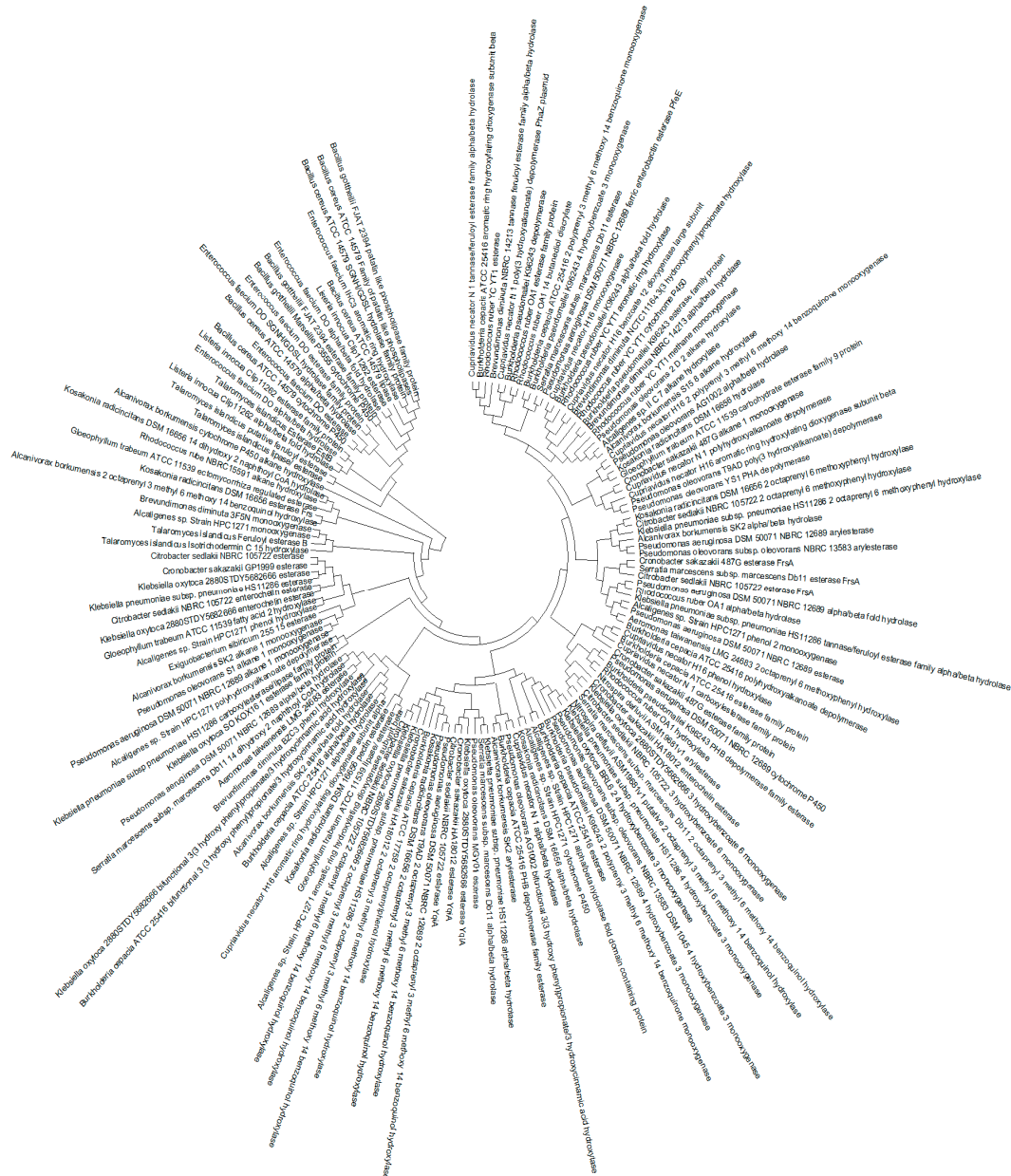


# Potential for and Distribution of Enzymatic Biodegradation of Polystyrene by Environmental Microorganisms

Liyuan Hou and Erica L.-W. Majumder



**Figure S1.** Phylogenetic tree of DNA sequences of all subclass enzymes from target microorganisms listed in Table 2 including cytochrome P450, monooxygenase, aromatic ring hydroxylase, esterase, and alpha/beta hydrolase.

**Table S1.** Potential PS degrading microorganisms and representative enzymes listed in the literature.

Kingdom	Species	Representative Potential Enzymes
Bacteria	<i>Bacillus cereus</i> ATCC 14579	Alpha/beta hydrolase, SGNH/GDSL hydrolase family protein, cytochrome P450
	<i>Cytobacillus gottheilii</i> ASM163634v1	Esterase family protein, cytochrome P450
	<i>Enterococcus faecium</i> DO	Alpha/beta hydrolase, SGNH/GDSL hydrolase family protein, aromatic ring hydroxylase, esterase family protein
	<i>Listeria innocua</i> Clip11262	Esterase family protein, alpha/beta fold hydrolase
	<i>Exiguobacterium sibiricum</i> 255-15	Esterase
	<i>Cupriavidus necator</i> N-1	Alpha/beta hydrolase, carboxylesterase family protein, polyhydroxyalkanoate depolymerase, phenol hydroxylase, monooxygenase, aromatic ring-hydroxylating dioxygenase subunit alpha
	<i>Burkholderia cepacia</i> ATCC 25416	Esterase family protein, alpha/beta fold hydrolase, polyhydroxyalkanoate depolymerase, PHB depolymerase family esterase, 2-polyprenyl-3-methyl-6-methoxy-1,4-benzoquinone monooxygenase
	<i>Burkholderia pseudomallei</i> K96243	PHB depolymerase family esterase, depolymerase, alpha/beta hydrolase, 2-polyprenyl-3-methyl-6-methoxy-1,4-benzoquinone monooxygenase
	<i>Klebsiella pneumoniae</i> subsp. <i>pneumoniae</i> HS11286	Alpha/beta hydrolase, carboxylesterase/lipase family protein, 2-octaprenyl-3-methyl-6-methoxy-1,4-benzoquinol hydroxylase, 4-hydroxybenzoate 3-monooxygenase, 2-octaprenyl-6-methoxyphenyl hydroxylase
	<i>Kosakonia radicincitans</i> DSM 16656	Hydrolase, alpha/beta hydrolase, 2-octaprenyl-6-methoxyphenyl hydroxylase, 2-octaprenyl-3-methyl-6-methoxy-1,4-benzoquinol hydroxylase
	<i>Cronobacter sakazakii</i> ASM98282v1	Esterase, esterase family protein, 2-octaprenyl-3-methyl-6-methoxy-1,4-benzoquinol hydroxylase, alkane 1-monooxygenase
	<i>Klebsiella oxytoca</i> ASM102219v1	Esterase, esterase family protein, 2-octaprenyl-3-methyl-6-methoxy-1,4-benzoquinol hydroxylase, bifunctional 3-(3-hydroxyphenyl)propionate/3-hydroxycinnamic acid hydroxylase, 4-hydroxybenzoate 3-monooxygenase
	<i>Citrobacter sedlakii</i> NBRC 105722	Esterase, 2-octaprenyl-6-methoxyphenyl hydroxylase, 2-octaprenyl-3-methyl-6-methoxy-1,4-benzoquinol hydroxylase, 3-hydroxybenzoate 6-monooxygenase
	<i>Alcaligenes</i> sp. Strain HPC1271	polyhydroxyalkanoate depolymerase, alpha/beta hydrolase, aromatic-ring-hydroxylating dioxygenase subunit beta, monooxygenase, phenol 2-monooxygenase, phenol hydroxylase, cytochrome P450
	<i>Aeromonas taiwanensis</i> LMG 24683	Esterase, 2-octaprenyl-6-methoxyphenyl hydroxylase
	<i>Brevundimonas diminuta</i> 48290_B02	Alpha/beta hydrolase, monooxygenase, phenol hydroxylase
	<i>Serratia marcescens</i> subsp. <i>marcescens</i> Db11	Esterase, alpha/beta hydrolase, 2-octaprenyl-3-methyl-6-methoxy-1,4-benzoquinol hydroxylase
	<i>Pseudomonas aeruginosa</i> PAO1	Esterase, alpha/beta hydrolase, 4-hydroxybenzoate 3-monooxygenase, cytochrome P450, alkane 1-monooxygenase
	<i>Rhodococcus ruber</i> ASM274172v1	Esterase, alpha/beta hydrolase, aromatic ring hydroxylase, cytochrome P450, alkane hydroxylase
	Eukaryota	<i>Gloeophyllum trabeum</i>
<i>Talaromyces islandicus</i>		Feruloyl esterase B, putative feruloyl esterase A

**Table S2.** DNA sequences of higher potential subclass enzymes from target microorganisms including cytochrome P450, monooxygenase, and aromatic ring hydroxylase.

Enzymes from Species	Accession NO.	
<i>Bacillus cereus</i> ATCC 14579_cytochrome P450	WP_000062123.1	<p>ATGTCAATGAAAAACAAAGTTGGGTAAAGCATAGAGGATGGCATTAAATTTAG            CTTCAGCTCAGTTTAAAGAAGATGCGTATGAAATTTATAAAGAATCGCGAAA            AAAACAACCTATATTATTTGTAAACCAAGTTGAAATCGGTAAAGAATGGCTC            ATTACTAGATATGAAGATGCTCTGCCACTTTTAAAAGATAATCGTTTAAAAAA            AGATTGGACAAATGTGTTTTCTCAAGATATAAAGAACATGTATCTTTCCGTTG            ATAATAGTGACCCTTAACAACACATATGCTAAATTCAGATCCACCTAACCA            CAGTCGTTTACGATCTTTAGTTCAAAAAGCTTTTACACCGAAGATGATTGCAC            AATTAGACGGAAGAATTCAGAGAATAGCAGATGATTTGATAAGTGATATAGA            GCGAAAAGGTACATTAATCTTGTGGATGATTATTCATTTCCATTACCAATTA            TTGTAATAAGCGAGATGCTCGGTATTCCAAAAGAAGATCAAGCGAAATTTAG            GATTTGGTCTCATGCTGTTATTGCATCACCGAAACACCTGAAGAAATAAAA            GAGACTGAAAAACAATCTGAATTTATTACATATCTTCAATATTTAGTTGA            TATTAAGAAAAGAGCCAAAAGAAGACTTGGTGAGTGCTTTAATACTTGCA            GAGAGTGAAGGGCATAAACTTAGCGCTCGGGAACCTATATTCAATGATAATGC            TATTAATTGTCGCAGGACATGAGACGACAGTGAATTTAATTACAAATACGGT            ATTAGCACTTCTTGAATAATCCAAATCAATTACAGTTATTAAGATAATCCAA            AACTAATTGATTCCGGCTATTGAGGAAGGATTGCGTTATTATTCTCCAGTTGAG            GTTACAACCTGCAAGATGGGCAGCGGAACCTTTTCAAATTCACCATCAAACAA            TACAGAAAGGAGATATGGTTATTATTGCATTGGCTTCAGCGAACCGTGATGA            AACAGTATTTGAAAATCCAGAAATATTTGATATTACACGGGAGAACAACCGT            CACATTGCCTTTGGTCATGGTAGTCATTTCTGCTTAGGAGCTCCACTTGCGAGG            TTAGAAGCAAAGATTGCTATTACTACTTTGTTAATCGAATGCCTGAACTACA            AATAAAAGGGAATCGTGAAGAAATTAATGGCAAGGTAACCTATTTAATGCGT            TCTTTAGAGGAATTACCTTTAACTTTCTAG            ATGACTGAAGTAAAACACTTTCCAAAAGAAGAGGGTCTCGATCATAGCCTTG            ATTTATTAAGAAGGCTATTTGTTTATTACAAATCGCAGTACTGCATTTCAA            TCAGATATTTTTGAAACACGCCTGCTGGGAGAGCGGGTTATTTGTCTGCGAGG            CAAGGAAGCTGCATCAATCTTTACGATACGCAGAAATTCAAACGAGAAGGT            GCAGCCCCAAATCGAATTCAGAAAACCTGTTAGGGAAAAACGGGGTACAA            TCACTGGATGGTGAAGCACATCAGCATCGGAAGGCAATGTTTATGTCGTTAAT            GACACCTGCTTCTCCAAAGAATGCGTGCTTTATAAAAAAAGAGTGGGAC            ATTGCGGCCAAGAAGTTTTCAAGAAAAGAAATTATCCTTTACGAAGAAG            CAAAAGGGTGCTTTGTAAAGCAGCTTGTGACTGGGCTGGTGTTCCTCTTAAA            GAGAACAATGTTGAGGAAACGGCCAATTTACTTGGATTACTATTTGAAACAC            CCGCAGCACTCGGCCCTAAGCATTGGCAAGGCAGACACGCACGGACAAAAT            TGGAAAAATGGCTTAAGGAATTAGTCATAGAAGTTCGAAACGGCAAATTCCT            CCTCCTGAAGATAAATCCTTATTCATTATTTCAAATCACCGCAATTTGGATG            GTGAGCTGCTTGTGACAGACATCGCCGCTGTTGAACTATTAATATTTGCGT            CCTATTGTCGCGGTAGCCGTGTATATTTGTTTTACGGCGCTTGCTGTATACCAG            CATCCAAAAGAAGCAGGCAAACCTGCGCGGGTATGATGAAAATCTTCTTCAGA            ACTTTGTACAAGAGGTCAGGAGATTTTATCCATTTTTTCCGTTTGCACCAGCA            AGAGTAAAAGCGGACTTCACATGGAATGGATATTTTGGAGAAAATACAT            TAACACTCCTCGATTTATATGGAACAAACCACCACCCTAAATTATGGGATAA</p>
<i>Bacillus gottheilii Marseille- P3555_cytochrome P450</i>	WP_080848536.1	<p>ATGACTGAAGTAAAACACTTTCCAAAAGAAGAGGGTCTCGATCATAGCCTTG            ATTTATTAAGAAGGCTATTTGTTTATTACAAATCGCAGTACTGCATTTCAA            TCAGATATTTTTGAAACACGCCTGCTGGGAGAGCGGGTTATTTGTCTGCGAGG            CAAGGAAGCTGCATCAATCTTTACGATACGCAGAAATTCAAACGAGAAGGT            GCAGCCCCAAATCGAATTCAGAAAACCTGTTAGGGAAAAACGGGGTACAA            TCACTGGATGGTGAAGCACATCAGCATCGGAAGGCAATGTTTATGTCGTTAAT            GACACCTGCTTCTCCAAAGAATGCGTGCTTTATAAAAAAAGAGTGGGAC            ATTGCGGCCAAGAAGTTTTCAAGAAAAGAAATTATCCTTTACGAAGAAG            CAAAAGGGTGCTTTGTAAAGCAGCTTGTGACTGGGCTGGTGTTCCTCTTAAA            GAGAACAATGTTGAGGAAACGGCCAATTTACTTGGATTACTATTTGAAACAC            CCGCAGCACTCGGCCCTAAGCATTGGCAAGGCAGACACGCACGGACAAAAT            TGGAAAAATGGCTTAAGGAATTAGTCATAGAAGTTCGAAACGGCAAATTCCT            CCTCCTGAAGATAAATCCTTATTCATTATTTCAAATCACCGCAATTTGGATG            GTGAGCTGCTTGTGACAGACATCGCCGCTGTTGAACTATTAATATTTGCGT            CCTATTGTCGCGGTAGCCGTGTATATTTGTTTTACGGCGCTTGCTGTATACCAG            CATCCAAAAGAAGCAGGCAAACCTGCGCGGGTATGATGAAAATCTTCTTCAGA            ACTTTGTACAAGAGGTCAGGAGATTTTATCCATTTTTTCCGTTTGCACCAGCA            AGAGTAAAAGCGGACTTCACATGGAATGGATATTTTGGAGAAAATACAT            TAACACTCCTCGATTTATATGGAACAAACCACCACCCTAAATTATGGGATAA</p>

