



Photosynthesis and Cellular Respiration

AND THE FLOW OF ENERGY!!

PHOTOSYNTHESIS

- Occurs in the chloroplasts of plant cells.
- Converts light energy into the chemical bonds of glucose (plants are Autotrophs).
- The overall reaction is:



Glucose

STEP 1: The Light Reactions

- Light trapped by chlorophyll is transferred to form ATP (adenosine triphosphate) molecules → (cell's energy molecule)

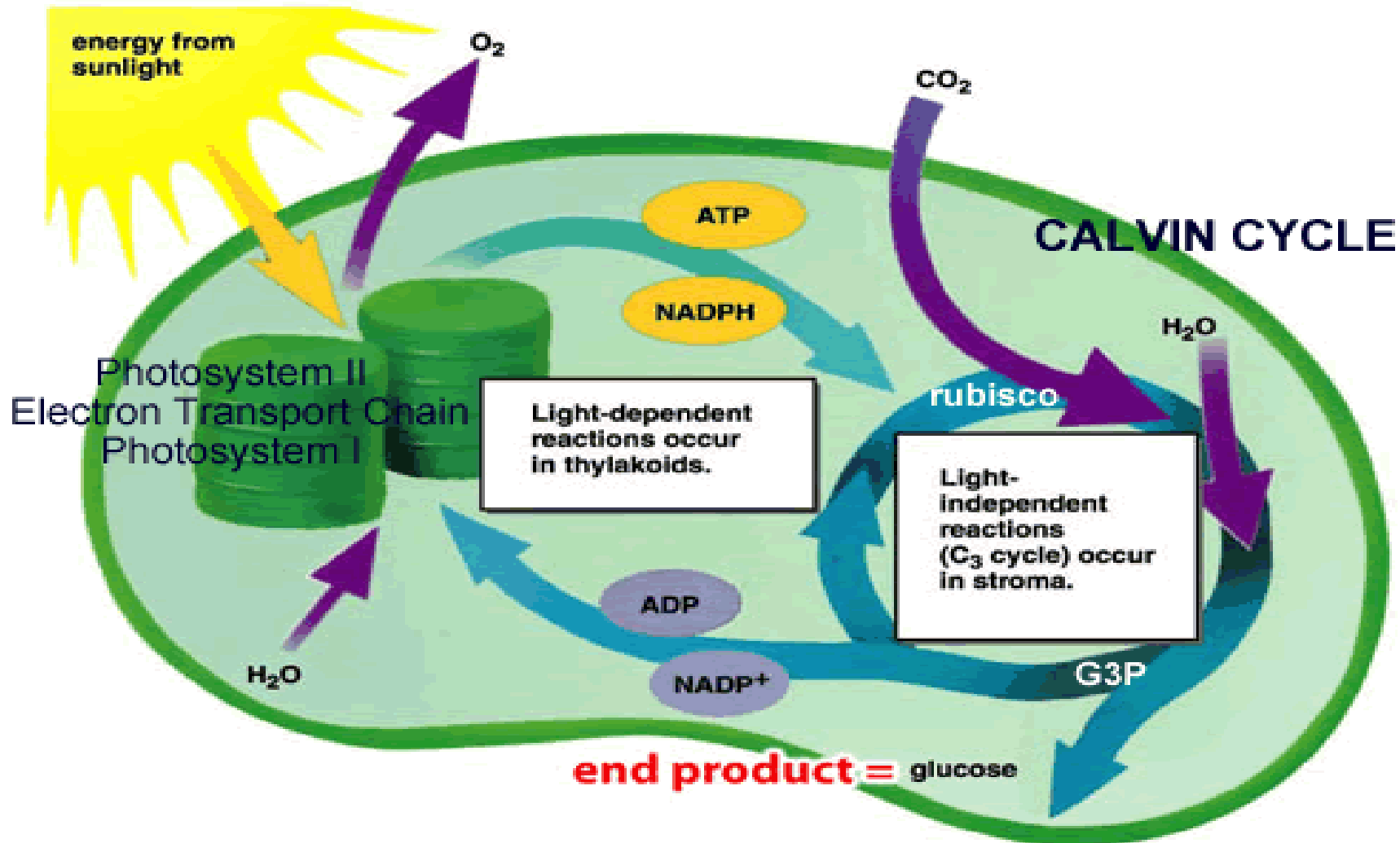


Step 2: The Light Independent Reaction (The Calvin Cycle)

