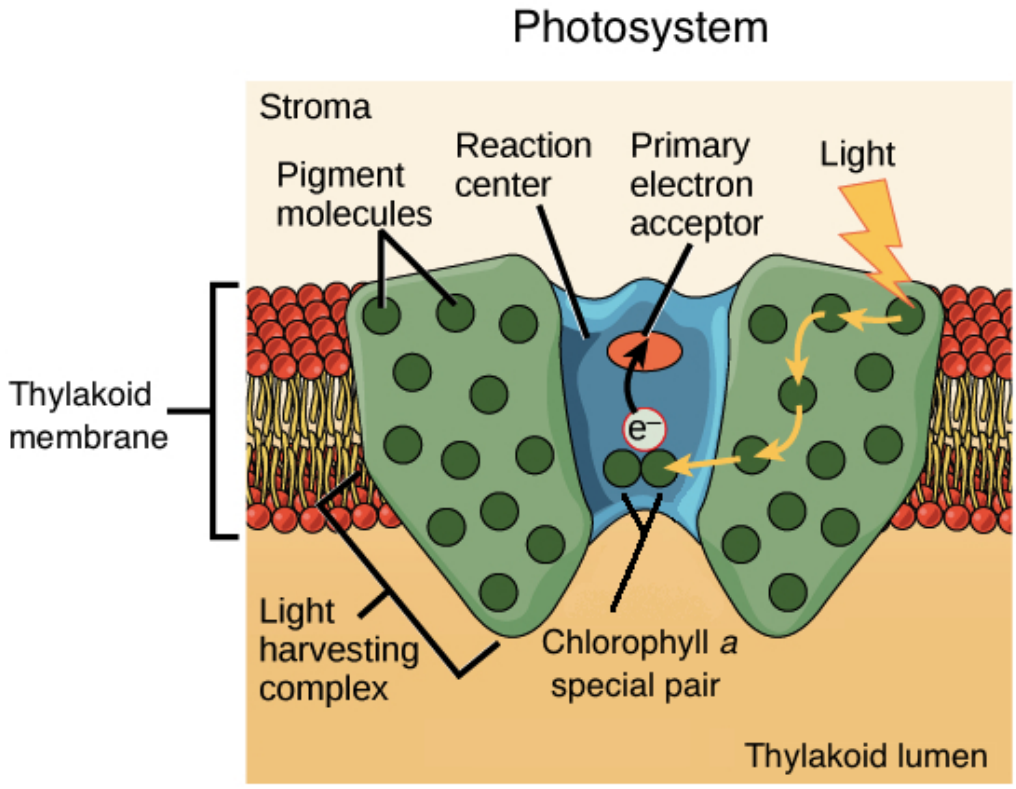
10.2

Light dependent reactions

As stated, the light dependent reactions are designed to convert light energy into chemical energy which they trap in NADPH or ATP molecules. This “trapping” occurs in unique complexes called photosystems (PS), designated as **PSI** and **PSII** , and consist of a pigment and a reaction center. Both complexes have the same structure of antenna proteins that surround the reaction center and bind chlorophyll pigments. The photosystems are classified by the maximal absorption wavelengths of visible light (**PSI = 700nm** ; **PSII = 680nm**). The two complexes differ in what they oxidize and what they reduce.

Absorbed light (photon) excites the chlorophyll molecules into a more excited state and that energy is then transferred from chlorophyll to chlorophyll until the energy level becomes suited for the reaction center. Within the reaction center are chlorophyll (a) molecules that are oxidized by the incoming energy as that light energy is converted to an excited electron. The reaction center of PSII (also called P680) will deliver its excited (high energy) electrons through an electron transport chain to PSI (also called P700). The transport of the electron through the transport chain proteins causes the electron to lose energy. This “lost” energy is recaptured and used to split water, which creates H^+ ions for translocation into the thylakoid space and to replace the loss of the electron from P680. The accumulation of the H^+ ions will be used to synthesize ATP through ATP synthase just like we saw in the mitochondria.

By the time the electron arrives at PSI it has lost the majority of its energy but can be re-excited by PSI through the absorption of another photon. That re-energized electron is sent to the reaction center, combined with a H^+ ion, and then attached to $NADP^+$ to form NADPH (reduction). The two complexes work to produce NADPH and ATP at very similar rates.



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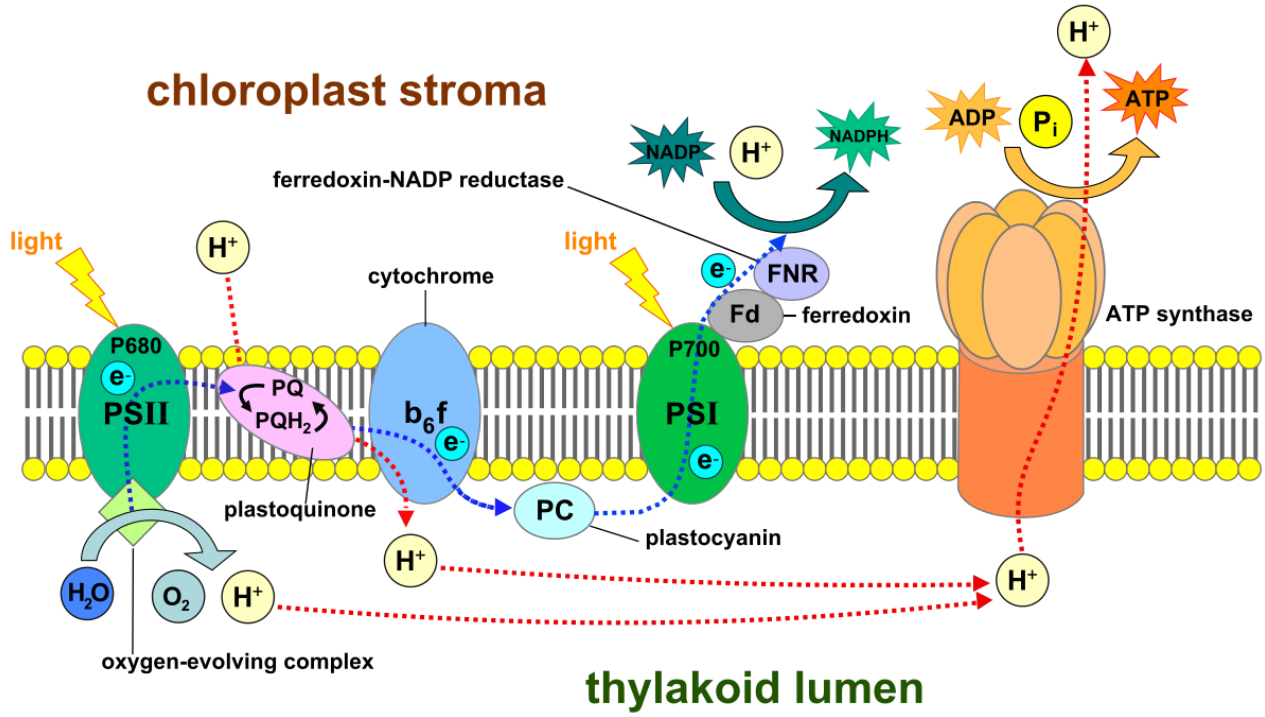

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