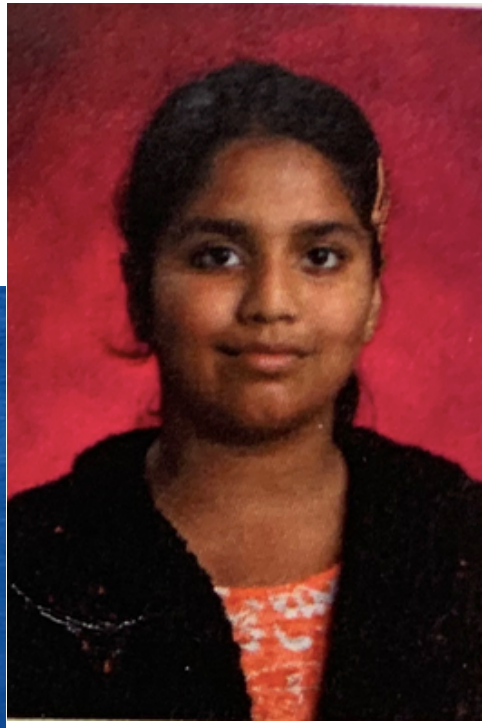
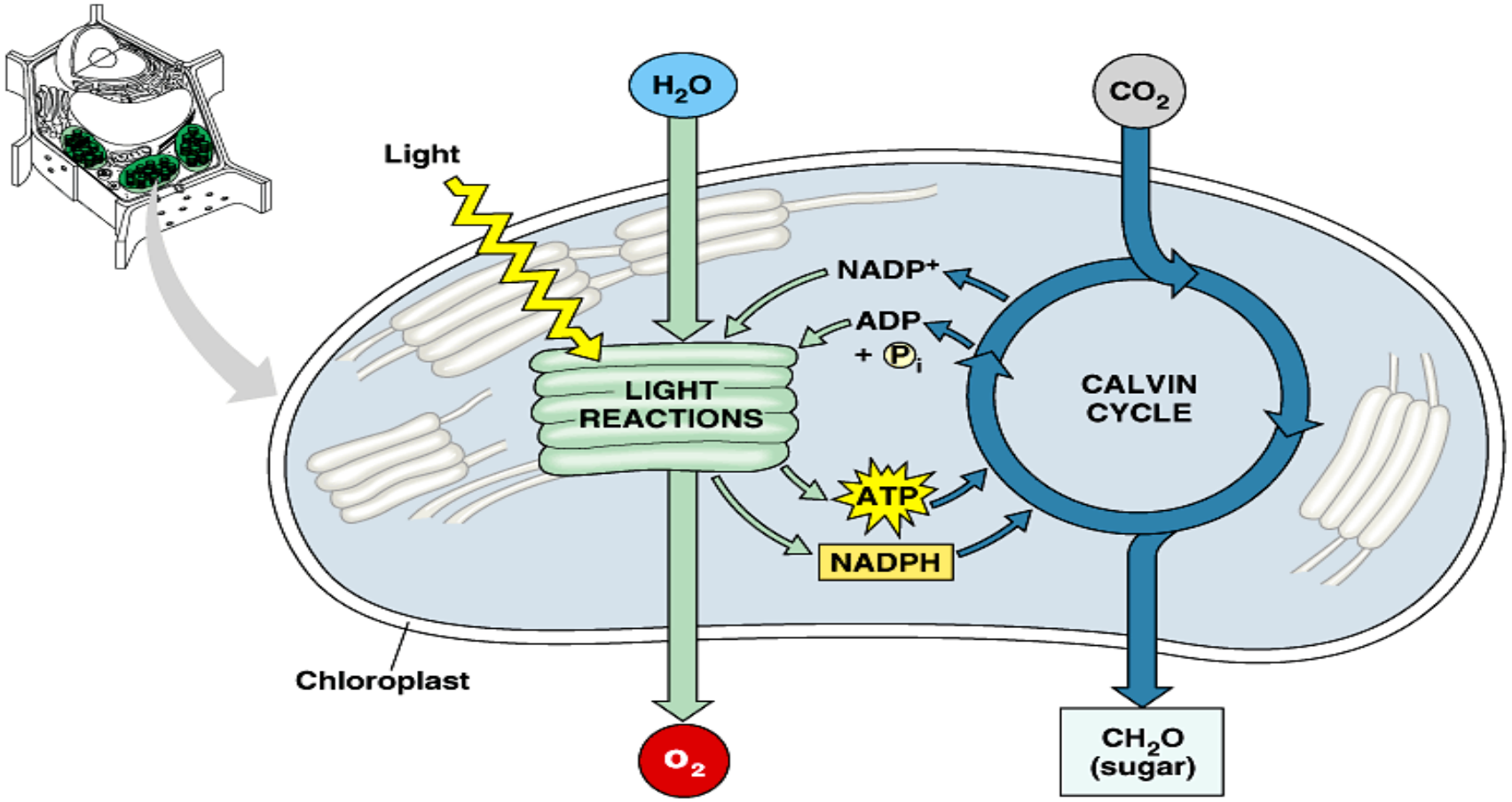
Pathways of Photosynthesis Light-Dependent Reactions