<p><i>Enterococcus faecium</i> IHC3_aromati c ring hydroxylase</p>	<p>RCT70246.1</p>	<p>CCCTGAGCTCTTTCAGCCGGATCGTTTTTCAAACCTGGAAGGACAGTCCATTCA GTTTTATTCTCAAGGCGGAGGTGACCATGATTTTGGTCATCGCTGTGCAGGC GAATGGGTGACGATTGAAATTATGAAGGAAACGCTGAATTTTCTTGTGAATA AAATTAGCTTCGCCATTCCAGATCAGGACTTAAGCTATAGCTTTAATGATATT CCAGCTCTTCTCACAGTAAAATCATTATGAAAGAAATTCATTTAAAATAA ATGATAAATAAAAATCGTGTTAAGGAGTGTCTGACGATGAGCGAAGCAAAC CAAGAACGGTCTGGACAAGAAATAGAATAATCAAAGAACGTATTCTTGCTG CCTTGAAAATGGTGATTGATCCTGAATTAGGAATCGACATCGTCAATTTAGGC TTGATTTATGATATAGAATTCAATCCTGAAAATGGAGAAAACAGTCATTAAGA TGACTCTAACAACATATGGGCTGTCCATTAGCAGATATTTAACAGAATCTATC CATGACGCATTAAGAAGTGCCAGAAGTAACGAAAGAAGAAGTAAAATA GTCTGGTAG ATGAACACCCCGTCTGGTTCCTTTCGAAGCCACGCCGCGCTATGTGCGGGT CGAGGGCCGACCCCGAAGGGTTTGTGCAGTTCGCCTTCAGCGTGGCCGAC CCGGAGCTCAACGTCGAACTGATCATGCCGGAACCGATGTTTGAAGCCTTCT GCTGCGTCAACCGGTGCGCTTCCTGCCCCGCTGGAAACCGCGCCGACGCC GCAAGCCGACGACTGA ATGTCAGCCACCGTGCACACGTCTATATCGCCCTGCAGAACACGACGACA CCCGACCCATCATCGACGCCATACCGAGGCCAACCCGCATGCGGTGGTGTG GCAGTTTCCCGCCATGGTCAAGATCGACGCCCGCCACCTGACCATCGTG CGCGAACTGGTGGCCGGCAAGCTCGGCCGCGACTGGGACCTGCAGGAGATC CACCTGAACCTGATCTCGCTGTGCGGAAACATCGACGAAGACGAAGACGCCT TCACGCTGCGCTGGAACGCCTGA ATGGACACCCTGATCAAAGAATTCGACGTGGCATTGCGCGCCATTGCCGGCG CCACGCGCACCGCGCGCGCAACCCGGCTGACCGGCTGGCGCCGGACACCG AACAGATGAGCGCCGATGAACGCCGCCACGTGGCCGGGCTGATGCGCATCA ACCATGTGCGCGAGGTCTGCGCGCAGGCCCTGTACCAGGCCCAGAAGCTCAC CGCGCGCGACCGCGCGGTGCGCGCGCAGATGGATGCCGCCGCGCGCAAGA GGAAGACCACCTGGCCTGGTGCGCCGAGCGCCTGCGCGAGCTGGGCTCGCGC CCGAGCCTGCTCAACCCGCTGTGGTACGCCGGCGCCTTCGCCATCGGCTGGAT GGCCGGCCGCGCCGGCGACCGCGTCAGCCTGGGCTTCGTGCGCGAGACCGAG CGCCAGGTCGAGCACCACTGGGCGGGCACCTGGACCGCTGCCCGAGGCC GACGGCCGCTCGCGCGCCATCCTCGAGCAGATGCGCGACGACGAGATCCGCC ACGGCAACGCCGCGCGGATGCCGGCGGGATCCCGTTACCTGCCCGGTGCG GGCGCTGATGCGCGCGCCTCGCGCGTATGACCACCGCCGCTACCGGATC TGA ATGATCCCCATCTATCCGGAGGGCAAGGCCCGTTTCGCCCGGCGCAAAGC GCCTCGACCTGGATACTTCTTGGTGAAGACAAGGCAAGCGGCGACTACCG GCTGCACCGCGCGCCTTCACTGACGAAGAGCTGTTTGAACCTCGAGATGAAG CACATCTTCGAGGGCAACTGGATCTACCTGGCGCACGAAAGCCAGATCCCGA ACAACAACGACTACTACACCACCATATCGGCCGCCAGCCGGTGGTGATCGC GCGCAATCGCCAGGGCGAACTGAACGCCTTCATCAACCGGTGCAGCCACCGC GGCGCCATGCTGTGCCGCCACAAGCGCGGCAACAAAGCCACCTACACCTGCC CGTTCCACGGCTGGACCTTCAACAACAGCGGCAAGCTGCTGAAGGTGAAGGA TCCCGAGAACGCCGGCTACCCTGACTGCTTCAACAAGGAAGGCTCGCACGAC CTGAAGAAGGTGGCGCGCTTCGAGAATAACCGCGGCTTCCTGTTGCGCAGCC TGAACGCTGACGTGCCGCCGCTGAAGGATTTCTGGGCGAAGCGGCGCGCGT CATCGACATGATCGTCGACCAGTCGGCCGACGGGCTCGAGGTGCTGCGCGGC</p>
<p><i>Cupriavidus necator</i> H16_phenol hydroxylase</p>	<p>WP_010810421.1</p>	<p>ATGAACACCCCGTCTGGTTCCTTTCGAAGCCACGCCGCGCTATGTGCGGGT CGAGGGCCGACCCCGAAGGGTTTGTGCAGTTCGCCTTCAGCGTGGCCGAC CCGGAGCTCAACGTCGAACTGATCATGCCGGAACCGATGTTTGAAGCCTTCT GCTGCGTCAACCGGTGCGCTTCCTGCCCCGCTGGAAACCGCGCCGACGCC GCAAGCCGACGACTGA ATGTCAGCCACCGTGCACACGTCTATATCGCCCTGCAGAACACGACGACA CCCGACCCATCATCGACGCCATACCGAGGCCAACCCGCATGCGGTGGTGTG GCAGTTTCCCGCCATGGTCAAGATCGACGCCCGCCACCTGACCATCGTG CGCGAACTGGTGGCCGGCAAGCTCGGCCGCGACTGGGACCTGCAGGAGATC CACCTGAACCTGATCTCGCTGTGCGGAAACATCGACGAAGACGAAGACGCCT TCACGCTGCGCTGGAACGCCTGA ATGGACACCCTGATCAAAGAATTCGACGTGGCATTGCGCGCCATTGCCGGCG CCACGCGCACCGCGCGCGCAACCCGGCTGACCGGCTGGCGCCGGACACCG AACAGATGAGCGCCGATGAACGCCGCCACGTGGCCGGGCTGATGCGCATCA ACCATGTGCGCGAGGTCTGCGCGCAGGCCCTGTACCAGGCCCAGAAGCTCAC CGCGCGCGACCGCGCGGTGCGCGCGCAGATGGATGCCGCCGCGCGCAAGA GGAAGACCACCTGGCCTGGTGCGCCGAGCGCCTGCGCGAGCTGGGCTCGCGC CCGAGCCTGCTCAACCCGCTGTGGTACGCCGGCGCCTTCGCCATCGGCTGGAT GGCCGGCCGCGCCGGCGACCGCGTCAGCCTGGGCTTCGTGCGCGAGACCGAG CGCCAGGTCGAGCACCACTGGGCGGGCACCTGGACCGCTGCCCGAGGCC GACGGCCGCTCGCGCGCCATCCTCGAGCAGATGCGCGACGACGAGATCCGCC ACGGCAACGCCGCGCGGATGCCGGCGGGATCCCGTTACCTGCCCGGTGCG GGCGCTGATGCGCGCGCCTCGCGCGTATGACCACCGCCGCTACCGGATC TGA ATGATCCCCATCTATCCGGAGGGCAAGGCCCGTTTCGCCCGGCGCAAAGC GCCTCGACCTGGATACTTCTTGGTGAAGACAAGGCAAGCGGCGACTACCG GCTGCACCGCGCGCCTTCACTGACGAAGAGCTGTTTGAACCTCGAGATGAAG CACATCTTCGAGGGCAACTGGATCTACCTGGCGCACGAAAGCCAGATCCCGA ACAACAACGACTACTACACCACCATATCGGCCGCCAGCCGGTGGTGATCGC GCGCAATCGCCAGGGCGAACTGAACGCCTTCATCAACCGGTGCAGCCACCGC GGCGCCATGCTGTGCCGCCACAAGCGCGGCAACAAAGCCACCTACACCTGCC CGTTCCACGGCTGGACCTTCAACAACAGCGGCAAGCTGCTGAAGGTGAAGGA TCCCGAGAACGCCGGCTACCCTGACTGCTTCAACAAGGAAGGCTCGCACGAC CTGAAGAAGGTGGCGCGCTTCGAGAATAACCGCGGCTTCCTGTTGCGCAGCC TGAACGCTGACGTGCCGCCGCTGAAGGATTTCTGGGCGAAGCGGCGCGCGT CATCGACATGATCGTCGACCAGTCGGCCGACGGGCTCGAGGTGCTGCGCGGC</p>
<p><i>Cupriavidus necator</i> H16_monoox ygenase</p>	<p>WP_010810419</p>	<p>ATGTCAGCCACCGTGCACACGTCTATATCGCCCTGCAGAACACGACGACA CCCGACCCATCATCGACGCCATACCGAGGCCAACCCGCATGCGGTGGTGTG GCAGTTTCCCGCCATGGTCAAGATCGACGCCCGCCACCTGACCATCGTG CGCGAACTGGTGGCCGGCAAGCTCGGCCGCGACTGGGACCTGCAGGAGATC CACCTGAACCTGATCTCGCTGTGCGGAAACATCGACGAAGACGAAGACGCCT TCACGCTGCGCTGGAACGCCTGA ATGGACACCCTGATCAAAGAATTCGACGTGGCATTGCGCGCCATTGCCGGCG CCACGCGCACCGCGCGCGCAACCCGGCTGACCGGCTGGCGCCGGACACCG AACAGATGAGCGCCGATGAACGCCGCCACGTGGCCGGGCTGATGCGCATCA ACCATGTGCGCGAGGTCTGCGCGCAGGCCCTGTACCAGGCCCAGAAGCTCAC CGCGCGCGACCGCGCGGTGCGCGCGCAGATGGATGCCGCCGCGCGCAAGA GGAAGACCACCTGGCCTGGTGCGCCGAGCGCCTGCGCGAGCTGGGCTCGCGC CCGAGCCTGCTCAACCCGCTGTGGTACGCCGGCGCCTTCGCCATCGGCTGGAT GGCCGGCCGCGCCGGCGACCGCGTCAGCCTGGGCTTCGTGCGCGAGACCGAG CGCCAGGTCGAGCACCACTGGGCGGGCACCTGGACCGCTGCCCGAGGCC GACGGCCGCTCGCGCGCCATCCTCGAGCAGATGCGCGACGACGAGATCCGCC ACGGCAACGCCGCGCGGATGCCGGCGGGATCCCGTTACCTGCCCGGTGCG GGCGCTGATGCGCGCGCCTCGCGCGTATGACCACCGCCGCTACCGGATC TGA ATGATCCCCATCTATCCGGAGGGCAAGGCCCGTTTCGCCCGGCGCAAAGC GCCTCGACCTGGATACTTCTTGGTGAAGACAAGGCAAGCGGCGACTACCG GCTGCACCGCGCGCCTTCACTGACGAAGAGCTGTTTGAACCTCGAGATGAAG CACATCTTCGAGGGCAACTGGATCTACCTGGCGCACGAAAGCCAGATCCCGA ACAACAACGACTACTACACCACCATATCGGCCGCCAGCCGGTGGTGATCGC GCGCAATCGCCAGGGCGAACTGAACGCCTTCATCAACCGGTGCAGCCACCGC GGCGCCATGCTGTGCCGCCACAAGCGCGGCAACAAAGCCACCTACACCTGCC CGTTCCACGGCTGGACCTTCAACAACAGCGGCAAGCTGCTGAAGGTGAAGGA TCCCGAGAACGCCGGCTACCCTGACTGCTTCAACAAGGAAGGCTCGCACGAC CTGAAGAAGGTGGCGCGCTTCGAGAATAACCGCGGCTTCCTGTTGCGCAGCC TGAACGCTGACGTGCCGCCGCTGAAGGATTTCTGGGCGAAGCGGCGCGCGT CATCGACATGATCGTCGACCAGTCGGCCGACGGGCTCGAGGTGCTGCGCGGC</p>
<p><i>Cupriavidus necator</i> H16_2- polyprenyl-3- methyl-6- methoxy-1,4- benzoquinone monooxygenase</p>	<p>WP_010814779.1</p>	<p>ATGATCCCCATCTATCCGGAGGGCAAGGCCCGTTTCGCCCGGCGCAAAGC GCCTCGACCTGGATACTTCTTGGTGAAGACAAGGCAAGCGGCGACTACCG GCTGCACCGCGCGCCTTCACTGACGAAGAGCTGTTTGAACCTCGAGATGAAG CACATCTTCGAGGGCAACTGGATCTACCTGGCGCACGAAAGCCAGATCCCGA ACAACAACGACTACTACACCACCATATCGGCCGCCAGCCGGTGGTGATCGC GCGCAATCGCCAGGGCGAACTGAACGCCTTCATCAACCGGTGCAGCCACCGC GGCGCCATGCTGTGCCGCCACAAGCGCGGCAACAAAGCCACCTACACCTGCC CGTTCCACGGCTGGACCTTCAACAACAGCGGCAAGCTGCTGAAGGTGAAGGA TCCCGAGAACGCCGGCTACCCTGACTGCTTCAACAAGGAAGGCTCGCACGAC CTGAAGAAGGTGGCGCGCTTCGAGAATAACCGCGGCTTCCTGTTGCGCAGCC TGAACGCTGACGTGCCGCCGCTGAAGGATTTCTGGGCGAAGCGGCGCGCGT CATCGACATGATCGTCGACCAGTCGGCCGACGGGCTCGAGGTGCTGCGCGGC</p>
<p><i>Cupriavidus necator</i> H16_benzoate 1,2- dioxygenase large subunit</p>	<p>WP_013956903.1</p>	<p>ATGATCCCCATCTATCCGGAGGGCAAGGCCCGTTTCGCCCGGCGCAAAGC GCCTCGACCTGGATACTTCTTGGTGAAGACAAGGCAAGCGGCGACTACCG GCTGCACCGCGCGCCTTCACTGACGAAGAGCTGTTTGAACCTCGAGATGAAG CACATCTTCGAGGGCAACTGGATCTACCTGGCGCACGAAAGCCAGATCCCGA ACAACAACGACTACTACACCACCATATCGGCCGCCAGCCGGTGGTGATCGC GCGCAATCGCCAGGGCGAACTGAACGCCTTCATCAACCGGTGCAGCCACCGC GGCGCCATGCTGTGCCGCCACAAGCGCGGCAACAAAGCCACCTACACCTGCC CGTTCCACGGCTGGACCTTCAACAACAGCGGCAAGCTGCTGAAGGTGAAGGA TCCCGAGAACGCCGGCTACCCTGACTGCTTCAACAAGGAAGGCTCGCACGAC CTGAAGAAGGTGGCGCGCTTCGAGAATAACCGCGGCTTCCTGTTGCGCAGCC TGAACGCTGACGTGCCGCCGCTGAAGGATTTCTGGGCGAAGCGGCGCGCGT CATCGACATGATCGTCGACCAGTCGGCCGACGGGCTCGAGGTGCTGCGCGGC</p>

*Cupriavidus  
necator*  
H16\_aromatic  
ring-  
hydroxylating  
dioxygenase  
subunit alpha

WP\_010811430.1

TCGTCCACCTACACGTTTCGAGGGCAACTGGAAGCTGCAGGCCGAGAACGGC  
GCCGATGGCTACCACGTGTCGGCGGTGCACTGGAAGTACGCCGCAACCACCA  
GCCAGCGCAAGCAGAAGAACGCGCAGGAAGACAAGATCCGCGCCATGGAC  
GCCGGCAAGTGGGGCCAGCAGGGCGGGCTTCTACGCCTTCGAGCATGGCC  
ACATGCTGCTGTGGACGCGCTGGGCCAACCCGGAGGACCGCCCCAACTTCAG  
CCGCCGCGAGGAATTCCGCGAGCGTTGCGGCGCCGAGACCGCGGACTGGAT  
GATCCAGAACTCTCGCAACCTGTGCCTTTATCCCAACGTCTACCTGATGGACC  
AGTTCGGCTCGCAGATCCGCCTGCTGCGTCCGCTGGCCGTCGACAAGACCGA  
GGTCACCATCTACTGCATCGCGCCGAAGGGAGAATCCGACGAGGCGCGCGC  
GCGCCGCATCCGCCAGTACGAGGACTTCTTCAACGTACGCGGCATGGCCACC  
CCCGACGACCTCGAGGAGTTCCGCGCTTGCCAGCAGGGGCTACGCCGGGCAGG  
CACTGGCCTGGAACGACATGTGCCGCGGCGCAAGCACTGGATCGACGGTGC  
CGACGAGGCCGCGCAGCGCATCGGACTCAAGCCCGTGATGAGCGGGGTGCG  
CACCGAGGACGAGGGCCTCTACACGGTGCAGCACCGCTACTGGCTGGACGTG  
ATGAAGAAGGCCGTGGCAGAGCAATCCGCCGAAGCCGCGAATGAAGCCACC  
GACACCACCGACGCCGCCGACGGAGCGCAGCATGA  
ATGACCGAGACCCACGACACGAAGCAGGTCAGGCCGCCGATGCGGGCCGGG  
CCCGAACTGGGCCAGTGGCACCCCGTGCTGGCCATCGAACAGGCCGATGGCG  
ACGGCCCCCTTCGCCGCACGGCTCTTTGGCCGCGCGTGGTGCTGTGGCGCAAT  
GCCGACGGCTGGCACGCCTGGGACGACCGCTGTCCGCACCGCGGCGCCGCTT  
TCACGCTGGGCGCCGTGCACGATGGCCTGCTGCATTGCGGCTATCACGGCTG  
GCGCTTTCCTCGGGCGGCCGCTGCACGCGCTATCCCGCCCACCCGGAAGT  
GTGCCTGCGCCGCGCGCCTGCGCCACCACGCACGCGGTGCGCGAGGGTACG  
GGCTGTTATGGGTACGCCTTGGCGGCGACGGCACCGAGGCCGTGCCCGAACT  
GCCGTCCTTCCCCGAGTACCACGACGCCGAATGCCGCCGCGTGGTCTGCGGC  
CCCTACGACGTTGCCACCTCGGCGCCACGGCTGGTGGAGAACTTCCTCGACA  
TGGCGCACTTCGGCTATGTCCATGACGGCTACCTGGGTGACCCGGCGCACAC  
CGAAGTGCCGCCCTATGAAGTGAAGCCATCGGCGATGCGCGCAAGCCCGA  
CGCGCTGCGCACCATCGGCTGCCGCGCCTGGCAGCCGCGCGCGCACGCCAGC  
GCCGCCGGCGGAGCCATGGTTCAGTATGAATAACCGCGTGGTTGCGCCCTACG  
CCGCGATCCTGACCAAGGTGCCCGACCTTGGCGACAACCATCGCGGCGCCAT  
CGCGCTGTTTATCGGCCCGCGGGACGAGGAATCGAGCCGCGTGTGGTTTCGTG  
ATGTCACTGGTGACAGACGATGACGACGCCAGCCTGCGCGAATTCCAGGACA  
CCATCTTCCTGCAGGACAAGCCGATCGTGGAATCGCAGCAGCCGCGCCGCT  
GCCGTTGCGCACCGGCGTGGAGGTGCCCGAGCCGGCGGACAAGCTGGCAGG  
CGCGTACCGCCGCTACCTGGCGGCGCATGGGGTGAGGTTTCGGCACGCTGGGC  
TAG  
ATGAAACCGATGAACTATTCCCTCTATCGCGAGAGCGCCCTCGGCACCGCGC  
GCGCCATTGAACTGCGACTGGAGATCGAGGCCTTCCACGCGGAATACTGCGC  
GGTGCTCGACGCCGGCCTGGTGGAGCAATGGCCCCGCTTCTTACCGAGGAT  
GCGCTTACCGGATACCGCGCGCGAGAATGCCGAGCGCAACCTGCCGGTGG  
GGCTGGTCTACGCCGAAGGGGTGGGCATGATGCGCGACCGCGCCGCTGCGAT  
TGCCAATACCCAGATGTTTCGCGCCGCGCTACAACCTGCACCTGGTGACCAAC  
ACGCGGGTCAGCGACGAAACCGCGGACGGCGATATCGTGCCACAGGCCAAC  
TACATGCTGCTGCAGACACTGGTGGAGGGCCCCACCACGATCCACCTGGCGG  
GGACCTACTACGACCGCTTCCGCCGCCAGGGTGGCAGCCTGCTGCTGCGCGA  
GCGGCAGGTTGTCTACGACACCACCATCATCGCCAACGACCTGGTCTACCCG  
GTCTAG

