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Crystal Structure of Trehalose-6-phosphate Phosphatase Related Protein. Krishnamurthy N. Rao, Subramanyam Swaminathan, Biology Dept., Brookhaven National Laboratory, Upton, NY 11973 USA.

Trehalose-6-phosphate phosphatases catalyze de-phosphorylation of trehalose-6-phosphate (T6P) to trehalose and orthophosphate. Synthesis of trehalose, a common disaccharide crucial for organism survival under stress conditions, is dependent on trehalose phosphatase. Here, we report crystal structure of trehalose-6-phosphate phosphatase related protein (T6PP) from *Thermoplasma acidophilum*, determined by dual-wavelength anomalous diffraction (DAD) method. It represents the first structure of the trehalose 6-phosphate phosphatase family. T6PP possesses a core domain of known α/β hydrolase fold, and a cap domain. An active site magnesium ion and a glycerol molecule bound at the interface between the two domains provide insight into the mode of substrate binding by T6PP. A trehalose-6-phosphate molecule modeled into a cage formed by the two domains makes favorable interactions with the protein molecule. We have confirmed that T6PP is a trehalose phosphatase from amino acid sequence, three dimensional structure, and biochemical assays.

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