reduce it to an Aldehyde].

- This aldehyde can be chemically modified easily without an energy input. This aldehyde is localized in this particular system only. Can take the aldehyde. combine them to make 6 Carbon by taking the energy associated with the reducing equivalent and combine it in different Carbon lengths and can be eventually converted to the substrate Ribulose 1, 5 diphosphate [Converted to Ribulose 5 Phosphate which can then be phosphorylated to Ribulose 1, 5 diphosphate]
- The ATP and NADPH are the two molecules that are required for this process to occur which have been generated from the Light reaction.
- There is an additional complexity associated with this entire process which has to do with a serious mistake on the part of photosynthesizing organisms. Mistake is that they created this garbage in the photosynthetic process which wasn't needed. Oxygen, was an undesirable product. It helped us but was a problem in the carboxylation reaction. Problem is that the co2 molecule is not all that different from an oxygen molecule. The O2 is basically too high in concentration. The 21% Oxygen is a lot more than the levels of CO2. that means that when the enzyme that does this operation can be fooled in using O2 instead of CO2. The rubisco enzyme does this.
- The Carboxylation, Cyclic Regeneration now has an Oxygen Problem.
- Ribulose 1,5 bisphosphate carboxylase oxygenase. Carboxylase for the carboxylation reaction and oxygenase for the oxygen reaction. Issue is that if you take the ribulose 1,5 diphosphate and add an oxygen molecule instead of a CO2; it creates 2x 3 PGA + a glycolate [2 C molecule] which causes no net Carbohydrate formation by the photosynthetic organism. Requires a lot of energy to form a 3C molecule again.
- Organisms over the past 500 years have developed ways to deal with the oxygen problem by utilizing alternative ways of utilizing the oxygen molecule.
- When CO2 is in the gaseous form it is fairly similar to O2 molecule which fools the enzyme especially when the O2 is in such a high concentration. Used a different carboxylation reaction which uses O2 in a different form. CO2 binds with water and creates bicarbonate [HCO3-]. If this CO2 is dissolved in water, its present as a bicarbonate anion. A completely different biochemical species that is utilized by these organisms. Organisms have now taken Phosphoenol pyruvate using the enzyme [phosphoenol pyruvate carboxylase - 3C] which can capture the carbonate anion to create an oxaloacetate [4C].