CHAPTER 10

PHOTOSYNTHESIS: LIGHT DEPENDENT AND LIGHT INDEPENDENT REACTIONS

LIGHT DEPENDENT RX'S

- LIGHT ENERGY (PHOTONS)
- PIGMENTS; CHLOROPHYLL AND ACCESSORY PIGMENTS.
- BOOSTS ENERGY TO HIGHER LEVEL
- ENERGY AS e-'S STORED IN ATP AND NADPH

NON-CYCLIC PHOTOPHOSPHORYLATION

- LIGHT ENERGY CAPTURED BY PSII AND GOES TO P680.
- e-'S PASSED TO CARRIERS.WATER SPLITS TO REPLACE e-'S.
- H+ STORED IN MATRIX
- e-'S PASSED THRU ETC TO P700
- e-'S GO THRU ETC AND TO NADP+

Figure 10.12 How noncyclic electron flow during the light reactions generates ATP and NADPH (Layer 1)

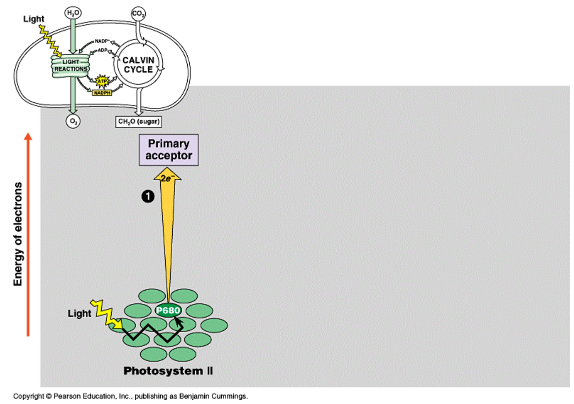


Figure 10.12 How noncyclic electron flow during the light reactions generates ATP and NADPH (Layer 2)

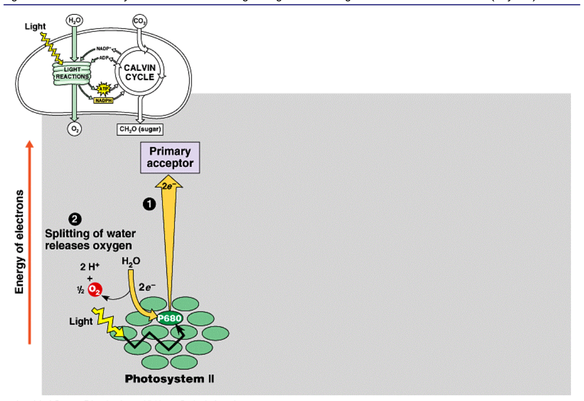


Figure 10.12 How noncyclic electron flow during the light reactions generates ATP and NADPH (Layer 3)

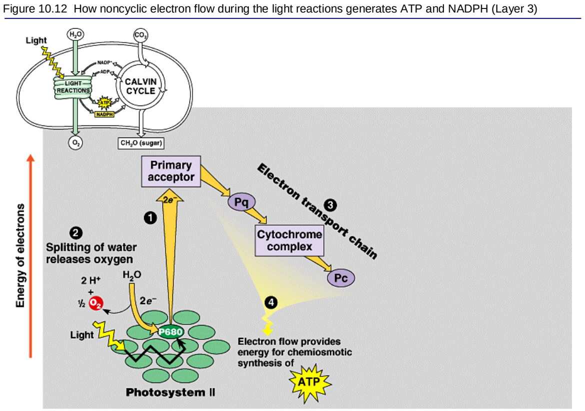


Figure 10.12 How noncyclic electron flow during the light reactions generates ATP and NADPH (Layer 4)

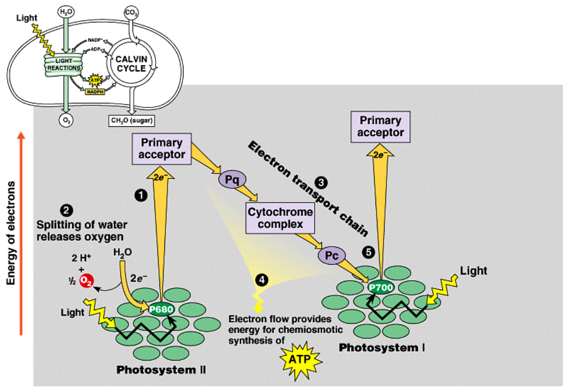


Figure 10.12 How noncyclic electron flow during the light reactions generates ATP and NADPH (Layer 5)

