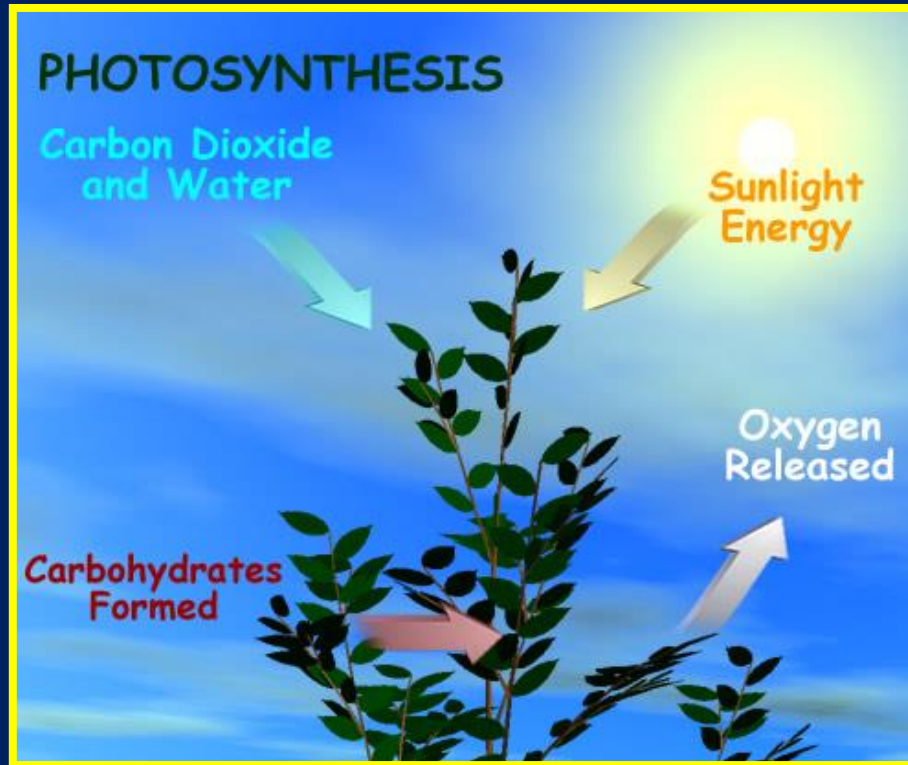


Photosynthesis

Reactants



Products



Photosynthetic Organisms

Some organisms are able to use the energy in sunlight to produce their own food



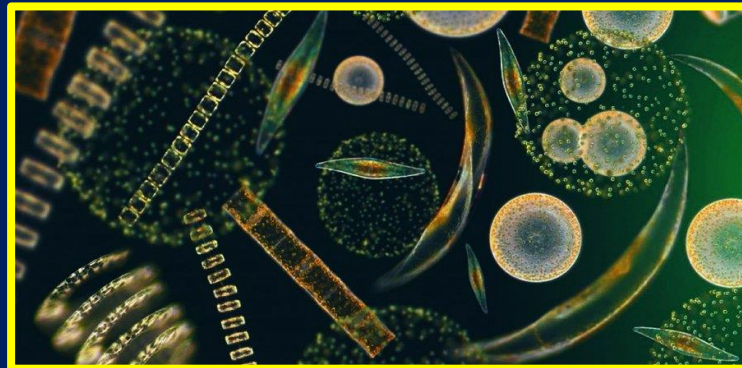
Plants



Cyanobacteria



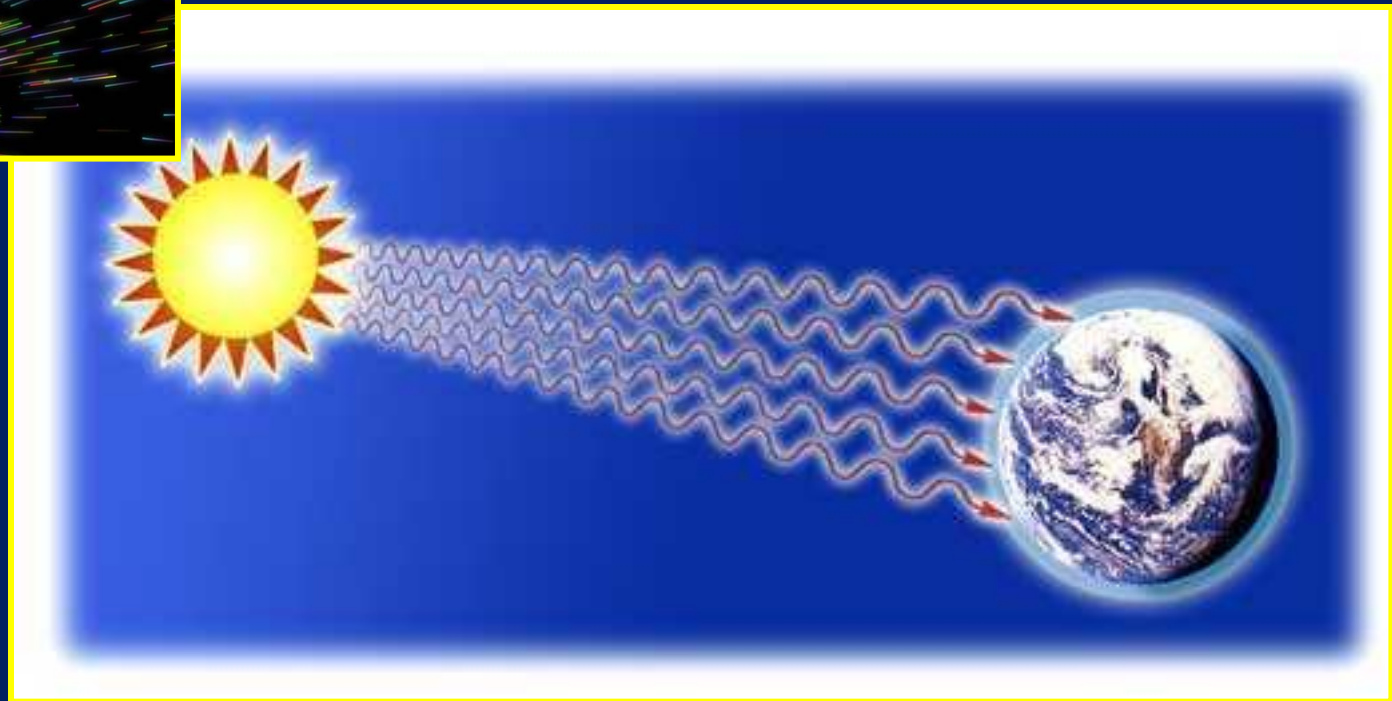
Algae



Phytoplankton

