SEQUENCE LISTING

<110> CODEXIS, INC.

<120> BIOCATALYSTS AND METHODS FOR HYDROXYLATION OF CHEMICAL COMPOUNDS

<130> CX2-153USP1

<140> To Be Assigned
<141> Submitted Herewith

<160> 1009

<210> 1
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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taa 843

<210> 2
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
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Ser Asp Phe Ala Cys Gly Lys Trp Glu Ala Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Ala Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Ala Val Arg Tyr Thr Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Ile Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Thr Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Met Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu His Leu Met Ile Asp Phe Glu Ala Thr Ala Phe
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
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Glu Arg Gly Glu Val Met Thr Tyr
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<210> 3
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<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240

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taa                                                               843
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<210> 4
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<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 4

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Phe
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
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Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 5
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 5
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
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ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
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<210> 6
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 6
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
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        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 7
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
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ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480

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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 8
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 8

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Phe
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
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Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 9
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 9

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcgtttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
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<210> 10
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 10

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Arg Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
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65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Phe
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 11
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
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gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgttgc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcgtttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720

atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 12
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Val Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Phe
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 13
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa 843

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<223> proline hydorxylase Shinorizobium melioti

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            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

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            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala His Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Phe
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 15
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 15
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
ggttgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcgtttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 16
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 16
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Gly Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Phe
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 17
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 17
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttacatg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagaat tagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcgtttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 18
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 18
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Thr Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ile Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

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    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Phe
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 19
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 19
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 20
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 20
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 21
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 21
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc ggtggtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 22
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 22
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Val Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val

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                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 23
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 23
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgta tgcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                             843
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<210> 24
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 24
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Met Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 25
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 25
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60

tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg caactgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 26
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 26
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

```
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 27
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 27
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 28
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 28
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Arg Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 29
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 29
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300

gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 30
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 30
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser

```
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 31
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 31
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacatgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                             843
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<210> 32
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 32
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1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
```

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Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 33
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 33
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg acactgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540

```
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 34
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 34

```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
```

```
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 35
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 35
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aatctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 36
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 36
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
```

```
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Asn Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 37
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 37
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg agccatttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 38
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 38
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Pro Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 39
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 39
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggtctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 40
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 40
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

```
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 41
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 41
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaaagga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa                                                                 843
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<210> 42
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 42
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 43
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 43
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aaactgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 44
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 44
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140

```
Ile Trp Phe Leu Asp Ala Lys Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 45
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 45
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 46
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 46
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 47
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 47
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca aagagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 48
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 48
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Lys Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175

```
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 49
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 49
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaaaa cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 50
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 50
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Lys His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 51
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 51
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120

```
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatga ttgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 52
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 52

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Ile Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
```

```
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 53
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 53
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccgc atgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 54
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 54
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
```

```
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ala Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 55
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 55
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360

ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac caggggaagt aatgacctac 840
taa 843

<210> 56
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 56
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Pro Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 57
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 57

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac aaggggaagt aatgacctac 840
taa                                                                843
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<210> 58
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 58

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
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    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Gln Gly Glu Val Met Thr Tyr
        275                 280
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<210> 59
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 59
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600

acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaag aaggggaagt aatgacctac 840
taa 843

<210> 60
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 60
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270

Glu Glu Gly Glu Val Met Thr Tyr
        275   280

<210> 61
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 61
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccag ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 62
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 62
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg

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                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ser Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 63
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 63
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccac atgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
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<210> 64
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 64
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Thr Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 65
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 65
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccaa atgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 66
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 66
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly

```
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Lys Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 67
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 67
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaagg cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 68

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 69
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcctg ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 70
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 70
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser

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145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Cys Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 71
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 71
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagttc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 72
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 72
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Val Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 73
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 73
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaat tgggggaagt aatgacctac 840
taa 843

<210> 74
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 74
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp

```
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Leu Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 75
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 75
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaag caggggaagt aatgacctac 840
taa   843

<210> 76
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 76

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Ala Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 77
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 77
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgccct gggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180

```
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtttc aatactgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgatgct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 78
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 78

```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Leu Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Phe Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Met Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
```

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 79
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 79
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgccct gggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtttc aattctgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgatgct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 80
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 80
```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
```

```
Ser Asp Phe Ala Leu Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Phe Asn Ser Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Met Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 81
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 81
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgccct gggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420

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ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgatgct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843


<210> 82
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 82
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Leu Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Met Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
```

```
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 83
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 83

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgccct gggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgct aatactgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                             843
```

<210> 84
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 84

```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Leu Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
```

```
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 85
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 85
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgccct gggaaaatgg 120
gaatcctgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgt gcaccaactc aggttgtttc aatactgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgatgct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
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cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 86
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 86
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Leu Gly Lys Trp Glu Ser Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Cys Thr Asn Ser Gly
115 120 125
Cys Phe Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Met Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr

275 280

<210> 87
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgct aattctgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgatgct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 88
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 88
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Leu Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95

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Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Ser Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Met Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 89
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 89
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttga ataccaactc aggttgtgct aattctgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg atgctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgatgct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 90
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 90
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Leu Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asn Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Ser Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Met Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Met Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 91

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 91
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 92
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 92
Met Phe Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125

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Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 93
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 93
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gaactgtgtg ttcttagaaa ccgtacaagt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 94
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Ser Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 95
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 95
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 96
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 96
Met Ile Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160

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Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 97
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 97
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 98
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 98
Met Glu Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 99
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 99

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 100
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 100
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190

```
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 101
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 101
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                843
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<210> 102
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 102
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Met Asn Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 103
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 103
atgagtagcc actttctcgg caaagtgaat ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240

gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 104
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 104
Met Ser Ser His Phe Leu Gly Lys Val Asn Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220

```
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 105
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 105
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag catgtcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 106
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 106
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Cys Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
```

```
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 107
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 107
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacagca atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480

```
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843


<210> 108
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 108
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Ala Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
```

```
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 109
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 109
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atgagtagcc actttctcgg ccaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttt tcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 110
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 110
```
Met Ser Ser His Phe Leu Gly Gln Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
```

```
65                  70                  75                  80
Glu Thr His Phe Asp Cys Phe Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 111
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 111
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt tgttcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
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atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 112
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 112
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Cys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 113
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 113
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttactttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 114
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 114
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Phe Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

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            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 115
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 115
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgtgt tcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 116
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 116
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Val Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 117
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 117
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttt tcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 118
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 118
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Phe Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

```
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 119
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 119
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcactgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 120
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 120
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Leu Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 121
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 121
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttg tcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 122
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 122
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Cys Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val

```
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 123
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 123
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgtta tcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 124
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 124
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Tyr Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 125
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 125
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60

tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgtcc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 126
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 126
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Pro Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

```
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 127
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 127
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgtct gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 128
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 128
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Leu Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 129
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaattg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300

gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 130
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 130
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Ile Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser

225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 131
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttta tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 132
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 132
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45

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Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Tyr Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 133
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 133
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540

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ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 134
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 134

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
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            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 135
<211> 843
<212> DNA
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<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 135
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcatttg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 136
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 136
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1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Phe Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
```

```
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 137
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 137
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttg gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 138
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<212> PRT
<213> Artificial Sequence

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<223> proline hydorxylase Shinorizobium melioti

<400> 138
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Trp Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 139
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 139
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
tgtacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 140
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Cys Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

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Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 141
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 141
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aactgtccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 142
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 142
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 143
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 143
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcacatg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 144
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 144
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala His Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140

```
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 145
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 145
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcagtgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 146
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 146
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Val Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 147
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 147
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 148
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 148
Met His Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175

```
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 149
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 149
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattat tgtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 150
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 150
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ile Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 151
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 151
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
cttacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 152
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 152

