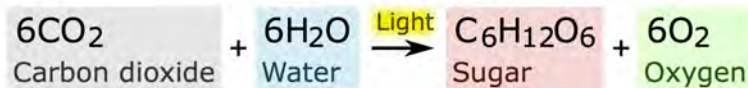
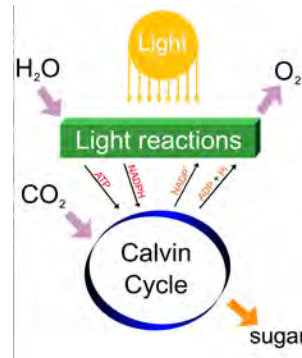
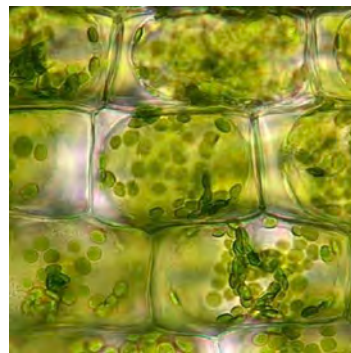


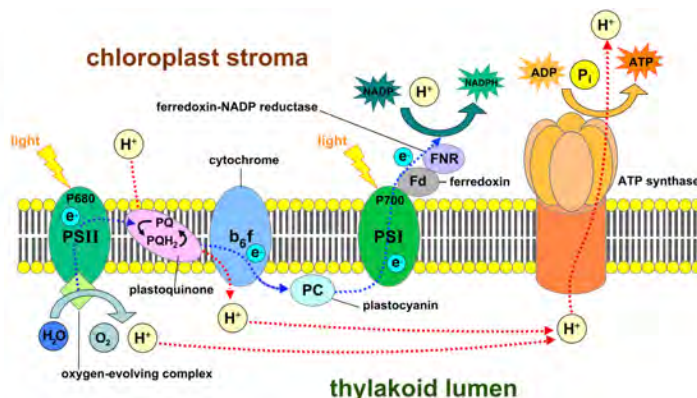
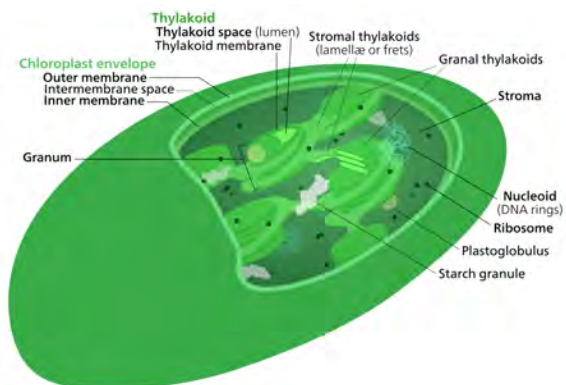
*** sugar ***

Sugar is sweet to the tongue. Whether human or honeybee, it's a taste we know at once ... and when the source is found, we return for more. Glucose and fructose are two common sugars - and they are ancient molecular structures. Once photosynthesis arrived on the planet (see [*starlight*](#)), glucose production became central to the capture of solar energy for later use in the biosphere. The importance of glucose production is reflected in the fact that the core enzyme involved in its manufacture, **RuBisCo**, is the *most abundant enzyme on the planet*.

