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Plastids

These are semi-autonomous organelles that have double membrane envelope. Plastids have their own genetic material (i.e., DNA). Due to their large size, they are easily seen under the microscope.

Occurrence

Plastids are found in all plant cells and euglenoides except in some protistans (e.g., Euglena, Dinophyceae, etc).

Types

Plastids are differentiated into three different types on the basis of the colour, i.e., type of pigments found in them.

Leucoplasts

These are the colourless plastids of varied shapes and sizes with stored nutrients in the form of carbohydrates lipids and proteins.

These are of following three types

(a) Amyloplasts are the carbohydrates (starch) containing leucoplast, e.g., Rice, wheat, potato, etc.

Amyloplasts are larger than the normal/original size of leucoplast.

(b) Elaioplasts are the leucoplast which stores oils and fats, e.g, Tuberose endosperm of castor seeds, etc.

(c) Aleuroplasts are the protein storing leucoplast.

e.g., Maize (aleurone cells).

ii. Chromoplasts

These are the leucoplast, whioh are yellow or reddish in appearance because of the presence of fat soluble carotenoid pigment carotene.

Xanthophyll and some other pigments are also present as the fat soluble carotenoid pigment other than carotene, e.g., Orange colour of carrot, etc.

iii. Chloroplasts

These are the plastids which are greenish in colour containing photosynthetic pigments chlorophyll and carotenoids. These pigments are responsible for trapping the light energy, essential for the photosynthesis, i.e., the synthesis of organic food from an inorganic raw materials in the presence of sunlight.

Occurrence

Chloroplasts occur in major number in the photosynthetic mesophyll cells of leaves and green stem.

Shape and Size

• They may be lens-shaped, oval, spherical, discoid or even ribbon-like organelles. They also have variable length (5-10 mm) and width (2-4 mm).

Number
Their number also varies from one per cell of the Chlamydomonas (a green alga) to 2-40 per cell in mesophyll.

infrastructure

Chloroplasts are also bounded by double membrane envelope like mitochondria, the two membranes are smooth and are thick of about 90-100 A. The inner membrane of chloroplast is less permeable than the other one.

The inner membrane is grounded by a space known as stroma or matrix, a dense, colourless and a granular substance mainly formed of soluble proteins. It also contains enzymes which are essential for the synthesis of carbohydrates, lipids and proteins.

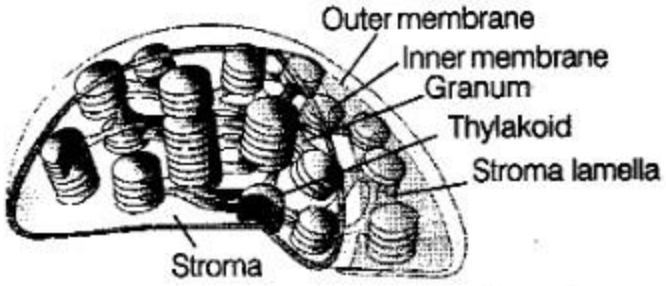

Fig 8.10 Sectional view of chloroplast

Thylakoids are number of membranous like flattened structures that run throughout the matrix or stroma. When several thylakoids are arranged or organised in the stack (like the piles of coins), called grana or the intergranal thylakoids. Many flat membranous tubules interconnect the thylakoids of different grana known as stroma lamellae.

Functions

Chloroplasts possess the following functions

(i) Helps in photosynthesis, i.e., formation of organic compounds.
(ii) In consumption of C02 and release of 02 in photosynthesis.
(iii) May also change into chromoplast in order to provide colour to many flowers and fruits.
(iv) Helps in storing fat and lipids.
(v) Functions in transduction of energy.

Note:

* The sum total of all plastids in a cell is called plastidome.
* The chloroplast with nitrogen fixing genes are called nitroplast.
* The space between the two membrane is called intermembrane space, which separates the two membrane. This space contains a narrow fluid. Stroma also contains small, double-stranded circular DNA, molecules and ribosomes.
* Ribosomes of chloroplasts are smaller (70S) than the ribosomes of cytoplasm (80S).Ribosomes

These are the small sub-spherical granular organelles, not bounded by any membrane. Ribosomes were first observed by George Palade (1953), as the dense particles under the electron microscope. Hence, are also called Palade particles.