

# Pre – AP Biology

## Photosynthesis 3.1

### Part 1

# Autotroph - Plants



# Autotroph - Algae



# Autotroph - Phytoplankton



# Autotroph - Bacteria

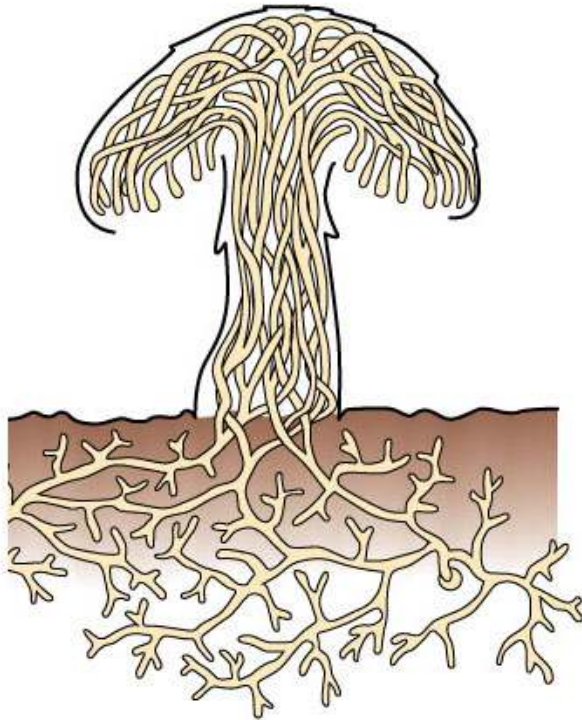


Benjamin  
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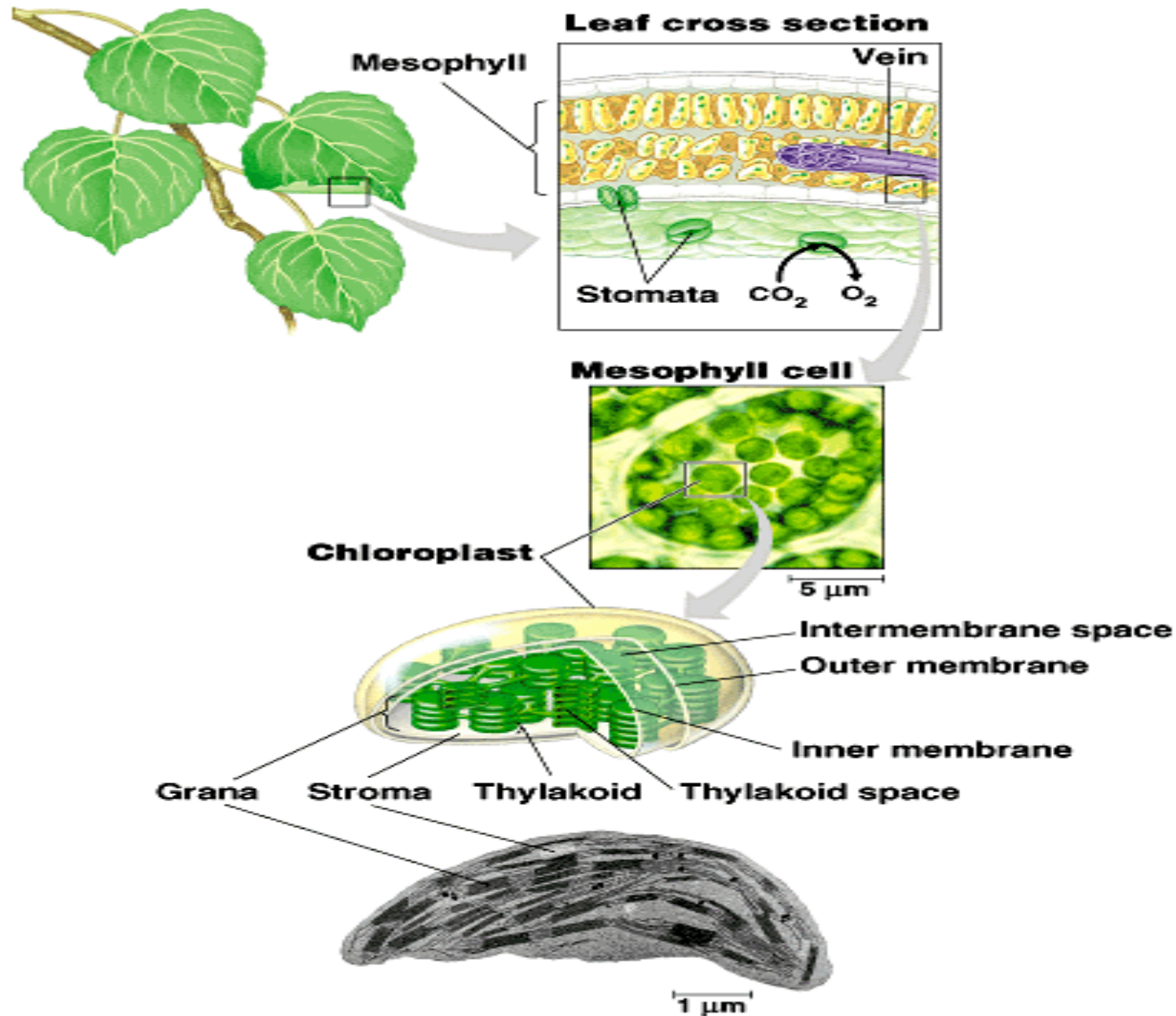
# Heterotroph - Animal