*Cupriavidus  
necator*  
H16\_aromatic  
-ring-  
hydroxylating  
dioxygenase  
subunit beta

WP\_041688019.1

*Burkholderia cepacia* ATCC 25416\_2-polyprenyl-3-methyl-6-methoxy-1,4-benzoquinone monooxygenase

WP\_027788457.1

ATGGTGTTTGATGAACTGATCAGCGAATTCGATCGCGGCCTGCGGTGCTGAC  
GGGCATTAGCCGATGAGCCGGCCGGTGCCCGCGCCGGCCGAGGCGCCCGC  
AGTCGAACTGACGCCCGGGAGCGTACGCATGCCGCCGGGCTGATGCGCGTG  
AACCACGTCGGCGAGGTCTGCGCTCAGGCGCTGTACCAGGCGCAGAAGCTCA  
CCGCGCGCACGGCATCCGCGAAGGCGATGTTTCGAGGAAGCCGCGCGGAGG  
AGGAGGATCACCTCGCGTGGACCGCGCACCGCCTGAAAGAGCTCGACTCGC  
GCCCCGAGCCTGTTGAACCCGCTCTGGTATGCGGGTTCGCTCGCGATCGGCGTG  
GCGGCTGGCGCGCTCGGCGACAAGGTCAGTCTCGGCTTCATGGCCGAGACCG  
AACGGCAGGTTCGAGAGCCATCTCGAAGGCCATATGTCCGAGTTGCCGGCGGC  
CGATACCGCGTCGCGCGCGATCGTCGACCAGATGCGTATCGACGAGGTGAAG  
CACGGCAAGGCCGCCGCCGACGCAGGCGGGATCGAACTGCCGCTGCCCGCG  
CGAATGCTGATGCGCGCCCGCTCGAAAGTCATGACGAGCACTGCGTACTATC  
TGTGA

*Burkholderia cepacia* ATCC 25416\_aromatic-ring-hydroxylating dioxygenase subunit beta

WP\_027792273.1

ATGACGATTTTCATCCGCATTGGCCGACGCACGGCCCGGACGCGCGGCACCG  
GAACGGTTGCGGCGACCTTCGCCGATTTCTACGGGCTCGTGGACCTGAACGC  
GCGCTACGCGTCCGCGCTGGATCGCGGCGACTGGGACGCGTGGCCGGAATTC  
TTCGAGGAGGACTGCACGTATCAGCTGTTGCCGCGGAGAACCATGAACGCG  
ACTTTCCGCTTTCGCGTCTCGCGTTCGAGAGCAAGGGGATGCTGAAGGATCG  
CGTGTACGGCATCAAGGAGACGCTGTTTTACGACCCGATTACCAGCGCCAC  
CTGATCGGCACGCCGCTCATCACGTATCTCGACGAATCGGTTCATCGAGGCCG  
AGACGAACTACGCGGTGCTGCGTACCAAGAGCGAGCAGATGAGCGACGTGT  
ACAACACCGGTTCGTTATCTCGACCGGATACGCCGCACGCCGCACGGGCTGCG  
TTTCGAGTCGCGCATCTGCGTGTACGACAGCGAGATGGTGCCGAATTCGATC  
ATCTATCCGATCTGA

*Burkholderia cepacia* ATCC 25416\_bifunctional 3-(3-hydroxyphenyl)propionate/3-hydroxycinnamic acid hydroxylase

WP\_027787836.1

ATGAATACCGAATCGAGCGCGCACGGCGACAGCACCGCCGAACACTGCGAC  
GTCCGATCGTCGGCTACGGCCCGACCGGCTCGTCGCAGCATCGATGCTGG  
GCCGCGCCGGCCATCGCGTGATCGTCTCGAACGCTGGCCGACGCCCTACGG  
CCTGCCGCGCCTCACGCACATCGACGGCGAAACCGCGCGCATCGTGCAGGCC  
AGTGCAGACGTCGATCACGCGTTCGCAACCGGAAGCCGTCGACACCTACC  
ACTACTGCGACGCGAACGGCGACCTGCTGCTCGAACTGAACTGGACCGGCCG  
CGCATGCGGCTATCCCGCGCACATCTCGATCTATCAGCCCGACATCGAGGAC  
GCGATCGATGCGCGCGCCAGCGCCTTCAGGAACGTGACGATCCTGCGCGGCT  
GGGAAGTCGACGCACTGCGGCAGGACGACGACGGCGTGACGCTGACCGCGC  
ATCCGTCGCCGCTACGGCCAGGACGCGCAATGGACCGACAGGCCCGCGGTCAT  
TCGCGCGCGCTACGTGATCGGGCGCCGACGGCGCGAACAGCCTCGTGCGCCG  
ACGCTCGGCATCGAACGCTCCGATTTTCGGCTGCAACGAACGCTGGCTCAATC  
TCGATTCGAAAACAAGCGCGATCTCGGGCGACGGCTGCGCGCGCACGACGA  
TCTACTGCGATCCGGCGCGCGGTACATGCACATGCCGATCGGCACGAAGCG  
CACGCGTTTCGAGCTGCGCGTGTGCCGAACGAATCGACGGCCGAATGGGAA  
ACGGAAGAAGCCGGCTGGAAGTGGCTCAACGACCACTACGGCTACGGCCCG  
GACGACCTGACGCTGCTGCGGCACGTCGTCTACACGTTTCGAGACGCGCATGG  
CCGAACGCTGGCGCGCCGGCCCGCTGCTGCTCGCGGGAGATGCGGCGCACA  
CGATGATGCCGTACATGGGACAAGGCGCGTGTCTCCGGCATGCGCGACGGCAT  
CAACCTCGCGTGGAAAGCTCGACCTGGTGTGCTGACCGGGCGCGCGTCCGCCGAC  
CTGCTCGACACCTATGAAGCCGAGCGCCCGCCGACGTCGACGGCGATCACGC  
AGATGTCGCTGTTTCTCGGGCAGGTCGTCAACGAGGACGATCCGCGCAAGGT  
CGCCGAGCGCGACGCGGCGTTCCGCTCCGGCAACATGCCGCCGATGCCGCCG  
TTCCCGAAGCTCGGCCACGGCATCGTGCACGCGCAAGCCGACGGCACGCTGC

*Burkholderia  
cepacia* ATCC  
17759\_2-  
octaprenylph  
enol  
hydroxylase

POM19962.1

TGCCGACGACGGGTGCACCGGCCCGCAAGGCCGCGCACGGCGCGGCGCGG  
CCGAGGGCCGTTTTGACGACGTGGTCGGCCAGGGTTTTCCAGCTCGTCACGCG  
CGAGCACCTGCCCGCCATCTCGACGACGCGCAGCGCGCATTCTCGCGCAG  
CTCGGCTGTACGTGGCCGTGTGGCCGACGACGTGTGCGCGCCGGATGCCG  
TGGTCGATCTCGACGGCGAGCAGCACGCGTTTCATGCACGCGCACGGCATCGC  
CGCGTATATCAAGCGGCCCGATTTTCATCGTGTTCGGTTCCGGTGACGGACCTGC  
GCGATCTCGGCGCGCTCGTCGACGCGCTGCGCGCCGACTGCACTGGTCTGC  
CGTTTCGAGCGAGCCTGCCGCGGCTTCGGCAGCCGTCACCCACGCATCGTGA  
ATGACTGCCACCACTCCTTCGACGTGCGCGTGGTCGGCGGGCGGGTCTCGTCGG  
CAAGACGGCCGCGCTCGCACTGACCCAGTCCGGCTACAAGACTGCCTTGCTC  
GCGCAGCCGGCCGCGCCGCGCCCGCCGATCTCGTATTCGACACGCGCGTCT  
ACGCGCTGTCTTCCAGTTCGCAGGCGTTGCTCGAGCGGCTGCGGGTCTGGCAG  
GCGCTCGACCATGGCCGCTCGCACCGGTCTACGACATGCGCGTATACGGCG  
ATGCGCACGCGGAAGTGCATTTCTCCGCGTACCAGGCATCCGTGCCGAGCT  
CGCGTGGATCGCCGAATCGTCGCTGGTCGAGGCGTCGCTTGACGCCGCGCTG  
CGTTCCAGCCGAACCTCACGTGGTTCGAGGCGCGCGCAGGGCTTCGACG  
TACACGACGACGACGCGCGTGTCTCACGCTGTCTCGGGGAGGTGCTGGAAGC  
GGATCTCGTCGTCGGCGCGGACGGCGCGCATTCGTGGGTGCGCTCGCAAATG  
GGGGCCAAAGTCGAACGGCGCGACTACCGGCAAACCGGTGTCTCGTCGCGAAC  
TTCAAGGCGTCGCTGCCGCATCGCGAGACGGCCTACCAGTGGTTCACGAAG  
GCGAGATCGTCGCGCTGTGCCGCTGCCGGACGGCCATGTGTCTCGCTCGTCTGG  
TCCGCGCACACCGCGCATGCGGATGAATTGCTCGCACTCGATCCGGCGCAGC  
TCGCGGCCGAGGTCGAGCGCGTGTCTCATGGCCAGGTCGGCACGCTCGACTG  
CGTGACGCCGGCCGCTGGCTTCCCGCTGGCGCTGCAGACGGTCGACAAGCTG  
ATCGCGCCGCGCGTGTGCGCTGGTCGGCGATGCCGCGCACCTGATCCACCCGC  
TCGCGGGACAGGGGATGAACCTCGGCCTGCGCGACGTGGCGGCGCTTGCCGA  
TGCGATCGCCGGAAGGAAAGCTTCCGCAACCTCGGCGATACGGTGTCTGCTG  
CGTCGCTACGAGCGTTCGCGCCGCGAGGACATCCGCGCGCTGATGGTCGCAA  
CCGACGGCCTGCAGCGGCTGTTCCGCGGTGCCGGGCTCGCTCGCGAAGGCCGT  
GCGCAATGCGGGCATGGCCTTCGTCTGGTGCAGCCGCTCGTGAAGCGCTGG  
CTCGTGTCCGCCGCGCTCGGCTGA

*Burkholderia  
pseudomallei*  
K96243\_2-  
polyprenyl-3-  
methyl-6-  
methoxy-1,4-  
benzoquinone  
monooxygenase

WP\_004527787.1

ATGCGCACGCAAGTCGCCATCATCGGCGCCGGGCCGTCCGGGCTGCTGCTTT  
CCCACCTGCTCCGTCTGCAAGGCGTCGATTCGGTCTGCTCGAGACCGGTTCA  
CGCGAATACTGCGAGAACCGGATCCGCGCCGGCGTGTGGAGCAGGGCACC  
GTCGACACGCTGAACGATGCGGGCCTCGGCGCGCGGATGCGGCGCGAAGGG  
CTCGTGATTGCGGCATCGAGCTGCTGTTTCGACGGCCGCGCCACCGGATCG  
ATTTCCGGCGAGCTGACGCCCCGGCCGCGCGATCACCGTCTACAGCCAGCACGA  
AGTCGTGCGCGACTTGATCGAGGCCGCGCTCGAGCACGGCCAGCCGATCCAC  
TTCGACGTGCGCGACGTGCGCGTGCACGACGTGCGGACCGAGCGGCGCTCGG  
TGACGTTTCATGCACGCGGACGGTCGCCCCGATCGGATCGATTGCGACTATGT  
CGCCGGCTGCGACGGCTTTCACGGCGTCGCGCGCCAGGCGATCCCCGCCGAG  
CGGCGGCGCACGTTTCGAGCGCGTGTACCCGTACGCCTGGCTCGGCATCCTCG  
CCGATGCGGCGCCGTCGCTCGACGAGCTCGTCTATGCGCATCACGCGCGCGG  
CTTCGCGCTGTTCTCGATGCGCTCGCCGACCGTACCCGACTGTACCTGCAAT  
GCCGCCCCGACGAGAACCTGGCCGAATGGCCGGATGCGCGCATCTGGGAGG  
AACTGGGCACGCGCTTCGAAAACGACGGCGGCTGGACGCCGACCCAGGCC  
GCATCACGCAGAAGAGCGTGACGCCGATGCGCAGCTTCGTGTGCGAGACGAT  
GCAGCACGGCCGGCTGTTCTCGCGGGCGACGCCGCGCACATCGTGCCGCCG

*Burkholderia  
pseudomallei*  
K96243\_4-  
hydroxybenz  
oate 3-  
monooxygena  
se

WP\_004556451.1

ACCGGCGCGAAGGGGATGAATCTCGCGGTCGCCGATGTCCGGGCGCTGTCCG  
GCGCGCTCGTCGCGCGCTACCGTCACGGCCGCGGCGATCTGCTCGATGCGTAT  
TCGTCAACCTGTCTGGAACGGATATGGCGTGCCGAGCATTTTTTCGTATTCCAT  
GACGAACATGCTGCACCCGTGCGCCGACGATTCCCGTTTCGTCAATCGGCTG  
AAGCTCGCCGAGCTCAGGTACGTGACGCGTTTCGCGCGCGGCCGCGCAGTCCG  
TCGCGGAGAACTACGTCGGCCTGCCGTTTCGACGAAACCGCGGGCGATGCGCC  
GTCGTTTGGCGAGGCGGCCGCCGCATGA  
ATGGTGTGTTGACGAGTTGATCACTGAATTTGACCGTGGGCTGCGCTCGATCGC  
GGGTGTGAGCCGGATGAGCCGCCCGGTGCCAAGCCCGCAGCCGCGGCGCC  
TGCCGAGCTTTCCGCAGCCGAGCGCAAGCATGCGGCGGGGTTGATGCGGGTG  
AATCACGTCGGCGAAGTCTGCGCGCAGGCGCTCTATCAGGCGCAGAAGCTCA  
CGACGTCTTCGGCCGGGCTGAAGGAGATGTTTCGAGCATGCGGCGCGCGAGGA  
AGAGGACCATCTCGCGTGGACCGCGCATCGATTGAAAGACCTCGATTTCGCGG  
CCGAGCCTGCTGAATCCGCTCTGGTATGCGGGCGCGCTCGCGATCGGCGTCTG  
CGCCGGGCGTCTCGGCGACAAGATGAGCCTCGGCTTCATGGCCGAGACGGAG  
CGGCAGGTGGAGAGCCACCTTGACGGCCATCTGTTCGGAGCTGCCGGCGGCCG  
ACGTCGAGTCGCGCGCGATCGTCGAGCAGATGCGCGCCGACGAGGTCAAGC  
ACGGCAAGTCGGCGACCGACCGCGCGCATCGAGCTGCCGATGCCGGCGC  
GCATGCTGATGCGCGCGCATCCAAGGTCATGACAAGCACTGCATACTATCT  
GTGA

*Klebsiella  
pneumoniae*  
subsp.  
*pneumoniae*  
HS11286\_2-  
octaprenyl-3-  
methyl-6-  
methoxy-1,4-  
benzoquinol  
hydroxylase

WP\_002894733.1

ATGACAATTCACGTAACAGATGTCGCCATCGTGGGCGGCGGCATGGTTCGGCG  
GCGCCCTGGCGTTAGGGCTGGCGCAACAGGGATTTACCGTGACGGTGCTTGA  
GAAAGCGGCGCCACCGCGTTCGATCCGGCATCCGCCCCGGATGTGCGGATC  
TCGGCGATCAGCGCGGCTTCGGTCGGCCTGCTGAAGAGTCTCGGCGTCTGGG  
ATGCCATACGGGCGATGCGCGTCCACGCGTATCGCCGCTGGAGACCTGGGA  
GTGGGAGAGCGCGCACGTCGCCTTCGACGCCGCGGAGCTCAAGCTGCCGGA  
GCTGGGCTATATGGTCGAGAACAAGGTTCTGCAATGGGGCCTGTGGCAAGCG  
CTGGCGGCGCATGAGGCGGTTACCCTGTGCGTCGGTAGCGAACTGAAAACGA  
TGCAGCGCGGCGAGACGCAGACGGCGTTGCATTTGCGCGAGGGGGAGACGA  
TCCACGCCCCGCTGGTTATCGGCGCCGACGGCGCTAACTCCCAGGTGCGGGA  
GATGGCCGGCATCGGCGTGCACGCCTGGCAATATCAGCAGTCCCTGTATGCTG  
ATCAGCGTCGAATGCGCCGACGATCCCGGCGACAGCACCTGGCAGCAGTTA  
CTCCCAGCGGCCACGCGCCTTCCTGCCGCTGTTTCGACCACTGGGCTTCGCTG  
GTCTGGTACGACGCCCCGGCGCGGATCCGTCAGCTGCAGAGCATGACCATGG  
CGCAGCTCCAGCAGGAGATCGCCAGTCACTTTCCGGCGCGGCTGGGACGGGT  
GACGCCGAGGCGGCCGCGCCTTCCCGCTACCCGGCGTTCATGCGCTGCAG  
TATGTTTCAGCCCGGCTGGCGCTGGTGGGCGATGCGGCGCACACCATTATCC  
ACTGGCGGGGACAGGGGGTTAACCTTGGCTATCGTGATGTTCGATGCCCTGCTG  
GAGATTCTGGCGGAAGCGCGCGGCCGCGGCGAAGACTGGGCCAGCCTGCCG  
GTGCTGAAGCGCTACCAGGCGCGGCGGCGAGCGGATAATTTTATCATGCAGT  
CGGGGATGGATCTGTTTTATGCCGTTTTAGCAATGACCTGGCGCCGGTGCGG  
ATGCTGCGTAATATTGGCCTGATGGCGGCTAACGCGCCGGGGTGCTGAAGC  
GTCAGGCGCTGAAGTATGCCTTAGGCTTGTA

