# COMPARING PHOTOSYNTHESIS AND CELLULAR RESPIRATION

Photosynthesis and cellular respiration are closely related to one another. In plants and other autotrophs, both processes may occur within individual cells. This is possible because plants contain mitochondria and chloroplasts. Animals and other heterotrophs undergo cellular respiration, but not photosynthesis. Nevertheless, heterotrophs require the products of photosynthesis to carry out cellular respiration. Photosynthesis uses the products of cellular respiration, and cellular respiration uses the products of photosynthesis (**Figure 1**).

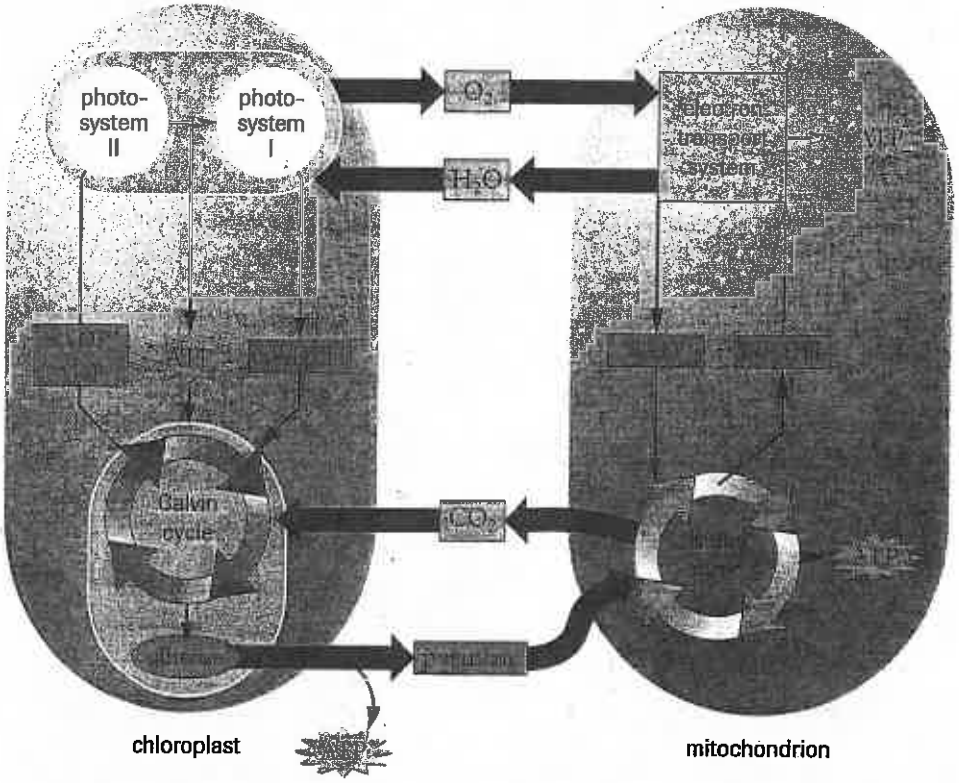


**Figure 1**
The food/energy cycle. Photosynthesis uses the products of cellular respiration and cellular respiration uses the products of photosynthesis.

Photosynthesis and cellular respiration are related in several other ways:

- The Calvin cycle includes reactions similar to reactions in cellular respiration but in reverse (Glycolysis and Kreb's cycle)
- Both photosynthesis and cellular respiration rely on carrier molecules to capture hydrogen ions & electrons to be carried to transport chains
- Both rely on electron transport chains to release energy in controlled amounts

| | Photosynthesis | Respiration |
|---|---|---|
| Site of Process In the Cell | Chloroplast | Mitochondrion |
| Raw Materials Used | $CO_2$<br>$H_2O$ | $C_6H_{12}O_6$<br>$O_2$ |
| Primary Energy Source | Solar energy | ATP |
| Products Useful To the Cell | $C_6H_{12}O_6$ | Energy (ATP) |
| Bi-products of The Process | $O_2$<br>$H_2O$ | $H_2O$<br>$CO_2$ |