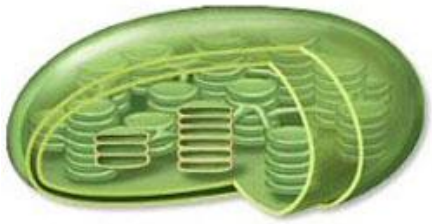
CHLOROPLASTS

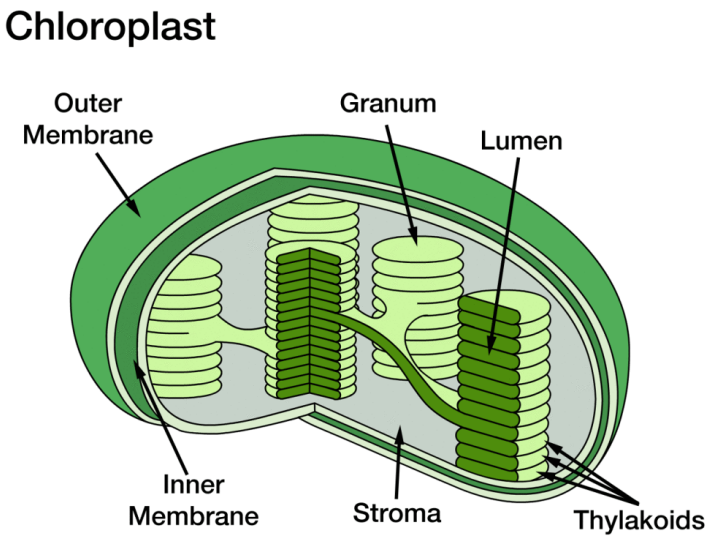
WHAT ARE AND WHAT THEY ARE MADE OF?

Photosynthesis is a process by which a cell converts light energy and inorganic materials into chemical energy for storage in organic matter and that can be exploited in the future in the long term.

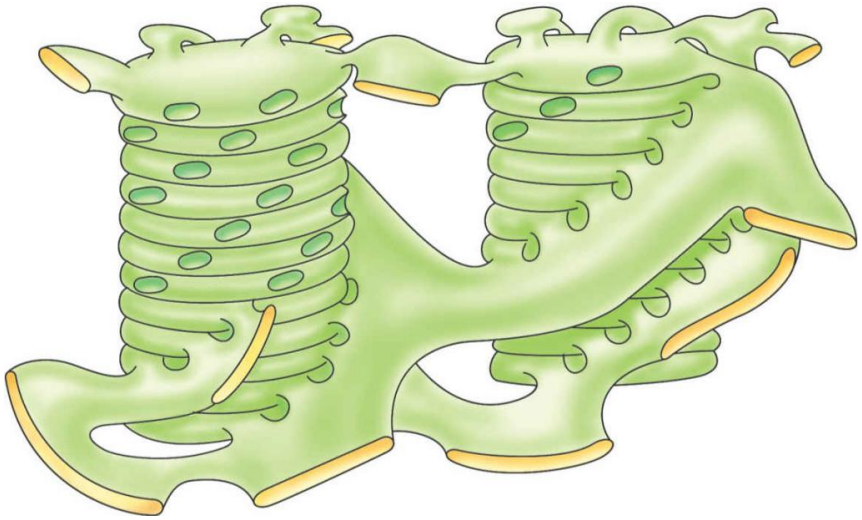
Photosynthesis occurs in a plant cell bodies called “chloroplasts” that are as small power factories limited by a sheath of two permeable membranes. A plant cell is between 50 and 200 chloroplasts. One square millimeter of tissue is about 500 thousand chloroplasts.



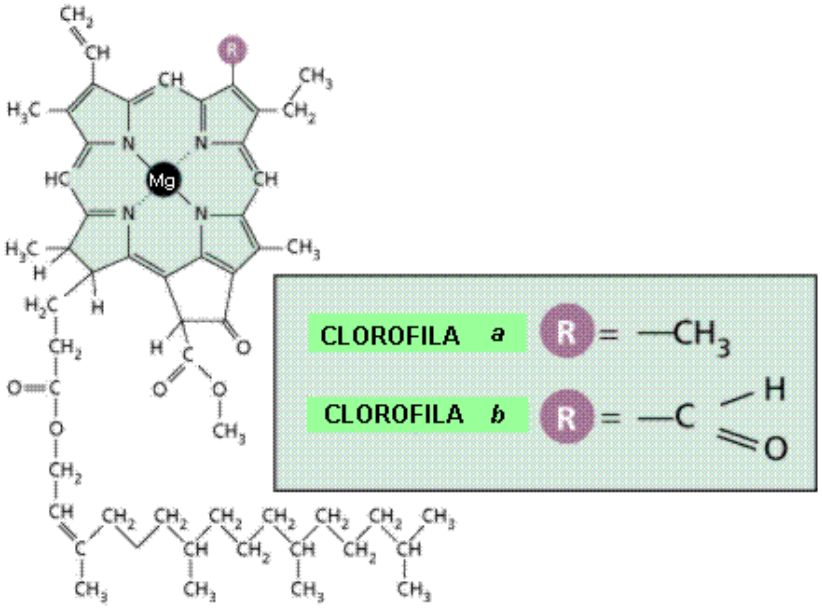
Within chloroplasts are the “thylakoids” and “stroma”.



