LEAF → Plant Cell → Chloroplast

SITE OF CALVIN CYCLE (LIGHT INDEPENDENT RXN)

Liquid

Strong

GRANUM - Stack of Thylakoids

Chlorophyll light absorbing pigment on T.M.

Thylakoid
- Site of Light Rxn (LIGHT DEPENDENT RXN)

Photosynthesis

Photosynthesis is a process by which green plants and certain bacteria use the energy from the Sun to convert carbon dioxide and water into the simple sugar **glucose** ($C_6H_{12}O_6$) and **oxygen**. Plants and animals use glucose as a source of **energy** for all life processes.

The process of photosynthesis begins in the leaves where light energy is absorbed by the green pigment **chlorophyll**. Chlorophyll is found within a plant cell organelle called the **chloroplast**.

During the **second stage** of photosynthesis, the captured light energy is used to convert **carbon dioxide** and **water** into **glucose** and **oxygen**.

$$6\,CO_2 \text{ carbon dioxide} + 6\,H_2O \text{ water} \xrightarrow[\text{chlorophyll}]{\text{light energy}} C_6H_{12}O_6 \text{ glucose} + 6\,O_2 \text{ oxygen}$$

water
glucose
carbon dioxide

1 Chloroplasts capture light energy.

2 Water enters the leaf.

3 Carbon dioxide enters the leaf through tiny pores called stomata. (Oxygen produced leaves the leaf through the stomata also.)

4 Using the captured light energy, glucose and oxygen are produced inside the chloroplasts through a complex series of chemical reactions.

5 Sugar leaves the leaf.

GLUCOSE

WATER

epidermis

chloroplast

guard cells

spongy cells

leaf vein

stoma

nucleus

stoma

Leaves

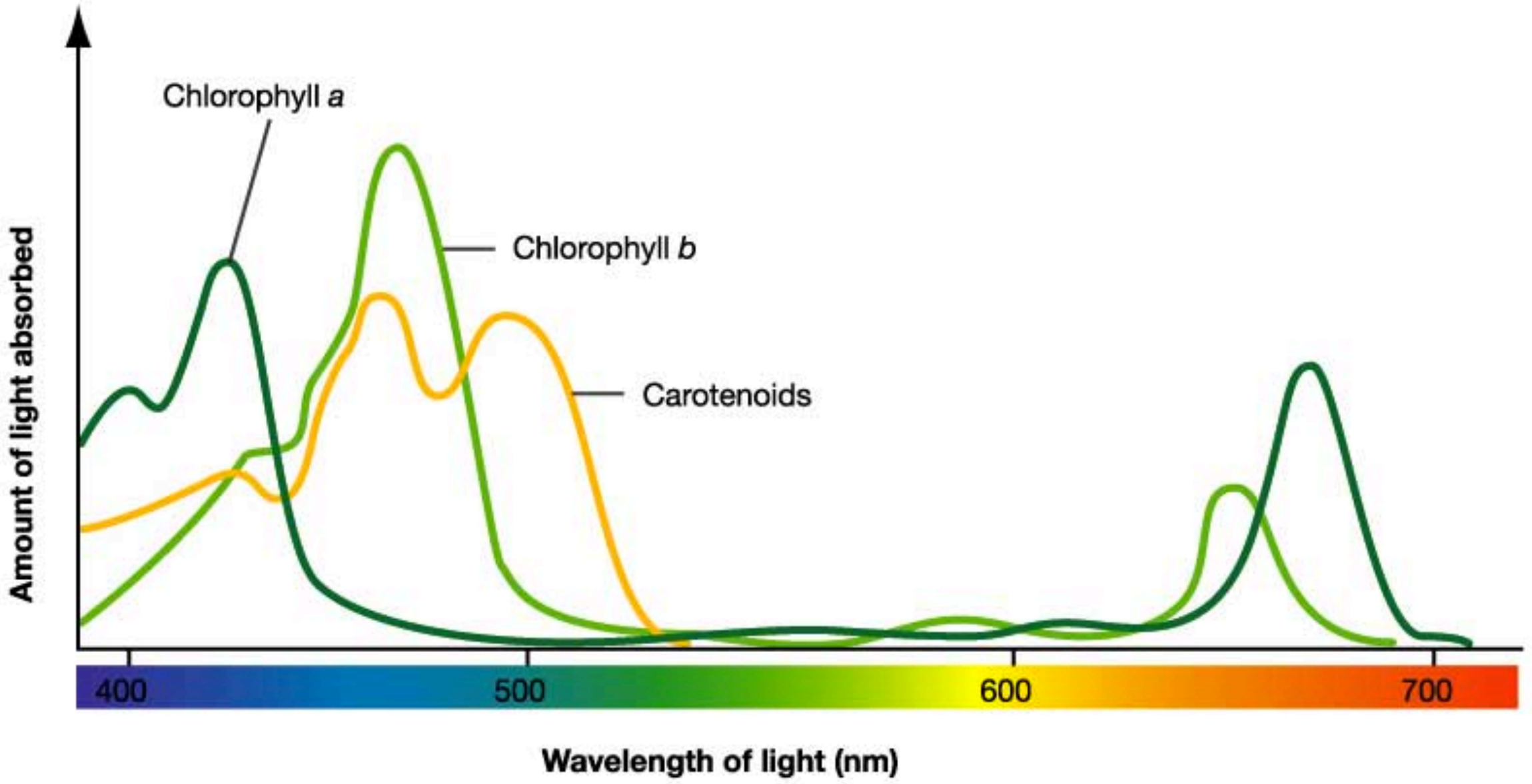
A leaf is made of many layers that are sandwiched between two layers of tough skin cells called the **epidermis**. These layers provide protection for the leaf from insects and other pests. Leaves have tiny pores called **stomates** which allow water and gases to pass in and out of the plant.