8.3



Photosynthesis Overview

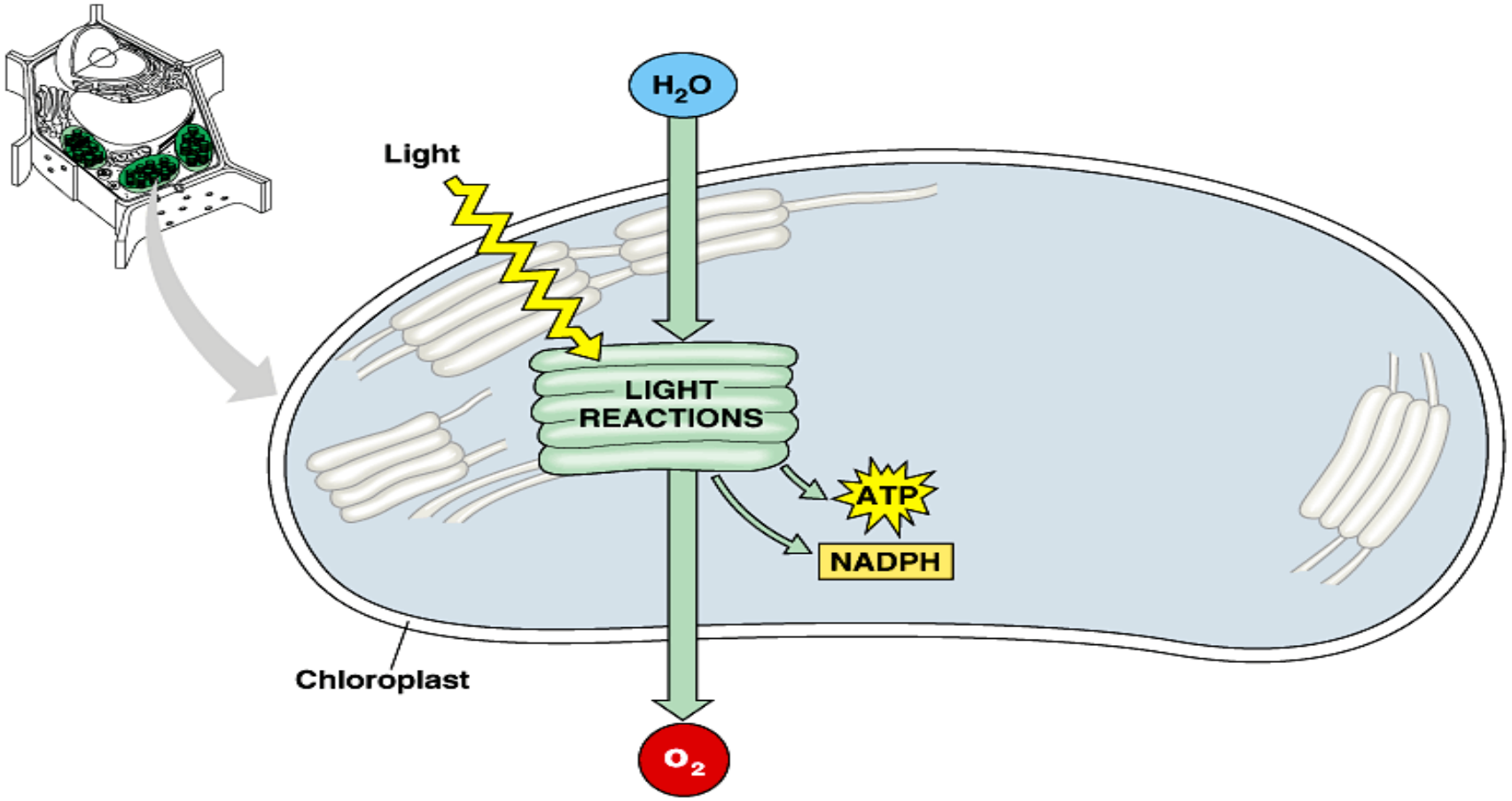


2 Stages of Photosynthesis

- **light-dependent reactions (Covered here)**
  - light energy is captured and used to synthesize ATP and NADPH

- **light-independent reactions (Calvin cycle)**
  - energy in ATP and NADPH is used to "fix" CO_2 into simple carbohydrate molecules

