Keynote Lectures

[KN2] Chaperones for the Folding, Assembly, and Activation of RuBisCO.

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Life on earth is dependent on the ability of photosynthetic organisms to sequester inorganic carbon dioxide of the atmosphere into organic carbon via the Calvin-Benson-Bassham (CBB) cycle. The key enzyme responsible for this process is ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCO), the most abundant protein in nature. It is also arguably the most important protein, since all biomass, and thus all food source, results either directly or indirectly from the action of RuBisCO. Despite its central role in biomass production, RuBisCO is an inefficient enzyme and also catalyses the wasteful reaction of photorespiration (oxygen as the substrate instead of carbon dioxide). Recent forecasts suggest that global food production will need to rise more than 30% by 2050 to meet the ever increasing demand of the growing human population. Hence, engineering a more efficient RuBisCO enzyme will be important to increase agricultural output and may also be useful in controlling the greenhouse gas induced climate change. However, efforts to evolve RuBisCO must take into account the complex cellular pathways and machineries for fits folding, assembly and activation. I will discuss our recent structural and functional analysis of the molecular chaperones that mediate RuBisCO biogenesis and maintenance, specifically the assembly chaperone RbcX and the AAA+ chaperone RuBisCO activase [1-5].

References:

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