

Structural Investigations of GFP-like Proteins

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Green Fluorescent Protein (GFP) from *A. Victoria* is an 11 stranded beta-barrel protein with a cyclic tri-peptide chromophore. Encoded by a single gene, GFP is self folding and has an autocatalytic mechanism of chromophore formation.

The intrinsic pigmentation and fluorescence properties of GFP-like proteins arise from their all-protein chromophores, with their differing spectral properties due to their unique chromophore structures and environments of each protein. Understanding GFP-like protein structure and related function is of fundamental interest.

The GFP-like proteins under investigation include a highly fluorescent, moderately fluorescent and two non fluorescent proteins, eqFP611, HcRed, KFP and Rtms5 respectively. All of which have strong sequence and structural homology to both GFP and a red fluorescent protein from *Discosoma* coral (DsRed). I have solved high resolution crystal structures of KFP, eqFP611 and HcRed. From structural comparisons between previously solved structures, Rtms5, DsRed and GFP.

By the detailed investigation of several GFP-like proteins through their structural determination and characterization I am gaining an understanding of the dynamic nature of the GFP-like protein family. It is anticipated that we will expand the current understanding of chromophore structure in conjunction with related protein fluorescence, subsequently aiding the development of novel GFP-like protein applications.

Keywords: GFP, protein cyrstallography, chromophore structure