- ATP energy is used to create bonds between the carbon, oxygen and hydrogen atoms.
- One molecule of glucose is created

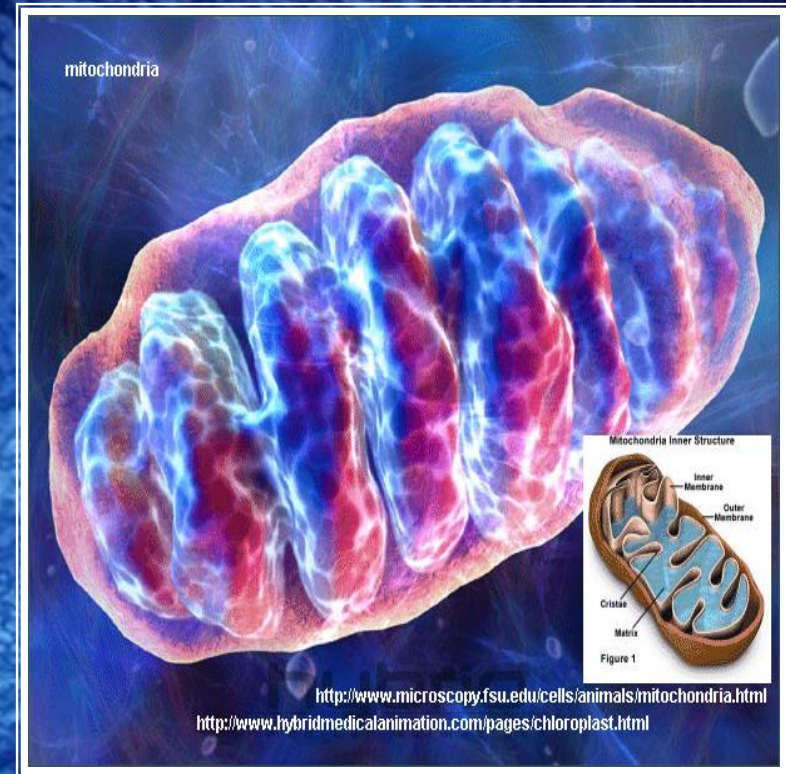


Step 2: The Light Independent Reaction (The Calvin Cycle)



CELLULAR RESPIRATION

- Supplies the cells with energy in the form of ATP.
- Provides energy for active transport, muscle contractions etc.
- Glucose is the fuel and it is broken down in a series of reactions.
- Two types: aerobic (needs Oxygen) and anaerobic

