

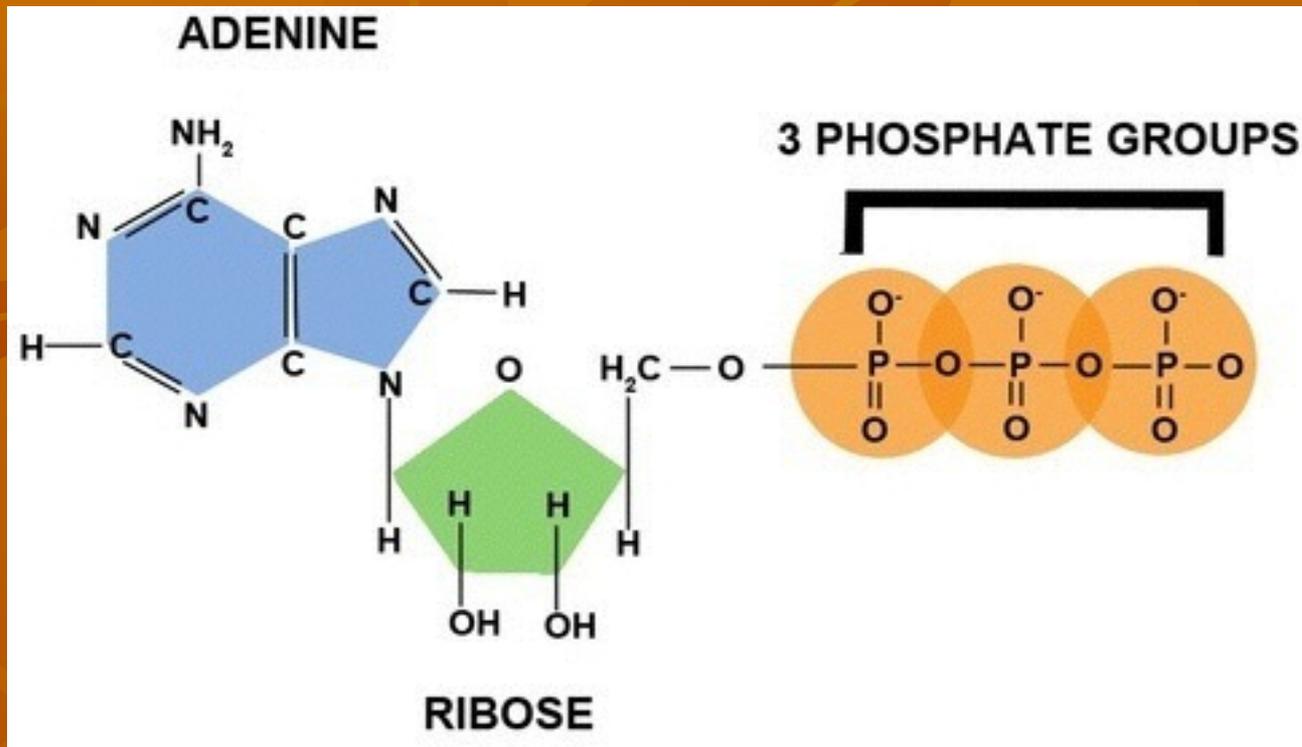
Chapter 8

Photosynthesis

Energy & Life

- All living must be able to obtain and use materials for energy
- Autotrophs are able to use light energy from the sun to make food
- Heterotrophs obtain energy from the foods they consume