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Leu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
```

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Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 153
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 153
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt gtgtcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 154
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 154
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
```

```
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Val Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 155
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 155
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aactttccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360

ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa 843

<210> 156
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 156
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Phe Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 157
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt atttcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                             843
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<210> 158
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 158
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
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    50                  55                  60
Leu Gln Thr Pro Leu Ser Ile Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 159
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<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600

acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 160
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<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 160
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270

Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 161
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca aagagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 162
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg

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                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Lys Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 163
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 163
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacc atgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cacctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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<210> 164
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<223> proline hydorxylase Shinorizobium melioti

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp His Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala His Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

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<213> Artificial Sequence

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gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
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ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
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cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcctg ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa 843

<210> 166
<211> 280
<212> PRT
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<220>
<223> proline hydorxylase Shinorizobium melioti

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            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Pro Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly

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        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Cys Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 167
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
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ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
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cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccac ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa   843

<210> 168

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 168
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Lys Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Thr Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 169
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<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccgc gtgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 170
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<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 170
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser

```
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ala Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 171
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 171
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcctg ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 172
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 172
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Cys Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 173
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 173
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccaa atgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 174
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 174
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp

```
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Lys Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 175
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 175
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca aagagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccgc gtgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 176
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 176

```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Lys Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ala Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 177
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 177
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180

aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 178
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 178
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 179
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 179
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa                                                                843
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<210> 180
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 180
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
```

```
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 181
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 181
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420

ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcctg ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 182
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 182
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Cys Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala

```
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 183
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 183

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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcctc ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggt cacagagtgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 184
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 184

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
```

```
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ser Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 185
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 185
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
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cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 186
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 186
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1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
260 265 270
Val Arg Gly Glu Val Met Thr Tyr

275 280

<210> 187
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 188
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 188
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95

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Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 189
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 189
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 190
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 190
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Val Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 191

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 191
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccaa atgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 192
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 192
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
115 120 125

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Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Lys Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 193
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 193
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gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccaa atgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 194
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Lys Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 195
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<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg agccgtttac cagattgcat 360
atggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 196
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Pro Phe Thr Arg Leu His Met Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160

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Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 197
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca aagagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccaa atgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 198
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 198
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1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Lys Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Lys Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 199
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 199

atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
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gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcctg ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 200
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 200
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190

```
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Cys Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 201
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 201
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccag ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagtgc gcggggaagt aatgacctac 840
taa                                                                843
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<210> 202
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 202
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ser Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 203
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 203
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240

gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccag ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 204
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 204
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220

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Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ser Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 205
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 205
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacc gtgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagtgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 206
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 206
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
```

```
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Arg Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 207
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 207
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacc gtccgtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480

aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 208
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 208
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Arg Pro Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255

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Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 209
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 209

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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca aagagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccaa atgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 210
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 210

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
```

```
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Lys Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Lys Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 211
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 211
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720

atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 212
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 212
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
260 265 270
Val Arg Gly Glu Val Met Thr Tyr
275 280

<210> 213
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 213
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccgc gtgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 214
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 214
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

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            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ala Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 215
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 215
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg agccgtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 216
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 216
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Pro Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Val Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 217
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 217
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 218
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 218
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

```
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 219
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 219
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccag ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagtgc gcggggaagt aatgacctac 840
taa                                                                843
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<210> 220
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 220
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ser Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260   265   270
Val Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 221
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 221
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 222
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 222
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val

```
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 223
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 223
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcctg ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa   843

<210> 224
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 224
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Cys Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Val Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 225
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 225
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60

tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca aagagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccag ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 226
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 226
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Lys Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

```
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ser Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 227
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 227
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg agccgtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 228
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 228
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Pro Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 229
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 229
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300

gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccac ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 230
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 230
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Thr Cys Arg Ser

225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 231
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 231
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 232
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 232
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45

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Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 233
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 233
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
```

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ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccag ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 234
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 234

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ser Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
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```
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280


<210> 235
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 235
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccgc ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa                                                                 843


<210> 236
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 236
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
```

```
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ala Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 237
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 237
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg agcagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 238
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 238
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Gln Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 239
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 239
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gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa 843

<210> 240
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 240
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

```
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Val Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 241
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 241
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaacgta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttacgt cacagagtgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 242
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 242
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Arg Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Arg His Arg
            260   265   270
Val Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 243
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 243
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca aagagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg ggcctgcctc atagtgcagc atgtttttct 480
aagacgccta gatttcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccgc ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 244
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 244
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Lys Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140

```
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Phe Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Ala Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 245
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 245
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttaccttaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cagctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcctg ctgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagtgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 246
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 246
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Gln Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Cys Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Val Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 247
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 247
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcatttg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 248
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 248
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Phe Ala
    50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165 170 175

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Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 249
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 249
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcatttg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aacctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 250
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 250
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Phe Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Asn Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 251
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 251
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcacttg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aacctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843


<210> 252
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 252
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Leu Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Asn Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
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Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 253
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 253
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aacctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 254
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 254
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
```

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            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Asn Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 255
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 255
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttg ccgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360

```
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aacctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843


<210> 256
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 256
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Cys Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Asn Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
```

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 257
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 257

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa cataacaggc atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aacctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 258
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 258

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Ile
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
```

```
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Asn Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 259
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 259
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcacttg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600

acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 260
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 260
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Leu Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270

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Glu Arg Gly Glu Val Met Thr Tyr
        275                 280


<210> 261
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 261
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843


<210> 262
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 262
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
```

```
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 263
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 263
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa cagaacaggc atgcaagaag aggatattgt ggtttcccat 180
aacgcagttg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
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<210> 264
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 264
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Val Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 265
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 265
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 266
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 266
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr

```
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 267
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 267
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa cataacaggc atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 268

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 268
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Ile
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 269
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 269
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180
aacgcacatg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggaccgtat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 270
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 270
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala His Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser

```
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 271
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 271
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaattg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc acattgtgcc aataccgaag aggaccgtat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 272
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 272
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Ile Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser His
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 273
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 273
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacagcg atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 274
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 274
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Ala Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp

```
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 275
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 275
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc acattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 276
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 276

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser His
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 277
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 277
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180

```
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggaccgtat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 278
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 278

```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
```

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 279
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 279
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc acattgtgcc aataccgaac aggaccgtat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 280
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 280
```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
```

```
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser His
        115                 120                 125
Cys Ala Asn Thr Glu Gln Asp Arg Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 281
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 281
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag catgccttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc acattgtgcc aataccgaag aggacaagat attccatctg 420

ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 282
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 282
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Cys Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser His
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala

```
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 283
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 283
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaattg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggaccgtat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                             843
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<210> 284
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 284
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Ile Ala
    50                  55                  60
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Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 285
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 285
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaattg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660

cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 286
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 286
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Ile Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr

275 280

<210> 287
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 287
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 288
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 288
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95

```
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 289
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 289
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttg gcgagtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc acattgtgcc aataccgaag aggaccgtat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 290
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 290
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Trp Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser His
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 291

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 291
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc acattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 292
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 292
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Cys Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser His
115 120 125

```
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 293
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 293
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcacatg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc acattgtgcc aataccgaag aggaccgtat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 294
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 294
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala His Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser His
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 295
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 295
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggaccgtat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 296
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 296
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Cys Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160

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Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 297
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 297
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 298
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 298
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Cys Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 299
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 299

atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aactgcccgg ctcttcagac cccgctgagt gtgtcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 300
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 300
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Val Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190

```
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 301
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 301
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tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 302
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 302
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 303
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 303
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tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aactgcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240

gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 304
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 304
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220

```
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 305
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 305
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tctacgctga gtcgtcgtga attttccagg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 306
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 306
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
```

```
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 307
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 307
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattat tgtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480

aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 308
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 308
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ile Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255

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Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 309
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 309

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                843
```

<210> 310
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 310

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
```

```
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 311
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 311
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720

atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 312
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 312
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 313
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 313
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccagg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttgaa 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 314
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 314
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

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            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Glu
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 315
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 315
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tctacgctga gtcgtcgtga attttccacg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt gtgtcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 316
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 316
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Val Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 317
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 317
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccagg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aactgcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 318
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 318
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