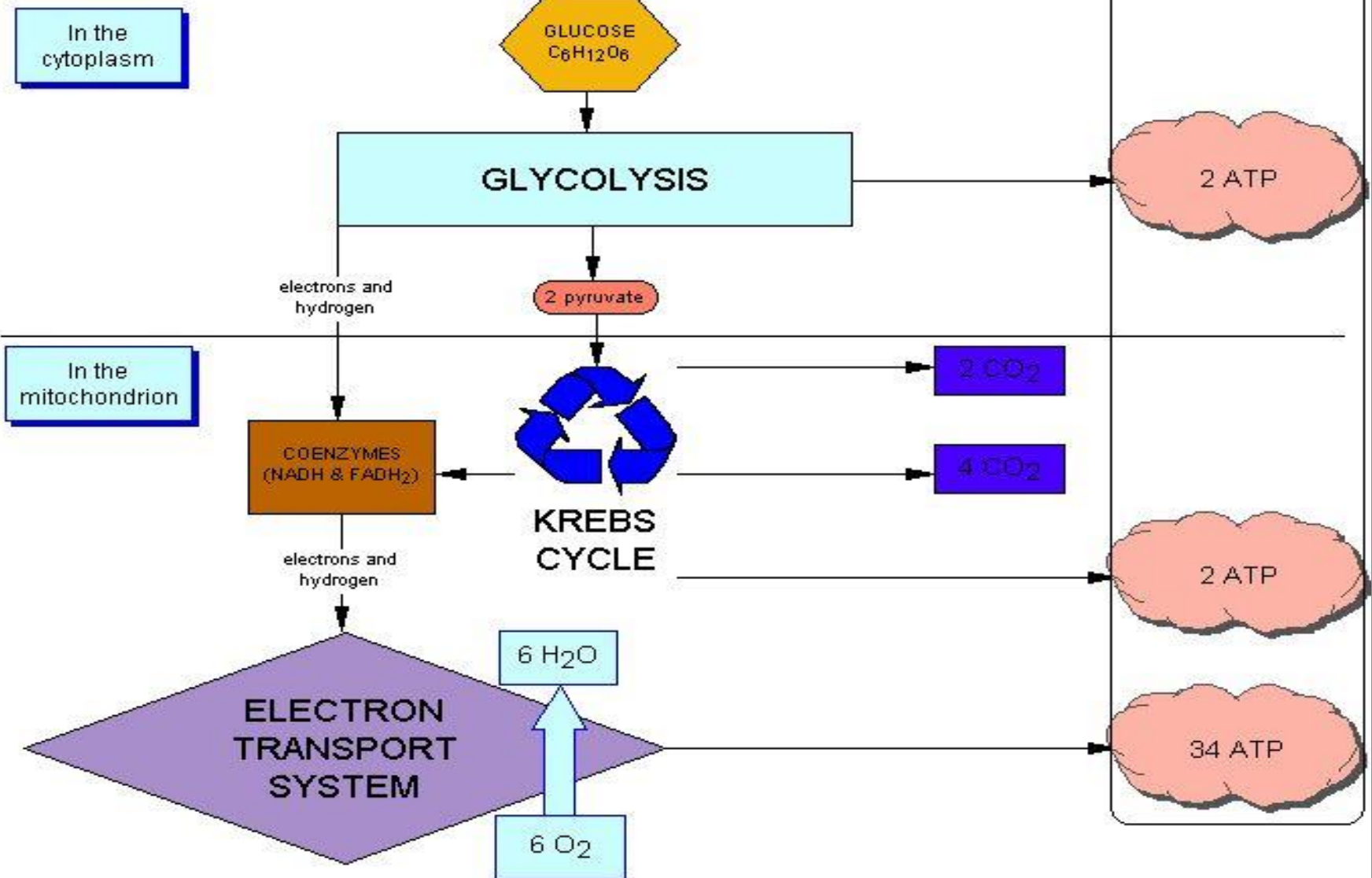


Aerobic Cellular Respiration

- Oxygen is present!
- In the first step called Glycolysis, 1 glucose is broken down into two molecules of pyruvic acid and 2 ATP molecules are formed.
- If O₂ is present the reaction continues inside the mitochondrion and another 34-36 ATP are created.