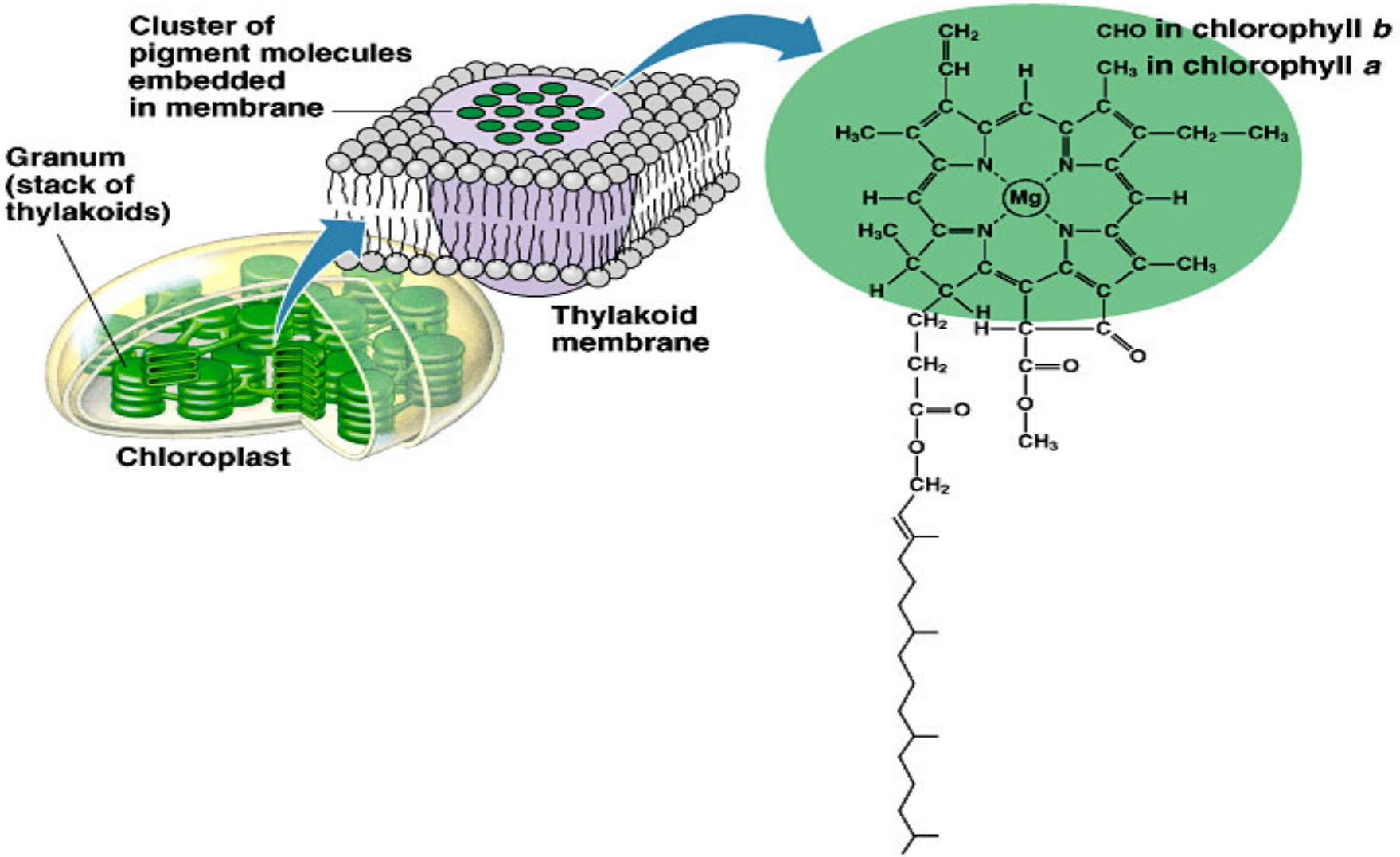
Light-Dependent Reactions



Light-Dependent Reactions

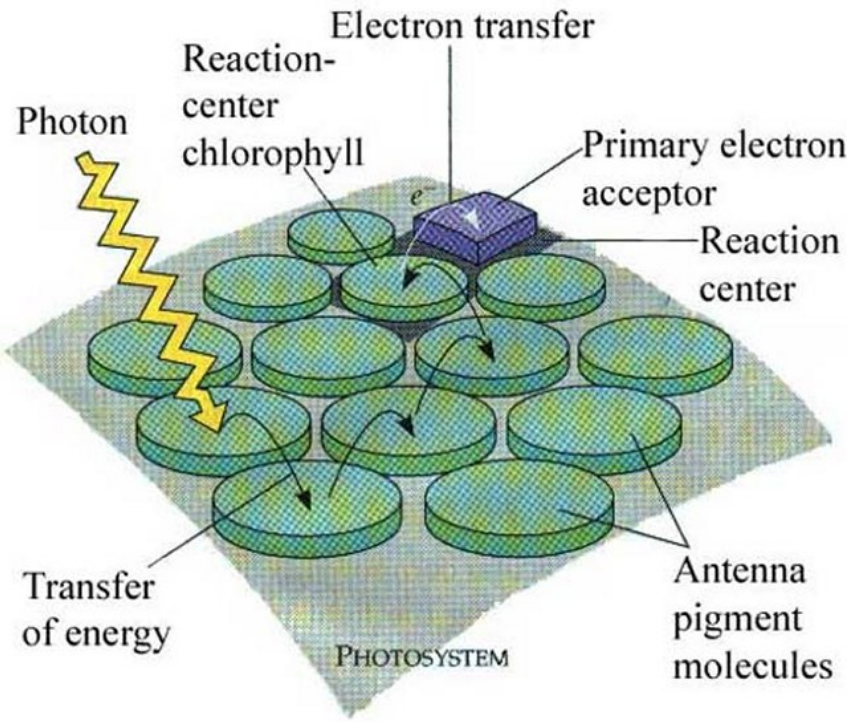
- absorption of a photon of light excites electrons in chlorophyll
- in thylakoid membranes, the excited electrons are transferred to primary electron acceptors - AKA **Photoactivation**
- occurs in **photosystems I (P700) and Photosystem II (P680)**
- electrons are regained back by **photolysis** (splitting water which releases O2)

