

Structural Characterization of a Zinc-Coordinated Bis-Histidine Heme-Binding Site in The DUF2470 Cyanobacterial Protein

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A large family of domain of unknown function (DUF)-containing proteins was recently identified by phylogenomic studies to bind to heme. DUF2470 and related subfamilies of phototroph-specific homologs have diverse heme-related functions, but the structure-function link of DUF2470 itself had yet to be determined. In *Synechocystis*, DUF2470 forms single domain proteins and were discovered to bind heme and zinc ions, generating a unique two-fold symmetric, zinc-bound bis-histidine heme site. Structural and spectroscopic characterizations of the wild-type and variants lacking conserved histidine residues elucidate the importance of zinc-binding and histidine residues for heme-binding activity. Results here supplement *in vivo* experiments and observed phenotypes that implicate DUF2470 in heme-dependent regulation of electron transport chains.