*Klebsiella  
pneumoniae*  
subsp.  
*pneumoniae*  
HS11286\_4-

WP\_004151384.1

ATGAAGACACAGGTCGCGATTATTGGCGCGGGCCCTCCGGGCTGCTGCTGG  
GGCAGTTGCTGCACAACGCCGGGATCCATAACCGTGATCCTTGAGCGTCAAAC  
GCCGAGTATGTGCTGGGGCGCATCCGCGCGGGAATTCTGGAAAGCGGTACC  
GTTGATCTGCTGCGCGAAGCGGGCGTGGCGCAGCGGATGGATGCCGAAGGCC  
TGGTGATCATGGGGTGGAGTTTCTGTTTACGGCCAGCGGGTGCCCGTCGCA



hydroxybenz  
oate 3-  
monooxygena  
se

CTGAGCGAGCTAACCGACGTAAGAGCGTAATGGTTTATGGCCAGACCGAA  
GTCACCCGCGATCTGATGGCTGCCCGGGCCAGCGGCGCGCCGATCGTCT  
ATGGCGTGAGCGAGGTGGCTATCCATGACGCCAAAAGCGACCGGCCGACGA  
TCACCTACCTCAGCGAAGGGGAAACCTGCCGTCTGGAGTGCGATTTTATTGCC  
GGTTGCGACGGTTTCCACGGCGTATCGCGGCAAAGTATTCCAGCTGGCATT  
GCAGACCTACGAGAGCGTGTGGCCGTTTGGCTGGCTAGGCCTGCTGGCGGAT  
ACGCCGCCGGTCAATCCGGAGCTTATTTATGCGCACCATCAGCGGGGGTTTGT  
ATTGTGCAGTCAACGCTCACTGACTCGCAGCCGCTATTATCTGCAGGTCCGC  
TGAGCGATAAGGTTGAAGCATGGTCGGACGAGCGCTTCTGGCAGGAGCTGAA  
AAGCCGCTTGCCGGAGGAGCTGGCATCCAGGTTAGTGACTGGTCACGCACTT  
GAGAAGAGCATTGCCCCCTGCGTAGCTTCGTCTGGAGCCGATGCAATATG  
GGCGTTGTTCTTGGTGGGGATGCGGCGCATATCGTTCCGCCAACCGGGGC  
GAAAGGATTAATCTGGCGGCATCGGACGTGAACTATCTGTGGCGGATTCTG  
CGGAATACTACCATCGTGGCCGAGCGATCTGCTGGCGGCTACTCGCAAC  
TGGCGCTGGATCGGGTCTGGAAAGGGGAAACGCTTTAGCTGGTTTATGACCCG  
CCTGCTGCATGATTTTCCGGATCAGAACGCGTTCGACGCTAAAATGCAGGCC  
GCCGACCGCCGCTACTATCTGGGCTCGCGCGCCGGGCTGACCACCATCGCGG  
AAAACCTACGTGGGCTTGCCCATGGAGCGTGTGCGCTGA

*Klebsiella*  
*pneumoniae*  
subsp.  
*pneumoniae*  
HS11286\_2-  
octaprenyl-6-  
methoxyphen  
yl  
hydroxylase

WP\_002916482.1

ATGAGCGTGCTGATCGTCGGCGGCGGGATGACCGGGGCGACGCTCGCGCTGG  
CCATCTCCCGTTTGACCGGCGGCGCGCTGCCGGTCCACCTCATTGAAGCGCAG  
GATCCGCATTCTTCACGCCACCCTGGCTTTGACGACCGGGCGATCGCCCTGGC  
TGCGGGCACCTGCCAGCAGCTGGCGCGTATCGGTATCTGGCAACGCCTCGCC  
GAACGCGGACGCCATCCAGCGAGTACACGTCAGCGACCGCGGTATGCC  
GGGTTTGTGAATCTGGCGGCCGCGGATTATGGCTGTGCGCGCTGGGCCAGGT  
GGTTGAACTCCACGATGTCGGCCAGCGGCTGTTTGGTCTGCTGCGCGAGGCGC  
CAGGCGTCACGCTGCACTGTCCGGCGAAAGTGGAAGCGGTCAGTCGCAGCCA  
GGAGAGCGTCAGCCTTACGCTTGAGGGCGGCGAAATCATTAAACGGTAAGCTG  
CTGGTGGCGGCGGACGGTTCCCGTTCGGCACTGGGCGCCCGCTGCGGCATCA  
GCTGGCAGCAGCAGCCGATGAGCAGATAGCGATCATTGCTAACGTCAGCAC  
CGCGTTGCCACGAAGGTCGCGCCTTCGAGCGCTTACCAGCATGGCCCCG  
CTGGCGATGCTGCCGATGTGCAAGGGCGCTGCTCGCTGGTGTGGTGTATCC  
GCAGTCGCGCCGCGATGAGGTGCAGAGCTGGTCTGACGAACGCTTTTGTGAG  
GAGCTGCAGCAGGCGTTCCGGCTGGCGGCTGGGGCGTATTACCCACGCCGGGA  
AGCGCAGCGTTTATCCGCTGGCCCTACCACCGCCAGCCGCGCGGTGTGCA  
CCGCTGGCGCTGGTGGCAACGCGGCGCAGACGCTGCACCCGATCGCCGGG  
CAGGGCTTTAATCTCGGCCTGCGCGATGTGATGAGCCTGGCGGAATTACTCGC  
TGACGCCCATCTCAGCGGCGAAGATGTGCGTCAATTATCCACTGCTGTGCCGCT  
ATCAGGCGCGCAGGGCAGGGGATAAAGCCGCCACCATCGGCGTGACCGATG  
GGCTGGTGCATCTGTTTGCCAACCGTTGGGCGCCGCTGGTGGCGGGGCGCAA  
CGTCGGTCTGATGGCGATGGAATTATTTACCCCGGCGCGGATGCGCTGGCGC  
AGCGTACCCTCGGTTGGGTTCCCGTTAA

*Kosakonia*  
*radicincitans*  
DSM 16656\_2-  
octaprenyl-6-  
methoxyphen  
yl  
hydroxylase

WP\_007370239.1

ATGAGTGTGATTATTGTTGGCGGCGGCATGGCCGGTGGCAGCTCGCGCTGGT  
CATTTACATCTGACGCAGGGGAAATTACCGGTTACCTGGTAGAGGCTACA  
GCACCGGGTGTCAACATCATCCTGGTTTTGATGCCCGTGTATTGCGCTGGC  
GGCAGGCACGTGCCAGCAGCTTGGCGCGCTGGGATCTGGCAGGCGATAGCC  
CGTTGTGCAACGCCCATTTCAACCGTTCATGTCAGCGATCGTGGTCACGCCGG  
TTTTGTACGCTGGATGCGCAGGATTATCACCTTGTGCGCTGGGCCAGGTGG  
TTGAGCTGCATGATATCGGCCAGCGGCTCTTTACCTTGCTGCAAAATGCGCCG

GGCGTGACGCTGCATTGCCCGATCGGGTCAGCAGTTTTACCCGTAATGAGC  
AACAGGTATCGGTAACGCTGGAAAGCGGCGAGCTGATTATTGGCCAGTTGCT  
GGTCGCGGGCGGACGGTTCCCGTTCGGGCATGGGCGAGCAACTGGGGATCCTC  
TGGCAGAAAACGCCCTATCACCAGGCCGAGTCATTGCCAACGTCACTACCT  
CTGTTCCGCACCAGGGACGCGCATTGAAACGTTTCACCGAGCACGGGCCGCT  
GGCGATGTTGCCGATGTCGCAGGGGCGCTGCTCACTGGTGTGGTGTGCATCCGC  
TGGAAAAACAGCAGCAGGTGACTGGCTGGTCTGACGAACGTTTTTGGCATGA  
GCTACAAAAAGCTTTCGGCTGGCGTCTGGGACGTATTGAACACGCCGAAAA  
CGCAGCGTTTATCCCCTGATGTTGACTAACGCGTCGTCGCCGTTTCTCATCGC  
GCGGTGCTGGTCGGCAATGCGGCTCAGACGCTGCATCCTATCGCCGGACAAG  
GGTTTAACTCGGCATGCGCGATGTTATGACGCTGGCGGAAACGCTGGCGGA  
GGCATGGGCGAAGCAGAAAGATGTCGGCTGTTATCCGGTGTGACGCGCTAC  
CGTCACCAGCGCCAGGCCGACAAAAGCGCCACCATAGGCGTTACCGACGGG  
CTGGTGCATCTGTTTCCAACCGCTGGGCGCCGCTTGTGCTCGGGCGCAATAT  
CGGGCTGATGGCGATGGAACATTTACCCCGGCGCGCGATGTGCTGGCGCAG  
CGTACCCTCGGTTGGGTAGCCCGTTAA

ATGACACATCACACTGAAGTCGCCGTCGTTGGCGGTGGCATGGTCCGGCGGAG  
CGCTGGCGCTGGGGCTGGCGCAACATGGATTTACCGTTACGGTAATTGAGCA  
GCATGCGCCGCCACGTTTGATGCGACGGCGCAGCCGGATGTGCGTATTTTCG  
GCAATTAGCGCCGCATCGGTGGCGTTGCTGCGCGGGTTGGGTGTCTGGGAAC  
GTGTGCAGGCGATGCGCTGCCACCCGTATCGCCAGCTGGAAACCTGGGAGTG  
GGAAAACGCCCATGTGATATTTGACGCCCGCGAGCTGAAATTGCCGCTGCTC  
GGTTATATGGTTGAAAACAATGTCCTGCAACGTGCGCTGTGGGACGCGCTTG  
AGGCGCATCCGCAGGTCACGTTACGTGTGCCCGCGCACTCAGCGGATTACA  
TACGGATGGTGATCATCACCAACTGACCTTCGAGGAGGGCGAGTCGTTAACG  
GCGAAGCTGGTGGTTGGCGCGGATGGCGCTAACTCCCGCGTTCCGGCAGGCCG  
CCGGAATTGGCATTACGCCTGGCAGTATCAGCAATCCTGTATGTTGATTACC  
GTTGAGTGCGAAGCTGAGGCAGGCGAGAGCACCTGGCAACATTTTACTCCCG  
ATGGGCCCGCACGCCTTTTTACCGCTGTTTGGCAACTGGGCCTCGTTGGTATGG  
TATGACACGCCTGCGCGTATTCGCCAGTTACAGACGCTGACTATGGCGCAGC  
TGGAGCAGGAGATCGTTTCGCAACTTTCTCCCGGACTGGGGCGCGTGAAGCC  
GGTTGCGGGCGGCGGCATTCGCCGCTGGCGCGCCGTATGCGTTGCAATATGTT  
GCCCGGGCCTTGCCTGGTGGGCGATGCGGCACATAACCATTATCCGCTGGC  
CGGGCAGGGCGTCAATCTGGGCTATCGTGATGTTGATGCCTTGTGGAAGTGC  
TTACCGGGGCACGTACGCACGGCGAAGCCTGGGCCAGTCACGCGATTTTAAA  
ACGCTATCAGACGCGTCGAATGGCGGATAACTTTATTATGCAAAGCGGTATG  
GATCTGTTCTATGCCGGTTTCAGCAACAACCTTGGCCCCGGTCAGGTTGTTGCG  
TAATATTGGTCTGATGGCGGCGGAGCGTGCCGGAGTGCTGAAACGTCAGGCG  
CTGAAATATGCTTTAGGACTATAG

ATGACAAATCAACCAATTGAAGTCGTCGTTGTGCGGGGGGCATGGTGGGTG  
CCGCCCGCGCTTGGGCTTGCGAAAATGGCTTTCAGGTCGCCGTCGTGGA  
ACATGCCCGCGCCGCCGCTTTTCACCGCAAACCCGCCGACGTGCGGATC  
TCGTGATCAGTTGCGCGTCCGTTGGATCTGCTGCGCGGGCTGGGCGTCTGGCA  
GCAGGTGCTTGAGATGCGCGCGCATCCTTATCGCCGCCTCGAAACCTGGGAG  
TGGAACGAGGCGCGGGTTGAATTCAGCGCCGATGAACTGCAACTGCCGGAG  
CTGGGCTATATGGTAGAAAACAGCGTGTGCAACGCGCGCTGTGGGAAGCGC  
TGGAGGCGCATCCGGCGGTGCAACTACTGTGCCCGGCGACGCTCACGCAGAT  
GACGCCGTCGCAAAACGGGTATCAGCTCTCGTTACTAATGGCGACACATTA

*Kosakonia  
radicincitans*  
DSM 16656\_2-  
octaprenyl-3-  
methyl-6-  
methoxy-1,4-  
benzoquinol  
hydroxylase

WP\_007373869.1

*Cronobacter  
sakazakii*  
HA18012\_2-  
octaprenyl-3-  
methyl-6-  
methoxy-1,4-  
benzoquinol  
hydroxylase

WP\_166492126.1

<p><i>Cronobacter sakazakii</i> 487G_alkane 1- monooxygenase</p>	<p>WP_105944427.1</p>	<p>CAGGCGCGCCTGGTGATCGGTGCGGACGGTGCCAGCTCGCAGGTACGTAAAT GGGCAGGTATCGGCGTTAACGCCTGGCAGTATCAGCAGTCATGCCTGTTGATT AGCGTGGAATGCGAGCAGCCGCCGGCGACAGCACCTGGCAGCACTTTACCC CGAACGGGCCGCATGCGTTTTTACC GTTTGATAACCGTGCGTTCGCTCGTC TGGTATGACCGCCCGGCACGTGTTTCGTCAGCTTCAGGCGATGACCATGACAC AGCTTGGGCGAGAGATTGCCGCCGCAATTCCTGCCCGCTTGGCCGCGTGAC GCCGTCGCCTGCGGCGCGTTTTCCGCTGGTGCCTCGCCATGCGCTGCGTTATG TGCAGCCGGGCGTTCGCGCTAATTGGCGACGCCGCGCATAACCATCATCCGTT GGCGGGGACAGGGGGTGAATCTCGGTTATCGCGATGTGGACGCGCTGCTGAAG GTGGTGATTGATGCCCGCAATGCGGGCGGAAGACTGGGCTTCCGGCGCGGTGC TTAAGCGCTATCAGCGTTCGTCGATGCCGGATAACCTGCTGATGCAAAGCGG TATGGATCTTTTCCATGCCGGGTTTACTGCGAAACTGAAACCGCTGCGCGTGC TGCGCAATCTTGGGCTTATCGCCGCCAGCGCTCAGGCGTGCTGAAACGCCA GGCGCTGCGGTATGCGCTCGGTTTATGA ATGCGCTGCCCGCAGGCGTTCGCGCCGCGCATTATGGCCTCGCGCACCCGCTTT TGTGACGGATAACAGTGACGACGCCCGCCGCTTCGCGCAAACCGGGCTGGCG GCTCAGGCCGCGCAGTTCCGCGCGCAGGGCCACCGGCTTACGGGCGAGACG CTGGAAGATTATATCGCCCGGTTTCGATGTGCATCTCGGCACCCCGCGGGAAA CGCTCGCCACGCTGTCGCGCGATAACGGCGCTCGCACGCGCCACCGATCTGTC GTTCCAGGTGCATTCCATCGATCCGCCGACCCGTTTATCTTGCCTCCATCTC ACTGCTGGCGCAGCAGGTGGCCCCCGCGCTTGGCTGGAAACAGGCCGACCCG GGCGCTGATGCCTCCACCCTTAACCCGATCAAGGAAACCTTATGA ATGACAAATCAACCAACGGAATGCCATTGTGCGCGGAGGAATGGTCCGGC GGCGACTGGCGCTGGGGCTGGCACAGCACGGATTTGCGGTAACGGTGATCG AGCACGCAGAACCTGCACCGTTTGTGCTGACAGCCAGCCTGACGTGCGGAT CTCGGCGATTAGTGGGCTTCGGTATCATTGCTTAAAGGTTTAGGCATCTGGG ACGCGGTACAGGCTATGCGTTGCCATCCTTACCGCAGACTGGAAACGTGGGA GTGGAAACGGCGCATGTGGTGTGTTGACGCCGCTGAACTTAAAGTACCGTTG CTTGGCTACATGGTGGAAAACACTGTCCTGCAACAGGCGCTGTGGCAGGCGC TGGAAGCGCATCCGAAAGTAAACGTTACGTGTGCCAGGCTCGCTGATTGCATT ACATCGAGATAATGATCTTCAGGAGCTGGAGCTGAAAGGCGGTGAAGTGATC CAGGCCAAGCTGGTGATTGGCGCTGACGGTGCAAATTCGCAGGTGCGGCAA TGGCGGGAATTGGCGTTCATGCCTGGCAGTATGCGCAGTCGTGTATGTTGATT AGCGTACAGTGCAGAAATGATCCCGGCGACAGCACCTGGCAGCAGTTTACTC CGGACGGGCGCGTGCCTTTTTGCCGCTGTTGATAACTGGGCGTTCGCTGGTG TGGTATGACTCTCCGGCGCGTATTCGCCAGTTGCAGAATATGAATATGGCGCA GCTCCAGGCGGAAATCGCGAAGCATTTCGCCGTCGCGTCTGGGTTACGTGACA CCGCTTGCCGCTGGTGCCTTTCCGCTGACACGTGCCATGCGTTGACGATGATG GCAACCAGGGCTTACGCTGGTGGGCGATGCCGCGCACACCATTATCCGTTG GCGGGGACAGGGGTTAACCTCGGTTATCGCGATGTTGATGCGCTGATTGACGT TCTGGTGAATGCCCCGAGCTACGGTGAAGCGTGGGCCAGTTATCCTGTCTCA AGCGTTACCAGATGCGGCGTATGGCGGATAACTTCATTATGCAAAGCGGTAT GGATTGTTTTATGCCGGATTCAGCAATAATCTGCCACCCTGCGTTTTATGCG TAATCTCGGATTAATGGCGGCGGAGCGTGCTGGCGTGTGAAACGTCAGGCC CTGAAATATGCGTTAGGGTTGTAG ATGGCAATACAACACCCTGACATCCAGCCTGCTGTTAACCATAGCGTTCAGG TGGCGATCGTGGTGCCGGTCCGGTCCGGCTGATGATGGCGAACTATCTCGG CCAGATGGGCATTGACGTGCTGGTGGTGGAGAACTCGATAAGTTGATCGAC</p>
<p><i>Klebsiella oxytoca</i> 2880STDY568 2666_2- octaprenyl-3- methyl-6- methoxy-1,4- benzoquinol hydroxylase</p>	<p>WP_022645356.1</p>	<p>AGCGTACAGTGCAGAAATGATCCCGGCGACAGCACCTGGCAGCAGTTTACTC CGGACGGGCGCGTGCCTTTTTGCCGCTGTTGATAACTGGGCGTTCGCTGGTG TGGTATGACTCTCCGGCGCGTATTCGCCAGTTGCAGAATATGAATATGGCGCA GCTCCAGGCGGAAATCGCGAAGCATTTCGCCGTCGCGTCTGGGTTACGTGACA CCGCTTGCCGCTGGTGCCTTTCCGCTGACACGTGCCATGCGTTGACGATGATG GCAACCAGGGCTTACGCTGGTGGGCGATGCCGCGCACACCATTATCCGTTG GCGGGGACAGGGGTTAACCTCGGTTATCGCGATGTTGATGCGCTGATTGACGT TCTGGTGAATGCCCCGAGCTACGGTGAAGCGTGGGCCAGTTATCCTGTCTCA AGCGTTACCAGATGCGGCGTATGGCGGATAACTTCATTATGCAAAGCGGTAT GGATTGTTTTATGCCGGATTCAGCAATAATCTGCCACCCTGCGTTTTATGCG TAATCTCGGATTAATGGCGGCGGAGCGTGCTGGCGTGTGAAACGTCAGGCC CTGAAATATGCGTTAGGGTTGTAG ATGGCAATACAACACCCTGACATCCAGCCTGCTGTTAACCATAGCGTTCAGG TGGCGATCGTGGTGCCGGTCCGGTCCGGCTGATGATGGCGAACTATCTCGG CCAGATGGGCATTGACGTGCTGGTGGTGGAGAACTCGATAAGTTGATCGAC</p>
<p><i>Klebsiella oxytoca</i> 2880STDY568</p>	<p>WP_001577817.1</p>	<p>ATGGCAATACAACACCCTGACATCCAGCCTGCTGTTAACCATAGCGTTCAGG TGGCGATCGTGGTGCCGGTCCGGTCCGGCTGATGATGGCGAACTATCTCGG CCAGATGGGCATTGACGTGCTGGTGGTGGAGAACTCGATAAGTTGATCGAC</p>