Photosystems



Photosystems

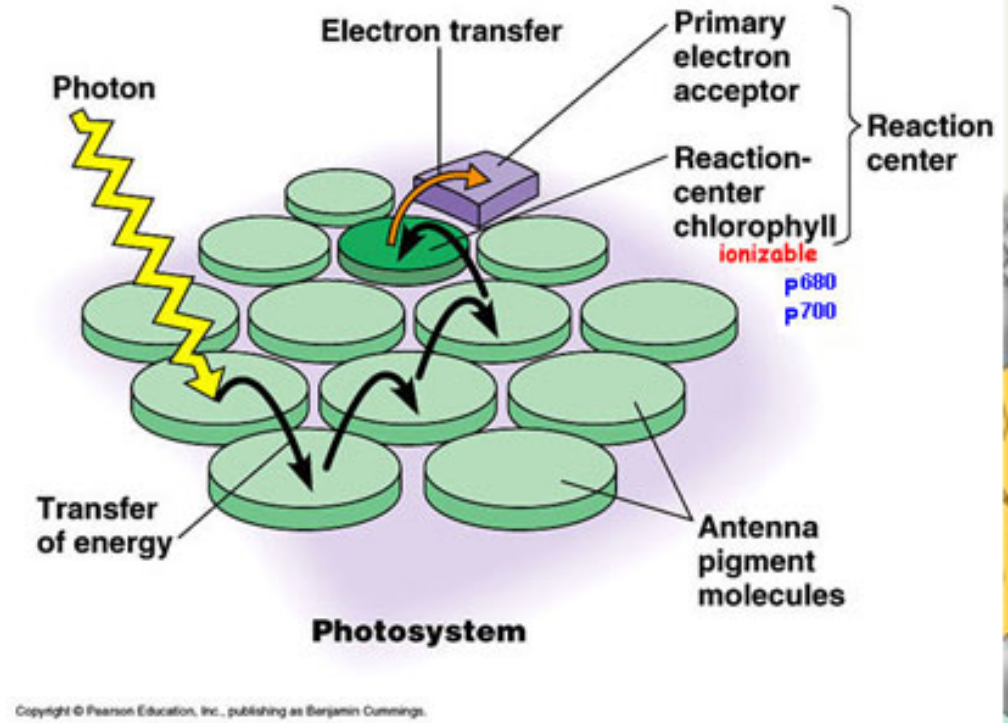
- antenna pigments
  chlorophyll molecules & accessory pigments in a protein matrix
- reaction centre
  chlorophyll *a* & primary electron acceptor