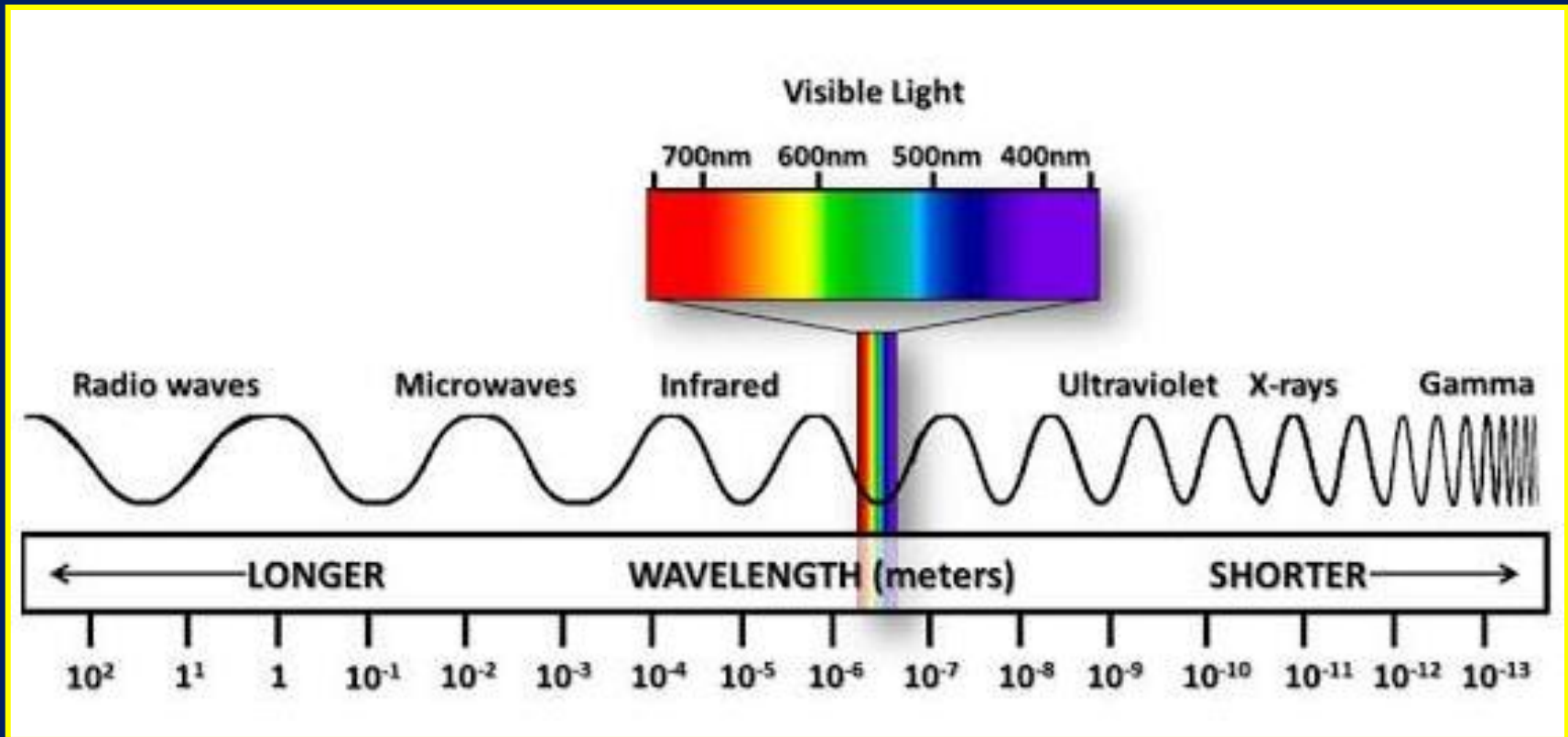
Light Energy

Light is made up of high energy particles, called photons, that travel in electromagnetic waves from the Sun to the Earth.



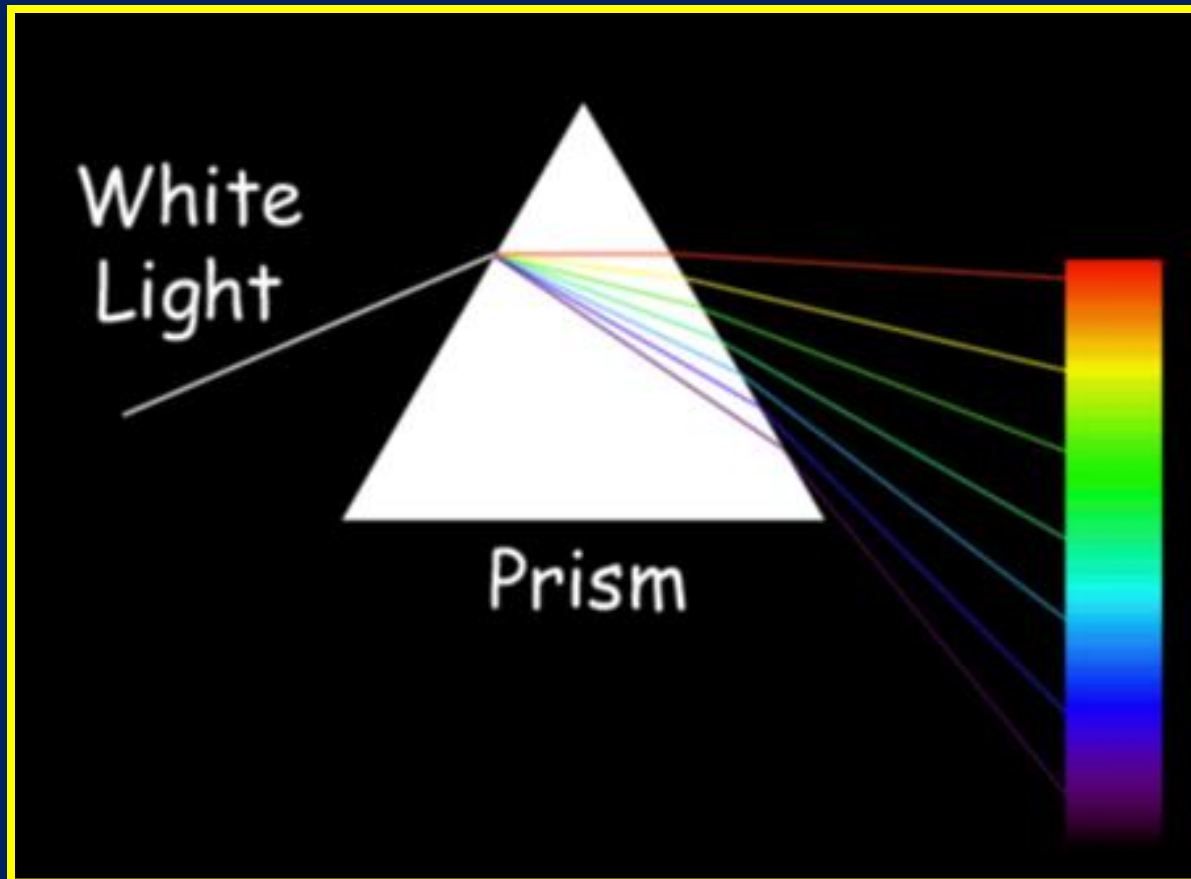
Visible Light Waves

Visible light waves have wavelengths that range from 700 nm to 400 nm.