# Heterotroph - Fungus



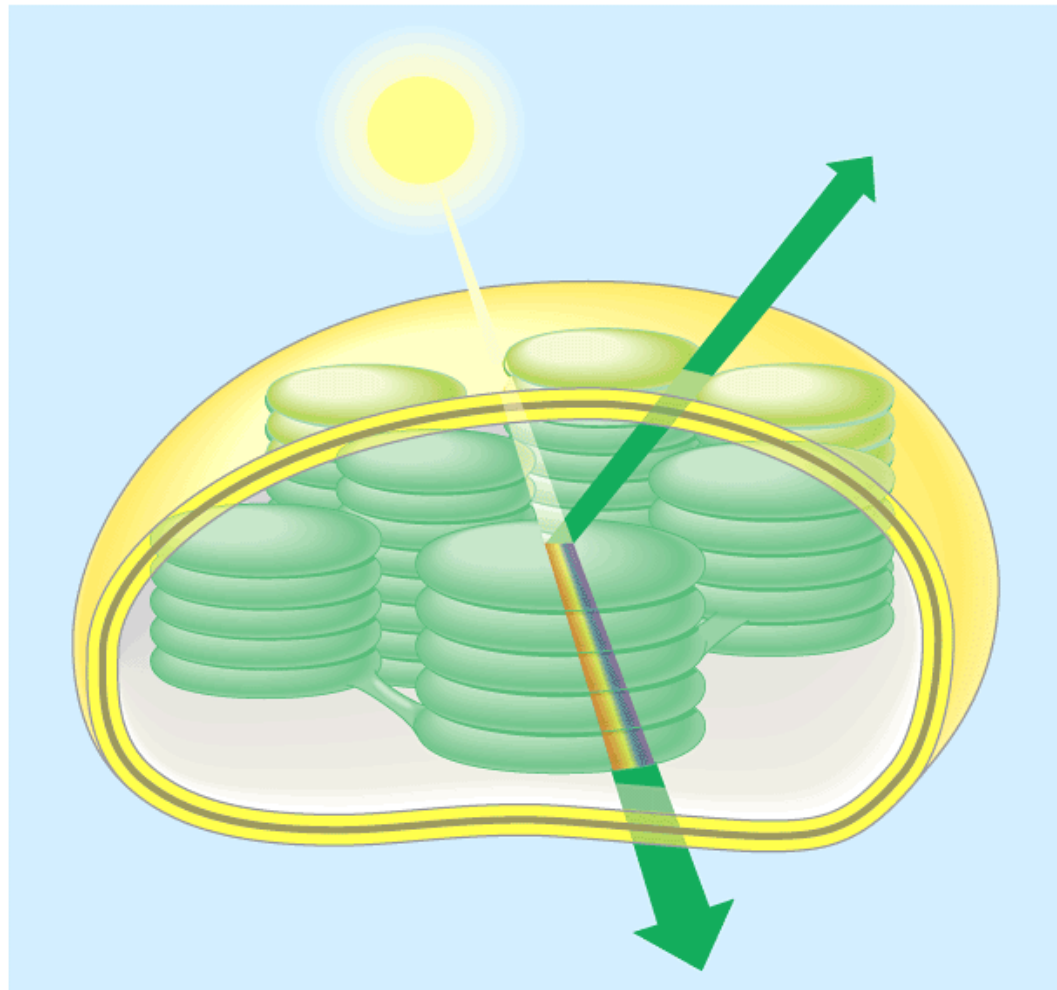
# Leaf and Chloroplast structure



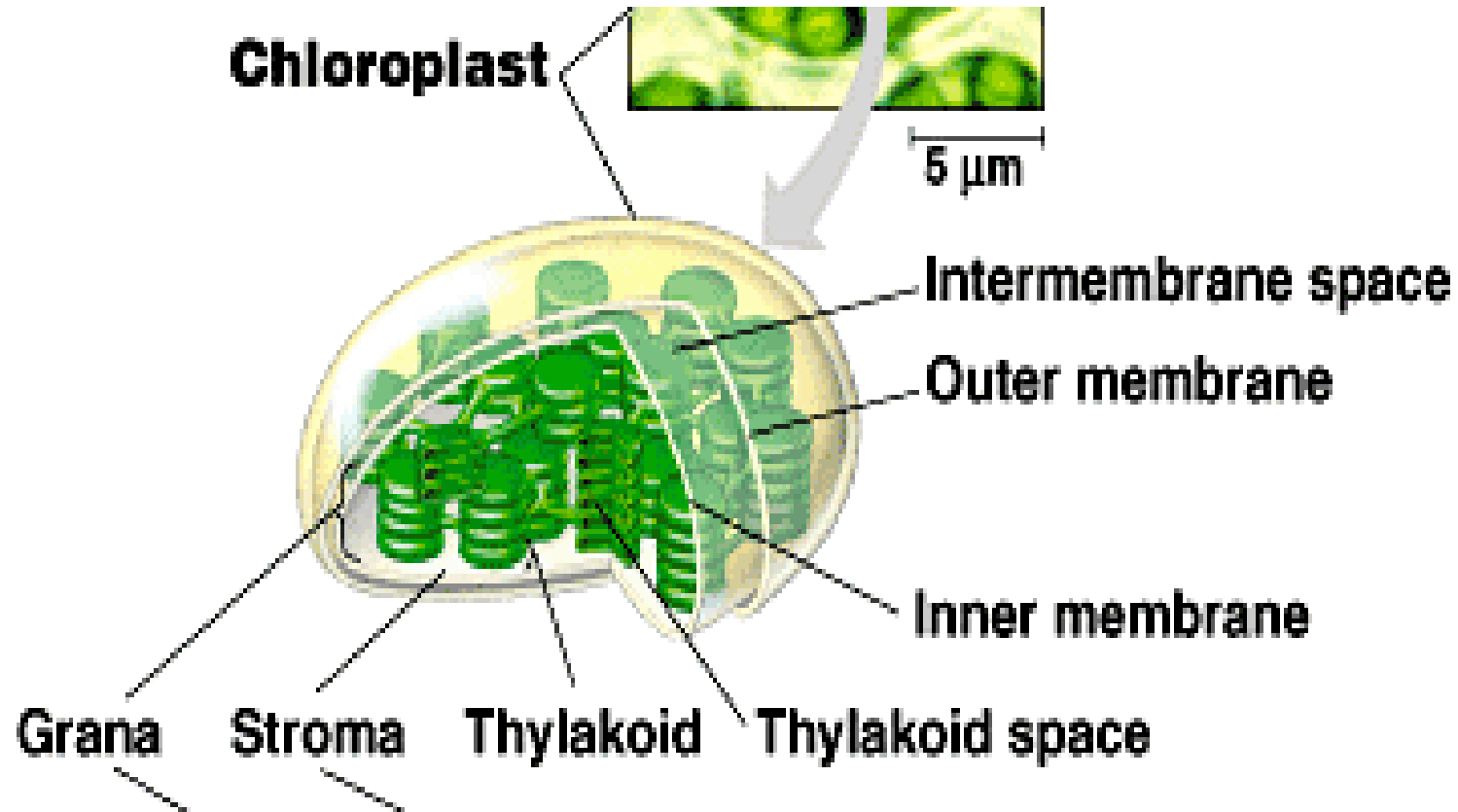


# Chloroplast

See the **green light** being *reflected*

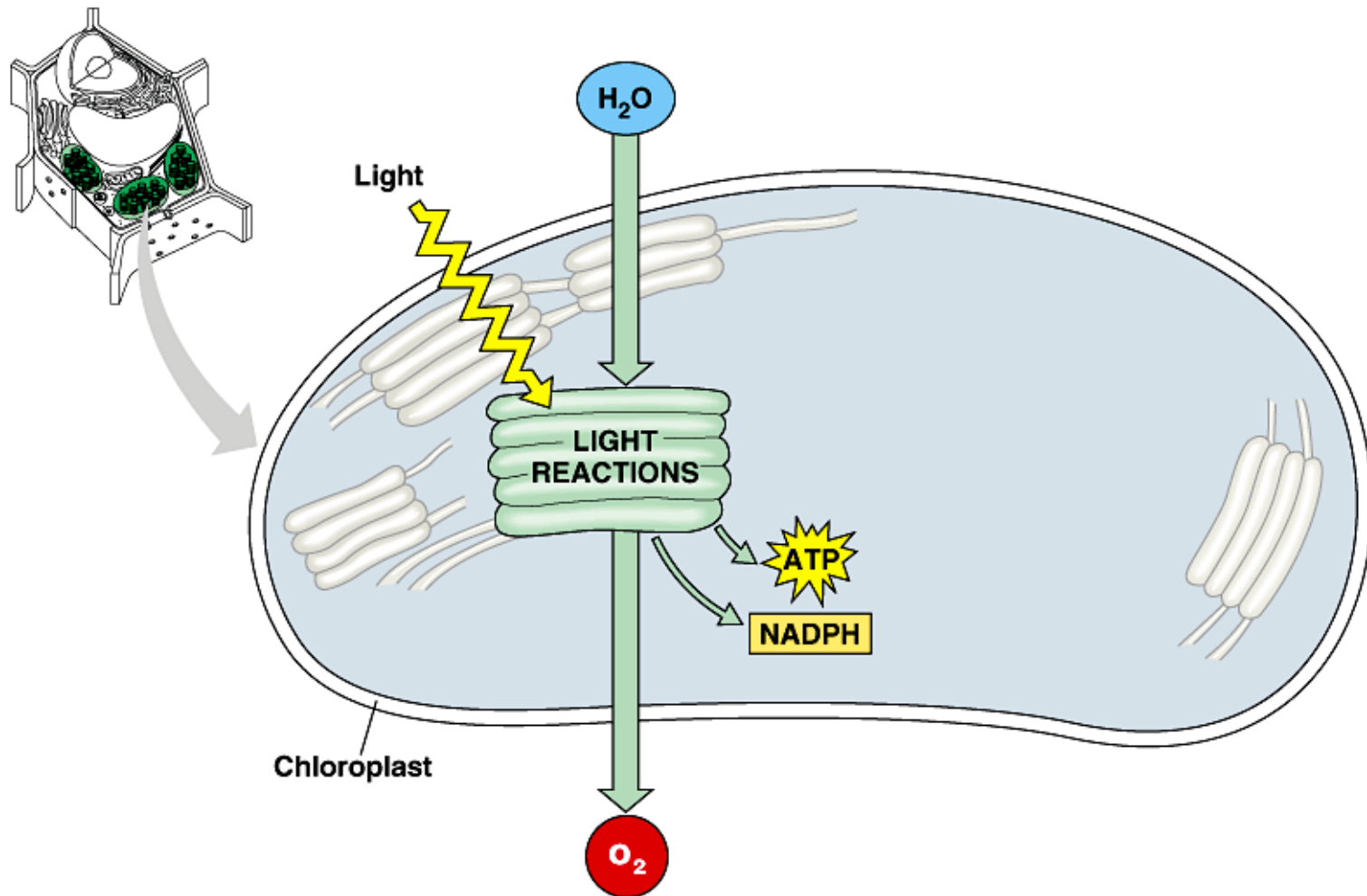


# Chloroplast structure



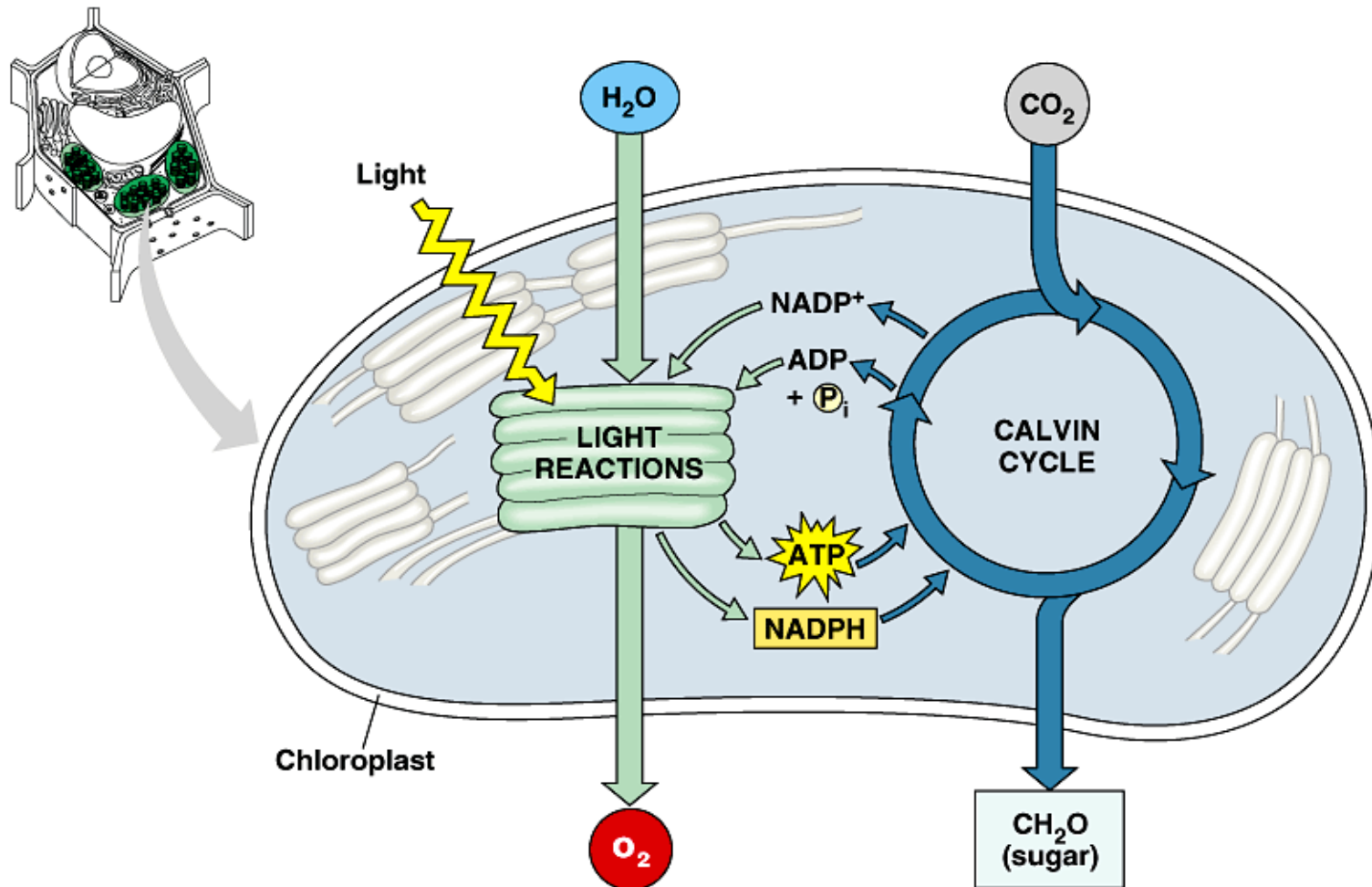
# Photosynthesis (Light Reaction)