2666\_bifuncti  
onal 3-(3-  
hydroxy-  
phenyl)propi  
onate/3-  
hydroxycinna  
mic acid  
hydroxylase

TACCCGCGTGCGATTGGTATTGATGACGAGGCGCTGCGCACCATGCAGTCGG  
TTGGCCTGGTCGATAATGTTCTGCCGCACACTACGCCGTGGCACGCGATGCGT  
TTTCTCACCCCAAAGGTCGCTGTTTTGCTGATATTCAGCCAATGACCGATGA  
ATTTGGCTGGCCGCGCCGTAACGCCTTTATTCAGCCTCAGGTCGATGCGGTAA  
TGCTGGAAGGATTGTCGCGTTTTCCGAATGTGCGCTGCCTGTTTTCCCGCGAG  
CTGGAGGCCTTCAGCCAGCAAGATGACGAAGTGACCGTGCACCTGAAAACG  
GCAGAAGGGCAGCGGAAACGGTCAAAGCCCAGTGGCTGGTGGCCTGTGAT  
GGTGGGGCAAGTTTTGTCCGTGCGACCCTGAATGTGCCGTTTGAAGGTAAAAC  
TGCGCAAATCAGTGGATTGTGGTAGATATCGCAAACGATCCGTTAAGTACG  
CCGCATATCTATTTGTGTTGTGATCCGGTGCGCCCGTATGTTTCTGCCGCGCTG  
CCTCATGCGGTACGTCGCTTTGAATTTATGGTGATGCCGGGAGAAACCGAAG  
AACAGCTGCGTGAGCCGCAAATATGCGCAAGCTGTTAAGCAAAGTGCTGCC  
TAATCCGGACAATGTTGAATTGATTTCGCCAGCGTGTCTACACCACAACGCG  
CGACTGGCGCAACGTTTTTCGTATTGATCGCGTACTGCTGGCGGGCGATGCCGC  
GCACATCATGCCGGTGTGGCAGGGGCAGGGCTATAACAGTGGTATGCGCGAC  
GCCTTTAACCTCGCATGGAAACTGGCGTTGGTTATCCAGGGGAAAGCCCCGCG  
ATGCGCTGCTCGATACCTATCAACAAGAACGTCGCGATCACGCCAAAGCGAT  
GATTGACCTGTCCGTGACGGCGGGCAACGTGCTGGCTCCGCCGAAACGCTGG  
CAGGGTACGTTACGTGACGGCGTTTCTGGCTGCTGAATTATCTGCCGCCAGT  
AAAACGCTACTTCTCGAAATGCGCTTCAAGCCGATGCCGCAATATTACGGC  
GGTGGCGCTGGTGGCGTGAAGGGCAAGCGAAGCACTCTCCGGTCGGCAAGATGT  
TTATTCAGCCGAAAGTCACGCTGGAAAACGGCGACGTGACGCTGCTCGATAA  
CGCGATCGGCGCGAACTTCGCGGTAATTGGCTGGGGATGCAATCCACTGTGG  
GGGATGAGCGACGAGCAAATCCAGCAGTGGCGCGCGTTGGGCACACGCTTC  
ATTCAGGTGGTGCCGGAAGTGCAAATTCATACCGCACAGGATAACCACGACG  
GCGTACTACGCGTGGGGGATACGCAAGGTCGCCTGCGTAGCTGGTTTCGCGCA  
ACACAATGCTTCGCTGGTGGTGATGCGCCCCGATCGCTTTGTGCGCCACCG  
CCATTCCGCAAACCTGGGCAAGACCCTGAATAAACTGGCGTCCGTGATGAC  
GCTGACCCGCCCTGATGCCGACGTTTCTGTGCGAAAAGGTAGCCTGA  
ATGGCAAAGTGATGCGAGCAATCATTGTGCGCGGCGGTATTGGCGGGGCGAG  
CCACGGCGCTTTCGCTGGCGCGCCAGGGTATCAAGGTGATGCTGCTGGAAAA  
GGCGCATGAAATCGGCGAAATTGGCGCCGGGATCCAGCTTGGCCCAAACGC  
GTTCTCGGCGCTGGACAGCCTCGGCGTCGGCGAAGTCGCCCGTCAGCGGGCG  
GTCTTTACCGACCATATCACCATGATGGATGCGATAAACGGCGAAGAGGTGCG  
TGCACATTGAGACAGGACAGGCGTTCCGCGACCATTTTGGCGGGCCGATGCG  
GGTATCCACCGGGTGGATATCCATGCCACCGTCTGGGAGGCGGCGCTGACC  
CATCCGGCCGTCGAGTATCGTACTTCGACGCAGGTAGTGGATATCCGCCAGA  
CCGCCGATGACGTGACGGTGTGTTGATGATAAAGGCAATAGCTGGACGGCGGA  
TATTCTGATCGGCTGCGACGGCGGTAATCGGTGGTGCGCCAAAGCCTGCTG  
GGCGATTCGCCGCGGGTAACCGGCCACGTGGTCTATCGCGCGGTCTGTCGATG  
CCGCCGATATGCCGGACGATTTACGCATCAATGCGCCGTAAGTGGGGCGGG  
TCCGCACTGCCACCTGGTGCAATATCCGCTGCGCGGGCGTAAGCAGTACAAC  
CTGGTGGTGACCTTTCATAGTCCGCAGCAGGAAGAGTGGGGCGTGCGCGACG  
GCAGTAAAGAAGAGGTGCTCTCCTACTTTAAAGGTATCCACCCGCGTCCCCG  
GCAGATGCTCGATAAACCGACCTCCTGGCGCCGCTGGTCCACCGCCGATCGC  
GAGCCGGTAGAAAAATGGGGCAACGATCGTATTACGCTGGTCCGGCGATGCCG  
CGCATCCGGTGGCGCAGTATATGGCGCAGGGGGCCTGTATGGCGCTGGAAGA  
TGCGGTGACCCTGGGTAAAGCGCTGGCCAGTGGCGACGGCGACGCCGCCCGC

*Klebsiella*  
*oxytoca*  
2880STDY568  
2666\_3-  
hydroxybenz  
oate 6-  
monooxygena  
se

WP\_032728552.1

*Klebsiella*  
*oxytoca* BRL6-  
2\_4-  
hydroxybenz WP\_024273698.1  
oate 3-  
monoxygena  
se

GCTTTCGCGCTGTATGAATCGGTGCGTATTCCGCGTACCGCGCGGATCGTCTG  
GTCGACGCGTGAAATGGGGCGGGTCTATCACGCTGCCGGGGTTGAGCGCCAG  
GTGCGCAATCTGCTGTGAAAGGCAAAACCCAGAGCGAGTTTTATCGCGGCA  
TTGAGTGGCTGTACGGCTGGAAAGAGGGTAACTGCCTGCAACCACGTAA  
ATGAAAACACAGGTGGCGATTATCGGGGCTGGCCCATCCGGACTCCTGCTGG  
GGCAGTTGTTACATCACGCCGGATTCAAACCGTCATCCTTGAGCGACAGAC  
TCCTGAGTACGTGCTGGGGAGGATCCGCGCGGGCATTCTGGAAAGCGGAACG  
GTAGAGCTGCTGCGCGAAGCCGGCGCCGCCCGCGAATGGAGGCTGAAGGC  
CTGGTGCATCATGGCGTCGAATTTTTGTTGAGGGCAAGCGGGTACCGGTTGC  
GCTGACGGAAGTACGGCGGGCAAAAGCGTGATGGTTTATGGCCAGACTGA  
AGTGACGCGGGATTGATGGCCGCGCGGGCGGAATGCGGGGCGGCGACGAT  
TTATGGCGTCAGCGAAGTCACTATTAATGAGGCAAAGAGCGATCGACCATCG  
GTCTCTTTTATCAGCAATGGCGAACACTGCCGCTTAGAGTGCAGCTTTATCGC  
CGGCTGCGATGGCTTTCACGGCGTGTCCCGTCAAAGTATTCTCCTGGGGTGC  
TGAAAGAGTACGAAAGCGTCTGGCCGTTTGGCTGGCTGGGGCTGCTGGCCGA  
TACGCCGCCGGTGAACCCGGAGCTTATTTACGCGCACACGAACGCGGGTTT  
GTTCTTTGTAGTCAGCGCTCACTAACTCGAAGCCGTTATTACCTCCAGGTCCC  
GCTCAGTGAAAAGGTTGAGGCATGGTCTGATGAGCGTTTCTGGAATGAACTC  
AAACGCCGCCTCCCTGAAGAGCTGTCCAGCAAGTTAGTGATTGGTCACTCAC  
TCGAGAAGAGCATCGCGCCGCTGCGCAGCTATGTGGTGGAGCCGATGCAGTA  
CGGCAGATTGTTTCTGGTGGGGGATGCGGCGCATATCGTACCGCCTACCGGG  
GCAAAAGGATTGAATCTCGCGGCGTCCGATGTGAACTATTTATGGCGCATCCT  
CCGTGAATATTATCACCATGGTTCGCGTTGACCTGCTGGCGAGCTACTCTCGTT  
TTGCGCTGGATAGGGTATGGAAAGGCGAAAGATTGAGCTGGTTTATGACCCG  
TCTGCTGCATGATTTCCCGCAACAAAGCGAGTTGATAGAAAAATGCAGGCG  
GCGGATCGGCGTTATTATCTTGGCTCACGCGCCGGATTAACCACGATCGCTGA  
AAACTATGTCGGTTTTGCCGATGGAGCGCGTGGCATAA  
ATGAGCGTGATTATCGTGGGCGGCGGCATGGTTCGGCGGACGCTGGCGCTGG  
CTATTTTCGCAACTCAGTCATGGGACGCTGCCGGTACATCTGATTGAAGCGACG  
GCGCCGGAGGCCGATGGCCACCCCGGATTCGACGCCCGGGCGATAGCGCTG  
GCAGCAGGTACCTGCCAGCAACTGGCGCGAATAGGCGTGTGGCAGGCCATTG  
CCGACTGCGCGACCGCTATCACGAGCGTTCACGTACGCGATCGCGGTCATGC  
CGGCTTTGTTACCTTACGCTGAGGACTATCGTCTCCCGCGCTGGGGCAGG  
TGGTTGAACTGCACGACGTAGGGCTGCGGCTTTTTGCCCTGTTGCGCAAAGCG  
TCTGGCGTTACGCTGCACTGCCCAGGATCGGGTCGCCAGCGTATCGCGCACGG  
CGGAGCAGGTGAGCGTGACGCTGAAAAACGGTCAGACGGTTACCGGTAGCC  
TGCTGGTTGCCGCCGACGGCACGCGTTCAGCGCTGGCAAGCGCGTGTGGCGT  
TGAGTGGCAGCAGGAACCGTATGAGCAACTGGCGGTGATAGCGAACGTCGC  
CACGTCTCTTTCGCGATGACGGCCGCGCCTTTGAACGCTTTACCGCGCATGGTC  
CGCTGGCGATGCTGCCCATGTCTGAAGGCCGCTGTTTCGCTGGTGTGGTGTAC  
CCGCTGGAAAAGCGCGACGAGATTCTGGCCTGGTCAGACGAACGTTTTTGGC  
GCGAACTGCAGACAGCATTCCGGCTGGCGGCTTGGCCGGATCACGCTGGCGGG  
CAAACGTAATGCTTATCCGCTTTCGCTTACTACGGCGGCGAAAGCGTTTACCC  
ATCGCACCGTACTGGTGGGCAATGCGGCGCAGACGCTGCATCCAATCGCCGG  
ACAAGGGTTTAACTCGGGCTGCGCGATGTGATGAGTCTTGTGAAACCTG  
ACGCAGGCGCAGTCTGTGGGGCAGGATATCGGCGATTACAATGTGCTTTCCG  
CCTATCAGCAGCGCCGCGCAAGACCGGAACGCCACGGTTCGGCGTGACCG  
ACGGCATGGTGCATCTGTTTGCCAATCGCTGGATAACCGCTGGTGGTTGGGCGC

*Citrobacter*  
*sedlakii* NBRC  
105722\_2-  
octaprenyl-6- WP\_042292169.1  
methoxyphen  
yl  
hydroxylase

*Citrobacter  
sedlakii* NBRC  
105722\_2-  
octaprenyl-3-  
methyl-6-  
methoxy-1,4-  
benzoquinol  
hydroxylase

WP\_042285453.1

AACGTCGGGTTAATGGCTATGGAGCTGTTTCCACCCGCCCGTGACGCTCTGGT  
GAAGCGCACGCTTGGCTGGGTTGCGCGATAA  
ATGACAAATCAACCAACGGAAGTGGCCATTGTCCGGCGGAGGGATGGTCCGC  
GGTGCCTGGCGCTGGGACTGGCGCAGCACGGATTTACGGTCACGGTGATTG  
AACACGCCGCGCCAGCGCCCTTTGCGGCGGACAGCCGGCCCGACGTGCGTAT  
TTCCGCGATCAGCGCCGCGTCTGTTTCGCTGTTGAAAAGCCTGGGCGTCTGGG  
ATGCGGTACAAGGGATGCGCAGCCATCCTTATCGTCCGGCTGGAAACCTGGGA  
ATGGGAAAATGCCACGTTGTTTTGACGCTGCGGAACTGAAGCTGCCGCTG  
CTGGGCTATATGGTCGAGAACACTGTTTTGCAGCAGGCGCTGTGGCAGGCGC  
TGGAGGCGCATCCGAACGTTACCCTGCGAGTCCCAGCGTCCGTTGCGGCGCT  
ACATCGTCATCACGACAGTCAGGTAAGTGGAGCTGGCAGATGGCGAGCAGATT  
ATGGCGAAGCTGGTGGTCCGGCGCTGACGGCGCGAATTACAGGTGCGCCAAC  
TGGCTGGCATTGGCATTACGCCTGGCAGTATGCGCAGTCATGCATGCTGATC  
AGCGTTCAGTGCGAACAGGCGCCGGGGACAGCACCTGGCAGCAGTTTACG  
CCGGATGGCCCGCGCGCTTTTTGCCGCTCTTTGATCGCTGGGCGTCCGCTGGT  
GTGGTATGACGCGCCAGCGCGTATTGCCAGTTGCAGACCCTGAGCATGCCG  
CAGTTGCAGGCGGAAATCGTAAAACATTTCCCGGCGCGGCTGGGGCCGGTGA  
CGCCGCTGGCCGAGGTGCGTTCCCGCTGACCCGTCGACACGCGTTGCAGTA  
TGTTACGCCGGCCTGGCGCTGGTTGGCGATGCGGCGCACACCATTATCCGC  
TGGCCGGGCAGGGGGTGAACCTCGGCTATCGCGATGTCCGATGCGCTGATCGA  
TGTGCTGGTAAATGCGCGCAGCTATGGAGAACGTTGGGCCAGCCAGCCGGTG  
TTGAAGCGCTACCAAATGCGGCGCATGGCGGATAACTTTATGATGCAGAGTG  
GAATGGATCTGTTTTACGCTGGATTACAGTAATAACCTGCCGCCGCTGCGTATG  
CTGCGCAACCTCGGCCTGATGGCTGCTGAACGTGCGGGTGTGTTAAACGCC  
AGGCGCTGAAGTATGCGTTAGGGTTGTAA  
ATGGCTAAAGTGAAGAGCGCAATTATCGTTGGCGGCGGCATTGGCGGGGCGAG  
CAACCGCGCTTTCGCTGGCGCGCCAGGGTATCAAGGTGATGCTGCTGGAAAA  
GGCGCACGAGATTGGCGAGATTGGCGCAGGCATCCAGCTTGGCCCAAATGCC  
TTTTCCGGCGCTGGACAGCCTCGGTGTTGGCGACGTAGCGCGCCAGCGGGCGG  
TATTTACCGACCATATCACCATGATGGATGCGGTAACCGCGGAGGAAGTTGT  
CCGCATTGAAACCGGCCAGGCGTTTTCCGCGACCATTTCCGGCGGGCCGTATGCC  
GTGATTCACCGCGTCGACATTCATGCCTCGGTCTGGGAAGCGGTGCTGACCCA  
TCCTGATGTTGAATACCGGACATCCACCAATGTGGTGGATATTCGCCAGACGC  
CGGACGACGTCACGGTATTTGATGAGCAGGAAACAGCTGGACAGCCGATA  
TTCTGGTGGGCTGTGACGGCGTGAAGTCGGTTGTGCGCCAGAGTCTGCTGGGG  
GATTCGCCCGGGTGACCGGACATGTGGTCTACCGGGCGGTGATTGACTGTG  
ACGATATGCCGGAAGATTTGCGCATTAAACCGCGCCGGTACTGTGGGCGGGGCC  
GCACTGTCACCTTGTCACTATCCGCTACGCGGCGGCAAGCAGTACAACCTG  
GTGGTGACGTTCCATAGCCGTCAGCAGGAGGAGTGGGGGTGAAGGACGGC  
AGTAAAGAAGAGGTGCTCTCGTATTTTCCCGGTATCCATCCTCGTCCACGTCA  
GATGCTCGACAAACCCACCTCCTGGCGTCGCTGGTCCACCGCCGATCGCGAA  
CCGGTGGAAAAATGGGGAACGGAGCGCATTACGCTGGTCCGGTACGCCGCG  
CACCCGGTCGCGCAGTATATGGCCCAGGGCGCATGCATGGCGCTGGAAGATG  
CGGTGACCCTCGGCAAAGCGCTGGAAAAATGCGAGGGCGATGCGGCAAGCG  
CCTTTGCGCTGTATGAGTCGGTGCGCATTCGCGCACGGCGCGAATTGTCTGG  
TCGACCCGCGAAATGGGGCGCGTCTACCACGCTGCGGGCGTCAACGTCAGG  
TGCGTAATCTGCTGTGGAAAGGCAAATCGCAGGCGGAATTTTATCGCGGCAT  
GGAGTGGTTATACGGCTGGAAAGAGGATAACTGTCTGCTGCCGCGCTAG

