

## **PHOTOSYNTHESIS: FROM FIRST BIOMOLECULES TO C4-PLANTS**

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Modern photosynthesis is performed by complex chlorophyll-containing photosystems. Comparative genomics allows us to trace back the origin of photosystem proteins towards the primitive photoprotective proteins composed from many identical chlorophyll-binding domains. Biophysical experiments have shown that many other molecules, including ATP, uracyl, flavins, pterin, NAD, melanin and others, capable of conversion of the light energy into biochemically available forms, usually redox gradients. Some inorganic compounds, such as zinc sulfide and titanium oxide, are also effective drivers of photochemical redox reactions and could have been played important roles in the energetic cycles of the most ancient living systems. We will trace the evolution of photosynthesis from the precellular hypercycles to the C4 carbon fixation of the most advanced plants and its place in the broader context of the evolution of bioenergetic systems.