3. Chlorophyll can absorb very well in R, O, Y, BV

Chlorophyll a + b → reflects green

Beta carotene & XANTHOPHYLL → Support

Carotenoids


Chlorophyll *a*
Chlorophyll *b*
Carotenoids
Amount of light absorbed
400
500
600
700
Wavelength of light (nm)

2.

H^+

2. CARRIED BY NADPH TO L. I. RXN

e^-

PS II

THYLAKOID

1. CREATE CONC. GRAD H^+ — TO MAKE ATP

e^- REPLACING e^- LOST BY PS II (chlorophyll)

O_2 - RELEASED TO ATMOSPHERE BY PRODUCT

H_2O

O_2

4| E.T.C. SERIES OF PROTEIN THAT CARRY e^- ALONG THYLAKOID MEMBRANE.

→ PROVIDE ENERGY TO BUILD CONC. OF H^+ (TO MAKE ATP)

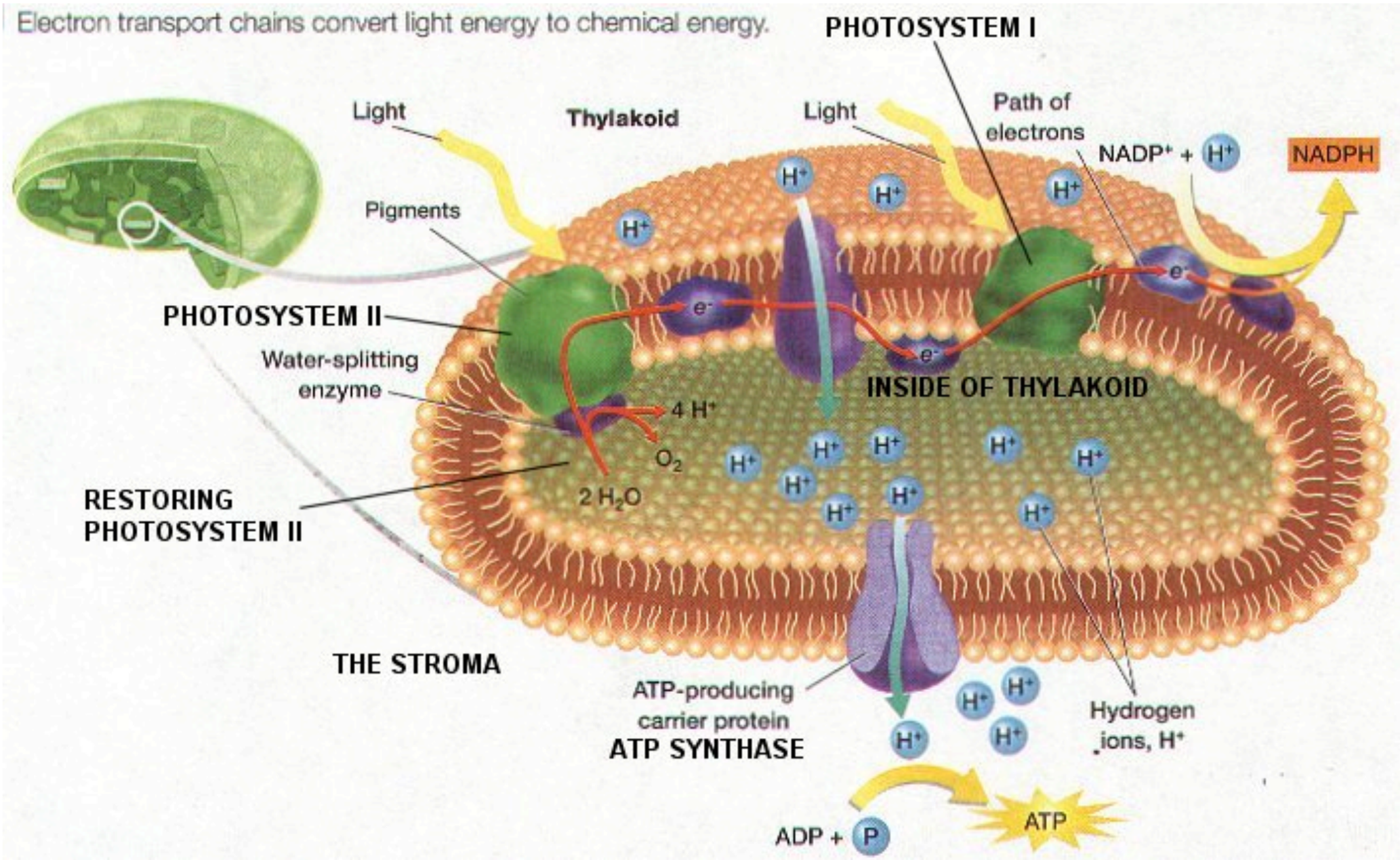
5] e^- From E.T.C. Will Be Picked Up By NADP+

NADPH Delivers H^+ & e^- To L.I. Rxn.