*Citrobacter  
sedlakii* NBRC  
105722\_3-  
hydroxybenz  
oate 6-  
monooxygena  
se

WP\_042284472.1

<p><i>Alcaligenes sp.</i> Strain HPC1271 _aromatic- ring- hydroxylating dioxygenase subunit beta</p>	<p>WP_009463815.1</p>	<p>ATGAGCGAAATCAGCCGTCAGGCCCTTATCGATTTTGTGTATGCGGAAGCCC GCCTGCTGGATGAGCAGCGCTACGAGCAATGGCTCGACCTGTTACCCGAGGA TGGCTACTACTGGATGCCGCTGGTGCACGATCAGCAGGACGCCCGTTGCAC GCGTCCCTGATGCACGAGGACAAGCTCTTGCTGCGTATCCGTGTGGAACGTCT GGCAGGCCGCCGTACCTTTTCCAGCAGCCCAAGAGCCGCAGCCATCACCTG CTCCAGCAACCCACTGTGGAAAGCATGGACGAGGAAAAAGGCCAATACACC GTGCGTTGCGCCTTCCATTACACGGAAACGCGTGGCGACAACCAAGATATCT ATGTGGGTTGGAATACCTACACCCTGGTGCGCCAGGACGACGCCTTGAAGAT CCGTCTGAAACGGGTGGATCTGCTCAATTGCGACGCGCCTTTCGGCAATATCC AGTTGTTTATGTGA ATGACATCCAAGGTTTATATCGGCCTGCAAGACAACGACATGTCGCGCTACA TCGTGAGGCCATCGAGGAAGACAACCCGACGCGACGGTGATTTATCAGCC AGCCATGATCCGTATTGAGTGTGTGGGTCAGTTGACCGTCAAGCGCGAGACC GTGGAAGAAAAGTATGGGCAGCAATGGGACATGCAGGAGCTGCATCTGAAT CTGATCACCTTGGGTGGCAACGTGGATGAAGATGAGGACCGCTTGTTTTTGCA CTGGAACAGCTAA</p>
<p><i>Alcaligenes sp.</i> Strain HPC1271_mo nooxygenase</p>	<p>WP_003800437.1</p>	<p>ATGTCAGACACGAGCTTGCCCACTTTGACAAAGTACGTACGCGTACGCAGTC CGGCCAACGCCGTTTTGTGGAATTTGATTTTGCCATCGGCCAGCCGGACCTG TTTGTGGAAGTGGTTCATGCCCCGGCGGCGTTTGTGAGCAGTTTTGTCTGAAAA CAATGTCCAGCCCATGAGCGATGAGCAAATGCGGGTCAATGACGAGAACGA AGAGAAATGGCGTTTTGGTTATGACACTTTGGTTCGGCAACAGTTCGTCAGGCTG AAGCCCAGTAG ATGGCAGTTACTGCAATTACCCCGGACTACCAAGGCTATGCGCGCGACCAGC AGTCGACTATGGCGACAGCATGTTGCTGTATATAGGCTGGGACGAGCACCT TTTGTCTGCTCGGCCAAGGCCTTTCTGGTTCAGCCCGAGATGACCGTGTCCC AGATGATCCAGCAACTGTTGCCCTGCCGTTTTTGGCCAGCACCTGACTTCGAG CAGATCGAATGGAGCAAGGTGCAATGGAATTTGAACGGCGAGGCGGTTGAA CTGAATCCTGACGACACCTTGGGTTCCAAGGGCTTCGATCACAATCCTTGT GCGTTTCAAGACCCCTGGCCTGAATGGCTACAAGGGTACGGGCGTATAA ATGTTTGGCGATTTTGTCTTTCGCTCACCTATGCAGCTTATGCCCCGTTCTCGT CAGGGGCCGCTTTGGTTTGGGATGCGGATTTCTGCGGTGGGGCGTGGTTAGT TCATAGGCACAGCGATGTACAAGCCGCCCTGCGCAATCCCGATTTAAGTGTG CGGCGTGTGGCGGGTGGGTGGCCAGGCTGGCGCTGACCCCTCCCCTCGTCT GCAAGCCTTCAAGGGCTTGATGGCCAGGACGCTGGTCTTTCTGGACCGCCCC CGTCACACACGCGTCAGACGAGTAGTGAACGCGGCTTTTGTGCGAAGGCTT TGGAACCCTGCACAGCACGATTGAAAAGCGCGTTACGCATATCCACCTGGA GTTAAAAGACAAGCTGCGGCACGGTTCAGTGGATCTGGTTGATGAGGTCGT CGCCCCTCCCCGCTTGGTTCATGATGGACGTGCTCGGCTTGGAGCAACTGCC TTTGTCTGTTTTTTCAGGCCTGGTTCAGAGCAACTGGCAGGTTTTATCGGACAAG CCACGCCGGATATGCCTTTGCTGAGAAGCACCCAGGACGCCTTGCTGGATAT GGCTGACTTTCTAGGCAACAGTGCCAATCTGCAAGAAGGCGGGTTGGCCTGG CGGCTTTTGCATGATGAGCAGCTTTCCCTTCAAGGCAGGCGCGAGCGCTTGGC ACAGTCCTGTATGTTGCTCTTTGCAAGGCTATGAAACCTCCCGGCATCTGCTTA GCTCCCTGTTTCAAACACTGCTGGCCGACTCCACAACGCTGCAGGACTTGCTA TCGAATCCGCAGAAAATTCCTGCCGCGATCAAAGAGGTGCTGCGTCACGACA GCCCGATTGAGTACACAGCCAGACGTTTGTGCGCGACCAGCACTGGCATGG TCAGCATTGCGCAAGGGGCAGTTGCTGCTTTTGTCTTTGGGCGCTGCCAAC CGGATCCGGCGGTGTTTGGCAATCCCGACGATCTGGACTTCAGCCGCAACAA</p>
<p><i>Alcaligenes sp.</i> Strain HPC1271_phe nol 2- monooxygenase</p>	<p>WP_009454452.1</p>	<p>ATGTCAGACACGAGCTTGCCCACTTTGACAAAGTACGTACGCGTACGCAGTC CGGCCAACGCCGTTTTGTGGAATTTGATTTTGCCATCGGCCAGCCGGACCTG TTTGTGGAAGTGGTTCATGCCCCGGCGGCGTTTGTGAGCAGTTTTGTCTGAAAA CAATGTCCAGCCCATGAGCGATGAGCAAATGCGGGTCAATGACGAGAACGA AGAGAAATGGCGTTTTGGTTATGACACTTTGGTTCGGCAACAGTTCGTCAGGCTG AAGCCCAGTAG ATGGCAGTTACTGCAATTACCCCGGACTACCAAGGCTATGCGCGCGACCAGC AGTCGACTATGGCGACAGCATGTTGCTGTATATAGGCTGGGACGAGCACCT TTTGTCTGCTCGGCCAAGGCCTTTCTGGTTCAGCCCGAGATGACCGTGTCCC AGATGATCCAGCAACTGTTGCCCTGCCGTTTTTGGCCAGCACCTGACTTCGAG CAGATCGAATGGAGCAAGGTGCAATGGAATTTGAACGGCGAGGCGGTTGAA CTGAATCCTGACGACACCTTGGGTTCCAAGGGCTTCGATCACAATCCTTGT GCGTTTCAAGACCCCTGGCCTGAATGGCTACAAGGGTACGGGCGTATAA ATGTTTGGCGATTTTGTCTTTCGCTCACCTATGCAGCTTATGCCCCGTTCTCGT CAGGGGCCGCTTTGGTTTGGGATGCGGATTTCTGCGGTGGGGCGTGGTTAGT TCATAGGCACAGCGATGTACAAGCCGCCCTGCGCAATCCCGATTTAAGTGTG CGGCGTGTGGCGGGTGGGTGGCCAGGCTGGCGCTGACCCCTCCCCTCGTCT GCAAGCCTTCAAGGGCTTGATGGCCAGGACGCTGGTCTTTCTGGACCGCCCC CGTCACACACGCGTCAGACGAGTAGTGAACGCGGCTTTTGTGCGAAGGCTT TGGAACCCTGCACAGCACGATTGAAAAGCGCGTTACGCATATCCACCTGGA GTTAAAAGACAAGCTGCGGCACGGTTCAGTGGATCTGGTTGATGAGGTCGT CGCCCCTCCCCGCTTGGTTCATGATGGACGTGCTCGGCTTGGAGCAACTGCC TTTGTCTGTTTTTTCAGGCCTGGTTCAGAGCAACTGGCAGGTTTTATCGGACAAG CCACGCCGGATATGCCTTTGCTGAGAAGCACCCAGGACGCCTTGCTGGATAT GGCTGACTTTCTAGGCAACAGTGCCAATCTGCAAGAAGGCGGGTTGGCCTGG CGGCTTTTGCATGATGAGCAGCTTTCCCTTCAAGGCAGGCGCGAGCGCTTGGC ACAGTCCTGTATGTTGCTCTTTGCAAGGCTATGAAACCTCCCGGCATCTGCTTA GCTCCCTGTTTCAAACACTGCTGGCCGACTCCACAACGCTGCAGGACTTGCTA TCGAATCCGCAGAAAATTCCTGCCGCGATCAAAGAGGTGCTGCGTCACGACA GCCCGATTGAGTACACAGCCAGACGTTTGTGCGCGACCAGCACTGGCATGG TCAGCATTGCGCAAGGGGCAGTTGCTGCTTTTGTCTTTGGGCGCTGCCAAC CGGATCCGGCGGTGTTTGGCAATCCCGACGATCTGGACTTCAGCCGCAACAA</p>
<p><i>Alcaligenes sp.</i> Strain HPC1271_cyt ochrome P450</p>	<p>WP_009457883.1</p>	<p>ATGTCAGACACGAGCTTGCCCACTTTGACAAAGTACGTACGCGTACGCAGTC CGGCCAACGCCGTTTTGTGGAATTTGATTTTGCCATCGGCCAGCCGGACCTG TTTGTGGAAGTGGTTCATGCCCCGGCGGCGTTTGTGAGCAGTTTTGTCTGAAAA CAATGTCCAGCCCATGAGCGATGAGCAAATGCGGGTCAATGACGAGAACGA AGAGAAATGGCGTTTTGGTTATGACACTTTGGTTCGGCAACAGTTCGTCAGGCTG AAGCCCAGTAG ATGGCAGTTACTGCAATTACCCCGGACTACCAAGGCTATGCGCGCGACCAGC AGTCGACTATGGCGACAGCATGTTGCTGTATATAGGCTGGGACGAGCACCT TTTGTCTGCTCGGCCAAGGCCTTTCTGGTTCAGCCCGAGATGACCGTGTCCC AGATGATCCAGCAACTGTTGCCCTGCCGTTTTTGGCCAGCACCTGACTTCGAG CAGATCGAATGGAGCAAGGTGCAATGGAATTTGAACGGCGAGGCGGTTGAA CTGAATCCTGACGACACCTTGGGTTCCAAGGGCTTCGATCACAATCCTTGT GCGTTTCAAGACCCCTGGCCTGAATGGCTACAAGGGTACGGGCGTATAA ATGTTTGGCGATTTTGTCTTTCGCTCACCTATGCAGCTTATGCCCCGTTCTCGT CAGGGGCCGCTTTGGTTTGGGATGCGGATTTCTGCGGTGGGGCGTGGTTAGT TCATAGGCACAGCGATGTACAAGCCGCCCTGCGCAATCCCGATTTAAGTGTG CGGCGTGTGGCGGGTGGGTGGCCAGGCTGGCGCTGACCCCTCCCCTCGTCT GCAAGCCTTCAAGGGCTTGATGGCCAGGACGCTGGTCTTTCTGGACCGCCCC CGTCACACACGCGTCAGACGAGTAGTGAACGCGGCTTTTGTGCGAAGGCTT TGGAACCCTGCACAGCACGATTGAAAAGCGCGTTACGCATATCCACCTGGA GTTAAAAGACAAGCTGCGGCACGGTTCAGTGGATCTGGTTGATGAGGTCGT CGCCCCTCCCCGCTTGGTTCATGATGGACGTGCTCGGCTTGGAGCAACTGCC TTTGTCTGTTTTTTCAGGCCTGGTTCAGAGCAACTGGCAGGTTTTATCGGACAAG CCACGCCGGATATGCCTTTGCTGAGAAGCACCCAGGACGCCTTGCTGGATAT GGCTGACTTTCTAGGCAACAGTGCCAATCTGCAAGAAGGCGGGTTGGCCTGG CGGCTTTTGCATGATGAGCAGCTTTCCCTTCAAGGCAGGCGCGAGCGCTTGGC ACAGTCCTGTATGTTGCTCTTTGCAAGGCTATGAAACCTCCCGGCATCTGCTTA GCTCCCTGTTTCAAACACTGCTGGCCGACTCCACAACGCTGCAGGACTTGCTA TCGAATCCGCAGAAAATTCCTGCCGCGATCAAAGAGGTGCTGCGTCACGACA GCCCGATTGAGTACACAGCCAGACGTTTGTGCGCGACCAGCACTGGCATGG TCAGCATTGCGCAAGGGGCAGTTGCTGCTTTTGTCTTTGGGCGCTGCCAAC CGGATCCGGCGGTGTTTGGCAATCCCGACGATCTGGACTTCAGCCGCAACAA</p>

<p><i>Alcaligenes sp.</i> II-C-7_alkane hydroxylase</p>	<p>ACJ22769.1</p>	<p>TCAGGCCGAGCTATCCATGGGACACGGAATTCATCATTGCCTGGGAGCCGGT  TTGGTGCAGCTGGAAGCCAAGCTCGTACTTGAGCAATTCCTGCCTTTGCTCCC  TCGCCTGCAAGGGACGCAAGGTGAGCGTATTCGACTCCCCGCCTATCGGGGC  TGGAAACCGCTTGCCGGTTCAATACCGGGCGGCACAGTCATGA  AATACCGGCCATGAGCTGGGGCACAAGACCGACCACCAGAGAAATGGATG  GCCAAGCTATGTCTCGCCCCGGTGTTCATATGGGCACTTCTATGTGGAACATAA  TCGTGGGCATCACGTGAGGGTTCCACGCCGAGGATCCGGCATCCTCCCGG  TTCGGCGAGACGTTCTGGGAGTTCCTGCCGCGACCGTGATCGGCAGCCTTAA  ATCCGCCTGGTCGCTGGAGAAACAGCGGCTGGAGCGGCAGGGGCTTTCGGTA  TGGAGCTGGCATAACGACAATCTGCAGGCCTGGGCATTGTCGGTGGTGTCTTG  GGTGCCCTGATACTGTGGTTGGGCTGGGCGGTGGTGCCGTTCTGCTGATTC  AGAGCCTGTTCCGTTTTAGTTGCTGGAGGTGGTCAACTATATCGAGCA  ATGTCTCAATCTGATCTGGCTCACGTTGACGTGACGATCGTCGGCGGCGGTAT  GAGCGGTGCCGTGCTGGCCCTCTCCCTCGCCGCCCTCCGGGGATCGGACGGT  GCCCCCTGCAGATCCTGCTGCTGGAGGCGAGCGCCCCGAGCTCAATGCTC  ATCCCGGCTTCGACGCCCGGCCATCGCCCTCTCGGCGGGCACCTGCGAGGC  GCTGACCCGCCACGGCATCTGGTCCCGTTTACCCCCATTGCACCCCCATCA  CCGACATTCACGTCTCGGATCGGGGCCACTGCGGCCAGGCCAGGCTGTCCGC  GGCGGAATATGGCTTGCCGGCGCTCGGCCAGGTGATCGAACTCTGTCCGCC  GGGATCGAGTTGCAGCGGGCCCTTGCCGCCACCCCGCAGATACGGGTGTGCT  GCCCCGGCCAGCTCGCACAGATTGAGCCCGACGAAGAAGGGGTGACCCTGA  CCCTCGCCACGAACGAGCGCTATCGGACCCAGCTGCTGGTGGCGGGCGGATGG  GGGCAACTCCTTCGTGCGCCAGCACTTCAAGATGCCGGTCACTGCGCCACGAC  TATGGCCAGAGCGCCATCATCGCCACGGTGAAGACCGCCCTGGACCCCGCCG  GGCGGGCCTTCGAGCGCTTACCGAAGGGGGGCGCTCGCCCTGCTGCCGAT  GCAGGAGGGGCTCTCCTCCCTGGTCTGGAGCCTGGCGGGGACGAGGCACAG  GCCCTGATGGCGCTGGACGACGCGGCGTTTTCTCGCCCCCTGCAGCAAGCCT  TTGGCTGGCGCCTCGGGCGTTTTCGAACGCACCGGCGTGGCCACCTCTATCCG  CTGGTGTGACGGTGGCCGATTATCCCCTGGCCCAGCGCACCGTGCTGGTGG  GCAACGCCGCCCATCTGCTGCACCCCATCGCCGTCAGGGCTTCAACCTCGG  CATGCGCGACCTTGACCTGCTCACCCGCGCCGTTGGCCAGGCGCTCCTGGCG  GGGAGGACATCGGCAGCTTCGAGGTGCTGAACGGTACTGGCAATCGCGCC  GGGAGGATCAAGCCCAGACCGTCTGGCTCACCTCCTCCCTGGCCCAGCTCTTC  TCCAACGCCACGCTCCCCTGGTGGCGGGGCGCAACCTGGCGCTCTCTGAT  GGGGCGACTGCCCTGGCTCAAGGCGCCGCTGGCTTCCCGCACCTGGGGTTC  GTCACCGACGTGTGCCGGCCATGA  ATGATCAAGCCGTTTCCATCAGCATTGAGAACACCCAGGACGGTTTTCGCCAT  CATCGAAGCCATCCTGGCCGACAACCCCGAGGCCAAGAGCAACCCCTTCCCG  GCCATGACCAAGATCGACTGCCCCGGTCCGGCTGGAAATCCCGCGCCGAGAGC  GTTTCCGAACGCCTGGGCCGCGACTGGGATCCTCAGGAAATCCACCTCAGCG  TCATCTCCCTGTCCGTTCCGGTGGACGAGGACGACGGCTCTCTGATCATCTTC  TGGAGATAG</p>
<p><i>Aeromonas taiwanensis</i> LMG 24683_2- octaprenyl-6- methoxyphen- yl hydroxylase</p>	<p>WP_043759840.1</p>	<p>ATGAACATCGACATCCAGGCCGAGGCGATCACGCCGCGGCGTCATACCTTCT  CGCACATCGCGCGGCGCTTCGGCGTCGACAAACCCGCCCTCGCGCTATGAAGA  GGCGACCTATGACGTGACGCCGGTGGTCAACTTCCACTATCGGCCGACCTAT  ACGCCGAGTTCGAACTGTACGACCCGCGCCGCACCCGCATCGTGATGAACG  ACTGGTACGTCTCCGCGATCCGCGCCAGTTCTATTACGCCTCCTACAACATC  AGCCGCGCGGCCATGCAGCAGTCGTTCCGACGACGCCGTGAACTTCGTCGAGA</p>
<p><i>Brevundimona s diminuta</i> 3F5N_monoo- xygenase</p>	<p>WP_087139175.1</p>	<p>ATGAACATCGACATCCAGGCCGAGGCGATCACGCCGCGGCGTCATACCTTCT  CGCACATCGCGCGGCGCTTCGGCGTCGACAAACCCGCCCTCGCGCTATGAAGA  GGCGACCTATGACGTGACGCCGGTGGTCAACTTCCACTATCGGCCGACCTAT  ACGCCGAGTTCGAACTGTACGACCCGCGCCGCACCCGCATCGTGATGAACG  ACTGGTACGTCTCCGCGATCCGCGCCAGTTCTATTACGCCTCCTACAACATC  AGCCGCGCGGCCATGCAGCAGTCGTTCCGACGACGCCGTGAACTTCGTCGAGA</p>
<p><i>Brevundimona s diminuta</i> BZC3_phenol hydroxylase</p>	<p>WP_088410947.1</p>	<p>ATGAACATCGACATCCAGGCCGAGGCGATCACGCCGCGGCGTCATACCTTCT  CGCACATCGCGCGGCGCTTCGGCGTCGACAAACCCGCCCTCGCGCTATGAAGA  GGCGACCTATGACGTGACGCCGGTGGTCAACTTCCACTATCGGCCGACCTAT  ACGCCGAGTTCGAACTGTACGACCCGCGCCGCACCCGCATCGTGATGAACG  ACTGGTACGTCTCCGCGATCCGCGCCAGTTCTATTACGCCTCCTACAACATC  AGCCGCGCGGCCATGCAGCAGTCGTTCCGACGACGCCGTGAACTTCGTCGAGA</p>



