

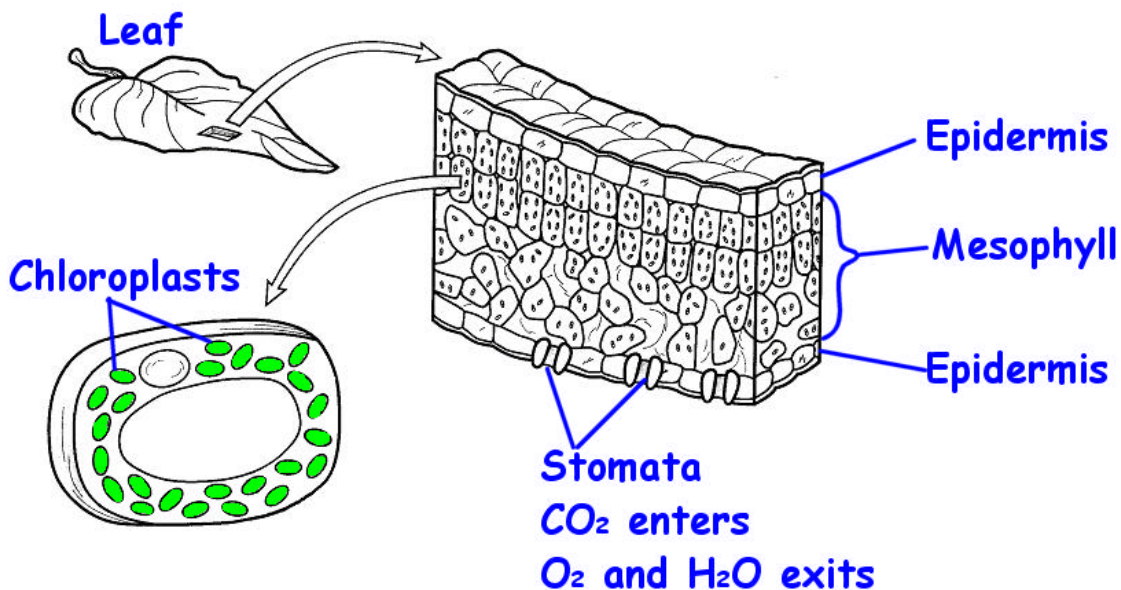
PHOTOSYNTHESIS

SUMMARY EQUATION



(emphasizes production of glucose 1 carbon at a time)

SITE OF PHOTOSYNTHESIS -- PLANTS



Water:

absorbed by roots

travels up the stem through the xylem

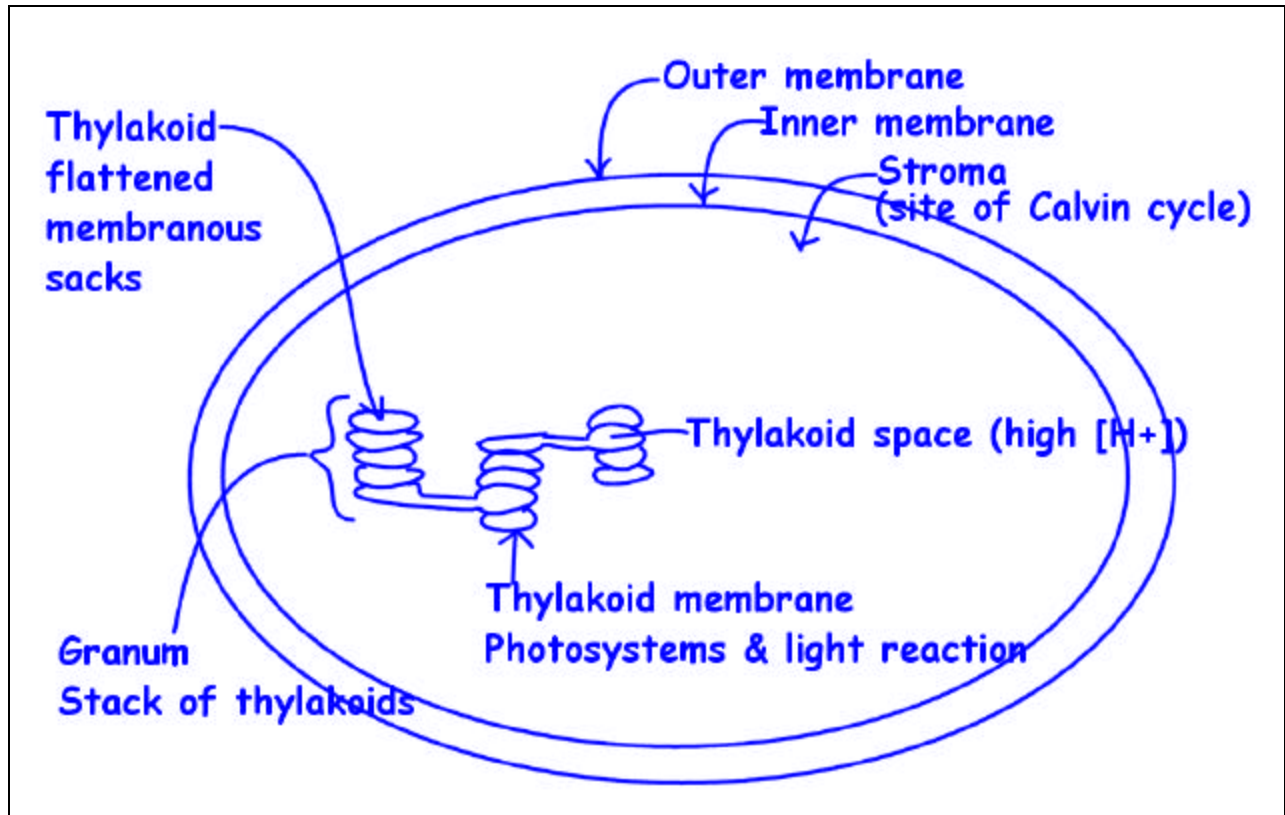
enters veins in leaf

SITE OF PHOTOSYNTHESIS – PROKARYOTES

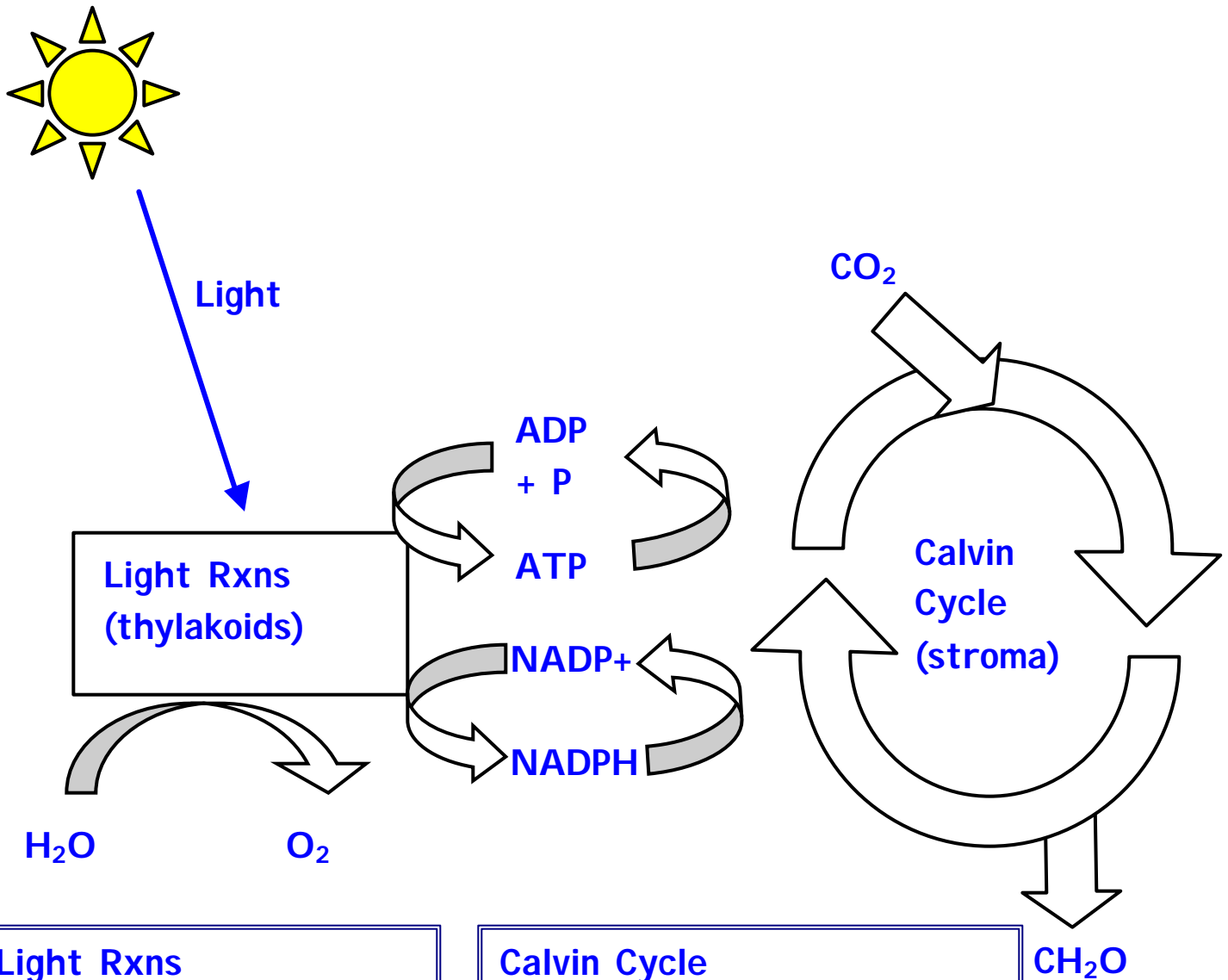
Lack chloroplasts

Chlorophyll built into plasma membrane

STRUCTURE OF CHLOROPLASTS



OVERVIEW OF PHOTOSYNTHESIS



Light Rxns

- Take e^- from H_2O
- Use light energy to boost e^- to higher energy level
- Use some energy to make ATP