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    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 319
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 319
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tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aactgcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 320
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 320
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 321
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 321
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccagc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttgaa 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 322
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 322
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Glu
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val

```
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 323
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 323
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aactgcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 324
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 324
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 325
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 325
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa 843

<210> 326
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 326
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

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        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 327
<211> 843
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<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtc cgcttagaaa ccgtacaggt atgcaagaag aggatattat tgtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
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aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa                                                                 843
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<211> 280
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<220>
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<400> 328
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1               5                   10                  15
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Pro Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ile Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 329
<211> 843
<212> DNA
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<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacttcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300

gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 330
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<213> Artificial Sequence

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<223> proline hydorxylase Shinorizobium melioti

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1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Phe Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser

225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

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<212> DNA
<213> Artificial Sequence

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tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
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taa 843

<210> 332
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<223> proline hydorxylase Shinorizobium melioti

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45

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Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 333
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
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tctacgctga gtcgtcgtga attttccagc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
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cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

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<212> PRT
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg

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            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattat tgtttcccat 180
aactgcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
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ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
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cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
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<400> 336
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ile Val Ser His Asn Cys Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
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Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 337
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<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 337
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
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taa 843

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1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
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<212> DNA
<213> Artificial Sequence

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttagtc cacagagaac gcggggaagt aatgaccttc 840
taa 843

<210> 340
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<212> PRT
<213> Artificial Sequence

<220>
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

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Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Val His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Phe
        275                 280
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<210> 341
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 341
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tctacgctga gtcgtcgtga attttccagg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt gtgtcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 342
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 342
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Val Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 343
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 343
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacttcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 344
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 344
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Phe Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140

```
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 345
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 345
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tctacgctga gtcgtcgtga attttccagc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt tgctcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttgaa 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 346
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 346
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Cys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Glu
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 347
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 347
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtc cgcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aactgcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 348
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 348
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Pro Leu Arg Asn Arg
        35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
    50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165 170 175

```
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 349
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 349
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tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 350
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 350
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 351
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 351
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120

gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 352
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 352
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1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205

```
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 353
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 353
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttgaa 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 354
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 354
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
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            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Glu
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 355
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 355
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360

ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 356
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 356
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Cys Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 357
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 357

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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                843
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<210> 358
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 358

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
```

```
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 359
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 359
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccagg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600

acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 360
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 360
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270

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Glu Arg Gly Glu Val Met Thr Tyr
        275                 280


<210> 361
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 361
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tctacgctga gtcgtcgtga attttccagg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843


<210> 362
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 362
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
```

```
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 363
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 363
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttgaa 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
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<210> 364
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 364
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Glu
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 365
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 365
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tctacgctga gtcgtcgtga attttccagg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtc cgcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacttcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 366
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 366
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Pro Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Phe Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr

```
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 367
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 367
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tctacgctga gtcgtcgtga attttccacg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtc cgcttagaaa ccgtacaggt atgcaagaag aggatattat tgtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 368

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 368
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Pro Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ile Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 369
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 369
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aactgcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 370
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 370
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser

```
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 371
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 371
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 372
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 372
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 373
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 373
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttgaa 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 374
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 374
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Glu
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp

```
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 375
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 375
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt gtgtcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 376
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 376

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Val Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 377
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 377
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180

aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aatgctggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 378
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 378
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Cys Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 379
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 379
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tctacgctga gtcgtcgtga attttccagg gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt gtgtcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttgaa 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 380
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 380
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
```

```
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Val Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Glu
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 381
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 381
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gtgggtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420

ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 382
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 382
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Trp Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala

```
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 383
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 383

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcgccgg ctcttcagac cccgctgagt tgctcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa                                                                 843
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<210> 384
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 384

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
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Leu Gln Thr Pro Leu Ser Cys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 385
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 385
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aacttcccgg ctcttcagac cccgctgagt tgctcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660

cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 386
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 386
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Phe Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Cys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr

275 280

<210> 387
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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tctacgctga gtcgtcgtga attttccagc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt gtgtcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc atattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 388
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 388
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Val Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95

```
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Tyr
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 389
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 389

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gtgggtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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<210> 390
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Trp Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 391

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt tgtttcccat 180
aactgcccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agcgtgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 392
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 392
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125

```
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 393
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 393
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gaactggcgg tttgcagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccgg ctcttcagac cccgctgagt atttcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agaatgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 394
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 394
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Cys Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Ile Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Glu
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 395
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<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccgg ctcttcagac cccgctgagt atttcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tactgccgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 396
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 396
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1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Ile Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Cys Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160

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Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 397
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 397
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg tttgcagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agaatgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 398
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 398
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Cys Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Glu
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 399
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 399

atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt atttcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agaatgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 400
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 400
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Ile Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Glu
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190

```
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 401
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 401

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agaatgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                843
```

<210> 402
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 402

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
```

```
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Glu
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 403
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 403
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240

gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagcgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 404
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 404
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Ala His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220

```
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 405
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 405
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagcgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 406
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 406
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
```

```
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Ala His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 407
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 407
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt atttcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agaatgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480

aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 408
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 408
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Ile Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Glu
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255

```
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 409
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 409

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt atttcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tactgccgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc agaatgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                843
```

<210> 410
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 410

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Ile Ser Leu Pro Tyr Val Asn Glu Leu Val
```

```
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Cys Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Glu
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 411
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 411
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg tttgcagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720

atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 412
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 412
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Cys Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145 150 155 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 413
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 413
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagcgcat 360
ctggtcttgc ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 414
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 414
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

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            100                 105                 110
Asp Glu Glu Phe Thr Arg Ala His Leu Val Leu His Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 415
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 415
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg tttgcagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccgg ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 416
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 416
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Cys Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 417
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 417
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccgg ctcttcagac cccgctgagt atttcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 418
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 418
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Ile Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

```
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 419
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 419
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aacctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 420
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 420
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Asn Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 421
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 421
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aagacagaat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 422
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 422
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val

```
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 423
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 423
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttg ccgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aacctgtgcc aataccgaag aagacagaat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aacctgcctc atagtgcagc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                             843
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<210> 424
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 424
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Cys Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Thr
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Asn Leu Pro His Ser Ala Ala Cys Phe Ser
145   150   155   160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 425
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 425
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60

tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcat 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggatct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 426
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 426
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

```
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg His
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Asp
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 427
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 427
```
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
ggctgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg actctgggcc atagtgcggc atgtttttct 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcat 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttattggc catagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 428
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 428
```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
```

```
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Gly Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Thr Leu Gly His Ser Ala Ala Cys Phe Ser
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg His
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Ile Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 429
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 429
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300

gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgttttcgt 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcat 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 430
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 430
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg His

```
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 431
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 431
```
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatcgtgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                             843
```

<210> 432
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 432
```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
```

```
Thr Gly Met Gln Glu Glu Asp Arg Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 433
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 433
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
ggctgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgttttcgt 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540

ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcat 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 434
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 434
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Gly Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg His
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg

```
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 435
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 435
```
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 436
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 436
```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
```

```
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 437
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 437
```
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggt ttttctatca tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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acggctgaat tggaacggtt ctttttaggc cacagagaat atggggaagt aatgacctac 840
taa 843

<210> 438
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 438
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Glu Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Tyr Gly Glu Val Met Thr Tyr
275 280

<210> 439
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 439
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gatatcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 440
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 440
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

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Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Tyr Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 441
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 441
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgccat cggaagatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aactgcccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
ggctgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 442
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 442
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Arg Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Gly Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 443
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 443
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaagatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aactgcccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcat 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggatct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 444
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 444
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Arg Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Cys Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140

```
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg His
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Asp
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 445
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 445
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgagtcattt 540
ttacggaacg ttgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggt ttttctgaaa tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcct tggaacagtt ctttttaggc cacagagaat atggggaagt aatgacctac 840
taa                                                               843
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<210> 446
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 446
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Glu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Gln Phe Phe Leu Gly His Arg
            260   265   270
Glu Tyr Gly Glu Val Met Thr Tyr
        275   280

<210> 447
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 447
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg accctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 448
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 448
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Thr Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175

```
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 449
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 449
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc ctgttcatat 540
ttacggaact ttgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggt ttttctgaaa tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctgact tggaacggtt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 450
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 450
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20   25   30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Cys Ser Tyr Leu Arg Asn Phe Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Glu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 451
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 451
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatttcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac cgggggaagt aatgacctac 840
taa                                                               843