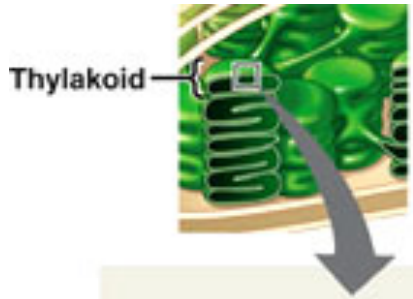


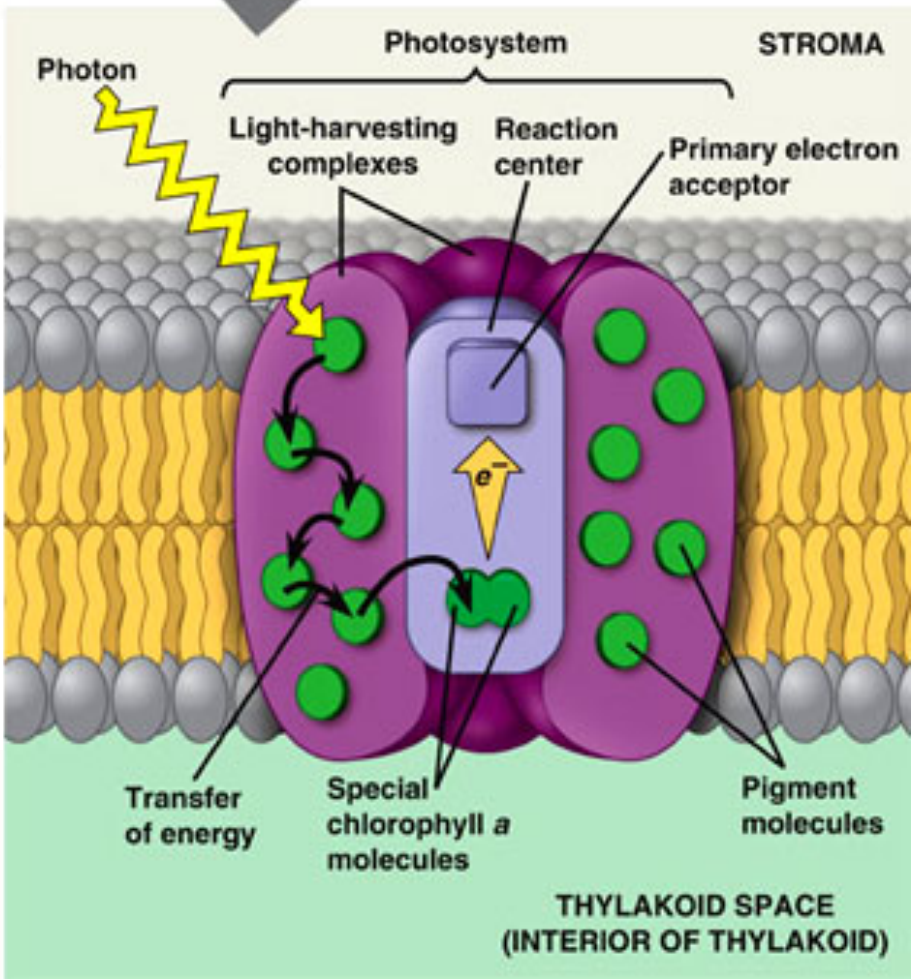
Visit the Khan Academy…

Great summary explanation (10 minutes long)
https://www.youtube.com/watch?v=vEsAtC9d_MQ

