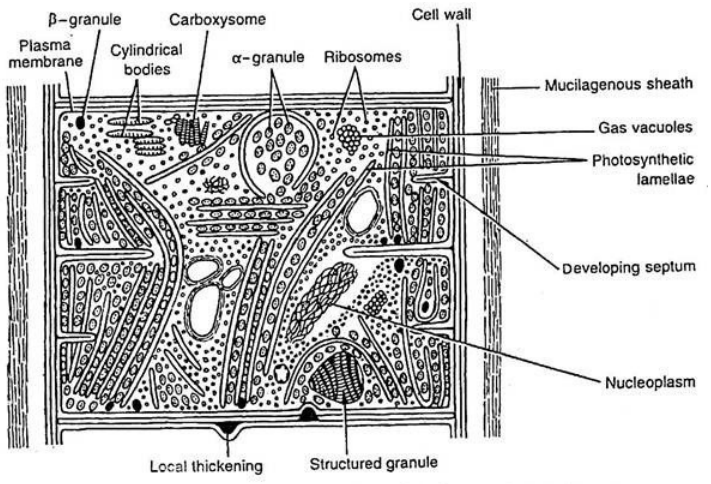
extend throughout the cell or are concentrated in the central part. The mitotic figures are also lacking. The chlorophyll pigment is bound to photosynthetic lamellae or thylakoids which may be arranged in parallel layers in the periphery of the cytoplasm or form a network extending throughout the cell cytoplasm. They are not organized into grana. The chloroplasts are thus absent and so are the mitochondria, golgi body and endoplasmic reticulum. The ribosomes are, however, present. The nuclear division does not take place by mitosis and no cell plate is formed instead there is a ring like extension of the cell wall.

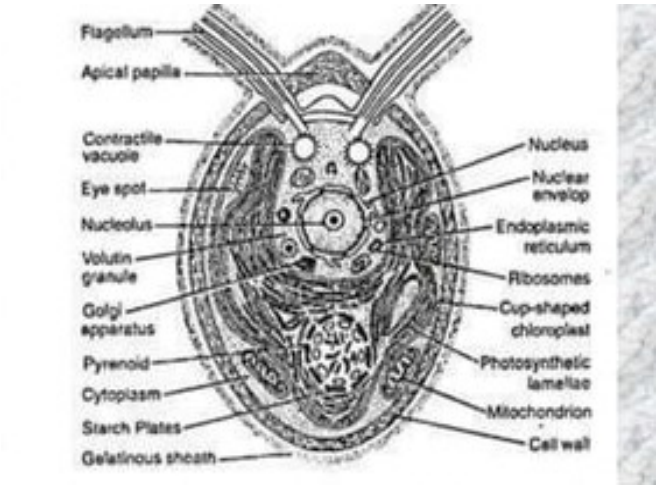
ALGAL FLAGELLA The motile cells of algae are provided with fine, protoplasmic, whiplike threads, the flagella. They are extremely fine and hyaline emergencies of the cytoplasm. In cells possessing firm cell walls, the flagella are connected with the inner cytoplasm through small pores in the cell wall. There is either a single anterior flagellum (rarely posterior) or the flagella occur in pairs, rarely in great numbers on the cell. The .flagella on the cell may be equal (isokont) or unequal (heterokont) in length. When the flagella are inserted laterally one is directed forwards in motion and the other backwards. They function as the locomotory or propelling structures of the cell. Usually there is a single granule at the base of each flagellum. It is known as the blepharoplast.

(a) Structure of the Flagellum: Forming the Lore of the flagellum is an axial or central filament called the axoneme. The latter is surrounded by a cytoplasmic membrane or sheath which terminates short of the apex. The naked, terminal portion of the axoneme is called the end piece. The tip of the end piece may be blunt and rounded or pointed. In cross section the flagellum consists of two inner central simple fibrils forming an elastic axial thread. It is surrounded by nine united, peripheral contractile, thicker protein double fibrils. All are enclosed by sheath which is an extension of the plasma membrane. Each peripheral fibril is composed of two thin fibrils. The two central fibrils are single. They lie side by side and are sometimes enclosed by a sheath of their own. The fibrils are hollow and extend along the entire length of the flagellum. The nine peripheral fibrils join the basal granule but the two central fibrils stop short of the granule. This '9 + 2' pattern of component fibrils is the basic structures of the flagellum of all organisms except the bacteria. (b) Kinds of Flagella: They are of two main types, whiplash and tinsel. The whiplash flagellum has a smooth surface. The tinsel flagellum bears

longitudinal rows of fine, minute flimmer hairs arranged along the axis almost to the tip of the flagellum. There may be a single row of hairs as in the Euglenophyta and Pyrrophyta or two as in Chrysophyceae and Phaeophyceae. The hairs arise from the margins of the peripheral fibrils. The whiplash or smooth flagella are also known by other names such as acronematic or peitchgeisel. The other names for the tinsel flagella are pantollematicflimmer or flimmergeisel.