Colors of Light

Different wavelengths of light waves produce different colors of light



R
O
Y
G
B
I
V

Pigments

Pigments are molecules that selectively absorb some colored light while reflecting others

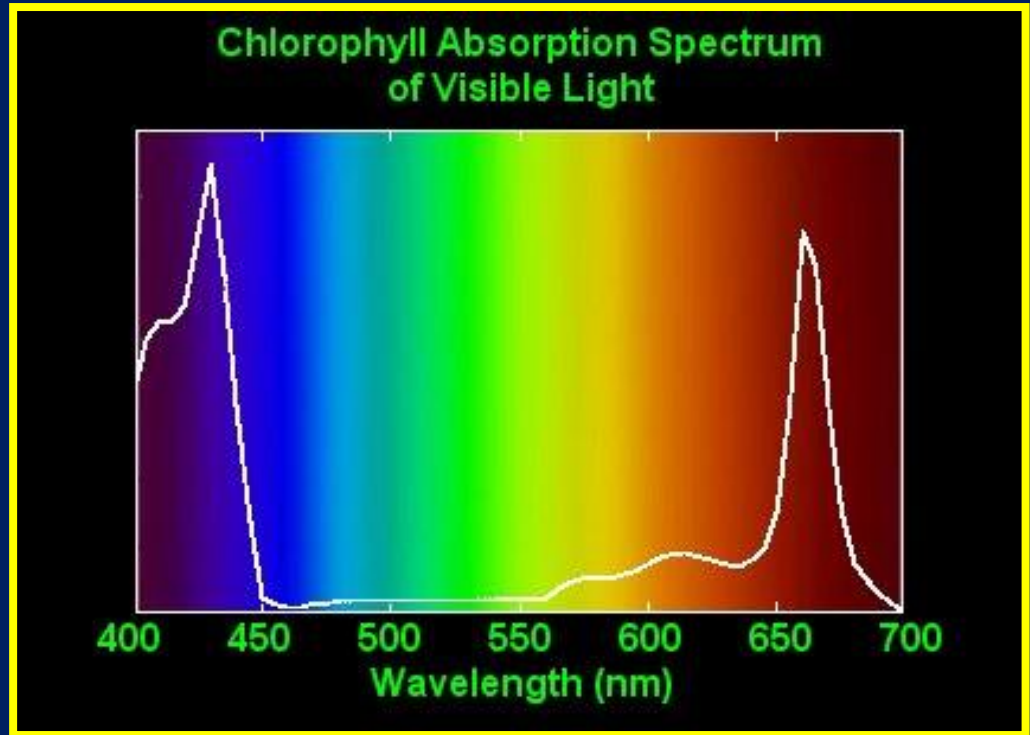


The colors you see are from the colors of the reflected light

The light from the colors that you do not see are absorbed by the pigments

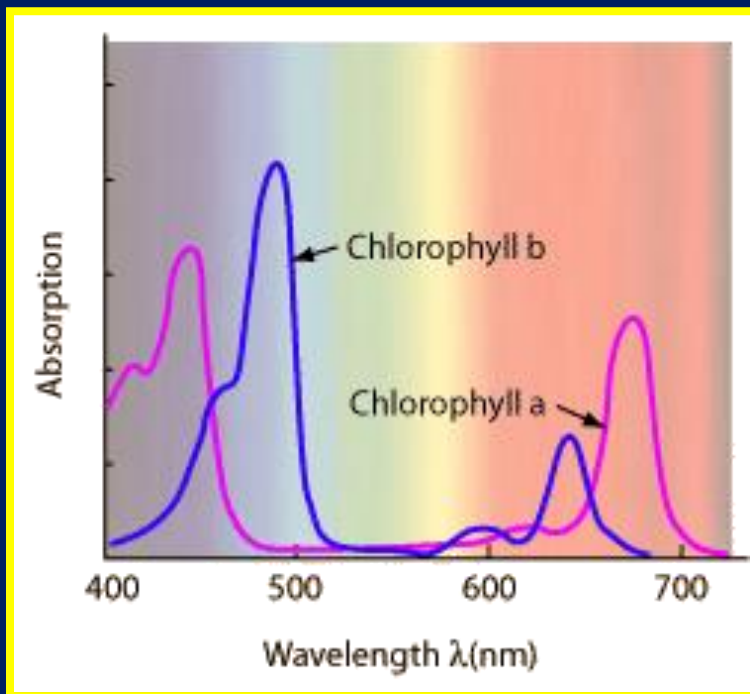
Chlorophyll

Chlorophyll is a pigment found in the green parts of plants, algae, and cyanobacteria that absorbs blue and red light but reflects green light.



Two Types of Chlorophyll

There are actually two types of chlorophyll, chlorophyll a and chlorophyll b, with each one absorbing light from slightly different wavelengths, but they both reflect green light.

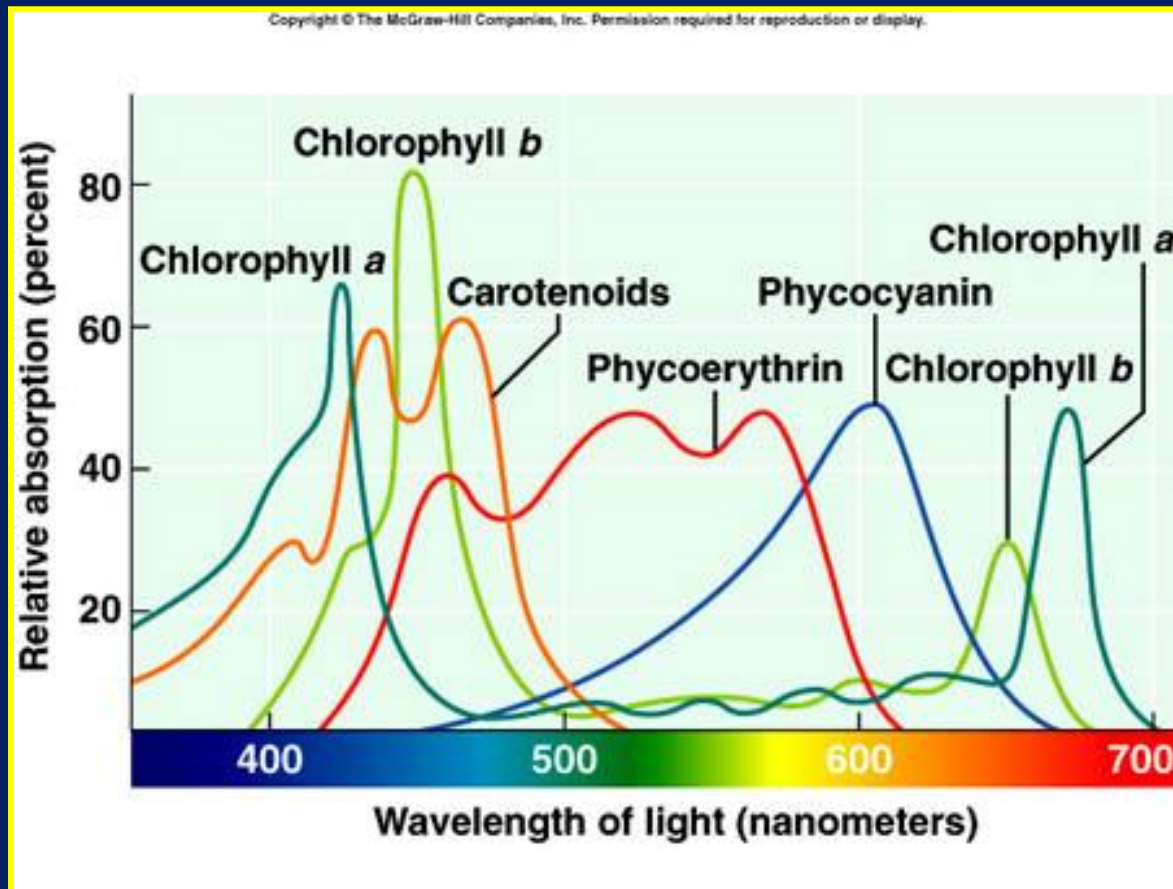


Chlorophyll a
Purple and red

Chlorophyll b
Blue and orange

Accessory Pigments

There are also other accessory pigments that absorb and reflect other wavelength colors