## Making the *batteries* ATP and NADPH



# Photosynthesis (Calvin Cycle)

Using the *batteries* to power the *making* of sugar



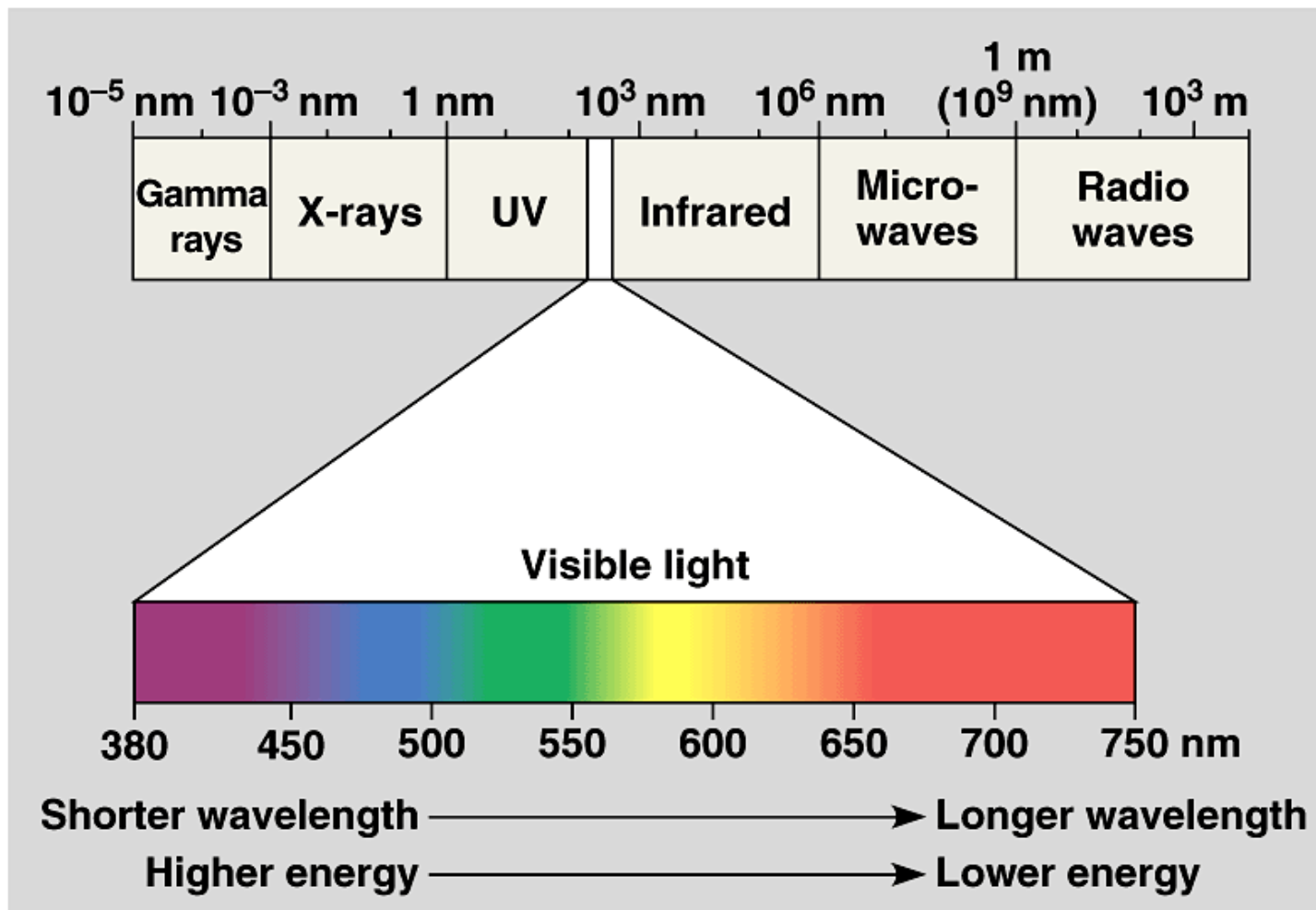
Photosynthesis chemical reaction  
(Remember... conservation of matter.)

The water splits using the sunlight  
energy; not the CO<sub>2</sub>

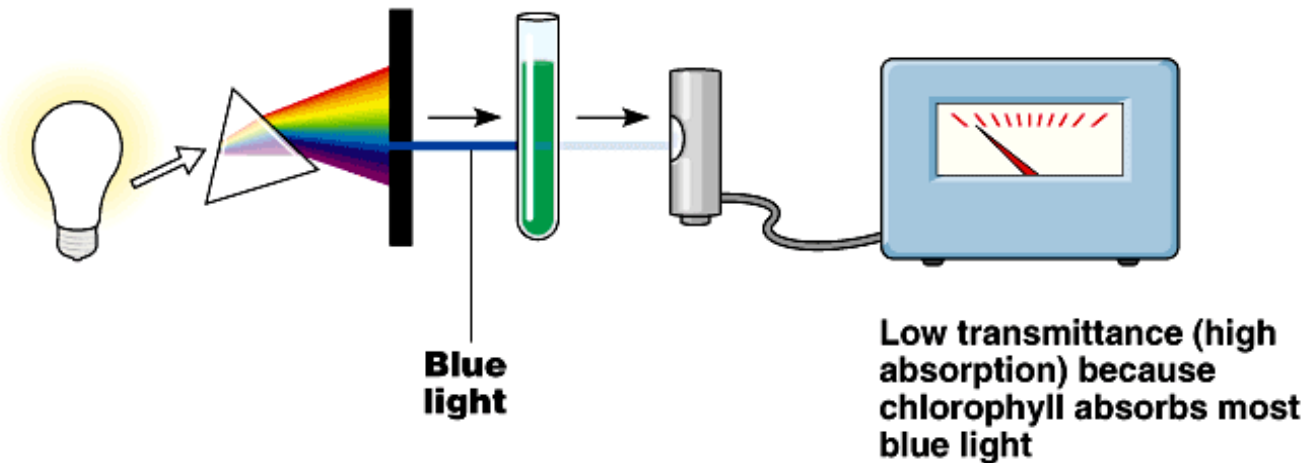
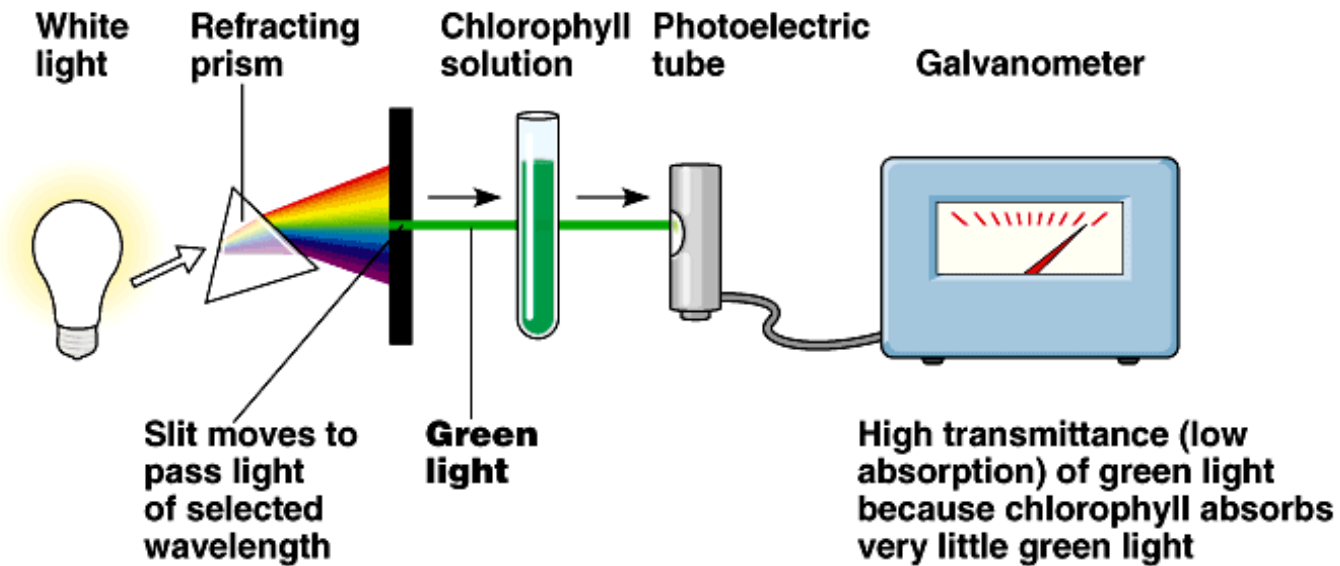


# Electromagnetic Spectrum

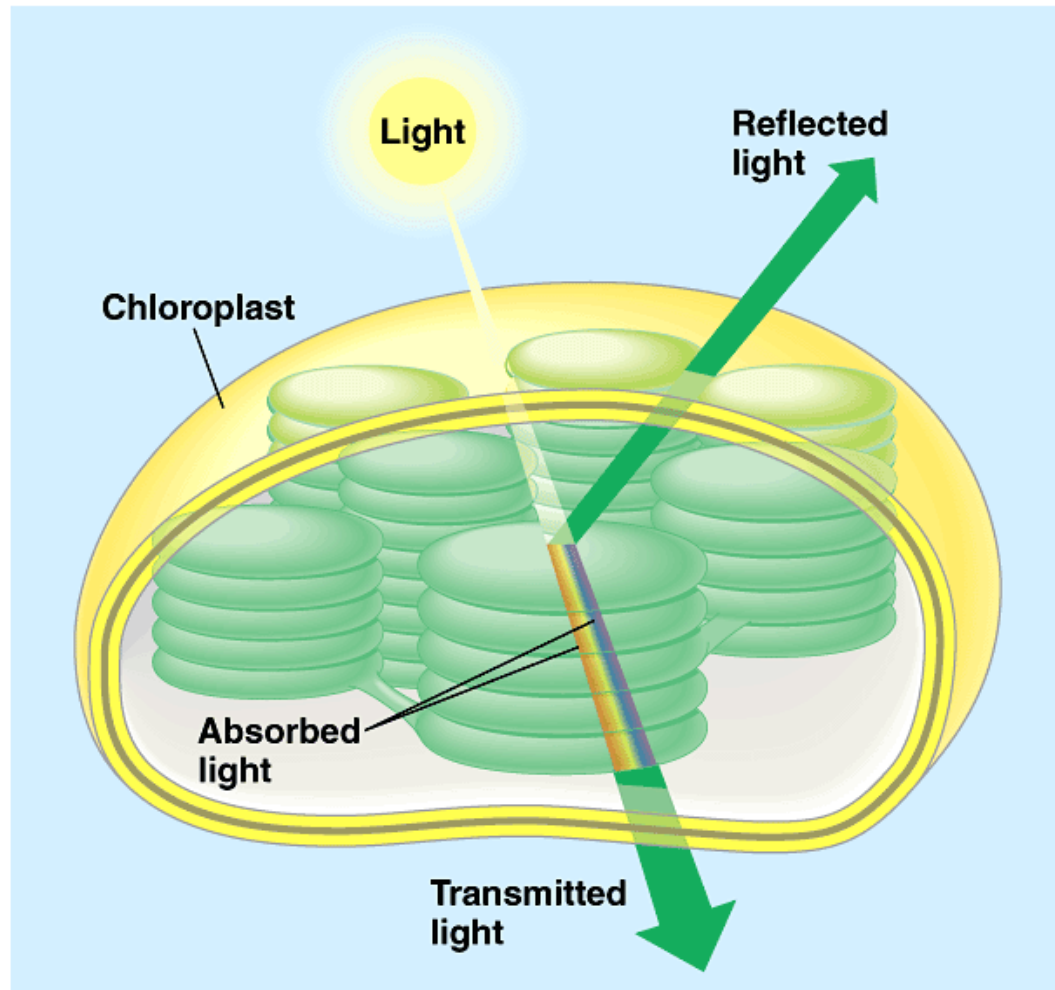
*which contains light waves*



Chlorophyll absorbs the **blue** but reflects the **green**.