<210> 452
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 452
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
```

```
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Pro Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 453
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 453
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tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgccat cggaagatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 454
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 454
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
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```
            20                  25                  30
Ser Asp Phe Ala Ile Gly Arg Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 455
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 455
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360

ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggaccgtat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 456
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 456
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Arg Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 457
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 457

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaatat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac ccgcggaagt aatgacctac 840
taa                                                               843
```

<210> 458
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 458

```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
```

```
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Asn Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Pro Ala Glu Val Met Thr Tyr
        275                 280
```

<210> 459
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 459
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccacc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600

acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 460
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 460
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270

```
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280


<210> 461
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 461
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactggcgg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gatgtcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgagtcatat 540
ttacggaact ttgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcct tggaacggtt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843


<210> 462
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 462
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Ala Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Met Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
```

```
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Tyr Leu Arg Asn Phe Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 463
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 463
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcctcc gcgtatagtg attttgcctg cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac ccggggaagt aatgaccctc 840
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<210> 464
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 464
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ser Ala Tyr
20 25 30
Ser Asp Phe Ala Cys Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Pro Gly Glu Val Met Thr Leu
275 280

<210> 465
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 465
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg agggttttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 466
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 466
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Gly Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly

```
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 467
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 467
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tctacgctga gtcgtcgtga attttcccgc gcgtatagtg attttgccct tggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 468

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 468
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Leu Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 469
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 469
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccgct gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 470
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 470
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Ala Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg

```
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 471
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 471
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccgag gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 472
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 472
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Glu Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 473
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 473
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgtc ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 474
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 474
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Leu Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp

```
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 475
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 475
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggagattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 476
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 476

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Glu Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 477
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 477
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180

```
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gaacttgaca atgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 478
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 478

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Asn Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
```

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 479
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 479
```
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cggctgcctc atagtgcagc atgtttttgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 480
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 480
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
```

```
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Cys
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 481
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 481
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaat gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420

ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 482
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 482
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala

```
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 483
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 483

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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gacgtcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 484
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 484

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Thr Ser His Asn Ala Pro Ala
    50                  55                  60
```

```
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 485
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 485
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaacgtgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660

cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 486
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 486
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Thr Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr

275 280

<210> 487
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 487
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tctacgctga gtcgtcgtga attttcccgt gcgtatactg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 488
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 488
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Thr Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95

```
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 489
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 489

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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaccgtgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 490
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 490
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Pro Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 491

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 491
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gtgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 492
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 492
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125

```
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 493
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 493
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacc aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 494
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 494
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Gln Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 495
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 495
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tctacgctga gtcgtcgtga attttccacg gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 496
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 496
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160

```
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 497
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 497
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaaat gatgacctac 840
taa                                                                 843
```

<210> 498
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 498
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Met Met Thr Tyr
        275   280

<210> 499
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 499

atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgggccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 500
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 500
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Gly Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190

```
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 501
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 501
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg gggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 502
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 502
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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```
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Gly Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 503
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 503
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240

gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaaaa gatgacctac 840
taa 843

<210> 504
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 504
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220

```
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Lys Met Thr Tyr
        275                 280
```

<210> 505
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 505
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tctacgctga gtcgtcgtga attttccgtt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 506
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 506
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Val Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
```

```
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 507
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 507
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacacgccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480

aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 508
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 508
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Thr Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255

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Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 509
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 509

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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacatgc tgattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 510
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 510

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
```

```
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ala Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 511
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 511
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
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atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 512
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 512
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1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Gly Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 513
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg gtgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 514
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 514
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

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            100                 105                 110
Asp Gly Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 515
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 515
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaaag gatgacctac 840
taa                                                                 843
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<210> 516
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 516
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Arg Met Thr Tyr
        275   280

<210> 517
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 517
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gatgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 518
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 518
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

```
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 519
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 519
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttattagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 520
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 520
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Ile Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 521
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 521
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaaga gatgacctac 840
taa 843

<210> 522
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 522
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1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val

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                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Glu Met Thr Tyr
        275                 280
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<210> 523
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 523
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aaccggccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 524
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 524
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1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Arg Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 525
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa 843

<210> 526
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

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        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
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<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gcctgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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<210> 528
<211> 280
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<220>
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            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Pro Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 529
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300

gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtctg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa 843

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Leu Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser

225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

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<212> DNA
<213> Artificial Sequence

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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgagccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 532
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<212> PRT
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45

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Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Glu Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<211> 843
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<213> Artificial Sequence

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<223> proline hydorxylase Shinorizobium melioti

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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540

ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa 843

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg

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            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagtgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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<213> Artificial Sequence

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
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Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Val His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<400> 537
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacatat ggattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa 843

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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Met Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

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<213> Artificial Sequence

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gaactgtgtg ttcttagaaa ccgtacaggt atgccggaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 540
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 540
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Pro Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

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Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 541
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 541
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattttctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 542
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 542
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Phe Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 543
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gacggaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa 843

<210> 544
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 544
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Gly Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140

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Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 545
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 545
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gacggaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gtcggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 546
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 546
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1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Gly Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 547
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 547
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tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacggaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa 843

<210> 548
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 548
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1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Gly Pro Ala
    50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165 170 175

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Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 549
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 549
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaggaag aggatattgt ggtttcccat 180
aacggaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 550
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 550
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Gly Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 551
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
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taa 843

<210> 552
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

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20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205

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Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 553
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 553
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gtcggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 554
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 554
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
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            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 555
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 555
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tctacgctga gtcgtcgtga attttcccgt gcgtataccg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacggaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagtgcat 360

ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa 843

<210> 556
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 556
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Thr Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Gly Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Val His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 557
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 557

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gacgaaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagtgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa                                                               843
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<210> 558
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 558

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Glu Pro Ala
```

```
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Val His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 559
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 559
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gacacgccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gtcggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagtgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600

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acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa                                                               843


<210> 560
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 560
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Thr Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Val His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
```

```
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280


<210> 561
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 561
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaggaag aggatattgt ggtttcccat 180
gacgaaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gtcggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa                                                                 843


<210> 562
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 562
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Glu Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
```

```
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 563
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 563
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacacgccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
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<210> 564
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 564
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Thr Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 565
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 565
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaggaag aggatattgt ggtttcccat 180
aacaggccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gtcggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagactgcat 360
ctggtcttgg aaaccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa   843

<210> 566
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 566
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Arg Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Glu Thr Asn Ser Gly

```
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 567
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 567
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgaaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gtcggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 568

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 568
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Glu Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 569
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 569
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgaaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgtc ttgtaagagc gtcggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagtgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa   843

<210> 570
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 570
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Glu Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Leu Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Val His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg

```
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 571
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 571
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacggaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gccggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 572
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 572
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Gly Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Pro Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 573
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 573
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacacgccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagtgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa 843

<210> 574
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 574
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Thr Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Val His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp

```
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 575
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 575
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgaaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gtcggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa   843

<210> 576
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 576

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Glu Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 577
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 577
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaggaag aggatattgt ggtttcccat 180

```
aacacgccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gccggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa                                                               843


<210> 578
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 578
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Thr Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Pro Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
```

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 579
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 579
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacaggccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gtcggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 580
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 580
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
```

```
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Arg Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 581
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 581
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gacacgccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420

ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa 843

<210> 582
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 582
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Thr Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala

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                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 583
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 583

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tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagtgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 584
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 584

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
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Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Val His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 585
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 585
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tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gccggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660

cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa 843

<210> 586
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 586
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Pro Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr

275 280

<210> 587
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 587
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tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa 843

<210> 588
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 588
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95

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Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 589
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 589
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tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gacggaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gccggagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagactgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 590
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 590
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Gly Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Pro Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 591

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 591
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tctacgctga gtcgtcgtga attttcccgt gcgtatagcg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacaggccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa 843

<210> 592
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 592
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Arg Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125