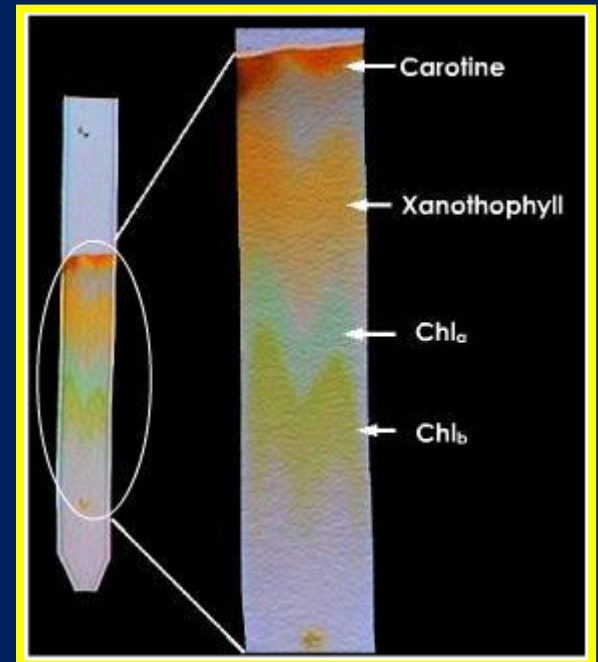
Carotene Pigment

Carotene, so named because it is so abundant in carrots, prevents oxygen from interacting with light energy and being transformed into toxic chemicals inside the cell.



Chlorophyll Dominates

The accessory pigments are always present, absorbing light, but the chlorophyll dominates during the growing season.



Decreasing Light Intensity

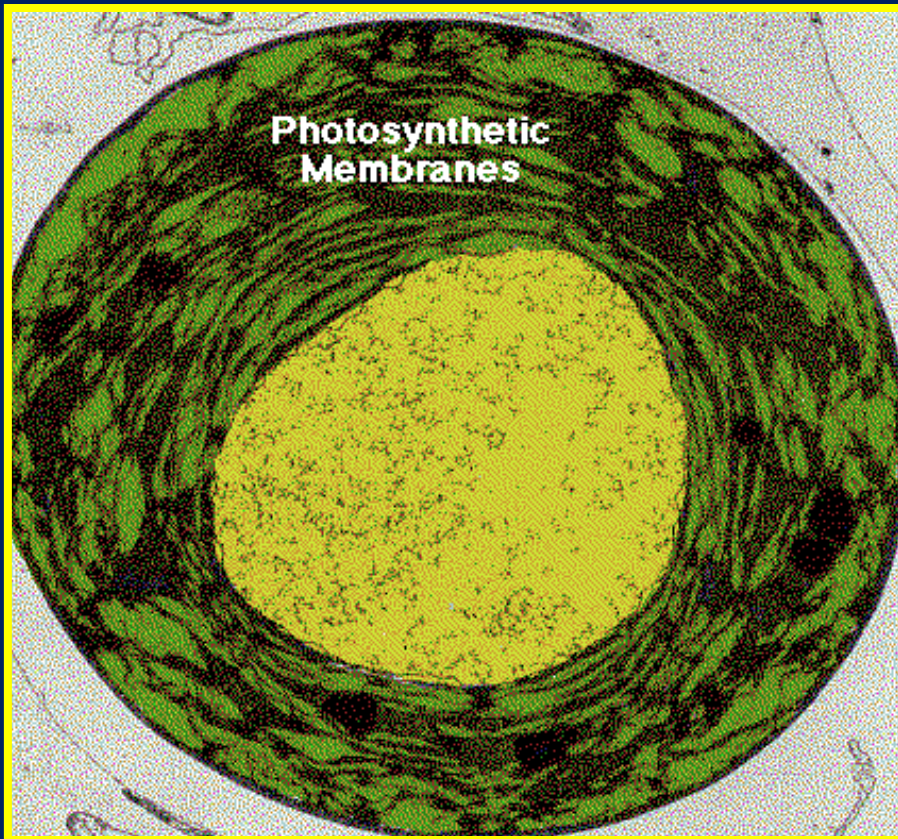
However, in the fall, the light intensity decreases and chlorophyll can no longer be produced by the plant.



That is when the colors from the accessory pigments can be seen.

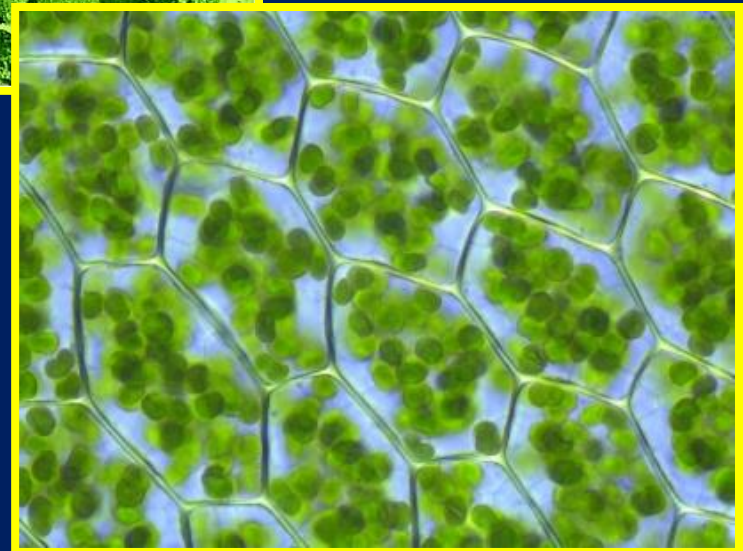
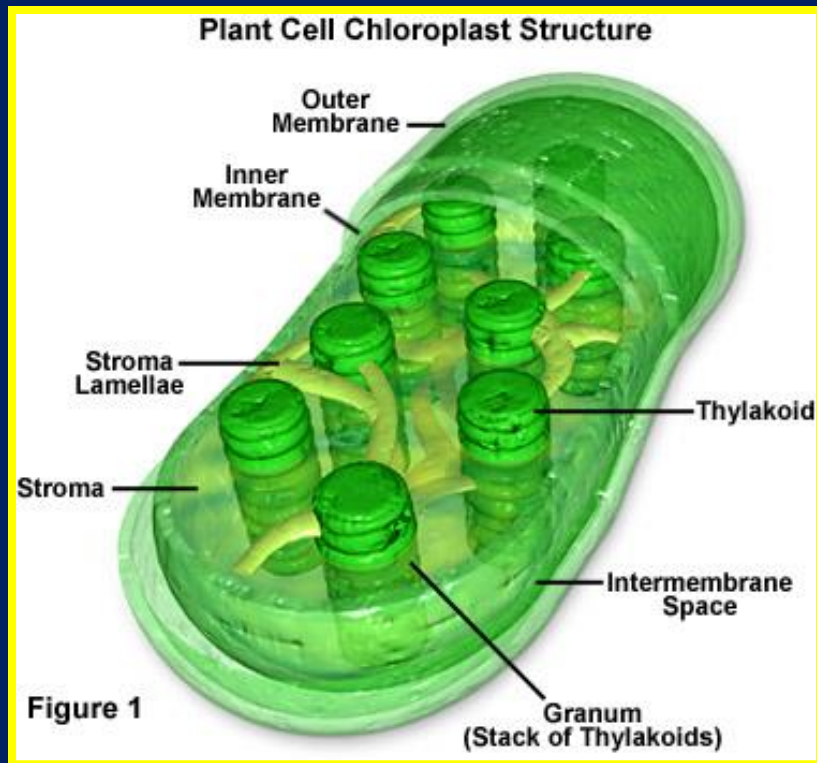
Cyanobacteria

In cyanobacteria, the chlorophyll and the other pigments are found in the cell membrane.



