

Light

- Visible light represents a small portion of the vast continuous range of radiation called the electromagnetic spectrum.
- All radiation in this spectrum travels as waves.
- Wavelength is the distance from one wave peak to the next.

- Preview from Notesale.co.uk
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- This gain in energy moves the electron from a lower energy atomic orbital to a higher energy atomic orbital, which is more distant from the nucleus.

Chloroplasts

- Lie mainly inside the leaf, in the cells of the mesophyll, a layer with many air spaces and a very high concentration of water vapour.
- Interior of the leaf exchanges gases with the outside through microscopic pores, called stomata.

- Pigments absorb photons (light NRG)
 - And become excited
- Chlorophyll a
 - absorb light in the blue region of the spectrum
- Chlorophyll b
 - Absorb light in the red regions of the spectrum
- Thus reflect green light.

Photosynthetic Pigments

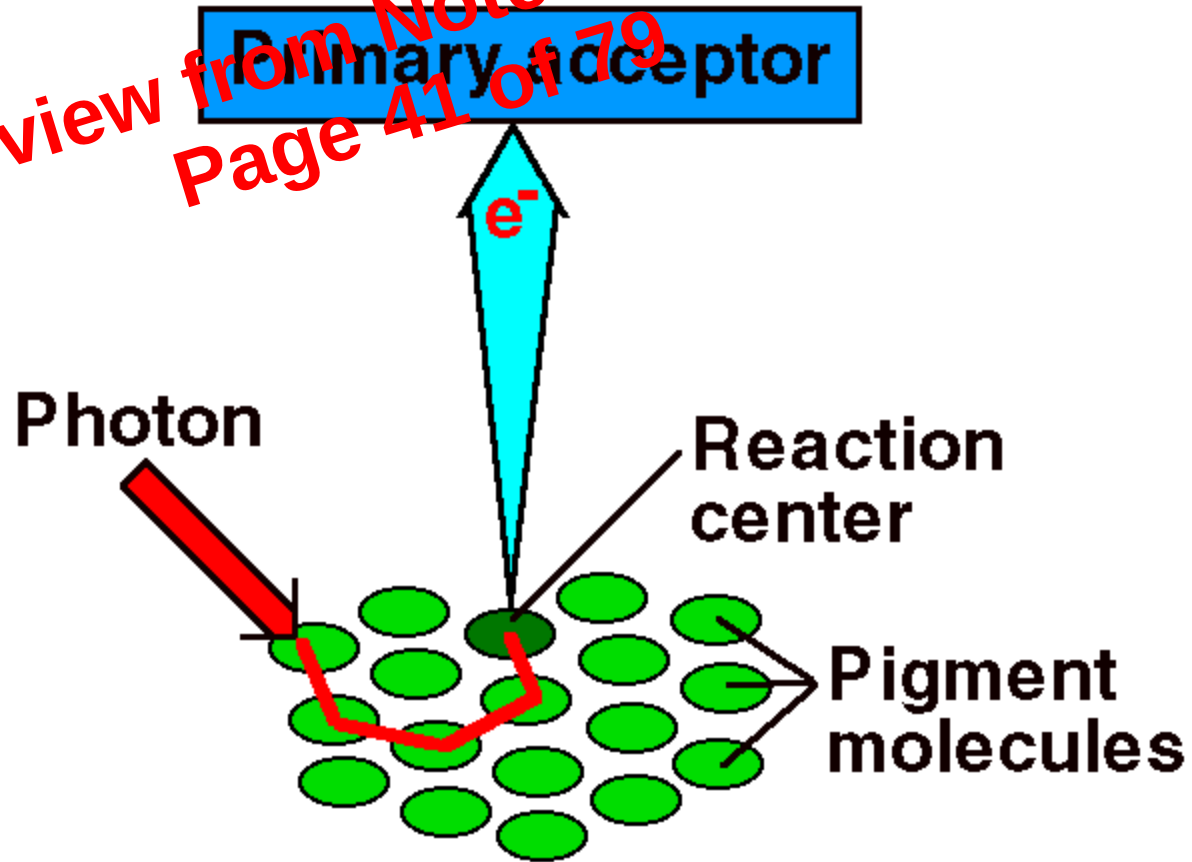
- Chlorophyll a
 - initiates the light dependent reactions of photosynthesis.
- Chlorophyll b
 - is an accessory pigment
 - Prevents damage to pigment chlorophyll a
 - By accepting electrons.

Antenna Systems

- Antenna System

- Pigments arrangement in Chloroplast
- energy absorbing systems/ light harvesting complex.
- pigments are packaged together
- and attached to thylakoid membranes
- by their long hydrocarbon chains.

- $\text{chlA}^* + \text{acceptor mol.} \rightarrow \text{Chl}^+ + \text{acceptor}$
- ChlA becomes positively charged (chemical oxidation).
- Final acceptor = NADP^+
- $\text{NADP}^+ + \text{H}^+ + 2 \text{e}^- \rightarrow \text{NADPH}$



Electron Transport Chain

- Cyclic electron transport
 - Only involves P700
 - Electron passed to electron acceptors, as they are passed on energy lost, lost energy used to pump protons across thylakoid membrane.
 - ATP synthase in thylakoid membrane uses the energy of the proton gradient to make ATP.

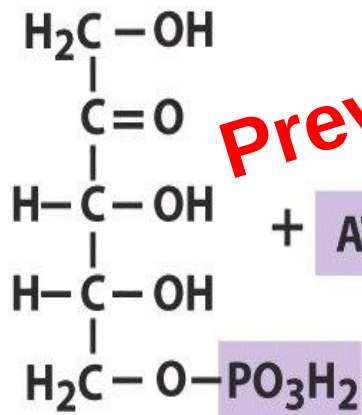
Photosynthesis

- RubisCO is a key catalyst of the Calvin cycle.
- RubisCO makes up over 50% of the total chloroplast proteins
- catalyzes formation of phosphoglyceric acid,
- key compound in biosynthesis of glucose.

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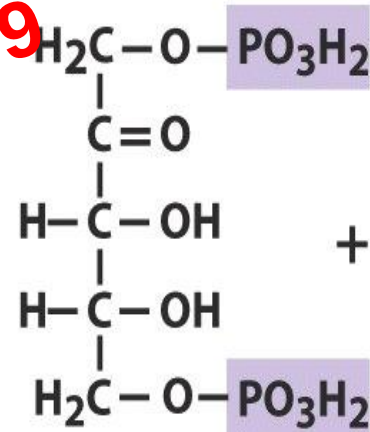
- Unstable 6 carbon molecules produced (6) yields 2 molecules of phosphoglycerate, (12 PGA) with 3C each.
- C of CO₂ is now a part of an organic molecule, 3C plants.
- Rubisco is the most abundant protein in chloroplast.

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+ ATP

Phosphoribulokinase



+ ADP

Cycle repeats
starting with (a)

Ribulose 5-phosphate

Ribulose biphosphate

Figure 17-21c Brock Biology of Microorganisms 11/e
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- C4
 - fix carbon using phosphoenolpyruvate (PEP)
- CAM
 - Crassulacean acid metabolism
 - Also uses PEP
- Fixing enzyme for PEP
 - PEP carboxylase
- 1st cmpd formed
 - Oxaloacetate (4C)