(b)





(c) **The Chloroplast:**

Chloroplasts are the very prominent feature of algal cells. They bear the photosynthetic pigments. It is a double-membrane structure.

Various forms of chloroplasts are known to occur in different types of algae, of which eight main types are usually recognised : cup shaped (e.g., Chlamydomonas and Volvox), discoid (e.g.,

Chara, Vaucheria and centric diatoms), parietal (e.g., Chaetophorales, Phaeophyceae, Rhodophyceae, many Chrysophyceae and pinnate diatoms), girdle shaped or C-shaped (e.g., Ulothrix), spiral (e.g., Spirogyra), reticulate (e.g., Oedogonium, Hydrodictyon and Cladophora), stellate (e.g., Zygnema), and ribbed (e.g., Volvocales). The basic structure of chloroplast is almost similar throughout the plant kingdom.

2. Mitochondria:

Mitochondria are found in all algal cells except Cyanophyceae. Each mitochondrion is surrounded by a double membrane envelope. The inner membrane of plant mitochondria encloses an aqueous matrix of solutes, soluble enzymes and the mitochondrial glucose.

The inner membrane is larger than the outer membrane and undergoes invagination producing sac-like cristae of variable shape and number — usually with a narrow neck. The whole mitochondrion is again encircled by an outer membrane lying close to the inner one, leaving an intermembrane space which is continuous with the intercristal space.

Eye-Spot or Stigma:

The motile vegetative and reproductive cells of algae have a pigmented spots in the anterior, middle or posterior part of the cell, known as eye-spot or stigma (Fig. 3.12). It is involved directly or indirectly in light perception. The stigma is usually found within the thylakoids run longitudinally through the eye-spot in between two rows of granules.

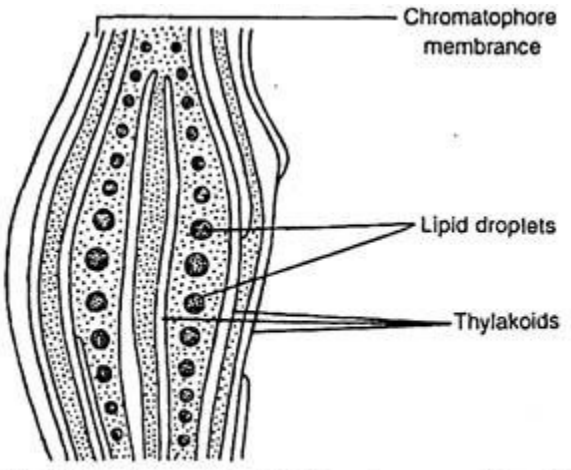


Fig. 3.12 : An eyespot of *Chlamydomonas reinhardtii* (after Dodge)

Vacuoles:

Almost all the algal cells, except the members of Cyanophyceae, possess one or more vacuoles. Each vacuole is bounded by a distinct membrane called tonoplast.

Three types of vacuoles are found in motile forms:

(i) Simple vacuole:

They are very small in size and show periodic contraction and expansion. They are also called contractile vacuoles. They throw out the metabolic wastes of the cells. They also regulate the water content of the cell by discharging the excess amount at short interval. So they are secretory in function.

(ii) Complex Vacuole:

This is the characteristics of Dinophyceae and Euglenophyceae. It consists of a tube-like cytopharynx, a large reservoir and a group of vacuoles of varying sizes. The vacuoles perform the function of osmoregulation inside the cell. Sometimes, the vacuoles also store reserve food materials such as laminarin and chrysolaminarin.

(iii) Gas Vacuoles:

In the cells of the members of Cyanophyceae there are gas containing cavities occurring as stacks of small transparent cylinders of uniform diameter. Their walls are freely permeable to gases. The gas vacuoles give buoyancy to the planktonic forms and also serve as protective screens against incident bright light.

- Online Reference if Any.
  - INTERNET
  - Explain answer with key point answers

- Questions to check understanding level of students-
- Small Discussion About Next Topic-
- Academic Day ends with-

National song**' Vande Mataram'**