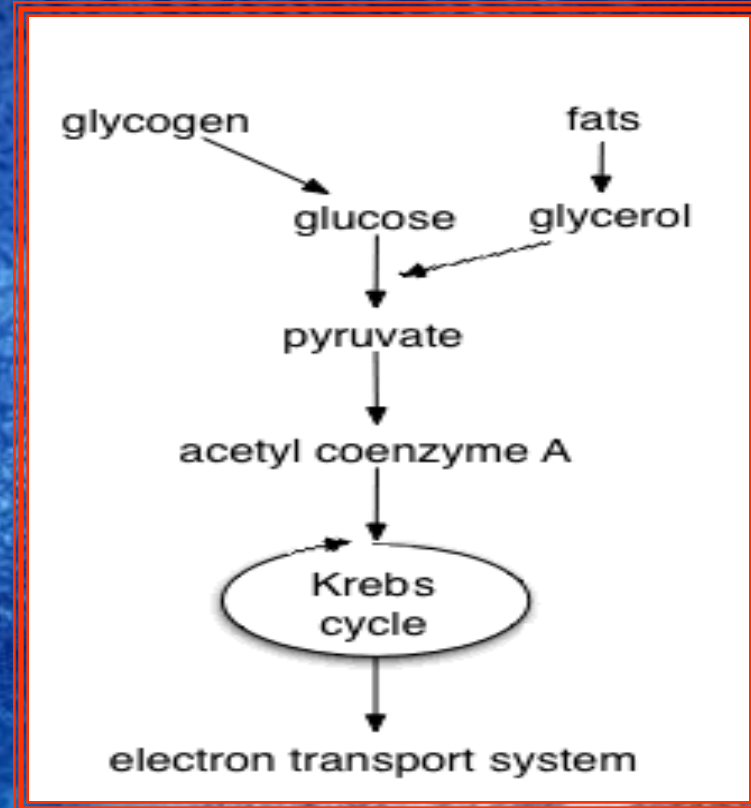


Cellular Respiration: An Overview



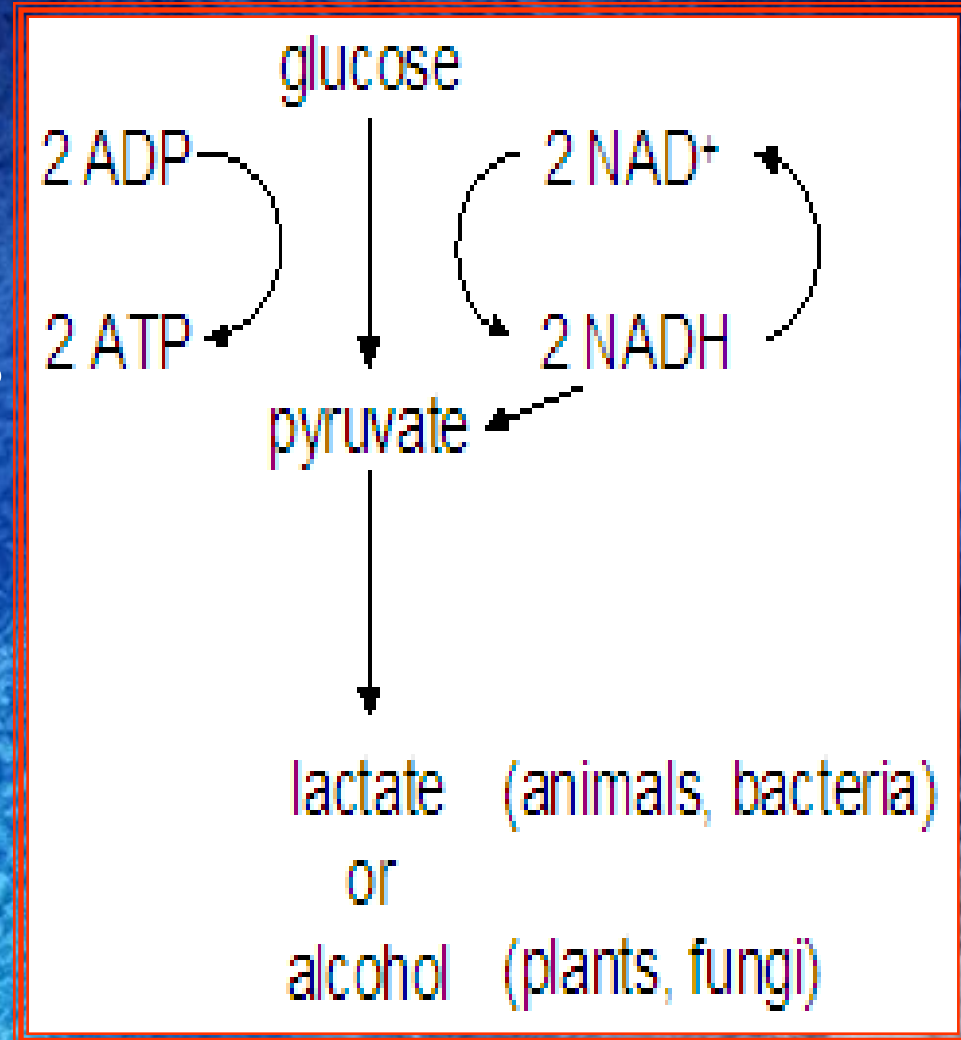
Sources of Energy

- Cells will use...
 - Glucose first.
 - Lipids are used second.
 - Proteins are used third.
- They enter the cellular respiration pathway at different stages.
- Without ATP the cell dies within seconds.



Anerobic Cellular Respiration

- Takes place in the **absence** of oxygen
- Common in prokaryotic organisms (bacteria)