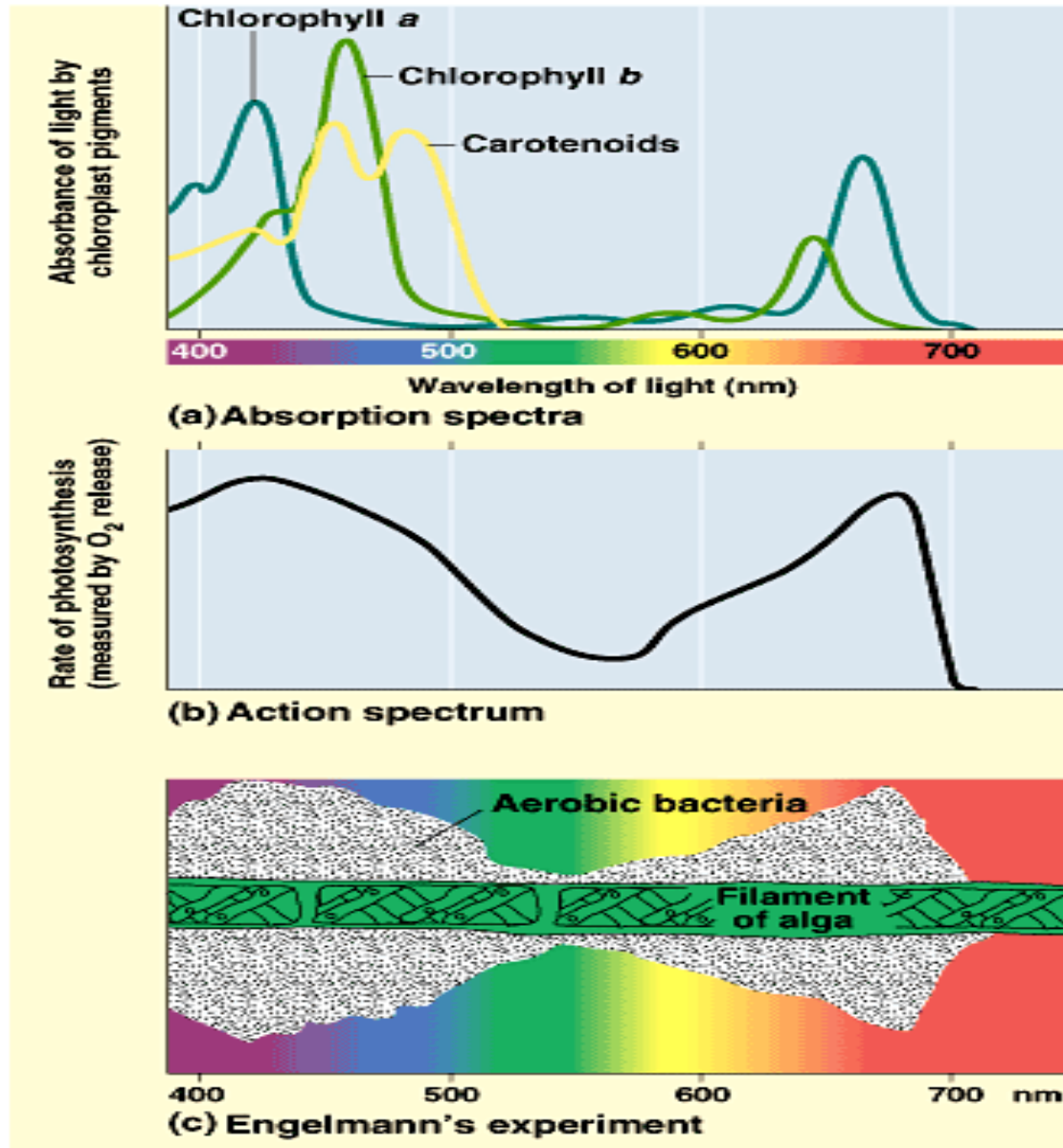
# Absorption vs. Reflection



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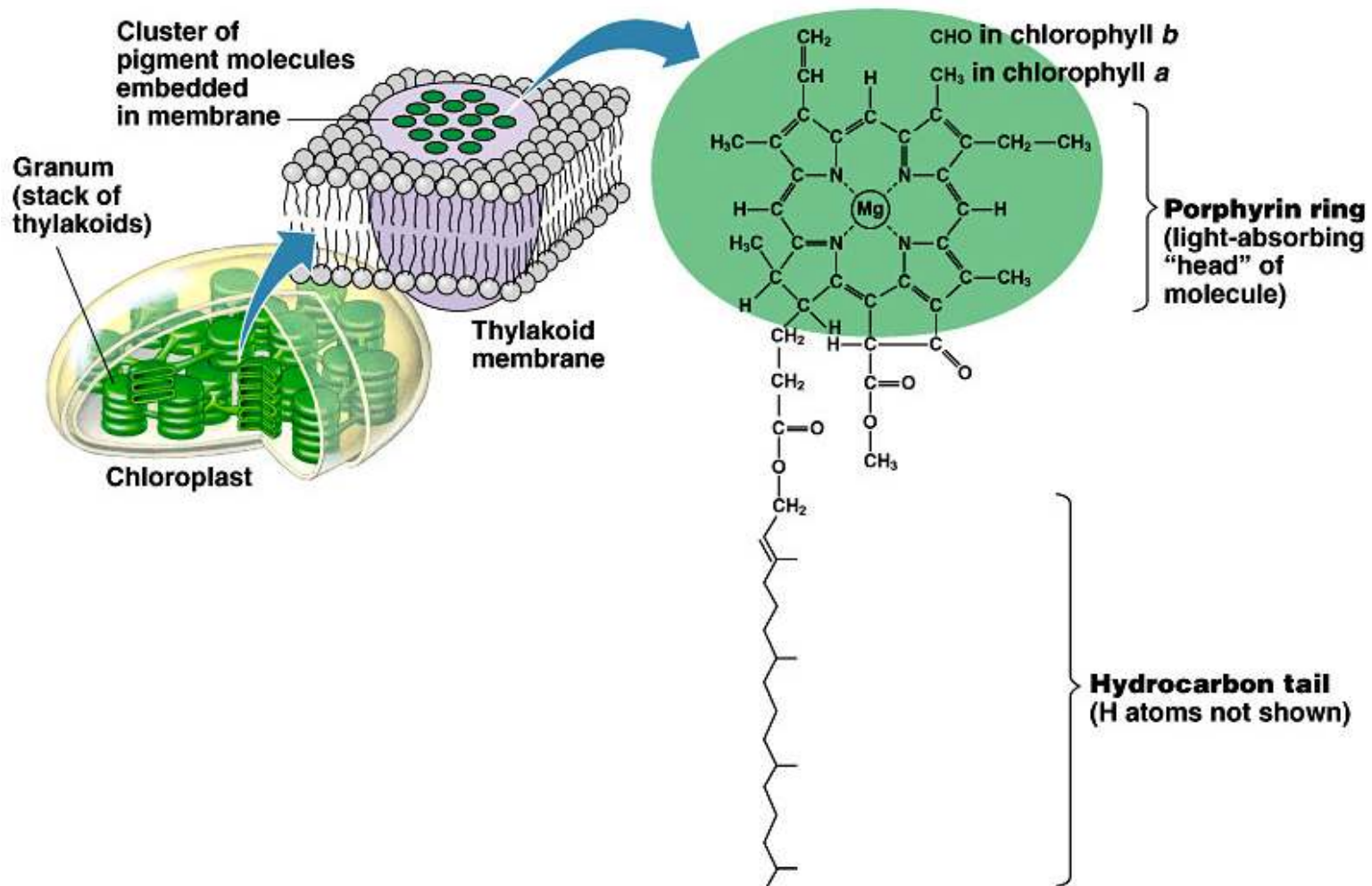


# Absorption = Action (work being done)

















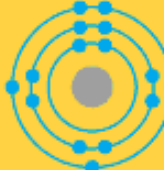
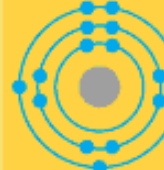
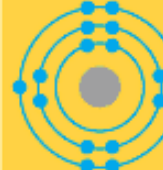
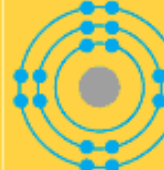
Chlorophyll Molecule contain Mg in the center  
(How many electrons are in Mg's outer shell?)

Hint: Look at the Periodic Table.



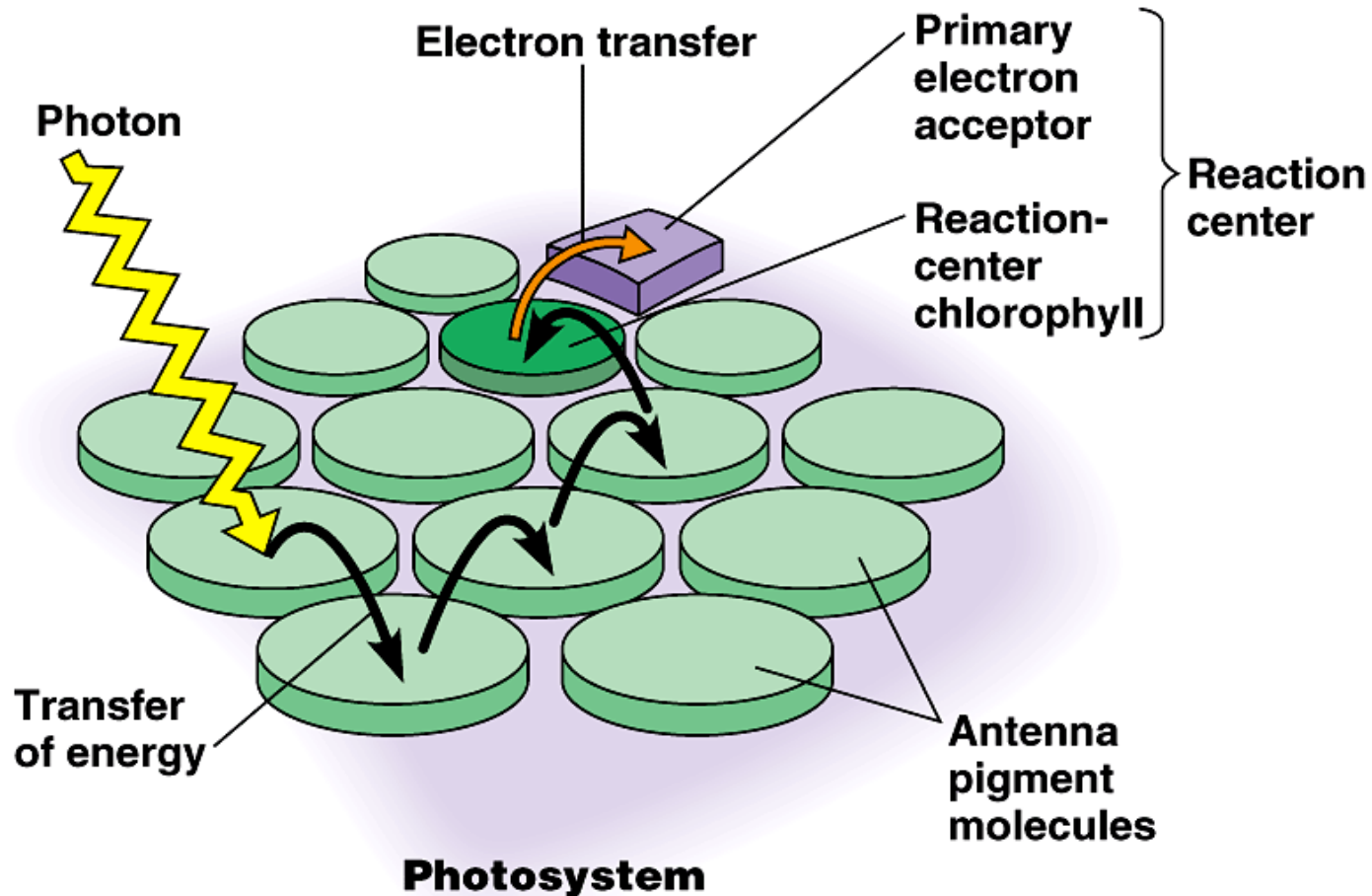
Answer: 2

Those 2 electrons will leave Mg and enter into the Electron Transport Chain.

