

Searching for the Function of Naturally Occurring Fluorescent Proteins

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Martin Chalfie, Osamu Shimomura, and Roger Y. Tsien were awarded the 2008 Nobel Prize in Chemistry for their discovery and development of the green fluorescent protein (GFP). Its use has become ubiquitous in molecular biology. GFP was originally found in *Aequorea victoria*, the crystal jellyfish. Since then it has been found in 262 other species ranging from sea pansies to corals.

The purpose of this experiment was to examine the difference between naturally occurring fluorescent proteins and those created as sensor molecules, in order to determine the function of fluorescent proteins in nature. All the fluorescent proteins in the Protein Databank were aligned and superimposed to examine the conservation of each amino acid and their location on the GFP. Amino acids that occurred with a conserved with a frequency >85% were recorded with their sequence number. The analysis showed that glycines were strongly conserved across all species, possibly because they are very flexible. Amongst FP with known structures the conserved glycines also had the lowest RMSD values, meaning they did not move.

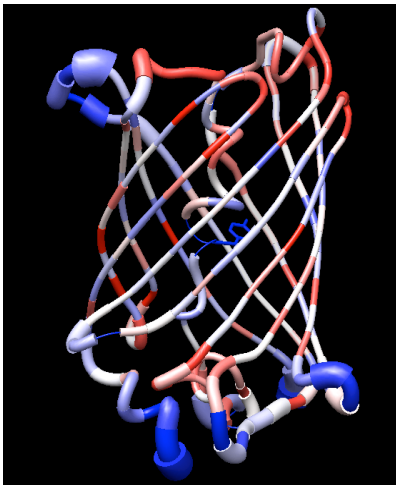


Fig 1. Red segments indicate regions with high conservation. Blue segments show regions with low amino acid frequency. Smaller width segments indicate amino acids that do not move much when compared to other structures. Bigger width segments show amino acids that move a significant amount.

Fluorescent Proteins		
	Crystalized	Non-Crystalized
Wild-type	30	263
Mutant	297	-