- Add high energy e^- to $NADP^+$

Calvin Cycle

- AKA Dark Rxn
- Uses ATP produced in light rxn
- Takes high energy e^- from NADPH and adds them to CO_2
- Produces sugar 1 carbon at a time

PROBLEM – PHOTORESPIRATION

If $[O_2] > [CO_2]$ in leaves

Rubisco fixes O_2 instead of CO_2

5-C compound produced

5-C \rightarrow 1 PGA enters Calvin Cycle

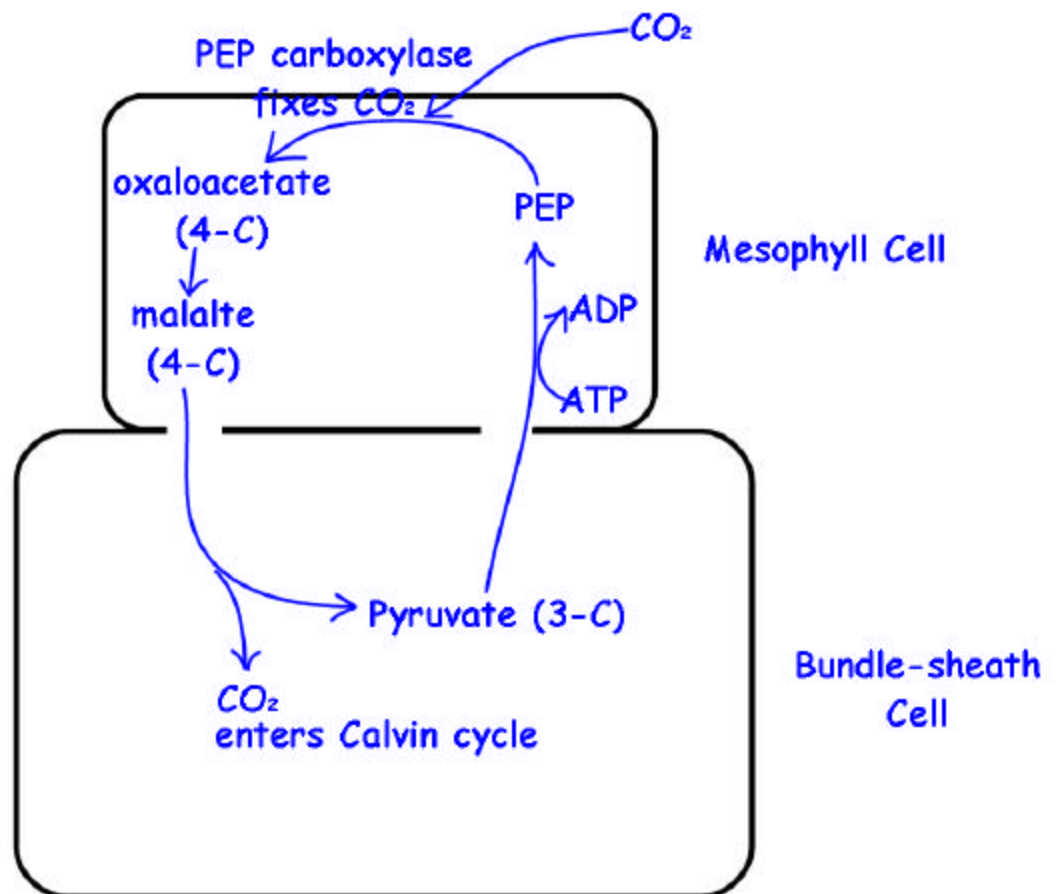
1 glycolate (2-C) exits chloroplasts and enters peroxisomes