<b>First shell</b>	<b>Hydrogen</b> ${}_1\text{H}$ 							<b>Helium</b> ${}_2\text{He}$ 
<b>Second shell</b>	<b>Lithium</b> ${}_3\text{Li}$ 	<b>Beryllium</b> ${}_4\text{Be}$ 	<b>Boron</b> ${}_5\text{B}$ 	<b>Carbon</b> ${}_6\text{C}$ 	<b>Nitrogen</b> ${}_7\text{N}$ 	<b>Oxygen</b> ${}_8\text{O}$ 	<b>Fluorine</b> ${}_9\text{F}$ 	<b>Neon</b> ${}_{10}\text{Ne}$ 
<b>Third shell</b>	<b>Sodium</b> ${}_{11}\text{Na}$ 	<b>Magnesium</b> ${}_{12}\text{Mg}$ 	<b>Aluminum</b> ${}_{13}\text{Al}$ 	<b>Silicon</b> ${}_{14}\text{Si}$ 	<b>Phosphorus</b> ${}_{15}\text{P}$ 	<b>Sulfur</b> ${}_{16}\text{S}$ 	<b>Chlorine</b> ${}_{17}\text{Cl}$ 	<b>Argon</b> ${}_{18}\text{Ar}$ 

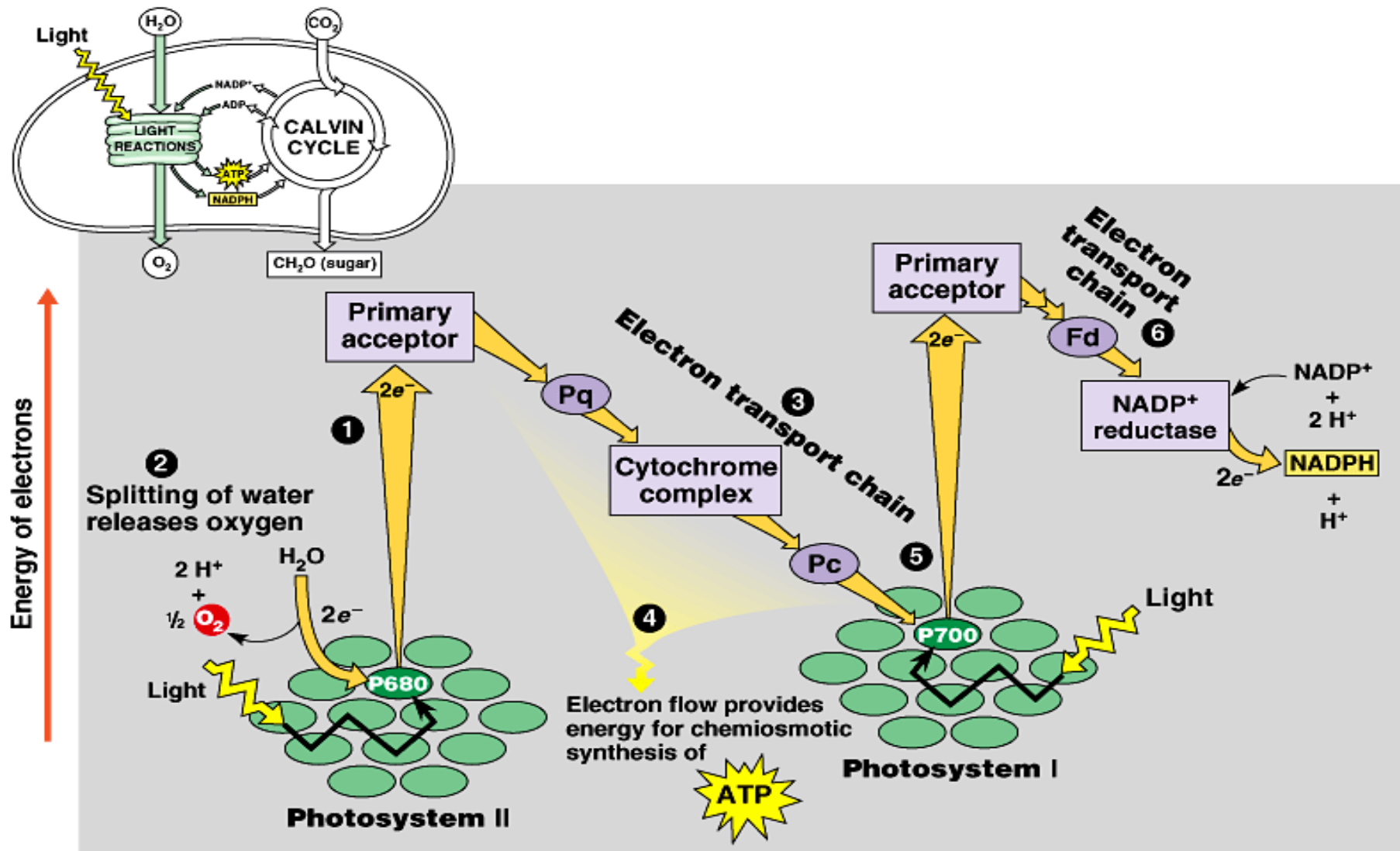
Photosystem and **collecting sunlight energy** and **funneling it into the Mg of Chlorophyll A.**

(Remember, excited electrons can “jump” away from the atom.)



# Photosystems 1 and 2

Excited electrons “jumping” away into the Electron Transport Chain 2 at a time.

