

SEQUENCE LISTING

<110> Insilico Biotechnology AG

<120> Biotechnologische Fixierung von Kohlenstoffdioxid

<130> 101358

<140> DE 10 2007 047 206.6

<141> 2007-10-02

<160> 194

<170> PatentIn version 3.4

<210> 1

<211> 1809

<212> DNA

<213> Ralstonia eutropha H16

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<212> PRT

<213> Ralstonia eutropha H16

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Ile Pro Asp Ala Val Leu Pro Gln Leu Gly Ala Gly Leu Lys Leu Ser
          35          40          45

Pro Leu Asp Ile Arg Glu Thr Ala Ser Phe Tyr His Phe Phe Leu Asp
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 Asp Thr Pro Cys Ile Gly Leu Ser Asp Gln Glu Pro Ala Met Leu Ile
 115 120 125
 Asp Lys Val Val Phe Thr Arg Leu Arg Pro Gly Lys Ile Thr Asp Ile
 130 135 140
 Ile Ala Gln Leu Lys Gln Gly Arg Ser Pro Ala Glu Ile Ala Asn Pro
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 Ala Gly Leu Pro Ser Gln Asp Ile Ala Tyr Val Asp Ala Met Val Glu
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 Ser Asn Val Arg Thr Lys Gly Pro Val Phe Phe Arg Gly Arg Thr Asp
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 Leu Arg Ser Leu Leu Asp Gln Cys Leu Leu Leu Lys Pro Glu Gln Val
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 Ile Glu Thr Ile Val Asp Ser Arg Leu Arg Gly Arg Gly Gly Ala Gly
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 Phe Ser Thr Gly Leu Lys Trp Arg Leu Cys Arg Asp Ala Glu Ser Glu
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 Lys Asp Arg Val Leu Leu Thr Arg Ala Pro Lys Lys Val Phe Val Gly
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 Ala Gly Phe Asp Phe Asp Ile Arg Ile Gln Met Gly Ala Gly Ala Tyr
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 Gly Thr Pro Arg Val Lys Pro Pro Phe Pro Val Gln Gln Gly Tyr Leu
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 Gly Lys Pro Thr Ser Val Asn Asn Val Glu Thr Phe Ala Ala Val Ser
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 385 390 395 400

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 450 455 460
 Tyr Glu Asp Leu Ser Cys Asn Gly Ala Phe Thr Ile Phe Asn Cys Lys
 465 470 475 480
 Arg Asp Leu Leu Glu Ile Val Arg Asp His Met Gln Phe Phe Val Glu
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 Glu Ser Cys Gly Ile Cys Val Pro Cys Arg Ala Gly Asn Val Asp Leu
 500 505 510
 His Arg Lys Val Glu Trp Val Ile Ala Gly Lys Ala Cys Gln Lys Asp
 515 520 525
 Leu Asp Asp Met Val Ser Trp Gly Ala Leu Val Arg Arg Thr Ser Arg
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 Cys Gly Leu Gly Ala Thr Ser Pro Lys Pro Ile Leu Thr Thr Leu Glu
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 Lys Phe Pro Glu Ile Tyr Gln Asn Lys Leu Val Arg His Glu Gly Pro
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 <213> Ralstonia eutropha H16
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Thr Leu Cys Tyr	Leu Lys Asp Lys Pro Cys Leu Gly	Thr Cys Arg Val	
	35	40	45
Cys Ser Val Lys	Val Asn Gly Asn Val Ala Ala	Ala Cys Thr Val Arg	
	50	55	60
Val Ser Lys Gly	Leu Asn Val Glu Val Asn Asp Pro Glu Leu Val Asp		
65	70	75	80
Met Arg Lys Ala	Leu Val Glu Phe Leu Phe Ala Glu Gly	Asn His Asn	
	85	90	95
Cys Pro Ser Cys	Glu Lys Ser Gly Arg Cys Gln Leu Gln Ala Val Gly		
	100	105	110
Tyr Glu Val Asp	Met Met Val Ser Arg Phe Pro Tyr Arg Phe Pro Val		
	115	120	125
Arg Val Val Asp	His Ala Ser Glu Lys Ile Trp Leu Glu Arg Asp Arg		
	130	135	140
Cys Ile Phe Cys	Gln Arg Cys Val Glu Phe Ile Arg Asp Lys Ala Ser		
145	150	155	160
Gly Arg Lys Ile	Phe Ser Ile Ser His Arg Gly Pro Glu Ser Arg Ile		
	165	170	175
Glu Ile Asp Ala	Glu Leu Ala Asn Ala Met Pro Pro Glu Gln Val Lys		
	180	185	190
Glu Ala Val Ala	Ile Cys Pro Val Gly Thr Ile Leu Glu Lys Arg Val		
	195	200	205
Gly Tyr Asp Asp	Pro Ile Gly Arg Arg Lys Tyr Glu Ile Gln Ser Val		
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<213> Ralstonia eutropha H16

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accaaggtct	acccttgtca	tgaggtggtc	aagatggatt	atttcattcc	gggttgtccc	540
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<213>  Ralstonia eutropha H16
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20        25        30

Val Ala Thr Ile Gly Leu Cys Gly Cys Trp Gly Cys Thr Leu Ser Phe
35        40        45

Leu Asp Met Asp Glu Arg Leu Leu Pro Leu Leu Glu Lys Val Thr Leu
50        55        60

Leu Arg Ser Ser Leu Thr Asp Ile Lys Arg Ile Pro Glu Arg Cys Ala
65        70        75        80

Ile Gly Phe Val Glu Gly Gly Val Ser Ser Glu Glu Asn Ile Glu Thr
85        90        95

Leu Glu His Phe Arg Glu Asn Cys Asp Ile Leu Ile Ser Val Gly Ala
100       105       110

Cys Ala Val Trp Gly Gly Val Pro Ala Met Arg Asn Val Phe Glu Leu
115       120       125

Lys Asp Cys Leu Ala Glu Ala Tyr Val Asn Ser Ala Thr Ala Val Pro
130       135       140

Gly Ala Lys Ala Val Val Pro Phe His Pro Asp Ile Pro Arg Ile Thr
145       150       155       160

Thr Lys Val Tyr Pro Cys His Glu Val Val Lys Met Asp Tyr Phe Ile
165       170       175

Pro Gly Cys Pro Pro Asp Gly Asp Ala Ile Phe Lys Val Leu Asp Asp
180       185       190

Leu Val Asn Gly Arg Pro Phe Asp Leu Pro Ser Ser Ile Asn Arg Tyr
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<211> 488

<212> PRT

<213> *Ralstonia eutropha* H16

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Gly Lys Val Val Val His Leu Asp Asp Asp Asn Lys Val Val Asp Ala
              20              25              30

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Lys Leu His Val Val Glu Phe Arg Gly Phe Glu Lys Phe Val Gln Gly
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His Pro Phe Trp Glu Ala Pro Met Phe Leu Gln Arg Ile Cys Gly Ile
50              55              60

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Cys Phe Val Ser His His Leu Cys Gly Ala Lys Ala Leu Asp Asp Met
65              70              75              80

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Val Gly Val Gly Leu Lys Ser Gly Ile His Val Thr Pro Thr Ala Glu
              85              90              95

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Lys Met Arg Arg Leu Gly His Tyr Ala Gln Met Leu Gln Ser His Thr
              100              105              110

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Thr Ala Tyr Phe Tyr Leu Ile Val Pro Glu Met Leu Phe Gly Met Asp
115              120              125

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Ala Pro Pro Ala Gln Arg Asn Val Leu Gly Leu Ile Glu Ala Asn Pro
130              135              140

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Asp Leu Val Lys Arg Val Val Met Leu Arg Lys Trp Gly Gln Glu Val
145              150              155              160

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Ile Lys Ala Val Phe Gly Lys Lys Met His Gly Ile Asn Ser Val Pro
              165              170              175

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Gly Gly Val Asn Asn Asn Leu Ser Ile Ala Glu Arg Asp Arg Phe Leu
180              185              190

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Asn Gly Glu Glu Gly Leu Leu Ser Val Asp Gln Val Ile Asp Tyr Ala
195              200              205

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Gln Asp Gly Leu Arg Leu Phe Tyr Asp Phe His Gln Lys His Arg Ala
210              215              220

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Gln Val Asp Ser Phe Ala Asp Val Pro Ala Leu Ser Met Cys Leu Val
225              230              235              240

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Gly Asp Asp Asp Asn Val Asp Tyr Tyr His Gly Arg Leu Arg Ile Ile
245 250 255

Asp Asp Asp Lys His Ile Val Arg Glu Phe Asp Tyr His Asp Tyr Leu
260 265 270

Asp His Phe Ser Glu Ala Val Glu Glu Trp Ser Tyr Met Lys Phe Pro
275 280 285

Tyr Leu Lys Glu Leu Gly Arg Glu Gln Gly Ser Val Arg Val Gly Pro
290 295 300

Leu Gly Arg Met Asn Val Thr Lys Ser Leu Pro Thr Pro Leu Ala Gln
305 310 315 320

Glu Ala Leu Glu Arg Phe His Ala Tyr Thr Lys Gly Arg Thr Asn Asn
325 330 335

Met Thr Leu His Thr Asn Trp Ala Arg Ala Ile Glu Ile Leu His Ala
340 345 350

Ala Glu Val Val Lys Glu Leu Leu His Asp Pro Asp Leu Gln Lys Asp
355 360 365

Gln Leu Val Leu Thr Pro Pro Pro Asn Ala Trp Thr Gly Glu Gly Val
370 375 380

Gly Val Val Glu Ala Pro Arg Gly Thr Leu Leu His His Tyr Arg Ala
385 390 395 400

Asp Glu Arg Gly Asn Ile Thr Phe Ala Asn Leu Val Val Ala Thr Thr
405 410 415

Gln Asn Asn Gln Val Met Asn Arg Thr Val Arg Ser Val Ala Glu Asp
420 425 430

Tyr Leu Gly Gly His Gly Glu Ile Thr Glu Gly Met Met Asn Ala Ile
435 440 445

Glu Val Gly Ile Arg Ala Tyr Asp Pro Cys Leu Ser Cys Ala Thr His
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Arg Leu Ile Asp Glu Arg Ala Arg
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<212> DNA

<213> Ralstonia eutropha H16

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gactacgtca	tcgtgcatgt	cggetacgcg	attggcaaga	tcgatccaga	ggaagcagaa	180
cgcacggtgc	gtctgttcctg	ggaattggag	cgagtgcagc	cgctctgcgtc	cgagccgatg	240
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<212> PRT

<213> Ralstonia eutropha H16

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 20 25 30

Leu Met Ala Asp Ala Val Val Gly Asp Tyr Val Ile Val His Val Gly
 35 40 45

Tyr Ala Ile Gly Lys Ile Asp Pro Glu Glu Ala Glu Arg Thr Leu Arg
 50 55 60

Leu Phe Ala Glu Leu Glu Arg Val Gln Pro Pro Ala Ser Glu Pro Met
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His Gly Met Asn Ile His Gln Glu Pro Ala
 85 90

<210> 11

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<212> DNA

<213> Ralstonia eutropha H16

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 catgccattt cgcgttacgg cgtgaccgaa ctgctgcccc agaacgtgcg gatgattcac 180
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<211> 379

<212> PRT

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 20 25 30

Met Glu Phe Cys Gly Gly His Thr His Ala Ile Ser Arg Tyr Gly Val
 35 40 45

Thr Glu Leu Leu Pro Glu Asn Val Arg Met Ile His Gly Pro Gly Cys
 50 55 60

Pro Val Cys Val Leu Pro Ile Gly Arg Ile Asp Leu Ala Leu His Leu
 65 70 75 80

Ala Leu Glu Arg Asp Ala Ile Val Cys Thr Tyr Gly Asp Thr Met Arg
 85 90 95
 Val Pro Ala Ser Gly Gly Met Ser Leu Ile Arg Ala Lys Ala His Gly
 100 105 110
 Ala Asp Ile Arg Met Val Tyr Ser Ala Ala Asp Ala Leu Lys Ile Ala
 115 120 125
 Gln Arg His Pro Gln Arg Glu Val Val Phe Leu Ala Ile Gly Phe Glu
 130 135 140
 Thr Thr Thr Pro Pro Thr Ala Leu Ile Ile Arg Glu Ala Lys Ala Arg
 145 150 155 160
 Gln Val Asp Asn Phe Ser Val Leu Cys Cys His Val Leu Thr Pro Ser
 165 170 175
 Ala Ile Thr His Ile Leu Glu Ser Pro Glu Val Arg Asp Tyr Gly Thr
 180 185 190
 Val Pro Ile Asp Gly Phe Val Gly Pro Ala His Val Ser Ile Val Ile
 195 200 205
 Gly Thr Arg Pro Tyr Glu His Phe Ser Arg Glu Tyr Gly Lys Pro Val
 210 215 220
 Val Ile Ala Gly Phe Glu Pro Leu Asp Val Met Gln Ala Ile Leu Met
 225 230 235 240
 Leu Val Arg Gln Val Asn Ser Gly Arg Ala Glu Val Glu Asn Glu Phe
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 260 265 270
 Ser Glu Val Phe Glu Leu Arg Pro Ser Phe Glu Trp Arg Gly Leu Gly
 275 280 285
 Glu Val Pro Tyr Ser Ala Leu Arg Ile Arg Ala Gln Phe Ala Arg Phe
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 Asp Ala Glu Gln Arg Phe Asp Leu Arg Tyr Arg Pro Val Pro Asp Asn
 305 310 315 320
 Lys Ala Cys Glu Cys Gly Ala Ile Leu Arg Gly Val Lys Lys Pro Thr
 325 330 335
 Asp Cys Lys Leu Phe Ala Thr Val Cys Thr Pro Glu Asn Pro Met Gly
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gctgcggtttg acaatgagtg gctgcgccag ggcaacgacc aggcgggcttt cgccatgcct    180
gccgggggcca gaatggtgat ggccaccgac gcgcacgtgg tgctgcgcgt attcttcccc    240
gggggtgaca tcggtagcct gtcggtgcac ggcaccatta acgatgtggc gatggccggt    300
gccaaaccgc tgtatctggc cgcgagtttc atcctcgagg aagggtttcc gctagcggat    360
cttaagcgca ttgtcgaatc gatggccggg gctgcgcgtg aggctggcgt gcctatcgtg    420
acgggtgaca cgaaagtggc cgagcaaggc aagggtgatg gcgtattcat taccactacc    480
ggcgtcggcg tgggtgccagc gggcattcta atcgacggcg ccggggccag gcccggcgac    540
gctattctgc tctctggcac tatgggggag catggcgtag cgatcctgtc caaacgcgag    600
tcgcttgaat ttgacactga gatccgctcg gacagcgccg cgctgcacga cttggtggca    660
cagatgctgg ccgtggtgcc gggggtagca gtgctgcggg atcctacgcg cggcggactg    720
gcgaccacgc tcaacgaaat ttccagtcaa tcgggagtg gcatggtgtt ggacgaagcg    780
gcgatccccg tcctgccaca ggtggacgcg gcgatgcgag tgctcgggct tgatccgctg    840
tacgtggcga acgaaggtaa attggttgcc atttgcgcag ctgcggacgc ggatgccctg    900
cttgccgcca tgcgggggca tccgctcggc cgcgaggcac ggcgcatcgg agaggtcac    960
gaggacgggg gccactttgt gcagatgcgc acaaaattcg gcgggatgcg cgtggtggac   1020
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<210> 14

<211> 351

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 14

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Met Ser Gly Thr Val Lys Leu Gly Tyr Gln Arg Pro Leu Asn Ile Lys
1          5          10          15

Ser Gly Arg Ile Asp Met Gly His Gly Ala Gly Gly Arg Ala Ala Ala
20          25          30

Gln Leu Ile Gln Glu Leu Phe Val Ala Ala Phe Asp Asn Glu Trp Leu
35          40          45

Arg Gln Gly Asn Asp Gln Ala Ala Phe Ala Met Pro Ala Gly Ala Arg
50          55          60

Met Val Met Ala Thr Asp Ala His Val Val Ser Pro Leu Phe Phe Pro
65          70          75          80

Gly Gly Asp Ile Gly Ser Leu Ser Val His Gly Thr Ile Asn Asp Val
85          90          95

Ala Met Ala Gly Ala Lys Pro Leu Tyr Leu Ala Ala Ser Phe Ile Leu
100         105         110

Glu Glu Gly Phe Pro Leu Ala Asp Leu Lys Arg Ile Val Glu Ser Met
115         120         125

Ala Gly Ala Ala Arg Glu Ala Gly Val Pro Ile Val Thr Gly Asp Thr
130         135         140

Lys Val Val Glu Gln Gly Lys Gly Asp Gly Val Phe Ile Thr Thr Thr
145         150         155         160

Gly Val Gly Val Val Pro Ala Gly Ile Leu Ile Asp Gly Ala Gly Ala
165         170         175

Arg Pro Gly Asp Ala Ile Leu Leu Ser Gly Thr Met Gly Glu His Gly
180         185         190

Val Ala Ile Leu Ser Lys Arg Glu Ser Leu Glu Phe Asp Thr Glu Ile
195         200         205

```

Arg Ser Asp Ser Ala Ala Leu His Asp Leu Val Ala Gln Met Leu Ala
 210 215 220
 Val Val Pro Gly Val Arg Val Leu Arg Asp Pro Thr Arg Gly Gly Leu
 225 230 235 240
 Ala Thr Thr Leu Asn Glu Ile Ser Ser Gln Ser Gly Val Gly Met Val
 245 250 255
 Leu Asp Glu Ala Ala Ile Pro Val Leu Pro Gln Val Asp Ala Ala Cys
 260 265 270
 Glu Leu Leu Gly Leu Asp Pro Leu Tyr Val Ala Asn Glu Gly Lys Leu
 275 280 285
 Val Ala Ile Cys Ala Ala Ala Asp Ala Asp Ala Leu Leu Ala Ala Met
 290 295 300
 Arg Gly His Pro Leu Gly Arg Glu Ala Arg Arg Ile Gly Glu Val Ile
 305 310 315 320
 Glu Asp Gly Arg His Phe Val Gln Met Arg Thr Lys Phe Gly Gly Met
 325 330 335
 Arg Val Val Asp Trp Leu Ser Gly Glu Gln Leu Pro Arg Ile Cys
 340 345 350

<210> 15
 <211> 360
 <212> DNA
 <213> *Ralstonia eutropha* H16
 <400> 15
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 gtacgcgcgc tgcgtttcgc gctcgaggcc attgcttcgg gaacctgcct ggagggcgct 180
 tgtatcgaga tcaggaacc tgagggacag gcctggtgcc tgcagtgcaa tgcagcggtt 240
 gctttggcgg agcgtggcgc accatgcagc ggatgcggcg gctaccggct ccagcccact 300
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<210> 16
 <211> 119
 <212> PRT
 <213> *Ralstonia eutropha* H16
 <400> 16
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 1 5 10 15
 Ala Ala Arg Arg Glu Arg Phe Ala Arg Val Thr Leu Leu Arg Leu Glu
 20 25 30
 Ala Gly Lys Leu Cys Gly Val Glu Val Arg Ala Leu Arg Phe Ala Leu
 35 40 45
 Glu Ala Ile Ala Ser Gly Thr Cys Leu Glu Gly Ala Cys Ile Glu Ile
 50 55 60
 Glu Glu Pro Glu Gly Gln Ala Trp Cys Leu Gln Cys Asn Ala Ala Val
 65 70 75 80
 Ala Leu Ala Glu Arg Gly Ala Pro Cys Ser Gly Cys Gly Gly Tyr Arg
 85 90 95
 Leu Gln Pro Thr Ala Gly Thr Glu Leu Arg Val Met Asp Met Leu Val

100

105

110

Glu Asp His Trp Cys Pro Glu

115

<210> 17

<211> 1086

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 17

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ggcga	aacatg	ctccc	ggccg	tggct	cctg	gatac	cgcca	ccgag	ccgcc	ggg	cgcg	120
catgt	acgga	tcgat	gcg	tc	cac	cggt	gat	ctgc	actac	gcg	cg	180
tctgt	gccg	gtctc	agtc	agc	gcg	tg	cg	atcaa	actgg	aacag	gacgt	240
aacaat	cgcc	ttgct	gcaca	caacc	gtcag	cattt	cgtcg	cacat	ggtgt	gctt	g	300
aatct	cg	ttt	ccagt	ccggg	gtc	ggg	caag	acg	ac	ttg	c	360
ttgcg	gcg	gt	gccgt	gcgga	cctg	cag	ctg	gccgt	gatcg	aggg	cgacca	420
catga	cg	cag	atccg	ggcca	cg	gg	gt	tac	ctgcga	tccag	atcaa	480
ggctg	tc	atc	tcgat	gcg	ct	aat	ggt	tgc	aatgc	gtacg	tcc	540
gcggc	acatg	cg	cac	acca	tgag	cac	cg	caag	aggacg	gacag	cattc	600
gaccac	gagc	atg	ctc	gcca	cgat	cacc	ac	gat	cac	cgat	ccag	660
ttgtt	catag	aaa	acg	tcg	cg	caat	ctg	gtg	tgc	ctg	caa	720
gcga	aggtg	cgat	cctg	tc	gg	tga	ccgag	ggc	gaggaca	agcc	gctcaa	780
atgtt	cgccg	ccg	ccag	cct	gat	gac	cctg	aaca	agatcg	acct	gctgcc	840
ttcga	tgtag	cac	gctg	cat	cga	at	atgcg	cgg	caagtca	atcc	gcac	900
cagct	gtc	cg	cg	acag	g	agag	ggc	gtg	gac	gag	tgg	960
ggcgc	ggcg	cg	ggg	gctg	tg	ccg	caacg	gat	ggc	gcg	gcg	1020
gaggc	cg	gaa	tcg	ctg	cc	ct	cgga	acgcag	ttg	g	ctcc	1080
atgtga												1086

<210> 18

<211> 361

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 18

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

145	150	155	160
Gly Cys His Leu Asp	Ala Leu Met Val	Ala Asn Ala Tyr Glu Arg	Leu
	165	170	175
Pro Leu His Ala Ala Ala His Ala His Thr His Glu His Arg Gln Glu			
	180	185	190
Asp Gly Gln His Ser His His His Asp His Glu His Ala Arg His Asp			
	195	200	205
His His Asp His Arg Ser Ser Gly Ile Gly Ser Val Leu Phe Ile Glu			
	210	215	220
Asn Val Gly Asn Leu Val Cys Pro Ala Met Trp Asp Leu Gly Glu Ser			
	225	230	240
Ala Lys Val Ala Ile Leu Ser Val Thr Glu Gly Glu Asp Lys Pro Leu			
	245	250	255
Lys Tyr Pro Asp Met Phe Ala Ala Ala Ser Leu Met Ile Leu Asn Lys			
	260	265	270
Ile Asp Leu Leu Pro His Leu Arg Phe Asp Val Ala Arg Cys Ile Glu			
	275	280	285
Tyr Ala Arg Gln Val Asn Pro His Leu Gln Val Leu Gln Leu Ser Ala			
	290	295	300
Ala Thr Gly Glu Gly Val Asp Glu Trp Leu Asp Trp Met Leu Ala Gly			
	305	310	320
Gly Ala Ala Ala Gly Ala Ala Ala Ala Thr Asp Gly Ala Arg Met Arg			
	325	330	335
Ile Ala Ala Pro Glu Ala Gly Ile Ala Ala Leu Gly Thr Gln Leu Ala			
	340	345	350
Pro Gly Pro Ala Val Ser Lys Glu Met			
	355	360	

<210> 19

<211> 1185

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 19

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ggcgatcttg	gagatccggc	caactgcgat	gcgcttgacc	agtcggtcga	acagttactt	180
gacagcgctc	acggccaggt	gcaggcgggtg	gcgcatgac	tgcacccgga	tttctatagc	240
acgcaactcg	cgcaacgcct	ggcggtccgg	ctttgcgtgc	cggcagtggc	cgtccagcac	300
catcacgcgc	acatcgccgc	gctgatggcg	gaatacgatc	tgagagaacc	cgtgatcggc	360
ttggcgctgg	acggcgctcg	tcttggcacg	gatggtacgg	cttgggggtg	ggagttgcta	420
tgggtttctc	cgtcagagtg	gtgtcgcttg	gggcatctcc	agtcgctgcc	gctgcctggc	480
ggcgacgtgg	cagcgcgcca	accctggcgc	atggcagccg	cagcgctaca	tgtgctggac	540
cgtacgggcg	agatcgggcg	gcgctacggc	gccgttgtag	gtgagcaggc	ggcccgtacc	600
gtggcagcga	tgctggaacg	gcaactcaac	tgtccacgat	ccagtagcgc	cgggcgctgg	660
ttcgacgcgc	cggcggggtg	gctgggtgtc	agtgtgcggc	agcaggccga	ggcgcaggct	720
gcgatcgccc	tgaggcgctc	tgcggccgac	tatctgtccg	cgctgtcgcc	gcctgaatgc	780
gtcgggtacgt	acgtcgtgga	tcaggacgga	gttctggatc	tgctggggct	gctggagcag	840
ctgtttgctc	tggccgatga	gggtcaggcg	gggcaagcgg	cgcggggctc	ggcgctgttc	900
catgtggcgc	tcgccgaggc	tctgggtggg	tgggcccgtg	acgcagcgca	gggccacgga	960
ctgaagaccg	tggccctggg	cggtggatgt	ttcatgaatg	gcattttgag	cgccagcgtg	1020

```

caagccggat tggcagcgcg aggtttgcaa gcgttgctgc cgcgcgcggt atcgtgcggc 1080
gatgcagggc tcgcgctggg gcaagcctgg gtcgcggccc gccagcctac ggctgcctg 1140
gcgccgcaaa cgcctctaca ggaggagggc gcgccatgtg cctag 1185

```

<210> 20

<211> 394

<212> PRT

<213> Ralstonia eutropha H16

<400> 20

```

Met Arg Ala Gln Thr Leu Pro Ala Gly Ser Asp His Ala Pro Val Leu
1          5          10          15

```

```

Ala Cys Gly Ala Trp Leu Lys Asn Ala Ala Cys Leu Leu Arg Gly Ala
20          25          30

```

```

Glu Val Leu Trp Ser Pro Ile His Gly Asp Leu Gly Asp Pro Ala Asn
35          40          45

```

```

Cys Asp Ala Leu Asp Gln Ser Val Glu Gln Leu Leu Asp Ser Ala His
50          55          60

```

```

Gly Gln Val Gln Ala Val Ala His Asp Leu His Pro Asp Phe Tyr Ser
65          70          75          80

```

```

Thr Gln Leu Ala Gln Arg Leu Ala Ala Arg Leu Cys Val Pro Ala Val
85          90          95

```

```

Ala Val Gln His His His Ala His Ile Ala Ala Leu Met Ala Glu Tyr
100         105         110

```

```

Asp Leu Arg Glu Pro Val Ile Gly Leu Ala Leu Asp Gly Val Gly Leu
115        120        125

```

```

Gly Thr Asp Gly Thr Ala Trp Gly Gly Glu Leu Leu Trp Val Ser Pro
130        135        140

```

```

Ser Glu Trp Cys Arg Leu Gly His Leu Gln Ser Leu Pro Leu Pro Gly
145        150        155        160

```

```

Gly Asp Val Ala Ala Arg Glu Pro Trp Arg Met Ala Ala Ala Ala Leu
165        170        175

```

```

His Val Leu Asp Arg Thr Gly Glu Ile Gly Arg Arg Tyr Gly Ala Val
180        185        190

```

```

Val Gly Glu Gln Ala Ala Arg Thr Val Ala Ala Met Leu Glu Arg Gln
195        200        205

```

```

Leu Asn Cys Pro Arg Ser Ser Ser Ala Gly Arg Trp Phe Asp Ala Ala
210        215        220

```

```

Ala Gly Ala Leu Gly Val Ser Val Arg Gln Gln Ala Glu Ala Gln Ala
225        230        235        240

```

```

Ala Ile Ala Leu Glu Ala Leu Ala Ala Asp Tyr Leu Ser Ala Leu Ser
245        250        255

```

```

Pro Pro Glu Cys Val Gly Thr Tyr Val Val Asp Gln Asp Gly Val Leu
260        265        270

```

```

Asp Leu Arg Gly Leu Leu Glu Gln Leu Phe Ala Leu Ala Asp Glu Gly
275        280        285

```

Gln Ala Gly Gln Ala Ala Arg Gly Ala Ala Leu Phe His Val Ala Leu
 290 295 300

Ala Glu Ala Leu Val Gly Trp Ala Ala Asp Ala Ala Gln Gly His Gly
 305 310 315 320

Leu Lys Thr Val Ala Leu Gly Gly Gly Cys Phe Met Asn Gly Ile Leu
 325 330 335

Ser Ala Ser Val Gln Ala Gly Leu Ala Ala Arg Gly Leu Gln Ala Leu
 340 345 350

Leu Pro Arg Ala Val Ser Cys Gly Asp Ala Gly Leu Ala Leu Gly Gln
 355 360 365

Ala Trp Val Ala Ala Arg Gln Pro Thr Ala Ala Leu Ala Pro Gln Thr
 370 375 380

His Leu Gln Glu Glu Gly Ala Pro Cys Ala
 385 390

<210> 21

<211> 342

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 21

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gacgggttttt	cccgcgtaac	ggcagtacgg	ctggagatcg	gccggctgtc	cagtatcgag	120
ccggaagcgc	tgcgcttctg	cttcgaggag	gtagtgcgcg	gcagtgtggc	tgacggcgcg	180
cggctggaga	tcgtggacac	ccccggtgcc	ggctgggtgcc	tgcaactgcag	cgagacgggtg	240
gcgatcggag	cgtgttacga	tccctgcccc	cagtgcggcg	gctaccaggt	gcagcccact	300
ggcggcacgg	aaatgcgcgt	catggatctg	gaagtggcgt	ga		342

<210> 22

<211> 113

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 22

Met His Glu Met Ser Leu Ala Val Gly Val Leu Gln Ile Val Glu Asp
 1 5 10 15

Val Ala Gln Arg Asp Gly Phe Ser Arg Val Thr Ala Val Arg Leu Glu
 20 25 30

Ile Gly Arg Leu Ser Ser Ile Glu Pro Glu Ala Leu Arg Phe Cys Phe
 35 40 45

Glu Glu Val Val Arg Gly Ser Val Ala Asp Gly Ala Arg Leu Glu Ile
 50 55 60

Val Asp Thr Pro Gly Ala Gly Trp Cys Leu His Cys Ser Glu Thr Val
 65 70 75 80

Ala Ile Gly Ala Leu Tyr Asp Pro Cys Pro Gln Cys Gly Gly Tyr Gln
 85 90 95

Val Gln Pro Thr Gly Gly Thr Glu Met Arg Val Met Asp Leu Glu Val
 100 105 110

Ala

<210> 23

<211> 963

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 23

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atgtgcacca actgtggctg cgccgccggc gaaacccgca tcgaaggcca ggagctggag      60
catgtcgacg agcatgcgca tgccgacggc accgtccatg gccacgcccc ccatcatcac      120
ggcgagcacg atcacgacca cggccctgcc taccgtgccg tgcgcggtac tgaccatctg      180
cattacggtc acggaccgcg tggtgcccat gccccaggca tgagccaggc gcgcatggtg      240
aagatcgagc aggacatcct gggcaagaac aacgcctacg cggcgagaa cgcgcgtgg      300
ttcgacgagc acggcgtggt cgcgctgaac ttctgtctga gccccggctc cgggaagacc      360
accctgctgg tgcgcaccat cgaggcgctg aagtccacct ccaggctggc cgtcatcgaa      420
ggcgaccagc agacttcctt cgatgccgag cgcattccgc ccaccggcgt gcaggcgctg      480
cagatcaaca ccggcaaggg ctgccacctg gatgccaca tgggtgggcca cgcgctggag      540
aaactgcggc cggaggacga gagcgtgctg ctgatcgaga acgtgggcaa cctgggtctgc      600
ccttcggcct tcgacctggg cgaagcccac aaggtggtga tcctttcggc caccgaaggg      660
gaggacaagc ccctgaaata tcctgacatg ttccgcgccg ccagcctgat gctgctcaac      720
aagtgcgacc tgctgccgca cctgtccttc gacgtggaga gggccatcga gtatgcgaag      780
cgggtgaatc cggacctgca cgtgatccgg acctcgtccg ccaccggtga aggcttcgac      840
gcatggctga cgtggattgc cgatggcctg gccggccagg ccgccaggcg cagccagagc      900
atggagctac tgcgcagccg catcgccggg ctggaagcgc aactggcggc gctcaagggt      960
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<210> 24

<211> 320

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 24

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Met Cys Thr Asn Cys Gly Cys Ala Ala Gly Glu Thr Arg Ile Glu Gly
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Gln Glu Leu Glu His Val Asp Glu His Ala His Ala Asp Gly Thr Val
                20             25             30

His Gly His Ala Pro His His His Gly Glu His Asp His Asp His Gly
35             40             45

Pro Ala Tyr Arg Ala Val Arg Gly Thr Asp His Leu His Tyr Gly His
50             55             60

Gly Pro Ala Gly Ala His Ala Pro Gly Met Ser Gln Ala Arg Met Val
65             70             75             80

Lys Ile Glu Gln Asp Ile Leu Gly Lys Asn Asn Ala Tyr Ala Ala Gln
85             90             95

Asn Arg Arg Trp Phe Asp Glu His Gly Val Phe Ala Leu Asn Phe Val
100            105            110

Ser Ser Pro Gly Ser Gly Lys Thr Thr Leu Leu Val Arg Thr Ile Glu
115            120            125

Ala Leu Lys Ser Thr Ser Arg Leu Ala Val Ile Glu Gly Asp Gln Gln
130            135            140

Thr Ser Phe Asp Ala Glu Arg Ile Arg Ala Thr Gly Val Gln Ala Leu
145            150            155            160

Gln Ile Asn Thr Gly Lys Gly Cys His Leu Asp Ala His Met Val Gly
165            170            175

His Ala Leu Glu Lys Leu Arg Pro Glu Asp Glu Ser Val Leu Leu Ile
180            185            190

```


Glu Asn Val Gly Asn Leu Val Cys Pro Ser Ala Phe Asp Leu Gly Glu
195 200 205

Ala His Lys Val Val Ile Leu Ser Val Thr Glu Gly Glu Asp Lys Pro
210 215 220

Leu Lys Tyr Pro Asp Met Phe Arg Ala Ala Ser Leu Met Leu Leu Asn
225 230 235 240

Lys Cys Asp Leu Leu Pro His Leu Ser Phe Asp Val Glu Arg Ala Ile
245 250 255

Glu Tyr Ala Lys Arg Val Asn Pro Asp Leu His Val Ile Arg Thr Ser
260 265 270

Ser Ala Thr Gly Glu Gly Phe Asp Ala Trp Leu Thr Trp Ile Ala Asp
275 280 285

Gly Leu Ala Gly Gln Ala Ala Arg Arg Ser Gln Ser Met Glu Leu Leu
290 295 300

Arg Ser Arg Ile Ala Gly Leu Glu Ala Gln Leu Ala Ala Leu Lys Val
305 310 315 320

<210> 25

<211> 2424

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 25

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ctcgcgggct	gggtgcgcaa	cgacggcgcc	ggcgtggaca	tcgaggccca	agggagcgcc	180
gcggccctcg	tcgagctgcg	cgagcgccgt	cgccgcgacg	cgccgcccc	ggcgcgggtg	240
gatgagatcg	gtgaggaaacg	ctgtgcggca	caggttgacg	ccgacggctt	tgccatcctc	300
gagagcagcc	gttccgatgc	cgccgtgcac	accgccatcg	gccacgacac	ggccgtatgc	360
cccgaactgcc	tggcggagct	gttcgacccc	gcgaaccggc	gctaccgcta	cgccctcatc	420
aactgcaccc	agtgcggccc	gcgctacacc	ctgacgtggg	cgctgcccta	cgaccgcgcc	480
accaccagca	tggcgccggt	ccccagtg	cgccctgtc	tcgacgagta	taacgcaccc	540
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gacgcgcaca	atgccgacgc	ggtggcgcg	ctgcgcagcc	gcaagcagcg	cgaggagaag	780
cccttcgcgc	tcattggtcgc	gaacctggcg	acggcgggcg	agtggggcga	catcggcagc	840
ggtgaagcgg	ccctgctcac	ggcgtcggag	cgccccatcg	ttctgctgcg	caagcgcagc	900
ggcgctgatg	ggcggttcgc	ggcggtggcg	ccgggactgg	tctggctggg	cgctcatgctg	960
cgtacacgc	cgcctccagta	tctgctgttc	cacgaggccg	ctggccgccc	cgagggcctc	1020
ggctggctcg	cccagccgca	gtcgctggtg	ctgggtgatga	ccagcgccaa	ccccggcgcc	1080
gagcccttgg	tcaccggcaa	cgacgaggcg	gcgcagcggc	tcactggcat	cgccgacgct	1140
ttcctgctcc	acgatcgcg	gatcctggtg	cgcttgtagc	attcggtggt	gaggggagac	1200
ggcgaaccag	cgcctcacgt	ccagttcatt	cgccgcgcgc	ggggttacac	gccgcgggcg	1260
atcaagctgg	cgcgcagcgg	cccctcggtg	ctggcgctgg	gcggctcctt	caagaacacg	1320
gtgtgcctga	cgcgcggcga	cgaggccttc	gtctctcagc	atgtggggcga	tctcggaac	1380
gctgccacct	gcgagggcct	gatcgaggcg	gtggcccatc	tgacgcgggt	gctggagatc	1440
cgccgcgagc	tcgtcgccca	cgatctgcat	ccgacttct	tcagcacacg	ccacgcagcg	1500
gagctggcgg	cgcaatgggg	ggtgcctgcc	gtcgccgtgc	agcaccatca	tgcccatatt	1560
gcggcggtgc	tggccgagca	cggtcgggac	gaacccgcca	tcggcctggc	gctggacggc	1620
gtcggcctgg	gcgacgacgg	gcaggcggtg	ggtggcggaac	tgctgctggt	ggacggcggc	1680
gcctgtaagc	gcctcggtca	cttgcgcgag	ctgcccgtac	ctggcgcgga	tcgcgcgcgc	1740
cgggagccct	ggcgcatggc	cgctgcggcg	tggtgcgcga	tgggcccggg	cgaggagatc	1800
gaggggcgct	tcgccgggca	gccgggggcg	ccgatgggtga	accgcatgct	ggcccagcgg	1860
cttaacgcgc	ccctctctct	cagcatgggg	cgctgggttc	acgccgcgcg	cgccctgctc	1920
ggcacacggg	aaacatggc	ctacgagggg	caggcggcga	tgctgctgga	aggggtggcc	1980
gagagctggg	gcgagcaacc	gtcgccgggg	cgccccaaga	cggttgctca	ctccctcggg	2040

```

ggggtgccgc gcagcggcgg ggggtacatac aaggcgctgg cgctgcccga tgcctggcgc 2100
atcgatgcgg gcaacaccct ggatctgctg ccgctgctcg aggcgctgtc cgccgaaacg 2160
aatgccgcgc gcggcgcggc acagttccac gccaccctgg tggcgggcgct ggaagcctgg 2220
accgtcgcga ccgtccaggt caccggcgctg cgcacggctg tcttcggcgg cggctgcttc 2280
ctcaaccaca tcctcgcccg caacctgtgc cggcgcttgg cggcgcgggg actgaccgtg 2340
ctgacagcgc gccagctgcc gcccaatgac ggaggcattg ccctcgggtca ggtctgggtg 2400
gcgctgcagc gggcgcccaa ctga 2424

```

<210> 26

<211> 807

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 26

```

Met Leu Met Pro Arg Arg Pro Arg Asn Pro Arg Thr Val Arg Ile Arg
1           5           10           15

```

```

Ile Arg Val Arg Gly Val Val Gln Gly Val Gly Phe Arg Pro Phe Val
          20           25           30

```

```

Tyr Arg Leu Ala Arg Glu Leu Gly Leu Ala Gly Trp Val Arg Asn Asp
          35           40           45

```

```

Gly Ala Gly Val Asp Ile Glu Ala Gln Gly Ser Ala Ala Ala Leu Val
          50           55           60

```

```

Glu Leu Arg Glu Arg Leu Arg Arg Asp Ala Pro Pro Leu Ala Arg Val
          65           70           75           80

```

```

Asp Glu Ile Gly Glu Glu Arg Cys Ala Ala Gln Val Asp Ala Asp Gly
          85           90           95

```

```

Phe Ala Ile Leu Glu Ser Ser Arg Ser Asp Ala Ala Val His Thr Ala
          100          105          110

```

```

Ile Gly His Asp Thr Ala Val Cys Pro Asp Cys Leu Ala Glu Leu Phe
          115          120          125

```

```

Asp Pro Ala Asn Arg Arg Tyr Arg Tyr Ala Phe Ile Asn Cys Thr Gln
          130          135          140

```

```

Cys Gly Pro Arg Tyr Thr Leu Thr Trp Ala Leu Pro Tyr Asp Arg Ala
          145          150          155          160

```

```

Thr Thr Ser Met Ala Pro Phe Pro Gln Cys Arg Pro Cys Leu Asp Glu
          165          170          175

