Crystal Structure Of Indole-3-Glycerol Phosphate Synthase From *Thermus Thermophilus* HB8

Bagautdin Bagautdinov, Yayoi Fujimoto, Tahir H Tahirov

(*Highthroughput Factory, RIKEN Harima Institute*)

e-mail:bagautdi@spring8.or.jp

The biosynthesis of tryptophan requires seven enzymatic functions to convert chorismate into tryptophan. Indol-3-glycerol phosphate synthase (IGPS) is the fifth reaction in this pathway. IGPS catalyses the ring closure of an N-alkylated anthranilate to a 3-alkyl indole derivative. The chemical reaction presumably consists of a sequence of condensation, decarboxylation and dehydration and requires heating with Lewis acids. It is practically irreversible, due to both the formation of the pyrrole ring of the indole and the release of CO_2. Here we present the crystallization and crystal structure analysis of IGPS from *Thermus thermophilus* HB8 (*Tt*IGPS). The crystals were obtained with a reservoir solution consisting of ammonium sulfate 1.93M, acetate acid and NaOH (pH 4.96). The space group for the crystal was $P2_12_12_1$ with lattice parameters: a=63.652, b=78.193, c=93.523 Å. The x-ray structure has been determined by molecular replacement and refined to a crystallographic residual of 18.6% at 1.8Å resolution. Phases were obtained using the refined structure of indol-3-glycerol phosphate synthase from *Sulfolobus solfataricus* (*Ss*IGPS) [1]. The overall structure of *Tt*IGPS consists $(\beta/\alpha)_8$-barrel fold and here are two molecules of 254 amino acid residues each in the asymmetric unit. Most of important atoms surrounding the active site in *Ss*IGPS are conserved in *Tt*IGPS. To understanding the stability property we have compared the structure of *Tt*IGPS with the known structures of the thermostable IGP synthases from *Sulfolobus solfataricus* (*Ss*IGPS), from *Thermotoga maritima* (*Tm*IGPS) [2,3] and the relatively thermolabile *Ec*IGPS from *Escherichia coli* [4,5].

References

1. Hennig M., Darimont B.D., Jansonius J.N., Kirschner K. *J.Mol.Biol*.(2002) **319**, 757-766.
2. Merz, A., Knochel, T., Jansonius, J.N., Kirschner K. *J. Mol. Biol*. (1999) **288**, 753-763.
3. Knochel, T., Pappenberger, A., Jansonius, J.N., Kirschner K. *J. Biol. Chem*. (2002) **277**, 8626-8634.
4. Wilmanns, M., Priestle, J.P., Niermann, T., Jansonious, J.N. *J. Mol. Biol*. (1992) **223**, 477-507.
5. Ivens, A., Mayans, O., Scadkowskii H., Jurgens C., Wilmanns, M., Kirschner, K. *Eur. J. Biochem*. (2002) **269**, 1145-1153.