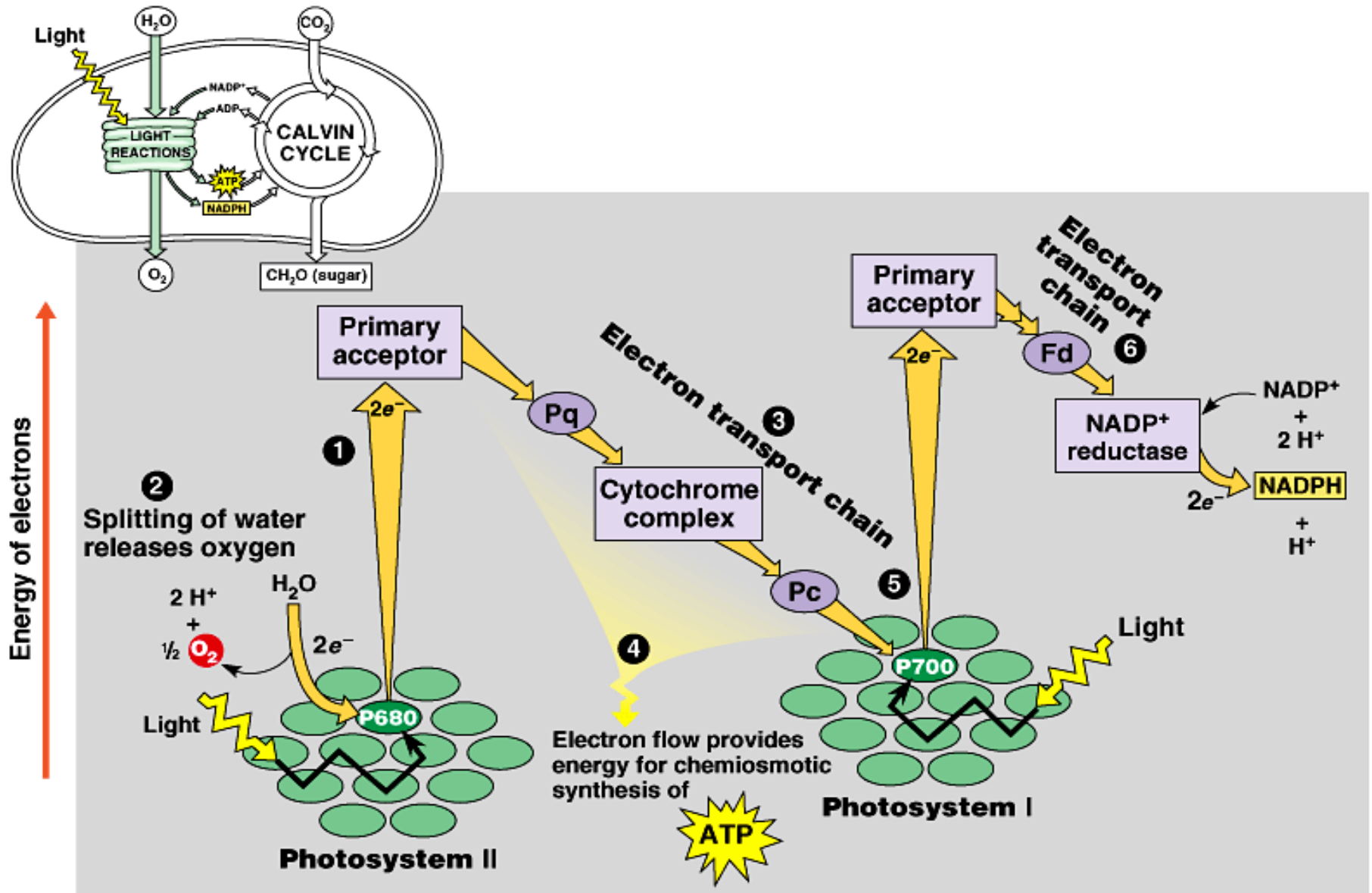


# Pre – AP Biology

Photosynthesis 3.1

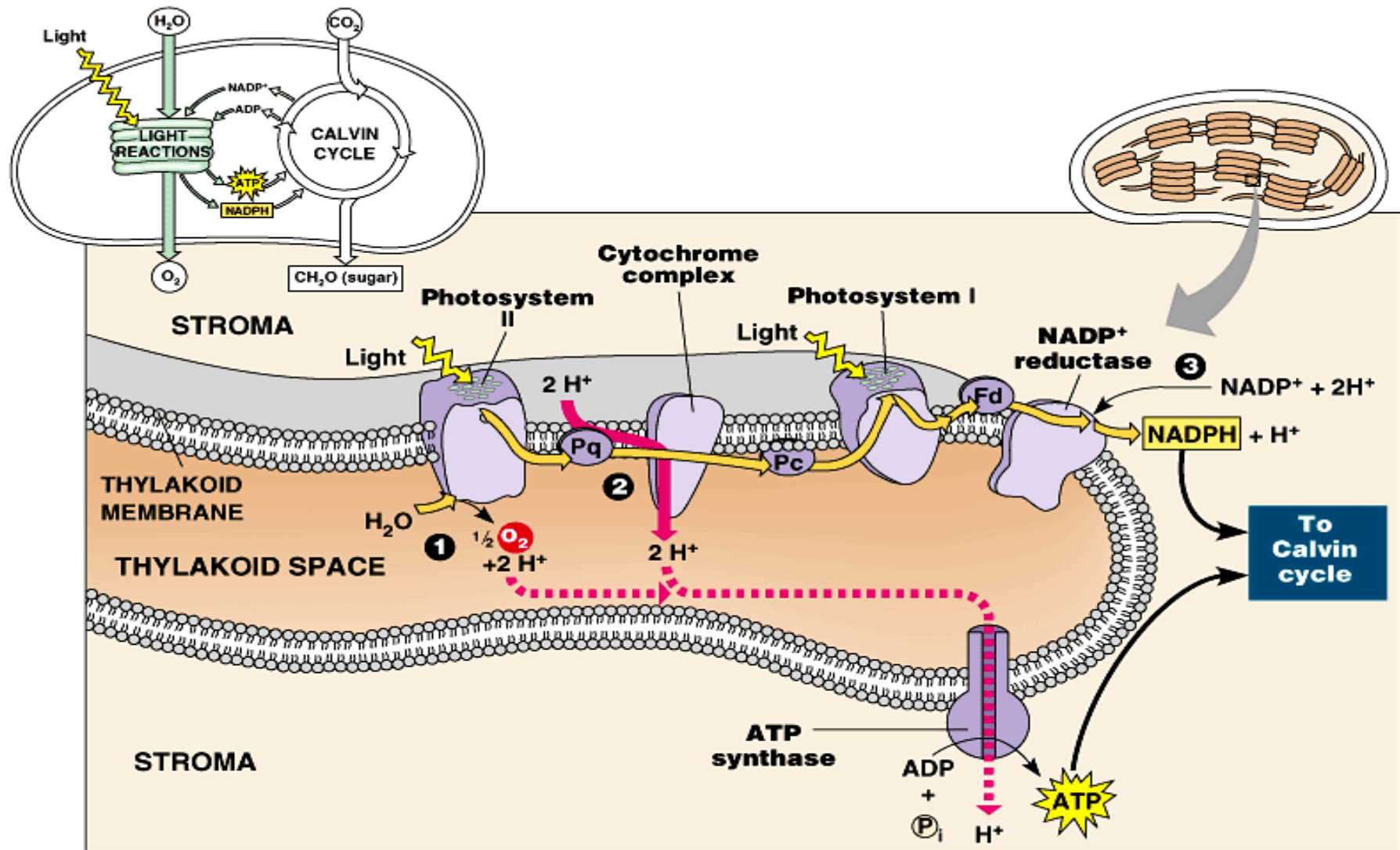
Part 2

# Light Reaction of Photosynthesis



# Where it is occurring?

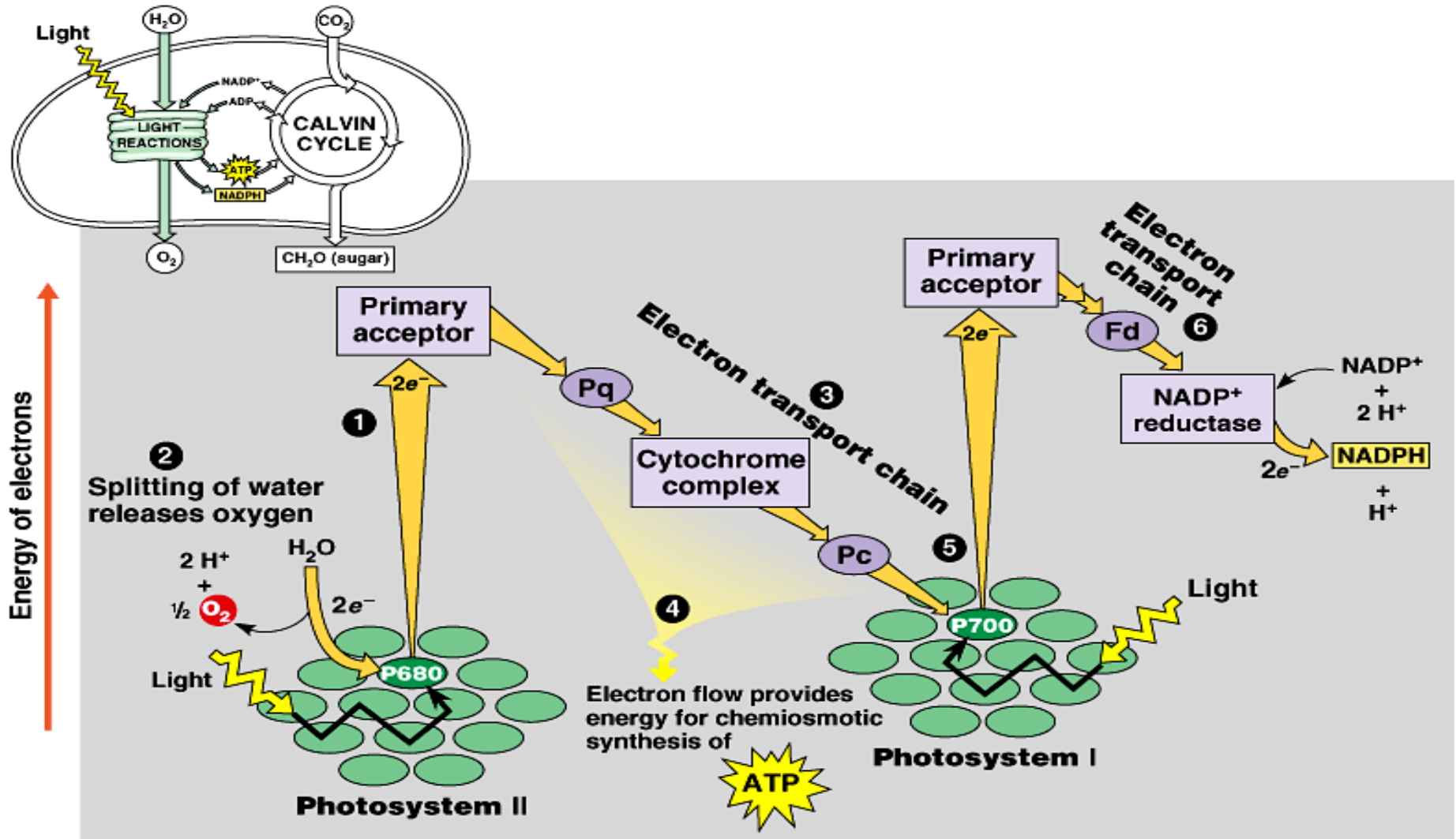
On the *inner* Thylakoid membrane where the photosystems are located.



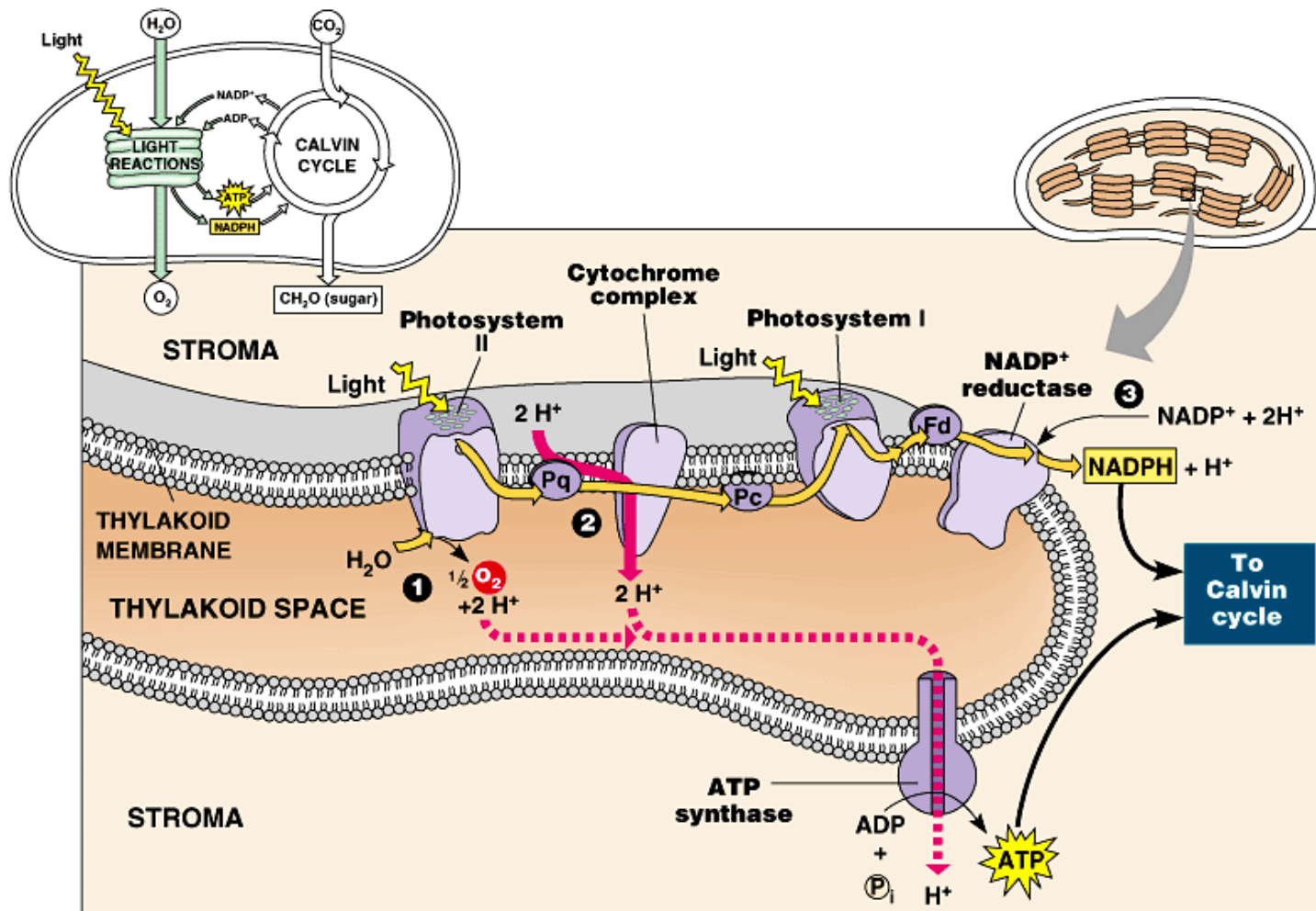


# Non-cyclic electron flow

Water splits to release 2 electrons This *replaces* the 2 electrons *lost* by the Mg of the photosystem.