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Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 593
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 593
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagagtgcat 360
ctggtcttgg ataccaactc aggttgtgcg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 594
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 594
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Thr Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Val His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 595
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 595
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tctacgctga gtcgtcgtga attttcccgt gcgtataccg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
gacggaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtttg aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cagagagaac gcggggaagt aatgacctac 840
taa 843

<210> 596
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 596
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Thr Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asp Gly Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Leu Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160

```
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Gln Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 597
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 597
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttattagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 598
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 598
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Thr Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Ile Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 599
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 599

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 600
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 600

```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
```

```
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 601
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 601
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg cgtctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaaat gatgacctac 840
taa                                                                 843
```

<210> 602
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 602
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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```
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Met Met Thr Tyr
        275                 280
```

<210> 603
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 603
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240

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gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                843


<210> 604
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 604
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
```

```
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 605
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 605
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 606
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 606
```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
```

```
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 607
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 607
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg agtgttttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480

aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 608
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 608
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Cys Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255

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Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 609
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 609

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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gctttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 610
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 610

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Leu Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
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65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 611
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 611
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gagttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720

atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 612
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 612
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Ser Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 613
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 613
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag agtcgattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 614
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 614
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Ser Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

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            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 615
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 615

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gtattcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 616
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 616
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Tyr Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 617
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 617
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gtgttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 618
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 618
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Cys Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

```
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 619
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 619
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgttgct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 620
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 620
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Leu Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 621
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 621
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gcattcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 622
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 622
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val His Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val

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                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 623
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 623
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gttgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 624
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 624
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Leu Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 625
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 625
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60

tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gattattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 626
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 626
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Ile Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

```
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 627
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 627
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt gaattcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 628
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 628
```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
```

```
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Asn Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 629
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 629
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattct ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300

```
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 630
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 630

```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Leu Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
```

225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 631
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 631
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gcggattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 632
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 632
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45

```
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Arg Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 633
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 633
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactggttct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540

ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 634
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 634
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Val Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg

```
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 635
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 635
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtagtgc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 636
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 636
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Ala Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65                  70                  75                  80
```

```
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ser Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 637
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 637
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattac tgtttcccat 180
aacgcaccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780

acggcttcat tggaacgctt ctttttaggc cacagagaac gcggggaagt aatgacctac 840
taa 843

<210> 638
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 638
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Thr Val Ser His Asn Ala Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
260 265 270
Glu Arg Gly Glu Val Met Thr Tyr
275 280

<210> 639
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 639
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tctacgctga gtcgtcgtga attttcccgt gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagagaac gcggggaagt aatgacctac 840
taa 843

<210> 640
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 640
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Arg Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

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Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 641
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 641
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgagccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc catagaggac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 642
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 642
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Glu Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260   265   270
Gly Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 643
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 643
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgt ggtttcccat 180
aacgagccag ctcttcagac cccgctgagt aaatcattgc cttacgtgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagt gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cgtagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 644
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 644
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Val Val Ser His Asn Glu Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Val Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Val Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140

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Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Arg Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 645
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 645
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 646
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 646
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 647
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 647
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
gacgagccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 648
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 648
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asp Glu Pro Ala
    50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165 170 175

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Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 649
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 649
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
gacgagccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca acgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagagaac gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 650
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 650
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asp Glu Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Asn Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Glu Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 651
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 651
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgagccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca acgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagagaac gcggggaagt aatgacctac 840
taa                                                               843


<210> 652
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 652
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Glu Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Asn Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
```

```
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 653
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 653
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
gacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagagaac gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 654
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 654
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
```

```
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asp Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 655
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 655
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca acgagtttac cagattgcat 360

ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 656
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 656
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Asn Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 657
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 657

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgagccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 658
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 658

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Glu Pro Ala
```

```
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 659
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 659
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
gacgagccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca acgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600

acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 660
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 660
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asp Glu Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Asn Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270

```
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280


<210> 661
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 661
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgacg aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cgtagagaac gcggggaagt aatgacctac 840
taa                                                                 843


<210> 662
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 662
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
```

```
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Glu Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Arg Arg
            260                 265                 270
Glu Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 663
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 663
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
gacgagccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca aggagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaggac gcggggaagt aatgacctac 840
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<210> 664
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 664
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asp Glu Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Lys Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Gly Arg Gly Glu Val Met Thr Tyr
275 280

<210> 665
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 665
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggacg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 666
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 666
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly

```
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Thr
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 667
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 667
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgcgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcaa 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 668

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 668
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Gln
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 669
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 669
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaat gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 670
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 670
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg

```
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Met Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 671
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 671
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttattacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 672
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 672
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ile Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 673
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 673
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtggtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 674
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 674
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Gly Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp

```
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 675
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 675
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaatg gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 676
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 676

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Trp Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 677
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 677
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180

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aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843


<210> 678
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 678
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
```

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 679
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 679
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tctacgctga cacgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 680
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 680
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
```

```
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 681
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 681
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420

ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttcatacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 682
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 682
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val His Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala

```
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 683
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 683
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 684
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 684
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
```

```
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 685
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 685
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaatata cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660

cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 686
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 686
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr

275 280

<210> 687
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 687
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcatg ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 688
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 688
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95

```
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Met Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 689
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 689
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaacag gggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 690
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 690
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Arg Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 691

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 691
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaacac aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 692
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 692
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Thr Gly
115 120 125

```
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 693
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 693
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaatg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 694
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 694
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Cys Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 695
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 695
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtcaaatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 696
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 696
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160

```
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Gln
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 697
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 697
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctgatt tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 698
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 698
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 699
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 699

atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtcaaggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 700
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 700
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Gln Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190

```
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 701
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 701
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc ttggatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                843
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<210> 702
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 702
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Leu Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 703
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 703
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagttttgc cttacctgaa tgaattagtt 240

gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 704
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 704
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Val Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220

```
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 705
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 705
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagcgtcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 706
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 706
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
```

```
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 707
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 707
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480

aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 708
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 708
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255

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Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 709
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 709

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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacggcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                843
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<210> 710
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 710

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
```

```
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Arg Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 711
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 711
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cacaagttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720

atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 712
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 712
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Gln Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 713
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 713
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc gattaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 714
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 714
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

```
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Ile Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 715
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 715
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagtg tgttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 716
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 716
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Cys Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 717
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 717
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tctacgctgt cgcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaaccg cggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
ggaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc gattcctacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 718
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 718
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Arg Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

```
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Gly Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Ile Pro Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 719
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 719
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
ggaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttcatacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 720
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 720
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Gly Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val His Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 721
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 721
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaaccg cggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
ggaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgtacagcc ggttactacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 722
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 722
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Arg Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Gly Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val

```
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Val Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 723
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 723
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga ctcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc cggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttcatacc cgttggatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 724
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 724
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val His Thr Arg Trp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 725
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 725
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60

tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaacag cggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
ggaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgtacagcc ggttcatacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 726
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 726
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Gly Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Val Gln Pro Val His Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

```
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 727
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 727
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
ggaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgtacagcc gattcatacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 728
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 728
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
```

```
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Gly Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Val Gln Pro Ile His Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 729
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 729
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300

gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggt ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggatc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 730
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 730
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ile

```
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 731
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 731
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaaaggcc ggttatcacc cgcgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatctt agcgaagctg cacttctttt ataaagccga ttgccggatc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                             843
```

<210> 732
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 732
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
```

```
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Arg Pro Val Ile Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ile
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 733
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 733
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540

ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggt ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcag 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 734
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 734
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Gln
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg

```
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 735
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 735
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagtcttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tggaagggcc ggttaccacc cgtgatatag tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 736
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 736
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Val Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
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Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gly Pro Val Thr Thr Arg Asp
            180                 185                 190
Ile Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 737
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 737
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacaacc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcatg ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcag 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780

acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 738
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 738
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Met Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Gln
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 739
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 739
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc ccgttcattt 540
ttacggaacc tggaagggcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 740
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 740
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

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Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Arg Ser Phe Leu Arg Asn Leu Glu Gly Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 741
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 741
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaacag cggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tggaaaggcc ggttatcacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 742
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 742
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Arg Pro Val Ile Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 743
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 743
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaacag cggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggt ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcag 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctggct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 744
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 744
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140

