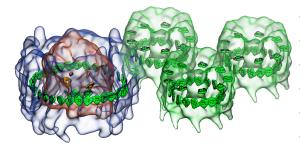
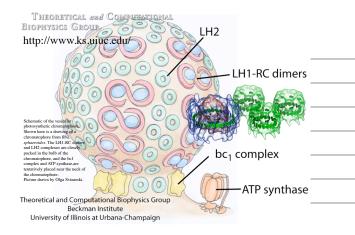
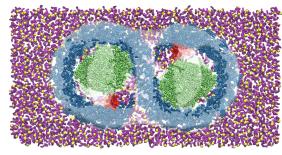
Theoretical *and* Computational Biophysics Group

LHC-1 Reaction Center and LHC2s http://www.ks.uiuc.edu/

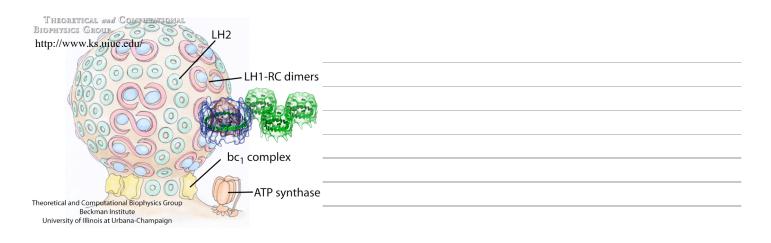




Reaction Centers and Light-Harvesting Complexes within the Chloroplast Membrane



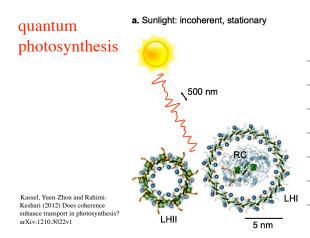
Jen Hsin, James Gumbart, Leonardo G. Trabuco, Elizabeth Villa, Pu Qian, C. Neil Hunter, and Klaus Schulten. Protein-induced membrane curvature investigated through molecular dynamics flexible fitting. Biophysical Journal, 97:321-329, 2009. (PMC: 2711417)



quantum photosynthesis

Why I refuse to teach quantum tunneling mechanisms in Photosynthesis

$$\tau_{DA} = \frac{2\pi}{\hbar} \sum_{m \in D} \sum_{n \in A} \frac{e^{-E_m^D/k_B T}}{\sum_{l \in D} e^{-E_l^D/k_B T}} |V_{mn}^{DA}|^2 \int dE S_m^D(E) S_n^A(E)$$



b. An inaccurate picture:



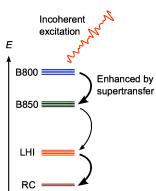
Kassel, Yuen-Zhou and Rahimi-Keshari (2012) Does coherence enhance transport in photosynthesis? arXiv:1210.5022v1

photosynthesis

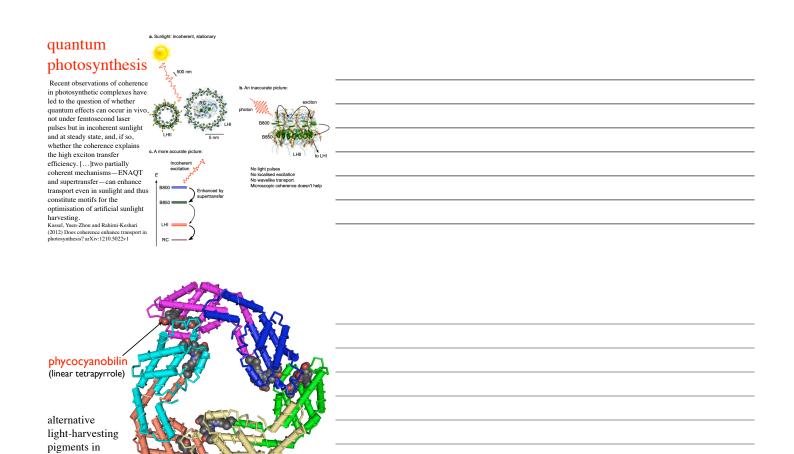
quantum

No light pulses No localised excitation No wavelike transport Microscopic coherence doesn't help

c. A more accurate picture:



Kassel, Yuen-Zhou and Rahimi-Keshari (2012) Does coherence enhance transport in photosynthesis? arXiv:1210.5022v1

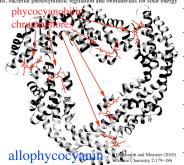


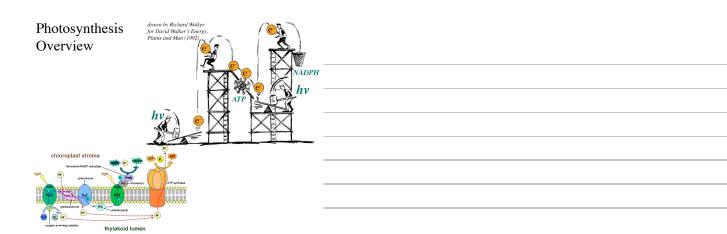
We observe a complex relationship between fluorescence intensity and lifetime that cannot be explained by simple static kinetic models. Light-induced conformational changes are shown to occur and evidence is obtained for fluctuations in the spontaneous emission lifetime, which is typically assumed to be constant. Our methods provide a new window into the dynamics of fluorescent proteins and the observations are relevant for the interpretation of *in vivo* single-molecule imaging experiments, bacterial photosynthetic regulation and biomaterials for solar energy harvesting.

Goldsmith & Moerner (2010) Watching conformational- and photodynamics of single fluorescent proteins in solution. Nature Chemistry2:179–186

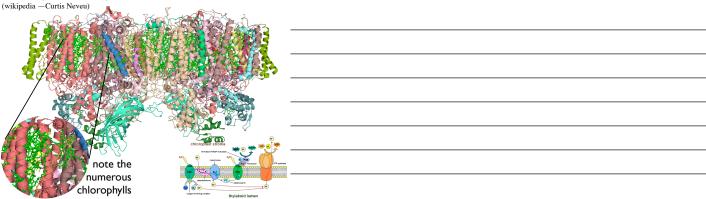
photosynthesis

alternative light-harvesting pigments in photosynthesis

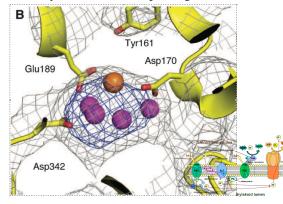




Photosystem II (cyanobacteria) (wikipedia – Curtis Neveu)



Photosystem II (water-splitting site)



Photosystem I (plants) (wikipedia – Curtis Neveu)