Photosystems



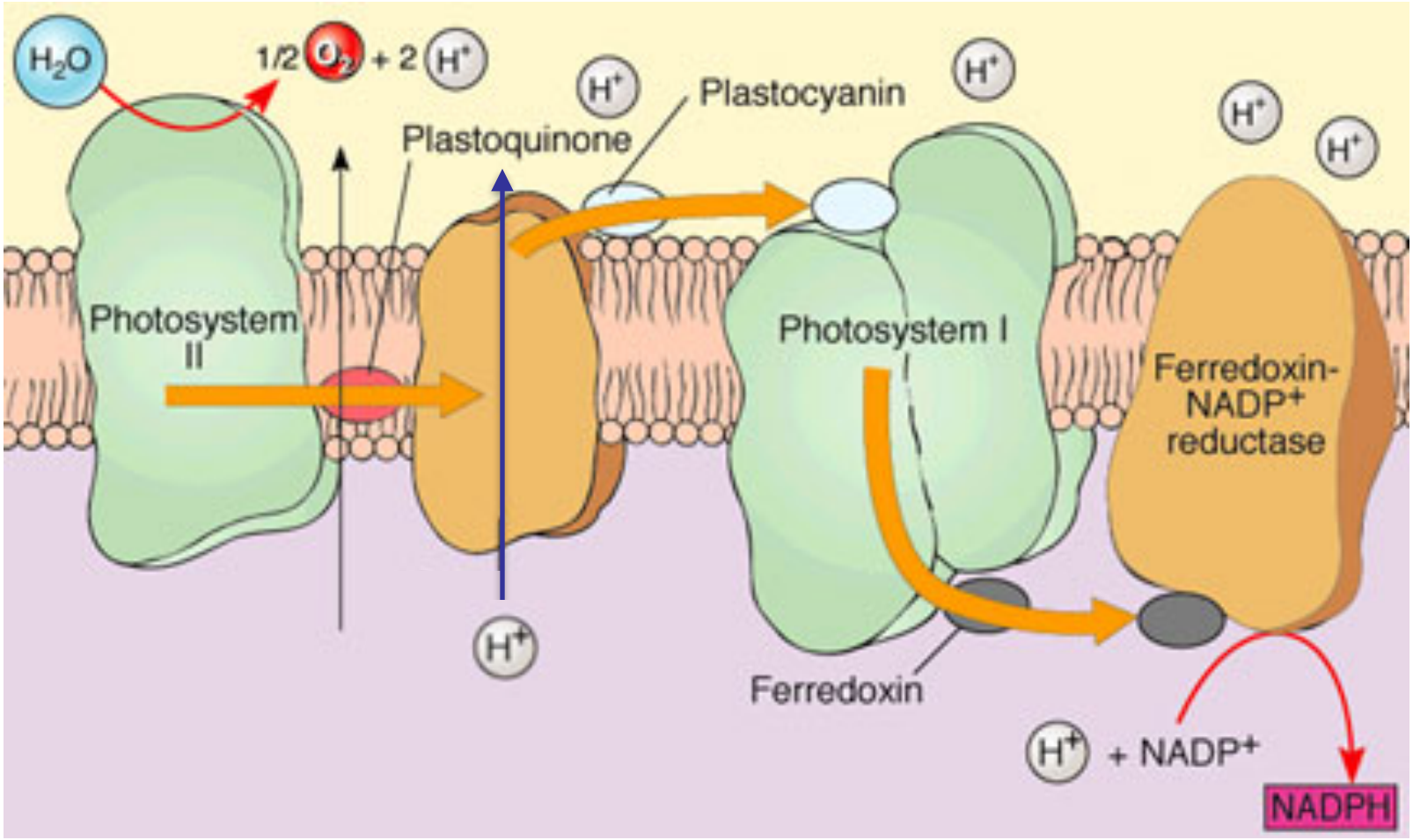




Light-Dependent Reactions

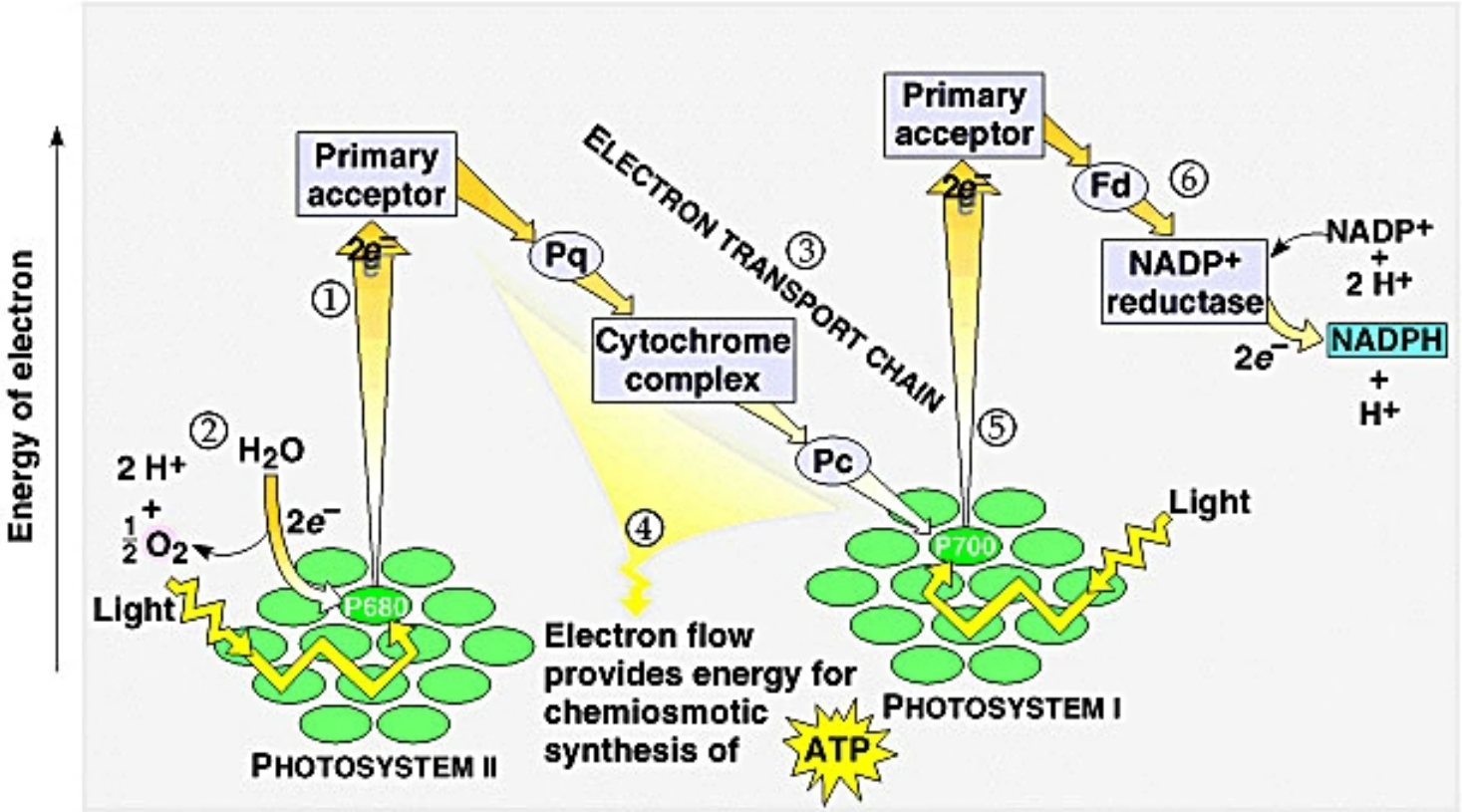
- Located in the thylakoid membrane (Grana for many thylakoid)
- excitation of electrons in Photosystems, results is transferred to a primary electron acceptor
- **linear electron flow-** electrons lost by chlorophyll a, move to a primary electron acceptor which is then is transferred along until is reaches the electron carrier NADP+ to form NADPH
- The electrons that are lost by chlorophyll a are replaced by the splitting of water and producing O_2
- A proton gradient of the hydrogens from water (like cellular respiration) is formed to generate ATP from ATP synthase.