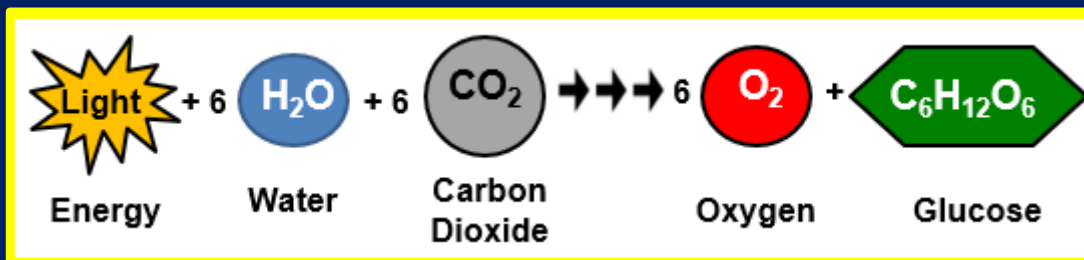
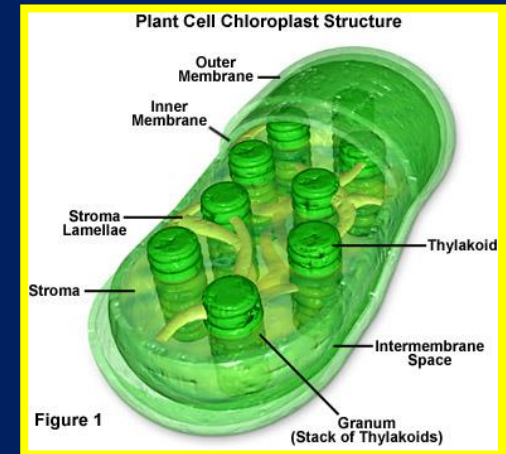
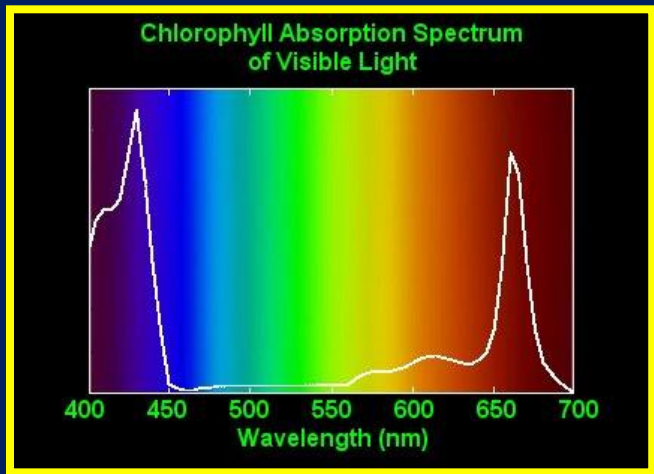
Chloroplasts

In plants, algae, and phytoplankton, chlorophyll is found inside chloroplasts located in the green parts of plants.



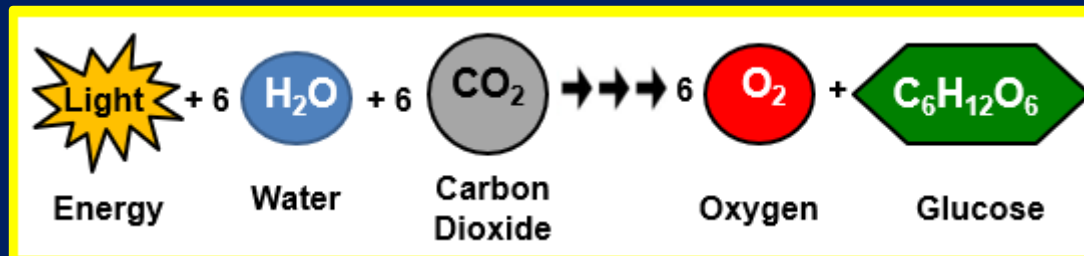
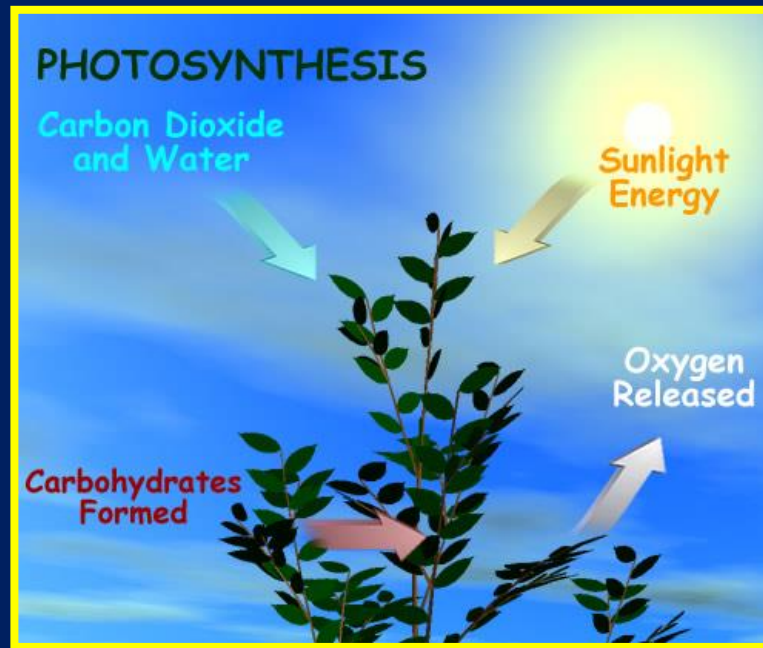
Absorbing Sunlight

During photosynthesis, chlorophyll, located in the chloroplasts, absorbs energy from sunlight and uses it to split water molecules into oxygen and hydrogen atoms.