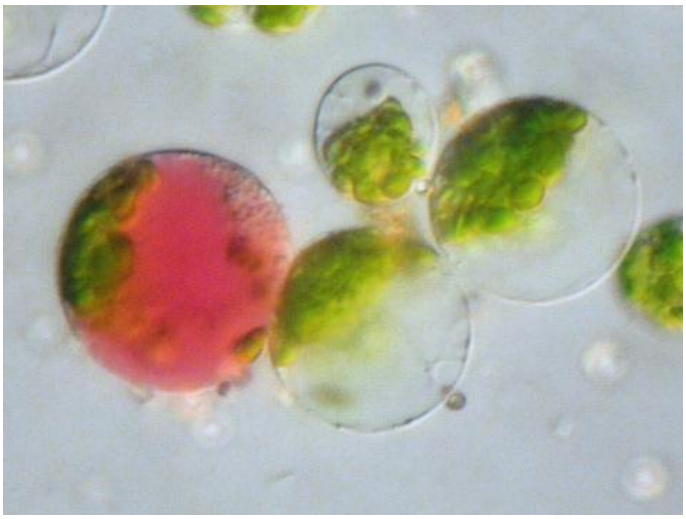
The “thylakoids” are flattened sacks bounded by membranes called “lumen” having embedded photosynthetic pigments, fats, proteins and enzymes which are arranged in “photosystems”. The “thylakoids” can be stacked on one another as coins in stacks called “grana” that are connected by small tubules.



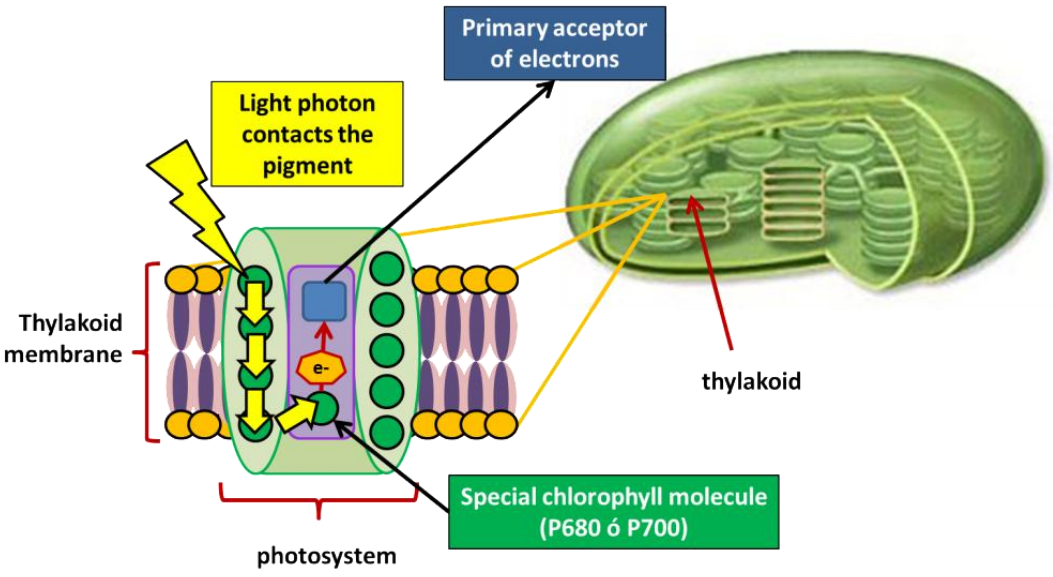
Pigments are chemicals that absorb and reflect certain electromagnetic waves of visible light. A chlorophyll pigment is a greenish stable molecule where the central ion is a magnesium organic molecule attached to a porphyrin ring shaped with four nitrogen atoms and these in turn connected with a complex organic molecule. The molecule has free electrons as a driver.