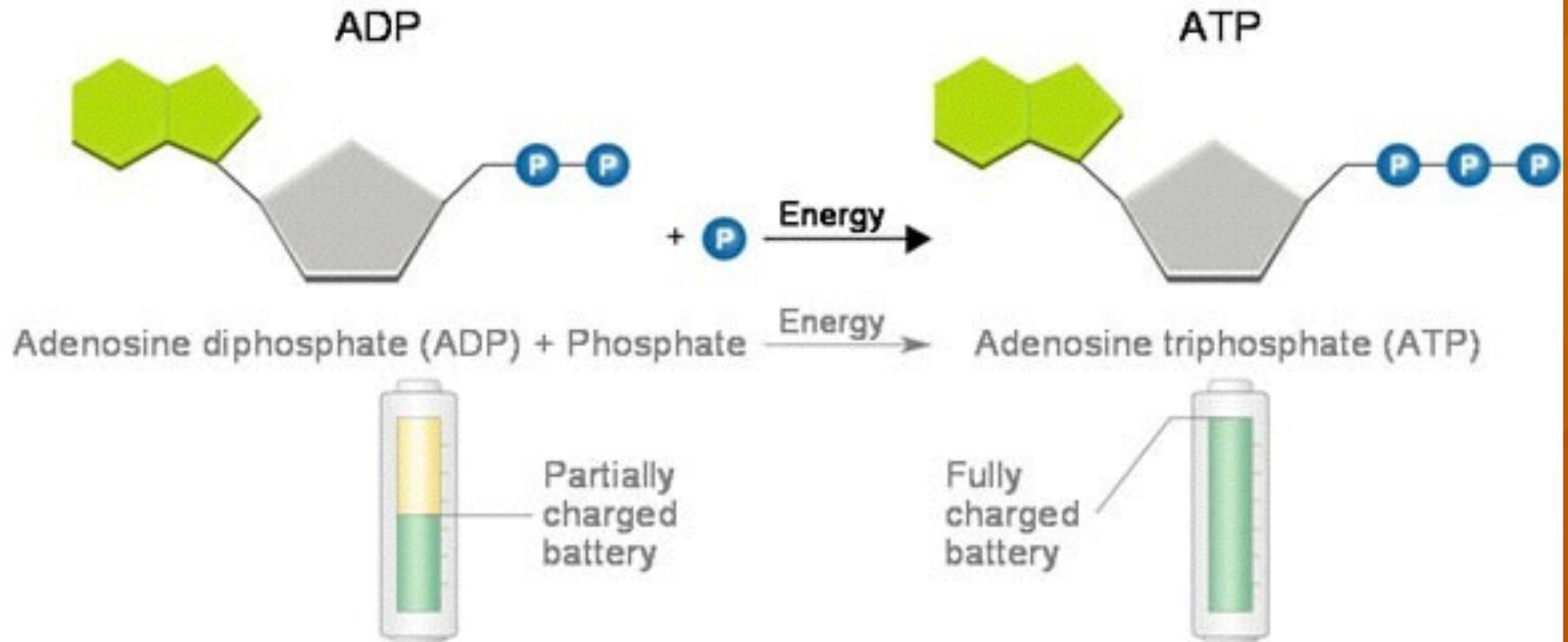
ATP (Adenosine Triphosphate)



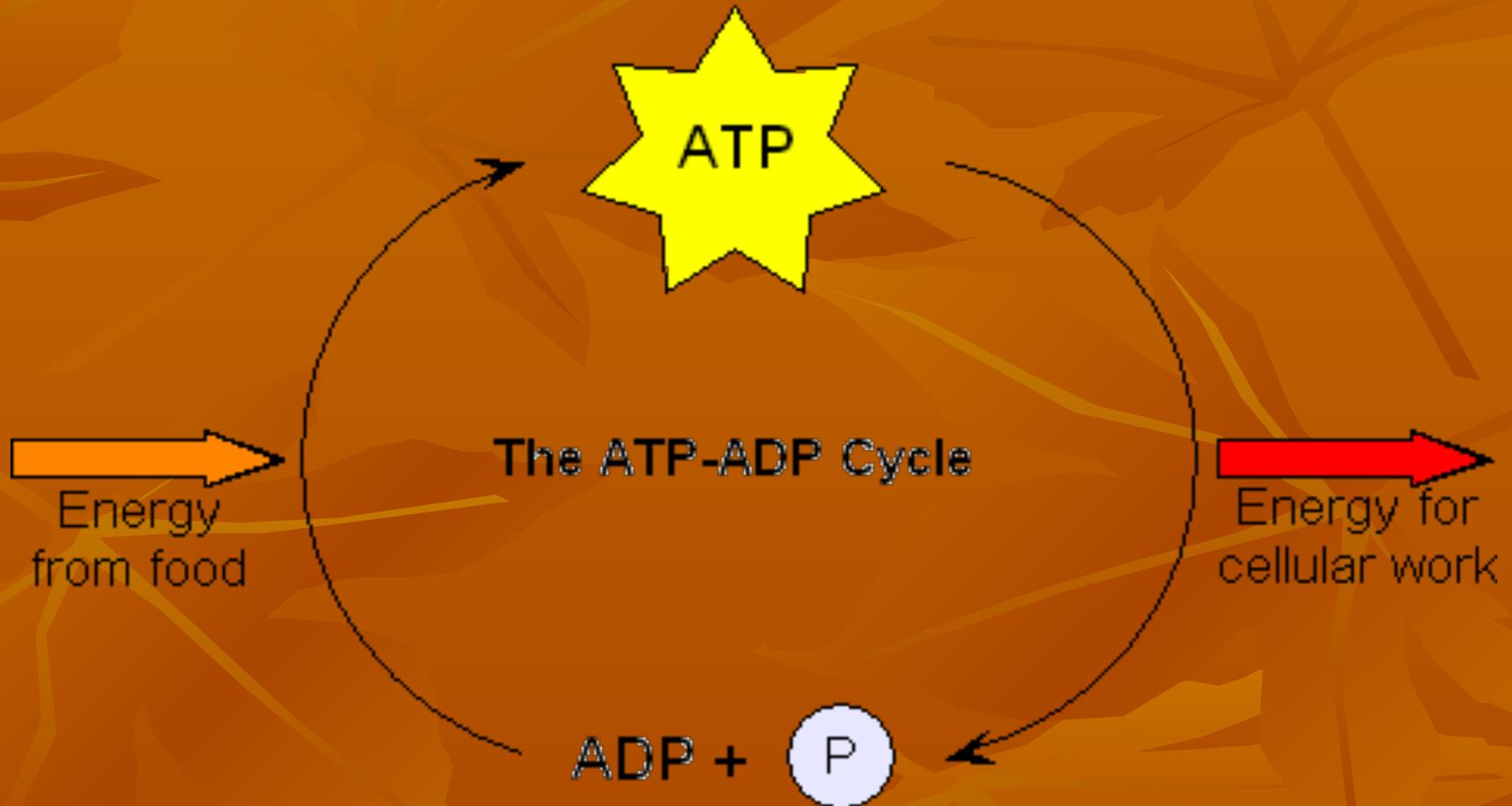
ADP (Adenosine Diphosphate)

