**Energy Transductions in Biological Systems**

**Autotroph** - (*auto* = "self"; *troph* - "feeding") an organism that captures energy and stores it in the chemical bonds of organic molecules that it manufactures from inorganic molecules via photosynthesis.

(a.k.a. - "producer") **Heterotroph** - (*hetero* = "other"; *troph* - "feeding") an organism that eats other organisms to obtain energy. (a.k.a. - "consumer")

**Storing the Energy: Photosynthesis**

The most common means by which autotrophs make organic molecules (sugar) is PHOTOSYNTHESIS. Autotrophs that capture light energy are called **PHOTOAUTOTROPHS**. (There are other kinds of autotrophs, but we won't discuss them here.)

Overall, the chemical reaction of photosynthesis is as follows:

Light energy + plant enzymes  
6CO2 + 12H2O ------------------------------------------------> C6H12O6 + 6O2 + 6H2O

...which means that it takes

* six molecules of carbon dioxide plus
* 12 molecules of water

in the presence of light and the proper enzymes in the cell, to make

* one molecule of glucose
* 6 molecules of oxygen
* 6 molecules of water

The sugar (glucose) is the storage form for energy in plants, and it's often converted into long chains for long-term storage as CARBOHYDRATE. The oxygen and water are side products that are not used by the plant in this reaction.

WHY STORE SUGAR AND CARBOHYDRATES? What does the plant do with them, once it has them? It uses them to (1) manufacture its body and for (2) energy storage.

 Plants ABSORB light primarily in the violet/blue and the orange/red region of the visible spectrum. This is the light energy packaged in sugar as chemical energy. (The sugar can be broken down to re-release the energy so the cell can do work.)

 Plants REFLECT and TRANSMIT light in the yellow, green, and orange region of the spectrum. This is why they look green to our eyes.

<http://www.bio.miami.edu/dana/dox/photosynthesis.html>

* Kinetic Energy - the energy of movement (example: )
* Potential Energy - stored energy (example: )

Speed of light: speed of light (299,792,458 meters per second!)

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