Chlorophyll pigments in a plant occur only under the presence of light. Although a seed germinate without light, it will have “protoplasts” with a yellowish-green color with “protochlorophyll” which in the presence of light acquire their green pigment forming a chloroplast. When autumn arrives or a ripe fruit, the chloroplast can become “protoplast”.



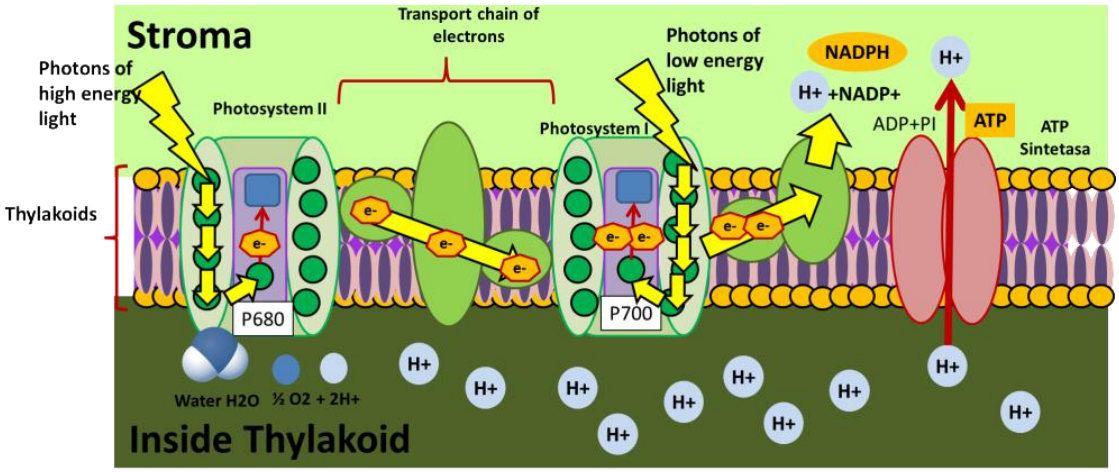
The “photosystems” are systems that capture photons of light. Each photosystem has about 200 molecules of chlorophyll and other pigments, but only 1 molecule of chlorophyll “a” in each photosystem converts photons of light into chemical energy.



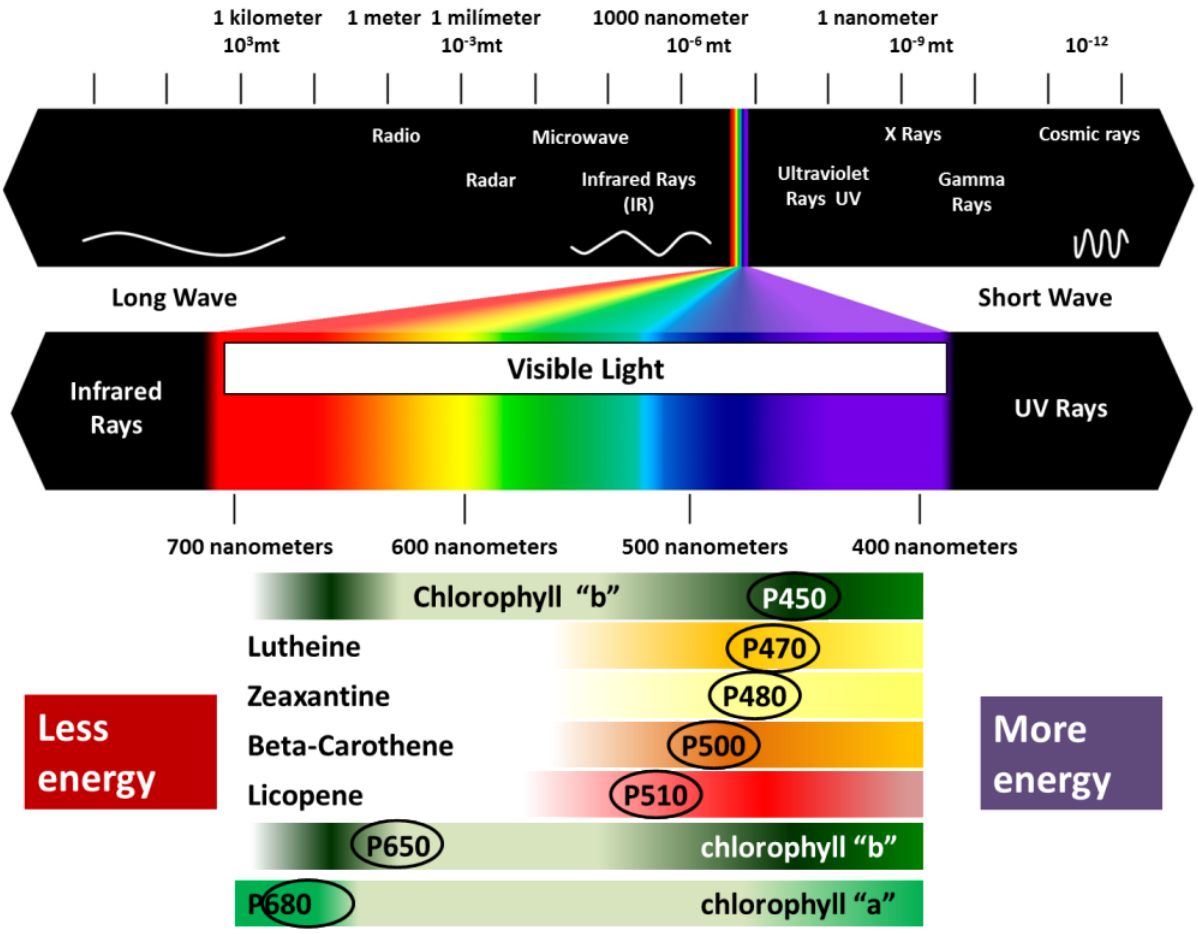
There are two types of “photosystems” which are classified depending on the ratio of its chlorophyll “a” pigment molecule with the other proteins in the thylakoid lumen.