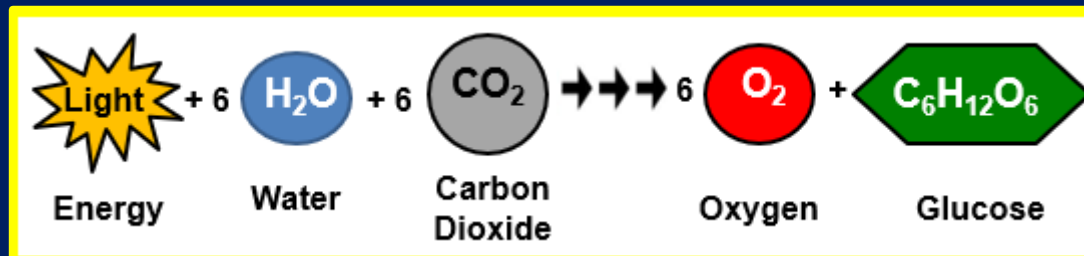
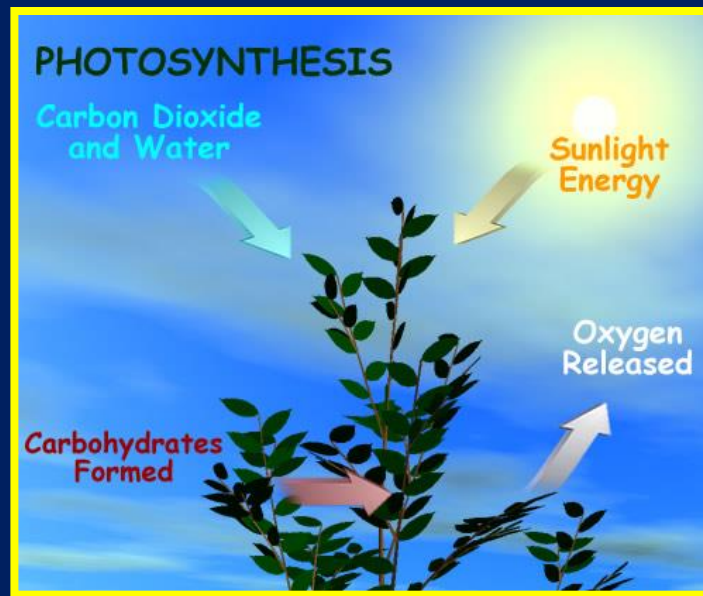
Oxygen Molecules

The oxygen atoms, O, are released into the air as oxygen molecules, O₂.



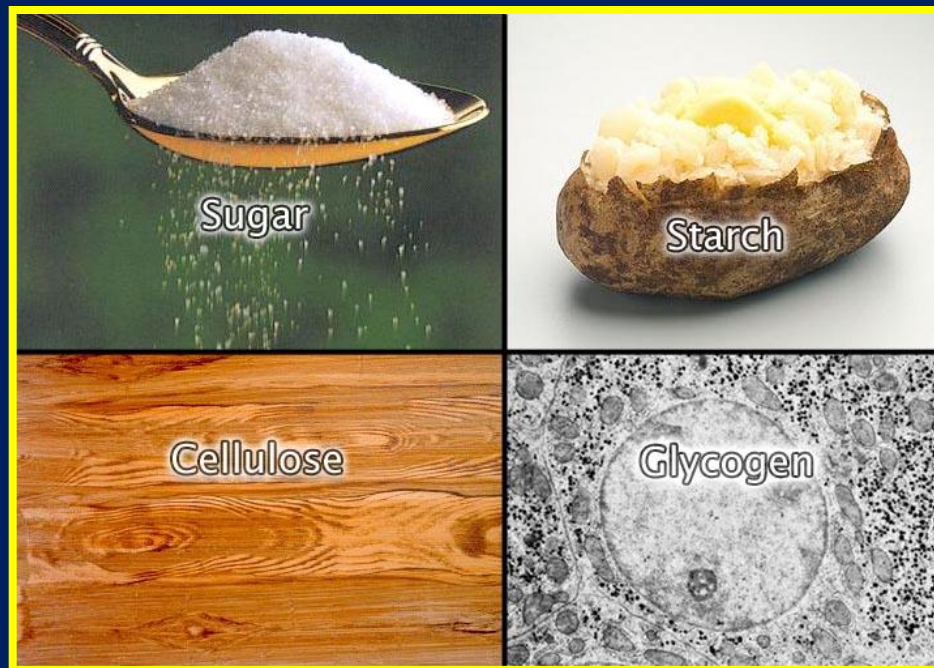
Glucose

The hydrogen atoms, H^+ , are combined with molecules of carbon dioxide, CO_2 , to produce glucose sugar, $C_6H_{12}O_6$.



Carbohydrates

Plants then use glucose for quick energy, convert it to cellulose to provide structure in the cell walls, or store it in the form of starch.



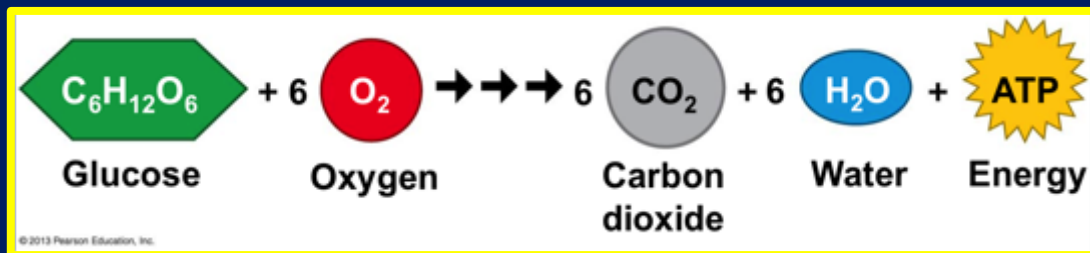
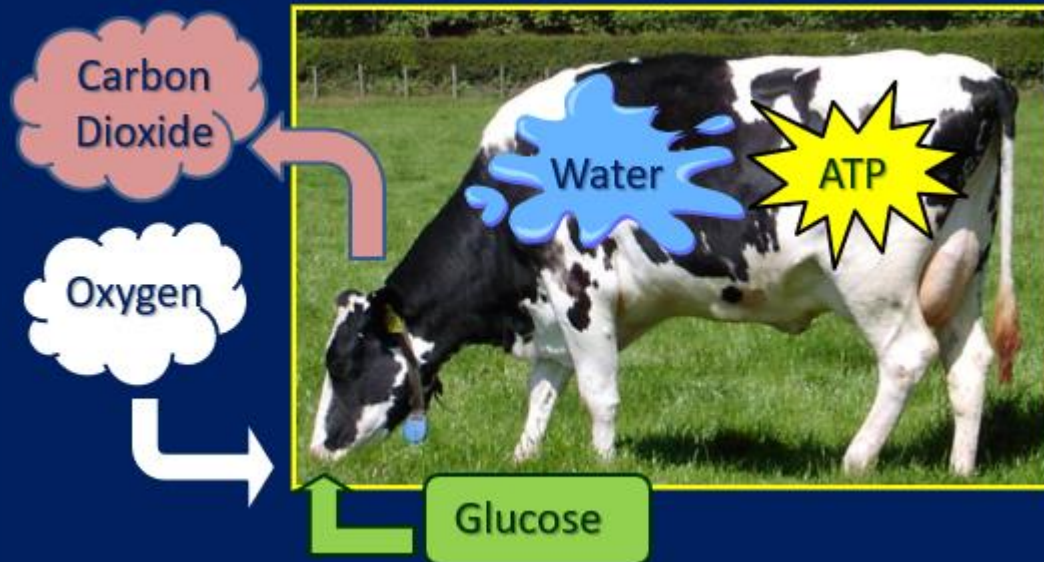
Food Chain

Other organisms obtain glucose when they eat plants or eat other organisms that previously ate plants.



