Chloroplast

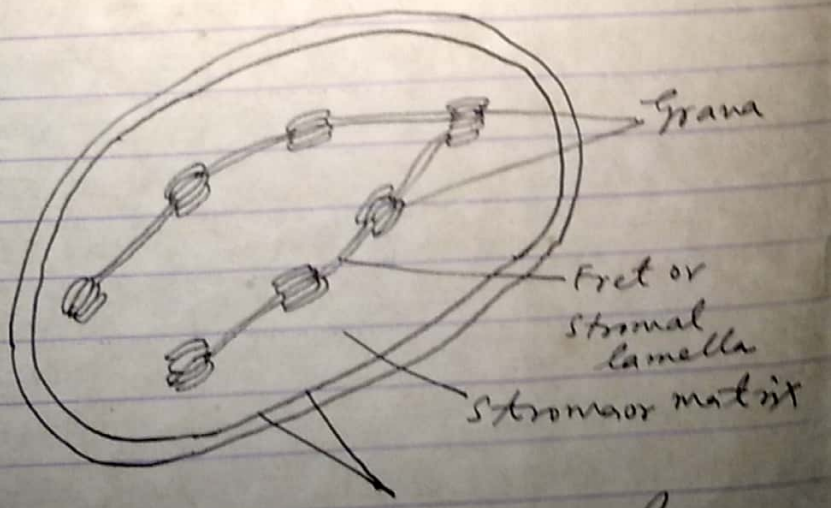
Chloroplast is an important cell organelle found in all green eucaryotic plants. It is found in the cell cytoplasm.

Shape of the chloroplast is usually biconvex or planoconvex. But in some cases other forms of chloroplast may also be found. These forms (shapes):- filamentous, fibrillar, stellate etc.

Usually the thickness of the chloroplast is 2-3μ and the diameter between 5-10μ.

The number of chloroplast per cell is variable from species to species or from plant to plant or sometimes even in a plant the number of chloroplast varies from organ to organ.

Structure of chloroplast :-



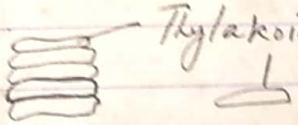
Structure of chloroplast as seen under electron microscope ×-

A chloroplast remains bounded by a double layered membrane. Each of the outer and inner membranes is 50 A° thick. And these two membranes usually remain separated from each other by a space which is 100 A° broad. Both outer & inner membrane made up of lipo protein.

Inside the membrane matrix or stroma remains present. This matrix or stroma is proteinaceous in nature.

In this matrix grana remain scattered. Number of grana per chloroplast varies from 40-60. Per granum number of thylakoids or photosynthetic lamellae is 10 to 100.

Two grana remain united together with a stromal lamella that is called fret. These grana as well as stromal lamellae contain pigments responsible for photosynthesis.



Granum.

The unit membrane of thylakoid and stromal lamellae (fret) is also made-up of lipo protein.

Inside a chloroplast, in addition to above mentioned structures DNA, ribosome etc are also found.

DNA :- For the first time Ris (1962) isolated DNA from the chloroplas

of Chlamydomonas. Later on Wood and Fernandez (1968) isolated DNA from the chloroplast of higher plants.

The DNA of chloroplast is certainly different from the nuclear DNA. The DNA of chloroplast resembles with the DNA of procaryotes. DNA of chloroplast is similar to Procaryotic DNA. RNAs of chloroplast are mRNA, tRNA & rRNA.

Chlorophylls: They are green pigments. They are of two types. Chlorophyll a, & Chlorophyll b. Chlorophyll a is about 80% of the total Chlorophylls. only about 20% is the Chlorophyll b.

Carotenoids: - They have Carotene & xanthophyll. They are also colour containing pigment.

Function of chloroplast:-

(1) Photosynthesis - The first and fore most function of the chloroplast is to photosynthesize food in the presence of light with the help of CO_2 & H_2O.

$$6CO_2 + 12H_2O \xrightarrow[\text{Sun light}]{\text{Chlorophyll}} C_6H_{12}O_6 + 6H_2O + 6O_2$$

In this process grana catch radient energy in the form of sunlight. That energy is transformed into chemical energy.

i/e ATP (light reaction).

ATP + $NADPH_2$ formed in light reaction are utilized as raw materials for dark reaction.

This dark reaction occurs in the stroma or matrix of the chloroplast. During dark reaction synthesis of carbohydrate takes place.

(22) Protein Synthesis :- Chloroplast is capable of synthesizing their own protein. It has all the requirements for protein synthesis. Such as tRNA, mRNA, rRNA, ribosome, DNA etc.

As chloroplast is capable of fulfilling all its requirements thus it is called autonomous body inside the cell.

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