Electron Transport



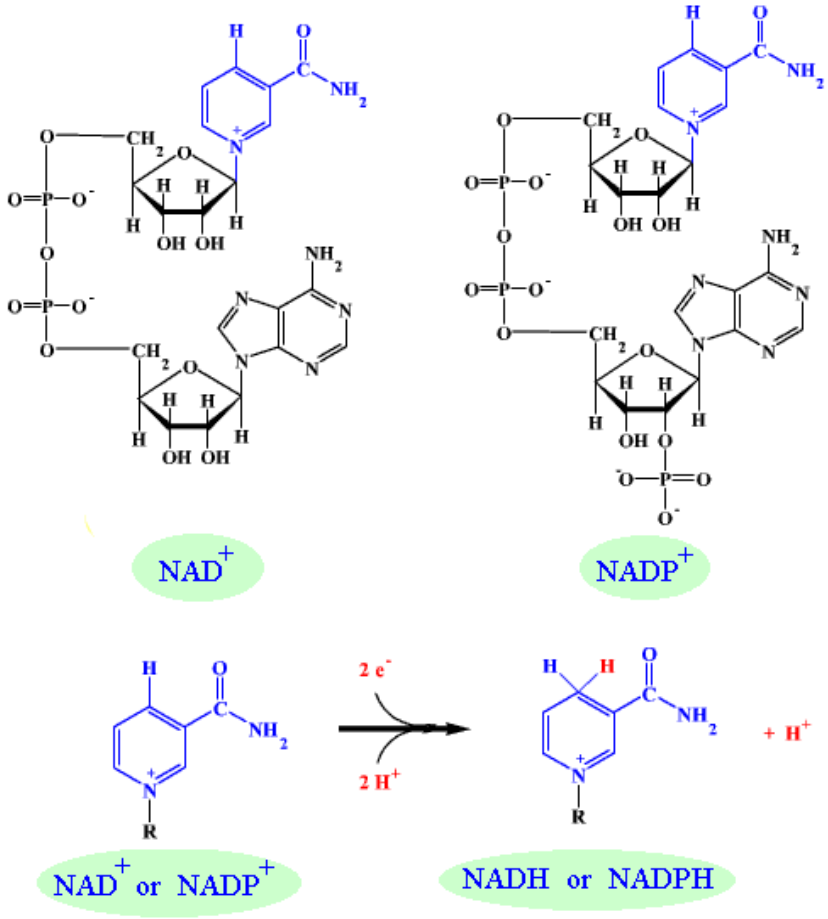
Non-cyclic Electron Flow

Figure 10.11 Noncyclic electron flow during the light reactions generates ATP



NAD^+ & $NADP^+$

- nicotinamide adenine dinucleotide phosphate
- coenzyme used in anabolic reactions such as photosynthesis



Cyclic Electron Flow