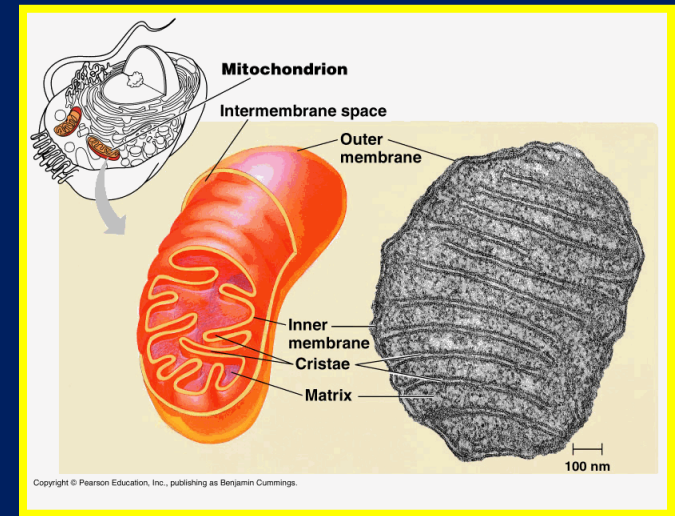
Cellular Respiration

During cellular respiration oxygen is used to help break down glucose into carbon dioxide, water and ATP energy.



Mitochondria

Cellular respiration takes place inside organelles called mitochondria that are found inside our cells.



Mitochondria are found in all of our cells but are more plentiful in cells that need a lot of energy, such as muscle cells.

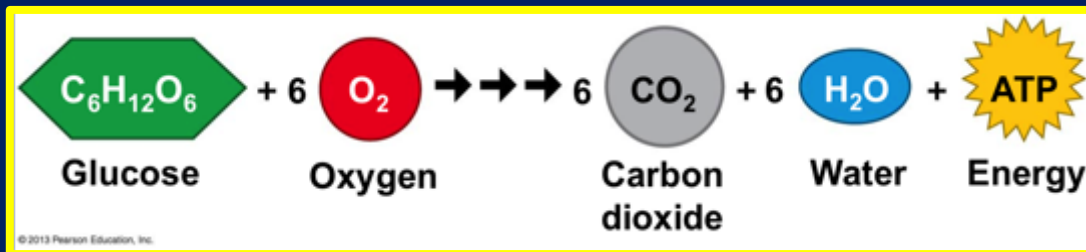
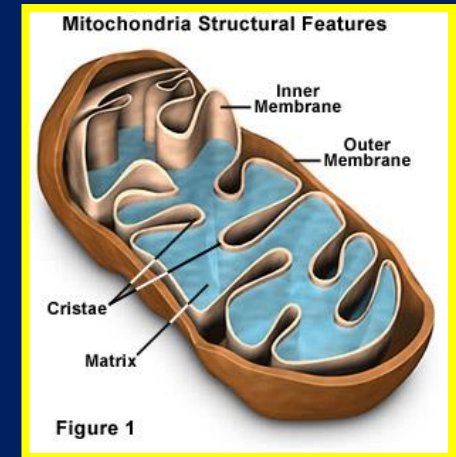
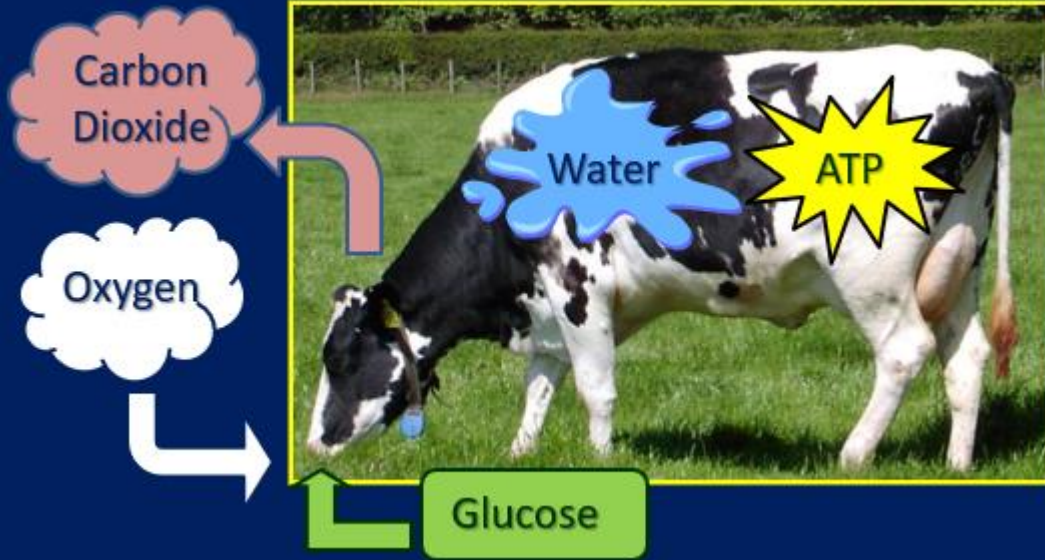
Glucose

Once consumed, glucose travels in our blood stream to each individual cell.



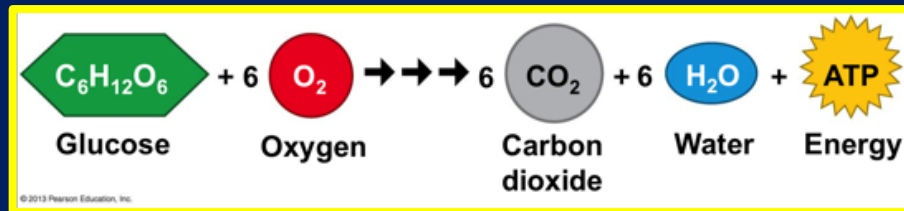
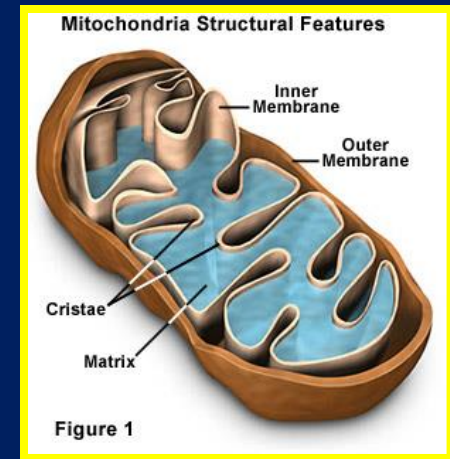
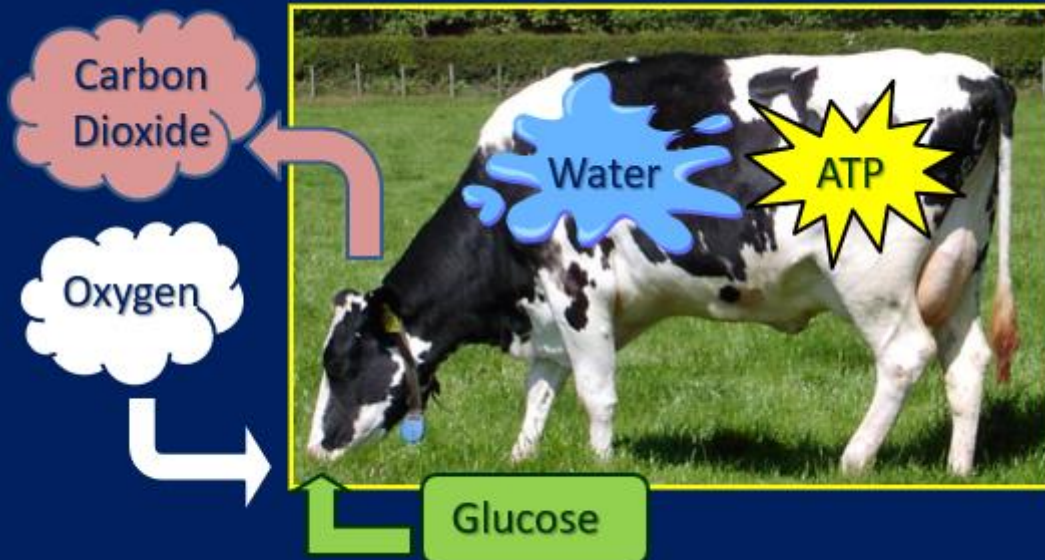
Carbon Dioxide

