

Short Talk 9, Annika Söderholm - Structure and substrate specificity of the tryptophan biosynthesis enzyme IGPS from *Pseudomonas aeruginosa*

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In bacteria, tryptophan synthesis is performed by the enzymes encoded in the *trp* operon. The product of the *trpC* gene, indole-3-glycerol phosphate synthase (IGPS) catalyzes the indole-forming reaction of tryptophan synthesis. The reaction mechanism includes a decarboxylation step of the substrate 1-(*o*-carboxyphenylamino) 1-deoxyribulose 5-phosphate (CdRP). The decarboxylation has been assumed to constitute an essential step of the mechanism since no activity with the decarboxylated variant of the substrate, phenylaminodeoxyribosephosphate

(PAdRP), was observed in an early study on IGPS from *Escherichia coli* (Smith and Yanofsky, 1962).

In this study, we demonstrate enzyme-catalyzed formation of the native product IGP from decarboxylated substrate PAdRP using IGPS from *Pseudomonas aeruginosa*. Moreover, the crystal structure of *P. aeruginosa* IGPS in complex with a substrate analogue was solved to 2.1 Å resolution. By structural comparison to *E. coli* IGPS (Wilmanns et al., 1992), we provide structure-based hypotheses on the difference in substrate specificity between the *E. coli* and *P. aeruginosa* homologs.

References:

Smith, B. O. H. and Yanofsky, C. (1962) 'Enzymes Involved in the Biosynthesis of Tryptophan', *Methods Enzymol.*, 5, pp. 794–806.

Wilmanns, M. et al. (1992) 'Three-dimensional structure of the bifunctional enzyme phosphoribosylanthranilate

isomerase: Indoleglycerolphosphate synthase from *Escherichia coli* refined at 2.0 Å resolution', *Journal of Molecular Biology*, 223(2), pp. 477–507.

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