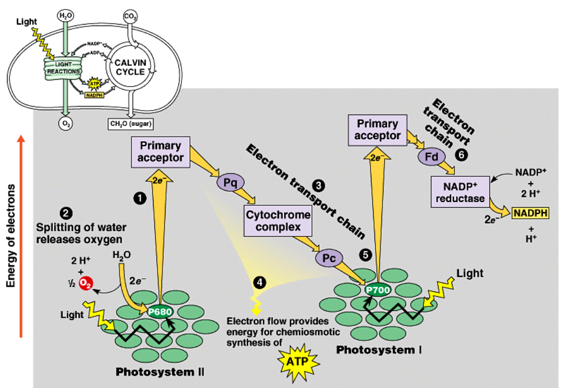
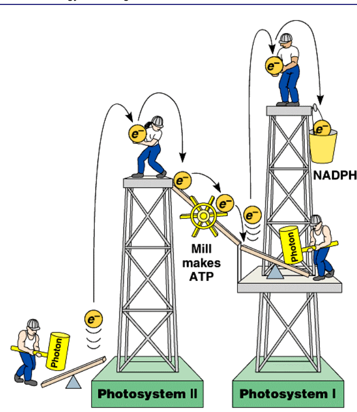


Figure 10.13 A mechanical analogy for the light reactions



CYCLIC PHOTOPHOSPHORYLATION

- PS I AND TRANSPORT PROTEIN
- (Cytochromes)
- e-'S RETURN TO CHLOROPHYLL TO FILL PHOTON GAP,
- GENERATING ATP
- PRODUCES 2 ATP PER 2 e-'s
- EVOLVED BEFORE NON-CYCLIC PHOTOPHOSPHORYLATION

Figure 10.14 Cyclic electron flow

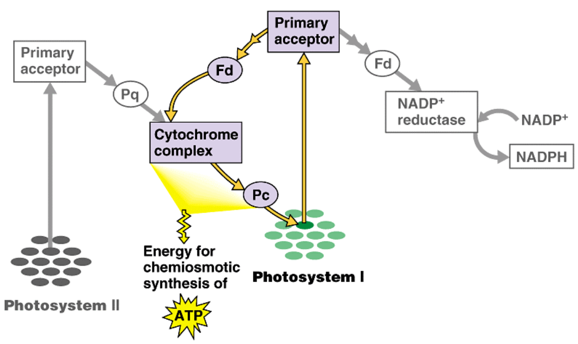


Figure 10.15 Comparison of chemiosmosis in mitochondria and chloroplasts

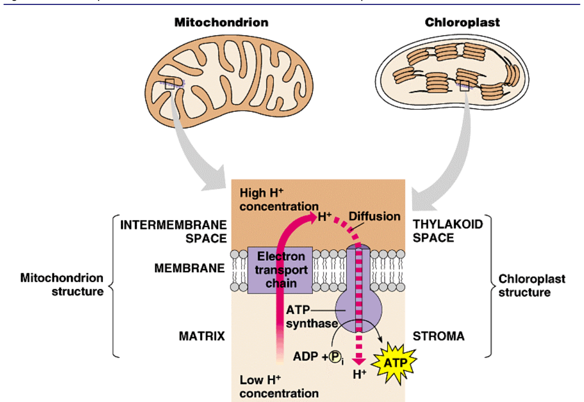
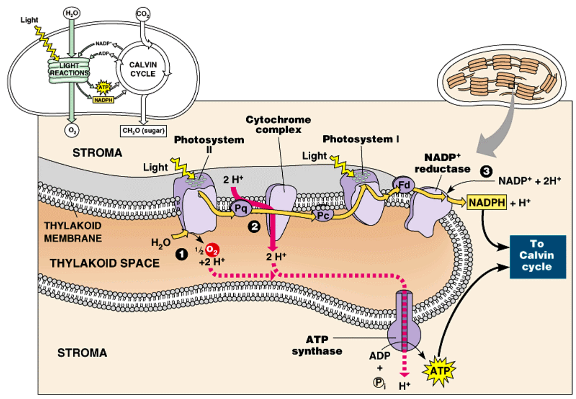


Figure 10.16 The light reactions and chemiosmosis: the organization of the thylakoid membrane



LIGHT INDEPENDENT RX.