```
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Gln
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Gly Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 745
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 745
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tggaagggcc ggttatcacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggt ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggatc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 746
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 746
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gly Pro Val Ile Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ile
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 747
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 747
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacc tggaacaacc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcatg ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatctt agcgaagctg cacttctttt ataaagccga ttgccggcag 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 748
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 748
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165 170 175

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Pro Glu Ser Phe Leu Arg Asn Leu Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Met Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Gln
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 749
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 749
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttatcacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggatc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 750
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 750
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ile Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ile
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 751
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 751
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120

gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagtcttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcag 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 752
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 752
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Val Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205

```
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Gln
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 753
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 753
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaacac cggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggt ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcag 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 754
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 754
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
```

```
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Thr Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Gln
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 755
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 755
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360

ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacaacc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaag gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 756
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 756
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Arg Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 757
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 757

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacc tggaagggcc ggttatcacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggt ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggcag 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
```

<210> 758
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 758

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
```

```
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Leu Glu Gly Pro Val Ile Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Gln
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 759
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 759
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaataca cagcggtgcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600

```
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctggct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843


<210> 760
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 760
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Gly Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
```

Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 761
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 761
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcta cagcggtgcc cgaatcattt 540
ttacggaacg tcgaacagca cgttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctggct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 762
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 762
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg

```
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln His Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Gly Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 763
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 763
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggtgcc cgaatcattt 540
ttacggaacg tcgaacagca cgttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
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<210> 764
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 764
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln His Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 765
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 765
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggtgcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctggct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 766
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 766
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly

```
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Gly Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 767
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 767
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcgaagcc cgaatcattt 540
ttacggaacg tcgaacagca cgttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga agcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctggct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 768

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 768
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Lys
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln His Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Gly Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 769
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 769
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcgaagcc cgaatcattt 540
ttacggaacg tcgaacagca cgttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 770
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 770
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg

```
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Lys
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln His Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 771
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 771
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaataca cagcggtgcc cgaatcattt 540
ttacggaacg tcgaacagcc cgttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctagct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 772
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 772
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 773
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 773
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaatata cagcggttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag agcagaatta 600
acggacgaag tgatcgaagg catactcggc ttttctctta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttcgaat ataaagccga ttgccggacc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 774
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 774
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
165 170 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp

```
            180                 185                 190
Met Val Asp Pro Arg Ala Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Leu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Thr
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 775
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 775
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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctatt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 776
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 776

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Tyr Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 777
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 777
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180

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aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaatata cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttcgaat ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843


<210> 778
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 778
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
```

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 779
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 779
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtagaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctctta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                843
```

<210> 780
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 780
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
```

```
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Leu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 781
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 781
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga cccgtggaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420

ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaaaaga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctctta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtcgatttt agcgaagctg cacttctatt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 782
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 782
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Gly Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Lys Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Leu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Tyr Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala

```
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 783
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 783

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtcccatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggacc 720
tgttatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 784
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 784

```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
```

```
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Pro
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Thr
225                 230                 235                 240
Cys Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 785
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 785
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660

cgtgaaatcg tgtctatttt agcgaagctg cacttcgaat ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 786
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 786
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr

275 280

<210> 787
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 787
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtggaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcga cagcggttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag agcagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 788
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 788
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Gly Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95

```
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Ala Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 789
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 789
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 790
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 790
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145   150   155   160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 791

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 791
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtggaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 792
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 792
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Gly Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125

```
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 793
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 793
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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag agcagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 794
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 794
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Ala Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 795
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 795
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtcccatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 796
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 796
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145 150 155 160

```
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Pro
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 797
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 797
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tctacgctga gccgtagaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 798
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 798
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 799
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 799

atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaaaa gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 800
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 800
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190

```
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Lys Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 801
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 801
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtggaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaatata cagcggttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgccatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg catactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttcgaat ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 802
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 802
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
```

```
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Gly Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
                165                 170                 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Ala
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 803
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 803
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240

gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgccacc cgtgccatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tggcgatttt agcgaagctg cacttctttt ataaagccga ttgccggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 804
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 804
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Ala
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220

```
Ala Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 805
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 805
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tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaatata cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 806
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 806
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
```

```
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 807
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 807
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480

cctacgccta gactgcagct gatgattgac ttcgaaaaga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggacc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 808
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 808
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Lys Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Thr
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255

```
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 809
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 809

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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 810
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 810

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
```

```
65                  70                  75                  80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145                 150                 155                 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 811
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 811
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga cccgtggaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggacc 720

tgttatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 812
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 812
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Gly Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145 150 155 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Thr
225 230 235 240
Cys Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 813
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 813
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaatata cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctctta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 814
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 814
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

```
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Leu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 815
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 815
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tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg catactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtcgatttt agcgaagctg cacttctatt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 816
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 816
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Tyr Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 817
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 817
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tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcga cagcggttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttcgaat ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 818
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 818
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

```
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145                 150                 155                 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 819
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 819
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctctta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttcgaat ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 820
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 820
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Leu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 821
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 821
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcga cagcggatcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttcgaat ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 822
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 822
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145 150 155 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Asp

```
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 823
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 823
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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaatata cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgccatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggacc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                             843
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<210> 824
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 824
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Ala
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Thr
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 825
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 825
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaatata cagcggatcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctctta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggacc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 826
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 826
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Asp
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

```
        195                 200                 205
Leu Gly Phe Ser Leu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Thr
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 827
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 827
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tctacgctga gccgtagaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 828
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 828
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 829
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 829
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tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300

gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaaaaga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tggcgatttt agcgaagctg cacttcgaat ataaagccga ttgccggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 830
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 830
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Lys Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ala Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser

```
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 831
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 831
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tctacgctga gccgtagaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaaaaga cagcggttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaag gatactcggc ttttctctta tcatatcgga ggcgaactac 660
cgtgaaatcg tggcgatttt agcgaagctg cacttcgaat ataaagccga ttgccggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                             843
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<210> 832
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 832
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
```

```
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Lys Thr Ala Val
                165                 170                 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Arg Ile
        195                 200                 205
Leu Gly Phe Ser Leu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ala Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 833
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 833
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tctacgctga cccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540

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ttacggaacg tcgaacagcc ggttgccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 834
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 834

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
```

```
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 835
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 835
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga cccgtagaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaaaaga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 836
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 836
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
```

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Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Lys Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 837
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 837
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaatata cagcggatcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttgccacc cgtcccatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tggcgatttt agcgaagctg cacttctttt ataaagccga ttgccggagc 720
tgttatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780

acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 838
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 838
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Asp
165 170 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Pro
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ala Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Cys Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 839
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 839
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc cacagagcgc gcggggaagt aatgacctac 840
taa   843

<210> 840
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 840
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

```
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly His Arg
            260                 265                 270
Ala Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 841
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 841
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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 842
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 842
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 843
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 843
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtggaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaaaaga cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttcgaat ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 844
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 844
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Gly Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140

```
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Lys Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 845
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 845
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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tggcgatttt agcgaagctg cacttctttt ataaagccga ttgccggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 846
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 846
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ala Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 847
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 847
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtagaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaatata cagcggttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 848
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 848
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
                165 170 175

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Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 849
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 849
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga cccgtgcaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatatttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc agcttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtgc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 850
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 850
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Thr Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Tyr Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ala
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Cys
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 851
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 851
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120

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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaatata cagcggttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843


<210> 852
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 852
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Tyr Thr Ala Val
                165                 170                 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
```

```
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 853
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 853
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgccacc cgtcccatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtcgatttt agcgaagctg cacttcgaat ataaagccga ttgccggacc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 854
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 854
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
```

```
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Ala Thr Arg Pro
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Thr
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 855
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 855
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtagaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaagaattgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360

ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgctttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctctta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttcgaat ataaagccga ttgccggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 856
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 856
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Glu Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Leu Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Glu Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 857
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 857

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtggaga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatatttgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
aaaacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 858
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 858