```

```

Tyr Asn Ala Pro Glu His Arg Arg Phe His Ala Glu Pro Asn Ala Cys
          180          185          190

```

```

Pro Asp Cys Gly Pro Ser Leu Ala Leu Leu Asn Ala Gln Gly Met Pro
          195          200          205

```

```

Val Glu Asp Val Asp Pro Ile Ala Glu Thr Val Ala Arg Leu Gln Arg
          210          215          220

```

```

Gly Glu Ile Val Ala Ile Lys Gly Leu Gly Gly Phe His Leu Ala Cys
          225          230          235          240

```

```

Asp Ala His Asn Ala Asp Ala Val Ala Arg Leu Arg Ser Arg Lys Gln
          245          250          255

```

```

Arg Glu Glu Lys Pro Phe Ala Val Met Val Ala Asn Leu Ala Thr Ala
          260          265          270

```

Ala	Gln	Trp	Gly	Asp	Ile	Gly	Ser	Gly	Glu	Ala	Ala	Leu	Leu	Thr	Ala	
	275						280					285				
Ser	Glu	Arg	Pro	Ile	Val	Leu	Leu	Arg	Lys	Arg	Ser	Gly	Val	Asp	Gly	
	290					295					300					
Arg	Phe	Ala	Gly	Val	Ala	Pro	Gly	Leu	Val	Trp	Leu	Gly	Val	Met	Leu	
305					310					315					320	
Pro	Tyr	Thr	Pro	Leu	Gln	Tyr	Leu	Leu	Phe	His	Glu	Ala	Ala	Gly	Arg	
				325					330					335		
Pro	Glu	Gly	Leu	Gly	Trp	Leu	Ala	Gln	Pro	Gln	Ser	Leu	Val	Leu	Val	
			340					345					350			
Met	Thr	Ser	Ala	Asn	Pro	Gly	Gly	Glu	Pro	Leu	Val	Thr	Gly	Asn	Asp	
		355					360					365				
Glu	Ala	Ala	Gln	Arg	Leu	Thr	Gly	Ile	Ala	Asp	Ala	Phe	Leu	Leu	His	
	370					375					380					
Asp	Arg	Glu	Ile	Leu	Val	Arg	Cys	Asp	Asp	Ser	Val	Val	Arg	Gly	Asp	
385					390					395					400	
Gly	Glu	Pro	Ala	Pro	His	Val	Gln	Phe	Ile	Arg	Arg	Ala	Arg	Gly	Tyr	
				405					410					415		
Thr	Pro	Arg	Ala	Ile	Lys	Leu	Ala	Arg	Ser	Gly	Pro	Ser	Val	Leu	Ala	
			420					425					430			
Leu	Gly	Gly	Ser	Phe	Lys	Asn	Thr	Val	Cys	Leu	Thr	Arg	Gly	Asp	Glu	
	435						440					445				
Ala	Phe	Val	Ser	Gln	His	Val	Gly	Asp	Leu	Gly	Asn	Ala	Ala	Thr	Cys	
	450					455					460					
Glu	Ala	Leu	Ile	Glu	Ala	Val	Ala	His	Leu	Gln	Arg	Val	Leu	Glu	Ile	
465					470					475					480	
Arg	Pro	Gln	Leu	Val	Ala	His	Asp	Leu	His	Pro	Asp	Phe	Phe	Ser	Thr	
				485					490					495		
Arg	His	Ala	Ala	Glu	Leu	Ala	Ala	Gln	Trp	Gly	Val	Pro	Ala	Val	Ala	
			500					505					510			
Val	Gln	His	His	His	Ala	His	Ile	Ala	Ala	Val	Leu	Ala	Glu	His	Gly	
	515						520					525				
Ser	Asp	Glu	Pro	Ala	Ile	Gly	Leu	Ala	Leu	Asp	Gly	Val	Gly	Leu	Gly	
	530					535					540					
Asp	Asp	Gly	Gln	Ala	Trp	Gly	Gly	Glu	Leu	Leu	Leu	Val	Asp	Gly	Gly	
545					550					555					560	
Ala	Cys	Lys	Arg	Leu	Gly	His	Leu	Arg	Glu	Leu	Pro	Leu	Pro	Gly	Gly	
				565					570					575		
Asp	Arg	Ala	Ala	Arg	Glu	Pro	Trp	Arg	Met	Ala	Ala	Ala	Ala	Leu	His	
			580					585					590			
Ala	Met	Gly	Arg	Gly	Glu	Glu	Ile	Glu	Gly	Arg	Phe	Pro	Arg	Gln	Pro	
	595						600					605				

Gly Ala Pro Met Val Asn Arg Met Leu Ala Gln Arg Leu Asn Ala Pro
 610 615 620
 Leu Ser Ser Ser Met Gly Arg Trp Phe Asp Ala Ala Ala Gly Leu Leu
 625 630 635 640
 Gly Thr Arg Glu Thr Met Ala Tyr Glu Gly Gln Ala Ala Met Leu Leu
 645 650 655
 Glu Gly Leu Ala Glu Ser Trp Gly Glu Gln Pro Ser Pro Gly Arg Pro
 660 665 670
 Lys Thr Val Ala His Ser Leu Gly Gly Val Pro Arg Ser Gly Gly Gly
 675 680 685
 Thr Tyr Lys Ala Leu Ala Leu Pro Asp Ala Trp Arg Ile Asp Ala Gly
 690 695 700
 Asn Thr Leu Asp Leu Leu Pro Leu Leu Glu Ala Leu Ser Ala Glu Thr
 705 710 715 720
 Asn Ala Ala Arg Gly Ala Ala Gln Phe His Ala Thr Leu Val Ala Ala
 725 730 735
 Leu Glu Ala Trp Thr Val Ala Thr Val Gln Val Thr Gly Val Arg Thr
 740 745 750
 Val Val Phe Gly Gly Gly Cys Phe Leu Asn His Ile Leu Ala Arg Asn
 755 760 765
 Leu Cys Arg Arg Leu Ala Ala Arg Gly Leu Thr Val Leu Thr Ala Arg
 770 775 780
 Gln Leu Pro Pro Asn Asp Gly Gly Ile Ala Leu Gly Gln Val Trp Val
 785 790 795 800
 Ala Leu Gln Arg Ala Pro Asn
 805

<210> 27

<211> 1449

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 27

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ctccggcgca	ctcttgacga	ggaattccgt	gtactgacgg	tcagctccgc	cgacgaggca	120
cgcgccttgt	tgctgcgcca	gccggtctcg	gtgatcctgt	gcgatcaacg	catgccaggc	180
ctcacggggg	tggaatttct	caaagagggtg	cgcgagcgct	ggccggaaat	cgtgcgtatc	240
gtcatctcag	gctataccga	ttcggaagac	atcattgcag	gggttaacga	ggcgggtatc	300
tatcagtaca	tcctcaagcc	ctgggtaccg	gaccatttga	tcgacaccgt	gcgccaggca	360
gtcgaggcac	aggggctgca	ggcgatatg	catcgcttg	atctcgagtt	gcgcaccagc	420
acgccggctc	tgcgccagcg	aagcagccag	aaactggcaa	gtgcgcagag	cgcatccaat	480
ttcgagcgca	ttgtgcgcgc	accgggcagc	ccattggatg	ccgtttgcga	ggtcgccgcc	540
cgcgtggcgc	gttatgattt	gccggttatg	gtgctcggcg	agtccggcac	cggcaaggag	600
ttgctggcgc	gcgccattca	ttacgccagc	ccacgcgcgg	cgcgcgcctt	tgtcagcgag	660
aactgcgctg	ccgtgcccga	caacctgctc	gaatccgagt	tgttcgggca	caagcgcggc	720
gccttcaccg	gggcgtacga	agatcatgcc	ggtctgttcc	agcgcgcgaa	cggcgggtacc	780
atctttcttg	atgagattgg	cgatacttcg	ccggcgtttc	aggtaagct	tctgcgcgtg	840
ctgcaggagg	gggagggtgc	gccagttggc	tcgccacgtt	ggataccggt	cgatgtccgt	900
gtcatcgcg	ccacccactg	taacctggaa	agcgacgtcc	atgccggacg	gttccgcgag	960
gatctttatt	accggatcgc	tggcgtcacc	atctcgatgc	cgccgttacg	ggagcgtagt	1020
ggggatttgc	agcccatcgc	ggccaagctg	ctggagcagg	tggcgcagga	gctggcccg	1080

```

ccccgtctgt atttcggtgg ggacgcactt gcagcgatga tggcgtatcc ctggccgggc 1140
aacatccgcg aactgcgcaa tgagatttat cgggcggtag cgctctcctc gggcgaagag 1200
attcgcgcgc aacttttctc gcgcaagggtg ctgcacggtc agcccggcac cgtcaagcgt 1260
gggccgcatg tgcagacttt cccgcagtcg ggtacgctgc aggagcgact tgacgcgac 1320
gaggcggtgg tgctgaagga ggcgctcctg cgccatcgtt ggaacaagac ccatgcggcc 1380
aaggagtgg gtctatcgcg cgtcggatta cgtcagaagc tgttgcgctt tggcttgag 1440
gagaaatga 1449

```

<210> 28

<211> 482

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 28

```

Met Ser Asp Lys Gln Ala Thr Val Leu Val Val Asp Asp Glu Thr Arg
1          5          10          15

```

```

Ser Gln Asp Ala Leu Arg Arg Thr Leu Asp Glu Glu Phe Arg Val Leu
          20          25          30

```

```

Thr Val Ser Ser Ala Asp Glu Ala Arg Ala Leu Leu Leu Arg Gln Pro
          35          40          45

```

```

Val Ser Val Ile Leu Cys Asp Gln Arg Met Pro Gly Leu Thr Gly Val
          50          55          60

```

```

Glu Phe Leu Lys Glu Val Arg Glu Arg Trp Pro Glu Ile Val Arg Ile
65          70          75          80

```

```

Val Ile Ser Gly Tyr Thr Asp Ser Glu Asp Ile Ile Ala Gly Val Asn
          85          90          95

```

```

Glu Ala Gly Ile Tyr Gln Tyr Ile Leu Lys Pro Trp Val Pro Asp His
          100          105          110

```

```

Leu Ile Asp Thr Val Arg Gln Ala Val Glu Ala Gln Gly Leu Gln Gly
          115          120          125

```

```

Asp Met His Arg Leu Asp Leu Glu Leu Arg Thr Ser Thr Pro Val Leu
          130          135          140

```

```

Arg Gln Arg Ser Ser Gln Lys Leu Ala Ser Ala Gln Ser Ala Phe Asn
          145          150          155          160

```

```

Phe Glu Arg Ile Val Arg Ala Pro Gly Ser Pro Leu Asp Ala Val Cys
          165          170          175

```

```

Glu Val Ala Ala Arg Val Ala Arg Tyr Asp Leu Pro Val Met Val Leu
          180          185          190

```

```

Gly Glu Ser Gly Thr Gly Lys Glu Leu Leu Ala Arg Ala Ile His Tyr
          195          200          205

```

```

Ala Ser Pro Arg Ala Ala Arg Ala Phe Val Ser Glu Asn Cys Ala Ala
          210          215          220

```

```

Val Pro Asp Asn Leu Leu Glu Ser Glu Leu Phe Gly His Lys Arg Gly
          225          230          235          240

```

```

Ala Phe Thr Gly Ala Tyr Glu Asp His Ala Gly Leu Phe Gln Arg Ala
          245          250          255

```

```

Asn Gly Gly Thr Ile Phe Leu Asp Glu Ile Gly Asp Thr Ser Pro Ala
          260          265          270

```

Phe Gln Val Lys Leu Leu Arg Val Leu Gln Glu Gly Glu Val Arg Pro
 275 280 285
 Val Gly Ser Pro Arg Trp Ile Pro Val Asp Val Arg Val Ile Ala Ala
 290 295 300
 Thr His Cys Asn Leu Glu Ser Asp Val His Ala Gly Arg Phe Arg Glu
 305 310 315 320
 Asp Leu Tyr Tyr Arg Ile Ala Gly Val Thr Ile Ser Met Pro Pro Leu
 325 330 335
 Arg Glu Arg Ser Gly Asp Leu Gln Pro Ile Ala Ala Lys Leu Leu Glu
 340 345 350
 Gln Val Ala Gln Glu Leu Ala Arg Pro Gly Leu Tyr Phe Gly Gly Asp
 355 360 365
 Ala Leu Ala Ala Met Met Ala Tyr Pro Trp Pro Gly Asn Ile Arg Glu
 370 375 380
 Leu Arg Asn Glu Ile Tyr Arg Ala Val Ala Leu Ser Ser Gly Glu Glu
 385 390 395 400
 Ile Arg Ala Gln Leu Phe Ser Arg Lys Val Leu His Gly Gln Pro Gly
 405 410 415
 Thr Val Lys Arg Gly Pro His Val Gln Thr Phe Pro Gln Ser Gly Thr
 420 425 430
 Leu Gln Glu Arg Leu Asp Ala Ile Glu Ala Val Val Leu Lys Glu Ala
 435 440 445
 Leu Leu Arg His Arg Trp Asn Lys Thr His Ala Ala Lys Glu Leu Gly
 450 455 460
 Leu Ser Arg Val Gly Leu Arg Gln Lys Leu Leu Arg Phe Gly Leu Glu
 465 470 475 480
 Glu Lys

<210> 29

<211> 1044

<212> DNA

<213> Ralstonia eutropha H16

<400> 29

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atgaacgcgc ctgtatgtac cggctcttgcc tcagcaaaac ccggcgtatt gaatgtgctc      60
tggatacagt ccggcggctg cggtaggctgc agcatgtccc tgctttgcgc ggacactacc      120
gatttcaactg gcatgctcaa gagtgcgga atccacatgc ttggcatcc ctcgctatcg      180
ctggaaagcg gcggtggaaca gctgcaaata ttggaagact gcttgcaagg ccgcgtcgca      240
ctgcatgcct tgtgtgtcga gggggcgatg ctgcgcggtc cgcattgtac cgggcgcttt      300
catctcctcg ccggcaactg tgtgccgatg atcgaatggg tcagccgcct ggcagcggtc      360
gccgactaca cgctggcggt cggcacctgt gccgcttatg gcggcatcac cgcaggtggc      420
gggaaccoga cggagcgctg tggcctgcaa tacgaggggg accagcccgg aggactgtc      480
ggcctcaact accgctcacg cggcgccctg ccggtgatca atgtcgccgg ttgcccagc      540
catccgggtt ggggtgacgga tgcactggca ttgctgtcgg ctcgcctgct aaccgcgagc      600
gacctggata ccctgggccc gctcgtatc tatgctgac agttgggtgca tcacggttgc      660
acgcgcaacg agtactatga attcaaggct agtgcgaaa agccttcgga cctgggttgc      720
atgatggaaa acatgggatg caagggtacc caggctcac ccgattgcaa taccgccta      780
tggaacggag agggttcctg taccgcggg gggtagcct gcatcagttg cactgaaccc      840
ggcttcgaag agcccggcca cccctccac caaacacca aggttgccgg catcccgatc      900

```

```

ggtttgccca ccgatatgcc caaagcctgg tttgtcgcgc ttgcttcggt gtccaagtca      960
gccacgcccga agcgagtga  acttaatgcc acggcagatc atccgctgat cgcgccagcc      1020
attcgcaaga cgcggctgaa atag                                           1044

```

<210> 30

<211> 347

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 30

```

Met Asn Ala Pro Val Cys Thr Gly Leu Ala Ser Ala Lys Pro Gly Val
1              5              10              15

```

```

Leu Asn Val Leu Trp Ile Gln Ser Gly Gly Cys Gly Gly Cys Ser Met
20              25              30

```

```

Ser Leu Leu Cys Ala Asp Thr Thr Asp Phe Thr Gly Met Leu Lys Ser
35              40              45

```

```

Ala Gly Ile His Met Leu Trp His Pro Ser Leu Ser Leu Glu Ser Gly
50              55              60

```

```

Val Glu Gln Leu Gln Ile Leu Glu Asp Cys Leu Gln Gly Arg Val Ala
65              70              75              80

```

```

Leu His Ala Leu Cys Val Glu Gly Ala Met Leu Arg Gly Pro His Gly
85              90              95

```

```

Thr Gly Arg Phe His Leu Leu Ala Gly Thr Gly Val Pro Met Ile Glu
100              105              110

```

```

Trp Val Ser Arg Leu Ala Ala Val Ala Asp Tyr Thr Leu Ala Val Gly
115              120              125

```

```

Thr Cys Ala Ala Tyr Gly Gly Ile Thr Ala Gly Gly Gly Asn Pro Thr
130              135              140

```

```

Asp Ala Cys Gly Leu Gln Tyr Glu Gly Asp Gln Pro Gly Gly Leu Leu
145              150              155              160

```

```

Gly Leu Asn Tyr Arg Ser Arg Ala Gly Leu Pro Val Ile Asn Val Ala
165              170              175

```

```

Gly Cys Pro Thr His Pro Gly Trp Val Thr Asp Ala Leu Ala Leu Leu
180              185              190

```

```

Ser Ala Arg Leu Leu Thr Ala Ser Asp Leu Asp Thr Leu Gly Arg Pro
195              200              205

```

```

Arg Phe Tyr Ala Asp Gln Leu Val His His Gly Cys Thr Arg Asn Glu
210              215              220

```

```

Tyr Tyr Glu Phe Lys Ala Ser Ala Glu Lys Pro Ser Asp Leu Gly Cys
225              230              235              240

```

```

Met Met Glu Asn Met Gly Cys Lys Gly Thr Gln Ala His Ala Asp Cys
245              250              255

```

```

Asn Thr Arg Leu Trp Asn Gly Glu Gly Ser Cys Thr Arg Gly Gly Tyr
260              265              270

```

```

Ala Cys Ile Ser Cys Thr Glu Pro Gly Phe Glu Glu Pro Gly His Pro
275              280              285

```

Phe His Gln Thr Pro Lys Val Ala Gly Ile Pro Ile Gly Leu Pro Thr
 290 295 300

Asp Met Pro Lys Ala Trp Phe Val Ala Leu Ala Ser Leu Ser Lys Ser
 305 310 315 320

Ala Thr Pro Lys Arg Val Lys Leu Asn Ala Thr Ala Asp His Pro Leu
 325 330 335

Ile Ala Pro Ala Ile Arg Lys Thr Arg Leu Lys
 340 345

<210> 31

<211> 1458

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 31

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gaggtcgcca	gcggtcgggt	atgctcagca	cgtgtgaatg	ccacgatgta	ccgcggattg	120
gaacagatcc	tgctacaccg	gcatccgctt	gacgcgctgg	tctatgcgcc	gcgtgtgtgc	180
ggtatctgct	cggtgtccca	gtcggtcgcg	gccagccgcg	cattggcgga	tcttgccggc	240
gtgacgggtac	ccgctaaccg	tatgctggcg	atgaacttga	tgctggcgac	cgagaatctg	300
gccgaccatc	tgacgcactt	ctatctgttc	ttcatgccgg	atttcacgcg	cgagatatat	360
gctggccgcc	cctggcacac	cgacgcgacg	gcacgttttt	cgcccacgca	tggtaaagcac	420
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aaatggccgc	acacagaatc	ggtgcagccc	ggtggttcgt	cgcgcgccat	cgacgccgct	540
gagcgcgttc	gcctgctggg	ccgggtgcgc	gaattccggt	gctttctcga	gcagacactg	600
tatgccgcac	cgctcgagga	cgtcgtcgcg	ctcgacagcg	aagtcgcggt	gtggcgctgg	660
catgcgcagg	cgccgcaggc	cggagacctg	cgatgtttcc	tcacgatcgc	gcaggatgcy	720
gcgctggacc	agatggggcc	cggcccgggt	acgtatctgt	catatggcgc	ctacccccag	780
cccgaaggcg	gtttttgctt	cgcacaaggt	gtgtggcgta	gcgcgcaagg	gcggctcgac	840
gcgcttgatc	ttgccgcgat	cagcgaagat	gccacctccg	cctggttagt	cgaccaaggg	900
ggggcgcgctc	atcctgccaa	tggcctgacc	gcgccagcac	ctgacaaggt	gggcgcctat	960
acctggaaca	aggcccctcg	attggccggc	gccgtgctgg	agaccggtgc	gatcgcccgg	1020
cagttggccg	gcgcacagcc	cttgggtgcg	gacgcgggtg	cgcgctgcgg	cgccaccgtc	1080
tatacgcgcg	tattggcgcg	actggttgaa	ctggcgcgag	tggtgccggt	gatggaagac	1140
tggttacagt	ccctagaaat	cggggcccca	tattgggcgt	cggcccacct	gccggatcag	1200
ggcgctggcg	ttggccttac	ggaggcggcg	cgcggcagcc	tggggcactg	ggtgtcgggtg	1260
cgcgatgggc	gaatcgacaa	ttaccagatc	gtcgcaccca	cgtcctggaa	cttctcgccg	1320
cgcgatatag	ccggccagcc	cggggccgtg	gagaaagcac	tcgagggtgc	gcctgtgctg	1380
caaggcgaaa	caacgccggt	cgccgttcag	cacattgtcc	gctccttcga	tccctgcatg	1440
gtgtgcaccg	tgcattga					1458

<210> 32

<211> 485

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 32

Met Glu Arg Leu Val Val Gly Pro Phe Asn Arg Val Glu Gly Asp Leu
 1 5 10 15

Glu Val Asn Leu Glu Val Ala Ser Gly Arg Val Cys Ser Ala Arg Val
 20 25 30

Asn Ala Thr Met Tyr Arg Gly Leu Glu Gln Ile Leu Leu His Arg His
 35 40 45

Pro Leu Asp Ala Leu Val Tyr Ala Pro Arg Val Cys Gly Ile Cys Ser
 50 55 60

Val Ser Gln Ser Val Ala Ala Ser Arg Ala Leu Ala Asp Leu Ala Gly
 65 70 75 80

Val Thr Val Pro Ala Asn Gly Met Leu Ala Met Asn Leu Met Leu Ala
 85 90 95
 Thr Glu Asn Leu Ala Asp His Leu Thr His Phe Tyr Leu Phe Phe Met
 100 105 110
 Pro Asp Phe Thr Arg Glu Ile Tyr Ala Gly Arg Pro Trp His Thr Asp
 115 120 125
 Ala Thr Ala Arg Phe Ser Pro Thr His Gly Lys His His Arg Leu Ala
 130 135 140
 Ile Ala Ala Arg Gln Arg Trp Phe Thr Leu Met Gly Thr Leu Gly Gly
 145 150 155 160
 Lys Trp Pro His Thr Glu Ser Val Gln Pro Gly Gly Ser Ser Arg Ala
 165 170 175
 Ile Asp Ala Ala Glu Arg Val Arg Leu Leu Gly Arg Val Arg Glu Phe
 180 185 190
 Arg Cys Phe Leu Glu Gln Thr Leu Tyr Ala Ala Pro Leu Glu Asp Val
 195 200 205
 Val Ala Leu Asp Ser Glu Val Ala Leu Trp Arg Trp His Ala Gln Ala
 210 215 220
 Pro Gln Ala Gly Asp Leu Arg Cys Phe Leu Thr Ile Ala Gln Asp Ala
 225 230 235 240
 Ala Leu Asp Gln Met Gly Pro Gly Pro Gly Thr Tyr Leu Ser Tyr Gly
 245 250 255
 Ala Tyr Pro Gln Pro Glu Gly Gly Phe Cys Phe Ala Gln Gly Val Trp
 260 265 270
 Arg Ser Ala Gln Gly Arg Leu Asp Ala Leu Asp Leu Ala Ala Ile Ser
 275 280 285
 Glu Asp Ala Thr Ser Ala Trp Leu Val Asp Gln Gly Gly Ala Arg His
 290 295 300
 Pro Ala Asn Gly Leu Thr Ala Pro Ala Pro Asp Lys Val Gly Ala Tyr
 305 310 315 320
 Thr Trp Asn Lys Ala Pro Arg Leu Ala Gly Ala Val Leu Glu Thr Gly
 325 330 335
 Ala Ile Ala Arg Gln Leu Ala Gly Ala Gln Pro Leu Val Arg Asp Ala
 340 345 350
 Val Ala Arg Cys Gly Ala Thr Val Tyr Thr Arg Val Leu Ala Arg Leu
 355 360 365
 Val Glu Leu Ala Arg Val Val Pro Leu Met Glu Asp Trp Leu Gln Ser
 370 375 380
 Leu Glu Ile Gly Ala Pro Tyr Trp Ala Ser Ala His Leu Pro Asp Gln
 385 390 395 400
 Gly Ala Gly Val Gly Leu Thr Glu Ala Ala Arg Gly Ser Leu Gly His
 405 410 415

Trp Val Ser Val Arg Asp Gly Arg Ile Asp Asn Tyr Gln Ile Val Ala
420 425 430

Pro Thr Ser Trp Asn Phe Ser Pro Arg Asp Ile Ala Gly Gln Pro Gly
435 440 445

Ala Val Glu Lys Ala Leu Glu Gly Ala Pro Val Leu Gln Gly Glu Thr
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Thr Pro Val Ala Val Gln His Ile Val Arg Ser Phe Asp Pro Cys Met
465 470 475 480

Val Cys Thr Val His
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<210> 33

<211> 1401

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 33

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<210> 34

<211> 466

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 34

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20 25 30

Trp Leu Asp Val Ile Arg Lys Met Asp Glu Val Tyr Leu Gln Leu Ile
35 40 45

Glu Asp Glu Val Ala Leu Glu Glu Lys Asn Ala Gln Leu Glu Gln Ser
50 55 60

Gln Gln Phe Ile Phe Ser Leu Leu Ser Ala Met Ser Asp Val Leu Val

65	70					75					80				
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Gln Leu	Leu 115	Ala	Asp	Asp	Asp	Ser 120	Ala	Ala	Thr	Leu	Arg 125	Thr	Val Ile		
Asp Asn Val	Gly 130	Pro	Gly	Arg	Ser	Phe 135	Asn	Val	Val	Glu	Leu	Asn	Leu		
Phe Asp Ala	Glu	Arg	Ser	Ile	Val	Pro	Val	Asp	Val	Ser	Cys	Thr	Pro 160		
Arg Ile Gly	Pro	Asn 165	Gly	Arg	Arg	Glu	Gly 170	Tyr	Val	Phe	Val	Gly	Arg 175		
Pro Met Ala	Glu 180	Ile	Lys	Arg	Ala	Tyr 185	His	Gln	Leu	Arg	Glu	Ala	His 190		
Glu Ala Leu	Lys 195	Arg	Thr	Gln	Gln	Gln 200	Leu	Leu	His	Ala	Glu	Lys	Met 205		
Ala Ser Leu	Gly	Arg	Leu	Val	Ala	Gly	Val	Ala	His	Glu	Leu	Asn	Asn 220		
Pro Ile Ser	Phe	Val	Leu	Gly	Asn	Val	His	Ala	Leu	Lys	Arg	Tyr	Ser 240		
Glu Arg Leu	Ala	Ala	Tyr	Val	Ala	Leu	Leu	His	Ser	Gly	Glu	Asp	Gly 255		
Ala Glu Ala	Glu	Arg	Gln	Arg	Ile	Arg	Leu	Arg	Ile	Asp	His	Ile	Leu 270		
Gln Asp Met	Pro	Ser	Leu	Ile	Glu	Gly	Thr	Leu	Glu	Gly	Ala	Gln	Arg 285		
Thr Ala Asp	Ile	Val	Arg	Gly	Leu	Thr	Arg	Phe	Ser	Ala	Val	Asp	Arg 300		
Glu Glu Pro	Ser	Val	Phe	Asp	Leu	Ser	Glu	Val	Val	Lys	Arg	Ala	Ile 320		
His Trp Val	Lys	Lys	Gly	Thr	Ala	Pro	Thr	Phe	Glu	Val	His	Trp	Ser 335		
Pro Leu Pro	Gly	Cys	Leu	Val	Met	Gly	Ser	Ala	Gly	His	Val	Gln	Gln 350		
Val Met Met	Asn	Leu	Ile	Gln	Asn	Ala	Tyr	Asp	Ala	Ala	Gly	Ser	Arg 365		
Asp Asp Ala	Val	Pro	Ala	Leu	Trp	Ile	Ala	Leu	Asp	Arg	Leu	Asp	Asp 380		
Arg Val Val	Leu	Arg	Phe	Arg	Asp	Asn	Gly	Pro	Gly	Ile	Ala	Ala	Glu 400		
His Leu Ala	Arg	Val	Phe	Asp	Pro	Phe	Phe	Ser	Thr	Lys	Pro	Val	Gly		

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 Lys Gly Thr Gly Leu Ser Leu Ser Ile Ser Tyr Gly Ile Val Glu Arg
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 <213> Ralstonia eutropha H16
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 <213> Ralstonia eutropha H16
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 Gly Val Lys Ser Val Val Ile Glu Gly Asp Ser Phe His Arg Tyr Asp
 35 40 45
 Arg Ala Glu Met Lys Val Lys Met Ala Glu Ala Glu Arg Thr Gly Asn
 50 55 60
 Met Asn Phe Ser His Phe Gly Ala Glu Asn Asn Leu Phe Gly Asp Leu
 65 70 75 80
 Glu Ser Leu Phe Arg Ser Tyr Ala Glu Ser Gly Thr Gly Met Arg Arg
 85 90 95
 Arg Tyr Leu His Ser Thr Glu Glu Ala Ala Pro Phe Gly Gln Gln Pro
 100 105 110
 Gly Thr Phe Thr Ala Trp Glu Pro Leu Pro Ala Asp Thr Asp Leu Leu
 115 120 125

Phe Tyr Glu Gly Leu His Gly Gly Val Val Thr Asp Glu Val Asn Val
 130 135 140
 Ala Gln Tyr Pro Asn Leu Leu Ile Gly Val Val Pro Val Ile Asn Leu
 145 150 155 160
 Glu Trp Ile Gln Lys Leu Trp Arg Asp Lys Lys Gln Arg Gly Tyr Ser
 165 170 175
 Thr Glu Ala Val Thr Asp Thr Ile Leu Arg Arg Met Pro Asp Tyr Val
 180 185 190
 Asn Tyr Ile Cys Pro Gln Phe Ser Arg Thr His Val Asn Phe Gln Arg
 195 200 205
 Val Pro Cys Val Asp Thr Ser Asn Pro Phe Ile Ser Arg Glu Ile Pro
 210 215 220
 Ala Pro Asp Glu Ser Met Val Val Ile Arg Phe Ala Asn Pro Lys Gly
 225 230 235 240
 Ile Asp Phe Gln Tyr Leu Leu Ser Met Ile His Asp Ser Phe Met Ser
 245 250 255
 Arg Ala Asn Thr Ile Val Val Pro Gly Gly Lys Met Glu Leu Ala Met
 260 265 270
 Gln Leu Ile Phe Thr Pro Phe Val Leu Arg Met Met Glu Arg Arg Lys
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 Arg Ala Ala Leu
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<210> 37

<211> 1461

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 37

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gacatgtacc	gcgccaaggc	ctaccgggtc	gatccgggtg	ccaacaaccc	cgagcagttc	300
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1461

<210> 38

<211> 486

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 38

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Glu Pro Lys Asp Thr Asp Leu Leu Ala Leu Phe Arg Ile Thr Pro Gln
 35 40 45

Asp Gly Val Asp Pro Val Glu Ala Ala Ala Val Ala Gly Glu Ser
 50 55 60

Ser Thr Ala Thr Trp Thr Val Val Trp Thr Asp Arg Leu Thr Ala Cys
 65 70 75 80

Asp Met Tyr Arg Ala Lys Ala Tyr Arg Val Asp Pro Val Pro Asn Asn
 85 90 95

Pro Glu Gln Phe Phe Cys Tyr Val Ala Tyr Asp Leu Ser Leu Phe Glu
 100 105 110

Glu Gly Ser Ile Ala Asn Leu Thr Ala Ser Ile Ile Gly Asn Val Phe
 115 120 125

Ser Phe Lys Pro Ile Lys Ala Ala Arg Leu Glu Asp Met Arg Phe Pro
 130 135 140

Val Ala Tyr Val Lys Thr Phe Ala Gly Pro Ser Thr Gly Ile Ile Val
 145 150 155 160

Glu Arg Glu Arg Leu Asp Lys Phe Gly Arg Pro Leu Leu Gly Ala Thr
 165 170 175

Thr Lys Pro Lys Leu Gly Leu Ser Gly Arg Asn Tyr Gly Arg Val Val
 180 185 190

Tyr Glu Gly Leu Lys Gly Gly Leu Asp Phe Met Lys Asp Asp Glu Asn
 195 200 205

Ile Asn Ser Gln Pro Phe Met His Trp Arg Asp Arg Phe Leu Phe Val
 210 215 220

Met Asp Ala Val Asn Lys Ala Ser Ala Ala Thr Gly Glu Val Lys Gly
 225 230 235 240

Ser Tyr Leu Asn Val Thr Ala Gly Thr Met Glu Glu Met Tyr Arg Arg
 245 250 255

Ala Glu Phe Ala Lys Ser Leu Gly Ser Val Val Ile Met Ile Asp Leu
 260 265 270

Ile Val Gly Trp Thr Cys Ile Gln Ser Met Ser Asn Trp Cys Arg Gln
 275 280 285

Asn Asp Met Ile Leu His Leu His Arg Ala Gly His Gly Thr Tyr Thr
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Arg Gln Lys Asn His Gly Val Ser Phe Arg Val Ile Ala Lys Trp Leu
 305 310 315 320
 Arg Leu Ala Gly Val Asp His Met His Thr Gly Thr Ala Val Gly Lys
 325 330 335
 Leu Glu Gly Asp Pro Leu Thr Val Gln Gly Tyr Tyr Asn Val Cys Arg
 340 345 350
 Asp Ala Tyr Thr His Thr Asp Leu Thr Arg Gly Leu Phe Phe Asp Gln
 355 360 365
 Asp Trp Ala Ser Leu Arg Lys Val Met Pro Val Ala Ser Gly Gly Ile
 370 375 380
 His Ala Gly Gln Met His Gln Leu Ile His Leu Phe Gly Asp Asp Val
 385 390 395 400
 Val Leu Gln Phe Gly Gly Gly Thr Ile Gly His Pro Gln Gly Ile Gln
 405 410 415
 Ala Gly Ala Thr Ala Asn Arg Val Ala Leu Glu Ala Met Val Leu Ala
 420 425 430
 Arg Asn Glu Gly Arg Asp Ile Leu Asn Glu Gly Pro Glu Ile Leu Arg
 435 440 445
 Asp Ala Ala Arg Trp Cys Gly Pro Leu Arg Ala Ala Leu Asp Thr Trp
 450 455 460
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 465 470 475 480
 Pro Thr Ala Ser Val Ala
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<210> 39

<211> 420

<212> DNA

<213> *Ralstonia eutropha* H16

<400> 39

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<210> 40

<211> 139

<212> PRT

<213> *Ralstonia eutropha* H16

<400> 40

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Val Gly Ile Glu Tyr Thr Asp Asp Pro His Pro Arg Asn Thr Tyr Trp
 35 40 45

Glu Met Phe Gly Leu Pro Met Phe Asp Leu Arg Asp Ala Ala Gly Ile
50 55 60

Leu Leu Glu Ile Asn Asn Ala Arg Ser Thr Phe Pro Asn His Tyr Ile
65 70 75 80

Arg Val Thr Ala Phe Asp Ser Thr His Thr Val Glu Ser Val Val Met
85 90 95

Ser Phe Ile Val Asn Arg Pro Ala Asp Glu Pro Gly Phe Arg Leu Val
100 105 110

Arg Gln Glu Glu Pro Gly Arg Thr Ile Arg Tyr Ser Ile Glu Ser Tyr
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Ala Val Gln Ala Arg Pro Glu Gly Ser Arg Tyr
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<210> 41

<211> 2145

<212> DNA

<213> Escherichia coli K12

<400> 41

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<211> 714


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<213>  Escherichia coli K12
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Arg Leu Ser Val Phe Lys Pro Ile Ala Gln Pro Arg Thr Gly Gly Asp
35        40        45

Ala Pro Asp Gln Thr Thr Thr Ile Val Arg Ala Asn Ser Ser Thr Thr
50        55        60

Thr Ala Ala Glu Pro Leu Lys Met Ser Tyr Val Glu Gly Leu Leu Ser
65        70        75        80

Ser Asn Gln Lys Asp Val Leu Met Glu Glu Ile Val Ala Asn Tyr His
85        90        95

Ala Asn Thr Lys Asp Ala Glu Val Val Leu Val Glu Gly Leu Val Pro
100       105       110

Thr Arg Lys His Gln Phe Ala Gln Ser Leu Asn Tyr Glu Ile Ala Lys
115      120      125

Thr Leu Asn Ala Glu Ile Val Phe Val Met Ser Gln Gly Thr Asp Thr
130      135      140

Pro Glu Gln Leu Lys Glu Arg Ile Glu Leu Thr Arg Asn Ser Phe Gly
145      150      155      160

Gly Ala Lys Asn Thr Asn Ile Thr Gly Val Ile Val Asn Lys Leu Asn
165      170      175

Ala Pro Val Asp Glu Gln Gly Arg Thr Arg Pro Asp Leu Ser Glu Ile
180      185      190

Phe Asp Asp Ser Ser Lys Ala Lys Val Asn Asn Val Asp Pro Ala Lys
195      200      205

Leu Gln Glu Ser Ser Pro Leu Pro Val Leu Gly Ala Val Pro Trp Ser
210      215      220

Phe Asp Leu Ile Ala Thr Arg Ala Ile Asp Met Ala Arg His Leu Asn
225      230      235      240

Ala Thr Ile Ile Asn Glu Gly Asp Ile Asn Thr Arg Arg Val Lys Ser
245      250      255

Val Thr Phe Cys Ala Arg Ser Ile Pro His Met Leu Glu His Phe Arg
260      265      270

Ala Gly Ser Leu Leu Val Thr Ser Ala Asp Arg Pro Asp Val Leu Val
275      280      285

Ala Ala Cys Leu Ala Ala Met Asn Gly Val Glu Ile Gly Ala Leu Leu
290      295      300

Leu Thr Gly Gly Tyr Glu Met Asp Ala Arg Ile Ser Lys Leu Cys Glu
305      310      315      320

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 355 360 365
 Ile Asn Ala Asp Trp Ile Glu Ser Leu Thr Ala Thr Ser Glu Arg Ser
 370 375 380
 Arg Arg Leu Ser Pro Pro Ala Phe Arg Tyr Gln Leu Thr Glu Leu Ala
 385 390 395 400
 Arg Lys Ala Gly Lys Arg Ile Val Leu Pro Glu Gly Asp Glu Pro Arg
 405 410 415
 Thr Val Lys Ala Ala Ala Ile Cys Ala Glu Arg Gly Ile Ala Thr Cys
 420 425 430
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 Arg Glu Ser Tyr Val Gly Arg Leu Val Glu Leu Arg Lys Asn Lys Gly
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 Thr Gly Thr Ser Gly Ala Gly Ser Asp Val Glu Lys Val Arg Glu Ala
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 Thr Arg Leu Ala Gln Glu Lys Arg Pro Asp Leu Met Ile Asp Gly Pro
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<213> Escherichia coli K12

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<210> 48

<211> 400

<212> PRT

<213> Escherichia coli K12

<400> 48

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20 25 30

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Leu Ala Glu Cys Phe His Leu Pro Glu Ala Arg Ile Lys Trp Lys Met
35 40 45

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Asp Gly Asn Lys Gln Glu Ala Ala Leu Gly Ala Gly Ala Ala His Ser
50 55 60

```

```

Glu Ala Leu Asn Phe Ile Val Asn Thr Ile Leu Ala Gln Lys Pro Glu
65 70 75 80

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Leu Ser Ala Gln Leu Thr Ala Ile Gly His Arg Ile Val His Gly Gly
85 90 95

```

```

Glu Lys Tyr Thr Ser Ser Val Val Ile Asp Glu Ser Val Ile Gln Gly
100 105 110

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Ile Lys Asp Ala Ala Ser Phe Ala Pro Leu His Asn Pro Ala His Leu
115 120 125

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Ile Gly Ile Glu Glu Ala Leu Lys Ser Phe Pro Gln Leu Lys Asp Lys
130 135 140

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Asn Val Ala Val Phe Asp Thr Ala Phe His Gln Thr Met Pro Glu Glu
145 150 155 160

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Ser Tyr Leu Tyr Ala Leu Pro Tyr Asn Leu Tyr Lys Glu His Gly Ile
165 170 175

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Arg Arg Tyr Gly Ala His Gly Thr Ser His Phe Tyr Val Thr Gln Glu
180 185 190

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Ala Ala Lys Met Leu Asn Lys Pro Val Glu Glu Leu Asn Ile Ile Thr
195 200 205

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Cys His Leu Gly Asn Gly Gly Ser Val Ser Ala Ile Arg Asn Gly Lys
210 215 220

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Cys Val Asp Thr Ser Met Gly Leu Thr Pro Leu Glu Gly Leu Val Met
225 230 235 240

Gly Thr Arg Ser Gly Asp Ile Asp Pro Ala Ile Ile Phe His Leu His
245 250 255

Asp Thr Leu Gly Met Ser Val Asp Ala Ile Asn Lys Leu Leu Thr Lys
260 265 270

Glu Ser Gly Leu Leu Gly Leu Thr Glu Val Thr Ser Asp Cys Arg Tyr
275 280 285

Val Glu Asp Asn Tyr Ala Thr Lys Glu Asp Ala Lys Arg Ala Met Asp
290 295 300

Val Tyr Cys His Arg Leu Ala Lys Tyr Ile Gly Ala Tyr Thr Ala Leu
305 310 315 320

Met Asp Gly Arg Leu Asp Ala Val Val Phe Thr Gly Gly Ile Gly Glu
325 330 335

Asn Ala Ala Met Val Arg Glu Leu Ser Leu Gly Lys Leu Gly Val Leu
340 345 350

Gly Phe Glu Val Asp His Glu Arg Asn Leu Ala Ala Arg Phe Gly Lys
355 360 365

Ser Gly Phe Ile Asn Lys Glu Gly Thr Arg Pro Ala Val Val Ile Pro
370 375 380

Thr Asn Glu Glu Leu Val Ile Ala Gln Asp Ala Ser Arg Leu Thr Ala
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<210> 49

<211> 2676

<212> DNA

<213> Escherichia coli K12

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gctgctgcag atgctcgaat cccactcgcg aaaaatggccg ttgccgaatc cggcatgggt      180
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gctgaaccaa tcggtattat ttgcggtatc gttccgacca ctaacccgac ttcaactgct      360
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gccgcataca gctccggtaa accagctatc ggtgtaggcg cgggcaacac tccagttggt      660
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tacttccgcc gtggctccct gccaatcgcg ctggatgaag tgattactga tggccacaaa     1440
cgtgcgctca tcgtgactga ccgcttcctg ttcaacaatg gttatgctga tcagatcact     1500

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<210> 50

<211> 891

<212> PRT

<213> Escherichia coli K12

<400> 50

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20 25 30

Lys Ile Phe Arg Ala Ala Ala Leu Ala Ala Ala Asp Ala Arg Ile Pro
35 40 45

Leu Ala Lys Met Ala Val Ala Glu Ser Gly Met Gly Ile Val Glu Asp
50 55 60

Lys Val Ile Lys Asn His Phe Ala Ser Glu Tyr Ile Tyr Asn Ala Tyr
65 70 75 80

Lys Asp Glu Lys Thr Cys Gly Val Leu Ser Glu Asp Asp Thr Phe Gly
85 90 95

Thr Ile Thr Ile Ala Glu Pro Ile Gly Ile Ile Cys Gly Ile Val Pro
100 105 110

Thr Thr Asn Pro Thr Ser Thr Ala Ile Phe Lys Ser Leu Ile Ser Leu
115 120 125

Lys Thr Arg Asn Ala Ile Ile Phe Ser Pro His Pro Arg Ala Lys Asp
130 135 140

Ala Thr Asn Lys Ala Ala Asp Ile Val Leu Gln Ala Ala Ile Ala Ala
145 150 155 160

Gly Ala Pro Lys Asp Leu Ile Gly Trp Ile Asp Gln Pro Ser Val Glu
165 170 175

Leu Ser Asn Ala Leu Met His His Pro Asp Ile Asn Leu Ile Leu Ala
180 185 190

Thr Gly Gly Pro Gly Met Val Lys Ala Ala Tyr Ser Ser Gly Lys Pro

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				245					250					255	
Ser	Val	Tyr	Asp	Ala	Val	Arg	Glu	Arg	Phe	Ala	Thr	His	Gly	Gly	Tyr
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Val	Glu	Lys	Ala	Glu	Lys	Leu	Val	Ala	Met	Gly	Gly	Ile	Gly	His	Thr
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Ser	Cys	Leu	Tyr	Thr	Asp	Gln	Asp	Asn	Gln	Pro	Ala	Arg	Val	Ser	Tyr
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			420					425					430		
Val	Gly	Pro	Lys	His	Leu	Ile	Asn	Lys	Lys	Thr	Val	Ala	Lys	Arg	Ala
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Glu	Asn	Met	Leu	Trp	His	Lys	Leu	Pro	Lys	Ser	Ile	Tyr	Phe	Arg	Arg
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Arg	Ala	Leu	Ile	Val	Thr	Asp	Arg	Phe	Leu	Phe	Asn	Asn	Gly	Tyr	Ala
				485					490					495	
Asp	Gln	Ile	Thr	Ser	Val	Leu	Lys	Ala	Ala	Gly	Val	Glu	Thr	Glu	Val
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Phe	Phe	Glu	Val	Glu	Ala	Asp	Pro	Thr	Leu	Ser	Ile	Val	Arg	Lys	Gly
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His	Pro	Glu	Thr	His	Phe	Glu	Glu	Leu	Ala	Leu	Arg	Phe	Met	Asp	Ile
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Arg	Lys	Arg	Ile	Tyr	Lys	Phe	Pro	Lys	Met	Gly	Val	Lys	Ala	Lys	Met
			580					585					590		
Ile	Ala	Val	Thr	Thr	Thr	Ser	Gly	Thr	Gly	Ser	Glu	Val	Thr	Pro	Phe
		595					600					605			
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Tyr	Ala	Leu	Thr	Pro	Asp	Met	Ala	Ile	Val	Asp	Ala	Asn	Leu	Val	Met
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705						710					715				720
Val	Cys	His	Ser	Met	Ala	His	Lys	Leu	Gly	Ser	Gln	Phe	His	Ile	Pro
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			740					745					750		
Ala	Asn	Asp	Asn	Pro	Thr	Lys	Gln	Thr	Ala	Phe	Ser	Gln	Tyr	Asp	Arg
		755					760					765			
Pro	Gln	Ala	Arg	Arg	Arg	Tyr	Ala	Glu	Ile	Ala	Asp	His	Leu	Gly	Leu
		770				775					780				
Ser	Ala	Pro	Gly	Asp	Arg	Thr	Ala	Ala	Lys	Ile	Glu	Lys	Leu	Leu	Ala
785						790					795				800
Trp	Leu	Glu	Thr	Leu	Lys	Ala	Glu	Leu	Gly	Ile	Pro	Lys	Ser	Ile	Arg
				805					810					815	
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			820					825					830		
Ser	Glu	Asp	Ala	Phe	Asp	Asp	Gln	Cys	Thr	Gly	Ala	Asn	Pro	Arg	Tyr
		835					840					845			
Pro	Leu	Ile	Ser	Glu	Leu	Lys	Gln	Ile	Leu	Leu	Asp	Thr	Tyr	Tyr	Gly
		850				855					860				
Arg	Asp	Tyr	Val	Glu	Gly	Glu	Thr	Ala	Ala	Lys	Lys	Glu	Ala	Ala	Pro

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870

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<210> 51

<211> 1809

<212> DNA

<213> Escherichia coli K12

<400> 51

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<210> 52

<211> 602

<212> PRT

<213> Escherichia coli K12

<400> 52

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Ile Ala Leu Ile Ser Lys Val Tyr Pro Met Arg Ser His Thr Val Ala
35          40          45

Ala Glu Gly Gly Ser Ala Ala Val Ala Gln Asp His Asp Ser Phe Glu
50          55          60

Tyr His Phe His Asp Thr Val Ala Gly Gly Asp Trp Leu Cys Glu Gln
65          70          75          80

Asp Val Val Asp Tyr Phe Val His His Cys Pro Thr Glu Met Thr Gln

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			100					105					110		
Asn	Val	Arg	Arg	Phe	Gly	Gly	Met	Lys	Ile	Glu	Arg	Thr	Trp	Phe	Ala
		115					120					125			
Ala	Asp	Lys	Thr	Gly	Phe	His	Met	Leu	His	Thr	Leu	Phe	Gln	Thr	Ser
	130					135					140				
Leu	Gln	Phe	Pro	Gln	Ile	Gln	Arg	Phe	Asp	Glu	His	Phe	Val	Leu	Asp
145					150					155					160
Ile	Leu	Val	Asp	Asp	Gly	His	Val	Arg	Gly	Leu	Val	Ala	Met	Asn	Met
				165					170					175	
Met	Glu	Gly	Thr	Leu	Val	Gln	Ile	Arg	Ala	Asn	Ala	Val	Val	Met	Ala
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Thr	Gly	Gly	Ala	Gly	Arg	Val	Tyr	Arg	Tyr	Asn	Thr	Asn	Gly	Gly	Ile
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Val	Thr	Gly	Asp	Gly	Met	Gly	Met	Ala	Leu	Ser	His	Gly	Val	Pro	Leu
	210					215					220				
Arg	Asp	Met	Glu	Phe	Val	Gln	Tyr	His	Pro	Thr	Gly	Leu	Pro	Gly	Ser
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Gly	Ile	Leu	Met	Thr	Glu	Gly	Cys	Arg	Gly	Glu	Gly	Gly	Ile	Leu	Val
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Thr	Pro	Leu	Gly	Glu	Pro	Lys	Asn	Lys	Tyr	Met	Glu	Leu	Gly	Pro	Arg
		275					280					285			
Asp	Lys	Val	Ser	Gln	Ala	Phe	Trp	His	Glu	Trp	Arg	Lys	Gly	Asn	Thr
	290					295					300				
Ile	Ser	Thr	Pro	Arg	Gly	Asp	Val	Val	Tyr	Leu	Asp	Leu	Arg	His	Leu
305					310					315					320
Gly	Glu	Lys	Lys	Leu	His	Glu	Arg	Leu	Pro	Phe	Ile	Cys	Glu	Leu	Ala
				325					330					335	
Lys	Ala	Tyr	Val	Gly	Val	Asp	Pro	Val	Lys	Glu	Pro	Ile	Pro	Val	Arg
			340					345					350		
Pro	Thr	Ala	His	Tyr	Thr	Met	Gly	Gly	Ile	Glu	Thr	Asp	Gln	Asn	Cys
		355					360					365			
Glu	Thr	Arg	Ile	Lys	Gly	Leu	Phe	Ala	Val	Gly	Glu	Cys	Ser	Ser	Val
	370					375					380				
Gly	Leu	His	Gly	Ala	Asn	Arg	Leu	Gly	Ser	Asn	Ser	Leu	Ala	Glu	Leu
385					390					395					400
Val	Val	Phe	Gly	Arg	Leu	Ala	Gly	Glu	Gln	Ala	Thr	Glu	Arg	Ala	Ala
				405					410					415	
Thr	Ala	Gly	Asn	Gly	Asn	Glu	Ala	Ala	Ile	Glu	Ala	Gln	Ala	Ala	Gly

420	425	430
Val Glu Gln Arg Leu Lys Asp	Leu Val Asn Gln Asp	Gly Gly Glu Asn
435	440	445
Trp Ala Lys Ile Arg Asp	Glu Met Gly Leu Ala Met	Glu Glu Gly Cys
450	455	460
Gly Ile Tyr Arg Thr Pro	Glu Leu Met Gln Lys Thr	Ile Asp Lys Leu
465	470	475
Ala Glu Leu Gln Glu Arg Phe	Lys Arg Val Arg Ile Thr	Asp Thr Ser
485	490	495
Ser Val Phe Asn Thr Asp	Leu Leu Tyr Thr Ile Glu	Leu Gly His Gly
500	505	510
Leu Asn Val Ala Glu Cys Met	Ala His Ser Ala Met	Ala Arg Lys Glu
515	520	525
Ser Arg Gly Ala His Gln	Arg Leu Asp Glu Gly Cys	Thr Glu Arg Asp
530	535	540
Asp Val Asn Phe Leu Lys	His Thr Leu Ala Phe	Arg Asp Ala Asp Gly
545	550	555
Thr Thr Arg Leu Glu Tyr	Ser Asp Val Lys Ile Thr	Thr Thr Leu Pro Pro
565	570	575
Ala Lys Arg Val Tyr Gly	Gly Glu Ala Asp Ala	Ala Asp Lys Ala Glu
580	585	590
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<210> 53

<211> 735

<212> DNA

<213> Escherichia coli K12

<400> 53

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gcaccgcata ggcgattcta tgaagtgcct tatgacgcaa ctacctcatt actggatgcg 120
ctgggctaca tcaaagacaa cctggcaccg gacctgagct accgctggtc ctgccgtatg 180
gcgatttgtg gttcctgcgg catgatggtt aacaacgtgc caaaactggc atgtaaaacc 240
ttcctgcgtg attacaccga cggatgaag gttgaagcgt tagctaactt cccgattgaa 300
cgcgatctgg tggtcgatat gaccacttc atcgaaagtc tggaagcgat caaaccgtac 360
atcatcgcca actccgcac cgcggatcag ggtactaaca tccagacccc ggcgcgatg 420
gcgaagtatc accagttctc cggttgcac aactgtggtt tgtgctacgc cgcgtgccc 480
cagtttgccc tgaaccaga gttcatcggt ccggtgcca ttacgctggc gcatcgttat 540
aacgaagata gccgcgacca cggtaagaag gagcgtatgg cgcagttgaa cagccagaac 600
ggcgtatgga gctgtacttt cgtgggctac tgctccgaag tctgcccga acacgtcgat 660
ccggtgcgg ccattcagca gggcaaagta gaaagtcca aagactttct tatcgcgacc 720
ctgaaaccac gctaa 735

```

<210> 54

<211> 244

<212> PRT

<213> Escherichia coli K12

<400> 54

Met Ala Glu Met Lys Asn Leu Lys Ile Glu Val Val Arg Tyr Asn Pro
1 5 10 15

Glu Val Asp Thr Ala Pro His Ser Ala Phe Tyr Glu Val Pro Tyr Asp

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

Leu Lys Pro Arg

```

<210> 55
<211> 396
<212> DNA
<213> Escherichia coli K12
<400> 55
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ccgtttttatc gctttttacat gctgcgcgaa ggcacggcgg ttccggctgt gtggttcagc      120
attgaactga ttttcgggct gtttgccctg aaaaatggcc cggaagcctg ggcgggattc      180
gtcgactttt tacaaaaccc ggttatcgtg atcattaacc tgatcactct ggcggcagct      240
ctgctgcaca ccaaaacctg gtttgaactg gcaccgaaag cggccaatat cattgtaaaa      300
gacgaaaaaa tgggaccaga gccaatattc aaaagtctct gggcggtaac tgtggttgcc      360
accatcgtaa tcctgtttgt tgccctgtac tggtaa                                396

```

```

<210> 56
<211> 131
<212> PRT
<213> Escherichia coli K12
<400> 56
Met Thr Thr Lys Arg Lys Pro Tyr Val Arg Pro Met Thr Ser Thr Trp

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[illegible]

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<210> 57
<211> 360
<212> DNA
<213> Escherichia coli K12
<400> 57
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ggtgggatgt ggagcgccat cattgcgccg gtgatgac tgcctggagg tattctgctg 120
ccactggggg tggttccggg tgatgcgctg agctacgagc gcgttctggc gttcgcgcag 180
agcttcattg gtcgcgtatt cctgttccctg atgatcgctt tgccgctgtg gtgtggttta 240
caccgtatgc accacgcgat gcacgatctg aaaatccacg tacctgcggg caaatgggtt 300
ttctacggtc tggctgctat cctgacagtt gtcacgctga ttgggtgctg tacaatctaa 360
```

```
<210> 58
<211> 119
<212> PRT
<213> Escherichia coli K12
<400> 58
```

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

Leu Ile Gly Val Val Thr Ile
115

<210> 59

<211> 2664

<212> DNA

<213> Escherichia coli K12

<400> 59

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atgtcagaac gtttcccaaa tgacgtggat ccgatcgaaa ctccgcgactg gctccaggcg      60
atcgaatcgg tcatccgtga agaaggtggt gagcgtgctc agtatctgat cgaccaactg      120
cttgcgtgaag cccgcaaagg cgggtgtaaac gtagccgcag gcacagggtat cagcaactac      180
atcaacacca tccccgttga agaacaaccg gagtatccgg gtaatctgga actggaacgc      240
cgtattcggtt cagctatccg ctggaacgcc atcatgacgg tgctgcgtgc gtcgaaaaaa      300
gacctcgaac tgggcggcca tatggcgctc ttccagtcct ccgcaaccat ttatgatgtg      360
tgctttaacc acttcttccg tgcacgcaac gagcaggatg gcggcgacct ggtttacttc      420
cagggccaca tctccccggg cgtgtacgct cgtgctttcc tggaagggtcg tctgactcag      480
gagcagctgg ataacttccg tcaggaagtt cacggcaatg gcctctcttc ctatccgcac      540
ccgaaactga tgccggaatt ctggcagttc ccgaccgtat ctatgggtct gggtcgcgatt      600
ggtgctatatt accaggctaa attcctgaaa tatctggaac accgtggcct gaaagatacc      660
tctaacaaca ccgtttacgc gttcctcggt gagcgtgaaa tggacgaacc ggaatccaaa      720
ggtgcgatca ccacgctac ccgtgaaaaa ctggataacc tggctcttcgt tatcaactgt      780
aacctgcagc gtcttgcagg cccgggtcacc ggtaacggca agatcatcaa cgaactggaa      840
ggcatcttcg aagggtgctg ctggaacgtg atcaaaagtga tgtggggtag ccgttgggat      900
gaactgctgc gtaaggatac cagcggtaaa ctgatccagc tgatgaacga aaccgttgac      960
ggcgactacc agaccttcaa atcgaaaagt ggtgcgtacg ttcgtgaaca cttcttcggt      1020
aaatatcctg aaaccgcagc actggttgca gactggactg acgagcagat ctgggcactg      1080
aaccgtgggtg gtcacgatcc gaagaaaatc tacgctgcat tcaagaaagc gcaggaaacc      1140
aaaggcaaaag cgacagtaat ccttgctcat accattaaag gttacggcat gggcgacgcg      1200
gctgaaggta aaaacatcgc gcaccagggtt aagaaaatga acatggacgg tgtgctcat      1260
atccgcgacc gtttcaatgt gccggtgtct gatgcagata tcgaaaaact gccgtacatc      1320
accttcccgg aagggtctga agagcatacc tatctgcacg ctcagcgtca gaaactgcac      1380
ggttatctgc caagccgtca gccgaacttc accgagaagc ttgagctgcc gagcctgcaa      1440
gacttcggcg cgtggttga agagcagagc aaagagatct ctaccactat cgcttctggt      1500
cgtgctctga acgtgatgct gaagaacaag tcgatcaaag atcgtctggt accgatcatc      1560
gccgacgaag cgcgtacttt cggtatggaa ggtctgttcc gtcagattgg tatttacagc      1620
ccgaacgggtc agcagtacac cccgcaggac cgcgagcagg ttgcttacta taaagaagac      1680
gagaaaaggtc agattctgca ggaagggatc aacgagctgg gcgcagggtt ttcttggtg      1740
gcagcggcga cctcttacag caccaacaat ctgccgatga tcccgttcta catctattac      1800
tcgatgttcg gcttccagcg tattggcgat ctgtgctggg cggctggcga ccagcaagcg      1860
cgtggcttcc tgatcggcgg tacttccggt cgtaccaccc tgaacggcga aggtctgcag      1920
cacgaagatg gtcacagcca cattcagtcg ctgactatcc cgaactgtat ctcttacgac      1980
ccggtttacg cttacgaagt tgctgtcatc atgcatgacg gtctggagcg tatgtacggt      2040
gaaaaacaag agaacgttta ctactacatc actacgctga acgaaaacta ccacatgccg      2100
gcaatgccgg aagggtgctga ggaaggtatc cgtaaaggta tctacaaact cgaaactatt      2160
gaaggtagca aaggtaaagt tcagctgctc ggctccggtt ctatcctgcg tcacgtccgt      2220
taagcagctg agatcctggc gaaagattac ggctaggtt ctgacgttta tagcgtgacc      2280
tccttcaccg agctggcgcg tgatggtcag gattgtgaac gctggaacat gctgcaccgc      2340
ctggaaaactc cgcgcgttcc gtatatcgct caggtgatga acgacgctcc ggcagtggca      2400
tctaccgact atatgaaact gttecgctgag caggtccgta cttacgtacc ggctgacgac      2460
taccgcgtac tgggtactga tggcttcggt cgttccgaca gccgtgagaa cctgcgtcac      2520
cacttcgaag ttgatgcttc ttatgtcgtg gttgcggcgc tgggcgaact ggctaaacgt      2580
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<210> 60

<211> 887

<212> PRT

<213> Escherichia coli K12

<400> 60

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Trp Leu Gln Ala Ile Glu Ser Val Ile Arg Glu Glu Gly Val Glu Arg
 20 25 30
 Ala Gln Tyr Leu Ile Asp Gln Leu Leu Ala Glu Ala Arg Lys Gly Gly
 35 40 45
 Val Asn Val Ala Ala Gly Thr Gly Ile Ser Asn Tyr Ile Asn Thr Ile
 50 55 60
 Pro Val Glu Glu Gln Pro Glu Tyr Pro Gly Asn Leu Glu Leu Glu Arg
 65 70 75 80
 Arg Ile Arg Ser Ala Ile Arg Trp Asn Ala Ile Met Thr Val Leu Arg
 85 90 95
 Ala Ser Lys Lys Asp Leu Glu Leu Gly Gly His Met Ala Ser Phe Gln
 100 105 110
 Ser Ser Ala Thr Ile Tyr Asp Val Cys Phe Asn His Phe Phe Arg Ala
 115 120 125
 Arg Asn Glu Gln Asp Gly Gly Asp Leu Val Tyr Phe Gln Gly His Ile
 130 135 140
 Ser Pro Gly Val Tyr Ala Arg Ala Phe Leu Glu Gly Arg Leu Thr Gln
 145 150 155 160
 Glu Gln Leu Asp Asn Phe Arg Gln Glu Val His Gly Asn Gly Leu Ser
 165 170 175
 Ser Tyr Pro His Pro Lys Leu Met Pro Glu Phe Trp Gln Phe Pro Thr
 180 185 190
 Val Ser Met Gly Leu Gly Pro Ile Gly Ala Ile Tyr Gln Ala Lys Phe
 195 200 205
 Leu Lys Tyr Leu Glu His Arg Gly Leu Lys Asp Thr Ser Lys Gln Thr
 210 215 220
 Val Tyr Ala Phe Leu Gly Asp Gly Glu Met Asp Glu Pro Glu Ser Lys
 225 230 235 240
 Gly Ala Ile Thr Ile Ala Thr Arg Glu Lys Leu Asp Asn Leu Val Phe
 245 250 255
 Val Ile Asn Cys Asn Leu Gln Arg Leu Asp Gly Pro Val Thr Gly Asn
 260 265 270
 Gly Lys Ile Ile Asn Glu Leu Glu Gly Ile Phe Glu Gly Ala Gly Trp
 275 280 285
 Asn Val Ile Lys Val Met Trp Gly Ser Arg Trp Asp Glu Leu Leu Arg
 290 295 300
 Lys Asp Thr Ser Gly Lys Leu Ile Gln Leu Met Asn Glu Thr Val Asp
 305 310 315 320
 Gly Asp Tyr Gln Thr Phe Lys Ser Lys Asp Gly Ala Tyr Val Arg Glu
 325 330 335
 His Phe Phe Gly Lys Tyr Pro Glu Thr Ala Ala Leu Val Ala Asp Trp
 340 345 350

Thr	Asp	Glu	Gln	Ile	Trp	Ala	Leu	Asn	Arg	Gly	Gly	His	Asp	Pro	Lys	
		355					360					365				
Lys	Ile	Tyr	Ala	Ala	Phe	Lys	Lys	Ala	Gln	Glu	Thr	Lys	Gly	Lys	Ala	
	370					375					380					
Thr	Val	Ile	Leu	Ala	His	Thr	Ile	Lys	Gly	Tyr	Gly	Met	Gly	Asp	Ala	
385					390					395					400	
Ala	Glu	Gly	Lys	Asn	Ile	Ala	His	Gln	Val	Lys	Lys	Met	Asn	Met	Asp	
				405					410					415		
Gly	Val	Arg	His	Ile	Arg	Asp	Arg	Phe	Asn	Val	Pro	Val	Ser	Asp	Ala	
			420					425					430			
Asp	Ile	Glu	Lys	Leu	Pro	Tyr	Ile	Thr	Phe	Pro	Glu	Gly	Ser	Glu	Glu	
	435						440					445				
His	Thr	Tyr	Leu	His	Ala	Gln	Arg	Gln	Lys	Leu	His	Gly	Tyr	Leu	Pro	
	450					455					460					
Ser	Arg	Gln	Pro	Asn	Phe	Thr	Glu	Lys	Leu	Glu	Leu	Pro	Ser	Leu	Gln	
465					470					475					480	
Asp	Phe	Gly	Ala	Leu	Leu	Glu	Glu	Gln	Ser	Lys	Glu	Ile	Ser	Thr	Thr	
				485					490					495		
Ile	Ala	Phe	Val	Arg	Ala	Leu	Asn	Val	Met	Leu	Lys	Asn	Lys	Ser	Ile	
			500					505					510			
Lys	Asp	Arg	Leu	Val	Pro	Ile	Ile	Ala	Asp	Glu	Ala	Arg	Thr	Phe	Gly	
		515					520					525				
Met	Glu	Gly	Leu	Phe	Arg	Gln	Ile	Gly	Ile	Tyr	Ser	Pro	Asn	Gly	Gln	
	530					535					540					
Gln	Tyr	Thr	Pro	Gln	Asp	Arg	Glu	Gln	Val	Ala	Tyr	Tyr	Lys	Glu	Asp	
545					550					555					560	
Glu	Lys	Gly	Gln	Ile	Leu	Gln	Glu	Gly	Ile	Asn	Glu	Leu	Gly	Ala	Gly	
				565					570					575		
Cys	Ser	Trp	Leu	Ala	Ala	Ala	Thr	Ser	Tyr	Ser	Thr	Asn	Asn	Leu	Pro	
			580					585					590			
Met	Ile	Pro	Phe	Tyr	Ile	Tyr	Tyr	Ser	Met	Phe	Gly	Phe	Gln	Arg	Ile	
		595					600					605				
Gly	Asp	Leu	Cys	Trp	Ala	Ala	Gly	Asp	Gln	Gln	Ala	Arg	Gly	Phe	Leu	
	610					615					620					
Ile	Gly	Gly	Thr	Ser	Gly	Arg	Thr	Thr	Leu	Asn	Gly	Glu	Gly	Leu	Gln	
625					630					635					640	
His	Glu	Asp	Gly	His	Ser	His	Ile	Gln	Ser	Leu	Thr	Ile	Pro	Asn	Cys	
				645					650					655		
Ile	Ser	Tyr	Asp	Pro	Ala	Tyr	Ala	Tyr	Glu	Val	Ala	Val	Ile	Met	His	
			660					665					670			
Asp	Gly	Leu	Glu	Arg	Met	Tyr	Gly	Glu	Lys	Gln	Glu	Asn	Val	Tyr	Tyr	
		675					680					685				

Tyr Ile Thr Thr Leu Asn Glu Asn Tyr His Met Pro Ala Met Pro Glu
 690 695 700
 Gly Ala Glu Glu Gly Ile Arg Lys Gly Ile Tyr Lys Leu Glu Thr Ile
 705 710 715 720
 Glu Gly Ser Lys Gly Lys Val Gln Leu Leu Gly Ser Gly Ser Ile Leu
 725 730 735
 Arg His Val Arg Glu Ala Ala Glu Ile Leu Ala Lys Asp Tyr Gly Val
 740 745 750
 Gly Ser Asp Val Tyr Ser Val Thr Ser Phe Thr Glu Leu Ala Arg Asp
 755 760 765
 Gly Gln Asp Cys Glu Arg Trp Asn Met Leu His Pro Leu Glu Thr Pro
 770 775 780
 Arg Val Pro Tyr Ile Ala Gln Val Met Asn Asp Ala Pro Ala Val Ala
 785 790 795 800
 Ser Thr Asp Tyr Met Lys Leu Phe Ala Glu Gln Val Arg Thr Tyr Val
 805 810 815
 Pro Ala Asp Asp Tyr Arg Val Leu Gly Thr Asp Gly Phe Gly Arg Ser
 820 825 830
 Asp Ser Arg Glu Asn Leu Arg His His Phe Glu Val Asp Ala Ser Tyr
 835 840 845
 Val Val Val Ala Ala Leu Gly Glu Leu Ala Lys Arg Gly Glu Ile Asp
 850 855 860
 Lys Lys Val Val Ala Asp Ala Ile Ala Lys Phe Asn Ile Asp Ala Asp
 865 870 875 880
 Lys Val Asn Pro Arg Leu Ala
 885

<210> 61

<211> 1893

<212> DNA

<213> Escherichia coli K12

<400> 61

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aaagcctcta	tgggaagttcc	gtctccgcag	gcgggtatcg	ttaaagagat	caaagtctct	180
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ggtgttaacc	ttgcgaaagt	gaagggcact	ggccgtaaag	gtcgtatcct	gcgcgaagac	1080
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```

ggtggatatcc ctggcatgct gccgtggccg aaggtggact tcagcaagtt tggtgaaatc 1200
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ttcgaccacc gcgtgatcga cgggtctgat ggtgcccggt tcattaccat cattaacaac 1860
acgctgtctg acattcgccg tctggtgatg taa 1893

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<210> 62

<211> 630

<212> PRT

<213> Escherichia coli K12

<400> 62

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Met Ala Ile Glu Ile Lys Val Pro Asp Ile Gly Ala Asp Glu Val Glu
1          5          10          15

```

```

Ile Thr Glu Ile Leu Val Lys Val Gly Asp Lys Val Glu Ala Glu Gln
20          25          30

```

```

Ser Leu Ile Thr Val Glu Gly Asp Lys Ala Ser Met Glu Val Pro Ser
35          40          45

```

```

Pro Gln Ala Gly Ile Val Lys Glu Ile Lys Val Ser Val Gly Asp Lys
50          55          60

```

```

Thr Gln Thr Gly Ala Leu Ile Met Ile Phe Asp Ser Ala Asp Gly Ala
65          70          75          80

```

```

Ala Asp Ala Ala Pro Ala Gln Ala Glu Glu Lys Lys Glu Ala Ala Pro
85          90          95

```

```

Ala Ala Ala Pro Ala Ala Ala Ala Ala Lys Asp Val Asn Val Pro Asp
100         105         110

```

```

Ile Gly Ser Asp Glu Val Glu Val Thr Glu Ile Leu Val Lys Val Gly
115         120         125

```

```

Asp Lys Val Glu Ala Glu Gln Ser Leu Ile Thr Val Glu Gly Asp Lys
130         135         140

```

```

Ala Ser Met Glu Val Pro Ala Pro Phe Ala Gly Thr Val Lys Glu Ile
145         150         155         160

```

```

Lys Val Asn Val Gly Asp Lys Val Ser Thr Gly Ser Leu Ile Met Val
165         170         175

```

```

Phe Glu Val Ala Gly Glu Ala Gly Ala Ala Ala Pro Ala Ala Lys Gln
180         185         190

```

```

Glu Ala Ala Pro Ala Ala Ala Pro Ala Pro Ala Ala Gly Val Lys Glu
195         200         205

```

```

Val Asn Val Pro Asp Ile Gly Gly Asp Glu Val Glu Val Thr Glu Val
210         215         220

```

```

Met Val Lys Val Gly Asp Lys Val Ala Ala Glu Gln Ser Leu Ile Thr
225         230         235         240

```


Val	Glu	Gly	Asp	Lys	Ala	Ser	Met	Glu	Val	Pro	Ala	Pro	Phe	Ala	Gly	
				245					250					255		
Val	Val	Lys	Glu	Leu	Lys	Val	Asn	Val	Gly	Asp	Lys	Val	Lys	Thr	Gly	
			260					265					270			
Ser	Leu	Ile	Met	Ile	Phe	Glu	Val	Glu	Gly	Ala	Ala	Pro	Ala	Ala	Ala	
		275					280					285				
Pro	Ala	Lys	Gln	Glu	Ala	Ala	Ala	Pro	Ala	Pro	Ala	Ala	Lys	Ala	Glu	
	290					295					300					
Ala	Pro	Ala	Ala	Ala	Pro	Ala	Ala	Lys	Ala	Glu	Gly	Lys	Ser	Glu	Phe	
305					310					315					320	
Ala	Glu	Asn	Asp	Ala	Tyr	Val	His	Ala	Thr	Pro	Leu	Ile	Arg	Arg	Leu	
				325					330					335		
Ala	Arg	Glu	Phe	Gly	Val	Asn	Leu	Ala	Lys	Val	Lys	Gly	Thr	Gly	Arg	
			340					345					350			
Lys	Gly	Arg	Ile	Leu	Arg	Glu	Asp	Val	Gln	Ala	Tyr	Val	Lys	Glu	Ala	
		355					360					365				
Ile	Lys	Arg	Ala	Glu	Ala	Ala	Pro	Ala	Ala	Thr	Gly	Gly	Gly	Ile	Pro	
	370					375					380					
Gly	Met	Leu	Pro	Trp	Pro	Lys	Val	Asp	Phe	Ser	Lys	Phe	Gly	Glu	Ile	
385					390					395					400	
Glu	Glu	Val	Glu	Leu	Gly	Arg	Ile	Gln	Lys	Ile	Ser	Gly	Ala	Asn	Leu	
				405					410					415		
Ser	Arg	Asn	Trp	Val	Met	Ile	Pro	His	Val	Thr	His	Phe	Asp	Lys	Thr	
			420					425					430			
Asp	Ile	Thr	Glu	Leu	Glu	Ala	Phe	Arg	Lys	Gln	Gln	Asn	Glu	Glu	Ala	
		435					440					445				
Ala	Lys	Arg	Lys	Leu	Asp	Val	Lys	Ile	Thr	Pro	Val	Val	Phe	Ile	Met	
	450					455					460					
Lys	Ala	Val	Ala	Ala	Ala	Leu	Glu	Gln	Met	Pro	Arg	Phe	Asn	Ser	Ser	
465					470					475					480	
Leu	Ser	Glu	Asp	Gly	Gln	Arg	Leu	Thr	Leu	Lys	Lys	Tyr	Ile	Asn	Ile	
				485					490					495		
Gly	Val	Ala	Val	Asp	Thr	Pro	Asn	Gly	Leu	Val	Val	Pro	Val	Phe	Lys	
			500					505					510			
Asp	Val	Asn	Lys	Lys	Gly	Ile	Ile	Glu	Leu	Ser	Arg	Glu	Leu	Met	Thr	
		515					520					525				
Ile	Ser	Lys	Lys	Ala	Arg	Asp	Gly	Lys	Leu	Thr	Ala	Gly	Glu	Met	Gln	
	530					535					540					
Gly	Gly	Cys	Phe	Thr	Ile	Ser	Ser	Ile	Gly	Gly	Leu	Gly	Thr	Thr	His	
545					550					555					560	
Phe	Ala	Pro	Ile	Val	Asn	Ala	Pro	Glu	Val	Ala	Ile	Leu	Gly	Val	Ser	
				565					570					575		

Lys Ser Ala Met Glu Pro Val Trp Asn Gly Lys Glu Phe Val Pro Arg
580 585 590

Leu Met Leu Pro Ile Ser Leu Ser Phe Asp His Arg Val Ile Asp Gly
595 600 605

Ala Asp Gly Ala Arg Phe Ile Thr Ile Ile Asn Asn Thr Leu Ser Asp
610 615 620

Ile Arg Arg Leu Val Met
625 630

<210> 63
<211> 1425
<212> DNA
<213> Escherichia coli K12
<400> 63

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gctgccttcc	gttgcgctga	tttaggtctg	gaaaccgtaa	tcgtagaacg	ttacaacacc	120
cttggcgggtg	tttgccctgaa	cgctcggtgt	atcccttcta	aagcactgct	gcacgtagca	180
aaagttatcg	aagaagccaa	agcgcctggct	gaacacggta	tcgtcttcgg	cgaaccgaaa	240
accgatatcg	acaagattcg	tacctggaaa	gagaaagtga	tcaatcagct	gaccggtggt	300
ctggctggta	tggcgaaaag	ccgcaaagtc	aaagtgggtca	acggctctggg	taaattcacc	360
ggggctaaca	ccctggaagt	tgaaggtgag	aacggcaaaa	ccgtgatcaa	cttcgacaac	420
gcgatcattg	cagcgggttc	tcgcccgatc	caactgccgt	ttattccgca	tgaagatccg	480
cgtatctggg	actccactga	cgcgctggaa	ctgaaaagaag	taccagaacg	cctgctggta	540
atgggtggcg	gtatcatcgg	tctggaaatg	ggcaccgttt	accacgcgct	gggttcacag	600
attgacgtgg	ttgaaatggt	cgaccagggt	atcccggcag	ctgacaaaaga	catcgttaaa	660
gtcttcacca	agcgtatcag	caagaaattc	aacctgatgc	tggaaaacca	agttaccgcc	720
ggtgaagcga	aagaagacgg	catttatgtg	acgatggaa	gcaaaaaagc	acccgctgaa	780
ccgcagcgtt	acgacgccgt	gctggtagcg	attggtcgtg	tgccgaacgg	taaaaacctc	840
gacgcaggca	aagcaggcgt	ggaagttgac	gaccgtgggt	tcacccgcgt	tgacaaaacag	900
ctgcgtacca	acgtaccgca	catctttgct	atcggcgata	tcgtcgggtca	accgatgctg	960
gcacacaaag	gtgttcacga	aggctacgtt	gccgctgaag	ttatcgccgg	taagaaacac	1020
tacttcgata	cgaaagtatt	cccgtccatc	gcctataccg	aaccagaagt	tgcattgggtg	1080
ggtctgactg	agaaagaagc	gaaagagaaa	ggcatcagct	atgaaaccgc	caccttccccg	1140
tgggctgctt	ctgggtcgtgc	tatcgcttcc	gactgcgcag	acgggtatgac	caagctgatt	1200
ttcgacaaag	aatctcaccg	tgtgatcggg	ggtgcgattg	tcggtactaa	cggcggcgag	1260
ctgctgggtg	aaatcggcct	ggcaatcgaa	atgggttggtg	atgctgaaga	catcgcactg	1320
accatccacg	cgcacccgac	tctgcacgag	tctgtgggcc	tggcggcgaga	agtgttcgaa	1380
ggttagcatta	ccgacctgcc	gaacccgaaa	gcgaagaaga	agtaa		1425

<210> 64
<211> 474
<212> PRT
<213> Escherichia coli K12
<400> 64

Met Ser Thr Glu Ile Lys Thr Gln Val Val Val Leu Gly Ala Gly Pro
1 5 10 15

Ala Gly Tyr Ser Ala Ala Phe Arg Cys Ala Asp Leu Gly Leu Glu Thr
20 25 30

Val Ile Val Glu Arg Tyr Asn Thr Leu Gly Gly Val Cys Leu Asn Val
35 40 45

Gly Cys Ile Pro Ser Lys Ala Leu Leu His Val Ala Lys Val Ile Glu
50 55 60

Glu Ala Lys Ala Leu Ala Glu His Gly Ile Val Phe Gly Glu Pro Lys
65 70 75 80

Thr Asp Ile Asp Lys Ile Arg Thr Trp Lys Glu Lys Val Ile Asn Gln
 85 90 95
 Leu Thr Gly Gly Leu Ala Gly Met Ala Lys Gly Arg Lys Val Lys Val
 100 105 110
 Val Asn Gly Leu Gly Lys Phe Thr Gly Ala Asn Thr Leu Glu Val Glu
 115 120 125
 Gly Glu Asn Gly Lys Thr Val Ile Asn Phe Asp Asn Ala Ile Ile Ala
 130 135 140
 Ala Gly Ser Arg Pro Ile Gln Leu Pro Phe Ile Pro His Glu Asp Pro
 145 150 155 160
 Arg Ile Trp Asp Ser Thr Asp Ala Leu Glu Leu Lys Glu Val Pro Glu
 165 170 175
 Arg Leu Leu Val Met Gly Gly Gly Ile Ile Gly Leu Glu Met Gly Thr
 180 185 190
 Val Tyr His Ala Leu Gly Ser Gln Ile Asp Val Val Glu Met Phe Asp
 195 200 205
 Gln Val Ile Pro Ala Ala Asp Lys Asp Ile Val Lys Val Phe Thr Lys
 210 215 220
 Arg Ile Ser Lys Lys Phe Asn Leu Met Leu Glu Thr Lys Val Thr Ala
 225 230 235 240
 Val Glu Ala Lys Glu Asp Gly Ile Tyr Val Thr Met Glu Gly Lys Lys
 245 250 255
 Ala Pro Ala Glu Pro Gln Arg Tyr Asp Ala Val Leu Val Ala Ile Gly
 260 265 270
 Arg Val Pro Asn Gly Lys Asn Leu Asp Ala Gly Lys Ala Gly Val Glu
 275 280 285
 Val Asp Asp Arg Gly Phe Ile Arg Val Asp Lys Gln Leu Arg Thr Asn
 290 295 300
 Val Pro His Ile Phe Ala Ile Gly Asp Ile Val Gly Gln Pro Met Leu
 305 310 315 320
 Ala His Lys Gly Val His Glu Gly His Val Ala Ala Glu Val Ile Ala
 325 330 335
 Gly Lys Lys His Tyr Phe Asp Pro Lys Val Ile Pro Ser Ile Ala Tyr
 340 345 350
 Thr Glu Pro Glu Val Ala Trp Val Gly Leu Thr Glu Lys Glu Ala Lys
 355 360 365
 Glu Lys Gly Ile Ser Tyr Glu Thr Ala Thr Phe Pro Trp Ala Ala Ser
 370 375 380
 Gly Arg Ala Ile Ala Ser Asp Cys Ala Asp Gly Met Thr Lys Leu Ile
 385 390 395 400
 Phe Asp Lys Glu Ser His Arg Val Ile Gly Gly Ala Ile Val Gly Thr
 405 410 415

Asn Gly Gly Glu Leu Leu Gly Glu Ile Gly Leu Ala Ile Glu Met Gly
 420 425 430

Cys Asp Ala Glu Asp Ile Ala Leu Thr Ile His Ala His Pro Thr Leu
 435 440 445

His Glu Ser Val Gly Leu Ala Ala Glu Val Phe Glu Gly Ser Ile Thr
 450 455 460

Asp Leu Pro Asn Pro Lys Ala Lys Lys Lys
 465 470

<210> 65

<211> 1767

<212> DNA

<213> Escherichia coli K12

<400> 65

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cgcgcgggcg	tgcaaatttc	ccagagcggc	cagacctgtg	cgctgctctc	taaagtcttc	120
ccgacccggt	cccataccgt	ttctgcgcaa	ggcggcatta	ccgttgcgct	gggtaataacc	180
catgaagata	actgggaatg	gcatatgtac	gacaccgtga	aagggtcgga	ctatatcggt	240
gaccaggacg	cgattgaata	tatgtgtaaa	accggggcgg	aagcgattct	ggaactcgaa	300
cacatggggc	tgccgttctc	gcgtctcgat	gatggtcgta	tctatcaacg	tccgtttggc	360
ggtcagtcga	aaaacttcgg	cggcgagcag	gcggcacgca	ctgcggcagc	agctgaccgt	420
accggtcacg	cactgttgca	cacgctttat	cagcagaacc	tgaaaaacca	caccaccatt	480
ttctccgagt	ggatatgcgt	ggatctgggtg	aaaaaccagg	atggcgcggt	ggtgggttgt	540
accgcactgt	gcacgaaac	cggtgaagtg	gtttatttca	aagcccgcgc	taccgtgctg	600
gcgactggcg	gagcagggcg	tatttatcag	tccaccacca	acgcccacat	taacaccggc	660
gacggtgtcg	gcatggctat	ccgtgcccgc	gtaccgggtg	aggatatgga	aatgtggcag	720
ttccacccga	ccggcattgc	cggtgcccgc	gtactgggtca	ccgaagggtg	ccgtgggtgaa	780
ggcggttatc	tgctgaacaa	acatggcgaa	cgttttatgg	agcgttatgc	gccgaacgcc	840
aaagacctgg	cgggccgtga	cgtgggttgc	cgttccatca	tgatcgaaat	ccgtgaagggt	900
cgcggtgtgt	atgggtccgtg	ggggccacac	gcgaaactga	aactcgatca	cctgggtaaa	960
gaagttctcg	aatcccgctc	gccgggtatc	ctggagcttt	cccgtacctt	cgctcacgtc	1020
gatccggtga	aagagccgat	tccggttatc	ccaacctgtc	actacatgat	gggcgggtatt	1080
ccgaccaaag	ttaccgggtca	ggcactgact	gtgaatgaga	aaggcgaaga	tgtggttgtt	1140
ccgggactgt	ttgccgttgg	tgaaatcgct	tgtgtatcgg	tacacggcgc	taaccgtctg	1200
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gagtcctatc	ccgagcaggg	cgcactgcgc	gatgccagcg	agtctgatgt	tgaagcgtct	1320
ctggatcgcc	tgaaccgctg	gaacaataat	cgtaaccggtg	aagatccggt	ggcgatccgt	1380
aaagcgctgc	aagaatgtat	gcagcataac	ttctcggtct	tccgtgaagg	tgatgcgatg	1440
gcgaaagggc	ttgagcagtt	gaaagtgatc	cgcgagcgtc	tgaaaaatgc	ccgtctggat	1500
gacacttcca	gcgagttcaa	cacccagcgc	ggtgagtgcc	tggaaactgga	taacctgatg	1560
gaaacggcgt	atgcaacggc	tgtttctgcc	aacttccgta	ccgaaagccg	tggcgcgcac	1620
agccgcttcg	acttcccggg	tcgtgatgat	gaaaactggc	tgtgccactc	cctgtatctg	1680
ccagagtcgg	aatccatgac	gcgccgaagc	gtcaacatgg	aaccgaaact	gcgcccggca	1740
ttcccgcga	agattcgtag	ttactaa				1767

<210> 66

<211> 588

<212> PRT

<213> Escherichia coli K12

<400> 66

Met Lys Leu Pro Val Arg Glu Phe Asp Ala Val Val Ile Gly Ala Gly
 1 5 10 15

Gly Ala Gly Met Arg Ala Ala Leu Gln Ile Ser Gln Ser Gly Gln Thr
 20 25 30

Cys Ala Leu Leu Ser Lys Val Phe Pro Thr Arg Ser His Thr Val Ser
 35 40 45

Ala Gln Gly Gly Ile Thr Val Ala Leu Gly Asn Thr His Glu Asp Asn

50					55					60					
Trp	Glu	Trp	His	Met	Tyr	Asp	Thr	Val	Lys	Gly	Ser	Asp	Tyr	Ile	Gly
65					70					75					80
Asp	Gln	Asp	Ala	Ile	Glu	Tyr	Met	Cys	Lys	Thr	Gly	Pro	Glu	Ala	Ile
				85					90					95	
Leu	Glu	Leu	Glu	His	Met	Gly	Leu	Pro	Phe	Ser	Arg	Leu	Asp	Asp	Gly
			100					105					110		
Arg	Ile	Tyr	Gln	Arg	Pro	Phe	Gly	Gly	Gln	Ser	Lys	Asn	Phe	Gly	Gly
		115					120					125			
Glu	Gln	Ala	Ala	Arg	Thr	Ala	Ala	Ala	Ala	Asp	Arg	Thr	Gly	His	Ala
		130				135					140				
Leu	Leu	His	Thr	Leu	Tyr	Gln	Gln	Asn	Leu	Lys	Asn	His	Thr	Thr	Ile
145					150					155					160
Phe	Ser	Glu	Trp	Tyr	Ala	Leu	Asp	Leu	Val	Lys	Asn	Gln	Asp	Gly	Ala
				165					170					175	
Val	Val	Gly	Cys	Thr	Ala	Leu	Cys	Ile	Glu	Thr	Gly	Glu	Val	Val	Tyr
			180					185					190		
Phe	Lys	Ala	Arg	Ala	Thr	Val	Leu	Ala	Thr	Gly	Gly	Ala	Gly	Arg	Ile
		195					200					205			
Tyr	Gln	Ser	Thr	Thr	Asn	Ala	His	Ile	Asn	Thr	Gly	Asp	Gly	Val	Gly
	210					215					220				
Met	Ala	Ile	Arg	Ala	Gly	Val	Pro	Val	Gln	Asp	Met	Glu	Met	Trp	Gln
225					230					235					240
Phe	His	Pro	Thr	Gly	Ile	Ala	Gly	Ala	Gly	Val	Leu	Val	Thr	Glu	Gly
				245					250					255	
Cys	Arg	Gly	Glu	Gly	Gly	Tyr	Leu	Leu	Asn	Lys	His	Gly	Glu	Arg	Phe
			260				265						270		
Met	Glu	Arg	Tyr	Ala	Pro	Asn	Ala	Lys	Asp	Leu	Ala	Gly	Arg	Asp	Val
		275					280					285			
Val	Ala	Arg	Ser	Ile	Met	Ile	Glu	Ile	Arg	Glu	Gly	Arg	Gly	Cys	Asp
	290					295					300				
Gly	Pro	Trp	Gly	Pro	His	Ala	Lys	Leu	Lys	Leu	Asp	His	Leu	Gly	Lys
305					310					315					320
Glu	Val	Leu	Glu	Ser	Arg	Leu	Pro	Gly	Ile	Leu	Glu	Leu	Ser	Arg	Thr
				325					330					335	
Phe	Ala	His	Val	Asp	Pro	Val	Lys	Glu	Pro	Ile	Pro	Val	Ile	Pro	Thr
			340					345					350		
Cys	His	Tyr	Met	Met	Gly	Gly	Ile	Pro	Thr	Lys	Val	Thr	Gly	Gln	Ala
		355					360					365			
Leu	Thr	Val	Asn	Glu	Lys	Gly	Glu	Asp	Val	Val	Val	Pro	Gly	Leu	Phe
	370					375					380				
Ala	Val	Gly	Glu	Ile	Ala	Cys	Val	Ser	Val	His	Gly	Ala	Asn	Arg	Leu

385	390	395	400
Gly Gly Asn Ser Leu Leu Asp Leu Val Val Phe Gly Arg Ala Ala Gly	405	410	415
Leu His Leu Gln Glu Ser Ile Ala Glu Gln Gly Ala Leu Arg Asp Ala	420	425	430
Ser Glu Ser Asp Val Glu Ala Ser Leu Asp Arg Leu Asn Arg Trp Asn	435	440	445
Asn Asn Arg Asn Gly Glu Asp Pro Val Ala Ile Arg Lys Ala Leu Gln	450	455	460
Glu Cys Met Gln His Asn Phe Ser Val Phe Arg Glu Gly Asp Ala Met	465	470	475
Ala Lys Gly Leu Glu Gln Leu Lys Val Ile Arg Glu Arg Leu Lys Asn	485	490	495
Ala Arg Leu Asp Asp Thr Ser Ser Glu Phe Asn Thr Gln Arg Val Glu	500	505	510
Cys Leu Glu Leu Asp Asn Leu Met Glu Thr Ala Tyr Ala Thr Ala Val	515	520	525
Ser Ala Asn Phe Arg Thr Glu Ser Arg Gly Ala His Ser Arg Phe Asp	530	535	540
Phe Pro Asp Arg Asp Asp Glu Asn Trp Leu Cys His Ser Leu Tyr Leu	545	550	555
Pro Glu Ser Glu Ser Met Thr Arg Arg Ser Val Asn Met Glu Pro Lys	565	570	575
Leu Arg Pro Ala Phe Pro Pro Lys Ile Arg Thr Tyr	580	585	

<210> 67

<211> 717

<212> DNA

<213> Escherichia coli K12

<400> 67

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cagctaaaag agaaagatcc cagcctgtcg ttccgcccgt cctgcccgtga aggtgtgtgc	180
ggttccgacg gtctgaacat gaacggcaag aatggtctgg cctgtattac cccgatttcg	240
gcactcaacc agccggggcaa gaagattgtg attcgcccgc tgccagggtt accggtgatc	300
cgcgatttgg tggtagacat gggacaattc tatgcgcaat atgagaaaat taagccttac	360
ctgttggaata atggacaaaa tccgccagct cgcgagcatt tacagatgcc agagcagcgc	420
gaaaaactcg acgggctgta tgaatgtatt ctctgcgcac gttgttcaac ctctgtccg	480
tctttctggt ggaatcccga taagtattatc ggcccggcag gcttggttagc ggcataatcgt	540
ttcctgattg atagccgtga taccgagact gacagccgcc tcgacggtt gagtgatgca	600
ttcagcgtat tccgctgtca cagcatcatg aactgcgtca gtgtatgtcc gaaggggctg	660
aacccgacgc gcgccatcgg ccatatcaag tcgatgttgt tgcaacgtaa tgcgtaa	717

<210> 68

<211> 238

<212> PRT

<213> Escherichia coli K12

<400> 68

Met Arg Leu Glu Phe Ser Ile Tyr Arg Tyr Asn Pro Asp Val Asp Asp	1	5	10	15
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Ala Pro Arg Met Gln Asp Tyr Thr Leu Glu Ala Asp Glu Gly Arg Asp
20 25 30

Met Met Leu Leu Asp Ala Leu Ile Gln Leu Lys Glu Lys Asp Pro Ser
35 40 45

Leu Ser Phe Arg Arg Ser Cys Arg Glu Gly Val Cys Gly Ser Asp Gly
50 55 60

Leu Asn Met Asn Gly Lys Asn Gly Leu Ala Cys Ile Thr Pro Ile Ser
65 70 75 80

Ala Leu Asn Gln Pro Gly Lys Lys Ile Val Ile Arg Pro Leu Pro Gly
85 90 95

Leu Pro Val Ile Arg Asp Leu Val Val Asp Met Gly Gln Phe Tyr Ala
100 105 110

Gln Tyr Glu Lys Ile Lys Pro Tyr Leu Leu Asn Asn Gly Gln Asn Pro
115 120 125

Pro Ala Arg Glu His Leu Gln Met Pro Glu Gln Arg Glu Lys Leu Asp
130 135 140

Gly Leu Tyr Glu Cys Ile Leu Cys Ala Cys Cys Ser Thr Ser Cys Pro
145 150 155 160

Ser Phe Trp Trp Asn Pro Asp Lys Phe Ile Gly Pro Ala Gly Leu Leu
165 170 175

Ala Ala Tyr Arg Phe Leu Ile Asp Ser Arg Asp Thr Glu Thr Asp Ser
180 185 190

Arg Leu Asp Gly Leu Ser Asp Ala Phe Ser Val Phe Arg Cys His Ser
195 200 205

Ile Met Asn Cys Val Ser Val Cys Pro Lys Gly Leu Asn Pro Thr Arg
210 215 220

Ala Ile Gly His Ile Lys Ser Met Leu Leu Gln Arg Asn Ala
225 230 235

<210> 69
<211> 390
<212> DNA
<213> Escherichia coli K12
<400> 69
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cccatcacgg cgatagcgtc cattctccat cgcgtttccg gtgtgatcac ctttgttgca 120
gtgggcatcc tgctgtggct tctgggtacc agcctctctt cccctgaagg ttctgagcaa 180
gcttccgcga ttatgggcag cttcttcgct aaatttatca tgtggggcat ccttaccgct 240
ctggcgatc acgtcgctcg aggtattcgc cacatgatga tggatttttg ctatctggaa 300
gaaacattcg aagcgggtaa acgctccgcc aaaatctcct ttgttattac tgcgtgctt 360
tcacttctcg caggagtcct cgtatggtaa 390

<210> 70
<211> 129
<212> PRT
<213> Escherichia coli K12
<400> 70

Met Ile Arg Asn Val Lys Lys Gln Arg Pro Val Asn Leu Asp Leu Gln
1 5 10 15

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

Trp

<210> 71
 <211> 348
 <212> DNA
 <213> Escherichia coli K12
 <400> 71
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 gctaccgcta tcgtcctgac gctctacatc atttatatgg tcggtttttt cgctaccagt 120
 ggcgagctga catatgaagt ctggatcggg ttcttcgcct ctgcgttcac caaagtgttc 180
 accctgctgg cgctgttttc tatcttgatc catgcctgga tcggcatgtg gcagggtgtg 240
 accgactacg ttaaaccgct ggctttgcgc ctgatgctgc aactgggtgat tgtcgttgca 300
 ctgggtgggtt acgtgattta tggattcgtt gtggtgtggg gtgtgtga 348

<210> 72
 <211> 115
 <212> PRT
 <213> Escherichia coli K12
 <400> 72
 Met Val Ser Asn Ala Ser Ala Leu Gly Arg Asn Gly Val His Asp Phe
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 Ile Leu Val Arg Ala Thr Ala Ile Val Leu Thr Leu Tyr Ile Ile Tyr
 20 25 30
 Met Val Gly Phe Phe Ala Thr Ser Gly Glu Leu Thr Tyr Glu Val Trp
 35 40 45
 Ile Gly Phe Phe Ala Ser Ala Phe Thr Lys Val Phe Thr Leu Leu Ala
 50 55 60
 Leu Phe Ser Ile Leu Ile His Ala Trp Ile Gly Met Trp Gln Val Leu
 65 70 75 80
 Thr Asp Tyr Val Lys Pro Leu Ala Leu Arg Leu Met Leu Gln Leu Val
 85 90 95
 Ile Val Val Ala Leu Val Val Tyr Val Ile Tyr Gly Phe Val Val Val
 100 105 110

Trp Gly Val
115

<210> 73

<211> 990

<212> DNA

<213> Escherichia coli K12

<400> 73

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actgccaatg	gctgcgaagc	ggtatgtatt	ttcgtaaacg	atgacggcag	ccgcccgggtg	180
ctggaagagc	tgaaaaagca	cggcggttaa	tatatcgccc	tgcgctgtgc	cggtttcaat	240
aacgtcgacc	ttgacgcggc	aaaagaactg	gggctgaaag	tagtccgtgt	tccagcctat	300
gatccagagg	ccgttgctga	acacgccatc	ggtatgatga	tgacgctgaa	ccgccgtatt	360
caccgcgcgt	atcagcgtag	ccgtgatgct	aacttctctc	tggaagggtct	gaccggcctt	420
actatgtatg	gcaaaacggc	aggcgttatc	ggtaccggta	aaatcggtgt	ggcgatgctg	480
cgcattctga	aagggttttg	tatgcgtctg	ctggcgcttc	atccgtatcc	aagtgcagcg	540
gcgctggaac	tcggtgtgga	gtatgtcgat	ctgccaaacc	tggttctctga	atcagacggt	600
atctctctgc	actgcccgt	gacaccggaa	aactatcatc	tggtgaacga	agccgccttc	660
gaacagatga	aaaatggcgt	gatgatcgct	aataccagtc	gcggtgcatt	gattgattct	720
caggcagcaa	ttgaagcgct	gaaaaatcag	aaaattgggt	cggtgggtat	ggacgtgtat	780
gagaacgaac	gcgatctatt	ctttgaagat	aaatccaacg	acgtgatcca	ggatgacgta	840
ttccgctgcc	tgtctgcctg	ccacaacgtg	ctgtttaccg	ggcaccaggc	attcctgaca	900
gcagaagctc	tgaccagtat	ttctcagact	acgctgcaaa	acttaagcaa	tctggaaaaa	960
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<210> 74

<211> 329

<212> PRT

<213> Escherichia coli K12

<400> 74

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

Pro Ser Ala Ala Ala Leu Glu Leu Gly Val Glu Tyr Val Asp Leu Pro
 180 185 190

Thr Leu Phe Ser Glu Ser Asp Val Ile Ser Leu His Cys Pro Leu Thr
 195 200 205

Pro Glu Asn Tyr His Leu Leu Asn Glu Ala Ala Phe Glu Gln Met Lys
 210 215 220

Asn Gly Val Met Ile Val Asn Thr Ser Arg Gly Ala Leu Ile Asp Ser
 225 230 235 240

Gln Ala Ala Ile Glu Ala Leu Lys Asn Gln Lys Ile Gly Ser Leu Gly
 245 250 255

Met Asp Val Tyr Glu Asn Glu Arg Asp Leu Phe Phe Glu Asp Lys Ser
 260 265 270

Asn Asp Val Ile Gln Asp Asp Val Phe Arg Arg Leu Ser Ala Cys His
 275 280 285

Asn Val Leu Phe Thr Gly His Gln Ala Phe Leu Thr Ala Glu Ala Leu
 290 295 300

Thr Ser Ile Ser Gln Thr Thr Leu Gln Asn Leu Ser Asn Leu Glu Lys
 305 310 315 320

Gly Glu Thr Cys Pro Asn Glu Leu Val
 325

<210> 75
 <211> 1191
 <212> DNA
 <213> Escherichia coli K12
 <400> 75

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gatttgc	cag	aagtgg	cgc	gcgccag	cgt	attctga	aaaa	acatgt	ccga	cttaag	cctg	180
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aagcgcc	caa	tgtgg	ttcca	gctttat	gtta	ctgcgc	gatac	gcggct	ttat	gcgtaa	cgcg	420
ctggagc	gag	caaaag	cagc	gggtt	gttcg	acgctg	gttt	tcaccg	tgg	tatgcc	gaca	480
ccgggcg	cac	gctacc	gtga	tgcgc	attca	ggtatg	agcg	gccga	aacgc	ggcaat	gcgc	540
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gacggtg	tac	tctctt	ccgc	ccgtgc	actg	cctgct	attg	cagatg	cggt	gaaagg	tgat	900
atagcc	attc	tggcgg	atag	cggaatt	cgt	aacggg	cctg	atgtcg	tgcg	tatgatt	gcg	960
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caggc	gggtg	tagcta	acct	gctaa	atctg	atcgaa	aaag	agatga	aaag	ggcgat	gacg	1080
ctgact	ggcg	cgaaat	cgat	cagcga	aatt	acgcaa	agatt	cgctgg	tgc	ggggct	gggt	1140
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<210> 76
 <211> 396
 <212> PRT
 <213> Escherichia coli K12
 <400> 76

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			20					25					30		
Tyr	Thr	Leu	Arg	Arg	Asn	Val	Glu	Asp	Leu	Ser	Glu	Val	Ala	Leu	Arg
		35					40					45			
Gln	Arg	Ile	Leu	Lys	Asn	Met	Ser	Asp	Leu	Ser	Leu	Glu	Thr	Thr	Leu
	50					55					60				
Phe	Asn	Glu	Lys	Leu	Ser	Met	Pro	Val	Ala	Leu	Ala	Pro	Val	Gly	Leu
65					70					75					80
Cys	Gly	Met	Tyr	Ala	Arg	Arg	Gly	Glu	Val	Gln	Ala	Ala	Lys	Ala	Ala
				85					90					95	
Asp	Ala	His	Gly	Ile	Pro	Phe	Thr	Leu	Ser	Thr	Val	Ser	Val	Cys	Pro
			100					105					110		
Ile	Glu	Glu	Val	Ala	Pro	Ala	Ile	Lys	Arg	Pro	Met	Trp	Phe	Gln	Leu
		115					120					125			
Tyr	Val	Leu	Arg	Asp	Arg	Gly	Phe	Met	Arg	Asn	Ala	Leu	Glu	Arg	Ala
	130					135					140				
Lys	Ala	Ala	Gly	Cys	Ser	Thr	Leu	Val	Phe	Thr	Val	Asp	Met	Pro	Thr
145					150					155					160
Pro	Gly	Ala	Arg	Tyr	Arg	Asp	Ala	His	Ser	Gly	Met	Ser	Gly	Pro	Asn
				165					170					175	
Ala	Ala	Met	Arg	Arg	Tyr	Leu	Gln	Ala	Val	Thr	His	Pro	Gln	Trp	Ala
		180					185						190		
Trp	Asp	Val	Gly	Leu	Asn	Gly	Arg	Pro	His	Asp	Leu	Gly	Asn	Ile	Ser
		195					200					205			
Ala	Tyr	Leu	Gly	Lys	Pro	Thr	Gly	Leu	Glu	Asp	Tyr	Ile	Gly	Trp	Leu
	210					215					220				
Gly	Asn	Asn	Phe	Asp	Pro	Ser	Ile	Ser	Trp	Lys	Asp	Leu	Glu	Trp	Ile
225					230					235					240
Arg	Asp	Phe	Trp	Asp	Gly	Pro	Met	Val	Ile	Lys	Gly	Ile	Leu	Asp	Pro
				245					250					255	
Glu	Asp	Ala	Arg	Asp	Ala	Val	Arg	Phe	Gly	Ala	Asp	Gly	Ile	Val	Val
			260					265					270		
Ser	Asn	His	Gly	Gly	Arg	Gln	Leu	Asp	Gly	Val	Leu	Ser	Ser	Ala	Arg
		275					280					285			
Ala	Leu	Pro	Ala	Ile	Ala	Asp	Ala	Val	Lys	Gly	Asp	Ile	Ala	Ile	Leu
	290					295					300				
Ala	Asp	Ser	Gly	Ile	Arg	Asn	Gly	Leu	Asp	Val	Val	Arg	Met	Ile	Ala
305					310					315					320
Leu	Gly	Ala	Asp	Thr	Val	Leu	Leu	Gly	Arg	Ala	Phe	Leu	Tyr	Ala	Leu
				325					330					335	
Ala	Thr	Ala	Gly	Gln	Ala	Gly	Val	Ala	Asn	Leu	Leu	Asn	Leu	Ile	Glu

340	345	350
Lys Glu Met	Lys Val Ala Met Thr Leu Thr Gly Ala	Lys Ser Ile Ser
355	360	365
Glu Ile Thr Gln Asp Ser Leu Val Gln Gly Leu Gly	Lys Glu Leu Pro	
370	375	380
Ala Ala Leu Ala Pro Met Ala Lys Gly Asn Ala Ala		
385	390	395

<210> 77

<211> 999

<212> DNA

<213> Escherichia coli K12

<400> 77

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aacaaagcag	gactgggtga	tatcctgggt	gccagcgggtg	ctgagaacgt	gcagggcgag	180
gttcagcaga	aactcgactt	gttcgctaata	gaaaaactga	aagccgcact	gaaagcacgc	240
gatatcgttg	cgggcattgc	ctctgaagaa	gaagatgaga	ttgtcgtctt	tgaaggctgt	300
gaacacgcaa	aatacgtggg	gctgatggac	cccctggatg	gctcgtccaa	catcgatggt	360
aacgtctctg	tcggtaccat	tttctccatc	taccgccgcg	ttacgcctgt	tggcacgcgc	420
gtaacggaag	aagatttcct	ccagcctggg	aacaaacagg	ttgcggcagg	ttacgtggta	480
tacggctcct	ctaccatgct	ggtttacacc	accggatgcg	gtgttcacgc	ctttacttac	540
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aaaacctact	ccatcaacga	aggaaactac	attaagtttc	cgaacggggg	gaagaagtac	660
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<210> 78

<211> 332

<212> PRT

<213> Escherichia coli K12

<400> 78

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20	30
Ala Lys Ile Ile His Arg Asp Ile Asn Lys Ala Gly Leu Val Asp Ile	
35	45
Leu Gly Ala Ser Gly Ala Glu Asn Val Gln Gly Glu Val Gln Gln Lys	
50	60
Leu Asp Leu Phe Ala Asn Glu Lys Leu Lys Ala Ala Leu Lys Ala Arg	
65	80
Asp Ile Val Ala Gly Ile Ala Ser Glu Glu Glu Asp Glu Ile Val Val	
85	95
Phe Glu Gly Cys Glu His Ala Lys Tyr Val Val Leu Met Asp Pro Leu	
100	110
Asp Gly Ser Ser Asn Ile Asp Val Asn Val Ser Val Gly Thr Ile Phe	
115	125

Ser Ile Tyr Arg Arg Val Thr Pro Val Gly Thr Pro Val Thr Glu Glu
 130 135 140
 Asp Phe Leu Gln Pro Gly Asn Lys Gln Val Ala Ala Gly Tyr Val Val
 145 150 155 160
 Tyr Gly Ser Ser Thr Met Leu Val Tyr Thr Thr Gly Cys Gly Val His
 165 170 175
 Ala Phe Thr Tyr Asp Pro Ser Leu Gly Val Phe Cys Leu Cys Gln Glu
 180 185 190
 Arg Met Arg Phe Pro Glu Lys Gly Lys Thr Tyr Ser Ile Asn Glu Gly
 195 200 205
 Asn Tyr Ile Lys Phe Pro Asn Gly Val Lys Lys Tyr Ile Lys Phe Cys
 210 215 220
 Gln Glu Glu Asp Lys Ser Thr Asn Arg Pro Tyr Thr Ser Arg Tyr Ile
 225 230 235 240
 Gly Ser Leu Val Ala Asp Phe His Arg Asn Leu Leu Lys Gly Gly Ile
 245 250 255
 Tyr Leu Tyr Pro Ser Thr Ala Ser His Pro Asp Gly Lys Leu Arg Leu
 260 265 270
 Leu Tyr Glu Cys Asn Pro Met Ala Phe Leu Ala Glu Gln Ala Gly Gly
 275 280 285
 Lys Ala Ser Asp Gly Lys Glu Arg Ile Leu Asp Ile Ile Pro Glu Thr
 290 295 300
 Leu His Gln Arg Arg Ser Phe Phe Val Gly Asn Asp His Met Val Glu
 305 310 315 320
 Asp Val Glu Arg Phe Ile Arg Glu Phe Pro Asp Ala
 325 330

<210> 79

<211> 1011

<212> DNA

<213> Escherichia coli K12

<400> 79

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cgtattatgc tcaaccaggt caacattgac ggcaccatcg tcattggtga aggtgaaatc      180
gacgaagcac cgatgctcta cattggtgaa aaagtcggta ctggtcgcgg cgacgcggta      240
gatattgctg ttgatccgat tgaaggcacg cgcattgacg cgatgggcca ggctaacgcg      300
ctggcgggtg tggcagtagg cgataaaggc tgcttcctca atgcgccgga tatgtatatg      360
gagaagctga ttgtcggggc gggagccaaa ggcaccattg atctgaacct gccgctggcg      420
gataacctgc gcaatgtagc ggcggcgctc ggcaaaccgt tgagcgaact gacggtaacg      480
attctggcta aaccacgccca cgatgccgtt atcgctgaaa tgcagcaact cggcgtagcg      540
gtatttgcta ttccggacgg cgacgttgcg gcctcaattc tcacctgtat gccagacagc      600
gaagttgacg tgctgtacgg tattggtggc gcgccggaag gcgtagtttc tgcggcgggtg      660
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gacaacgaag agaatcgteg cattggcgag caggagctgg cacgctgcaa agcgatgggc      780
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tctgccaccg gtattaccaa aggcgatctg ctggaaggca ttagccgcaa aggcaatatc      900
gcgactaccg aaacgctgct gatccgcggc aagtcacgca ccattcgccg cattcagtcg      960
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<210> 80

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<211> 336
<212> PRT
<213> Escherichia coli K12
<400> 80
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20          25          30

Asp Gly Ala Ala Val Asn Ala Met Arg Ile Met Leu Asn Gln Val Asn
35          40          45

Ile Asp Gly Thr Ile Val Ile Gly Glu Gly Glu Ile Asp Glu Ala Pro
50          55          60

Met Leu Tyr Ile Gly Glu Lys Val Gly Thr Gly Arg Gly Asp Ala Val
65          70          75          80

Asp Ile Ala Val Asp Pro Ile Glu Gly Thr Arg Met Thr Ala Met Gly
85          90          95

Gln Ala Asn Ala Leu Ala Val Leu Ala Val Gly Asp Lys Gly Cys Phe
100         105         110

Leu Asn Ala Pro Asp Met Tyr Met Glu Lys Leu Ile Val Gly Pro Gly
115         120         125

Ala Lys Gly Thr Ile Asp Leu Asn Leu Pro Leu Ala Asp Asn Leu Arg
130         135         140

Asn Val Ala Ala Ala Leu Gly Lys Pro Leu Ser Glu Leu Thr Val Thr
145         150         155         160

Ile Leu Ala Lys Pro Arg His Asp Ala Val Ile Ala Glu Met Gln Gln
165         170         175

Leu Gly Val Arg Val Phe Ala Ile Pro Asp Gly Asp Val Ala Ala Ser
180         185         190

Ile Leu Thr Cys Met Pro Asp Ser Glu Val Asp Val Leu Tyr Gly Ile
195         200         205

Gly Gly Ala Pro Glu Gly Val Val Ser Ala Ala Val Ile Arg Ala Leu
210         215         220

Asp Gly Asp Met Asn Gly Arg Leu Leu Ala Arg His Asp Val Lys Gly
225         230         235         240

Asp Asn Glu Glu Asn Arg Arg Ile Gly Glu Gln Glu Leu Ala Arg Cys
245         250         255

Lys Ala Met Gly Ile Glu Ala Gly Lys Val Leu Arg Leu Gly Asp Met
260         265         270

Ala Arg Ser Asp Asn Val Ile Phe Ser Ala Thr Gly Ile Thr Lys Gly
275         280         285

Asp Leu Leu Glu Gly Ile Ser Arg Lys Gly Asn Ile Ala Thr Thr Glu
290         295         300

Thr Leu Leu Ile Arg Gly Lys Ser Arg Thr Ile Arg Arg Ile Gln Ser
305         310         315         320

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Ile His Tyr Leu Asp Arg Lys Asp Pro Glu Met Gln Val His Ile Leu
 325 330 335

<210> 81

<211> 1080

<212> DNA

<213> Escherichia coli K12

<400> 81

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gactccatca acgccgtact ggaaaccgct gctaaagtta aagcgccggt tatcgttcag     180
ttctccaacg gtggtgcttc ctttatcgct ggtaaaggcg tgaaatctga cgttccgcag     240
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gacggtctgt tggacgcggg tgaaaaacac ttgcagcta ccggtaaagcc gctgttctct    420
tctcacatga tcgacctgtc tgaagaatct ctgcaagaga acatcgaaat ctgctctaaa    480
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ggtgaagaag acggcgtgga caacagccac atggacgctt ctgcactgta caccagccg     600
gaagacgttg attacgcata caccgaactg agcaaaatca gcccgcgttt caccatcgca    660
gcgtccttcg gtaacgtaca cgggtgtttac aagccgggta acgtggttct gactccgacc    720
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aacttcgtat tccacggtgg ttccggttct actgctcagg aaatcaaaga ctccgtaagc    840
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ctgaactact acaaagcgaa cgaagcttat ctgcagggtc agctgggtaa cccgaaaggc     960
gaagatcagc cgaacaagaa atactacgat ccgcgcgtat ggctgcgtgc cggtcagact   1020
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<210> 82

<211> 359

<212> PRT

<213> Escherichia coli K12

<400> 82

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Met Ser Lys Ile Phe Asp Phe Val Lys Pro Gly Val Ile Thr Gly Asp
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          20          25          30

Pro Ala Val Asn Cys Val Gly Thr Asp Ser Ile Asn Ala Val Leu Glu
          35          40          45

Thr Ala Ala Lys Val Lys Ala Pro Val Ile Val Gln Phe Ser Asn Gly
          50          55          60

Gly Ala Ser Phe Ile Ala Gly Lys Gly Val Lys Ser Asp Val Pro Gln
65          70          75          80

Gly Ala Ala Ile Leu Gly Ala Ile Ser Gly Ala His His Val His Gln
          85          90          95

Met Ala Glu His Tyr Gly Val Pro Val Ile Leu His Thr Asp His Cys
          100         105         110

Ala Lys Lys Leu Leu Pro Trp Ile Asp Gly Leu Leu Asp Ala Gly Glu
          115         120         125

Lys His Phe Ala Ala Thr Gly Lys Pro Leu Phe Ser Ser His Met Ile
          130         135         140

Asp Leu Ser Glu Glu Ser Leu Gln Glu Asn Ile Glu Ile Cys Ser Lys
145         150         155         160

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Tyr Leu Glu Arg Met Ser Lys Ile Gly Met Thr Leu Glu Ile Glu Leu
 165 170 175
 Gly Cys Thr Gly Gly Glu Glu Asp Gly Val Asp Asn Ser His Met Asp
 180 185 190
 Ala Ser Ala Leu Tyr Thr Gln Pro Glu Asp Val Asp Tyr Ala Tyr Thr
 195 200 205
 Glu Leu Ser Lys Ile Ser Pro Arg Phe Thr Ile Ala Ala Ser Phe Gly
 210 215 220
 Asn Val His Gly Val Tyr Lys Pro Gly Asn Val Val Leu Thr Pro Thr
 225 230 235 240
 Ile Leu Arg Asp Ser Gln Glu Tyr Val Ser Lys Lys His Asn Leu Pro
 245 250 255
 His Asn Ser Leu Asn Phe Val Phe His Gly Gly Ser Gly Ser Thr Ala
 260 265 270
 Gln Glu Ile Lys Asp Ser Val Ser Tyr Gly Val Val Lys Met Asn Ile
 275 280 285
 Asp Thr Asp Thr Gln Trp Ala Thr Trp Glu Gly Val Leu Asn Tyr Tyr
 290 295 300
 Lys Ala Asn Glu Ala Tyr Leu Gln Gly Gln Leu Gly Asn Pro Lys Gly
 305 310 315 320
 Glu Asp Gln Pro Asn Lys Lys Tyr Tyr Asp Pro Arg Val Trp Leu Arg
 325 330 335
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 355

<210> 83

<211> 1053

<212> DNA

<213> Escherichia coli K12

<400> 83

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gccggagctt	catttgctgc	taaccgcgtc	tactttgacc	cgaaaaacat	tgttgaactg	300
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cggcgttatg	cgcacgcgat	tccattcctc	gtcaaactta	atcacaacga	gacgctaagt	420
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gcggttgccg	ttggtgcgac	tatctatttt	ggctcggaag	agtcacgtcg	ccagattgaa	540
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tatttgcgta	actccgcctt	taagaaagat	ggcgttgatt	accatgtttc	cgccgacctg	660
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gatgcagtgc	gtactgcggt	tatcaacaaa	cgcgaggcg	gaatggggct	gattcttgga	960
cgtaaagcgt	tcaagaaatc	gatggctgac	ggcgtgaaac	tgattaacgc	cgtgcaggac	1020
gtttatctcg	atagcaaaat	tactatcgcc	tga			1053

<210> 84
 <211> 350
 <212> PRT
 <213> Escherichia coli K12
 <400> 84
 Met Thr Asp Ile Ala Gln Leu Leu Gly Lys Asp Ala Asp Asn Leu Leu
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 Gln His Arg Cys Met Thr Ile Pro Ser Asp Gln Leu Tyr Leu Pro Gly
 20 25 30
 His Asp Tyr Val Asp Arg Val Met Ile Asp Asn Asn Arg Pro Pro Ala
 35 40 45
 Val Leu Arg Asn Met Gln Thr Leu Tyr Asn Thr Gly Arg Leu Ala Gly
 50 55 60
 Thr Gly Tyr Leu Ser Ile Leu Pro Val Asp Gln Gly Val Glu His Ser
 65 70 75 80
 Ala Gly Ala Ser Phe Ala Ala Asn Pro Leu Tyr Phe Asp Pro Lys Asn
 85 90 95
 Ile Val Glu Leu Ala Ile Glu Ala Gly Cys Asn Cys Val Ala Ser Thr
 100 105 110
 Tyr Gly Val Leu Ala Ser Val Ser Arg Arg Tyr Ala His Arg Ile Pro
 115 120 125
 Phe Leu Val Lys Leu Asn His Asn Glu Thr Leu Ser Tyr Pro Asn Thr
 130 135 140
 Tyr Asp Gln Thr Leu Tyr Ala Ser Val Glu Gln Ala Phe Asn Met Gly
 145 150 155 160
 Ala Val Ala Val Gly Ala Thr Ile Tyr Phe Gly Ser Glu Glu Ser Arg
 165 170 175
 Arg Gln Ile Glu Glu Ile Ser Ala Ala Phe Glu Arg Ala His Glu Leu
 180 185 190
 Gly Met Val Thr Val Leu Trp Ala Tyr Leu Arg Asn Ser Ala Phe Lys
 195 200 205
 Lys Asp Gly Val Asp Tyr His Val Ser Ala Asp Leu Thr Gly Gln Ala
 210 215 220
 Asn His Leu Ala Ala Thr Ile Gly Ala Asp Ile Val Lys Gln Lys Met
 225 230 235 240
 Ala Glu Asn Asn Gly Gly Tyr Lys Ala Ile Asn Tyr Gly Tyr Thr Asp
 245 250 255
 Asp Arg Val Tyr Ser Lys Leu Thr Ser Glu Asn Pro Ile Asp Leu Val
 260 265 270
 Arg Tyr Gln Leu Ala Asn Cys Tyr Met Gly Arg Ala Gly Leu Ile Asn
 275 280 285
 Ser Gly Gly Ala Ala Gly Gly Glu Thr Asp Leu Ser Asp Ala Val Arg
 290 295 300
 Thr Ala Val Ile Asn Lys Arg Ala Gly Gly Met Gly Leu Ile Leu Gly

305					310					315					320
Arg	Lys	Ala	Phe	Lys	Lys	Ser	Met	Ala	Asp	Gly	Val	Lys	Leu	Ile	Asn
				325					330					335	
Ala	Val	Gln	Asp	Val	Tyr	Leu	Asp	Ser	Lys	Ile	Thr	Ile	Ala		
			340					345					350		

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<210> 85
<211> 663
<212> DNA
<213> Escherichia coli K12
<400> 85
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ccgctggcgg gtgtgaccac taaccaagc attatcgccg cgggtaaaaa accgctggat 120
gttgtgcttc cgcaacttca tgaagcgatg ggcggtcagg ggcgtctgtt tgcccaggta 180
atggctacca ctgccgaagg gatggttaat gacgcgctta agctgcgttc tattattgcg 240
gatatcgctgg tgaaagtctc ggtgaccgcc gaggggctgg cagctattaa gatgttaaaa 300
gcggaaggga ttccgacgct gggaaccgcc gtatatggcg cagcacaagg gctgctgtcg 360
gcgctggcag gtgcggaata tgttgcgcct tacgttaatg gtattgatgc tcagggcggg 420
agcggcattc agactgtgac cgacttacac cagttattga aaatgcatgc gccgcaggcg 480
aaagtgctgg cagcgagttt caaaaccccg cgtcaggcgc tggactgctt actggcagga 540
tgtgaatcaa ttactctgcc actggatgtg gcacaacaga tgattagcta tccggcggtt 600
tggtccgctg tggcgaagtt tgagcaggac tggcaggggag cgtttggcag aacgtcgatt 660
taa 663
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<210>	86																
<211>	220																
<212>	PRT																
<213>	Escherichia coli K12																
<400>	86																
Met	Glu	Leu	Tyr	Leu	Asp	Thr	Ser	Asp	Val	Val	Ala	Val	Lys	Ala	Leu		
1				5					10					15			
Ser	Arg	Ile	Phe	Pro	Leu	Ala	Gly	Val	Thr	Thr	Asn	Pro	Ser	Ile	Ile		
			20					25					30				
Ala	Ala	Gly	Lys	Lys	Pro	Leu	Asp	Val	Val	Leu	Pro	Gln	Leu	His	Glu		
		35					40					45					
Ala	Met	Gly	Gly	Gln	Gly	Arg	Leu	Phe	Ala	Gln	Val	Met	Ala	Thr	Thr		
	50					55					60						
Ala	Glu	Gly	Met	Val	Asn	Asp	Ala	Leu	Lys	Leu	Arg	Ser	Ile	Ile	Ala		
65					70					75					80		
Asp	Ile	Val	Val	Lys	Val	Pro	Val	Thr	Ala	Glu	Gly	Leu	Ala	Ala	Ile		
				85					90					95			
Lys	Met	Leu	Lys	Ala	Glu	Gly	Ile	Pro	Thr	Leu	Gly	Thr	Ala	Val	Tyr		
		100						105					110				
Gly	Ala	Ala	Gln	Gly	Leu	Leu	Ser	Ala	Leu	Ala	Gly	Ala	Glu	Tyr	Val		
		115					120					125					
Ala	Pro	Tyr	Val	Asn	Arg	Ile	Asp	Ala	Gln	Gly	Gly	Ser	Gly	Ile	Gln		
	130					135					140						
Thr	Val	Thr	Asp	Leu	His	Gln	Leu	Leu	Lys	Met	His	Ala	Pro	Gln	Ala		
145					150					155					160		
Lys	Val	Leu	Ala	Ala	Ser	Phe	Lys	Thr	Pro	Arg	Gln	Ala	Leu	Asp	Cys		
				165					170					175			

Leu Leu Ala Gly Cys Glu Ser Ile Thr Leu Pro Leu Asp Val Ala Gln
 180 185 190

Gln Met Ile Ser Tyr Pro Ala Val Asp Ala Ala Val Ala Lys Phe Glu
 195 200 205

Gln Asp Trp Gln Gly Ala Phe Gly Arg Thr Ser Ile
 210 215 220

<210> 87

<211> 663

<212> DNA

<213> Escherichia coli K12

<400> 87

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atggaactgt atctggacac cgctaacgtc gcagaagtcg aacgtctggc acgcatattc 60
cccattgccg gggtgacaac taacccgagc attatcgctg ccagcaagga gtccatatgg 120
gaagtgtctg cgcgtctgca aaaagcgatt ggtgatgagg gcattctgtt tgctcagacc 180
atgagccgcg acgcgcaggg gatgggtggaa gaagcgaagc gcctgcgcga cgctattccg 240
gggtattgtg tgaaaaatccc ggtgacttcc gaaggctctg cagcaattaa aatactgaaa 300
aaagagggtg ttactacact tggcactgct gtatatagcg ccgcacaagg gttattagcc 360
gcactggcag gggcaaaaata cgttgctccg tatgttaacc gcgtagatgc ccagggcgga 420
gacggcattc gtacggttca ggagctgcaa acgctgttag aaatgcacgc gccagaaagc 480
atgggtgtgg cagccagctt taaaacgccg cgtcaggcgc tggactgttt actggcagga 540
tgtgaatcca tcaccctgcc cttagatgta gcgcaacaaa tgctcaacac ccctgcggta 600
gagtcagcta tagagaagtt cgaacacgac tggaatgccg catttggcac tactcatctc 660
taa 663

```

<210> 88

<211> 220

<212> PRT

<213> Escherichia coli K12

<400> 88

Met Glu Leu Tyr Leu Asp Thr Ala Asn Val Ala Glu Val Glu Arg Leu
 1 5 10 15

Ala Arg Ile Phe Pro Ile Ala Gly Val Thr Thr Asn Pro Ser Ile Ile
 20 25 30

Ala Ala Ser Lys Glu Ser Ile Trp Glu Val Leu Pro Arg Leu Gln Lys
 35 40 45

Ala Ile Gly Asp Glu Gly Ile Leu Phe Ala Gln Thr Met Ser Arg Asp
 50 55 60

Ala Gln Gly Met Val Glu Glu Ala Lys Arg Leu Arg Asp Ala Ile Pro
 65 70 75 80

Gly Ile Val Val Lys Ile Pro Val Thr Ser Glu Gly Leu Ala Ala Ile
 85 90 95

Lys Ile Leu Lys Lys Glu Gly Ile Thr Thr Leu Gly Thr Ala Val Tyr
 100 105 110

Ser Ala Ala Gln Gly Leu Leu Ala Ala Leu Ala Gly Ala Lys Tyr Val
 115 120 125

Ala Pro Tyr Val Asn Arg Val Asp Ala Gln Gly Gly Asp Gly Ile Arg
 130 135 140

Thr Val Gln Glu Leu Gln Thr Leu Leu Glu Met His Ala Pro Glu Ser
 145 150 155 160

Met Val Leu Ala Ala Ser Phe Lys Thr Pro Arg Gln Ala Leu Asp Cys
 165 170 175

Leu Leu Ala Gly Cys Glu Ser Ile Thr Leu Pro Leu Asp Val Ala Gln
 180 185 190

Gln Met Leu Asn Thr Pro Ala Val Glu Ser Ala Ile Glu Lys Phe Glu
 195 200 205

His Asp Trp Asn Ala Ala Phe Gly Thr Thr His Leu
 210 215 220

<210> 89

<211> 1020

<212> DNA

<213> Escherichia coli K12

<400> 89

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 gccatcaccc tggcaagaaa tggccacgag gttgtcctct ggggccatga ccctgaacat 120
 atcgcaacgc ttgaacgcga ccgctgtaac gccgcgtttc tccccgatgt gccttttccc 180
 gatacgctcc atcttgaaaag cgatctcgcc actgcgctgg cagccagccg taatattctc 240
 gtcgctgtac ccagccatgt ctttggtgaa gtgctgcgcc agattaaacc actgatgcgt 300
 cctgatgcgc gtctggtgtg ggcgacaaa gggctggaag cggaaaccgg acgtctgtta 360
 caggacgtgg cgcgtgaggc cttaggcgat caaattccgc tggcggttat ctctggccca 420
 acgtttgcga aagaactggc ggcaggttta ccgacagcta tttcgtggc ctcgaccgat 480
 cagacctttg ccgatgatct ccagcagctg ctgcactgcg gcaaaaagttt ccgcgtttac 540
 agcaatccgg atttcattgg cgtgcagctt ggcggcgcgg tgaaaaacgt tattgccatt 600
 ggtgcgggga tgtccgacgg tatcggtttt ggtgcgaatg cgcgtacggc gctgatcacc 660
 cgtgggctgg ctgaaatgtc gcgtcttggg gcggcgctgg gtgccgaccc tgccaccttt 720
 atgggcatgg cggggcttgg cgatctggtg cttacctgta ccgacaacca gtcgcgtaac 780
 cgccgttttg gcatgatgct cggtcagggc atggatgtac aaagcgcgca ggagaagatt 840
 ggtcaggtgg tggaaaggcta ccgcaatacg aaagaagtcc gcgaactggc gcatcgcttc 900
 ggcgttgaaa tgccaataac cgaggaaatt tatcaagtat tatattgcgg aaaaaacgcg 960
 cgcgaggcag cattgacttt actaggtcgt gcacgcaagg acgagcgcgag cagccactaa 1020

<210> 90

<211> 339

<212> PRT

<213> Escherichia coli K12

<400> 90

Met Asn Gln Arg Asn Ala Ser Met Thr Val Ile Gly Ala Gly Ser Tyr
 1 5 10 15

Gly Thr Ala Leu Ala Ile Thr Leu Ala Arg Asn Gly His Glu Val Val
 20 25 30

Leu Trp Gly His Asp Pro Glu His Ile Ala Thr Leu Glu Arg Asp Arg
 35 40 45

Cys Asn Ala Ala Phe Leu Pro Asp Val Pro Phe Pro Asp Thr Leu His
 50 55 60

Leu Glu Ser Asp Leu Ala Thr Ala Leu Ala Ala Ser Arg Asn Ile Leu
 65 70 75 80

Val Val Val Pro Ser His Val Phe Gly Glu Val Leu Arg Gln Ile Lys
 85 90 95

Pro Leu Met Arg Pro Asp Ala Arg Leu Val Trp Ala Thr Lys Gly Leu
 100 105 110

Glu Ala Glu Thr Gly Arg Leu Leu Gln Asp Val Ala Arg Glu Ala Leu
 115 120 125

Gly Asp Gln Ile Pro Leu Ala Val Ile Ser Gly Pro Thr Phe Ala Lys
 130 135 140
 Glu Leu Ala Ala Gly Leu Pro Thr Ala Ile Ser Leu Ala Ser Thr Asp
 145 150 155 160
 Gln Thr Phe Ala Asp Asp Leu Gln Gln Leu Leu His Cys Gly Lys Ser
 165 170 175
 Phe Arg Val Tyr Ser Asn Pro Asp Phe Ile Gly Val Gln Leu Gly Gly
 180 185 190
 Ala Val Lys Asn Val Ile Ala Ile Gly Ala Gly Met Ser Asp Gly Ile
 195 200 205
 Gly Phe Gly Ala Asn Ala Arg Thr Ala Leu Ile Thr Arg Gly Leu Ala
 210 215 220
 Glu Met Ser Arg Leu Gly Ala Ala Leu Gly Ala Asp Pro Ala Thr Phe
 225 230 235 240
 Met Gly Met Ala Gly Leu Gly Asp Leu Val Leu Thr Cys Thr Asp Asn
 245 250 255
 Gln Ser Arg Asn Arg Arg Phe Gly Met Met Leu Gly Gln Gly Met Asp
 260 265 270
 Val Gln Ser Ala Gln Glu Lys Ile Gly Gln Val Val Glu Gly Tyr Arg
 275 280 285
 Asn Thr Lys Glu Val Arg Glu Leu Ala His Arg Phe Gly Val Glu Met
 290 295 300
 Pro Ile Thr Glu Glu Ile Tyr Gln Val Leu Tyr Cys Gly Lys Asn Ala
 305 310 315 320
 Arg Glu Ala Ala Leu Thr Leu Leu Gly Arg Ala Arg Lys Asp Glu Arg
 325 330 335
 Ser Ser His

<210> 91

<211> 1629

<212> DNA

<213> Escherichia coli K12

<400> 91

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gacatcgcaa ccggtgccac cgggcgtaac cacggcctgc tgcacagcgg tgcgcgctat      180
gcggttaaccg atgcggaatc ggcccgcgaa tgcattagtg aaaaccagat cctgaaacgc      240
attgcacgtc actgcgttga accaaccaac ggcctgttta tcaccctgcc ggaagatgac      300
ctctccttcc aggccacttt tattcgcgcc tgcgaagaag cagggatcag cgcagaagct      360
atagacccgc agcaagcgcg cattatcgaa cctgccgtta acccggcact gattggcgcg      420
gtgaaagttc cggatggcac cgttgatcca ttctgtctga ccgcagcaaa catgctggat      480
gccaaagaac acggtgccgt tatccttacc gtcctatga tccacggggt gattcgtgaa      540
ggcgcgacgg tgtgcggtgt tcgtgtacgt aaccatctca ccggcgaaac tcaggccctt      600
catgcacctg tcgtggttaa tgccgctggg atctgggggc aacacattgc cgaatatgcc      660
gatctgcgca ttcgcatggt cccggcgaaa ggatcgctgc tgatcatgga tcaccgcatt      720
aaccagcatg tgatcaaccg ctgccgtaaa ccttccgacg ccgatattct ggtgcctggc      780
gataccattt cgctgattgg taccacctct ttacgtattg attacaacga gattgacgat      840
aatcgagtga cggcagaaga ggttgatatt ctgctgcgtg aaggggaaaa actggccccc      900

```

```

gtgatggcga aaacgcgcac tttgcggggc tattctggcg tgcgcccgcg ggttgccagc 960
gatgacgacc cgagcggacg taacgtcagc cgtggcatcg tgctgctcga ccatgctgaa 1020
cgcgatgggtc tggacggatt tatcaccatc accggtggca aactgatgac ctatcggctg 1080
atggctgaat gggctaccga cgcggtatgc cgcaaactgg gcaaacacgcg cccctgtacg 1140
actgccgatc tggcactgcc tggttcacaa gaaccgcgctg aagttacctt gcgtaaagtc 1200
atctccctgc ctgccccgct gcgcggttct gcggtttatc gtcatggcga tcgcacgcct 1260
gcctggctga gcgaaggccg tctgcaccgt agcctggtat gtgagtgcga agcggtaact 1320
gcgggtgaag tgcagtacgc ggtagaaaaa ttaaacgtta atagcctgct ggatttacgc 1380
cgctgtaccc gtgtggggat gggcacctgc caggcgcaac tctgcgcctg ccgcgctgcc 1440
ggactgctgc aacgttttaa cgtcacgacg tccgcgcaat ctatcgagca actttccacc 1500
ttccttaacg aacgctggaa aggcgtgcaa cccatcgctt ggggagatgc actgcgcgaa 1560
agcgaattta cccgctgggt ttatcagggg ttgtgtggtc tggagaagga gcagaaagat 1620
gcgctttga 1629

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<210> 92

<211> 542

<212> PRT

<213> Escherichia coli K12

<400> 92

```

Met Lys Thr Arg Asp Ser Gln Ser Ser Asp Val Ile Ile Ile Gly Gly
1          5          10          15

```

```

Gly Ala Thr Gly Ala Gly Ile Ala Arg Asp Cys Ala Leu Arg Gly Leu
          20          25          30

```

```

Arg Val Ile Leu Val Glu Arg His Asp Ile Ala Thr Gly Ala Thr Gly
          35          40          45

```

```

Arg Asn His Gly Leu Leu His Ser Gly Ala Arg Tyr Ala Val Thr Asp
          50          55          60

```

```

Ala Glu Ser Ala Arg Glu Cys Ile Ser Glu Asn Gln Ile Leu Lys Arg
65          70          75          80

```

```

Ile Ala Arg His Cys Val Glu Pro Thr Asn Gly Leu Phe Ile Thr Leu
          85          90          95

```

```

Pro Glu Asp Asp Leu Ser Phe Gln Ala Thr Phe Ile Arg Ala Cys Glu
          100          105          110

```

```

Glu Ala Gly Ile Ser Ala Glu Ala Ile Asp Pro Gln Gln Ala Arg Ile
          115          120          125

```

```

Ile Glu Pro Ala Val Asn Pro Ala Leu Ile Gly Ala Val Lys Val Pro
          130          135          140

```

```

Asp Gly Thr Val Asp Pro Phe Arg Leu Thr Ala Ala Asn Met Leu Asp
          145          150          155          160

```

```

Ala Lys Glu His Gly Ala Val Ile Leu Thr Ala His Glu Val Thr Gly
          165          170          175

```

```

Leu Ile Arg Glu Gly Ala Thr Val Cys Gly Val Arg Val Arg Asn His
          180          185          190

```

```

Leu Thr Gly Glu Thr Gln Ala Leu His Ala Pro Val Val Val Asn Ala
          195          200          205

```

```

Ala Gly Ile Trp Gly Gln His Ile Ala Glu Tyr Ala Asp Leu Arg Ile
          210          215          220

```

```

Arg Met Phe Pro Ala Lys Gly Ser Leu Leu Ile Met Asp His Arg Ile
          225          230          235          240

```

```

Asn Gln His Val Ile Asn Arg Cys Arg Lys Pro Ser Asp Ala Asp Ile
                245                250                255

Leu Val Pro Gly Asp Thr Ile Ser Leu Ile Gly Thr Thr Ser Leu Arg
                260                265                270

Ile Asp Tyr Asn Glu Ile Asp Asp Asn Arg Val Thr Ala Glu Glu Val
                275                280                285

Asp Ile Leu Leu Arg Glu Gly Glu Lys Leu Ala Pro Val Met Ala Lys
                290                295                300

Thr Arg Ile Leu Arg Ala Tyr Ser Gly Val Arg Pro Leu Val Ala Ser
305                310                315                320

Asp Asp Asp Pro Ser Gly Arg Asn Val Ser Arg Gly Ile Val Leu Leu
                325                330                335

Asp His Ala Glu Arg Asp Gly Leu Asp Gly Phe Ile Thr Ile Thr Gly
                340                345                350

Gly Lys Leu Met Thr Tyr Arg Leu Met Ala Glu Trp Ala Thr Asp Ala
                355                360                365

Val Cys Arg Lys Leu Gly Asn Thr Arg Pro Cys Thr Thr Ala Asp Leu
                370                375                380

Ala Leu Pro Gly Ser Gln Glu Pro Ala Glu Val Thr Leu Arg Lys Val
385                390                395                400

Ile Ser Leu Pro Ala Pro Leu Arg Gly Ser Ala Val Tyr Arg His Gly
                405                410                415

Asp Arg Thr Pro Ala Trp Leu Ser Glu Gly Arg Leu His Arg Ser Leu
                420                425                430

Val Cys Glu Cys Glu Ala Val Thr Ala Gly Glu Val Gln Tyr Ala Val
                435                440                445

Glu Asn Leu Asn Val Asn Ser Leu Leu Asp Leu Arg Arg Arg Thr Arg
                450                455                460

Val Gly Met Gly Thr Cys Gln Gly Glu Leu Cys Ala Cys Arg Ala Ala
465                470                475                480

Gly Leu Leu Gln Arg Phe Asn Val Thr Thr Ser Ala Gln Ser Ile Glu
                485                490                495

Gln Leu Ser Thr Phe Leu Asn Glu Arg Trp Lys Gly Val Gln Pro Ile
                500                505                510

Ala Trp Gly Asp Ala Leu Arg Glu Ser Glu Phe Thr Arg Trp Val Tyr
                515                520                525

Gln Gly Leu Cys Gly Leu Glu Lys Glu Gln Lys Asp Ala Leu
                530                535                540

```

<210> 93

<211> 1260

<212> DNA

<213> Escherichia coli K12

<400> 93

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atgcgctttg atactgtcat tatgggcggc ggcctcgccg gattactctg tggcctgcaa      60
ctgcaaaaac acggcctgcg ctgtgccatt gtcactcgct gtcaaagcgc actgcatttc      120
tcatccggat cgctggattt gctgagccat ctgccagatg gtcaaccggg gacagacatt      180
cacagtggac tggaatcttt gcgtcagcag gcaccagccc atccttactc ccttctcgag      240
ccacaacgcg tgctcgatct cgcttgccag gcgcaggcat taatcgctga aagcgggtgcg      300
caattgcagg gcagcgtaga acttgctcac cagcgggtta cgccgctcgg cactctgcgc      360
tctacctggc taagtctgcc agaagtcccc gtctggccgc tgcccgcgaa gaaaatatgt      420
gtagtgggaa ttagcggcct gatggatttt caggcgccacc ttgcggcagc ttcggtgcgt      480
gaactcggcc ttgccgttga aaccgcagaa atagagctgc cggaactgga tgtgctgcgc      540
aataacgcca ccgaatttcg cgcggtgaat atcgcccgtt tccttgataa tgaagaaaac      600
tgggcgctgt tacttgatgc gcttattcct gtcgccaata cctgcgaaat gatcctgatg      660
cccgcctgct tcggtctggc cgatgacaaa ctgtggcggt ggttgaatga aaaactacct      720
tgttcactga tgcttttgcc aacgctgccg ccttcctgct tgggcattcg tctgcaaaac      780
cagttacagc gccagtttgt gcgccagggt ggcgtgtgga tgccgggcca tgaagtgaaa      840
aaagtgacct gtaaaaaatgg cgtagtgaac gaaatctgga cccgcaatca cgccgatatt      900
ccgtacgctc cacgtttcgc gggtctcgcc agcggcagtt tctttagtgg cggactggta      960
gcggaacgta acggcattcg agagccgatt ctgggccttg atgtgctaca aaccgccacg     1020
cggggtgaaat ggtataaggg agattttttt gcgccgcaac cgtggcagca gttcgggtgta     1080
accactgatg agacgctacg cccgtcacag gcagggcaaa ccattgaaaa cctgttttgc      1140
atcggttcgg tgctgggcgg atttgatccc atcgcccagg gatgcggcgg cggtgtttgt      1200
gccgtcagtg ctttacatgc cgctcaacag attgcccacg gcgcaggagg ccaacaatga      1260

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<210> 94

<211> 419

<212> PRT

<213> Escherichia coli K12

<400> 94

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Met Arg Phe Asp Thr Val Ile Met Gly Gly Gly Leu Ala Gly Leu Leu
1              5              10              15

```

```

Cys Gly Leu Gln Leu Gln Lys His Gly Leu Arg Cys Ala Ile Val Thr
              20              25              30

```

```

Arg Gly Gln Ser Ala Leu His Phe Ser Ser Gly Ser Leu Asp Leu Leu
              35              40              45

```

```

Ser His Leu Pro Asp Gly Gln Pro Val Thr Asp Ile His Ser Gly Leu
              50              55              60

```

```

Glu Ser Leu Arg Gln Gln Ala Pro Ala His Pro Tyr Ser Leu Leu Glu
65              70              75              80

```

```

Pro Gln Arg Val Leu Asp Leu Ala Cys Gln Ala Gln Ala Leu Ile Ala
              85              90              95

```

```

Glu Ser Gly Ala Gln Leu Gln Gly Ser Val Glu Leu Ala His Gln Arg
              100             105             110

```

```

Val Thr Pro Leu Gly Thr Leu Arg Ser Thr Trp Leu Ser Ser Pro Glu
              115             120             125

```

```

Val Pro Val Trp Pro Leu Pro Ala Lys Lys Ile Cys Val Val Gly Ile
              130             135             140

```

```

Ser Gly Leu Met Asp Phe Gln Ala His Leu Ala Ala Ala Ser Leu Arg
145              150              155             160

```

```

Glu Leu Gly Leu Ala Val Glu Thr Ala Glu Ile Glu Leu Pro Glu Leu
              165             170             175

```

```

Asp Val Leu Arg Asn Asn Ala Thr Glu Phe Arg Ala Val Asn Ile Ala
              180             185             190

```


Arg Phe Leu Asp Asn Glu Glu Asn Trp Pro Leu Leu Leu Asp Ala Leu
 195 200 205
 Ile Pro Val Ala Asn Thr Cys Glu Met Ile Leu Met Pro Ala Cys Phe
 210 215 220
 Gly Leu Ala Asp Asp Lys Leu Trp Arg Trp Leu Asn Glu Lys Leu Pro
 225 230 235 240
 Cys Ser Leu Met Leu Leu Pro Thr Leu Pro Pro Ser Val Leu Gly Ile
 245 250 255
 Arg Leu Gln Asn Gln Leu Gln Arg Gln Phe Val Arg Gln Gly Gly Val
 260 265 270
 Trp Met Pro Gly Asp Glu Val Lys Lys Val Thr Cys Lys Asn Gly Val
 275 280 285
 Val Asn Glu Ile Trp Thr Arg Asn His Ala Asp Ile Pro Leu Arg Pro
 290 295 300
 Arg Phe Ala Val Leu Ala Ser Gly Ser Phe Phe Ser Gly Gly Leu Val
 305 310 315 320
 Ala Glu Arg Asn Gly Ile Arg Glu Pro Ile Leu Gly Leu Asp Val Leu
 325 330 335
 Gln Thr Ala Thr Arg Gly Glu Trp Tyr Lys Gly Asp Phe Phe Ala Pro
 340 345 350
 Gln Pro Trp Gln Gln Phe Gly Val Thr Thr Asp Glu Thr Leu Arg Pro
 355 360 365
 Ser Gln Ala Gly Gln Thr Ile Glu Asn Leu Phe Ala Ile Gly Ser Val
 370 375 380
 Leu Gly Gly Phe Asp Pro Ile Ala Gln Gly Cys Gly Gly Gly Val Cys
 385 390 395 400
 Ala Val Ser Ala Leu His Ala Ala Gln Gln Ile Ala Gln Arg Ala Gly
 405 410 415

Gly Gln Gln

<210> 95

<211> 1191

<212> DNA

<213> Escherichia coli K12

<400> 95

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ctgcgtttga	aagatggcgc	actgtatgac	gaggcgctga	aatattgcat	caactgcaaa	180
cgttgtgaag	tcgcctgccc	gtccgatgtg	aagattggcg	atattatcca	gcgcgcgcgg	240
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gtgcggcagc	tgcttgatgc	ggcgttaaaa	atcgatcatc	gccgcacgct	accgaaatac	420
tccttcggca	cgttccgctc	ctgggtatcgc	agcgtggcgg	ctcagcaagc	acaatataaa	480
gaccaggtcg	ctttctttca	cggtcgcttc	gttaactaca	accatccgca	gtaggtataa	540
gattttaatta	aagtgtctcaa	cgcaatgggt	accggtgtac	aactgctcag	caaagaaaaa	600
tgctgcggcg	taccgctaata	cgccaacggc	tttaccgata	aagcacgcaa	acaggcaatt	660
acgaatgtag	agtcgatccg	cgaagctgtg	ggagtaaaag	gcattccggg	gattgccacc	720
tcctcaacct	gtacatttgc	cctgcgcgac	gaatacccg	aagtgctgaa	tgctcgacaac	780

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aaaggcttgc gcgatcatat cgaactggca acccgctggc tgtggcgcaa gctggacgaa      840
ggcaaaacgt taccgctgaa accgctgccc ctgaaagtgg tttatcacac tccgtgccat      900
atggaaaaaa tgggctggac gctctacacc ctggagctgt tgcgtaacat cccggggcctt      960
gagttaacgg tgctggattc ccagtgtctg ggtattgcgg gtacttacgg tttcaaaaaa    1020
gagaactacc ccacctcaca agccatcggc gcaccactgt tccgccagat agaagaaagc    1080
ggcgcagatc tgggtggtcac cgactgcgaa acctgtaaat ggcagattga gatgtccaca    1140
agtcttcgct gcgaacatcc gattacgcta ctggcccagg cgctggctta a              1191

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<210> 96

<211> 396

<212> PRT

<213> Escherichia coli K12

<400> 96

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Met Asn Asp Thr Ser Phe Glu Asn Cys Ile Lys Cys Thr Val Cys Thr
1                               5                               10          15

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Thr Ala Cys Pro Val Ser Arg Val Asn Pro Gly Tyr Pro Gly Pro Lys
                20                25                30

```

```

Gln Ala Gly Pro Asp Gly Glu Arg Leu Arg Leu Lys Asp Gly Ala Leu
        35                40                45

```

```

Tyr Asp Glu Ala Leu Lys Tyr Cys Ile Asn Cys Lys Arg Cys Glu Val
50                55                60

```

```

Ala Cys Pro Ser Asp Val Lys Ile Gly Asp Ile Ile Gln Arg Ala Arg
65                70                75                80

```

```

Ala Lys Tyr Asp Thr Thr Arg Pro Ser Leu Arg Asn Phe Val Leu Ser
                85                90                95

```

```

His Thr Asp Leu Met Gly Ser Val Ser Thr Pro Phe Ala Pro Ile Val
100                105                110

```

```

Asn Thr Ala Thr Ser Leu Lys Pro Val Arg Gln Leu Leu Asp Ala Ala
115                120                125

```

```

Leu Lys Ile Asp His Arg Arg Thr Leu Pro Lys Tyr Ser Phe Gly Thr
130                135                140

```

```

Phe Arg Arg Trp Tyr Arg Ser Val Ala Ala Gln Gln Ala Gln Tyr Lys
145                150                155                160

```

```

Asp Gln Val Ala Phe Phe His Gly Cys Phe Val Asn Tyr Asn His Pro
165                170                175

```

```

Gln Leu Gly Lys Asp Leu Ile Lys Val Leu Asn Ala Met Gly Thr Gly
180                185                190

```

```

Val Gln Leu Leu Ser Lys Glu Lys Cys Cys Gly Val Pro Leu Ile Ala
195                200                205

```

```

Asn Gly Phe Thr Asp Lys Ala Arg Lys Gln Ala Ile Thr Asn Val Glu
210                215                220

```

```

Ser Ile Arg Glu Ala Val Gly Val Lys Gly Ile Pro Val Ile Ala Thr
225                230                235                240

```

```

Ser Ser Thr Cys Thr Phe Ala Leu Arg Asp Glu Tyr Pro Glu Val Leu
245                250                255

```

```

Asn Val Asp Asn Lys Gly Leu Arg Asp His Ile Glu Leu Ala Thr Arg
260                265                270

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Trp Leu Trp Arg Lys Leu Asp Glu Gly Lys Thr Leu Pro Leu Lys Pro
 275 280 285
 Leu Pro Leu Lys Val Val Tyr His Thr Pro Cys His Met Glu Lys Met
 290 295 300
 Gly Trp Thr Leu Tyr Thr Leu Glu Leu Leu Arg Asn Ile Pro Gly Leu
 305 310 315 320
 Glu Leu Thr Val Leu Asp Ser Gln Cys Cys Gly Ile Ala Gly Thr Tyr
 325 330 335
 Gly Phe Lys Lys Glu Asn Tyr Pro Thr Ser Gln Ala Ile Gly Ala Pro
 340 345 350
 Leu Phe Arg Gln Ile Glu Glu Ser Gly Ala Asp Leu Val Val Thr Asp
 355 360 365
 Cys Glu Thr Cys Lys Trp Gln Ile Glu Met Ser Thr Ser Leu Arg Cys
 370 375 380
 Glu His Pro Ile Thr Leu Leu Ala Gln Ala Leu Ala
 385 390 395

<210> 97
 <211> 1506
 <212> DNA
 <213> Escherichia coli K12
 <400> 97
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 acctcttccg ccagttcaaa actcattcac ggtggcctgc gctacctga gcactatgaa 180
 ttccgcctgg tcagcgaggc gctggctgaa cgtgaagtgc tgctgaaaat ggccccgc 240
 atcgcccttc cgatgcgttt tcgcctgcca catcgctccg atctgcgccc ggctgggatg 300
 attcgcatgg gtctgtttat gtacgatcat ctgggtaaac gcaccagctt gccgggatca 360
 actggtttgc gttttggcgc aaattcagtg ttaaaaccgg aaattaagcg cggattcgaa 420
 tattctgact gttgggtaga cgacgcccg ctggtactcg ccaacgccc gatggtggtg 480
 cgtaaaggcg gcgaagtgt tactcgact cgcgccacct ctgctcgcc cgaaaacggc 540
 ctgtggattg tggaagcgga agatatcgat accggcaaaa aatatagctg gcaagcgcg 600
 ggcttggtta acgccaccgg cccgtgggtg aaacagttct tcgacgacgg gatgcatctg 660
 ccttcgcctt atggcattcg cctgatcaaa ggcagccata ttgtggtgcc gcgcgtgcat 720
 acccagaagc aagcctacat tctgcaaaac gaagataaac gtattgtgtt cgtgatcccg 780
 tggatggacg agttttccat catcggcact accgatgtcg agtaciaaagg cgatccgaaa 840
 gcggtgaaga ttgaagagag tgaaatcaat tacctgctga atgtgtataa cagcacttt 900
 aaaaagcagt taagccgtga cgatatcgtc tggacctact ccggtgtgcg tccgctgtgt 960
 gatgatgagt ccgactcgcc gcaggctatt acccgatgatt acacccttga tattcatgat 1020
 gaaaatggca aagcaccgct gctgtcggtt ttcggcggtt agctgaccac ctaccgaaaa 1080
 ctggcggaac atgcgctgga aaaactaacg ccgtattatc agggatttgg cccggcatgg 1140
 acgaaagaga gtgtgctacc ggggtggcgc attgaaggcg accgcgacga ttatgccgct 1200
 cgctgcgcc gccgctatcc gttcctgact gaatcgctgg cgcgtcatta cgctcgact 1260
 tacggcagca acagcgagct gctgctcgcc aatgcgggaa cggtaagcga tctcggggaa 1320
 gatttcggtc atgagttcta cgaagcggag ctgaaatacc tgggtgatca cgaatgggtc 1380
 cgccgcgccg acgacgccct gtggcgctgc aaaaaacaag gcatgtggct aaatgcggat 1440
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 tcgtaa 1506

<210> 98
 <211> 501
 <212> PRT
 <213> Escherichia coli K12
 <400> 98
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1	5	10	15
Gly Ile Ala	Ala 20 Asp	Ala 25 Gly Arg	Gly Leu Ser Val Leu Met Leu 30
Glu Ala Gln	Asp 35 Leu Ala	Cys 40 Ala Thr	Ser Ser Ala Ser Ser Lys Leu 45
Ile His Gly	Gly 50 Leu Arg	Tyr 55 Leu Glu	His Tyr Glu Phe Arg Leu Val 60
Ser Glu Ala	Leu 65 Ala Glu	Arg 70 Glu Val	Leu Leu Lys Met Ala Pro His 80
Ile Ala Phe	Pro 85 Met Arg	Phe 90 Arg Leu	Pro His Arg Pro His Leu Arg 95
Pro Ala Trp	Met 100 Ile Arg	Ile 105 Gly Leu	Phe Met Tyr Asp His Leu Gly 110
Lys Arg Thr	Ser 115 Leu Pro	Gly 120 Ser Thr	Gly Leu Arg Phe Gly Ala Asn 125
Ser Val Leu	Lys 130 Pro Glu	Ile 135 Lys Arg	Gly Phe Glu Tyr Ser Asp Cys 140
Trp Val Asp	Asp 145 Ala Arg	Leu 150 Val Leu	Ala Asn Ala Gln Met Val Val 160
Arg Lys Gly	Gly 165 Glu Val	Leu Thr Arg	Thr Arg Ala Thr Ser Ala Arg 175
Arg Glu Asn	Gly 180 Leu Trp	Ile Val Glu	Ala Glu Asp Ile Asp Thr Gly 190
Lys Lys Tyr	Ser 195 Trp Gln	Ala 200 Arg Gly	Leu Val Asn Ala Thr Gly Pro 205
Trp Val Lys	Gln 210 Phe Phe	Asp 215 Asp Gly	Met His Leu Pro Ser Pro Tyr 220
Gly Ile Arg	Leu 225 Ile Lys	Gly 230 Ser His	Ile Val Val Pro Arg Val His 240
Thr Gln Lys	Gln 245 Ala Tyr	Ile Leu Gln	Asn Glu Asp Lys Arg Ile Val 255
Phe Val Ile	Pro 260 Trp Met	Asp 265 Glu Phe	Ser Ile Ile Gly Thr Thr Asp 270
Val Glu Tyr	Lys 275 Gly Asp	Pro 280 Lys Ala	Val Lys Ile Glu Glu Ser Glu 285
Ile Asn Tyr	Leu 290 Leu Asn	Val 295 Tyr Asn	Thr His Phe Lys Lys Gln Leu 300
Ser Arg Asp	Asp 305 Ile Val	Trp 310 Thr Tyr	Ser Gly Val Arg Pro Leu Cys 320
Asp Asp Glu	Ser 325 Asp Ser	Pro 330 Gln Ala	Ile Thr Arg Asp Tyr Thr Leu 335
Asp Ile His	Asp Glu	Asn Gly Lys	Ala Pro Leu Leu Ser Val Phe Gly

340	345	350
Gly Lys Leu Thr Thr Tyr Arg Lys Leu Ala Glu His Ala Leu Glu Lys		
355	360	365
Leu Thr Pro Tyr Tyr Gln Gly Ile Gly Pro Ala Trp Thr Lys Glu Ser		
370	375	380
Val Leu Pro Gly Gly Ala Ile Glu Gly Asp Arg Asp Asp Tyr Ala Ala		
385	390	395
Arg Leu Arg Arg Arg Tyr Pro Phe Leu Thr Glu Ser Leu Ala Arg His		
405	410	415
Tyr Ala Arg Thr Tyr Gly Ser Asn Ser Glu Leu Leu Leu Gly Asn Ala		
420	425	430
Gly Thr Val Ser Asp Leu Gly Glu Asp Phe Gly His Glu Phe Tyr Glu		
435	440	445
Ala Glu Leu Lys Tyr Leu Val Asp His Glu Trp Val Arg Arg Ala Asp		
450	455	460
Asp Ala Leu Trp Arg Arg Thr Lys Gln Gly Met Trp Leu Asn Ala Asp		
465	470	475
Gln Gln Ser Arg Val Ser Gln Trp Leu Val Glu Tyr Thr Gln Gln Arg		
485	490	495
Leu Ser Leu Ala Ser		
500		

<210> 99

<211> 1509

<212> DNA

<213> Escherichia coli K12

<400> 99

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ccaaaaccag	gttgggtaga	acacgaccca	atggaaatct	gggccaccca	aagctccacg	180
ctggtagaag	tgctggcgaa	agccgatatc	agttccgatac	aaattgcagc	tatcgggtatt	240
acgaaccagc	gtgaaaccac	tattgtctgg	gaaaaagaaa	ccggcaagcc	tatctataac	300
gccattgtct	ggcagtgccg	tcgtaccgca	gaaatctgcg	agcatttaaa	acgtgacggt	360
ttagaagatt	atatccgcag	caataccggt	ctgggtgattg	accggtactt	ttctggcacc	420
aaagtgaagt	ggatcctcga	ccatgtggaa	ggctctcgcg	agcgtgcacg	tcgtgggtgaa	480
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gtgaccgatt	acaccaacgc	ctctcgtacc	atgttgttca	acatccatac	cctggactgg	600
gacgacaaaa	tgctggaagt	gctggatatt	ccgcgcgaga	tgctgccaga	agtgcgtcgt	660
tcttccgaag	tatacgggtca	gactaacatt	ggcggcaaag	gcggcacgcg	tattccaatc	720
tccgggatcg	ccggtgacca	gcaggccgcg	ctgtttggtc	agttgtgcgt	gaaagaaggg	780
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gtgaaatcag	aaaacggcct	gctgaccacc	atcgccctgcg	gcccgactgg	cgaagtgaac	900
tatgcgttgg	aaggtgcggt	gtttatggca	ggcgcaccca	ttcagtggtt	gcgcgatgaa	960
atgaagttga	ttaacgacgc	ctacgattcc	gaatatttgc	ccaccaaagt	gcaaaacacc	1020
aatggtgtgt	atgtggttcc	ggcatttacc	gggctgggtg	cgccgtactg	ggaccctgat	1080
gcgcgcgggg	cgattttcgg	tctgactcgt	ggggtgaacg	ctaaccacat	tatacgcgcg	1140
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ggtatccgct	tgacgcacct	gcgcgtggat	ggtggcgagc	tagcaaaaca	tttcctgatg	1260
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gcattgggtg	cggcctatct	cgcaggcctg	gcggttggct	tctggcagaa	cctcgacgag	1380
ctgcaagaga	aagcggtgat	tgagcgcgag	ttccgtccag	gcacgaaac	cactgagcgt	1440
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gacgaataa						1509

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<210> 100
<211> 502
<212> PRT
<213> Escherichia coli K12
<400> 100
Met Thr Glu Lys Lys Tyr Ile Val Ala Leu Asp Gln Gly Thr Thr Ser
1          5          10          15

Ser Arg Ala Val Val Met Asp His Asp Ala Asn Ile Ile Ser Val Ser
          20          25          30

Gln Arg Glu Phe Glu Gln Ile Tyr Pro Lys Pro Gly Trp Val Glu His
          35          40          45

Asp Pro Met Glu Ile Trp Ala Thr Gln Ser Ser Thr Leu Val Glu Val
          50          55          60

Leu Ala Lys Ala Asp Ile Ser Ser Asp Gln Ile Ala Ala Ile Gly Ile
65          70          75          80

Thr Asn Gln Arg Glu Thr Thr Ile Val Trp Glu Lys Glu Thr Gly Lys
          85          90          95

Pro Ile Tyr Asn Ala Ile Val Trp Gln Cys Arg Arg Thr Ala Glu Ile
          100          105          110

Cys Glu His Leu Lys Arg Asp Gly Leu Glu Asp Tyr Ile Arg Ser Asn
          115          120          125

Thr Gly Leu Val Ile Asp Pro Tyr Phe Ser Gly Thr Lys Val Lys Trp
          130          135          140

Ile Leu Asp His Val Glu Gly Ser Arg Glu Arg Ala Arg Arg Gly Glu
145          150          155          160

Leu Leu Phe Gly Thr Val Asp Thr Trp Leu Ile Trp Lys Met Thr Gln
          165          170          175

Gly Arg Val His Val Thr Asp Tyr Thr Asn Ala Ser Arg Thr Met Leu
          180          185          190

Phe Asn Ile His Thr Leu Asp Trp Asp Asp Lys Met Leu Glu Val Leu
          195          200          205

Asp Ile Pro Arg Glu Met Leu Pro Glu Val Arg Arg Ser Ser Glu Val
          210          215          220

Tyr Gly Gln Thr Asn Ile Gly Gly Lys Gly Gly Thr Arg Ile Pro Ile
225          230          235          240

Ser Gly Ile Ala Gly Asp Gln Gln Ala Ala Leu Phe Gly Gln Leu Cys
          245          250          255

Val Lys Glu Gly Met Ala Lys Asn Thr Tyr Gly Thr Gly Cys Phe Met
          260          265          270

Leu Met Asn Thr Gly Glu Lys Ala Val Lys Ser Glu Asn Gly Leu Leu
          275          280          285

Thr Thr Ile Ala Cys Gly Pro Thr Gly Glu Val Asn Tyr Ala Leu Glu
          290          295          300

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Gly Ala Val Phe Met Ala Gly Ala Ser Ile Gln Trp Leu Arg Asp Glu
 305 310 315 320
 Met Lys Leu Ile Asn Asp Ala Tyr Asp Ser Glu Tyr Phe Ala Thr Lys
 325 330 335
 Val Gln Asn Thr Asn Gly Val Tyr Val Val Pro Ala Phe Thr Gly Leu
 340 345 350
 Gly Ala Pro Tyr Trp Asp Pro Tyr Ala Arg Gly Ala Ile Phe Gly Leu
 355 360 365
 Thr Arg Gly Val Asn Ala Asn His Ile Ile Arg Ala Thr Leu Glu Ser
 370 375 380
 Ile Ala Tyr Gln Thr Arg Asp Val Leu Glu Ala Met Gln Ala Asp Ser
 385 390 395 400
 Gly Ile Arg Leu His Ala Leu Arg Val Asp Gly Gly Ala Val Ala Asn
 405 410 415
 Asn Phe Leu Met Gln Phe Gln Ser Asp Ile Leu Gly Thr Arg Val Glu
 420 425 430
 Arg Pro Glu Val Arg Glu Val Thr Ala Leu Gly Ala Ala Tyr Leu Ala
 435 440 445
 Gly Leu Ala Val Gly Phe Trp Gln Asn Leu Asp Glu Leu Gln Glu Lys
 450 455 460
 Ala Val Ile Glu Arg Glu Phe Arg Pro Gly Ile Glu Thr Thr Glu Arg
 465 470 475 480
 Asn Tyr Arg Tyr Ala Gly Trp Lys Lys Ala Val Lys Arg Ala Met Ala
 485 490 495
 Trp Glu Glu His Asp Glu
 500

<210> 101

<211> 1104

<212> DNA

<213> Escherichia coli K12

<400> 101

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ttaggttttg ctcaatccac tgtcgagaaa agctttaaag atgctggact ggtagtagaa	180
attgcgccgt ttggcgggtga atgttcgcaa aatgagatcg accgtctgcg tggcatcgcg	240
gagactgctc agtgtggcgc aattctcggg atcgggtggcg gaaaaaccct cgatactgcc	300
aaagcactgg cacatttcat ggggtgttccg gttagcgatcg caccgactat cgcctctacc	360
gatgcaccgt gcagcgcatt gtctgttatc tacaccgatg aggggtgagtt tgaccgctat	420
ctgctgttgc caaataaccc gaatatggtc attgtcgaca ccaaaatcgt cgctggcgca	480
cctgcacgtc tgttagcggc ggggtatcggc gatgcgctgg caacctgggt tgaagcgcgt	540
gctgtctctc gttagcggcg gaccaccatg gcgggcggca agtgcaccca ggctgcgctg	600
gcactggctg aactgtgcta caacaccctg ctggaagaag gcgaaaaagc gatgcttgct	660
gccgaacagc atgtagtac tccggcgctg gagcgcgtga ttgaagcgaa cacctatttg	720
agcgggtgtg gttttgaaag tgggtggtctg gctgcggcgc acgcagtgc taacggcctg	780
accgctatcc cggacgcgca tcactattt cagcgtgaaa aagtggcatt cggtacgctg	840
acgcagctgg ttctggaaaa tgcgcgggtg gaggaatcg aaaccgtagc tgcccttagc	900
catgcggtag gtttgccaat aactctcgct caactggata ttaaagaaga tgtcccggcg	960
aaaatgcgaa ttgtggcaga agcggcatgt gcagaagggt aaaccattca caacatgcct	1020
ggcggcgcgca cgccagatca ggtttacgcc gctctgctgg tagccgacca gtacggctcag	1080
cgtttctctgc aagagtggga ataa	1104

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<210> 102
<211> 367
<212> PRT
<213> Escherichia coli K12
<400> 102
Met Asp Arg Ile Ile Gln Ser Pro Gly Lys Tyr Ile Gln Gly Ala Asp
1      5      10      15
Val Ile Asn Arg Leu Gly Glu Tyr Leu Lys Pro Leu Ala Glu Arg Trp
20     25     30
Leu Val Val Gly Asp Lys Phe Val Leu Gly Phe Ala Gln Ser Thr Val
35     40     45
Glu Lys Ser Phe Lys Asp Ala Gly Leu Val Val Glu Ile Ala Pro Phe
50     55     60
Gly Gly Glu Cys Ser Gln Asn Glu Ile Asp Arg Leu Arg Gly Ile Ala
65     70     75     80
Glu Thr Ala Gln Cys Gly Ala Ile Leu Gly Ile Gly Gly Gly Lys Thr
85     90     95
Leu Asp Thr Ala Lys Ala Leu Ala His Phe Met Gly Val Pro Val Ala
100    105    110
Ile Ala Pro Thr Ile Ala Ser Thr Asp Ala Pro Cys Ser Ala Leu Ser
115    120    125
Val Ile Tyr Thr Asp Glu Gly Glu Phe Asp Arg Tyr Leu Leu Leu Pro
130    135    140
Asn Asn Pro Asn Met Val Ile Val Asp Thr Lys Ile Val Ala Gly Ala
145    150    155    160
Pro Ala Arg Leu Leu Ala Ala Gly Ile Gly Asp Ala Leu Ala Thr Trp
165    170    175
Phe Glu Ala Arg Ala Cys Ser Arg Ser Gly Ala Thr Thr Met Ala Gly
180    185    190
Gly Lys Cys Thr Gln Ala Ala Leu Ala Leu Ala Glu Leu Cys Tyr Asn
195    200    205
Thr Leu Leu Glu Glu Gly Glu Lys Ala Met Leu Ala Ala Glu Gln His
210    215    220
Val Val Thr Pro Ala Leu Glu Arg Val Ile Glu Ala Asn Thr Tyr Leu
225    230    235    240
Ser Gly Val Gly Phe Glu Ser Gly Gly Leu Ala Ala Ala His Ala Val
245    250    255
His Asn Gly Leu Thr Ala Ile Pro Asp Ala His His Tyr Tyr His Gly
260    265    270
Glu Lys Val Ala Phe Gly Thr Leu Thr Gln Leu Val Leu Glu Asn Ala
275    280    285
Pro Val Glu Glu Ile Glu Thr Val Ala Ala Leu Ser His Ala Val Gly
290    295    300

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Leu Pro Ile Thr Leu Ala Gln Leu Asp Ile Lys Glu Asp Val Pro Ala
305 310 315 320

Lys Met Arg Ile Val Ala Glu Ala Ala Cys Ala Glu Gly Glu Thr Ile
325 330 335

His Asn Met Pro Gly Gly Ala Thr Pro Asp Gln Val Tyr Ala Ala Leu
340 345 350

Leu Val Ala Asp Gln Tyr Gly Gln Arg Phe Leu Gln Glu Trp Glu
355 360 365

<210> 103

<211> 951

<212> DNA

<213> Escherichia coli K12

<400> 103

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aatggcaaga cccaggaaca acagggtgtc gcagcgtgtg acaaactggc ggtcaatttc 240
ggtgctgaaa tcctcaaaat cgtacccggg cgcggtgtcaa cagaagttga tgcacgcctc 300
tcttttgata aagaaaagag tattgagaag gcgcgccatc tgggtggactt gtatcagcaa 360
caaggcgttg agaaatcacg cattctgacg aagctggctt cgacctggga aggaattcgc 420
gcggcagaag agctggaaaa agaaggtatt aactgcaacc tgacgctgct gttttctttt 480
gcacaggcac gggcctgtgc ggaagcaggc gtttttctga tttcgccgtt tgcgggcgct 540
atttatgact ggtatcaggc acgcaagccg atggaccctg atgtggtgga agaagatccg 600
ggcggttaaat cgggtgcgcaa tatctacgac tactataagc aacaccacta tgaaccatt 660
gtgatgggag cgagcttccg tcgcaccgaa caaatcctcg ccttaaccgg ctgcgatcga 720
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aaattaatcc caccttctca gacgttccca cgccagctc ccatgagcga agcggagttc 840
cgttgggagc acaatcagga tgcgatggcg gtagaaaaac tgtctgaagg cattcgtctg 900
ttcgccgttg atcaacgcaa actggaagat cttcttgccg ccaaaactata a 951
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<210> 104

<211> 316

<212> PRT

<213> Escherichia coli K12

<400> 104

Met Asn Glu Leu Asp Gly Ile Lys Gln Phe Thr Thr Val Val Ala Asp
1 5 10 15

Ser Gly Asp Ile Glu Ser Ile Arg His Tyr His Pro Gln Asp Ala Thr
20 25 30

Thr Asn Pro Ser Leu Leu Leu Lys Ala Ala Gly Leu Ser Gln Tyr Glu
35 40 45

His Leu Ile Asp Asp Ala Ile Ala Trp Gly Lys Lys Asn Gly Lys Thr
50 55 60

Gln Glu Gln Gln Val Val Ala Ala Cys Asp Lys Leu Ala Val Asn Phe
65 70 75 80

Gly Ala Glu Ile Leu Lys Ile Val Pro Gly Arg Val Ser Thr Glu Val
85 90 95

Asp Ala Arg Leu Ser Phe Asp Lys Glu Lys Ser Ile Glu Lys Ala Arg
100 105 110

His Leu Val Asp Leu Tyr Gln Gln Gln Gly Val Glu Lys Ser Arg Ile
115 120 125

Leu Ile Lys Leu Ala Ser Thr Trp Glu Gly Ile Arg Ala Ala Glu Glu
 130 135 140
 Leu Glu Lys Glu Gly Ile Asn Cys Asn Leu Thr Leu Leu Phe Ser Phe
 145 150 155 160
 Ala Gln Ala Arg Ala Cys Ala Glu Ala Gly Val Phe Leu Ile Ser Pro
 165 170 175
 Phe Val Gly Arg Ile Tyr Asp Trp Tyr Gln Ala Arg Lys Pro Met Asp
 180 185 190
 Pro Tyr Val Val Glu Glu Asp Pro Gly Val Lys Ser Val Arg Asn Ile
 195 200 205
 Tyr Asp Tyr Tyr Lys Gln His His Tyr Glu Thr Ile Val Met Gly Ala
 210 215 220
 Ser Phe Arg Arg Thr Glu Gln Ile Leu Ala Leu Thr Gly Cys Asp Arg
 225 230 235 240
 Leu Thr Ile Ala Pro Asn Leu Leu Lys Glu Leu Gln Glu Lys Val Ser
 245 250 255
 Pro Val Val Arg Lys Leu Ile Pro Pro Ser Gln Thr Phe Pro Arg Pro
 260 265 270
 Ala Pro Met Ser Glu Ala Glu Phe Arg Trp Glu His Asn Gln Asp Ala
 275 280 285
 Met Ala Val Glu Lys Leu Ser Glu Gly Ile Arg Leu Phe Ala Val Asp
 290 295 300
 Gln Arg Lys Leu Glu Asp Leu Leu Ala Ala Lys Leu
 305 310 315

<210> 105

<211> 954

<212> DNA

<213> Escherichia coli K12

<400> 105

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aacgcagcgc agattccgga ataccgtaag ttgattgatg atgctgtcgc ctgggcgaaa    180
cagcagagca acgatcgcgc gcagcagatc gtggacgcga ccgacaaact ggcagtaa    240
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ctttcctatg acaccgaagc gtcaattgcg aaagcaaaac gcctgatcaa actctacaac    360
gatgctggta ttagcaacga tcgtattctg atcaaactgg cttctacctg gcagggtatc    420
cgtgctgcag aacagctgga aaaagaaggc atcaactgta acctgacctt gctgttctcc    480
ttcgctcagg ctcgtgcttg tgcggaagcg ggcgtgttcc tgatctcgcc gtttgttggc    540
cgtattcttg actggtacaa agcgaatacc gataagaaaag agtacgctcc ggcagaagat    600
ccgggcgtgg tttctgtatc tgaaatctac cagtactaca aagagcacgg ttatgaaacc    660
gtggttatgg gcgcaagctt ccgtaacatc ggcgaaattc tggaactggc aggctgcgac    720
cgtctgacca tcgcaccggc actgctgaaa gagctggcgg agagcgaagg ggctatcgaa    780
cgtaaaactgt cttacaccgg cgaagtgaaa gcgcgtccgg cgcgtatcac tgagtcgag    840
ttcctgtggc agcacaacca ggatccaatg gcagtagata aactggcgga aggtatccgt    900
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<210> 106

<211> 317

<212> PRT

<213> Escherichia coli K12

<400> 106

Met Thr Asp Lys Leu Thr Ser Leu Arg Gln Tyr Thr Thr Val Val Ala
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 Thr Thr Asn Pro Ser Leu Ile Leu Asn Ala Ala Gln Ile Pro Glu Tyr
 35 40 45
 Arg Lys Leu Ile Asp Asp Ala Val Ala Trp Ala Lys Gln Gln Ser Asn
 50 55 60
 Asp Arg Ala Gln Gln Ile Val Asp Ala Thr Asp Lys Leu Ala Val Asn
 65 70 75 80
 Ile Gly Leu Glu Ile Leu Lys Leu Val Pro Gly Arg Ile Ser Thr Glu
 85 90 95
 Val Asp Ala Arg Leu Ser Tyr Asp Thr Glu Ala Ser Ile Ala Lys Ala
 100 105 110
 Lys Arg Leu Ile Lys Leu Tyr Asn Asp Ala Gly Ile Ser Asn Asp Arg
 115 120 125
 Ile Leu Ile Lys Leu Ala Ser Thr Trp Gln Gly Ile Arg Ala Ala Glu
 130 135 140
 Gln Leu Glu Lys Glu Gly Ile Asn Cys Asn Leu Thr Leu Leu Phe Ser
 145 150 155 160
 Phe Ala Gln Ala Arg Ala Cys Ala Glu Ala Gly Val Phe Leu Ile Ser
 165 170 175
 Pro Phe Val Gly Arg Ile Leu Asp Trp Tyr Lys Ala Asn Thr Asp Lys
 180 185 190
 Lys Glu Tyr Ala Pro Ala Glu Asp Pro Gly Val Val Ser Val Ser Glu
 195 200 205
 Ile Tyr Gln Tyr Tyr Lys Glu His Gly Tyr Glu Thr Val Val Met Gly
 210 215 220
 Ala Ser Phe Arg Asn Ile Gly Glu Ile Leu Glu Leu Ala Gly Cys Asp
 225 230 235 240
 Arg Leu Thr Ile Ala Pro Ala Leu Leu Lys Glu Leu Ala Glu Ser Glu
 245 250 255
 Gly Ala Ile Glu Arg Lys Leu Ser Tyr Thr Gly Glu Val Lys Ala Arg
 260 265 270
 Pro Ala Arg Ile Thr Glu Ser Glu Phe Leu Trp Gln His Asn Gln Asp
 275 280 285
 Pro Met Ala Val Asp Lys Leu Ala Glu Gly Ile Arg Lys Phe Ala Ile
 290 295 300
 Asp Gln Glu Lys Leu Glu Lys Met Ile Gly Asp Leu Leu
 305 310 315

<210> 107
 <211> 2186
 <212> DNA

<213> Methylobacterium extorquens formate-tetrahydrofolate ligase

<400> 107

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acactgccac gatcggttta tcgtggccgt tccgttcgtc accacggaag catagggacg      240
gaccgggcga cggctcggca cgccgcgagc ccgcgtgaac aagaaacgac ggtgagagaa      300
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gcactcaacc ggatcggaac gcgggcgggt atgtgcctgc gcgagccctc gtcgggcccc      600
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gccgcgctga tcgacaacca catctactgg gccaacgagc tcaacatcga cgtgcgccgc      780
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gagggaacc cgccctgat ccatggcggc cggttcgcca acatcgccca cggctgcaac      1140
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aacaagaagg atctccaggc tgagaacctc gacgcgctgg agaagggttt cgccaacctc      1380
gagcgccacg tgaacaacgt gcggagcttc ggcttgccgg tgggtggtggg cgtgaaccac      1440
ttcttccagg acaccgacgc cgagcatgcc cggttgaagg agctctgccg cgaccgtctt      1500
caggctcgagg cgatcacctg caagcactgg gcggagggcg gcgcggggcg cgaggctctg      1560
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gatatccaga tcgagtcgaa ggccgccacc aagctcgccg gcttcgagaa ggatggctac      1740
ggcggattgc ccgtctgcat ggccaagacg cagtactcgt tctcgaccga cccgacctg      1800
atgggcgcgc cctcgggcca cctcgtctcg gtgcgcgacg tgcgcctctc ggcgggcgcc      1860
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gcggcggaaca ccatccgcct cgacgccaac ggtcagatcg acgggctgtt ctagccgctg      1980
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tcgggcaagc ccgaggtccg tcgggggagg gccctttgcc ctctgcgcta cgccgccagc      2100
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<210> 108

<211> 557

<212> PRT

<213> Methylobacterium extorquens formate-tetrahydrofolate ligase

<400> 108

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Met Pro Ser Asp Ile Glu Ile Ala Arg Ala Ala Thr Leu Lys Pro Ile
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Ala Gln Val Ala Glu Lys Leu Gly Ile Pro Asp Glu Ala Leu His Asn
20           25           30

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Tyr Gly Lys His Ile Ala Lys Ile Asp His Asp Phe Ile Ala Ser Leu
35           40           45

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Glu Gly Lys Pro Glu Gly Lys Leu Val Leu Val Thr Ala Ile Ser Pro
50           55           60

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```

Thr Pro Ala Gly Glu Gly Lys Thr Thr Thr Thr Val Gly Leu Gly Asp
65           70           75           80

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Ala Leu Asn Arg Ile Gly Lys Arg Ala Val Met Cys Leu Arg Glu Pro
85           90           95

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Ser Leu Gly Pro Cys Phe Gly Met Lys Gly Gly Ala Ala Gly Gly Gly
 100 105 110
 Lys Ala Gln Val Val Pro Met Glu Gln Ile Asn Leu His Phe Thr Gly
 115 120 125
 Asp Phe His Ala Ile Thr Ser Ala His Ser Leu Ala Ala Ala Leu Ile
 130 135 140
 Asp Asn His Ile Tyr Trp Ala Asn Glu Leu Asn Ile Asp Val Arg Arg
 145 150 155 160
 Ile His Trp Arg Arg Val Val Asp Met Asn Asp Arg Ala Leu Arg Ala
 165 170 175
 Ile Asn Gln Ser Leu Gly Gly Val Ala Asn Gly Phe Pro Arg Glu Asp
 180 185 190
 Gly Phe Asp Ile Thr Val Ala Ser Glu Val Met Ala Val Phe Cys Leu
 195 200 205
 Ala Lys Asn Leu Ala Asp Leu Glu Glu Arg Leu Gly Arg Ile Val Ile
 210 215 220
 Ala Glu Thr Arg Asp Arg Lys Pro Val Thr Leu Ala Asp Val Lys Ala
 225 230 235 240
 Thr Gly Ala Met Thr Val Leu Leu Lys Asp Ala Leu Gln Pro Asn Leu
 245 250 255
 Val Gln Thr Leu Glu Gly Asn Pro Ala Leu Ile His Gly Gly Pro Phe
 260 265 270
 Ala Asn Ile Ala His Gly Cys Asn Ser Val Ile Ala Thr Arg Thr Gly
 275 280 285
 Leu Arg Leu Ala Asp Tyr Thr Val Thr Glu Ala Gly Phe Gly Ala Asp
 290 295 300
 Leu Gly Ala Glu Lys Phe Ile Asp Ile Lys Cys Arg Gln Thr Gly Leu
 305 310 315 320
 Lys Pro Ser Ala Val Val Ile Val Ala Thr Ile Arg Ala Leu Lys Met
 325 330 335
 His Gly Gly Val Asn Lys Lys Asp Leu Gln Ala Glu Asn Leu Asp Ala
 340 345 350
 Leu Glu Lys Gly Phe Ala Asn Leu Glu Arg His Val Asn Asn Val Arg
 355 360 365
 Ser Phe Gly Leu Pro Val Val Val Gly Val Asn His Phe Phe Gln Asp
 370 375 380
 Thr Asp Ala Glu His Ala Arg Leu Lys Glu Leu Cys Arg Asp Arg Leu
 385 390 395 400
 Gln Val Glu Ala Ile Thr Cys Lys His Trp Ala Glu Gly Gly Ala Gly
 405 410 415
 Ala Glu Ala Leu Ala Gln Ala Val Val Lys Leu Ala Glu Gly Glu Gln
 420 425 430

Lys Pro Leu Thr Phe Ala Tyr Glu Thr Glu Thr Lys Ile Thr Asp Lys
435 440 445

Ile Lys Ala Ile Ala Thr Lys Leu Tyr Gly Ala Ala Asp Ile Gln Ile
450 455 460

Glu Ser Lys Ala Ala Thr Lys Leu Ala Gly Phe Glu Lys Asp Gly Tyr
465 470 475 480

Gly Gly Leu Pro Val Cys Met Ala Lys Thr Gln Tyr Ser Phe Ser Thr
485 490 495

Asp Pro Thr Leu Met Gly Ala Pro Ser Gly His Leu Val Ser Val Arg
500 505 510

Asp Val Arg Leu Ser Ala Gly Ala Gly Phe Val Val Val Ile Cys Gly
515 520 525

Glu Ile Met Thr Met Pro Gly Leu Pro Lys Val Pro Ala Ala Asp Thr
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Ile Arg Leu Asp Ala Asn Gly Gln Ile Asp Gly Leu Phe
545 550 555

<210> 109

<211> 2148

<212> DNA

<213> Escherichia coli K12

<400> 109

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cgccctgaaa	cccccatgat	ccgtcgccag	cgtggcggca	aactcgaacc	tgtttcctgg	240
gatgaggcac	tgaattacgt	tgccgagcgc	ctgagcgcca	tcaaagagaa	gtacgggtccg	300
gatgccatcc	agacgaccgg	ctcctcgctg	ggtaggggta	acgaaaccaa	ctatgtaatg	360
caaaaatttg	cgcgcgccgt	tattggtacc	aataacgttg	actgctgcgc	tcgtgtctga	420
cacggcccat	cggttgcagg	tctgcaccaa	tcggtcggta	atggcgcaat	gagcaatgct	480
attaacgaaa	ttgataatac	cgatttagtg	ttcgttttcg	ggtagaacc	ggcggtattcc	540
cacccaatcg	tggcgaaatca	cgtaattaac	gctaaacgta	acggggcgaa	aattatcgctc	600
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aacctcggtg	agccgatcgc	gggtgttaac	ccggttcgtg	gtcagaacaa	cgttcagggt	1020
gcctgcgata	tgggcgcgct	gccggatacg	tatccgggat	accagtacgt	gaaagatccg	1080
gctaaccgcg	agaaattcgc	caaagcctgg	ggcgtggaaa	gcctgccagc	gcataccggc	1140
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atgggcgaag	atccgctaca	aactgacgcg	gagctgtcgg	cagtacgtaa	agcctttgaa	1260
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atcatcagtg	aaatcgccac	ccgtatgggt	tatccgatgc	actacaacaa	caccaggag	1500
atctgggatg	agttgcgtca	tctgtgcccg	gatttctacg	gtgcgactta	cgagaaaatg	1560
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gagtggttag	cgccaactca	caaaactcacc	gacgagtacc	cgatgggtact	gtcaacgggtg	1740
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ctggctgatg	aacctgggta	cgcacaaatc	aataccgaag	acgccaacg	tctgggtatt	1860
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gtcagcgatc	gtccgaacaa	aggggcgatt	tacatgacct	accagtgggtg	gattgggtgcc	1980
tgtaacgagc	tggttaccga	aaacttaagc	ccgattacga	aaacgccgga	gtacaaatac	2040

tgcgcccgttc gcgtcgagcc gatcgccgat cagcgcgccg ccgagcagta cgtgattgac 2100
 gagtacaaca agttgaaaac tcgcctgcgc gaagcggcac tggcgtaa 2148

<210> 110

<211> 714

<212> PRT

<213> Escherichia coli K12

<400> 110

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Gln Gly Lys Thr Asn Gln Gly Thr Leu Cys Leu Lys Gly Tyr Tyr Gly
35 40 45

Trp Asp Phe Ile Asn Asp Thr Gln Ile Leu Thr Pro Arg Leu Lys Thr
50 55 60

Pro Met Ile Arg Arg Gln Arg Gly Gly Lys Leu Glu Pro Val Ser Trp
65 70 75 80

Asp Glu Ala Leu Asn Tyr Val Ala Glu Arg Leu Ser Ala Ile Lys Glu
85 90 95

Lys Tyr Gly Pro Asp Ala Ile Gln Thr Thr Gly Ser Ser Arg Gly Thr
100 105 110

Gly Asn Glu Thr Asn Tyr Val Met Gln Lys Phe Ala Arg Ala Val Ile
115 120 125

Gly Thr Asn Asn Val Asp Cys Cys Ala Arg Val His Gly Pro Ser Val
130 135 140

Ala Gly Leu His Gln Ser Val Gly Asn Gly Ala Met Ser Asn Ala Ile
145 150 155 160

Asn Glu Ile Asp Asn Thr Asp Leu Val Phe Val Phe Gly Tyr Asn Pro
165 170 175

Ala Asp Ser His Pro Ile Val Ala Asn His Val Ile Asn Ala Lys Arg
180 185 190

Asn Gly Ala Lys Ile Ile Val Cys Asp Pro Arg Lys Ile Glu Thr Ala
195 200 205

Arg Ile Ala Asp Met His Ile Ala Leu Lys Asn Gly Ser Asn Ile Ala
210 215 220

Leu Leu Asn Ala Met Gly His Val Ile Ile Glu Glu Asn Leu Tyr Asp
225 230 235 240

Lys Ala Phe Val Ala Ser Arg Thr Glu Gly Phe Glu Glu Tyr Arg Lys
245 250 255

Ile Val Glu Gly Tyr Thr Pro Glu Ser Val Glu Asp Ile Thr Gly Val
260 265 270

Ser Ala Ser Glu Ile Arg Gln Ala Ala Arg Met Tyr Ala Gln Ala Lys
275 280 285

Ser Ala Ala Ile Leu Trp Gly Met Gly Val Thr Gln Phe Tyr Gln Gly

290					295					300					
Val	Glu	Thr	Val	Arg	Ser	Leu	Thr	Ser	Leu	Ala	Met	Leu	Thr	Gly	Asn
305					310					315					320
Leu	Gly	Lys	Pro	His	Ala	Gly	Val	Asn	Pro	Val	Arg	Gly	Gln	Asn	Asn
				325					330					335	
Val	Gln	Gly	Ala	Cys	Asp	Met	Gly	Ala	Leu	Pro	Asp	Thr	Tyr	Pro	Gly
			340					345					350		
Tyr	Gln	Tyr	Val	Lys	Asp	Pro	Ala	Asn	Arg	Glu	Lys	Phe	Ala	Lys	Ala
		355					360					365			
Trp	Gly	Val	Glu	Ser	Leu	Pro	Ala	His	Thr	Gly	Tyr	Arg	Ile	Ser	Glu
	370					375					380				
Leu	Pro	His	Arg	Ala	Ala	His	Gly	Glu	Val	Arg	Ala	Ala	Tyr	Ile	Met
385					390					395					400
Gly	Glu	Asp	Pro	Leu	Gln	Thr	Asp	Ala	Glu	Leu	Ser	Ala	Val	Arg	Lys
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Ala	Phe	Glu	Asp	Leu	Glu	Leu	Val	Ile	Val	Gln	Asp	Ile	Phe	Met	Thr
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Lys	Thr	Ala	Ser	Ala	Ala	Asp	Val	Ile	Leu	Pro	Ser	Thr	Ser	Trp	Gly
		435					440					445			
Glu	His	Glu	Gly	Val	Phe	Thr	Ala	Ala	Asp	Arg	Gly	Phe	Gln	Arg	Phe
	450					455					460				
Phe	Lys	Ala	Val	Glu	Pro	Lys	Trp	Asp	Leu	Lys	Thr	Asp	Trp	Gln	Ile
465					470					475					480
Ile	Ser	Glu	Ile	Ala	Thr	Arg	Met	Gly	Tyr	Pro	Met	His	Tyr	Asn	Asn
				485					490					495	
Thr	Gln	Glu	Ile	Trp	Asp	Glu	Leu	Arg	His	Leu	Cys	Pro	Asp	Phe	Tyr
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Gly	Ala	Thr	Tyr	Glu	Lys	Met	Gly	Glu	Leu	Gly	Phe	Ile	Gln	Trp	Pro
		515					520					525			
Cys	Arg	Asp	Thr	Ser	Asp	Ala	Asp	Gln	Gly	Thr	Ser	Tyr	Leu	Phe	Lys
	530					535					540				
Glu	Lys	Phe	Asp	Thr	Pro	Asn	Gly	Leu	Ala	Gln	Phe	Phe	Thr	Cys	Asp
545					550					555					560
Trp	Val	Ala	Pro	Ile	Asp	Lys	Leu	Thr	Asp	Glu	Tyr	Pro	Met	Val	Leu
				565					570					575	
Ser	Thr	Val	Arg	Glu	Val	Gly	His	Tyr	Ser	Cys	Arg	Ser	Met	Thr	Gly
			580					585					590		
Asn	Cys	Ala	Ala	Leu	Ala	Ala	Leu	Ala	Asp	Glu	Pro	Gly	Tyr	Ala	Gln
		595					600					605			
Ile	Asn	Thr	Glu	Asp	Ala	Lys	Arg	Leu	Gly	Ile	Glu	Asp	Glu	Ala	Leu
	610					615					620				
Val	Trp	Val	His	Ser	Arg	Lys	Gly	Lys	Ile	Ile	Thr	Arg	Ala	Gln	Val

625 630 635 640
 Ser Asp Arg Pro Asn Lys Gly Ala Ile Tyr Met Thr Tyr Gln Trp Trp
 645 650 655
 Ile Gly Ala Cys Asn Glu Leu Val Thr Glu Asn Leu Ser Pro Ile Thr
 660 665 670
 Lys Thr Pro Glu Tyr Lys Tyr Cys Ala Val Arg Val Glu Pro Ile Ala
 675 680 685
 Asp Gln Arg Ala Ala Glu Gln Tyr Val Ile Asp Glu Tyr Asn Lys Leu
 690 695 700
 Lys Thr Arg Leu Arg Glu Ala Ala Leu Ala
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<210> 111

<211> 1305

<212> DNA

<213> Escherichia coli K12

<400> 111

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cctgaatgca cgctggcgca actgggcgca gcgaaaatgt ggcgtctgct gcacggtgag    180
tcgaaaaaag gctacatcaa cagcctcggc gcactgactg gcggtcaggc gctgcaacag    240
gcgaaagcgg gtattgaagc agtctatctg tcgggatggc aggtagcggc ggacgctaac    300
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gagccggggc atccgcgcta tgctcgattac ttcttgccga tcgttgccga tgcggaagcc    480
ggttttggcg gtgtcctgaa tgcttttgaa ctgatgaaag cgatgattga agccggtgca    540
gcggcagttc acttcgaaga tcagctggcg tcagtgaaga aatgcgggtca catgggcggc    600
aaagtttttag tgccaactca ggaagctatt cagaaaactgg tcgcggcgcg tctggcagct    660
gacgtgacgg gcgttccaac cctgctgggt gcccggtaccg atgctgatgc ggcggatctg    720
atcacctccg attgcgaccc gtatgacagc gaatttatta ccggcgagcg taccagtga    780
ggcttcttcc gtactcatgc gggcattgag caagcgatca gccgtggcct ggcgtatgcg    840
ccatatgctg acctgggtct gtgtgaaacc tccacgccgg atctggaact ggcgcgtcgc    900
tttgacaaag ctatccacgc gaaatatccg ggcaaactgc tggcttataa ctgctcgccg    960
tcgttcaact ggcagaaaaa cctcgacgac aaaactattg ccagcttcca gcagcagctg   1020
tcggatatgg gctacaagtt ccagttcatc accctggcag gtatccacag catgtggttc   1080
aacatgtttg acctggcaaa cgcctatgcc cagggcgagg gtatgaagca ctacgttgag   1140
aaagtgcagc agccggaatt tgccgccgcy aaagatggct ataccttcgt atctcaccag   1200
caggaagtgg gtacaggtta cttcgataaa gtgacgacta ttattcaggg cggcacgtct   1260
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<210> 112

<211> 434

<212> PRT

<213> Escherichia coli K12

<400> 112

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

65				70					75					80			
Ala	Lys	Ala	Gly	Ile 85	Glu	Ala	Val	Tyr	Leu 90	Ser	Gly	Trp	Gln	Val	Ala		
Ala	Asp	Ala	Asn 100	Leu	Ala	Ala	Ser	Met 105	Tyr	Pro	Asp	Gln	Ser	Leu	Tyr		
Pro	Ala	Asn 115	Ser	Val	Pro	Ala	Val	Val 120	Glu	Arg	Ile	Asn 125	Asn	Thr	Phe		
Arg	Arg 130	Ala	Asp	Gln	Ile	Gln 135	Trp	Ser	Ala	Gly	Ile 140	Glu	Pro	Gly	Asp		
Pro 145	Arg	Tyr	Val	Asp 150	Tyr	Phe	Leu	Pro	Ile 155	Val	Ala	Asp	Ala	Glu	Ala 160		
Gly	Phe	Gly	Gly	Val 165	Leu	Asn	Ala	Phe	Glu 170	Leu	Met	Lys	Ala	Met 175	Ile		
Glu	Ala	Gly	Ala 180	Ala	Ala	Val	His	Phe 185	Glu	Asp	Gln	Leu	Ala	Ser	Val		
Lys	Lys	Cys 195	Gly	His	Met	Gly	Gly 200	Lys	Val	Leu	Val	Pro 205	Thr	Gln	Glu		
Ala	Ile 210	Gln	Lys	Leu	Val	Ala 215	Ala	Arg	Leu	Ala	Ala 220	Asp	Val	Thr	Gly		
Val 225	Pro	Thr	Leu	Leu 230	Val	Ala	Arg	Thr	Asp 235	Ala	Asp	Ala	Ala	Asp	Leu 240		
Ile	Thr	Ser	Asp 245	Cys	Asp	Pro	Tyr	Asp 250	Ser	Glu	Phe	Ile	Thr	Gly 255	Glu		
Arg	Thr	Ser	Glu 260	Gly	Phe	Phe	Arg	Thr 265	His	Ala	Gly	Ile	Glu	Gln	Ala		
Ile	Ser 275	Arg	Gly	Leu	Ala	Tyr	Ala 280	Pro	Tyr	Ala	Asp 285	Leu	Val	Trp	Cys		
Glu 290	Thr	Ser	Thr	Pro	Asp	Leu 295	Glu	Leu	Ala	Arg	Arg 300	Phe	Ala	Gln	Ala		
Ile 305	His	Ala	Lys	Tyr 310	Pro	Gly	Lys	Leu	Leu 315	Ala	Tyr	Asn	Cys	Ser	Pro 320		
Ser	Phe	Asn 325	Trp	Gln	Lys	Asn	Leu	Asp 330	Asp	Lys	Thr	Ile	Ala	Ser 335	Phe		
Gln	Gln	Gln 340	Leu	Ser	Asp	Met	Gly	Tyr 345	Lys	Phe	Gln	Phe	Ile	Thr	Leu		
Ala	Gly 355	Ile	His	Ser	Met	Trp	Phe 360	Asn	Met	Phe	Asp 365	Leu	Ala	Asn	Ala		
Tyr 370	Ala	Gln	Gly	Glu	Gly	Met 375	Lys	His	Tyr	Val	Glu 380	Lys	Val	Gln	Gln		
Pro 385	Glu	Phe	Ala	Ala 390	Ala	Lys	Asp	Gly	Tyr 395	Thr	Phe	Val	Ser	His	Gln		
Gln	Glu	Val	Gly	Thr	Gly	Tyr	Phe	Asp	Lys	Val	Thr	Thr	Ile	Ile	Glu		

405

410

415

Gly Gly Thr Ser Ser Val Thr Ala Leu Thr Gly Ser Thr Glu Glu Ser
 420 425 430

Gln Phe

<210> 113

<211> 1134

<212> DNA

<213> Methylobacterium extorquens serine-glyoxylate aminotransferase

<400> 113

```

ccgggacgca accacctggt cgttcccggc ccgaccaaca tcccggaccg ggtgatgcgc      60
gccatgatgg tgcagtccga ggatcaccgc tcggtcgatt tcccgtcgct gacgaagccg      120
ctgttcgagg acaccaagaa ggtgttcggc tcgaccgaag gcacgatctt cctgttccccg      180
gcctccggca cgggcatctg ggaatcggcg ctgtccaaca cgctcgccccg cggcgacaag      240
gtgctggccg cccgcttcgg ccagttcagc catctctgga tcgacatggc ccagcgcctc      300
ggcctggacc tcgtcgtcca ggaggaggag tggggcaccg gcgccaagcc cgagaagatc      360
gaggaggccc tgcgcgccga caagaacccat gagatcaagg ccgtcatggt ggtccataac      420
gagaccgcga ccggcgtagc ctccaacatc ggcgcccgtgc gcaaggcgat cgacgcgcgc      480
ggccacccgg cctgctggtt cgtcgcactgc gccatcgccg gctcccagaa gggcctgatg      540
ctgcccggcg gcctcggcgt gatttgcgtc agccagaagg cgctcaaggc cgccgagggc      600
cagtccggcc gcaacgaccg gctcgcgccg gtctacttcg actgggaaga ccagaagaag      660
cagaacccga ccggtactt cccctacacc ccgcccgtgc cgctgctcta cggcctgcgc      720
gaggcgctcg cctgcctggt cgaggaaggc ctggagaacg tctaccaccg ccacgccgtg      780
ctcggtgagg cgaccgctca ggccgtcgcg gcctggggcc tgaagacctg cgccaagtcg      840
ccggagtggg actccgacac cgtcaccgcc atcctggcgc ccgaggggtg ggacgcggcc      900
aagatcatca agcacgccta tgtgcgctac aacctcgcg tcggcgccgg cctgtcccag      960
gtcgcgggca aggtgttccg catcgccac gtcggcgacc tgaacgaact ctcgctgctc     1020
ggcgccatcg ccggtgccga gatgtcgctc atcgacaacg gcgtgaaggt gacccccggt     1080
tcgggtgttg cggtgcctc cagctacctg cgcgagaacc cgctcgccaa ggct          1134

```

<210> 114

<211> 379

<212> PRT

<213> Methylobacterium extorquens serine-glyoxylate aminotransferase

<400> 114

Met Pro Gly Arg Asn His Leu Phe Val Pro Gly Pro Thr Asn Ile Pro
 1 5 10 15

Asp Arg Val Met Arg Ala Met Met Val Gln Ser Glu Asp His Arg Ser
 20 25 30

Val Asp Phe Pro Ser Leu Thr Lys Pro Leu Phe Glu Asp Thr Lys Lys
 35 40 45

Val Phe Gly Ser Thr Glu Gly Thr Ile Phe Leu Phe Pro Ala Ser Gly
 50 55 60

Thr Gly Ile Trp Glu Ser Ala Leu Ser Asn Thr Leu Ala Arg Gly Asp
 65 70 75 80

Lys Val Leu Ala Ala Arg Phe Gly Gln Phe Ser His Leu Trp Ile Asp
 85 90 95

Met Ala Gln Arg Leu Gly Leu Asp Val Val Val Gln Glu Glu Glu Trp
 100 105 110

Gly Thr Gly Ala Lys Pro Glu Lys Ile Glu Glu Ala Leu Arg Ala Asp
 115 120 125

Lys Asn His Glu Ile Lys Ala Val Met Val Val His Asn Glu Thr Ala

130	135	140
Thr Gly Val Thr Ser Asn Ile Gly Ala Val Arg Lys Ala Ile Asp Ala		
145	150	155 160
Ala Gly His Pro Ala Leu Leu Phe Val Asp Cys Ala Ile Ala Gly Ser		
	165	170 175
Gln Lys Gly Leu Met Leu Pro Ala Gly Leu Gly Val Ile Cys Val Ser		
	180	185 190
Gln Lys Ala Leu Lys Ala Ala Glu Gly Gln Ser Gly Arg Asn Asp Arg		
	195	200 205
Leu Ala Arg Val Tyr Phe Asp Trp Glu Asp Gln Lys Lys Gln Asn Pro		
	210	215 220
Thr Gly Tyr Phe Pro Tyr Thr Pro Pro Leu Pro Leu Leu Tyr Gly Leu		
	225	230 235 240
Arg Glu Ala Leu Ala Cys Leu Phe Glu Glu Gly Leu Glu Asn Val Tyr		
	245	250 255
His Arg His Ala Val Leu Gly Glu Ala Thr Arg Gln Ala Val Ala Ala		
	260	265 270
Trp Gly Leu Lys Thr Cys Ala Lys Ser Pro Glu Trp Asn Ser Asp Thr		
	275	280 285
Val Thr Ala Ile Leu Ala Pro Glu Gly Val Asp Ala Ala Lys Ile Ile		
	290	295 300
Lys His Ala Tyr Val Arg Tyr Asn Leu Ala Leu Gly Ala Gly Leu Ser		
	305	310 315 320
Gln Val Ala Gly Lys Val Phe Arg Ile Gly His Val Gly Asp Leu Asn		
	325	330 335
Glu Leu Ser Leu Leu Gly Ala Ile Ala Gly Ala Glu Met Ser Leu Ile		
	340	345 350
Asp Asn Gly Val Lys Val Thr Pro Gly Ser Gly Val Ala Ala Ala Ser		
	355	360 365
Ser Tyr Leu Arg Glu Asn Pro Leu Ala Lys Ala		
	370	375

<210> 115

<211> 942

<212> DNA

<213> Methylobacterium extorquens NADH-dependent hydroxypyruvate reductase (HPR)

<400> 115

atgacaaaga aagtcgtctt cctcgatcgc gagtcgctcg atgcgaccgt gcgcgaaattc	60
aacttcccgc acgagtacaa ggaatatgag tcgacctgga cgccggagga gatcgctcgag	120
cgcttccagg gcgccgagat cgcgatgac aacaagggtgc cgatgcgcgc cgacacgctg	180
aagcagcttc ccgacctgaa gctgatcgcg gtggctgcca cgggcacgga cgtcgtcgac	240
aaggctgcgg ccaaggcgca gggcatcacg gtcgtcaaca tccgcaacta cgcttcaac	300
accgtgccc agcacgtggt cggcctgatg ttcgcgctgc gccgggcat cgtgccttac	360
gccaaactcg tgccgcgggg cgattggaac aagtcgaagc agttctgcta cttcgattac	420
ccgatctacg acatcgccgg ctcgacgctc ggcacatcgc gctacggcgc gctcggcaag	480
tcgatcgcca agcgggctga ggccctcggc atgaagggtgc tcgccttcga cgtgttccc	540
caggacgggc tcgtggatct cgagacgatc ctgacgcaat ccgacgtcat caccctgcac	600

```

gtgccgctga ccccgacac caagaacatg atcggggccc agcagctcaa gaagatgaag 660
cgctccgcga tcctcatcaa caccgcccgc ggcgggctgg tggacgaggc ggccctgctc 720
caggcgctca aggacggcac catcggcggc gccggcttcg acgtcgtggc ccaggagccc 780
ccgaaggacg gcaacatcct ctgcgacgcc gacctgccca acctgatcgt caccgccgac 840
gtggcctggg cgagcaagga ggcgatgcag atcctcgccg accagctcgt ggacaacgtc 900
gaggccttcg tcgcgggcaa gccgcagaac gtcgtcgagg cg 942

```

<210> 116

<211> 314

<212> PRT

<213> Methylobacterium extorquens NADH-dependent hydroxypyruvate reductase (HPR)

<400> 116

```

Met Thr Lys Lys Val Val Phe Leu Asp Arg Glu Ser Leu Asp Ala Thr
1          5          10          15

```

```

Val Arg Glu Phe Asn Phe Pro His Glu Tyr Lys Glu Tyr Glu Ser Thr
          20          25          30

```

```

Trp Thr Pro Glu Glu Ile Val Glu Arg Leu Gln Gly Ala Glu Ile Ala
          35          40          45

```

```

Met Ile Asn Lys Val Pro Met Arg Ala Asp Thr Leu Lys Gln Leu Pro
          50          55          60

```

```

Asp Leu Lys Leu Ile Ala Val Ala Ala Thr Gly Thr Asp Val Val Asp
65          70          75          80

```

```

Lys Ala Ala Ala Lys Ala Gln Gly Ile Thr Val Val Asn Ile Arg Asn
          85          90          95

```

```

Tyr Ala Phe Asn Thr Val Pro Glu His Val Val Gly Leu Met Phe Ala
          100          105          110

```

```

Leu Arg Arg Ala Ile Val Pro Tyr Ala Asn Ser Val Arg Arg Gly Asp
          115          120          125

```

```

Trp Asn Lys Ser Lys Gln Phe Cys Tyr Phe Asp Tyr Pro Ile Tyr Asp
          130          135          140

```

```

Ile Ala Gly Ser Thr Leu Gly Ile Ile Gly Tyr Gly Ala Leu Gly Lys
145          150          155          160

```

```

Ser Ile Ala Lys Arg Ala Glu Ala Leu Gly Met Lys Val Leu Ala Phe
          165          170          175

```

```

Asp Val Phe Pro Gln Asp Gly Leu Val Asp Leu Glu Thr Ile Leu Thr
          180          185          190

```

```

Gln Ser Asp Val Ile Thr Leu His Val Pro Leu Thr Pro Asp Thr Lys
          195          200          205

```

```

Asn Met Ile Gly Ala Glu Gln Leu Lys Lys Met Lys Arg Ser Ala Ile
          210          215          220

```

```

Leu Ile Asn Thr Ala Arg Gly Gly Leu Val Asp Glu Ala Ala Leu Leu
225          230          235          240

```

```

Gln Ala Leu Lys Asp Gly Thr Ile Gly Gly Ala Gly Phe Asp Val Val
          245          250          255

```

```

Ala Gln Glu Pro Pro Lys Asp Gly Asn Ile Leu Cys Asp Ala Asp Leu
          260          265          270

```

Pro Asn Leu Ile Val Thr Pro His Val Ala Trp Ala Ser Lys Glu Ala
275 280 285

Met Gln Ile Leu Ala Asp Gln Leu Val Asp Asn Val Glu Ala Phe Val
290 295 300

Ala Gly Lys Pro Gln Asn Val Val Glu Ala
305 310

<210> 117

<211> 1170

<212> DNA

<213> extorquens malate thiokinase (beta subunit)

<400> 117

```

atggacgttc acgagtacca agccaaggag ctgctcgcga gcttcgggggt cgccgtcccc 60
aagggcgccg tggttttcag cccggatcaa gcggtctatg cggcgaccga gctcggcgggc 120
tcgttctggg cgggtgaaggc tcagatccat gccggcgcgc gcggcaaggc gggcgggctc 180
aagctttgcc gcacctacaa tgaagtgcgc gacgccgcc gcgacctgct gggaaaacgc 240
ctcgtgacgc tccagaccgg ccccaggggc aagccggtgc agcgcgtcta cgtcgagacc 300
gccgaccggt tcgagcgtga actctatctc ggctacgtgc tcgatcggaa ggccgagcgc 360
gtccgtgtca tcgcctccca gcgcggcggc atggatatcg aggagatcgc cgccaaggag 420
cccgaggcgc tgatccaggt cgtggtcgag ccggcggtgg gcctgcagca gttccaggcc 480
cgcgagatcg cgttccagct cggcctcaac atcaagcagg tctcggccgc ggtgaagacc 540
atcatgaacg cctaccgggc gttccgcgac tgcgacggca ccatgctgga gatcaaccgc 600
ctcgtcgtca ccaaggacga ccgggttctg gcactcgacg ccaagatgtc cttcgacgac 660
aacgccctgt tccgccgccc caacatcgcg gacatgcacg atccatcgca gggcgatccc 720
cgcgaggccc aggctgccga gcacaatctc agctatatcg gcctcgaggg cgaaattggc 780
tgcacgtca acggcgcggg tctggccatg gcgaccatgg acatgatcaa gcacgcgggc 840
ggcgagccgg caaacttcct ggatgtgggc ggcggtgcca gcccggaccg cgtcgccacg 900
gccttccgcc tcgttctgtc ggaccgcaac gtgaaggcga tcctcgtcaa catcttcgcc 960
ggcatcaacc gctgcgactg ggtcgcgag ggctgtgtca aggccgcgcg cgaggtgaag 1020
atcgacgtgc cgtcatcgt gcggctcgcc ggcacgaacg tcgatgaag caagaagatc 1080
ctcgccgaga gcgggctcga cctcatcacc gccgacaccc ttacggaagc cgcgcgcaag 1140
gctgtcgaag cctgccacgg cgccaagcac

```

<210> 118

<211> 390

<212> PRT

<213> extorquens malate thiokinase (beta subunit)

<400> 118

Met Asp Val His Glu Tyr Gln Ala Lys Glu Leu Leu Ala Ser Phe Gly
1 5 10 15

Val Ala Val Pro Lys Gly Ala Val Ala Phe Ser Pro Asp Gln Ala Val
20 25 30

Tyr Ala Ala Thr Glu Leu Gly Gly Ser Phe Trp Ala Val Lys Ala Gln
35 40 45

Ile His Ala Gly Ala Arg Gly Lys Ala Gly Gly Leu Lys Leu Cys Arg
50 55 60

Thr Tyr Asn Glu Val Arg Asp Ala Ala Arg Asp Leu Leu Gly Lys Arg
65 70 75 80

Leu Val Thr Leu Gln Thr Gly Pro Glu Gly Lys Pro Val Gln Arg Val
85 90 95

Tyr Val Glu Thr Ala Asp Pro Phe Glu Arg Glu Leu Tyr Leu Gly Tyr
100 105 110

Val Leu Asp Arg Lys Ala Glu Arg Val Arg Val Ile Ala Ser Gln Arg

115					120					125						
Gly	Gly	Met	Asp	Ile	Glu	Glu	Ile	Ala	Ala	Lys	Glu	Pro	Glu	Ala	Leu	
130					135					140						
Ile	Gln	Val	Val	Val	Glu	Pro	Ala	Val	Gly	Leu	Gln	Gln	Phe	Gln	Ala	
145					150					155					160	
Arg	Glu	Ile	Ala	Phe	Gln	Leu	Gly	Leu	Asn	Ile	Lys	Gln	Val	Ser	Ala	
165					170					175						
Ala	Val	Lys	Thr	Ile	Met	Asn	Ala	Tyr	Arg	Ala	Phe	Arg	Asp	Cys	Asp	
180					185					190						
Gly	Thr	Met	Leu	Glu	Ile	Asn	Pro	Leu	Val	Val	Thr	Lys	Asp	Asp	Arg	
195					200					205						
Val	Leu	Ala	Leu	Asp	Ala	Lys	Met	Ser	Phe	Asp	Asp	Asn	Ala	Leu	Phe	
210					215					220						
Arg	Arg	Arg	Asn	Ile	Ala	Asp	Met	His	Asp	Pro	Ser	Gln	Gly	Asp	Pro	
225					230					235					240	
Arg	Glu	Ala	Gln	Ala	Ala	Glu	His	Asn	Leu	Ser	Tyr	Ile	Gly	Leu	Glu	
245					250					255						
Gly	Glu	Ile	Gly	Cys	Ile	Val	Asn	Gly	Ala	Gly	Leu	Ala	Met	Ala	Thr	
260					265					270						
Met	Asp	Met	Ile	Lys	His	Ala	Gly	Gly	Glu	Pro	Ala	Asn	Phe	Leu	Asp	
275					280					285						
Val	Gly	Gly	Gly	Ala	Ser	Pro	Asp	Arg	Val	Ala	Thr	Ala	Phe	Arg	Leu	
290					295					300						
Val	Leu	Ser	Asp	Arg	Asn	Val	Lys	Ala	Ile	Leu	Val	Asn	Ile	Phe	Ala	
305					310					315					320	
Gly	Ile	Asn	Arg	Cys	Asp	Trp	Val	Ala	Glu	Gly	Val	Val	Lys	Ala	Ala	
325					330					335						
Arg	Glu	Val	Lys	Ile	Asp	Val	Pro	Leu	Ile	Val	Arg	Leu	Ala	Gly	Thr	
340					345					350						
Asn	Val	Asp	Glu	Gly	Lys	Lys	Ile	Leu	Ala	Glu	Ser	Gly	Leu	Asp	Leu	
355					360					365						
Ile	Thr	Ala	Asp	Thr	Leu	Thr	Glu	Ala	Ala	Arg	Lys	Ala	Val	Glu	Ala	
370					375					380						
Cys	His	Gly	Ala	Lys	His											
385					390											

<210> 119

<211> 780

<212> DNA

<213> Methylobacterium extorquens malate thiokinase (alpha subunit)

<400> 119

atgagcattc	tcacgcacga	gaagaccccg	atcctggtcc	agggcatcac	gggcgacaag	60
ggcaccttcc	acgccaagga	gatgatcgcc	tacggctcga	acgtcgtcgg	cggcgtcacc	120
ccgggcaagg	gcggaagac	ccattgcggc	gtgccggtgt	tcaacaccgt	caaggaggcc	180
gtggaggcga	ccggcgccac	cacctcgatc	accttcgtgg	cgccccctt	cgcggcggac	240
gcgatcatgg	aggcggccga	cgccggcctc	aagctcgtct	gctcgatcac	cgacggcatc	300

```

cccgcctcagg acatgatgcg ggtgaaacgc tacctccggc gctatccgaa ggagaagcgc 360
acgatgggtgg tgggcccga ctcgcgcgggc atcatctcgc ccggcaagtc gatgctcggc 420
atcatgcccc gccacatcta cctccccgggc aaggctcggc tcatctcccc ttccggcacg 480
ctgggctacg aggcccgccg gcagatgaag gagctcggca tcggcatctc gacctccgtc 540
ggcatcggcg gcgatccgat caacggctcc tccttcctcg accacctcgc tctgttcgag 600
caggatcccc agacggaagc cgtgctgatg atcggcgaga tcggcgggcc gcaggaggcc 660
gaggcctcgg cctggatcaa ggagaacttt tccaagcccg tgatcggctt cgtggcgggc 720
ctcaccgccc ccaaggggccg ccgcatgggg catgcgcacc atggcttcgg cagcgcgggg 780

```

<210> 120

<211> 260

<212> PRT

<213> Methylobacterium extorquens malate thiokinase (alpha subunit)

<400> 120

```

Met Ser Ile Leu Ile Asp Glu Lys Thr Pro Ile Leu Val Gln Gly Ile
1           5           10          15

```

```

Thr Gly Asp Lys Gly Thr Phe His Ala Lys Glu Met Ile Ala Tyr Gly
          20          25          30

```

```

Ser Asn Val Val Gly Gly Val Thr Pro Gly Lys Gly Gly Lys Thr His
          35          40          45

```

```

Cys Gly Val Pro Val Phe Asn Thr Val Lys Glu Ala Val Glu Ala Thr
          50          55          60

```

```

Gly Ala Thr Thr Ser Ile Thr Phe Val Ala Pro Pro Phe Ala Ala Asp
65          70          75          80

```

```

Ala Ile Met Glu Ala Ala Asp Ala Gly Leu Lys Leu Val Cys Ser Ile
          85          90          95

```

```

Thr Asp Gly Ile Pro Ala Gln Asp Met Met Arg Val Lys Arg Tyr Leu
          100         105         110

```

```

Arg Arg Tyr Pro Lys Glu Lys Arg Thr Met Val Val Gly Pro Asn Cys
          115         120         125

```

```

Ala Gly Ile Ile Ser Pro Gly Lys Ser Met Leu Gly Ile Met Pro Gly
          130         135         140

```

```

His Ile Tyr Leu Pro Gly Lys Val Gly Val Ile Ser Arg Ser Gly Thr
          145         150         155         160

```

```

Leu Gly Tyr Glu Ala Ala Ala Gln Met Lys Glu Leu Gly Ile Gly Ile
          165         170         175

```

```

Ser Thr Ser Val Gly Ile Gly Gly Asp Pro Ile Asn Gly Ser Ser Phe
          180         185         190

```

```

Leu Asp His Leu Ala Leu Phe Glu Gln Asp Pro Glu Thr Glu Ala Val
          195         200         205

```

```

Leu Met Ile Gly Glu Ile Gly Gly Pro Gln Glu Ala Glu Ala Ser Ala
          210         215         220

```

```

Trp Ile Lys Glu Asn Phe Ser Lys Pro Val Ile Gly Phe Val Ala Gly
          225         230         235         240

```

```

Leu Thr Ala Pro Lys Gly Arg Arg Met Gly His Ala His His Gly Phe
          245         250         255

```

Gly Ser Gly Gly

260

```

<210> 121
<211> 975
<212> DNA
<213> Methylobacterium extorquens
<400> 121
atgagcttca ccctgatcca gcaggccacc ccgcgcctgc accgctcggg actcgcgggtt    60
cccggctcca acccgacctt catggagaag tcggccgcct cgaaggccga cgtgatcttc    120
ctcgacctcg aggacgcggt tgcgcccgcg gacaaggagc aggcccgcaa gaacatcatc    180
caggccctca acgacctgga ttggggcaac aagaccatga tgatccgcat caacggtctc    240
gacacccact acatgtaccg cgacgtggtg gacatcgtgg aggcctgccc gcgcctcgac    300
atgatcctga tccccaaagg cggcgtgccg gccgacgtct acgccatcga cgtgctgacg    360
acgcagatcg agcaggccaa gaagcgcgag aagaagatcg gcttcgagggt gctgatcgag    420
accgcgctcg gcatggccaa tgctcgaggcg atcgcgacct cgtctaagcg ccttgaggcg    480
atgtccttcg gtgtcgccga ctacgccgct tccacccgcg cccgctccac cgtgatcggc    540
ggcgtcaacg ccgattacag cgtgctcacc gacaaggacg aggccggcaa ccgccagacc    600
cactggcagg atccgtggct gttcgcccag aaccgcatgc tggtcgcctg ccgcgcctac    660
ggcctgcgcc cgatcgacgg tcccttcggc gacttctccg atccggacgg ctacacctcg    720
gcccgtcgcc gctgcgcgcg gctcggcttc gagggcaagt gggcgatcca cccctcgag    780
atcgatctcg ccaacgagggt cttcaccccc tccgaggccg aggtcaccaa ggcccgcgc    840
atcctggaag ccatggaaga ggccgccaag gccggccgcg gcgccgtctc gctcgacggc    900
cgtctcatcg acatcgctc gatccgcgat gccgaggcgc tgatccagaa ggccgacgcg    960
atgggcggaa agtaa                                         975

```

```

<210> 122
<211> 324
<212> PRT
<213> Methylobacterium extorquens
<400> 122
Met Ser Phe Thr Leu Ile Gln Gln Ala Thr Pro Arg Leu His Arg Ser
1          5          10          15

Glu Leu Ala Val Pro Gly Ser Asn Pro Thr Phe Met Glu Lys Ser Ala
          20          25          30

Ala Ser Lys Ala Asp Val Ile Phe Leu Asp Leu Glu Asp Ala Val Ala
          35          40          45

Pro Asp Asp Lys Glu Gln Ala Arg Lys Asn Ile Ile Gln Ala Leu Asn
          50          55          60

Asp Leu Asp Trp Gly Asn Lys Thr Met Met Ile Arg Ile Asn Gly Leu
65          70          75          80

Asp Thr His Tyr Met Tyr Arg Asp Val Val Asp Ile Val Glu Ala Cys
          85          90          95

Pro Arg Leu Asp Met Ile Leu Ile Pro Lys Val Gly Val Pro Ala Asp
          100          105          110

Val Tyr Ala Ile Asp Val Leu Thr Thr Gln Ile Glu Gln Ala Lys Lys
          115          120          125

Arg Glu Lys Lys Ile Gly Phe Glu Val Leu Ile Glu Thr Ala Leu Gly
          130          135          140

Met Ala Asn Val Glu Ala Ile Ala Thr Ser Ser Lys Arg Leu Glu Ala
145          150          155          160

Met Ser Phe Gly Val Ala Asp Tyr Ala Ala Ser Thr Arg Ala Arg Ser
          165          170          175

```

Thr Val Ile Gly Gly Val Asn Ala Asp Tyr Ser Val Leu Thr Asp Lys
 180 185 190
 Asp Glu Ala Gly Asn Arg Gln Thr His Trp Gln Asp Pro Trp Leu Phe
 195 200 205
 Ala Gln Asn Arg Met Leu Val Ala Cys Arg Ala Tyr Gly Leu Arg Pro
 210 215 220
 Ile Asp Gly Pro Phe Gly Asp Phe Ser Asp Pro Asp Gly Tyr Thr Ser
 225 230 235 240
 Ala Ala Arg Arg Cys Ala Ala Leu Gly Phe Glu Gly Lys Trp Ala Ile
 245 250 255
 His Pro Ser Gln Ile Asp Leu Ala Asn Glu Val Phe Thr Pro Ser Glu
 260 265 270
 Ala Glu Val Thr Lys Ala Arg Arg Ile Leu Glu Ala Met Glu Glu Ala
 275 280 285
 Ala Lys Ala Gly Arg Gly Ala Val Ser Leu Asp Gly Arg Leu Ile Asp
 290 295 300
 Ile Ala Ser Ile Arg Met Ala Glu Ala Leu Ile Gln Lys Ala Asp Ala
 305 310 315 320
 Met Gly Gly Lys

<210> 123

<211> 1833

<212> DNA

<213> Chlorobium tepidum TLS

<400> 123

gtgagcattc	tcgcaaataa	agatacccg	gcggtcatca	ttggtggtgt	ggcaggcgctc	60
aatgcggcaa	aacgcatggc	ccagttcgac	tacctgatca	accgtccgct	gaccgtccag	120
gctttcgtgt	atccgcccga	agcgggccag	cagaaagaaa	tcttccgcgg	tggcgaactc	180
aaaaacgtta	ccgtctatcc	gtctctggct	ccagctctca	atgagcatcc	ggacatcaac	240
accgccctca	tctacctcgg	cgcacgcaga	gcgaccgagg	ccgcgatgga	agcgcttgaa	300
ttcccgaaca	ttcagctggt	ctcgatgatc	actgaagggtg	ttccggaaaa	ggacgccaa	360
cggctgaaaa	aacttgccca	gaagcttggc	aagatgctga	acggcccgtc	gtcgattggc	420
atcatgtctg	ctggcgagtg	ccgtctcggg	gtgatcggcg	gcgagtaccg	caacctgaaa	480
ctctgcaacc	tctatcgtca	gggttcgttc	ggtgttctaa	ccaagtccgg	cggctctgtc	540
aacgaggcga	tgtggctttg	cgcccagaat	ggtgatggta	tcacctctgc	cgtggctatt	600
ggcggtagac	agtcgctggg	caccgatctc	gtcacctatc	ttgaaatgtt	cgagaaggat	660
cctgcaacca	cggcggctcg	catgatcggc	gaggttgccg	gtaatctcga	agaggaagct	720
gcagagtggc	tggcagccga	accacgccgc	atcaagctga	tcgccgccat	tggcgggtacc	780
tgccaggagg	ttctcccga	gggtatgaag	tttggtcacg	ctggcgcgaa	agagggcaaa	840
aagggcgctg	gctcagcccg	ctccaagatg	aacgctctgc	gtgaagccgg	tgcgctcgtg	900
cccgatacct	ttggcggtct	gagcaaggcg	atcaagcagg	tctatgaaga	gttgctcgtc	960
tctggcgcca	tcaagccgaa	gcccgaatc	gacgaggcgc	tgctgcctga	gctaccgccg	1020
agcgttcagg	aggttatgaa	gcagggtgaa	gtggttgtcg	aaccgctcat	ccgcaccacc	1080
atctccgacg	atcgtggcga	agagcctcgc	tatgccggtt	atgccgcttc	ggagctttgc	1140
tcgaaagggg	atggtatcga	ggatgtcatc	ggcctgctct	ggagcaagaa	gcttccgagc	1200
cgcgaggagt	ccgagatcat	caagcgcac	atcatgatct	ctgctgacca	cggctccggca	1260
gtgtctggcg	cctttggcac	tatcctcgcc	gcctgcgcag	gcacgatgat	gccgcaggcc	1320
gtctctgcgc	gtatgacctat	gatcggtccg	cgctttggcg	gtgctgtgac	caacgctggc	1380
aaatacttca	aaatgggtgt	caaggagtat	ccgaacgaca	ttcccggctt	ccttgcctgg	1440
atgaagaaaa	acgtcgggcc	ggttcccggc	attggccaca	gggtcaagag	tctcaggaat	1500
cccgaccagc	gcgtgaagta	cctcgtcagc	tacgtgaaga	acgaaacctc	gctgcacacg	1560
ccgattctca	actacgcgct	cgaagtcgaa	aagatcacga	ccgccaagaa	ggagaacctg	1620
atcctgaacg	tcgatggcac	cataggttgc	atccttatgg	acctcggctt	cccggagcac	1680

```
tctctgaatg gcttcttcgt gctggcccgt accattggca tgatcggcca ctggatcgac 1740
cagaacaacc agaactcgcg tctgatcagg ctctacgatt acctgatcaa ctacgccgtc 1800
aaaccggaac gcccggttcc cgacaagaag taa 1833
```

<210> 124

<211> 610

<212> PRT

<213> Chlorobium tepidum TLS

<400> 124

```
Met Ser Ile Leu Ala Asn Lys Asp Thr Arg Ala Val Ile Ile Gly Gly
1          5          10          15
```

```
Val Ala Gly Val Asn Ala Ala Lys Arg Met Ala Gln Phe Asp Tyr Leu
20          25          30
```

```
Ile Asn Arg Pro Leu Thr Val Gln Ala Phe Val Tyr Pro Pro Glu Ala
35          40          45
```

```
Gly Gln Gln Lys Glu Ile Phe Arg Gly Gly Glu Leu Lys Asn Val Thr
50          55          60
```

```
Val Tyr Pro Ser Leu Ala Pro Ala Leu Asn Glu His Pro Asp Ile Asn
65          70          75          80
```

```
Thr Ala Leu Ile Tyr Leu Gly Ala Ser Arg Ala Thr Glu Ala Ala Met
85          90          95
```

```
Glu Ala Leu Glu Ser Pro Asn Ile Gln Leu Val Ser Met Ile Thr Glu
100         105         110
```

```
Gly Val Pro Glu Lys Asp Ala Lys Arg Leu Lys Lys Leu Ala Gln Lys
115         120         125
```

```
Leu Gly Lys Met Leu Asn Gly Pro Ser Ser Ile Gly Ile Met Ser Ala
130         135         140
```

```
Gly Glu Cys Arg Leu Gly Val Ile Gly Gly Glu Tyr Arg Asn Leu Lys
145         150         155         160
```

```
Leu Cys Asn Leu Tyr Arg Gln Gly Ser Phe Gly Val Leu Thr Lys Ser
165         170         175
```

```
Gly Gly Leu Ser Asn Glu Ala Met Trp Leu Cys Ala Gln Asn Gly Asp
180         185         190
```

```
Gly Ile Thr Ser Ala Val Ala Ile Gly Gly Asp Ala Tyr Pro Gly Thr
195         200         205
```

```
Asp Phe Val Thr Tyr Leu Glu Met Phe Glu Lys Asp Pro Ala Thr Lys
210         215         220
```

```
Ala Val Val Met Ile Gly Glu Val Gly Gly Asn Leu Glu Glu Glu Ala
225         230         235         240
```

```
Ala Glu Trp Leu Ala Ala Glu Pro Arg Arg Ile Lys Leu Ile Ala Ala
245         250         255
```

```
Ile Gly Gly Thr Cys Gln Glu Val Leu Pro Gln Gly Met Lys Phe Gly
260         265         270
```

```
His Ala Gly Ala Lys Glu Gly Lys Lys Gly Ala Gly Ser Ala Arg Ser
275         280         285
```

Lys Met Asn Ala Leu Arg Glu Ala Gly Ala Leu Val Pro Asp Thr Phe
 290 295 300
 Gly Gly Leu Ser Lys Ala Ile Lys Gln Val Tyr Glu Glu Leu Leu Ala
 305 310 315 320
 Ser Gly Ala Ile Lys Pro Lys Pro Glu Ile Asp Glu Ala Leu Leu Pro
 325 330 335
 Glu Leu Pro Pro Ser Val Gln Glu Val Met Lys Gln Gly Glu Val Val
 340 345 350
 Val Glu Pro Leu Ile Arg Thr Thr Ile Ser Asp Asp Arg Gly Glu Glu
 355 360 365
 Pro Arg Tyr Ala Gly Tyr Ala Ala Ser Glu Leu Cys Ser Lys Gly Tyr
 370 375 380
 Gly Ile Glu Asp Val Ile Gly Leu Leu Trp Ser Lys Lys Leu Pro Ser
 385 390 395 400
 Arg Glu Glu Ser Glu Ile Ile Lys Arg Ile Ile Met Ile Ser Ala Asp
 405 410 415
 His Gly Pro Ala Val Ser Gly Ala Phe Gly Thr Ile Leu Ala Ala Cys
 420 425 430
 Ala Gly Ile Asp Met Pro Gln Ala Val Ser Ala Gly Met Thr Met Ile
 435 440 445
 Gly Pro Arg Phe Gly Gly Ala Val Thr Asn Ala Gly Lys Tyr Phe Lys
 450 455 460
 Met Gly Val Lys Glu Tyr Pro Asn Asp Ile Pro Gly Phe Leu Ala Trp
 465 470 475 480
 Met Lys Lys Asn Val Gly Pro Val Pro Gly Ile Gly His Arg Val Lys
 485 490 495
 Ser Leu Arg Asn Pro Asp Gln Arg Val Lys Tyr Leu Val Ser Tyr Val
 500 505 510
 Lys Asn Glu Thr Ser Leu His Thr Pro Ile Leu Asn Tyr Ala Leu Glu
 515 520 525
 Val Glu Lys Ile Thr Thr Ala Lys Lys Glu Asn Leu Ile Leu Asn Val
 530 535 540
 Asp Gly Thr Ile Gly Cys Ile Leu Met Asp Leu Gly Phe Pro Glu His
 545 550 555 560
 Ser Leu Asn Gly Phe Phe Val Leu Ala Arg Thr Ile Gly Met Ile Gly
 565 570 575
 His Trp Ile Asp Gln Asn Asn Gln Asn Ser Arg Leu Ile Arg Leu Tyr
 580 585 590
 Asp Tyr Leu Ile Asn Tyr Ala Val Lys Pro Glu Arg Pro Val Pro Asp
 595 600 605
 Lys Lys
 610

```

<210> 125
<211> 1197
<212> DNA
<213> Chlorobium tepidum TLS
<400> 125
atggctaataa ttcttgaagg gcctgccatg aaattgttca acaagtgggg cattcctgtg      60
cctaattatg ttgttatcat ggaccctaaa cgtcttgac agcttggtga agctaataaa      120
tggctgcgtg aatcaaaaact tgtcgtcaag gctcacgaag cgatcggcgg ccggttcaag      180
cttggtcctt tcaaaatcgg actcaatctc gatgaggcaa tccaggcctc caggagatg      240
ctcggcgcca aagtcggtac ggctgaagtc cgccagggtca tcgtggcaga aatgctcgat      300
catgacgcag aattctatgt ctccattatc ggcaacagag atggtgccga gttactgatt      360
tccaaatatg gcggtgtcga tatcgaggat aactgggaca gcgttcgccg catccagatt      420
cctctcgatg aacatccgac catcgagcaa ctgaccgcgc tggccaaaga ggccggtttt      480
gaaggcgaaa tcgccgagcg cgtcggcaaa atctgttccc gcctcgttct ctgcttcgac      540
aacgaggacg cacagtctat cgaaatcaac ccgctgggtca tccgcaagag cgacatgcgt      600
ttcgtgcgc tcgacgcgct gatgaacgtc gattgggacg cccggttccg tcacgccgac      660
tggtatttca agccggtttc tgaaattggc cgtccgttta ccgaagccga gcagcagatc      720
atggacatcg actccaggat caagggttcg gtcaagttcg ttgaggtgcc tggcggtgaa      780
atcgctcttc tgaccgcagg cggaggcgca tcggtgttct atgccgacgc agtcgtggct      840
cgcgccggga ccatgcccaa ctatgcagag tattcgggcg acccgctga ctgggcccgtg      900
gaagcgctca cggaaaccaa ctgccgtttg cccaatatca agcacatcat cgtcgggtggc      960
gctatcgcca acttcaccga tgtcaaggca accttcagcg gtatcatcaa cggtttgcg      1020
gaaagcaagt cgaaaggcta cctcgaaggc gtcaaaatct gggtagcccg tggcgggtccg      1080
aacgaggctc agggccttgc cgccatcagg aagctccagg aggaaggctt cgacattcac      1140
gtctacgacc gctccatgcc gatgaccgat attgtcgacc tggctctgaa gtcttga      1197

```

```

<210> 126
<211> 398
<212> PRT
<213> Chlorobium tepidum TLS
<400> 126
Met Ala Lys Ile Leu Glu Gly Pro Ala Met Lys Leu Phe Asn Lys Trp
1          5          10          15

Gly Ile Pro Val Pro Asn Tyr Val Val Ile Met Asp Pro Lys Arg Leu
          20          25          30

Ala Gln Leu Gly Glu Ala Asn Lys Trp Leu Arg Glu Ser Lys Leu Val
          35          40          45

Val Lys Ala His Glu Ala Ile Gly Gly Arg Phe Lys Leu Gly Leu Val
          50          55          60

Lys Ile Gly Leu Asn Leu Asp Glu Ala Ile Gln Ala Ser Arg Glu Met
65          70          75          80

Leu Gly Ala Lys Val Gly Thr Ala Glu Val Arg Gln Val Ile Val Ala
          85          90          95

Glu Met Leu Asp His Asp Ala Glu Phe Tyr Val Ser Ile Ile Gly Asn
          100          105          110

Arg Asp Gly Ala Glu Leu Leu Ile Ser Lys Tyr Gly Gly Val Asp Ile
          115          120          125

Glu Asp Asn Trp Asp Ser Val Arg Arg Ile Gln Ile Pro Leu Asp Glu
          130          135          140

His Pro Thr Ile Glu Gln Leu Thr Ala Leu Ala Lys Glu Ala Gly Phe
145          150          155          160

Glu Gly Glu Ile Ala Glu Arg Val Gly Lys Ile Cys Ser Arg Leu Val
          165          170          175

```

Leu Cys Phe Asp Asn Glu Asp Ala Gln Ser Ile Glu Ile Asn Pro Leu
 180 185 190
 Val Ile Arg Lys Ser Asp Met Arg Phe Ala Ala Leu Asp Ala Val Met
 195 200 205
 Asn Val Asp Trp Asp Ala Arg Phe Arg His Ala Asp Trp Asp Phe Lys
 210 215 220
 Pro Val Ser Glu Ile Gly Arg Pro Phe Thr Glu Ala Glu Gln Gln Ile
 225 230 235 240
 Met Asp Ile Asp Ser Arg Ile Lys Gly Ser Val Lys Phe Val Glu Val
 245 250 255
 Pro Gly Gly Glu Ile Ala Leu Leu Thr Ala Gly Gly Gly Ala Ser Val
 260 265 270
 Phe Tyr Ala Asp Ala Val Val Ala Arg Gly Gly Thr Ile Ala Asn Tyr
 275 280 285
 Ala Glu Tyr Ser Gly Asp Pro Pro Asp Trp Ala Val Glu Ala Leu Thr
 290 295 300
 Glu Thr Ile Cys Arg Leu Pro Asn Ile Lys His Ile Ile Val Gly Gly
 305 310 315 320
 Ala Ile Ala Asn Phe Thr Asp Val Lys Ala Thr Phe Ser Gly Ile Ile
 325 330 335
 Asn Gly Leu Arg Glu Ser Lys Ser Lys Gly Tyr Leu Glu Gly Val Lys
 340 345 350
 Ile Trp Val Arg Arg Gly Gly Pro Asn Glu Ala Gln Gly Leu Ala Ala
 355 360 365
 Ile Arg Lys Leu Gln Glu Glu Gly Phe Asp Ile His Val Tyr Asp Arg
 370 375 380
 Ser Met Pro Met Thr Asp Ile Val Asp Leu Ala Leu Lys Ser
 385 390 395

<210> 127

<211> 1533

<212> DNA

<213> Escherichia coli K12

<400> 127

atgacgcaga	aaattgaaca	atctcaacga	caagaacggg	tagcggcctg	gaatcgtcgc	60
gctgaatgcg	atcttgccgc	tttccagaac	tcgccaaagc	aaacctacca	ggctgaaaaa	120
gcgcgcgacg	gcaaactgtg	cgccaacctg	gaagaagcga	ttcgctcgctc	tggtttacag	180
gacggcatga	cggtttccct	ccatcacgct	ttccgtggcg	gtgacctgac	cgtcaatatg	240
gtgatggacg	tcatcgcgaa	gatgggcttt	aaaaacctga	ccctggcgctc	cagctccctg	300
agtgattgcc	atgcgcgcgt	ggtagaacac	attcgccagg	gcgtgggttac	ccgcatttat	360
acctccggcc	tgcgtgggtc	actggcgga	gagatctccc	gtggtctgct	ggcagaaccg	420
gtgcagatcc	actctcacgg	cggtcgtgtg	catctggtac	agagcggcga	actgaatatc	480
gacgtggcct	tcctcggcgt	cccgtcctgt	gatgaattcg	gtaatgcca	cggctacacc	540
ggtaaaagcct	gctgcggctc	cctcggctat	gcaatagtgt	atgccgacaa	cgcaaaacag	600
gtcgtgatgc	ttaccgaaga	actgctgcct	tatccgcata	atccggcaag	cattgagcaa	660
gatcagggtg	atttgatcgt	caaagttgac	cgcgttgggc	atgctgcaaa	aatcggcgct	720
ggcgcgaccc	gtatgaccac	taaccgcgc	gaactgctta	ttgcccgtag	cgctgcggat	780
gtgattgtca	actctggcta	cttcaaagaa	ggtttctcca	tgcaaaccgg	caccggcggc	840
gcacgcgtgg	cggtaacccg	tttcttgga	gacaaaatgc	gtagccgcga	tattcgcgcc	900

```

gacttcgccc ttggcgggtat taccgcgacg atggttgacc tgcacgaaaa aggtctgatc 960
cgcaaactgc tggatgtgca gagctttgac agccatgctg cgcaatcgct ggcccgtaac 1020
cccaatcaca tcgaaatcag cgccaaccag tacgctaact ggggttcgaa aggcgcgcatcg 1080
gttgatcgctc tcgacgtggt ggtactgagc gcgctggaaa ttgacaccca gttcaacgtt 1140
aacgtgctga ccggtctctga cggcgactg cgtggtgctt ccggtggtca ctgcgatacc 1200
gcgattgcct ctgcgctttc catcatcgct gcgccgctgg tacgcggtcg tattccgact 1260
ctggtggata acgtactgac ctgcatcacc ccaggctcca gtgtcgatat tctggtcaca 1320
gaccacggta tcgcagttaa cccggcacgt ccggaactgg cagaacgtct gcaggaagcg 1380
ggcattaaag tggtttccat tgagtggctg cgcgaacgtg cgcgtctgct gaccggtgaa 1440
ccacagccga ttgaattcac agaccgcgct gttgccggtt tgcgttaccg cgatggctcg 1500
gtgatcgatg ttgtgcatca ggtgaaggaa taa 1533

```

<210> 128

<211> 510

<212> PRT

<213> Escherichia coli K12

<400> 128

```

Met Thr Gln Lys Ile Glu Gln Ser Gln Arg Gln Glu Arg Val Ala Ala
1          5          10          15

```

```

Trp Asn Arg Arg Ala Glu Cys Asp Leu Ala Ala Phe Gln Asn Ser Pro
20          25          30

```

```

Lys Gln Thr Tyr Gln Ala Glu Lys Ala Arg Asp Arg Lys Leu Cys Ala
35          40          45

```

```

Asn Leu Glu Glu Ala Ile Arg Arg Ser Gly Leu Gln Asp Gly Met Thr
50          55          60

```

```

Val Ser Phe His His Ala Phe Arg Gly Gly Asp Leu Thr Val Asn Met
65          70          75          80

```

```

Val Met Asp Val Ile Ala Lys Met Gly Phe Lys Asn Leu Thr Leu Ala
85          90          95

```

```

Ser Ser Ser Leu Ser Asp Cys His Ala Pro Leu Val Glu His Ile Arg
100         105         110

```

```

Gln Gly Val Val Thr Arg Ile Tyr Thr Ser Gly Leu Arg Gly Pro Leu
115        120        125

```

```

Ala Glu Glu Ile Ser Arg Gly Leu Leu Ala Glu Pro Val Gln Ile His
130        135        140

```

```

Ser His Gly Gly Arg Val His Leu Val Gln Ser Gly Glu Leu Asn Ile
145        150        155        160

```

```

Asp Val Ala Phe Leu Gly Val Pro Ser Cys Asp Glu Phe Gly Asn Ala
165        170        175

```

```

Asn Gly Tyr Thr Gly Lys Ala Cys Cys Gly Ser Leu Gly Tyr Ala Ile
180        185        190

```

```

Val Asp Ala Asp Asn Ala Lys Gln Val Val Met Leu Thr Glu Glu Leu
195        200        205

```

```

Leu Pro Tyr Pro His Asn Pro Ala Ser Ile Glu Gln Asp Gln Val Asp
210        215        220

```

```

Leu Ile Val Lys Val Asp Arg Val Gly Asp Ala Ala Lys Ile Gly Ala
225        230        235        240

```