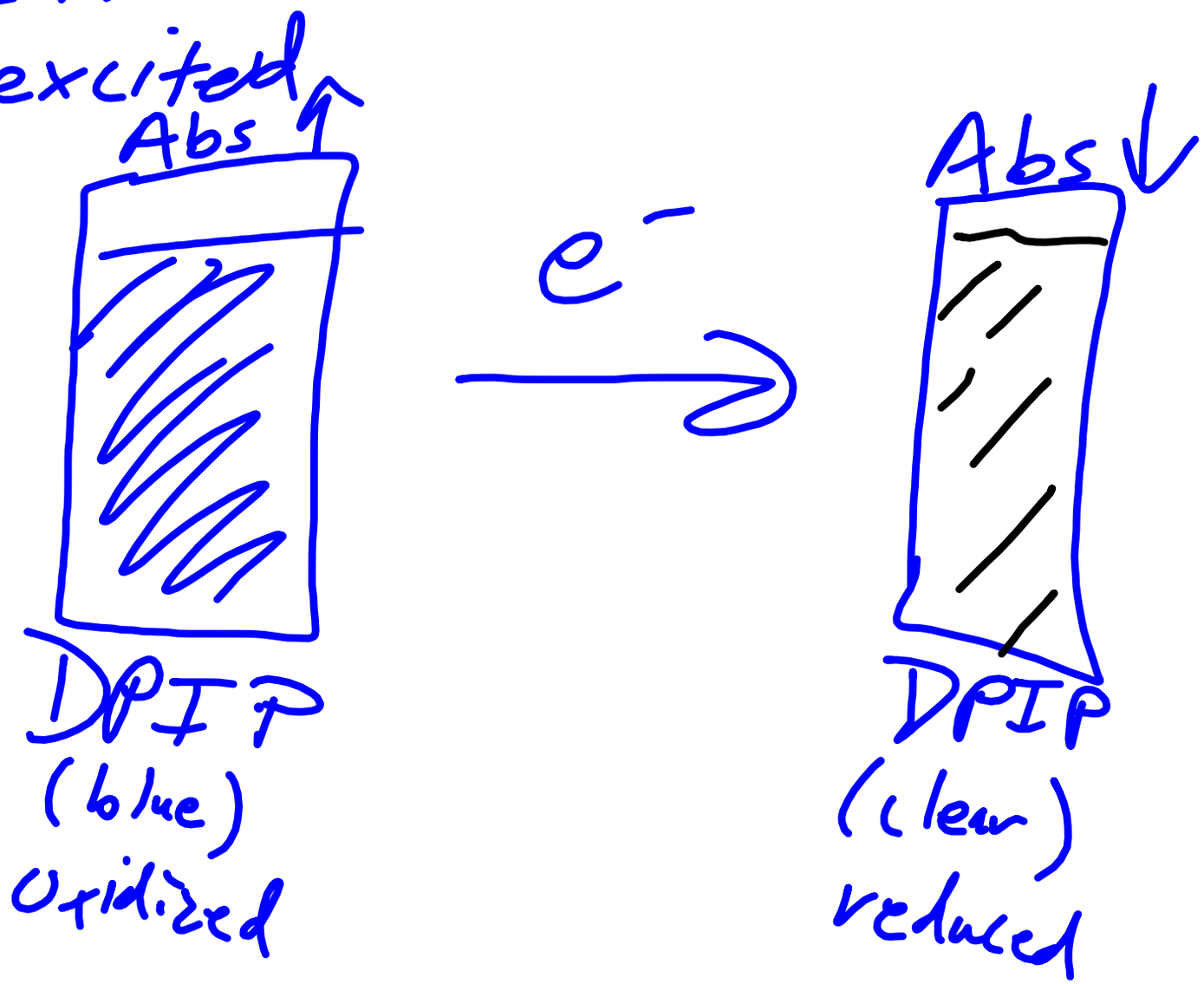
NADP+ $\xrightarrow[H+]{e^-}$ NADPH

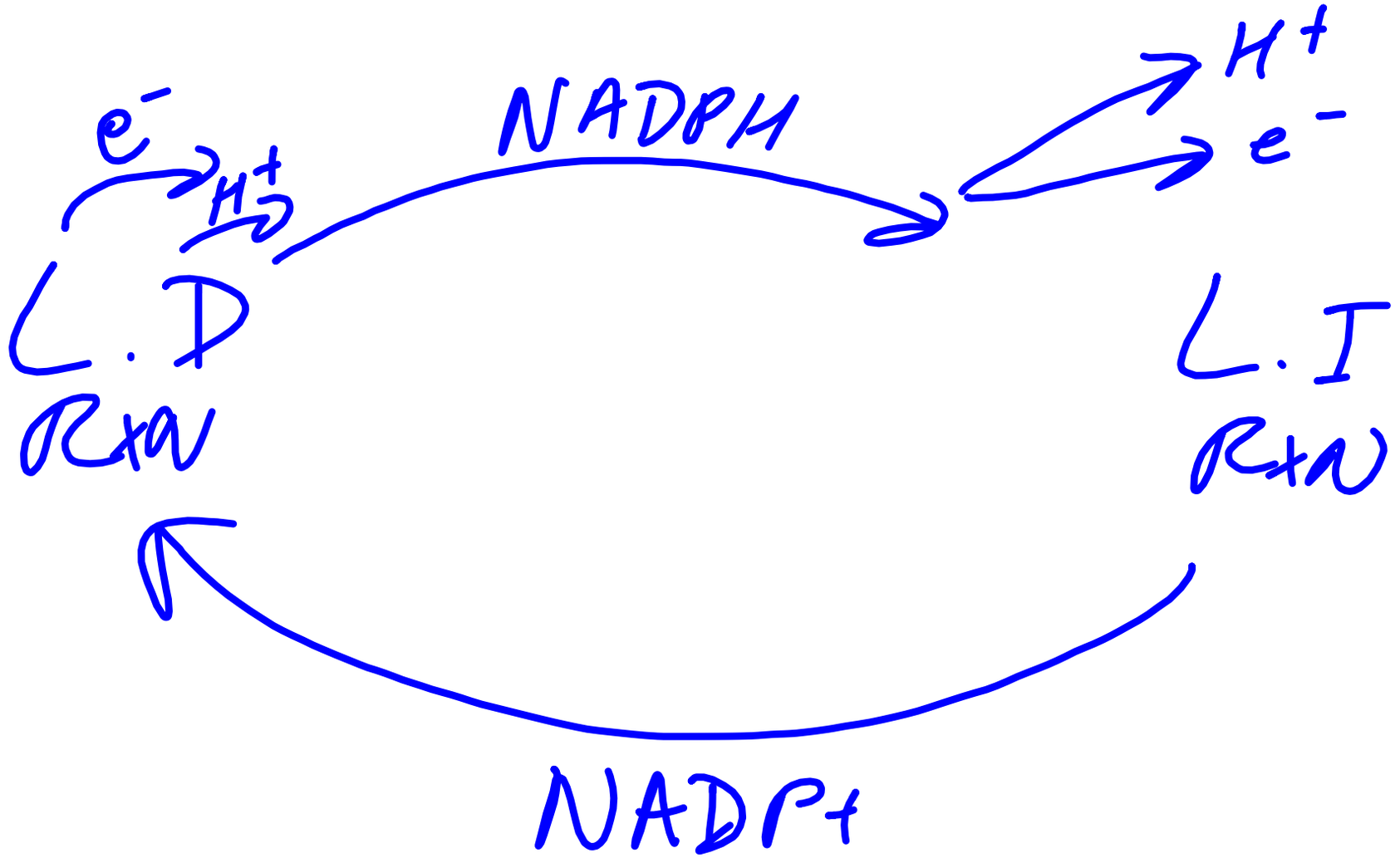
e- acceptor (oxidized)

e- carrier (reduced)


Electron transport chains convert light energy to chemical energy.
PHOTOSYSTEM I
Light
Thylakoid
Light
Path of electrons
NADP+ + H+
NADPH
Pigments
PHOTOSYSTEM II
Water-splitting enzyme
INSIDE OF THYLAKOID
4 H+
O2
2 H2O
RESTORING PHOTOSYSTEM II
THE STROMA
ATP-producing carrier protein
ATP SYNTHASE
Hydrogen ions, H+
ADP + P
ATP

DPIP Turned Clear As e^- Were excited




e⁻
H⁺
NADPH
H⁺
e⁻
L.D
Rxn
L.I
Rxn
NADP+

DPIP PLAYED THE ROLE OF NADP+ IN THIS LAB

SO WE COULD MONITOR RATE OF PHOTOSYN.

PREDICT BEST RATE

.049 abs/min WHITE – 3 → small green light was reflected

.0513 abs/min BLUE – 2 RANK

.0548 abs/min Red – 1

.0418 abs/min Green – 4 → Chlorophyll reflect green light; other pigments.

.00196 abs/min Ambient

↓

DARK

As e^- were excited DPIP Accepted e^-. THE MORE- DPIP picked up, the clearer the solution. As the DPIP TURNED From BLUE to clear the absorbance readings decreased.

The greater decrease in absorbance; the greater the rate of photosynthesis.