- adenine, ribose and 2 phosphate groups

Chemical Energy & ATP



Releasing Energy from ATP



ATP and Glucose

- most cells contain small amounts of ATP
- 1 glucose molecule stores more than 90 times the chemical energy of 1 ATP molecule
- cells make ATP from ADP as needed by using the energy stored in glucose

8-2 Photosynthesis: An Overview

plants use the energy of sunlight to convert water and carbon dioxide into oxygen and high-energy sugars (glucose)

Investigating Photosynthesis

- Jan van Helmont (1600's): concluded that most of the plant's mass came from water
- Joseph Priestly (1700's): concluded that plants produce a substance required for burning (we now that substance is oxygen)
- Jan Ingenhousz (1700's): concluded that light is needed for plants to produce oxygen

The Photosynthesis Equation



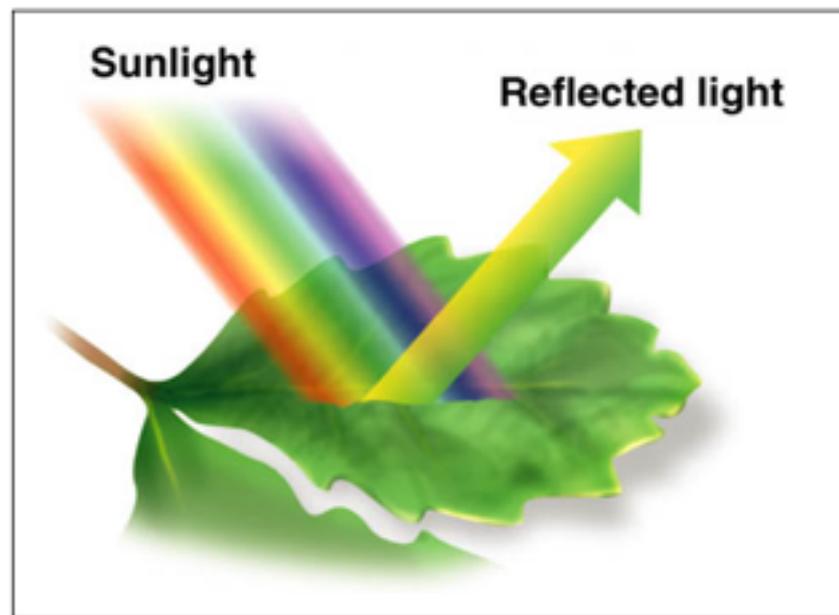
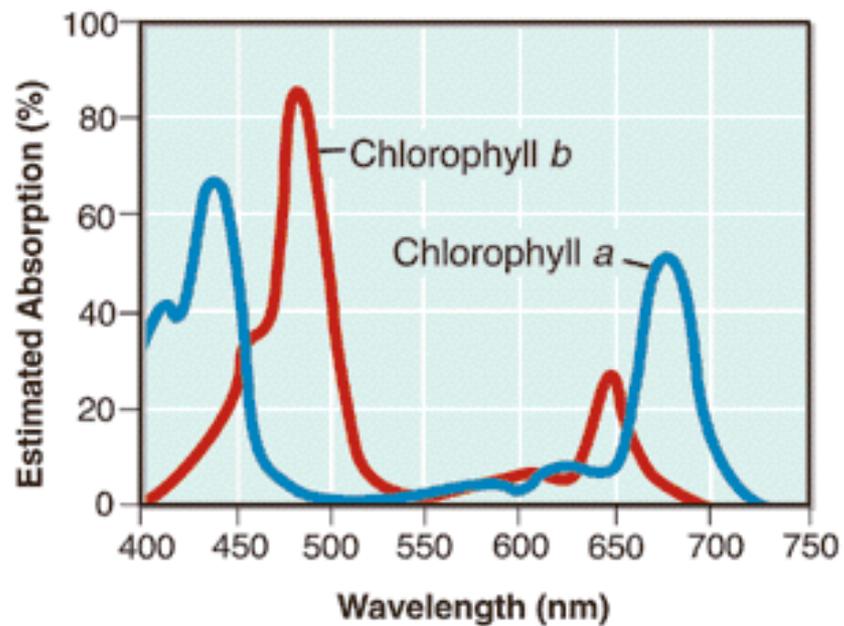
Light and Pigments

Sunlight: white light (contains all colors) is absorbed by plants with light absorbing molecules called pigments

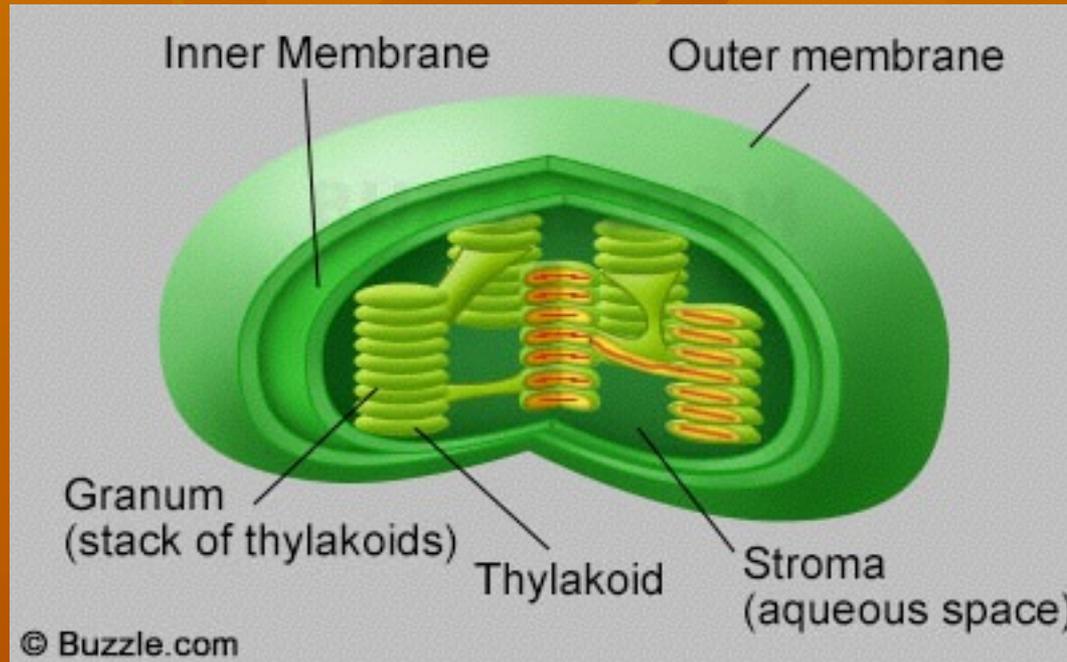
Chlorophyll (A & B): main pigment in plants