Once inside a cell, the mitochondria breaks down the glucose, $C_6H_{12}O_6$, into carbon dioxide, CO_2 , molecules that are released into the atmosphere.



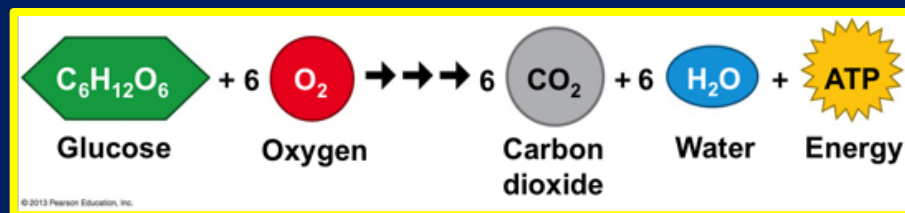
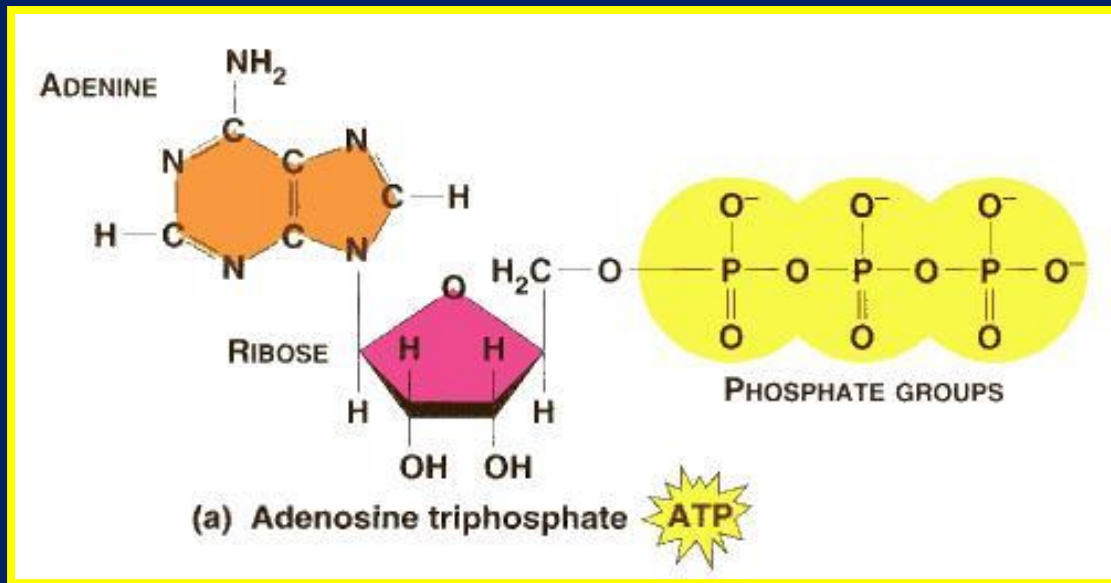
Water

Water molecules, H_2O , are also produced and remain in our cells as a substrate for organelles to float upon, to help dissolve cell materials, and to aid in chemical reactions.



ATP Energy

ATP, adenosine triphosphate, is the molecule all organisms use as chemical energy molecules to power all of the body's functions.



Oxygen

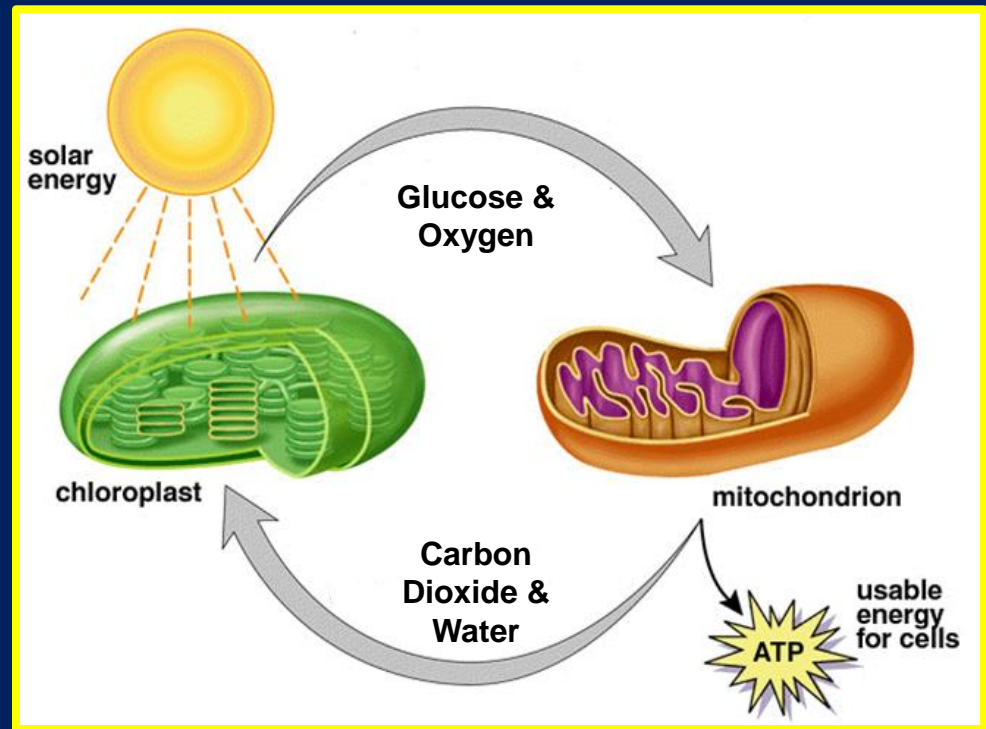
While some small organisms, such as anaerobic bacteria, can perform cellular respiration without oxygen, most organisms need oxygen to help produce enough ATP to survive.



No Oxygen = No Energy = Death

Photosynthesis and Cellular Respiration

Photosynthesis is how light energy is converted into chemical energy and cellular respiration is how that energy is converted into usable energy for cells.



Products of one are the Reactants of the Other

