GFP-like structures in the PDB – Yellow Chemistry and Proton Pumps

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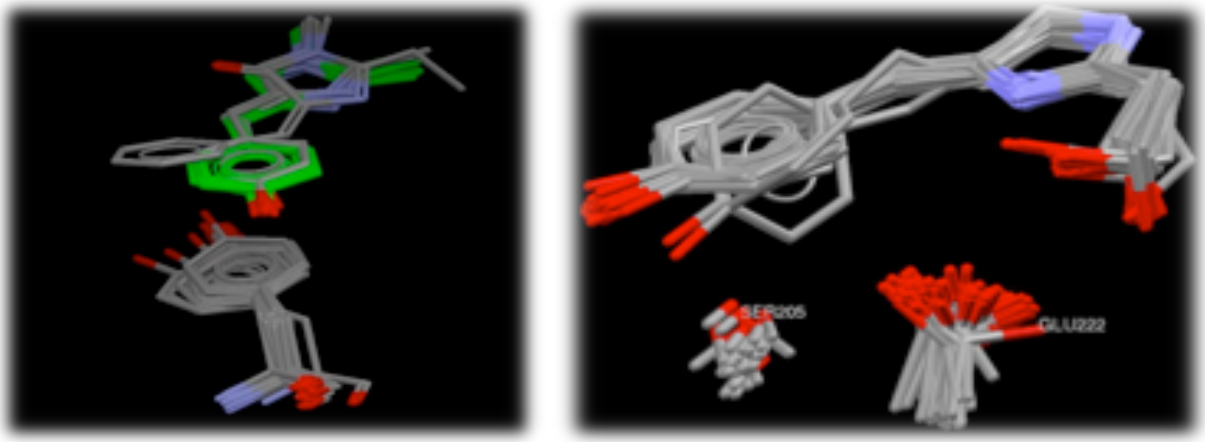
The RCSB protein databank contains 266 crystal structures of green fluorescent proteins (GFP) and GFP-like proteins. We have used the pdb to undertake the first systematic analysis of the GFP-like structures. Amongst other things we have examined the underlying causes of the blue shift produced by the Thr203Tyr mutation in GFP and the increased fluorescence of the resulting yellow fluorescent protein. Thr203 can act as a nanoswitch to open excited state proton transfer. In *Aequorea victorea* the fluorescent proteins can act as a calcium activated proton pump. However, the required proton chain (see below) is only found in Aequorean jellyfish leading us to conclude that the proton pump is only a secondary function of fluorescent proteins.



Isostar plots of all YFPs (left) and all proton-chains in all the GFP-like proteins found in the protein databank.