4-Hydroxyphenylglycine biosynthesis in *Herpetosiphon aurantiacus*: a case of gene duplication and catalytic divergence.

Kastner S, Müller S, Natesan L, König GM, Guthke R, Nett M (2012) 4-Hydroxyphenylglycine biosynthesis in *Herpetosiphon aurantiacus*: a case of gene duplication and catalytic divergence. *Arch Microbiol* 194(6), 557-566.

Details

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Abstract

The nonproteinogenic amino acid 4-hydroxyphenylglycine (HPG) arises from the diversion of the tyrosine degradation pathway into secondary metabolism, and its biosynthesis requires a set of three enzymes. The gene cassette for HPG biosynthesis is widely spread in actinomycete bacteria, which incorporate the amino acid as a building block into various peptide antibiotics, but it has never been reported from another taxonomic group of eubacteria. A genome mining study has now revealed a putative HPG pathway in the predatory bacterium Herpetosiphon aurantiacus, which is phylogenetically distinct from Actinomycetes. Anomalies in the active center of one annotated key enzyme raised questions about the true product of this pathway, prompting an in vitro reconstitution attempt. This study confirmed the capability of H. aurantiacus for HPG production. Sequence analysis of the aberrant 4-hydroxymandelate synthase refines the existing model on the catalytic differentiation of iron(II)-dependent dioxygenases. Furthermore, we report a comprehensive analysis on the phylogeny of these enzymes, which sheds light on the evolution of

paralogous gene sets and the ensuing metabolic diversity in a barely studied bacterium.

Beteiligte Forschungseinheiten

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