- Two major types of anaerobic respiration
 - **Lactic acid fermentation**
 - **Alcoholic fermentation**



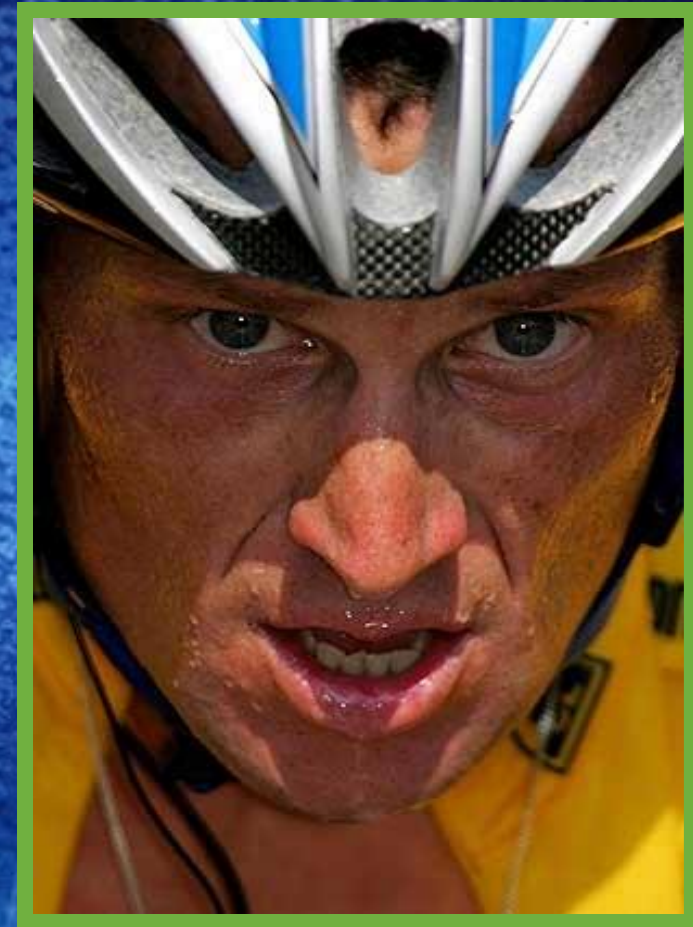
Lactic Acid Fermentation

- Occurs during vigorous exercise when O_2 is in short supply.
- After glycolysis, the pyruvic acid is converted into lactic acid.
- Lactic Acid is toxic and must be removed by delivering O_2 to the cells. This is why you breath heavily after a sprint