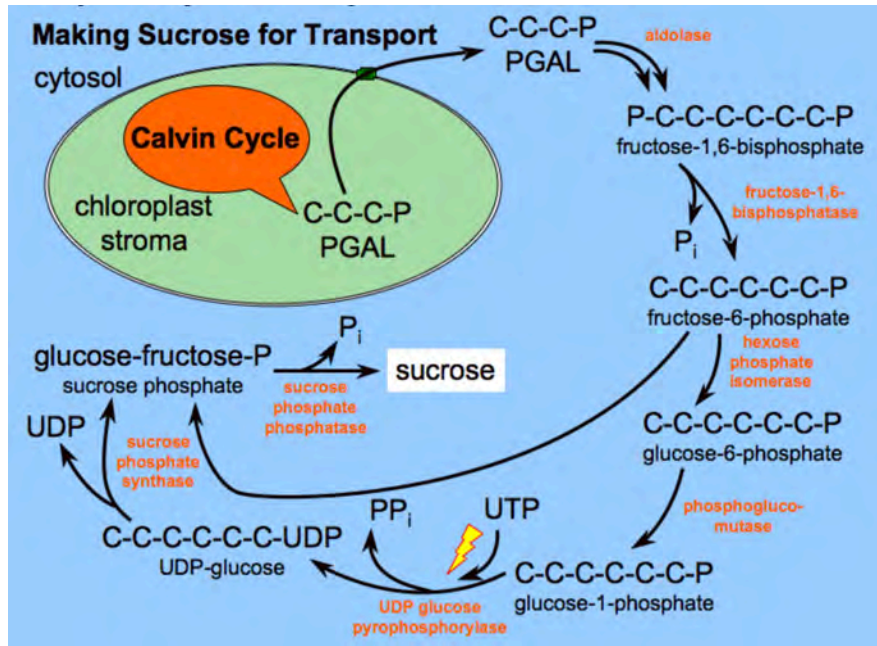
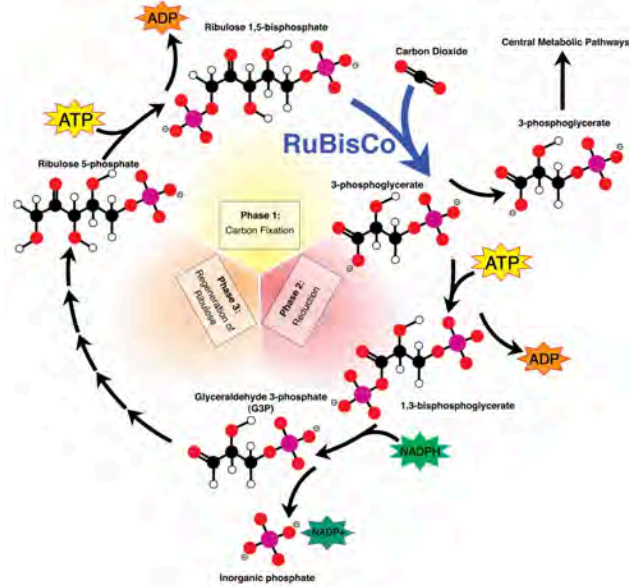
Here is the light-powered reaction sequence by which sugars are made from carbon dioxide and water:



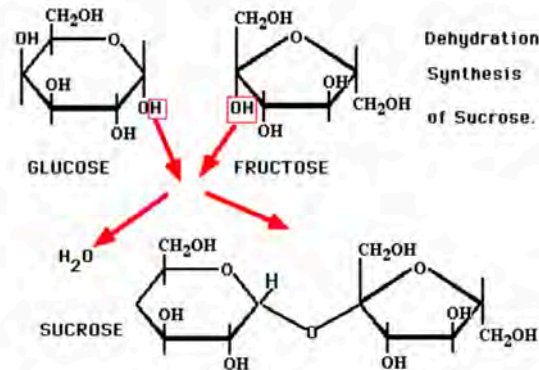
Realize that “*photosynthesis*” is better termed “*photophosphorylation*”, because the energy of light is actually being used *not* to make sugar directly, but rather to *generate an H⁺ gradient across a membrane*. This drives phosphorylation of ADP to **ATP**, the energy currency of living systems. In other steps, the **ATP** is used to power the reactions of glucose production. Here’s a view of activity on the chloroplast stromal membrane:



With **ATP** available to drive the reactions, here is what occurs next:



1. **Sucrose** aka cane sugar is made of glucose + fructose snapping together to form a disaccharide.



Cane sugar is sweet to humans ... and to honeybees:

