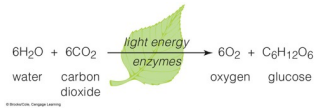
Photosynthesis

Harvesting Energy from Light

1

Photosynthesis

- Organisms use **pigments** to capture the sunlight
- The synthesis of **organic** molecules/sugar/glucose ($C_6H_{12}O_6$) from **inorganic** molecules (CO_2, H_2O) ***using the energy from light to fuel enzymes***

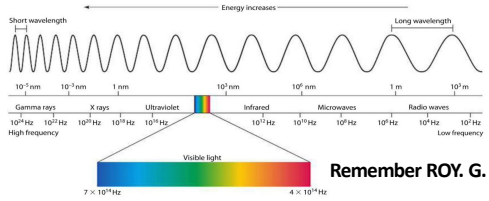


Equation for photosynthesis

2

Energy from Light?

- Light travels in waves. We only see visible light.
- The type of light depends on the distance or length between waves (wavelength) measured in nanometers (1 BILLIONTH of a meter)
- Those waves can be absorbed by special chemicals called pigments in plants to be used as an energy source

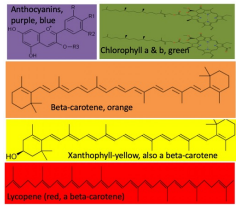


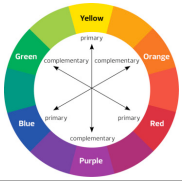
Remember ROY. G. BIV?

3

Pigments & Absorbance

- Colors of the VISIBLE Light Spectrum.
- A **Pigment** is an organic molecule that selectively ***absorbs*** *light of specific wavelengths and* ***reflects*** *those it does not absorb.*
- Examples: Chlorophyll
  - The most common photosynthetic pigment
- Anthocyanins (reflect purple)
- Beta-carotene (reflects orange)
- Xanthophylls (reflect yellow)
- Lycopenes (reflect red)

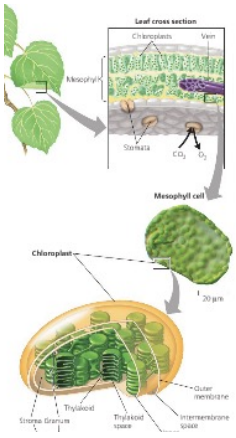




4

Where does photosynthesis occur?

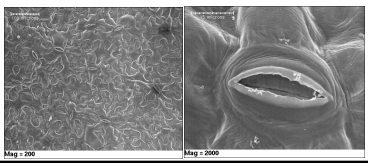
- Green, photosynthetic **TISSUE**
  - Green stems, leaves
  - Not Roots or flowers
- Contains specialized **CELLS**
  - Mesophyll (spongy/palisade)
- With Specific Org**anelles**
  - **Chloroplasts** are specialized organelles in plants contain green pigments
  - This is where CO_2 is processed to make sugar in the form of glucose ($C_6H_{12}O_6$)
  - Done by specific **ENZYMES** which are proteins that can drive chemical reactions in cells.

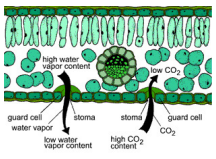


5

How does CO_2 get into the plant cells?

- Through pores called **STOMATES/STOMA** (look like Demogorgons under Scanning Electron Microscopes)
- Small openings in the leaf "skin" or epidermis that allow for gas exchange: CO_2 goes in while O_2 and H_2O go out
- Don't get confused: water comes into the plant via the roots, but exits through the stomates to cool the plant
- "Plant sweat"…pores that allow water out via ***transpiration***
- Stomates close on dry days to minimize water loss, but then CO_2 can't get in…evolution's big dumb dilemma.





6