- does not absorb green light very well making plants green

Absorption of Light by Chlorophyll *a* and Chlorophyll *b*

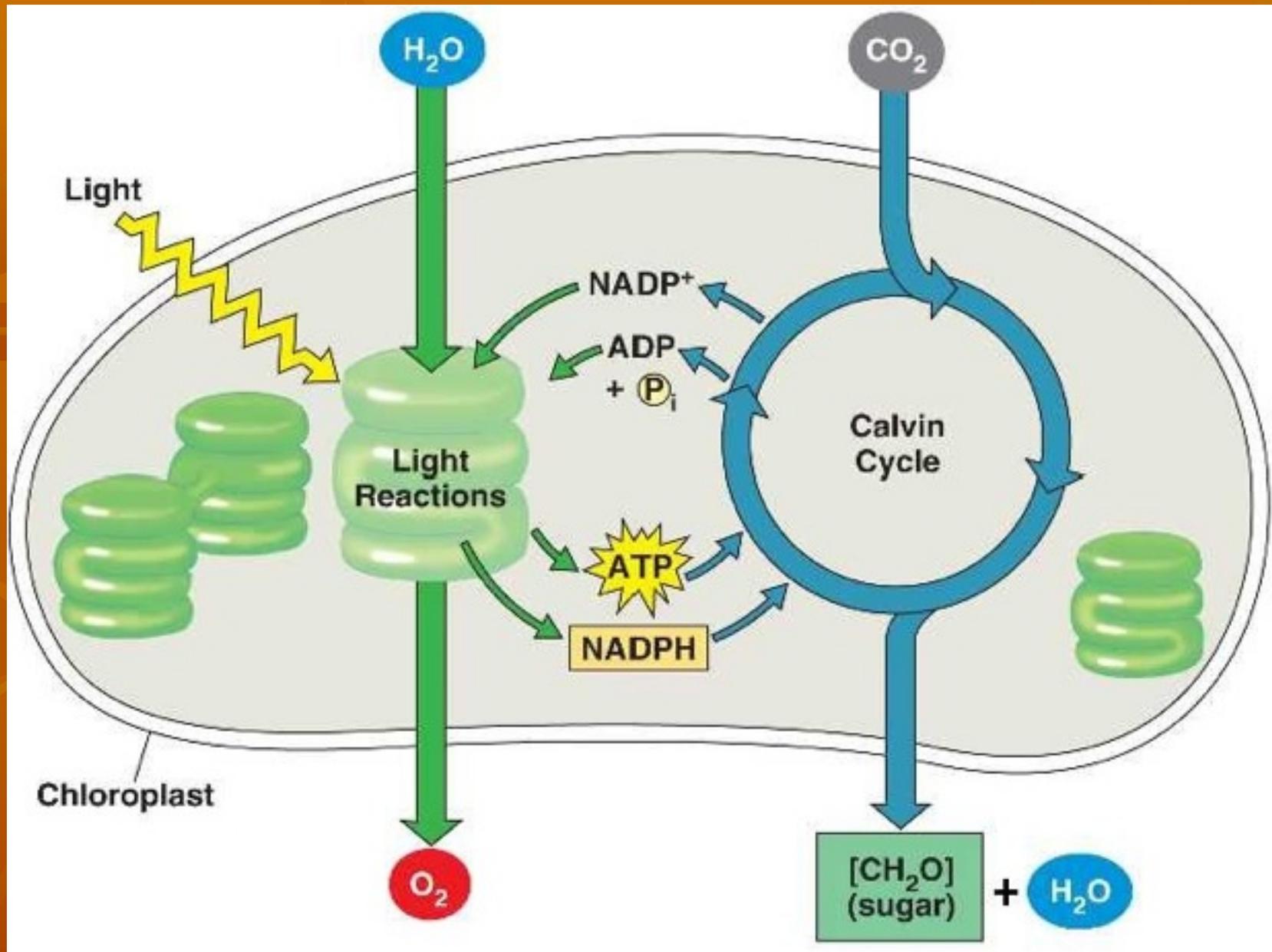


8-3 The Reactions of Photosynthesis



Light-dependent reactions occur in the thylakoids

Light-independent reactions/Calvin Cycle occur in the stroma



Glucose produced in photosynthesis may be:

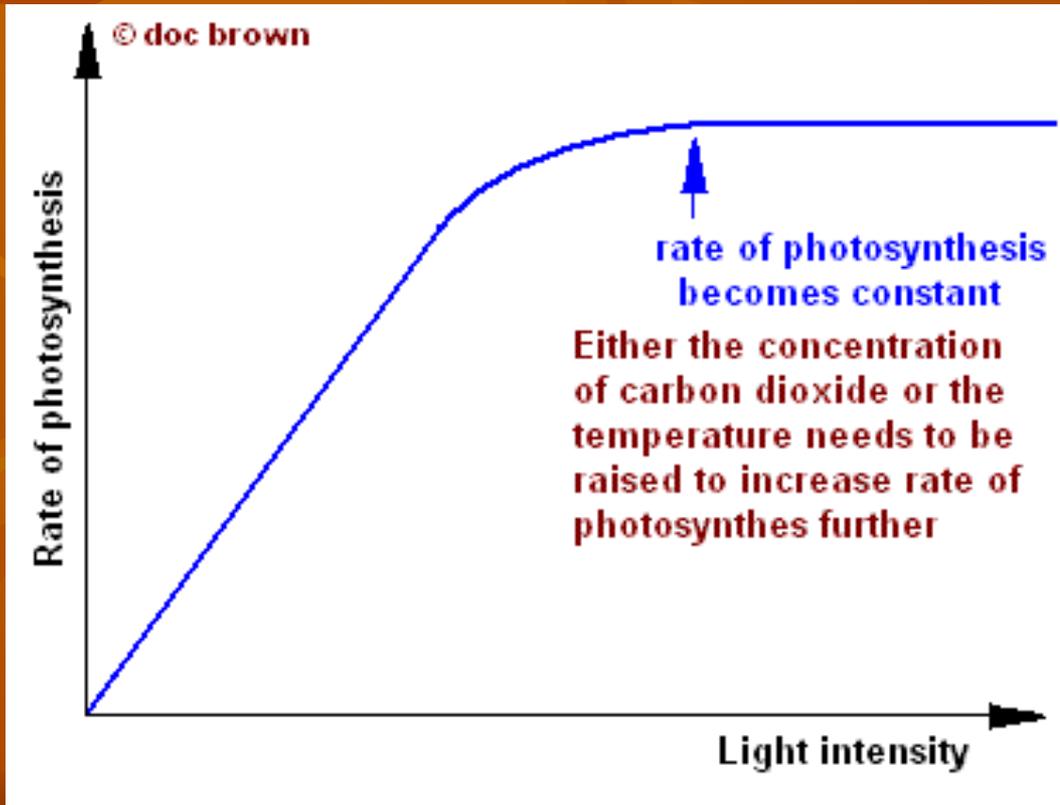
- Used as an energy source for ATP production during cell respiration
- Used to synthesize macromolecules including proteins, nucleic acids, starches and fats
- Converted into storage products (starch)

Factors Affecting Photosynthesis

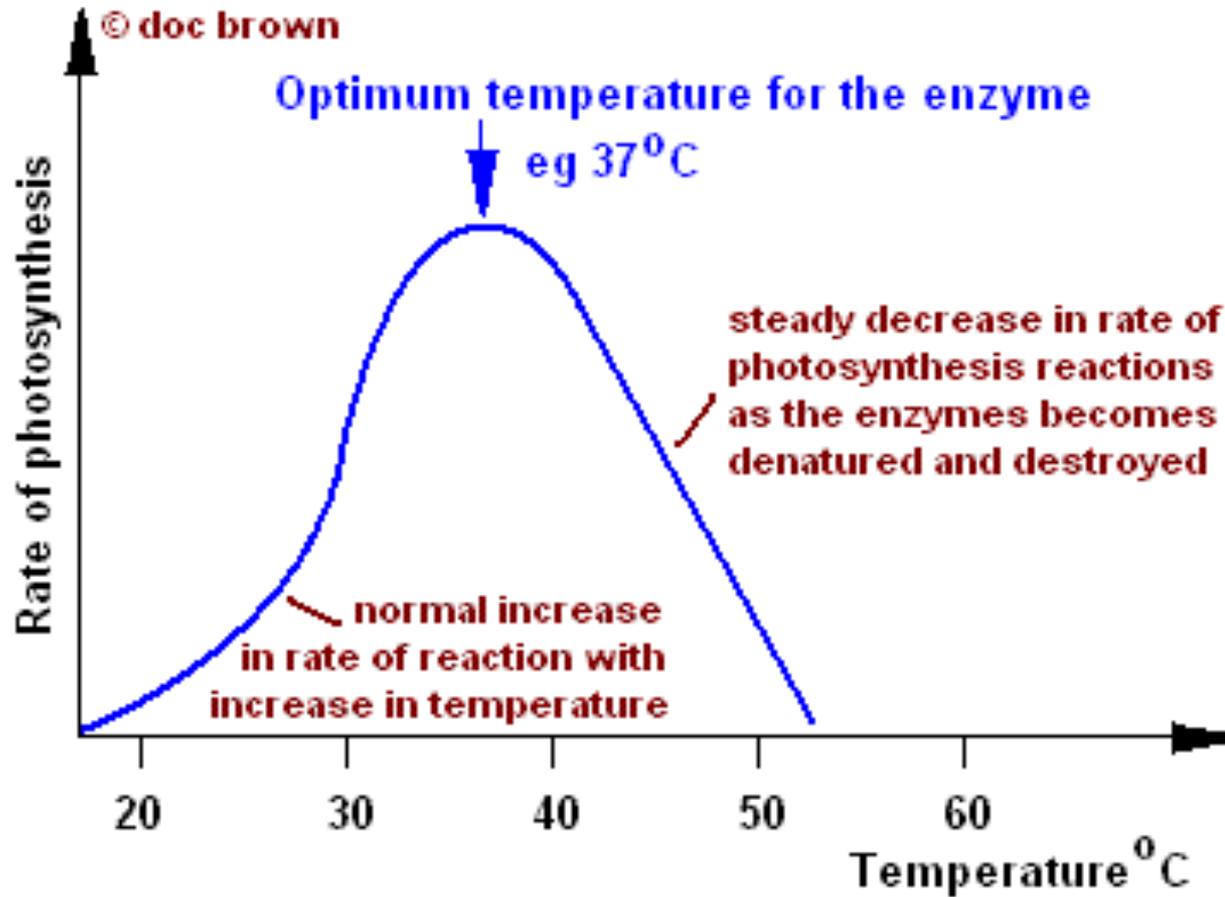
Water (a raw material)

