**Handout 2**

**Photosynthesis**

The production of glucose in photosynthesis can be summarized by the following equation:

6 CO2 + 12 H2O + light à C6H12O6 + O2 + H2O carbon dioxide + carbon dioxide +water + light energy à glucose + oxygen gas + water

Let’s break this equation down a little bit. On the left side of the equation, where does the carbon dioxide come from? It is present in the air, and is brought into the plant through tiny pores in the leaf called stomata. How about water, where does it come from? It comes from the soil, and is drawn in by the roots. And, as mentioned above, the light comes from the sun, and provides the energy for the chemical reaction between carbon dioxide and water. On the right side of the equation, notice that photosynthesis gives off oxygen, the very substance we need to breathe. As we will see later, oxygen is a necessary component of cellular respiration. This is why the word ‘respiration’ is used for both breathing and for the release of energy from glucose molecules.

**Cellular Respiration**

How do plants and animals use the energy stored in glucose? Cellular respiration! While only plants can photosynthesize, all organisms perform some kind of respiration. Respiration is the breakdown of glucose in the presence of oxygen and can be summarized by the following equation:

C6H12O6 + 6 O2 --> 6 CO2 + 6 H2O

Glucose + Oxygen = Carbon dioxide + water

Notice that oxygen is required for cellular respiration, which is why we breathe it in, and that carbon dioxide is one of the waste products. Notice also that this is the reverse of photosynthesis, where carbon dioxide is taken in and oxygen is a product. In other words, we exist in a beautiful mutualism with plants – they provide us with exactly what we need and vice versa!