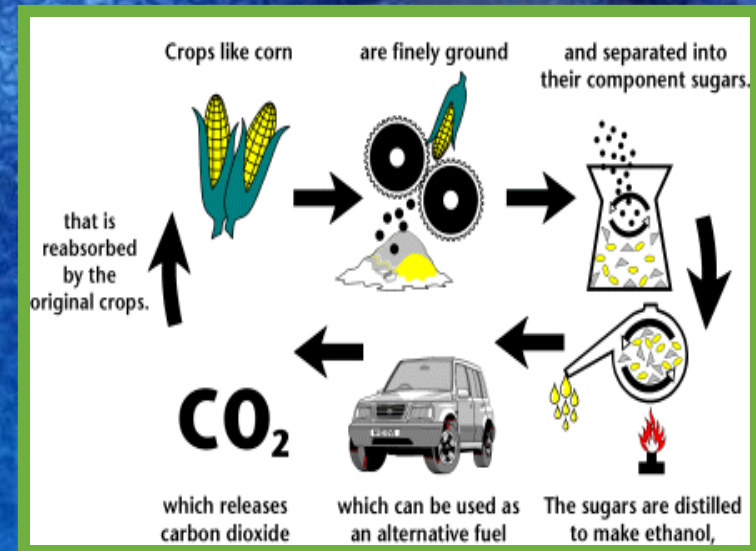
Lactic Acid Fermentation

- Elite athletes can tolerate higher L.A. levels in their blood.
- Eg. Lance Armstrong 4x the normal threshold!
- This process is also used to make cheese and yogurt.



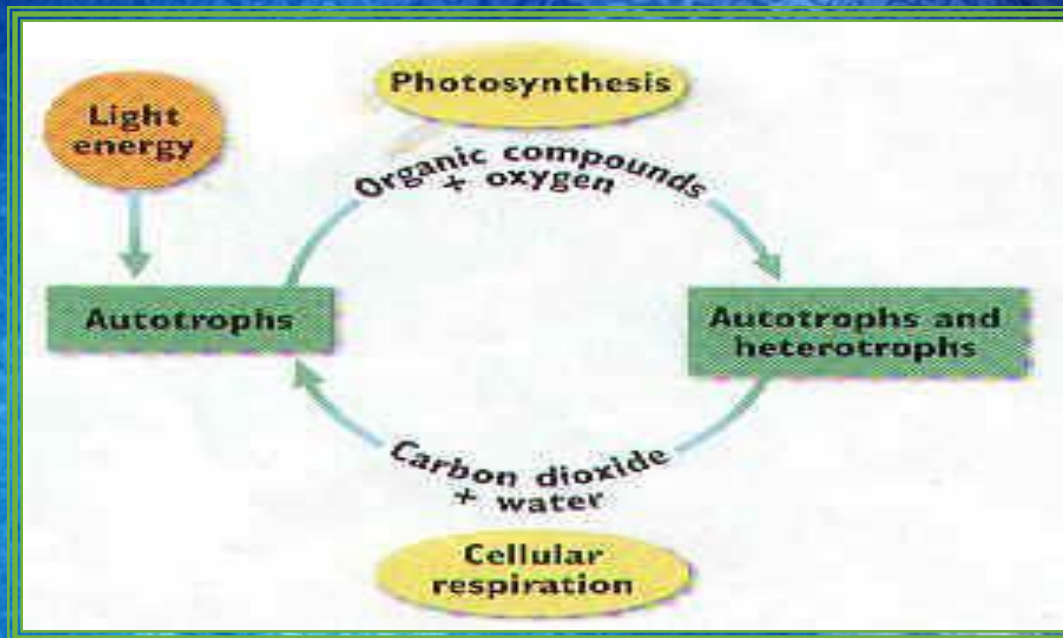
Alcoholic Fermentation

- Occurs in cytoplasm of yeast cells.
- After glycolysis, pyruvic acid is converted to CO_2 and alcohol.
- Ethanol could be a valuable, clean burning fuel for industry and transportation.



Complementary Processes

- The energy that fuels life on earth cycles between Photosynthesis and Cellular Respiration.
- The products of each process become the substrates for the other.



Homework

- Answer 1-5 on page 76
- Answer 1,2,5 – 8 on page 82