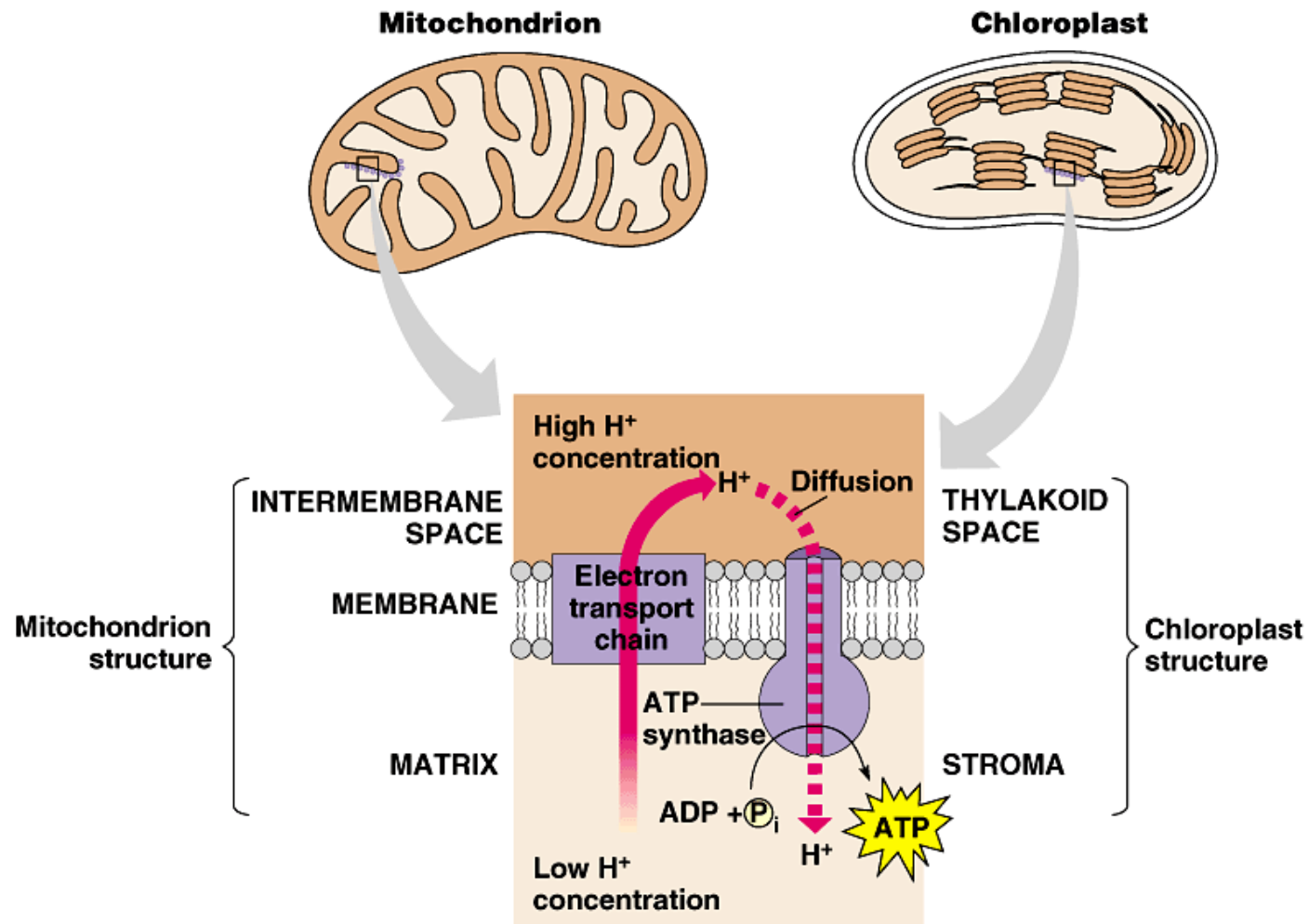


See the protons ( $H^+$ ) being **actively pumped** into the **Thylakoid**.



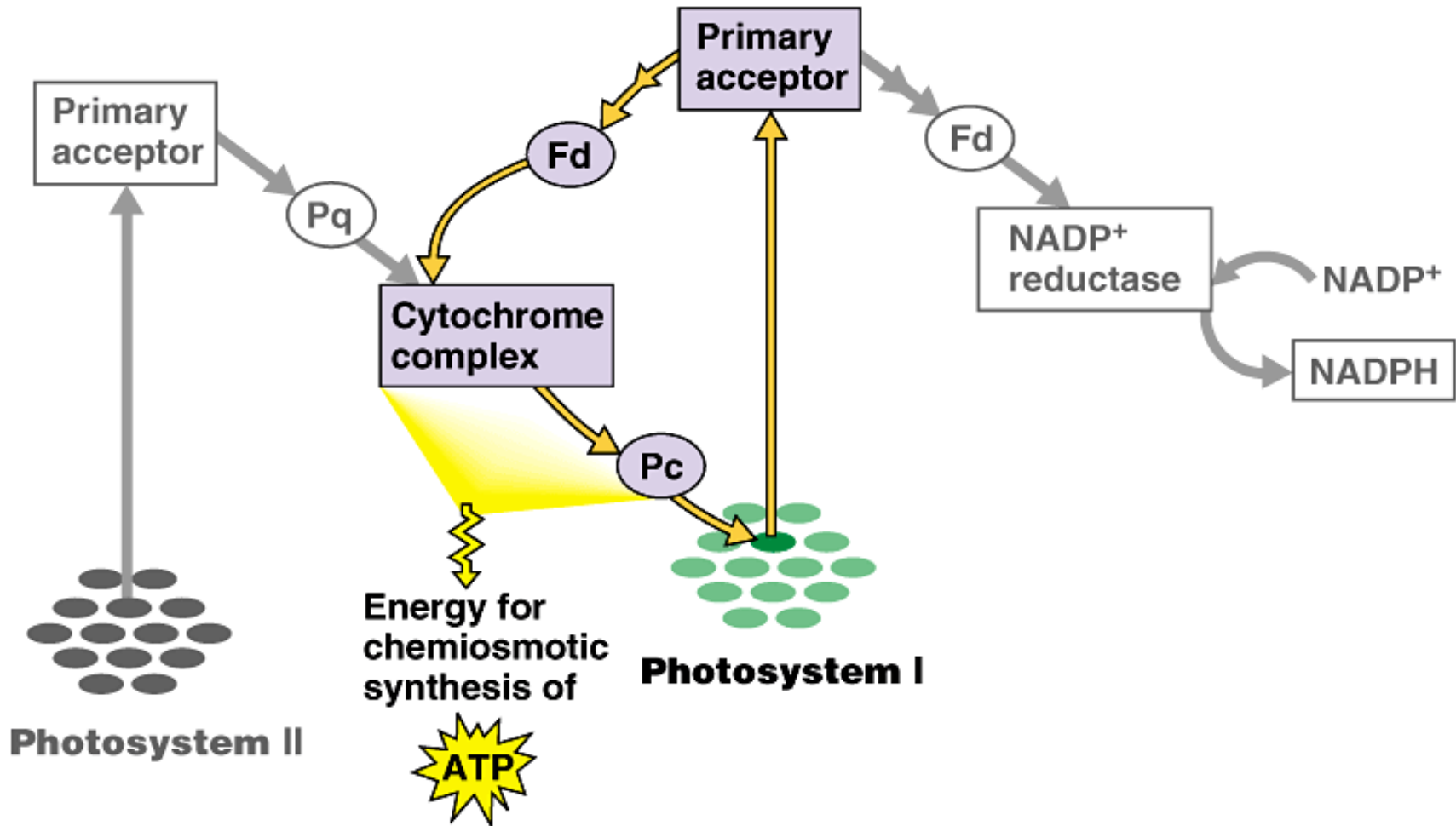
Pumping the  $H^+$  (protons) into a **confined** space to **build up** *potential* energy.

See the similarity in structure and function?

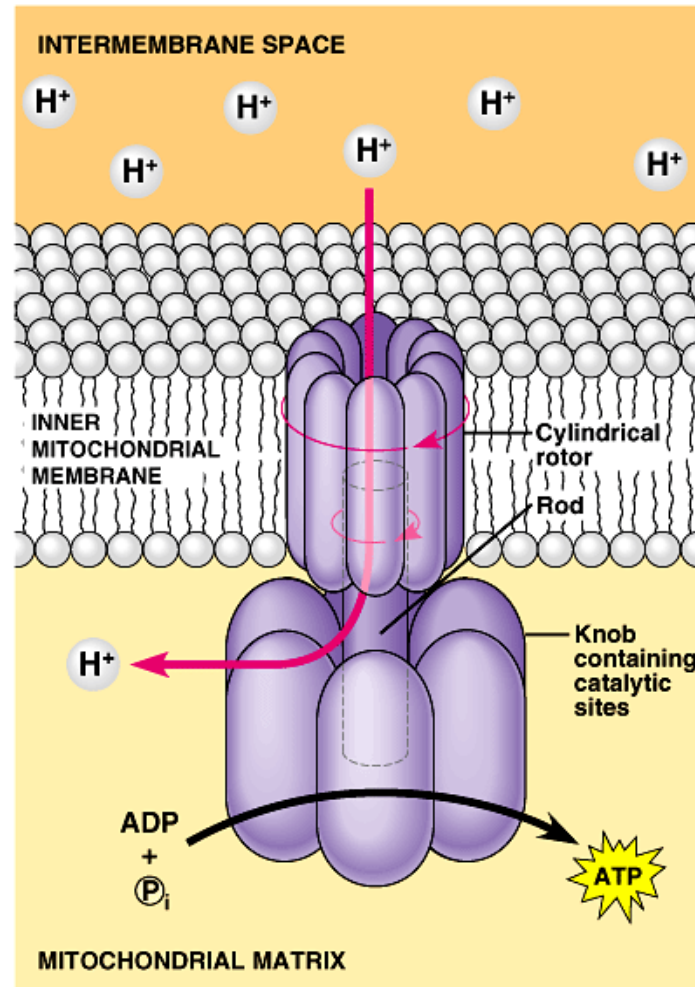


# Cyclic electron flow

Electrons *start* and *finish* at the *same point*.