Decreases productivity

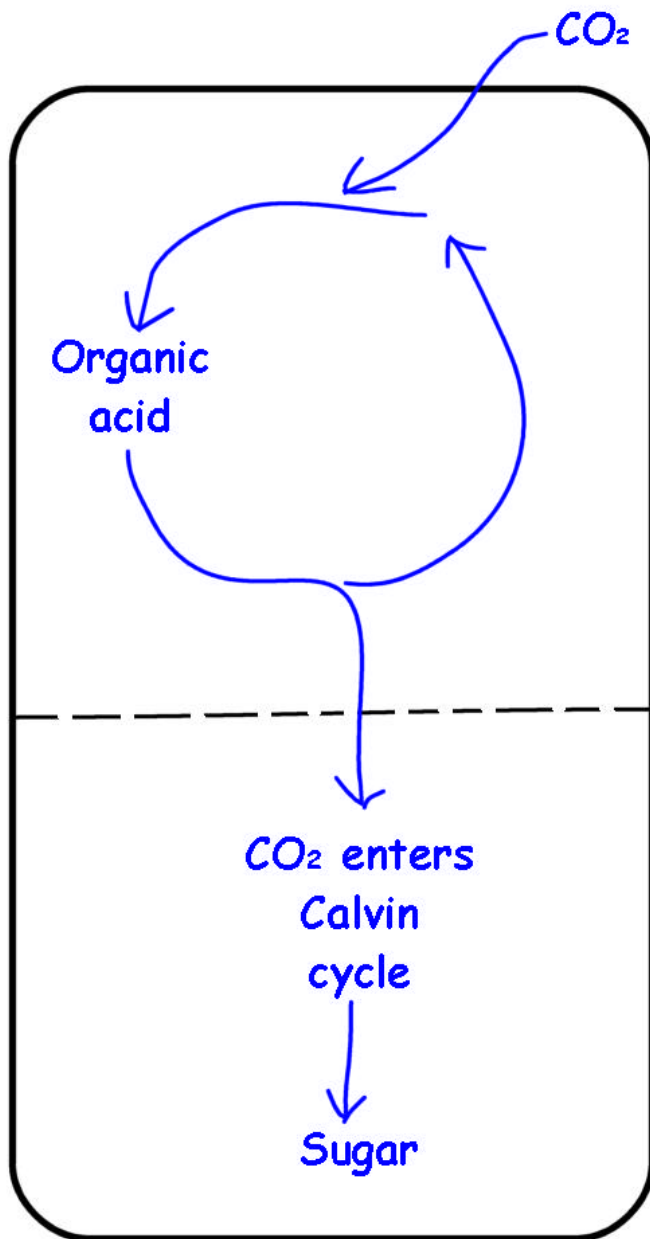
Fostered by hot, dry, bright days

C₄ PLANTS

- Fix CO_2 as 4-C compound
- Segregate CO_2 fixation from Calvin cycle
- Acts as CO_2 pump
- PEP carboxylase has lower affinity for O_2 than rubisco
- Adaptation in hot regions with intense light



CAM PLANTS Crassulacean Acid Metabolism



Night
stomata open
 CO_2 enters
Acid conc. increases

Day
stomata closed
Acid broken down
 CO_2 released