*Brevundimona  
s diminuta*  
NCTC11164\_3  
-(3-  
hydroxyphen  
yl)propionate  
hydroxylase

SPU44975.1

AACGCGACCTGATCGCCGATGTGCCCCGGAATGGCGCGACCTGTTGCCCGC  
CTGGCTGCTGCCGCTGCGCCATGTGGAATGGGCGGCGAACATGAACTGCCAG  
CTGATCGCCGACTGGGGCTATGGGACGCAGATCACCTCGGCGGCGGCCTTCT  
GCGGGGCCGACCGCCTTGGCATCGCCAGGTCATCTCGCGCATCGGCCTGCT  
GCTGGGTCAGGGCACGAAAGCGCCCTGAAGGAAGCCAAGACCCAATGGCT  
GGAGGCCGACGCTCTGGCAACCCCTGCGCCGCCTGGCCGAAGACCAGCTGGTC  
GTCCATGACTGGTTCGAGCTCTATGTGCCCAGCTGATCGTGCTGGACGGCTA  
CATCTATCCGCTGGCGACGGGCGCCTTCGACCGTGCGGGCGCGGCGCACAAAC  
GGCGCCGCCTTCTCGATGATGACCGGCTTCCTGGGCGACTGGTACGCCGACA  
ACAGCCGCTGGACCGACGCCGTCATCAAGGCCGCCGCCGAGAGTCCGAGG  
CCAACCGCATCGTTTTGGGCGAATGGTTTCGAGCGCTGGTCCGCCCGCGCCGA  
AGAAGCCGTCCGCCCCCTCGCCGCCATGGTGTGGGCGCCGAAGGCGACGCC  
GCCGTCGATGCGGTGCGCGCGCCTGCGTGAACGGATGGTCGGACTGAACG  
CCCTAGAAGCGCGGGAGATGGCGGCATGA  
ATGCTTGATTCCATGAACGACGCCGCCCTCCCTCCCCGTGGTCATCGTCGG  
CGGCGGGTTCTCCGGCGCCATGCTGGCCGTGCGCCTGGCCGAAGTGGCCAA  
GCCTCGGTCTGATCGAGCGCAGCGAACAGGTGCGCCTCGGCGTCGCCTATT  
CCACGCCGCTGGACGACCACCGGCTGAACGTCCGCGCCGAGCGGATGAGCG  
CCCCCCCCGACCGCCCCGCCACTTCACCGACTGGTTGGCGCTCCACGCCCC  
CGCCTTCGCCGATCCGAACGGCTTCGCCCCGCGCCGCCTCTACGGCCTCTATG  
TGCAGGCCCGCCTGGCCGAGGCCGAGGCCGCCCGTCCCGGCCCTGATCCGTCG  
TGTGAAGGGCGAGGGCGTCCGCATCGAAGGCGAGACCGTCCTCCTCGCCGAC  
GGCGCCCCGATCCCCGGCCGCGCCGTGGCGCTGGCCACCGGCAACCCGCCGC  
CGCGCCCCGCGTGGCGGGCGAAGGCCCCCCGCGCATCGCCGACCCGTGGC  
GGTCCGACGCTCTGGCCGCGATCGGCCCCGACGATGACGTGCTGATCCTCGG  
TTCCGGCCTGACCATGGTCGATGTCGTTCTGGCGTTTACGGCTCAGGGCTGGC  
GCGGCCGGGCGACGGTCGTGTCGCGGCGCGGCCTGCTGCCCCAGGCCACGG  
CGCCCATCACGACGCCCCATCGACCTGCCGCCGAGGCGCTGACCGGCGCC  
CTGTGCGCGCCGCTGGCCTCGGCGCGACGACTGGCGCGCGATCACGGCTGGC  
GCCGCGTATGGAGGGTATCGCCCCGTCACCGCCGCGTGTGGGGCGCCGC  
GACGATCGCCGAGCGCGGCCGCTTCCTGCGCCATCTGCGTCCCTGGTGGGAC  
GTTTCATCGCCACCGCATCGCGCCCCGAGATCGCCGCCGTGCTGGAAAGGTTGA  
AAGCGGAGAACCGACTGACCGTCGTGCGGGGCCGCGCCAGGCGATGGCGG  
CCGACCGCCAGGCCGCGAACCTGACCGTCCGTCCACGGAACGGCGAAGTTC  
AAGCCTTCTCCGCCGCTGGTTGATCGACTGCACCGTCCCGGCCACGACGC  
CGCCTGCACGCCCTGACCGCCGCCCTGATCGCCGAAGGCCGCGCCCCGCTC  
GATGCGGTGATCTGGGCCTCGACCTCGACGCCGAGGGCCGCGTGTGTCACG  
CCGACGGCGTCCCGACCCCCGGCCTGTTCTGTGCTCGGCCCCCCGGCTCGCGC  
CGCCTTCTGGGAGACGATCGCCGTGCCGGACATCCGCCAGCGCATCGAAGCC  
CTGGCCCCGCTCTCGCCGATTGGCGCCAGCCGTTACGGCGCGGTTCGGAATTT  
CTAA

*Serratia  
marcescens  
subsp.  
marcescens*  
Db11\_2-  
octaprenyl-3-  
methyl-6-

WP\_025301854.1

ATGAAGACATCTCAAATCGGTATGACGCGGTGGTGGTGGGTTGGCGGCATGG  
TCGGCGCGGCGGCGGCCCTGGGGCTGGCGCAGGCGGGCTGGTTCGGTGGCGTT  
GCTGGAACATCAGGCGCCGAGGCGTTTCGAGGCGCAAAGCCCGCCGGACCT  
GCGCATTTCGCGATCGGCTGCACCTCGGTGGGGCTGCTGAAACAGCTCGGC  
ACCTGGCAGGCCGTGACGGCGATGCGTACGGCGCCGTATCGCCGGCTGGAGA  
CCTGGGAGTGGGCGTCTGTCGTGCGTGGCGTTTCGACGCGGTGTCCCTGGGGCTG  
CCCGAGCTGGGCTTTATGGTGGAAAACCGCATTTCTGCAGCTGGGGCTGTGGC

methoxy-1,4-  
benzoquinol  
hydroxylase

AACAGTTCGCGCAGTGCGCCAACCTGACGCTGCTGTGCCCCGCCAGGCTGCA  
ATCGCTGCAGCGGGCGGACAATGCCTGGCAGCTGACGCTGGACAGCGGCGA  
GACGCTGCAAGCGCGGCTGGTTGTTCGGTGCCGACGGGGCCAACTCGCAGGTG  
CGCAAGCTGGCGGCGATCGGCACCAACGGCTGGCAATATCGTCAGGCGTGCA  
TGTTGATCACCGTCGATACCGGCGCGCCGACGAGGATGTGACCTGGCAGCG  
CTTCTTCCCGTCCGGGCCCGCGCCTTCCTGCCGCTGTACGACAGCTGGGCGT  
CGCTGGTGTGGTATGACAGCCCCGAGCGCATTTCGCCAACTGCAGGCGATGCC  
GCCGCGCAGCTGGAGCGGAAATCGCTACCGCTTTTCCGGCGCGACTGGGC  
CCGGTCAAGGTGCACGCTGCCGGATCGTTCCCGCTGACGCGGCGTCATGCGC  
AGCGCTACGTGCTGCCGGGGCTGGCGCTGGTGGGCGATGCCGGCGCATAACCAT  
CAACCCGCTGGCCGGGCAGGGCGTCAATCTGGGGTATCGCGATGTGGATGCC  
TTGCTGAACGTGCTGAGCGAGGGCGCGGGATCAGGGAGAGGACTGGAGCAGC  
GAGGCGGTACTGCTGCGTTATCAGCGTCGCCGCCGTACCGACAATCTGCTGAT  
GCAGAGCGGCATGGATCTGTTTTATAACCGCCTTCAGCAATAACCTGGCGCCG  
CTGAACGTCGCGCGCAATCTGGCGCTGATGGCCGCGCAGCGGGCGGGCAAG  
CTGAAAGAACATGCGTTGAAGTACGCGTTGGGATTGTAA

*Pseudomonas  
aeruginosa*  
DSM 50071 =  
NBRC  
12689\_4-  
hydroxybenz  
oate 3-  
monooxygenase

AKO84441.1

ATGAAGACTCAAGTCGCCATCATCGGCGCCGGTCCGTCCGGCCTCCTGCTCG  
GCCAGTTGCTGCACAAGGCCGGCATCGACAACGTGATCCTCGAACGCCAGAC  
CCCGACTACGTGCTCGGCCGCATCCGCGCCGGCGTGTGGAACAGGGTATG  
GTCGACCTGCTGCGCGAGGCCGGCGTCCGACCGGCGCATGGCGCGGACGGG  
CTGGTCCACGAAGGCGTGGAGATCGCCTTCGCCGGGCAGCGCCGGCGCATCG  
ACCTGAAGCGCCTGAGCGGCGGCAAGACGGTGTGGTCTACGGCCAGACCG  
AGGTCACCCGCGACCTCATGGAGGCCCGGAAGCCTGCGGCGCCACTACCGT  
CTACCAGGCCCGGAGGTGCGCCTGCACGACCTGCAAGGTGAGCGCCCCTAC  
GTGACCTTCGAACGCGACGGCGAACGGCTGCGCCTGGATTGCGACTACATCG  
CCGGCTGCGATGGCTTCCACGGCATCTCGCGGCAATCGATCCCGGCGGAACG  
GCTGAAGGTCCTCGAGCGGGTCTATCCGTTCCGGTGGCTCGGCCTGCTCGCCG  
ACACCCCGCCGGTCAGCCACGAACTGATCTACGCCAACCATCCGCGCGGCTT  
CGCCCTGTGCAGCCAGCGTTCGGCGACCCGACCGCTACTACGTACAGGTG  
CCATTGACAGAGAAGGTTCGAGGACTGGTCCGACGAGCGCTTCTGGACGGAA  
CTGAAAGCGCGCCTCCCGGCCGAGGTGGCGGAGAACTGGTGACCGGTCTT  
CGCTGGAGAAGAGCATCGCGCCGCTGCGCAGCTTCGTGGTTCGAGCCGATGCA  
GCATGGCCGGCTGTTCTCGCCGGCGACGCCGCGCACATCGTGCCGCCACC  
GGCGCAAGGGACTGAACCTGGCGGCCAGCGACGTCAGCACGCTCTACCGG  
CTGCTGCTGAAGGCCTACCGCGAAGGGCGCGGCGAACTGCTGGAACGCTACT  
CGGCAATCTGCCTGCGGCGGATCTGGAAGGCCGAACGCTTCTCTGGTGGAT  
GACTTCGGTGCTGCATCGCTTCCCCGACACCGACGCGTTACGCCAGCGCATCC  
AGCAGACCGAACTGGAGTACTACCTGGGCTCCGAGGCGGGCCTGGCGACCAT  
AGCCGAGAACTATGTCCGCTGCCCTACGAGGAAATCGAGTAG

*Pseudomonas  
aeruginosa*  
DSM 50071 =  
NBRC  
12689\_cytochr  
ome P450

WP\_003091710.1

GTGCCTGATCGCAAACCTGAGACTGGGCGAGGAACTGATCTCGCCACTGCACG  
CGCTTACGACGGCCTGCAGGTGGACGGCGCGCCGCGTCCCGCGCATCGCGC  
CGCCGAGCATCCGGTGTGGGTGGTACGCGCTACCGCGACGCGCGCAAGGTC  
CTCAACCATCCGGGCGTCCGCCGCGACGCCCGGAGGCCGCCGAACTCTACG  
CGAAGCGTACCGGCAGCCCGCGCGCGGGGATCCGTGAGGGACTCAGCCACC  
ACATGCTCAACCTCGACCCGCCGACCATAACCGCCTGCGCTCGCTGGTTGG  
CCGCGGTTACCCCGCGCCAGGTGGAGCGCTGCAACCGCATATAGAACGG  
ATCACCGAGGAATTGCTGGACGCCATGGCCGGCCGCGAACAGGCCGACCTG  
ATGGCCGACTTCGCGATCCCGCTGACCATCGCGGTGATCTTCGAGCTGCTGGG

*Pseudomonas  
aeruginosa*  
DSM 50071 =  
NBRC  
12689\_2-  
octaprenyl-3-  
methyl-6-  
methoxy-1,4-  
benzoquinol  
hydroxylase

WP\_003120388.1

CATTCCCGAGGCCGAGCGGAACACGCCCGCCAGTCCTGGGAGCGCCAGGC  
GGAAGTGTGTCGCCGAGGAGGCCAGGCCCTGGCCGATGCGCAGGTGCA  
CTACCTGCGCGTGTGCTGCTCGAGGCCAAGCGCCGGCAGCCGGCCGACGACGTC  
TACAGCGGGCTGGTGCAGGCCGCCGACGAGAGCGGCCAGTTGAGCGAAGCG  
GAACTCGTCTCCATGGCCACCTGCTGATGATGAGCGGCTTCGAGACCACCA  
TGAACATGATCGGCAACGCGCTGGTCACCCTGCTGGTCAACCCGGAGCAACT  
GGCGTTGCTGCGGGCGCAGCCGGAACCTCTGCCAACGCCATGGAAGAACTG  
GTCCGCCACGACAGTCCGGTGCAGCGCCTCGATGTTGCGCTTCACCGTGGAAG  
ACGTGGAAGTGGACGGGGTACCATTCCCGCCGGCGAATACATCCTGGTCTC  
CAACCTGACCGCAACACCGATGCCGAGCGCTTCGACGATCCCGACCGCCTC  
GACCTACCCGCAACACCGATGGCCATCTCGGCTACGGCTTCGGCGTGCCT  
ACTGCGTCCGGCGCCTCGCTGGCCCGGCTGGAGGGGCGGATCGCCATCCAGCG  
CCTGCTCGCGCGCTTCCCCGACCTCCAGTTGGCGGTGCCCCACGCGGAGCTGC  
AGTGGCTGCCGATCACCTTCCCTCCGCGCCTGATCAGCGTGCCGGTGCACACC  
GGATGCAGCGCCCCGGCGAACACCGCCTCCACGCCAACCCGATCGAGAGG  
ATCGCCCAATGA

ATGCACGCGGATCTGGTCATCGTCCGGCGCCGGCATGGTCGGTAGCGCCCTGG  
CCCTGGCCCTGGAGGGCAGCGGCCTGGAGGTGCTGCTGGTGGACGGCGGCTC  
GCTCGACGTGGCGCCGTTCAAGCCGGAGGCGCCCTACGAGCCGCGGGTCAGC  
GCGCTGTCCGAAGCCAGCCGGCGGATTCTCCAGCGCCTGCATGCCTGGGACG  
GCATCGTCCGCGCGCCGCGCCGAGCCCTATCGCGAGATGCAGGTGTGGGATGG  
CTCCGGCACCCGGGCGGATCGGCTTACGCGCCGCCAGCGTGCACGCCGAGGTA  
CTCGGCCATATCGTCGAGAACC GGTTGGTGCAGGACGCCCTGCTGGAACGCC  
TGCACGATTCCACCACCGCCTGCTGGCCAATGCGCGCCTGGAACAGATGCG  
CCACTCCGGCGACGACTGGTGTGACCTGGCCGACGGTCGCCAGCTGCGT  
GCGCCGCTGGTGGTGCAGCGCCGACGGCGCCAACCTCGGCGGTACGCCGCTGG  
CCGGCTGCGCCACCCGCGAATGGGATTACCTGCACCACGCCATCGTCACCAG  
CGTGCCTGCGAGAACGCGCACCCGCGCAACCCGCTGGCAGCGCTTCACCGAC  
GACGGTCCGCTGGCCTTCCCTGCCCTGCCGACCCGCGGCGACGAGCACTGGT  
GCTCGATCGTCTGGTGCACCACCCCGGAACAGGCAGAACCGCTGATGGCGTT  
GGACGAGGATGGCTTCCGCGCCGCCCTCGGCGAAGCCTTCAACAGCGCCTG  
GGCGCCATCCTGCATGCCGACCGGCGCCTGTGCATCCCGCTGCGCCAGCGGC  
ACGCCAAGCGTTACGTGAGCCGGGCCTGGCGCTGGTCCGGCGATGCTGCGCA  
CACCATCCACCCGCTGGCCGGACAGGGCGTGAACCTGGGCTTCCCTCGATGCG  
GCGGTGCTGTCCGAGGTCTTGTGCACGCCCTGGAGCGCGGCGAACGGCTTG  
CCGACGAACGCGTGTGAGTGCCTTCGAGCGGCGGCGGATGCCGCACAACCT  
GGGCATGATGACGGCGATGGAAGGCTTCGAGCGCCTGTTCCAGGCCGACCGG  
TTGCCGCTGCGCTGGCTGCGCAACGCCGGCCTGCGCCTGGTTCGACGGCCATC  
ACGAGGCGAAGGCGCTGTTCTCGTCCGCCAGGCGCTTGGCCTCAGCGGCGACCT  
GCCGTCGCTGGCACGAGTCTGA

