Photosynthesis

Harvesting Energy from Light

1. Organisms use pigments to capture the sunlight.
2. The synthesis of organic molecules/sugar/glucose (C₆H₁₂O₆) from inorganic molecules (CO₂, H₂O) using the energy from light to fuel enzymes.

Equation for photosynthesis:

\[ \text{6H}_2\text{O} + 6\text{CO}_2 \rightarrow 6\text{O}_2 + 6\text{C}_6\text{H}_{12}\text{O}_6 \]

Energy from Light?

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

Remember ROY G. BIV?
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)

Where does photosynthesis occur?

- Green, photosynthetic TISSUE
  - Green stems, leaves
  - Not Roots or flowers
- Contains specialized CELLS
  - Mesophyll (spongy/palisade)
- With Specific Organelles
  - Chloroplasts are specialized organelles in plants contain green pigments
  - This is where CO₂ is processed to make sugar in the form of glucose (C₆H₁₂O₆)
  - Done by specific ENZYMES which are proteins that can drive chemical reactions in cells.

How does CO₂ 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: CO₂ goes in while O₂ and H₂O 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 CO₂ can’t get in…evolution’s big dumb dilemma.