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Gly Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
```

```
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Tyr Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 859
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 859
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtac tttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctgggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cccaagttcc cgaatcattc 540
ttacggaacg tcgaacagcc ggttaccacc cggcaaatgg tcgaccctag aaaagaatta 600

acggacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcact tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 860
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 860
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Thr Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Gln Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Gln
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270

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Thr Arg Gly Glu Val Met Thr Tyr
        275                 280


<210> 861
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 861
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtac tttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggttccggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattc 540
ttacggaacg tcgaacagcc ggttaccacc cggcaaatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843


<210> 862
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 862
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Thr Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
```

```
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Ser Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Gln
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 863
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 863
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga gttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacgcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtcagggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcact tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
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<210> 864
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 864
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Gln Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 865
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 865
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctgggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattc 540
ttacggaacg tcgaacagcc ggttaccacc cggcaaatgg tcgaccctag aaaagaatta 600
actgacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 866
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 866
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly

```
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Gln
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 867
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 867
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtac tttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
actgacgaag tgatcgaatg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcgga ttgtcggcgc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 868

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 868
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Thr Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Trp Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Arg
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 869
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 869
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tctacgctga gtcgtcgtga gttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggttccggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttccgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cccaagttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
actgacgaag tgatcgaatg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccgaggct tattgaaaag 780
acggcttcct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 870
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 870
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Ser Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg

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145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Gln Val
                165                 170                 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Trp Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Arg
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 871
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 871
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tctacgctga gtcgtcgtac tttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
actgacgaag tgatcgaatg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaatcgga ttgtcggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcact tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 872
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 872
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Thr Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Trp Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ser Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 873
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 873
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgggacatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaatg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccgaggct tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 874
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 874
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp

```
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Trp Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Arg
                245                 250                 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 875
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 875
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tctacgctga gtcgtcgtga gttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacgcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc attttgtgcc aataccgaag aggacaagat attccatctg 420
ggtcagggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattc 540
ttacggaacg tcgaacagcc ggttaccacc ctgcaaatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcact tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 876
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 876

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Phe
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Gln Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Leu Gln
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 877
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 877
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tctacgctga gtcgtcgtga gttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180

aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aaattgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
actgacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcgga ttgtcggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 878
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 878
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Asn
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 879
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 879
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tctacgctga gtcgtcgtga gttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggttccggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cccaagttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 880
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 880
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Lys Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
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Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Ser Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Gln Val
                165                 170                 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 881
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 881
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420

ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
actgacgaag tgatcgaatg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 882
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 882
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Trp Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala

```
                245                 250                 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 883
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 883

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tctacgctga gtcgtcgtga gttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgacgagtc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattc 540
ttacggaacg tcgaacagcc ggttaccacc ctgcaaatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcact tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 884
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 884

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
```

```
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Arg His Phe Asp Glu Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Leu Gln
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 885
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 885
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tctacgctga gtcgtcgtac tttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgacgagtc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttccgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgggacatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaatg gatactcgga ttttctatta tcatatcgga ggcgaactac 660

cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccgaggct tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 886
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 886
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Lys Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Thr Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Arg His Phe Asp Glu Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Trp Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Arg
245 250 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr

275 280

<210> 887
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 887
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tctacgctga gtcgtcgtac tttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctgggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta ccgccgttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cggcaaatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcact tattgaaaag 780
acggcttcct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 888
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 888
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Thr Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95

```
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Gln
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 889
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 889
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cccaagttcc cgaatcaatg 540
ttacggaacg tcgaacagcc ggttaccacc cgggacatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcgga tactcggcgc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcact tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 890
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 890
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Gln Val
                165   170   175
Pro Glu Ser Met Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Thr Arg Arg
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 891

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 891
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tctacgctga gtcgtcgtac tttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
actgacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccgaggct tattgaaaag 780
acggcttcct tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 892
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 892
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Thr Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125

```
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Arg
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 893
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 893
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tctacgctga gtcgtcgtac tttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacgcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcact tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 894
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 894
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Thr Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 895
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 895
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtac tttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc attttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctgggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttccgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cggcaaatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccgaggct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 896
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 896
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Thr Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Phe
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160

```
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Gln
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Arg
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 897
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 897
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tctacgctga gtcgtcgtga gttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacgcatt tcgacgagtc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
actgacgaag tgatcgaatg gatactcgga ttttctatta tcatatcgga agccaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagcgga ttgtcggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcact tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                843
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<210> 898
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 898
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Glu Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Trp Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 899
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 899

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tctacgctga gtcgtcgtga gttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aaagtgtgcc aataccgaag aggacaagat attccatctg 420
ggttccggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga agccaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccgaggct tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 900
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 900
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Lys
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Ser Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190

```
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Arg
                245                 250                 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 901
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 901
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tctacgctga gtcgtcgtga gttttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggctgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgtttccgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattc 540
ttacggaacg tcgaacagcc ggttaccacc ctgcaaatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaatg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgtcggagc 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                843
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<210> 902
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 902
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
```

```
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Leu Gln
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Trp Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 903
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 903
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240

gagaggcatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc attttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctgggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg gatactcgga ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggctgact tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 904
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 904
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Arg His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Phe
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220

```
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Asp Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 905
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 905
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtcaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 906
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 906
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
```

```
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Gln Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 907
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 907
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
```

aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgcacctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 908
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 908
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Ala Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255

```
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 909
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 909

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattggtaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 910
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 910

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
```

```
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Gly Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 911
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 911
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgtt ggaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720

atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 912
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 912
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Leu Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 913
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 913
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcggg tgcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 914
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 914
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu

```
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Gly Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 915
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 915
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aagttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 916
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 916
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Ser
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 917
<211> 843

<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 917
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatagaaggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 918
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 918
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu

```
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Glu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 919
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 919
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tataggtggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 920
<211> 280
<212> PRT

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 920
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Gly Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 921
<211> 843
<212> DNA
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 921
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag gtcggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 922
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 922
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Gly Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val

```
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 923
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 923
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctcgta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                             843
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<210> 924
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 924
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Arg Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 925
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 925
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60

tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaaggaa cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 926
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 926
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile

```
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Glu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 927
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 927
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtggtggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 928
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 928
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
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Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Gly Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 929
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 929
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300

gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga gggtaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 930
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 930
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Gly Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser

```
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 931
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 931
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttgttacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                             843
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<210> 932
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 932
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
```

```
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Val Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 933
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 933
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540

ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcggtcctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 934
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 934
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Gly Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg

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            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 935
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 935
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaagca 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 936
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 936
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
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Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Ala Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 937
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 937
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780

acggcttcat tgtgtcgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 938
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 938
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Cys Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 939
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 939
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga tggtcggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 940
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 940
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110

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Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Gly Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 941
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 941
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacggaaa gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 942
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 942
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Glu Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 943
<211> 843
<212> DNA

<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 943
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atttatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 944
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 944
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140

```
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Ile Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 945
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 945
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcgtatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 946
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 946
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Val Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 947
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 947
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctggta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 948
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 948
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165 170 175

```
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Gly Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 949
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 949
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga gtgtaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 950
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 950
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Cys Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 951
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 951
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120

```
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga tagtcggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843


<210> 952
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 952
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
```

```
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Ser Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 953
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 953
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
gtttatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
```

<210> 954
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 954
```
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
```

```
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Val Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 955
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 955
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360

ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc agttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 956
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 956
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Ser Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240

```
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 957
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 957

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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcatgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 958
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 958

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
```

```
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser His Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 959
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 959
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600

acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggttcgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 960
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 960
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Val Arg Phe Phe Leu Gly Trp Arg
260 265 270

Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 961
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 961
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gttacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 962
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 962
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Val Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg

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                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 963
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 963
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tggaaaggcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaag gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
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<210> 964
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 964
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Arg Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Arg Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr
275 280

<210> 965
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 965
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tggaaaggcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaat gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 966
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 966
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly

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        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Arg Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Met Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 967
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 967
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tggaaaggcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 968

<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 968
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Arg Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 969
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 969
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tggaaaggcc ggttatcacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaag gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 970
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 970
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg

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145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Arg Pro Val Ile Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Arg Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 971
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 971
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacc tggaagggcc ggttatcacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaag gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 972
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 972
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145   150   155   160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Leu Glu Gly Pro Val Ile Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Arg Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 973
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 973
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacc tggaacaacc ggttatcacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaat gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 974
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 974
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Leu Glu Gln Pro Val Ile Thr Arg Asp

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            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Met Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 975
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 975
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacc tggaaaggcc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaat gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 976
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 976

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                  10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Leu Glu Arg Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Met Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 977
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 977
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180

aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tggaagggcc ggttatcacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaag gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 978
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 978
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gly Pro Val Ile Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Arg Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val

```
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 979
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 979
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atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacc tggaacaacc ggttaccacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaag gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 980
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 980
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
            20                  25                  30
```

```
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145                 150                 155                 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Leu Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Arg Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 981
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 981
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tctacgctga gtcgtcgtga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatcattgc cttacctgaa tgaattagtt 240
gagacacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420

ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc atgttttcgt 480
aagacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacc tggaacaacc ggttatcacc cgtgatatgg tcgaccctag aaaagaatta 600
acggacgaag tgatcgaaaa gatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 982
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 982
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Arg Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Thr His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Cys Phe Arg
145 150 155 160
Lys Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Leu Glu Gln Pro Val Ile Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Lys Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala

```
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
```

<210> 983
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 983

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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtagtgc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 984
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 984

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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
```

```
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ser Ala Asn Phe Arg
145                 150                 155                 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 985
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 985
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tctacgctga gccgtgctga attttccaac gcgtatactg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660

cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 986
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 986
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Thr Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145 150 155 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
195 200 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
210 215 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225 230 235 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
245 250 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
260 265 270
Thr Arg Gly Glu Val Met Thr Tyr

275 280

<210> 987
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 987
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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttattagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 988
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 988
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Ile Arg
85 90 95

```
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145                 150                 155                 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 989
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 989
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 990
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 990
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Lys Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145   150   155   160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 991

<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 991
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
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gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 992
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 992
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Trp Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125

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Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145                 150                 155                 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 993
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 993
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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaaact 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                 843
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<210> 994
<211> 280

<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 994
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Thr Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145   150   155   160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 995
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 995
atgagtagcc actttctcgg caaagtgaaa ttcgatgaag cacggcttgc agaagacttg 60
tctacgctga gccgtgctga attttccaac gcgtatgggg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa   843

<210> 996
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 996
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Gly Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145   150   155   160

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Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 997
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 997
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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaacag 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                               843
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<210> 998
<211> 280
<212> PRT
<213> Artificial Sequence

<220>

<223> proline hydorxylase Shinorizobium melioti

<400> 998
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1   5   10   15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20   25   30
Ser Asp Phe Ala Ile Gly Lys Gln Glu Leu Cys Val Leu Arg Asn Arg
        35   40   45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50   55   60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65   70   75   80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85   90   95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100   105   110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115   120   125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130   135   140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Ala Ala Asn Phe Arg
145   150   155   160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165   170   175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180   185   190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195   200   205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210   215   220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225   230   235   240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245   250   255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260   265   270
Thr Arg Gly Glu Val Met Thr Tyr
        275   280

<210> 999
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 999

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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgtggc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa 843

<210> 1000
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 1000
Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
1 5 10 15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
20 25 30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
35 40 45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
50 55 60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65 70 75 80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
85 90 95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
100 105 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
115 120 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
130 135 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Val Ala Asn Phe Arg
145 150 155 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190

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Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 1001
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 1001
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tctacgctga gccgtgctga attttccaac gcgtatagtg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240
gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagttttgc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
ttacggaacg tcgaacagcc ggttaccacc cgtgatatgg tcgaccctag aaaggaatta 600
acggacgaag tgatcgaagg tatactcggc ttttctatta tcatatcgga ggcgaactac 660
cgtgaaatcg tgtctatttt agcgaagctg cacttctttt ataaagccga ttgccggtcg 720
atgtatgatt ggctgaaaga aatttgcaag agacggggag acccggcgct tattgaaaag 780
acggcttcat tggaacgctt ctttttaggc tggagaacgc gcggggaagt aatgacctac 840
taa                                                                843
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<210> 1002
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 1002
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Met Ser Ser His Phe Leu Gly Lys Val Lys Phe Asp Glu Ala Arg Leu
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1               5                   10                  15
Ala Glu Asp Leu Ser Thr Leu Ser Arg Ala Glu Phe Ser Asn Ala Tyr
            20                  25                  30
Ser Asp Phe Ala Ile Gly Lys Trp Glu Leu Cys Val Leu Arg Asn Arg
        35                  40                  45
Thr Gly Met Gln Glu Glu Asp Ile Ala Val Ser His Asn Asp Pro Ala
    50                  55                  60
Leu Gln Thr Pro Leu Ser Lys Ser Leu Pro Tyr Leu Asn Glu Leu Val
65                  70                  75                  80
Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
                85                  90                  95
Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
            100                 105                 110
Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
        115                 120                 125
Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
    130                 135                 140
Ile Trp Phe Leu Asp Ala Arg Leu Pro His Ser Phe Ala Asn Phe Arg
145                 150                 155                 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
                165                 170                 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
            180                 185                 190
Met Val Asp Pro Arg Lys Glu Leu Thr Asp Glu Val Ile Glu Gly Ile
        195                 200                 205
Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
    210                 215                 220
Ser Ile Leu Ala Lys Leu His Phe Phe Tyr Lys Ala Asp Cys Arg Ser
225                 230                 235                 240
Met Tyr Asp Trp Leu Lys Glu Ile Cys Lys Arg Arg Gly Asp Pro Ala
                245                 250                 255
Leu Ile Glu Lys Thr Ala Ser Leu Glu Arg Phe Phe Leu Gly Trp Arg
            260                 265                 270
Thr Arg Gly Glu Val Met Thr Tyr
        275                 280
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<210> 1003
<211> 843
<212> DNA
<213> Artificial Sequence

<220>
<223> proline hydorxylase Shinorizobium melioti

<400> 1003
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tctacgctga gccgtgctga attttccaac gcgtatcatg attttgccat cggaaaatgg 120
gaactgtgtg ttcttagaaa ccgtacaggt atgcaagaag aggatattgc ggtttcccat 180
aacgacccag ctcttcagac cccgctgagt aaatctttgc cttacctgaa tgaattagtt 240

gagaaacatt tcgactgttc gcgtgtccgt tacgttcgta ttgtaagagc gagcgagaac 300
gcgtgcctga taccacattc agattacctc gagcttgaca gcgagtttac cagattgcat 360
ctggtcttgg ataccaactc aggttgtgcc aataccgaag aggacaagat attccatctg 420
ggtctcggtg aaatatggtt cttggatgcg aggctgcctc atagtgcagc aaattttcgt 480
cctacgccta gactgcagct gatgattgac ttcgaagcta cagcggttcc cgaatcattt 540
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Glu Lys His Phe Asp Cys Ser Arg Val Arg Tyr Val Arg Ile Val Arg
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Ala Ser Glu Asn Ala Cys Leu Ile Pro His Ser Asp Tyr Leu Glu Leu
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Asp Ser Glu Phe Thr Arg Leu His Leu Val Leu Asp Thr Asn Ser Gly
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Cys Ala Asn Thr Glu Glu Asp Lys Ile Phe His Leu Gly Leu Gly Glu
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145 150 155 160
Pro Thr Pro Arg Leu Gln Leu Met Ile Asp Phe Glu Ala Thr Ala Val
165 170 175
Pro Glu Ser Phe Leu Arg Asn Val Glu Gln Pro Val Thr Thr Arg Asp
180 185 190
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Leu Gly Phe Ser Ile Ile Ile Ser Glu Ala Asn Tyr Arg Glu Ile Val
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<220>
<223> lysine cyclodeaminase Agrobacterium tumefaciens

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