*Pseudomonas  
aeruginosa*  
DSM 50071 =  
NBRC  
12689\_alkane  
1-  
monooxygenase

WP\_003083349.1

ATGTTTGCCTCGCTTTCCTCTGCCTGGATGCTGCGTCTGAAAAAGTACGGCTA  
CTGGATCTGGCTGATCGCGGTGCTCGGCATCCCGCTCAGCTACTGGTGGTTCGC  
TCGGTAGCGACTACCCCAACGCCTGGCCCTGGCTGGTATCAGCGTGGTGTTC  
GGGCTGATCCCGATCCTCGATGCCATCGTCCGGCCGCGATCCGGCCAACCCCG  
AGGAAGCCAGCGAAGTGCCGGAGATGGAAGCACAGGGCTACTACCGCGTAC  
TGTCCCTGGCCACCGTCCCGCTGTTGCTGGGCATGCTCGTCTGGTCCGGCTGG  
ATCCTCGCCACGAGACCCGCTGGGACTGGGTCCGCCAACCTGGGCTGGATCC  
TGTCGGTGGGCACCGTGATGGGCGCCATCGGCATCACCGTCTCCACGAACT

*Rhodococcus*  
*ruber*  
OA1\_hydroxy  
lase

RQM33257.1

GATCCACAAGGACCCGCAACTGGAACAGAACGCCGGCGGCTGCTGCTGGC  
AGCGGTGTGCTATGCCGGCTTCAAGGTGGAACACGTGCGCGGCCACCATGTA  
CACGTCTCGACCCCGGAAGATGCCTCGTCTCGCGCTACGGCCAGAGCCTCT  
ACTCGTTCCTCCCGCACGCCTACAAGCACAACCTTCTCAACGCCTGGCGCCTG  
GAGGCCGAGCGCCTGAAGCGCAAGGGCCTGCCGGCCCTGCACTGGCGCAAC  
GAGCTGATCTGGTGGTACGCCATCAGCGCCCTCTTCTGCTCGGCTCAGCCT  
GGCCTTCGGCTGGCTGGGAGCGATCTTCTTCTCGGCCAGTCGGTGATGGCCT  
TCACCCTGCTGGAGATCGTCAACTACGTGAGCACTACGGCCTGCATCGGCG  
GCGCCTGGACAACGGCCGCTACGAACGCACCACGCCGGAACACTCGTGAA  
CAGCAATTTCTCTGACCAACCTGTTCTTTTCCACCTGCAGCGCCATTCCGA  
CCACCATGCCTACGCCAAGCGCCGCTACCAGGTGCTGCGCCACTACGACAGC  
AGCCCGCAACTGCCCAACGGCTACGCCGGGATGATCGTCTCGCCCTGTTCC  
CACCGCTCTGGCGCGGGTATGGACCCGAAGGTGCGCGCCTACTATGCCGG  
CGAGGAATACCAGCTTACCGACACCCAGCGCATCTGA  
ATGGGAGCCGAAACGTCACCGTCACCGTCCCGTCCATCCGCCGCCCCGGTGC  
GCGTGCCGGCCGACCATCCCGGCGTCGCCGAGCTGTTGCGGGTGTCTCGCCTA  
CGGTGAGATCTCGGCCTTCTATCGCCTTGCCGACGATGCGCGGATGTCGCCGA  
GCCTGCAGGGGCGGGTGGCGTTCGCAAGCATGGCGGCGGCGGAGATGAGCC  
ACTTCGAGACGCTGCACGCCGCCCTGACCGCGCGCGGTGTCGAAATCTACGC  
GGCGATGGAGCCCTACCGGCGTGCCTTCGACGCCTACCACGCGTCCACGAAC  
CCGTGCAACTGGCACGAGTCGCTGGTCAAGGCATATGTCGGCGACGGCATCG  
CCGCCACTTCTACCGCGAGATCGCCGGTACCCTCGCCCCGAGGTGGCCGA  
GGTCTGACGAGAGGTGCTCGCCGAGACCGGGCACTCGGAATTCGTGGTGCAC  
GAGGTCCGCGAGGCGGTGCGGCACAGCGCCGCCGACAAGGACCGGCTGATG  
CTGTGGGGGCGGCGGCTGCTGGGCGAGGCCATACCCAGGCCAGTACGTGA  
TGGCCCAGCGGGAGGATCTACCGATCTGGTGATCGCCGCTACCGGTGATCT  
CGCCGACATCGCGCGTGTTCGACCGGATGCAGCTCGAGCACGCCGACCGG  
ATGGCAGTGCTGGGACTGCACTAA  
ATGTCGACCTACTACCAGCCCCGCAAGTACCCCGCCTCCGACTTCGCGTCGAT  
GCAACCCGACGCCGAGGCGCTGCCCGTGGTCGTCTCGGAGCCGGACCCGTC  
GGCATGGCCGTCGCCCTCGGCCTCGCCAGCGCGGCATCCCGTGACGATCC  
TCGAGGCGGCAGTCCAGGTCTCCTTCGGCAGCCGTGCCATCTGCATCTCCCGG  
CACAGCCTCGAGGCCGCCGACGTCCTCGGCTTCGGCGCCGAGCTGGAGAAGA  
TCGTCTGCCCTGGGTGCGCGGCCGAGCTTCTACCGTGACCAGCAGGTGCTG  
CACTTCCGGATGCCGACGCGGAGTTCGACGTGCGACCGCCGATGATCAATG  
TCTCGCAGTCCGAGTACGAGCAGATCGTCTGTCGACACCATCGAGCAGAACCC  
GCTGATACCCCTGCACTGGCAGGCGAGCATCGCCGGCATCCTGCGCGACGAC  
GACCACGTGACCCTGGAGGTGACACCCGATTCGGCAAGCGTCACCTGCGGG  
CCGCATGGGTGCTCGCCGCCGACGGCGGCCGAGCCGCATGCGTGAGCTCGC  
CGGTCTGCGACTCGAGGGCACCAACTACGAGGGCCGCTACGTCATCGCCGAC  
ATCCACTGGGAGTCGGAGCTGCCCCGCCGAGCGCATGGTCTGGTTCGATCCGC  
CGAGCAACCCCGGCTCGACGATCATATGCACAAGCAGCCGAAGAACATCT  
GGCGCATCGACTACCAGCTCGATCCGTCCGAGGACGCGGAGATCGAGACCC  
GCGAGGACGCCATCCGGGCCCCGCATACCAAGCACCTGGACTGGCTGCAGA  
ACGACCTGCCCTGGACGCTCGAGTGGCACGGGTTCTACAGCGCCCCGCGCCT  
CGCGCTGCGCGAGTTCACCCACGACCGCCTCTCTTCGCCGGCGACGCCGCG  
CACCTCGTGCCGATCTTCGGCGTGCGCGGCCTGAACTCCGGCATGGAGGACG  
CCGAGACCCTGGCCTGGCAGCTCGCCGCCGTCGTCCACGGCAACGCCGACCG

*Rhodococcus*  
*ruber* YC-  
YT1\_aromatic WP\_119699570.1  
ring  
hydroxylase

CGCGTCTGCAGGCGTACTCGATCGAACGACACGACGCGTGGGAGCAGAA  
CGTCGCGAACGCCGTAAGTCCACGCTCATCATGTCCCCGGGCACCCACGGC  
TACCGCACCCCGCGATGCCGTGCTCGCGCTCGCCGTGAACCGCCCCGAAT  
TCGGGGAAGTATCAACCCGCGCCAGTCCAGCGCCACCCACGCCCGCCTGTC  
GCCGCTGACCTGGCCGGTTCGCGGAGGGCCTGACCGGGGTCTGCCCGGCGAC  
CCCGTTCGAGGACCGCCGCGTTCGCGGTCGCCACCGCCGGCGGCGGCACCGAG  
TCGTGCTCAACGCGGTGCGCGGCAACGGCTTCGCCGTCGTGGGCTTCGGTCT  
CGACGCCCGCCGAGCGCCGCGCTCGCGGCGGCCACGGCCGACCTCGCCGC  
CGCGCTGGCGCCGGAGAGCGTGCCTGCGTTCGTGCGGTGCCGATAGTTCC  
GGTGCCGACGGTTCGATGATGTCACGGTGTCTGACGCGCCCGATCTGGCCG  
AGGCGCTCGGCGCCACCCCGGGCGAGGCCTTCGTGATCCGGCCCCGACGGGCT  
GCTGCTGTGCCGGGTGCCGGTTCGCGGCCCTGTCCGGTGTGCCCGCCGACTCC  
GCACCGGCACGGCCCCGAGGGGCGCGGTCCCCGCGCGCCCGGCACAGA  
TCCTCACAGAGGGCGAGCAGCGTGTGAGAACGTCTGGCTCGGCCTGTCCGA  
CGCGCTCGACCAGGTCGATCCGTCCGACCGGGAAGGATTTTTGGTGCGGCTC  
GCGCTGCAGCTCGGGTTCGAGGCCGGTACCGCGAGTTCGAAGAAGCCATCG  
CAGCGGCGACCGACACGTCGCCGGTGTCCACCCGGAACTGGCGCCACAGG  
CCTGA

ATGAGCACTACAGAGCAGGTCACGGAGCTGATCCCGGACACCGTCGCCCCG  
CAGATCGTGTGCCCGAAGGGCACCCGGGACAACGACGCGTTGTTTCGAGGCCT  
ACCGCTGGCTGCGTGAGAACACCCGCTCGGCCGCGCCGTGGTCGAGGGATA  
CGACCCGCTGTGGCTGGTGTAGCAAGCACGCCGACATCATGGAAATCGAGCG  
CCAGCCCGACATCTTACCAGCGCAGGGCGGCGACGACAAGGGGTCCGTCAA  
CCCGATCCTGGCGAACAGGCCGGCGACGAGTTCACCAAGAGCATCAACAA  
CGGCAGTCTCCGATCCTCGAGACCCTCACCTACCTCGATCCGCCGGAGCAC  
ACCGAGATCAAGGACATCGCGATCGACTGGTTCCGGCCGACCAACCTCGCGA  
AGTGGGAAACCGTCATCCGTGACCTTGCCAAGGCGTCCGTACCCGGCTCCT  
CGAGACGGACGGACGGATCGACTTCGTCAAGGACTTCGCCCTCCACTACCCG  
CTGCACGTATCATGAGCCTGTTCCGGGTGCCCGAGGAAGACGAACCCCGCA  
TGATGGCCCTGACGCAAGAGTCTTCGGGACGGCCGACCCCGATGCCGTCCG  
TGAGGATGTGCAACCGCTACCCCGGACGCCGCGCCAAGCAGTGGGTGGCC  
ACGATCCAGGACTTCTACGCGTACTTCGAACGGTGTCTCCAGGATCGCCCG  
CCAATCCTCGAGACGACCTCGCCACGATCATCTCCTCGGCCCGCGACAAGGA  
CGGCGAGTACTACCCGAACGAGATGGCCTACGGTTGGTTCATCGCCATCGCG  
ACCGCGGGCCACGACACCACCTCGAGACCCTCGCGGGCGGCATGCTCGAG  
CTCGGCCGCAACCCGGACAGCTCGCCAAGGTGAAGGCCGACCTGGCGCTCG  
CTCCGCACCTTGTAACGAGTCGCTGCGTGGGCTCGCCGGTCAAGCACTTC  
ATGCGTCAGGCGACGCAAGGACTACACGCTGCGCGGCCGCGACATCAAGAAG  
GGCGACCGCTTCATGCTGCTGTACCAGTCGGGCAACCGCGACGCGGAGGTCA  
TCCCCGACCCCGATCGCTTCGACATCACCCGCCGGCCCAACAAGCACATCGC  
CTTCGGTACGGTCCGCACATGTGCATCGGCCAGCACCTGGCGAAACTGGAA  
CTGCGCATCATGTTTCAAGAACTGCTCCCCACATCGAGTCCCTCGCGTGGT  
GGACGACACGAAGATGATCCAGACGAACCTTCGTGGGCGGGCTCAAGAACAT  
GCCCGTCCAGATCGAGTTCACCGGGTAA

TTGAGTAGGCAGAGCCTGACCAAGGCCATGCAAAGATCACCGAGCTGACG  
TGGAACCGACGTTTCGCGACGCCGGCCACCCGCTTCGGCACCGACTACACGT  
TCGAGAAGGCCCCCAAGAAGGACCCTCTCAAGCAGATCATGCGGTCTACTT  
CCCCATGGAGGAGGAGAAGGACAACCGGGTCTACGGCGCGATGGACGGCGC

*Rhodococcus*  
*ruber* YC-  
YT1\_cytochro  
me P450

WP\_102031076.1

*Rhodococcus*  
*ruber* YC-  
YT1\_methane

WP\_010596327.1

monooxygenase

GATCCGCGGCAACATGTTCCGCCAGGTCCAGCAGCGCTGGCTGGAGTGGCAG  
AAGCTGTTCTCTCGATCATCCCGTTCCCGGAGATCTCCGCGGCCCGCGGAT  
GCCGATGGCCATCGACGCGGTGCCCAACCCGAGATCCACAACGGTCTCGCG  
GTGCAGATGATCGACGAGGTCCGGCACTCGACGATCCAGATGAACCTCAAG  
AAGCTCTACATGAACAACACTACATCGATCCCGCCGGGTTTCGACATGACCGAGA  
AGGCGTTTCGCGAACAACACTACGCGGGCACCATCGGCCGGCAGTTCGGGGAGG  
GCTTCATCACCGGTGACGCGATCACCGCGGCCAACATCTACCTGACCGTGGT  
CGCGGAGACCGCCTTACGAACACCCTGTTTCGTGGCGATGCCCGACGAGGCC  
GCCGCCAACGGTGACTACCTGCTGCCACCCTGTTCCACTCGGTGCAGTCCGA  
CGAGTCCGCGCCACATCTCCAACGGCTACTCGATCCTGCTCATGGCCCTGGCCG  
ACGAGCGGAACCGGCCGCTGCTCGAACGCGACCTGCGCTACGCCTGGTGGAA  
ACAACCACTGCGTGGTTCGACGCGCGATCGGCACGTTTCATCGAATACGGCAC  
CAAGGACCGCCGCAAGGACCGCGAGAGCTACGCCGAGATGTGGCGGGCGGTG  
GATCTACGACGACTACTACCGCAGCTACCTGCTCCCCCTCGAGAAGTACGGG  
CTCACCATTCGCGACGATCTCGTCGAGGAGGCGTGGAAAGCGCATACCGAGA  
AGGGTTACGTCCACGAGGTGGCCCGGTTCTTCGCCACGGGCTGGCCGGTGAA  
CTACTGGCGGATCGACGCCATGACCGACGCGGACTTCGAGTGGTTCGAGGAG  
AAGTACCCCGGCTGGTACTCCAAGTTCGGCAAGTGGTGGGAGAACTACAACC  
GCCTCGCCTACCCCGGCCGCAACAAGCCGATCGCGTTCGAGGAAGTCGGATA  
CCAGTACCCGCACCGCTGCTGGACCTGCATGGTGCCGGCCCTGGTCCGCGAG  
GACATGGTTCGTGGAGAAGGTTCGACGACCACTGGCGGACCTACTGCTCGGAG  
ACGTGCTACTGGACCGACGCGGTTCGCCTTCGCGGTGAGTACGAGGGCCCGGC  
CCACGCCGAACATGGGCCGCTCTACCGGTTTCGGGAATGGGAGACCCTGCA  
CCACGACAAGGATCTCGCCGACATCGTGCAGGACCTCGGGTATGTGCGCGAC  
GACGGCAAGACCCTCGTCGGCCAGCCGCACCTCGATCTCGACCCGAAGAAG  
ATGTGGACCCCTCGACGACGTGCGGGGCAACACCTTCCAGAGCCCGAACGTCC  
TGCTGAACCAGATGACGGACGAGGAGCGCGCAGCGCACATCGCGGAGTACC  
GCGCCGGCGCCACGCCGCTCTGA  
CGAGTTGGGTCATAAGAAGGACGACCTCGAACGGTGGCTGTCGAAGATCACC  
CTGGCCCAGACCGGCTACGGCCACTTCTACATCGAACACAACCGCGGCCACC  
ACGTGCGGGTCTCCACCCCGGAGGACCCGGCCTCGGCCCGTTTCGGCGAATC  
GTTCTGGGCGTTCCTGCCGCGCAGCGTGTGGGGCAGCCTGAAGTCGTCTGG  
GAGCTCGAGAAGACCCGCCTGCAGCGACTCGGCAAGAGCCCGTGGACCCCTG  
CGCAACGACGTCTCAACCGGTGGGCGATGTCGGTGGTCTGTTTCGGCGTGCT  
CGTCGCGGTGTTTCGGCCCGGTTCATCGTTCCGTTCTGATCCTGCAGGCCGTCT  
ACGGTTTCTCCCTGCTCGAGACGGTGAACACTCGAGCACTACGGACTGCTG  
CGGCAGAAGACGGCCTCGGGCCGGTACGAGCGCTGCACCCCGCGCACAGC  
TGGAATTCCGACCACATCGTCACCAACATCTTCTGTACCACCTGCAGCGACA  
C

*Rhodococcus*  
*ruber*  
NBRC15591\_a BAV60970.1  
lkane  
hydroxylase