a shortage of water can slow or stop photosynthesis

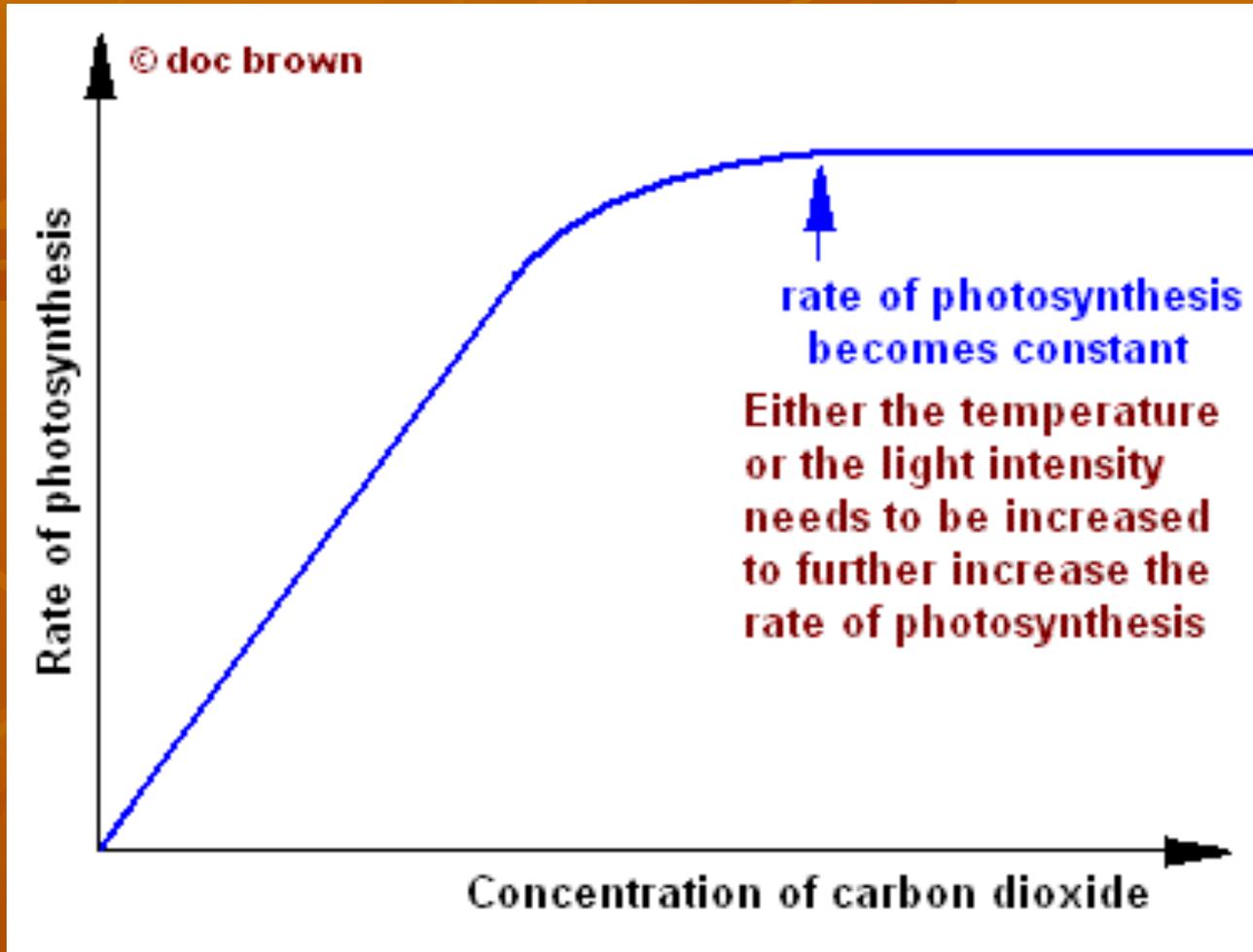
Light Intensity



Temperature



Carbon Dioxide Concentration



Leaf Structure (Section 23-4)

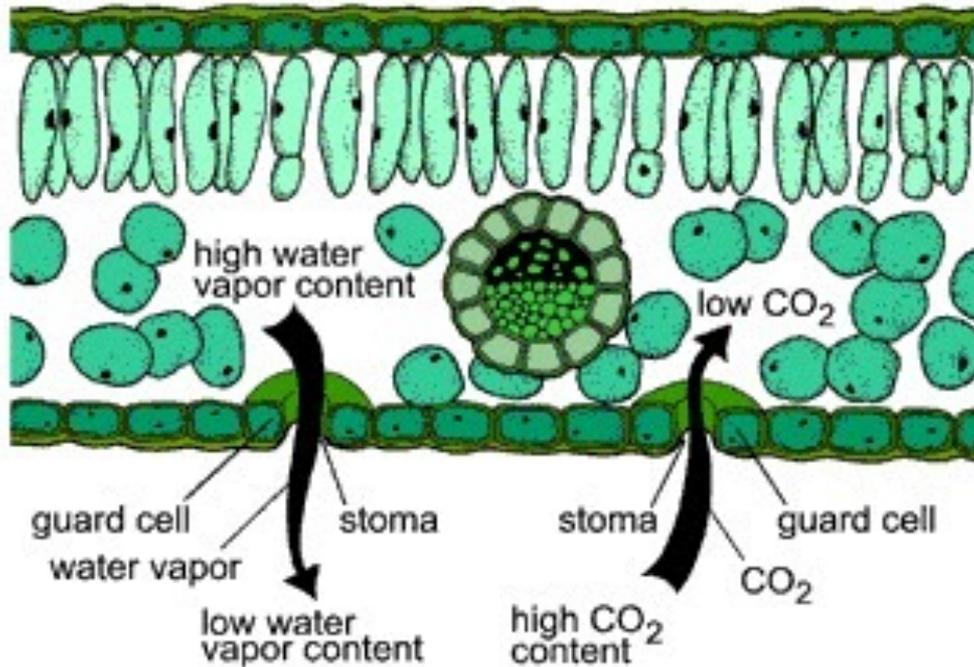
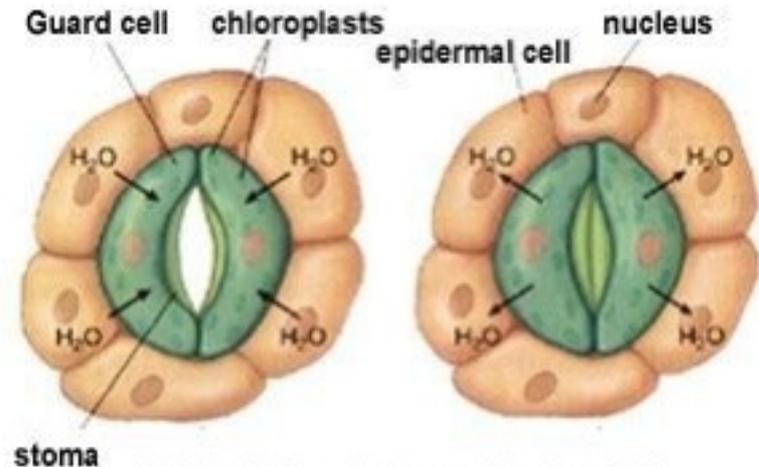


Figure 25. Stomata open to allow carbon dioxide (CO₂) to enter a leaf and water vapor to leave.

Oxygen also leaves through stomata

Leaf Stoma



Water diffuses into guard cells which causes them to open. On hot/dry days, the guard cells have less water, they relax and the stoma close