Chlorophyll photosystems receiving waves with a maximum wavelength of 700 nanometers are “photosystems I” (FSI) and predominate in thylakoids that are not stacked.

Photosystems receiving waves with a maximum wavelength of 680 nanometers are “photosystems II” (FSII) and predominate en stacked thylakoids. Most plants use both photosystems in a coordinated manner.

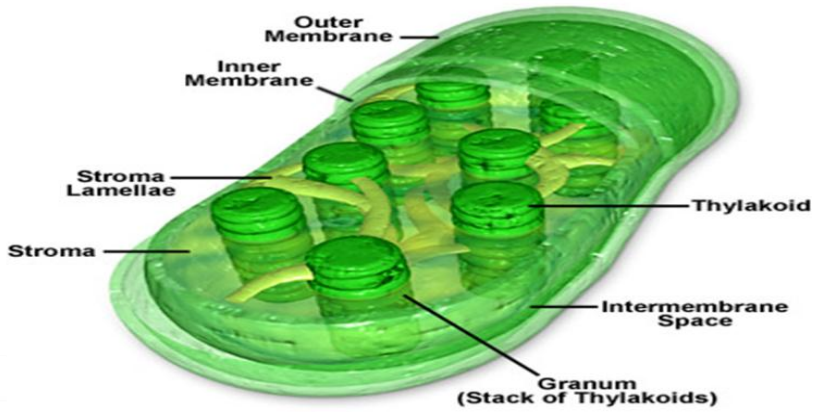


Besides chlorophyll there are other pigments such as chlorophyll b, carotenoids, beta-carotene and xanthophylls which absorb the energy not absorbed by chlorophyll.

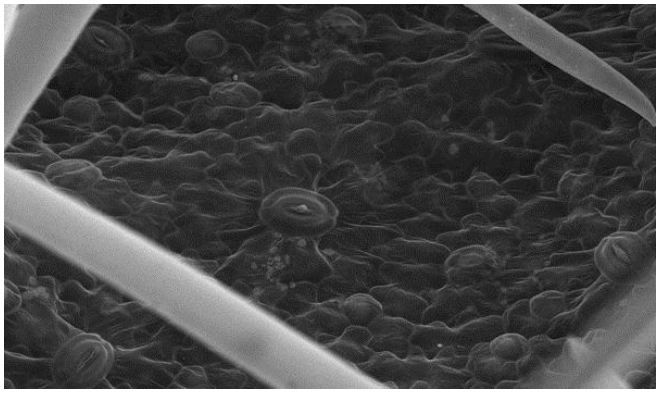


The chloroplast is bounded by two membranes with proteins, and within the inside membrane there is a gelatinous substance called “stroma” that fills the chloroplast that is in contact with the “photosystems”.

In the stroma exists water molecules, carbon dioxide, DNA, ribosomes, granules, fat, starch granules, and other substances such as the enzyme RuBisCO.



Gases such as oxygen, carbon dioxide and others enter the leaf in a controlled manner through special openings called “stomata” which are on the rear face of the the leaf, while water, nitrogen and sulfur are absorbed from the soil through the root and enter through the xylem vessels in the leaf.



Source: http://www.artinaid.com/2013/04/chloroplasts-what-are-and-what-they-are-made%E2%80%8B%E2%80%8B-of/