

TABLE OF CONTENTS

The TyrA family of aromatic-pathway dehydrogenases in phylogenetic context

Abstract	Page 1
Background	Page 2
Results and Discussion	Page 2
Background of TyrA diversity	Page 2
Phylogenetically congruent TyrA groupings	Page 2
Multiple alignments of catalytic-core domains	Page 2
Congruency within major clades	Page 4
Proteobacteria	Page 4
Comparison of tryptophan and tyrosine congruency groups	Page 8
Distribution in Nature of TyrA specificity subclasses for the cyclohexadienyl substrate	Page 9
Cyclohexadienyl dehydrogenases	Page 10
Arogenate dehydrogenases	Page 10
Prephenate dehydrogenases	Page 12
PapC dehydrogenases	Page 12
The “redundant” <i>trp/aro</i> supraoperon of Nostoc/Anabaena	Page 12
Profile hidden Markov models (HMMs) to distinguish specificity subfamilies for cyclohexadienyl substrate	Page 13
The catalytic-core domain of TyrA proteins	Page 14
Specificity for the pyridine nucleotide co-substrate within the TyrA superfamily	Page 14
Beyond the catalytic core: allosteric domains	Page 15
The <i>tyrA</i> gene is a popular fusion partner	Page 16
Fusion with <i>aroQ</i>	Page 16
Fusion with <i>aroF</i>	Page 16
Fusion with <i>hisH_b</i>	Page 16
Fusion with ACT	Page 17
Fusion with REG	Page 17
A novel 4-domain fusion	Page 17
<i>tyrA</i> in its syntenic context	Page 17
Zooming in on syntenic contexts of Proteobacteria	Page 21
Beta Proteobacteria and upper-gamma Proteobacteria	Page 21
The enteric lineage	Page 22
TyrA in its context of regulation	Page 23
TyrR regulon	Page 23
PhhR in relationship to aromatic catabolism	Page 23
Relationship of TyrR and PhhR	Page 23
Regulation by attenuation	Page 26
Conclusion	Page 27
Methods	Page 27
TyrA sequences	Page 27
Congruency groupings	Page 28
Alignments	Page 28
Profile Hmms	Page 28
Appraisal of gene fusions as one-time or multiple events	Page 28
Authors’ contributions	Page 28
Additional material	Page 28
Additional file 1	Page 28
Acknowledgements	Page 29
References	Page 29