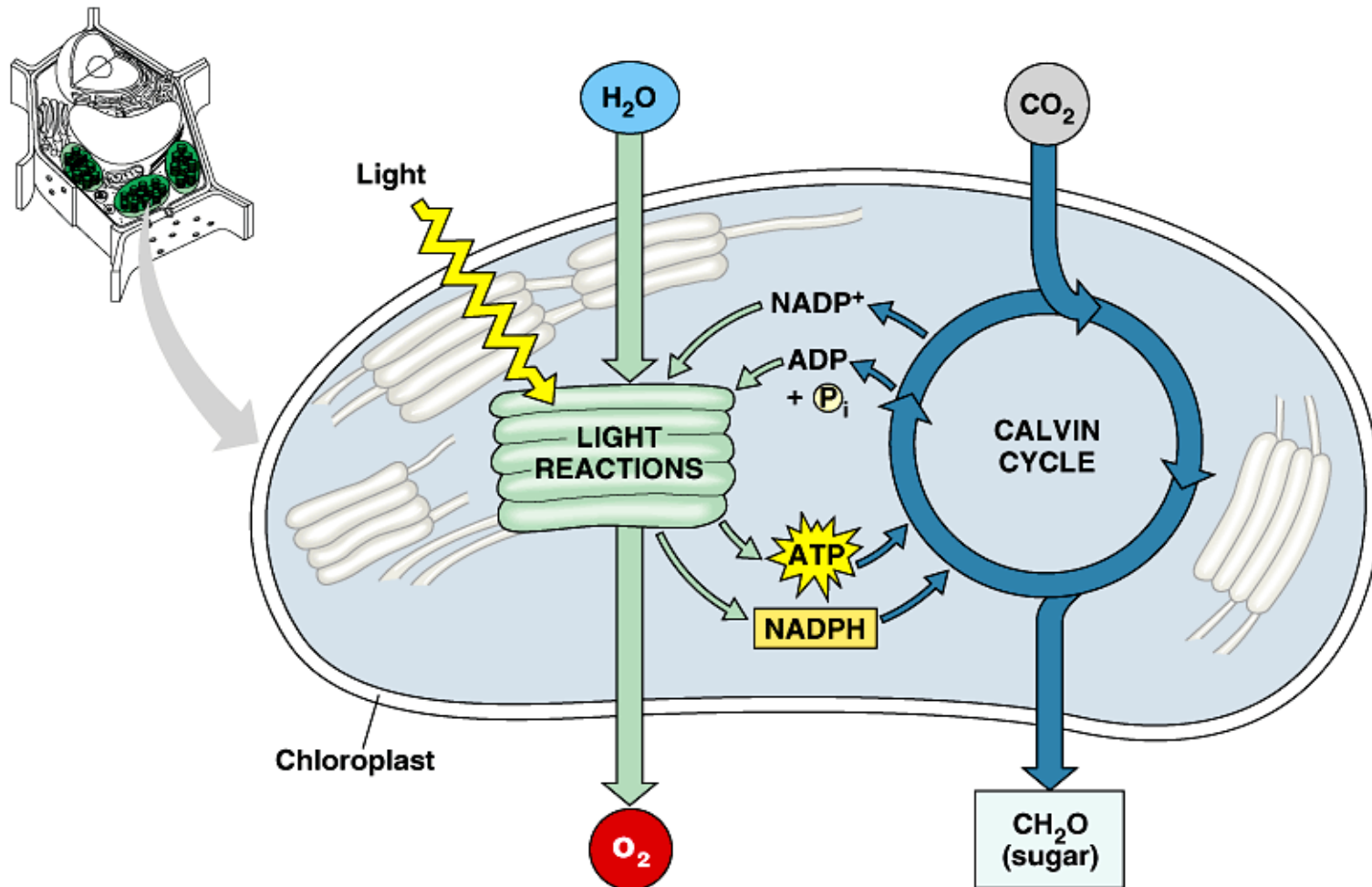
Turning **potential** energy into **kinetic** energy to power **ATP production** by **phosphorylation**



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# Photosynthesis (Calvin Cycle)

Using the *batteries* to power the *making* of sugar



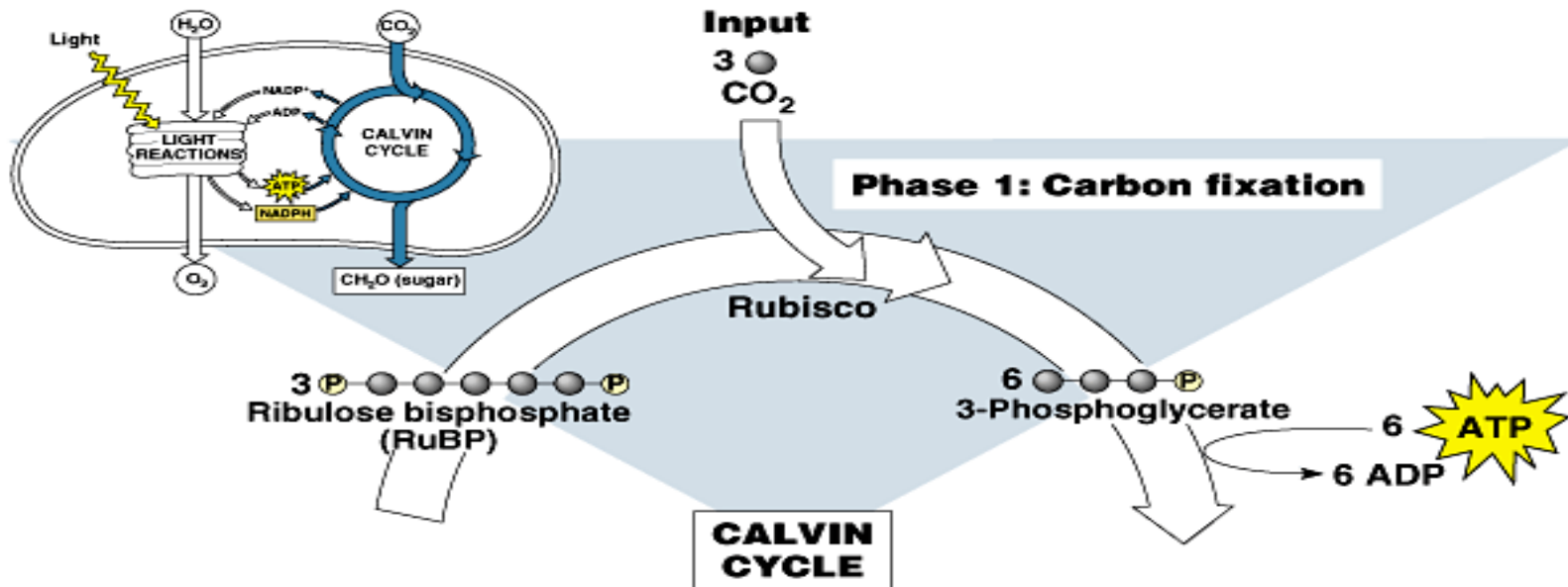
# Pre – AP Biology

Photosynthesis 3.1

Part 3

# Calvin Cycle Part 1

Bringing in the  $\text{CO}_2$  to begin making sugar

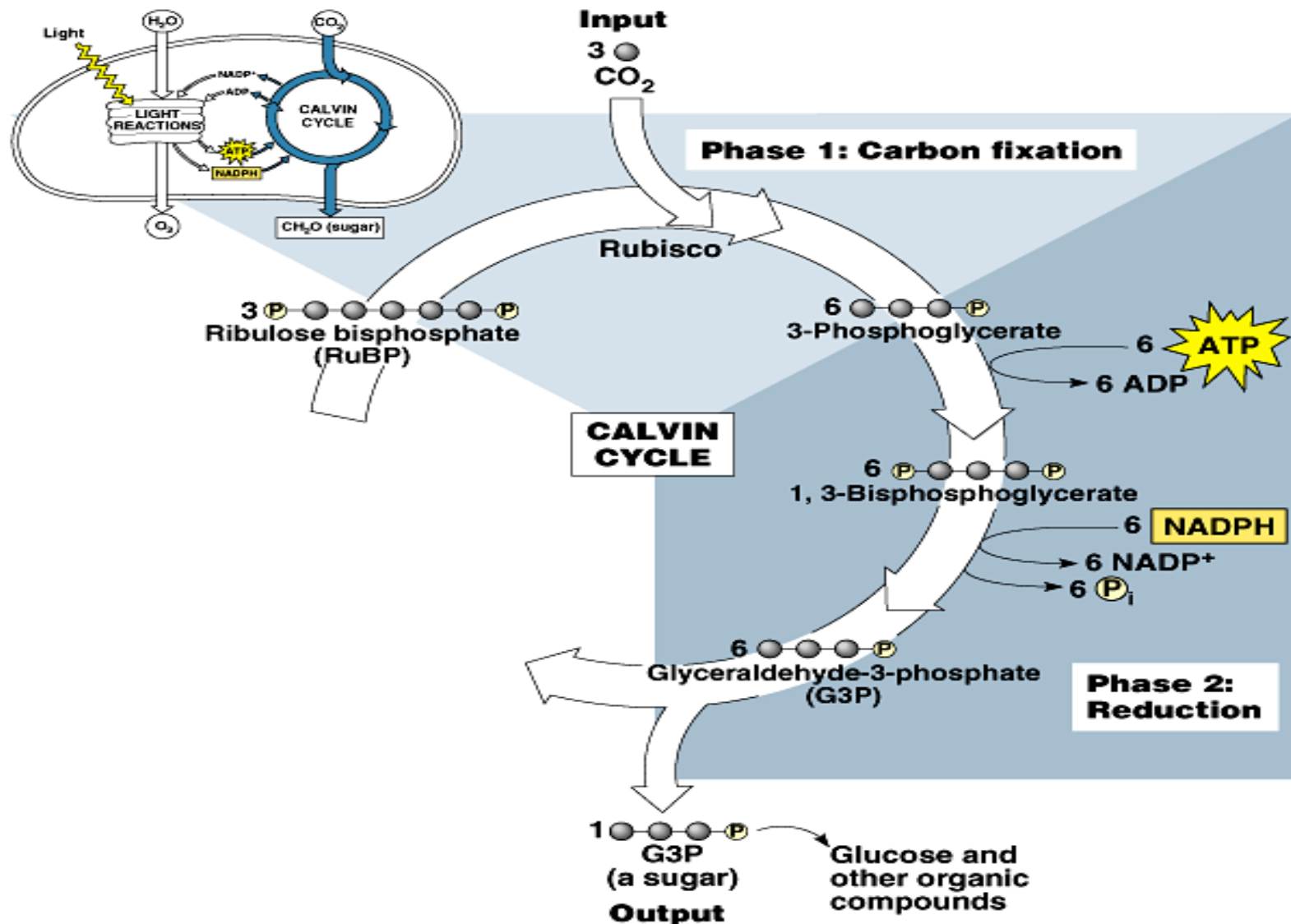




# Calvin Cycle Step 2:

Using or batteries to make G3Ps

Take 1 G3P to build a sugar molecule.



# Calvin Cycle step 3:

*Recycle remaining G3Ps back to RuBP to start again.*

*Cycles goes around twice to make 1 sugar molecule.*