- ENERGY FROM LIGHT DEP. RX'S
- COMBINES C02 + 5c SUGAR
- FORMS 2-3C INTERMEDIATES
- THEN FORMS 6C STORAGE CMPDS.
- CALVIN -BENSON CYCLE

Figure 10.17 The Calvin cycle (Layer 1)

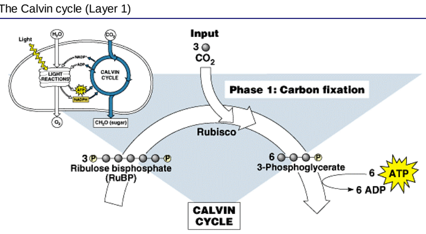


Figure 10.17 The Calvin cycle (Layer 2)

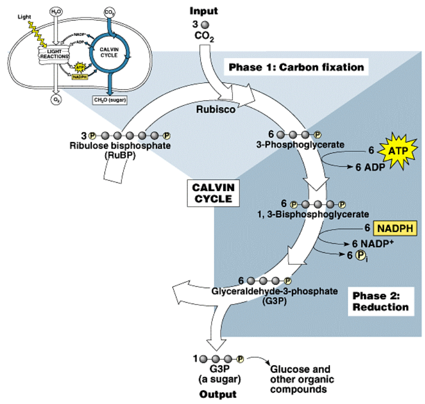
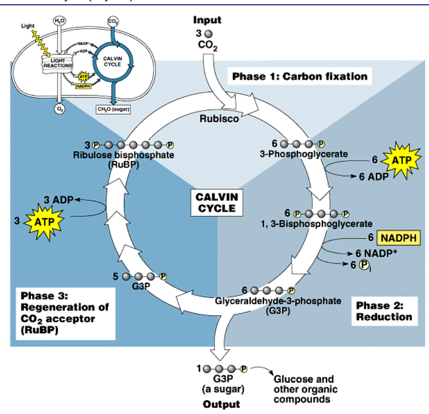


Figure 10.17 The Calvin cycle (Layer 3)



C4 PHOTOSYNTHESIS

- **C3 PS/STOMATES ON LEAVES OPEN PART-TIME, C02 USED AS AVAILABLE**
- **WHEN C02 USED UP, RuBP JOINS WITH 02 (PHOTRESPIRATION) A WASTEFUL PROCESS.**
- **C4 PLANTS, LIKE GRASSES, STORE EXTRA C02 IN BUNDLE SHEATH**

C4 PLANTS CONTINUED

- **CO2 STORED IN C4 ACID COMPOUNDS IN BUNDLE SHEATH CELLS.**
- **SUCCULENTS OPEN STOMATA AT NITE TAKING IN CO2**
- **C4 PLANTS MAKE C02 AVAILABLE TO MAKE GLUCOSE**

CAM PHOTOSYNTHESIS

- CAM Photosynthesis/Crassulaceae
- or succulent plants.
- Stomata stay open at night/build up carbon dioxide.
- Carbon dioxide then can be used all the time by plant, even when stomata are closed during times of drought/heat.

Figure 10.19 C_4 and CAM photosynthesis compared

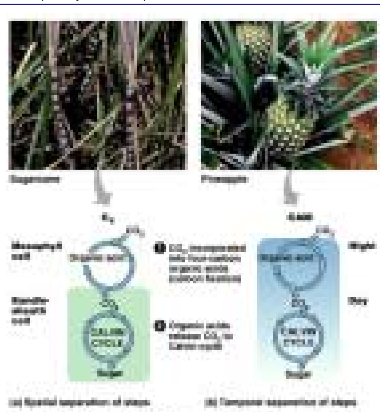


Figure 10.20 A review of photosynthesis