```

Gly Ala Thr Arg Met Thr Thr Asn Pro Arg Glu Leu Leu Ile Ala Arg

```

245					250					255					
Ser	Ala	Ala	Asp	Val	Ile	Val	Asn	Ser	Gly	Tyr	Phe	Lys	Glu	Gly	Phe
			260					265					270		
Ser	Met	Gln	Thr	Gly	Thr	Gly	Gly	Ala	Ser	Leu	Ala	Val	Thr	Arg	Phe
		275					280					285			
Leu	Glu	Asp	Lys	Met	Arg	Ser	Arg	Asp	Ile	Arg	Ala	Asp	Phe	Ala	Leu
		290					295					300			
Gly	Gly	Ile	Thr	Ala	Thr	Met	Val	Asp	Leu	His	Glu	Lys	Gly	Leu	Ile
305						310					315				320
Arg	Lys	Leu	Leu	Asp	Val	Gln	Ser	Phe	Asp	Ser	His	Ala	Ala	Gln	Ser
				325					330					335	
Leu	Ala	Arg	Asn	Pro	Asn	His	Ile	Glu	Ile	Ser	Ala	Asn	Gln	Tyr	Ala
			340					345					350		
Asn	Trp	Gly	Ser	Lys	Gly	Ala	Ser	Val	Asp	Arg	Leu	Asp	Val	Val	Val
		355					360					365			
Leu	Ser	Ala	Leu	Glu	Ile	Asp	Thr	Gln	Phe	Asn	Val	Asn	Val	Leu	Thr
		370				375					380				
Gly	Ser	Asp	Gly	Val	Leu	Arg	Gly	Ala	Ser	Gly	Gly	His	Cys	Asp	Thr
385						390					395				400
Ala	Ile	Ala	Ser	Ala	Leu	Ser	Ile	Ile	Val	Ala	Pro	Leu	Val	Arg	Gly
				405					410					415	
Arg	Ile	Pro	Thr	Leu	Val	Asp	Asn	Val	Leu	Thr	Cys	Ile	Thr	Pro	Gly
			420					425					430		
Ser	Ser	Val	Asp	Ile	Leu	Val	Thr	Asp	His	Gly	Ile	Ala	Val	Asn	Pro
		435					440					445			
Ala	Arg	Pro	Glu	Leu	Ala	Glu	Arg	Leu	Gln	Glu	Ala	Gly	Ile	Lys	Val
		450				455					460				
Val	Ser	Ile	Glu	Trp	Leu	Arg	Glu	Arg	Ala	Arg	Leu	Leu	Thr	Gly	Glu
465						470					475				480
Pro	Gln	Pro	Ile	Glu	Phe	Thr	Asp	Arg	Val	Val	Ala	Val	Val	Arg	Tyr
			485					490						495	
Arg	Asp	Gly	Ser	Val	Ile	Asp	Val	Val	His	Gln	Val	Lys	Glu		
			500					505					510		

<210> 129

<211> 909

<212> DNA

<213> Escherichia coli K12

<400> 129

atgatttccg	cttcgctgca	acaacgtaaa	actcgcaccc	gccgcagcat	gttgtttgtg	60
cctggtgcca	atgccgcgat	ggtcagcaac	tccttcatct	acccggtga	tgccctgatg	120
tttgacctcg	aagactccgt	agcattgcgt	gaaaaagaca	ccgcccgcg	catggtttac	180
cacgcgctgc	aacatccgct	gtatcgcgat	attgaaacca	ttgtgcgtgt	caacgcgctg	240
gattccgaat	gggggtgtaa	cgacctggaa	gccgtcgttc	gcggtggtgc	ggacgttgtg	300
cgtctgccga	aaaccgatac	cgctcaggat	gttctggata	ttgaaaaaga	gatcctgcgt	360
atcgaaaaag	cctgtggtcg	tgaaccgcgc	agcaccggcc	tgctggcggc	gattgaatct	420
ccgctgggga	ttaccgcgcg	agtggaaatc	gctcacgctt	ccgagcggtt	gatcggtatc	480


```

gccctcgggtg cagaagacta tgtgcgcaac ctgcgtacag aacgctcccc ggaaggaact 540
gaactgctgt tgcacgctg ttccattttg caggccgcgc gctctgcggg tattcaggcg 600
ttcgataccg tctattccga cgctaacaac gaagccggat ttctgcaaga agccgcccac 660
atcaaacagc tgggctttga cggcaaatac ctgatcaacc cgcgtcagat tgatctgctg 720
cacaacctct acgcaccgac ccagaaagaa gtggatcacg cccgccgcgt cgtagaagcc 780
gctgaagccg ccgctcgcga aggcctcggc gtggtttccc tgaacggcaa gatggtggac 840
ggtccggtta tcgatcgcgc ccgtctggtg ctctcccgtg cagaactttc cggcatccgc 900
gaagaataa 909

```

<210> 130

<211> 302

<212> PRT

<213> Escherichia coli K12

<400> 130

Met Ile Ser Ala Ser Leu Gln Gln Arg Lys Thr Arg Thr Arg Arg Ser
1 5 10 15

Met Leu Phe Val Pro Gly Ala Asn Ala Ala Met Val Ser Asn Ser Phe
20 25 30

Ile Tyr Pro Ala Asp Ala Leu Met Phe Asp Leu Glu Asp Ser Val Ala
35 40 45

Leu Arg Glu Lys Asp Thr Ala Arg Arg Met Val Tyr His Ala Leu Gln
50 55 60

His Pro Leu Tyr Arg Asp Ile Glu Thr Ile Val Arg Val Asn Ala Leu
65 70 75 80

Asp Ser Glu Trp Gly Val Asn Asp Leu Glu Ala Val Val Arg Gly Gly
85 90 95

Ala Asp Val Val Arg Leu Pro Lys Thr Asp Thr Ala Gln Asp Val Leu
100 105 110

Asp Ile Glu Lys Glu Ile Leu Arg Ile Glu Lys Ala Cys Gly Arg Glu
115 120 125

Pro Gly Ser Thr Gly Leu Leu Ala Ala Ile Glu Ser Pro Leu Gly Ile
130 135 140

Thr Arg Ala Val Glu Ile Ala His Ala Ser Glu Arg Leu Ile Gly Ile
145 150 155 160

Ala Leu Gly Ala Glu Asp Tyr Val Arg Asn Leu Arg Thr Glu Arg Ser
165 170 175

Pro Glu Gly Thr Glu Leu Leu Phe Ala Arg Cys Ser Ile Leu Gln Ala
180 185 190

Ala Arg Ser Ala Gly Ile Gln Ala Phe Asp Thr Val Tyr Ser Asp Ala
195 200 205

Asn Asn Glu Ala Gly Phe Leu Gln Glu Ala Ala His Ile Lys Gln Leu
210 215 220

Gly Phe Asp Gly Lys Ser Leu Ile Asn Pro Arg Gln Ile Asp Leu Leu
225 230 235 240

His Asn Leu Tyr Ala Pro Thr Gln Lys Glu Val Asp His Ala Arg Arg
245 250 255

Val Val Glu Ala Ala Glu Ala Ala Ala Arg Glu Gly Leu Gly Val Val

260 265 270

Ser Leu Asn Gly Lys Met Val Asp Gly Pro Val Ile Asp Arg Ala Arg
275 280 285

Leu Val Leu Ser Arg Ala Glu Leu Ser Gly Ile Arg Glu Glu
290 295 300

<210> 131
<211> 297
<212> DNA
<213> Escherichia coli K12
<400> 131
atgaaaataa accagcccg cgttgcaggc acccttgagt ctgggggatgt gatgatacgc 60
atcgccccac tcgatacgca ggatatcgac ctgcaaataca atagcagcgt tgagaaacag 120
tttggcgatg caattcgcac caccattctg gacgttctcg cccgctacaa cgtgcgcggc 180
gtacagctga atgtcgatga caaaggcgca ctggactgca ttttacgtgc acgactggaa 240
gccctgctgg cagcgccag cggatatcccg gctctgccat gggaggattg ccaatga 297

<210> 132
<211> 98
<212> PRT
<213> Escherichia coli K12
<400> 132
Met Lys Ile Asn Gln Pro Ala Val Ala Gly Thr Leu Glu Ser Gly Asp
1 5 10 15
Val Met Ile Arg Ile Ala Pro Leu Asp Thr Gln Asp Ile Asp Leu Gln
20 25 30
Ile Asn Ser Ser Val Glu Lys Gln Phe Gly Asp Ala Ile Arg Thr Thr
35 40 45
Ile Leu Asp Val Leu Ala Arg Tyr Asn Val Arg Gly Val Gln Leu Asn
50 55 60
Val Asp Asp Lys Gly Ala Leu Asp Cys Ile Leu Arg Ala Arg Leu Glu
65 70 75 80
Ala Leu Leu Ala Arg Ala Ser Gly Ile Pro Ala Leu Pro Trp Glu Asp
85 90 95

Cys Gln

<210> 133
<211> 1824
<212> DNA
<213> Hydrogenobacter thermophilus
<400> 133
atggcgtttg atttgaccat caaaatagggt ggtgaagggtg gtgaagggtgt tatatccgcc 60
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gatataacctg tgcagtctat aaaagactca ataaaagcaa agtttttaag aaagggacag 480
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gcttatccca taacgccggc aacgacggta ggaaactaca tagtagaaga cctcataagg 720
gtgggagggt ggctctatca agctgaggat gaaatagcct ccctcggtat ggctttaggg 780

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gcttcttttg caggcgtaaa agctatgacc gccacctccg gaccgggatt atgccttatg 840
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agggtaggac ctgcaacggg tatgcctacc aagcacgaac agggagacct ctaccacgcc 960
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aaggctgaca taggtatcat atcctggggt cttaccgcat ccgctacaaa ggaggctgtt 1500
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<210> 134

<211> 607

<212> PRT

<213> Hydrogenobacter thermophilus

<400> 134

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Met Ala Phe Asp Leu Thr Ile Lys Ile Gly Gly Glu Gly Gly Glu Gly
1          5          10          15

Val Ile Ser Ala Gly Asp Phe Leu Thr Glu Ser Ala Ala Arg Ala Gly
          20          25          30

Tyr Tyr Val Val Asn Phe Lys Ser Phe Pro Ala Glu Ile Lys Gly Gly
          35          40          45

Tyr Ala Gln Ser Thr Ile Arg Val Ser Asn Lys Lys Leu Tyr Thr Thr
          50          55          60

Gly Asp Gly Phe Asp Ile Leu Cys Cys Phe Asn Gly Glu Ala Tyr Glu
65          70          75          80

Phe Asn Arg Lys His Leu Arg Pro Gly Thr Val Leu Val Tyr Asp Ser
          85          90          95

Ser Asp Phe Glu Pro Glu Glu His Glu Gly Val Val Met Tyr Pro Val
          100          105          110

Pro Leu Ser His Leu Ala Lys Asp Ile Met Lys Ala Tyr Ile Thr Lys
          115          120          125

Asn Val Ile Ala Leu Gly Val Leu Cys Gly Leu Phe Asp Ile Pro Val
          130          135          140

Gln Ser Ile Lys Asp Ser Ile Lys Ala Lys Phe Leu Arg Lys Gly Gln
145          150          155          160

Glu Ile Ile Glu Leu Asn Tyr Lys Ala Leu Glu Thr Gly Ile Asn Tyr
          165          170          175

Val Arg Glu Asn Ile Lys Lys Leu Asp Gly Tyr Leu Phe Pro Pro Ala
          180          185          190

Lys Glu Pro Lys Asp Val Val Ile Met Glu Gly Asn Gln Ala Ile Ala
          195          200          205

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Lys Gly Ala Val Val Ala Gly Cys Lys Phe Tyr Ala Ala Tyr Pro Ile
 210 215 220
 Thr Pro Ala Thr Thr Val Gly Asn Tyr Ile Val Glu Asp Leu Ile Arg
 225 230 235 240
 Val Gly Gly Trp Leu Tyr Gln Ala Glu Asp Glu Ile Ala Ser Leu Gly
 245 250 255
 Met Ala Leu Gly Ala Ser Phe Ala Gly Val Lys Ala Met Thr Ala Thr
 260 265 270
 Ser Gly Pro Gly Leu Cys Leu Met Thr Glu Phe Ile Ser Tyr Ala Gly
 275 280 285
 Met Thr Glu Leu Pro Ile Val Ile Val Asp Val Gln Arg Val Gly Pro
 290 295 300
 Ala Thr Gly Met Pro Thr Lys His Glu Gln Gly Asp Leu Tyr His Ala
 305 310 315 320
 Ile Tyr Ser Gly His Gly Glu Ile Pro Arg Ala Val Leu Ala Pro Thr
 325 330 335
 Asn Val Glu Glu Ser Phe Tyr Leu Thr Val Glu Ala Phe Asn Leu Ala
 340 345 350
 Glu Lys Tyr Gln Ile Pro Val Ile Val Leu Thr Asp Ala Ser Leu Ser
 355 360 365
 Leu Arg Ala Glu Ala Phe Pro Thr Pro Lys Val Lys Asp Ile Lys Val
 370 375 380
 Ile Asn Arg Trp Val Tyr Asn Ala Glu Asp Asp Pro Glu Gly Lys Phe
 385 390 395 400
 Arg Arg Ala Gly Arg Phe Leu Arg Tyr Ala Leu Phe Thr Glu Asp Gly
 405 410 415
 Ile Thr Pro Met Gly Val Pro Gly Asp Pro Asn Ala Ile His Ala Ile
 420 425 430
 Thr Gly Leu Glu Arg Gln Glu Asn Ser Asp Pro Arg Asn Arg Pro Asp
 435 440 445
 Ile Arg Thr Trp Gln Met Asp Lys Arg Phe Lys Lys Met Glu Lys Leu
 450 455 460
 Leu Arg Glu Asp Ala Glu Lys Phe Tyr Glu Met Asp Ala Pro Phe Glu
 465 470 475 480
 Lys Ala Asp Ile Gly Ile Ile Ser Trp Gly Leu Thr Ala Ser Ala Thr
 485 490 495
 Lys Glu Ala Val Glu Arg Leu Arg Ser Lys Gly Arg Lys Ile Asn Ala
 500 505 510
 Leu Tyr Pro Lys Leu Leu Trp Pro Leu Arg Val Asp Ile Leu Glu Asn
 515 520 525
 Phe Ala Lys Ser Cys Arg Arg Ile Ile Met Pro Glu Ser Asn Tyr Ser
 530 535 540

Gly Gln Leu Ala Thr Val Leu Arg Ala Glu Thr Arg Ile Arg Pro Ile
545 550 555 560

Ser Tyr Cys Ile Tyr Arg Gly Glu Pro Phe Ile Pro Arg Glu Ile Glu
565 570 575

Glu Phe Ile Glu Tyr Val Leu Glu Asn Ser Tyr Ile Glu Glu Gly Lys
580 585 590

Phe Thr Pro Ala Asn Leu Tyr Gly Glu Lys Ala Tyr Gly Leu Ile
595 600 605

<210> 135

<211> 888

<212> DNA

<213> *Hydrogenobacter thermophilus*

<400> 135

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ttaagcctg aaaacatagt ttccgtatcc ggtataggtt gttcctcaag gcttcccctc      180
tttgttaaaa actactcggg gcattcactg cacggaagag ctatcccagt agctgtaggc      240
ataaagctgg caaggccgga ccttaccgtc atagtggaaa cgggcgacgg agacctcttc      300
tccataggcg cgggacacaa cccacacgca gcacgcagaa acatagacat aaccgtcata      360
tgtatggaca atcagggttta tggctttacc aaaaatcaag tttctccaac ttcaagggaa      420
ggactttacg gctccctaac accttacggc tccatagaca gacctgtaaa ccccatagcc      480
accatgctct cctacgggtg cacttttgtt gcacagactt atgcgggcaa tctcaagcac      540
atgacagagg tgataaagca agctatacag cataaaggct tttcctttgt aaatgtgata      600
tctccctgcc ccacctttaa caaagtggac accttccagt actataaggg taagggtgaag      660
gacataaacg agcaggggaca cgacccatcc gattacagaa aggctcttga acttgctttc      720
catgaccttg accactatca cgatccgaac gctccagtac ctataggcgt attttacaaa      780
gctgagctgg aaacctacga agacaggatg cagtccgtga agagaaggta caaacagggtg      840
gaagatgtgc aagaactcat agatatgtgt aagccaaaaa ctttatga      888

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<210> 136

<211> 295

<212> PRT

<213> *Hydrogenobacter thermophilus*

<400> 136

Met Leu Glu Val His Leu Lys Pro Ala Asp Tyr Lys Ser Asp Val Glu
1 5 10 15

Pro Thr Trp Cys Ser Gly Cys Gly Asp Phe Gly Val Val Ala Ala Leu
20 25 30

Thr Arg Ala Tyr Ser Glu Leu Gly Leu Lys Pro Glu Asn Ile Val Ser
35 40 45

Val Ser Gly Ile Gly Cys Ser Ser Arg Leu Pro Leu Phe Val Lys Asn
50 55 60

Tyr Ser Val His Ser Leu His Gly Arg Ala Ile Pro Val Ala Val Gly
65 70 75 80

Ile Lys Leu Ala Arg Pro Asp Leu Thr Val Ile Val Glu Thr Gly Asp
85 90 95

Gly Asp Leu Phe Ser Ile Gly Ala Gly His Asn Pro His Ala Ala Arg
100 105 110

Arg Asn Ile Asp Ile Thr Val Ile Cys Met Asp Asn Gln Val Tyr Gly
115 120 125

Leu Thr Lys Asn Gln Val Ser Pro Thr Ser Arg Glu Gly Leu Tyr Gly

130	135	140
Ser Leu Thr Pro Tyr Gly	Ser Ile Asp Arg Pro	Val Asn Pro Ile Ala
145	150	155 160
Thr Met Leu Ser Tyr Gly	Ala Thr Phe Val Ala	Gln Thr Tyr Ala Gly
	165	170 175
Asn Leu Lys His Met Thr	Glu Val Ile Lys Gln	Ala Ile Gln His Lys
	180	185 190
Gly Phe Ser Phe Val Asn	Val Ile Ser Pro Cys	Pro Thr Phe Asn Lys
	195	200 205
Val Asp Thr Phe Gln Tyr	Tyr Lys Gly Lys Val	Lys Asp Ile Asn Glu
	210	215 220
Gln Gly His Asp Pro Ser	Asp Tyr Arg Lys Ala	Leu Glu Leu Ala Phe
	225	230 235 240
His Asp Leu Asp His Tyr	His Asp Pro Asn Ala	Pro Val Pro Ile Gly
	245	250 255
Val Phe Tyr Lys Ala Glu	Leu Glu Thr Tyr Glu	Asp Arg Met Gln Ser
	260	265 270
Val Lys Arg Arg Tyr Lys	Gln Val Glu Asp Val	Gln Glu Leu Ile Asp
	275	280 285
Met Cys Lys Pro Lys Ala	Leu	
	290	295

<210> 137

<211> 1119

<212> DNA

<213> Escherichia coli K12

<400> 137

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aagattgcct	gggcgctgga	gaacaaaccg	cgcattccgg	tggatatggat	ccacggtctg	180
gaatgcacct	gctgtaccga	atctttttatc	cgctccgctc	acccactggc	gaaggacgtc	240
atcctttccc	tgattttccct	cgattacgac	gatactttga	tggctgccgc	cggaacccag	300
gcggaagaag	tctttgaaga	catcatcacg	caatacaatg	gcaaataat	cctcgcagta	360
gaaggtaatc	cgccgctggg	cgagcagggg	atgttctgta	tcagcagcgg	tcgaccgttt	420
attgagaaac	tcaaacgtgc	cgctgccgga	gccagcgcca	ttatcgccctg	gggaacctgc	480
gcgtcctggg	gctgcgtgca	ggccgcgcga	cccaatccga	cgcaggcaac	gcctatcgac	540
aaagtcatca	ccgacaaacc	cattatcaaa	gtacctggct	gcccgccgat	cccggatgtg	600
atgagcgcca	tcattactta	catggtgacc	tttgatcgct	tgccagatgt	cgacagaatg	660
ggccgtccgc	tgatgttcta	tggtcagcga	atccacgata	aatgctatcg	ccgcgcccac	720
ttcgacgccg	gagagtctgt	ccagagtggg	gatgatgacg	ctgcccgcga	aggttactgc	780
ctgtacaaaa	tgggctgcaa	agggcctacc	acctataacg	cctgttcctc	cacacgctgg	840
aatgatggcg	tttctttccc	aatccagtct	ggtcacggct	gcctgggctg	tcgggaaaat	900
ggtttctggg	atcgcggttc	gttctacagc	cgctgggtcg	atattccgca	aatgggtact	960
cattccaccg	ccgataccgt	cggtttaacc	gcgcttggcg	tggtggcgagc	ggctgttggg	1020
gtgcacgcag	tcgccagcgc	cgttgaccag	cgcagacgtc	ataaccagca	acctacagaa	1080
accgaacatc	agccaggcaa	tgaggataaa	caggcatga			1119

<210> 138

<211> 372

<212> PRT

<213> Escherichia coli K12

<400> 138

Met Asn Asn Glu Glu Thr Phe Tyr Gln Ala Met Arg Arg Gln Gly Val

1	5	10	15
Thr Arg Arg Ser Phe Leu Lys Tyr Cys Ser Leu Ala Ala Thr Ser Leu	20	25	30
Gly Leu Gly Ala Gly Met Ala Pro Lys Ile Ala Trp Ala Leu Glu Asn	35	40	45
Lys Pro Arg Ile Pro Val Val Trp Ile His Gly Leu Glu Cys Thr Cys	50	55	60
Cys Thr Glu Ser Phe Ile Arg Ser Ala His Pro Leu Ala Lys Asp Val	65	70	75
Ile Leu Ser Leu Ile Ser Leu Asp Tyr Asp Asp Thr Leu Met Ala Ala	85	90	95
Ala Gly Thr Gln Ala Glu Glu Val Phe Glu Asp Ile Ile Thr Gln Tyr	100	105	110
Asn Gly Lys Tyr Ile Leu Ala Val Glu Gly Asn Pro Pro Leu Gly Glu	115	120	125
Gln Gly Met Phe Cys Ile Ser Ser Gly Arg Pro Phe Ile Glu Lys Leu	130	135	140
Lys Arg Ala Ala Ala Gly Ala Ser Ala Ile Ile Ala Trp Gly Thr Cys	145	150	155
Ala Ser Trp Gly Cys Val Gln Ala Ala Arg Pro Asn Pro Thr Gln Ala	165	170	175
Thr Pro Ile Asp Lys Val Ile Thr Asp Lys Pro Ile Ile Lys Val Pro	180	185	190
Gly Cys Pro Pro Ile Pro Asp Val Met Ser Ala Ile Ile Thr Tyr Met	195	200	205
Val Thr Phe Asp Arg Leu Pro Asp Val Asp Arg Met Gly Arg Pro Leu	210	215	220
Met Phe Tyr Gly Gln Arg Ile His Asp Lys Cys Tyr Arg Arg Ala His	225	230	235
Phe Asp Ala Gly Glu Phe Val Gln Ser Trp Asp Asp Asp Ala Ala Arg	245	250	255
Lys Gly Tyr Cys Leu Tyr Lys Met Gly Cys Lys Gly Pro Thr Thr Tyr	260	265	270
Asn Ala Cys Ser Ser Thr Arg Trp Asn Asp Gly Val Ser Phe Pro Ile	275	280	285
Gln Ser Gly His Gly Cys Leu Gly Cys Ala Glu Asn Gly Phe Trp Asp	290	295	300
Arg Gly Ser Phe Tyr Ser Arg Val Val Asp Ile Pro Gln Met Gly Thr	305	310	315
His Ser Thr Ala Asp Thr Val Gly Leu Thr Ala Leu Gly Val Val Ala	325	330	335
Ala Ala Val Gly Val His Ala Val Ala Ser Ala Val Asp Gln Arg Arg			

340

345

350

Arg His Asn Gln Gln Pro Thr Glu Thr Glu His Gln Pro Gly Asn Glu
 355 360 365

Asp Lys Gln Ala
 370

<210> 139

<211> 1794

<212> DNA

<213> Escherichia coli K12

<400> 139

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aatgtgatca ccaatgccgt ctccctgcggc accatgtttc gcgggctgga gatcataccta      180
caagggcgcg acccgcgcgga tgcgtggggc ttcggtgaac gtatctgcgg cgtctgtact      240
ggcgtaacag ccctggcttc ggtttacgcc atcgaagatg ctatcggtat taaagtgccg      300
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gccatcgggtc agttcaacaa accgtggagc gaaatcggca ctggtctttc tgataaatgc      900
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cccaaagggc agattggcgc ttatgaagcg gcgctgatga acacaaaaat ggcgatcccc     1680
gagcaaccgc tggagatcct gcgtactctg cacagctttg acccgtgcct cgctgtttca     1740
acacacgtgc tgggcgacga cggtagcgag ctgatctccg tgcaggtgcg ttaa      1794

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<210> 140

<211> 597

<212> PRT

<213> Escherichia coli K12

<400> 140

Met Ser Thr Gln Tyr Glu Thr Gln Gly Tyr Thr Ile Asn Asn Ala Gly
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Arg Arg Leu Val Val Asp Pro Ile Thr Arg Ile Glu Gly His Met Arg
 20 25 30

Cys Glu Val Asn Ile Asn Asp Gln Asn Val Ile Thr Asn Ala Val Ser
 35 40 45

Cys Gly Thr Met Phe Arg Gly Leu Glu Ile Ile Leu Gln Gly Arg Asp
 50 55 60

Pro Arg Asp Ala Trp Ala Phe Val Glu Arg Ile Cys Gly Val Cys Thr
 65 70 75 80

Gly	Val	His	Ala	Leu	Ala	Ser	Val	Tyr	Ala	Ile	Glu	Asp	Ala	Ile	Gly	85	90	95
Ile	Lys	Val	Pro	Asp	Asn	Ala	Asn	Ile	Ile	Arg	Asn	Ile	Met	Leu	Ala	100	105	110
Thr	Leu	Trp	Cys	His	Asp	His	Leu	Val	His	Phe	Tyr	Gln	Leu	Ala	Gly	115	120	125
Met	Asp	Trp	Ile	Asp	Val	Leu	Asp	Ala	Leu	Lys	Ala	Asp	Pro	Arg	Lys	130	135	140
Thr	Ser	Glu	Leu	Ala	Gln	Ser	Leu	Ser	Ser	Trp	Pro	Lys	Ser	Ser	Pro	145	150	155
Gly	Tyr	Phe	Phe	Asp	Val	Gln	Asn	Arg	Leu	Lys	Lys	Phe	Val	Glu	Gly	165	170	175
Gly	Gln	Leu	Gly	Ile	Phe	Arg	Asn	Gly	Tyr	Trp	Gly	His	Pro	Gln	Tyr	180	185	190
Lys	Leu	Pro	Pro	Glu	Ala	Asn	Leu	Met	Gly	Phe	Ala	His	Tyr	Leu	Glu	195	200	205
Ala	Leu	Asp	Phe	Gln	Arg	Glu	Ile	Val	Lys	Ile	His	Ala	Val	Phe	Gly	210	215	220
Gly	Lys	Asn	Pro	His	Pro	Asn	Trp	Ile	Val	Gly	Gly	Met	Pro	Cys	Ala	225	230	235
Ile	Asn	Ile	Asp	Glu	Ser	Gly	Ala	Val	Gly	Ala	Val	Asn	Met	Glu	Arg	245	250	255
Leu	Asn	Leu	Val	Gln	Ser	Ile	Ile	Thr	Arg	Thr	Ala	Asp	Phe	Ile	Asn	260	265	270
Asn	Val	Met	Ile	Pro	Asp	Ala	Leu	Ala	Ile	Gly	Gln	Phe	Asn	Lys	Pro	275	280	285
Trp	Ser	Glu	Ile	Gly	Thr	Gly	Leu	Ser	Asp	Lys	Cys	Val	Leu	Ser	Tyr	290	295	300
Gly	Ala	Phe	Pro	Asp	Ile	Ala	Asn	Asp	Phe	Gly	Glu	Lys	Ser	Leu	Leu	305	310	315
Met	Pro	Gly	Gly	Ala	Val	Ile	Asn	Gly	Asp	Phe	Asn	Asn	Val	Leu	Pro	325	330	335
Val	Asp	Leu	Val	Asp	Pro	Gln	Gln	Val	Gln	Glu	Phe	Val	Asp	His	Ala	340	345	350
Trp	Tyr	Arg	Tyr	Pro	Asn	Asp	Gln	Val	Gly	Arg	His	Pro	Phe	Asp	Gly	355	360	365
Ile	Thr	Asp	Pro	Trp	Tyr	Asn	Pro	Gly	Asp	Val	Lys	Gly	Ser	Asp	Thr	370	375	380
Asn	Ile	Gln	Gln	Leu	Asn	Glu	Gln	Glu	Arg	Tyr	Ser	Trp	Ile	Lys	Ala	385	390	395
Pro	Arg	Trp	Arg	Gly	Asn	Ala	Met	Glu	Val	Gly	Pro	Leu	Ala	Arg	Thr	405	410	415

Leu Ile Ala Tyr His Lys Gly Asp Ala Ala Thr Val Glu Ser Val Asp
420 425 430

Arg Met Met Ser Ala Leu Asn Leu Pro Leu Ser Gly Ile Gln Ser Thr
435 440 445

Leu Gly Arg Ile Leu Cys Arg Ala His Glu Ala Gln Trp Ala Ala Gly
450 455 460

Lys Leu Gln Tyr Phe Phe Asp Lys Leu Met Thr Asn Leu Lys Asn Gly
465 470 475 480

Asn Leu Ala Thr Ala Ser Thr Glu Lys Trp Glu Pro Ala Thr Trp Pro
485 490 495

Thr Glu Cys Arg Gly Val Gly Phe Thr Glu Ala Pro Arg Gly Ala Leu
500 505 510

Gly His Trp Ala Ala Ile Arg Asp Gly Lys Ile Asp Leu Tyr Gln Cys
515 520 525

Val Val Pro Thr Thr Trp Asn Ala Ser Pro Arg Asp Pro Lys Gly Gln
530 535 540

Ile Gly Ala Tyr Glu Ala Ala Leu Met Asn Thr Lys Met Ala Ile Pro
545 550 555 560

Glu Gln Pro Leu Glu Ile Leu Arg Thr Leu His Ser Phe Asp Pro Cys
565 570 575

Leu Ala Cys Ser Thr His Val Leu Gly Asp Asp Gly Ser Glu Leu Ile
580 585 590

Ser Val Gln Val Arg
595

<210> 141

<211> 708

<212> DNA

<213> Escherichia coli K12

<400> 141

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aagccgctac cttccgtcag cggcgaggcg acgtatctgt tctatatggg ctacatcagg      180
ttaattcact tcagcgccgg gatgggtttt accgtggttt tgctgatgcg gatctactgg      240
gcttttggtg gcaatcgata ctcccgcgag ctgtttatcg tgccggtatg gcgtaaaagc      300
tggtggcagg gcgtgtggta tgaaatccgc tggatatctg ttctggcaaa acgtccgagt      360
gccgatatag gccataatcc catcgcccag gcggcgatgt tcggctatct cctgatgtcg      420
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gcgccgttcc gttatgtggt ggaatttttc tactggacgg gtggcaactc aatggacatt      540
cacagctggc atcggctggg gatgtggctg attggcgcg tttgtgatcg tcatgtctac      600
atggcgctgc gtgaagacat catgtccgac gacacggtga tctccaccat ggtcaacggc      660
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<210> 142

<211> 235

<212> PRT

<213> Escherichia coli K12

<400> 142

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Pro Val Arg Ile Trp His Trp Leu Thr Val Leu Cys Met Ala Val Leu
20 25 30

Met Val Thr Gly Tyr Phe Ile Gly Lys Pro Leu Pro Ser Val Ser Gly
35 40 45

Glu Ala Thr Tyr Leu Phe Tyr Met Gly Tyr Ile Arg Leu Ile His Phe
50 55 60

Ser Ala Gly Met Val Phe Thr Val Val Leu Leu Met Arg Ile Tyr Trp
65 70 75 80

Ala Phe Val Gly Asn Arg Tyr Ser Arg Glu Leu Phe Ile Val Pro Val
85 90 95

Trp Arg Lys Ser Trp Trp Gln Gly Val Trp Tyr Glu Ile Arg Trp Tyr
100 105 110

Leu Phe Leu Ala Lys Arg Pro Ser Ala Asp Ile Gly His Asn Pro Ile
115 120 125

Ala Gln Ala Ala Met Phe Gly Tyr Phe Leu Met Ser Val Phe Met Ile
130 135 140

Ile Thr Gly Phe Ala Leu Tyr Ser Glu His Ser Gln Tyr Ala Ile Phe
145 150 155 160

Ala Pro Phe Arg Tyr Val Val Glu Phe Phe Tyr Trp Thr Gly Gly Asn
165 170 175

Ser Met Asp Ile His Ser Trp His Arg Leu Gly Met Trp Leu Ile Gly
180 185 190

Ala Phe Val Ile Gly His Val Tyr Met Ala Leu Arg Glu Asp Ile Met
195 200 205

Ser Asp Asp Thr Val Ile Ser Thr Met Val Asn Gly Tyr Arg Ser His
210 215 220

Lys Phe Gly Lys Ile Ser Asn Lys Glu Arg Ser
225 230 235

<210> 143

<211> 588

<212> DNA

<213> Escherichia coli K12

<400> 143

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atgagcgcgc aacgcgtggt ggtcatgggg ctgggcaacc tgctgtgggc cgatgaaggc      60
ttcggcgtgc ggggtggcgga acggctgtat gccattacc actggcccga gtatgtggag      120
attgtcgatg gcggtactca gggactgaac ttgctggggt atgtcgaaag cgccagccat      180
ctgttgattc tcgatgccat tgactacggg ctggaacctg gaacgctgcg aacctatgcc      240
ggagaacgca ttccggctta tctcagcgcg aagaaaatga gcctgcatca gaacagtttc      300
tccgaagtgt tggcgctggc ggatatccgc ggacatctgc cagcacatat tgccctcgtc      360
ggtctgcaac ccgcaatgct cgacgactac ggcggtagcc tgagcgaaact ggcacgggag      420
caactgcccg ctgcggaaca ggcggcgctg gcgcagcttg ctgcgtgggg aattgtgccg      480
caaccggcta atgaatcgcg ctgtctcaat tatgactgtc tgtcgatgga aaattacgaa      540
ggcgttcgct tgcgccagta ccggatgaca caggaggagc agggatga      588

```

<210> 144

<211> 195

<212> PRT

<213> Escherichia coli K12

<400> 144

Met Ser Glu Gln Arg Val Val Val Met Gly Leu Gly Asn Leu Leu Trp
 1 5 10 15

Ala Asp Glu Gly Phe Gly Val Arg Val Ala Glu Arg Leu Tyr Ala His
 20 25 30

Tyr His Trp Pro Glu Tyr Val Glu Ile Val Asp Gly Gly Thr Gln Gly
 35 40 45

Leu Asn Leu Leu Gly Tyr Val Glu Ser Ala Ser His Leu Leu Ile Leu
 50 55 60

Asp Ala Ile Asp Tyr Gly Leu Glu Pro Gly Thr Leu Arg Thr Tyr Ala
 65 70 75 80

Gly Glu Arg Ile Pro Ala Tyr Leu Ser Ala Lys Lys Met Ser Leu His
 85 90 95

Gln Asn Ser Phe Ser Glu Val Leu Ala Leu Ala Asp Ile Arg Gly His
 100 105 110

Leu Pro Ala His Ile Ala Leu Val Gly Leu Gln Pro Ala Met Leu Asp
 115 120 125

Asp Tyr Gly Gly Ser Leu Ser Glu Leu Ala Arg Glu Gln Leu Pro Ala
 130 135 140

Ala Glu Gln Ala Ala Leu Ala Gln Leu Ala Ala Trp Gly Ile Val Pro
 145 150 155 160

Gln Pro Ala Asn Glu Ser Arg Cys Leu Asn Tyr Asp Cys Leu Ser Met
 165 170 175

Glu Asn Tyr Glu Gly Val Arg Leu Arg Gln Tyr Arg Met Thr Gln Glu
 180 185 190

Glu Gln Gly
 195

<210> 145
 <211> 399
 <212> DNA
 <213> Escherichia coli K12
 <400> 145

atgagcaacg acacgccatt tgatgcgttg tggcaacgaa tgctggcgcg cggctggacg 60
 ccagtcagtg aatccccgtct tgacgactgg cttacgcaag cgccagacgg cgtgggtgta 120
 ttaagcagtg acccgaaacg cacgccagag gtcagcgata atccggtaat gattggcgaa 180
 ttactgcgcg agtttcccga ctatacatgg caggtggcga ttgctgacct tgagcagagc 240
 gaagccatcg gcgatcgctt tggcgtcttt cgctttcctg ccactttagt gtttaccggc 300
 ggaaactatc gcggcgtgct gaatggtatt caccctgggg cggaactgat aaacctgatg 360
 cgcgggcttg tcgaaccgca gcaggagcgt gcctcatga 399

<210> 146
 <211> 132
 <212> PRT
 <213> Escherichia coli K12
 <400> 146

Met Ser Asn Asp Thr Pro Phe Asp Ala Leu Trp Gln Arg Met Leu Ala
 1 5 10 15

Arg Gly Trp Thr Pro Val Ser Glu Ser Arg Leu Asp Asp Trp Leu Thr
 20 25 30

Gln Ala Pro Asp Gly Val Val Leu Leu Ser Ser Asp Pro Lys Arg Thr
 35 40 45

Pro Glu Val Ser Asp Asn Pro Val Met Ile Gly Glu Leu Leu Arg Glu
 50 55 60

Phe Pro Asp Tyr Thr Trp Gln Val Ala Ile Ala Asp Leu Glu Gln Ser
 65 70 75 80

Glu Ala Ile Gly Asp Arg Phe Gly Val Phe Arg Phe Pro Ala Thr Leu
 85 90 95

Val Phe Thr Gly Gly Asn Tyr Arg Gly Val Leu Asn Gly Ile His Pro
 100 105 110

Trp Ala Glu Leu Ile Asn Leu Met Arg Gly Leu Val Glu Pro Gln Gln
 115 120 125

Glu Arg Ala Ser
 130

<210> 147
 <211> 858
 <212> DNA
 <213> Escherichia coli K12
 <400> 147

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agcatgaatc	cactgccgat	cacctgtcag	gtgaatgatg	aaccgagtat	ggcggccctg	120
gagcaatgtg	ctcacagccc	gcaggtgatt	gcgctgttaa	acgagttaca	acatcaacta	180
agcgaacgcc	aaccgccgtt	gggcgaggtg	ctggcagtcg	atctgttaaa	tctcaacgcc	240
gacgatcgtc	actttatcaa	tacgcttctc	ggggaagggg	aagtgtcagt	gcgcattcag	300
caggctgacg	acagtgaaag	tgaaatacag	gaggcgatct	tctgcggatt	atggcgggtg	360
cgcagacgtc	gcggcgaaaa	gttgctggag	gacaaactgg	aggctggctg	cgcgccgctg	420
gcgttggtgc	aggcggcaac	gcaaaatctc	ttgccgacag	attcgctgtt	accgccgccc	480
attgatggcc	tgatgaatgg	cctaccgttg	gcgcatgagt	tactggcaca	tgtacgtaac	540
cccgcgcgc	agccgcacag	cattaatctg	acgcaattac	ccatcagcga	ggctgatcgg	600
ctttttctct	cacgtctctg	tgggccggga	aatattcaga	ttcgtaccat	tggctatggc	660
gagagctata	tcaacgccac	ggggttacgc	catgtctggc	atttacgctg	tacggacacc	720
ttaaaaggcc	cgttactgga	aagttatgaa	atctgcccac	taccggaagt	ggtgctggca	780
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gaagctgcac	cgacgtaa					858

<210> 148
 <211> 285
 <212> PRT
 <213> Escherichia coli K12
 <400> 148

Met	Ser	Glu	Thr	Phe	Phe	His	Leu	Leu	Gly	Pro	Gly	Thr	Gln	Pro	Asn
1				5					10					15	

Asp Asp Ser Phe Ser Met Asn Pro Leu Pro Ile Thr Cys Gln Val Asn
 20 25 30

Asp Glu Pro Ser Met Ala Ala Leu Glu Gln Cys Ala His Ser Pro Gln
 35 40 45

Val Ile Ala Leu Leu Asn Glu Leu Gln His Gln Leu Ser Glu Arg Gln
 50 55 60

Pro Pro Leu Gly Glu Val Leu Ala Val Asp Leu Leu Asn Leu Asn Ala
 65 70 75 80

Asp Asp Arg His Phe Ile Asn Thr Leu Leu Gly Glu Gly Glu Val Ser

85					90					95						
Val	Arg	Ile	Gln	Gln	Ala	Asp	Asp	Ser	Glu	Ser	Glu	Ile	Gln	Glu	Ala	
100					105					110						
Ile	Phe	Cys	Gly	Leu	Trp	Arg	Val	Arg	Arg	Arg	Arg	Gly	Glu	Lys	Leu	
115					120					125						
Leu	Glu	Asp	Lys	Leu	Glu	Ala	Gly	Cys	Ala	Pro	Leu	Ala	Leu	Trp	Gln	
130					135					140						
Ala	Ala	Thr	Gln	Asn	Leu	Leu	Pro	Thr	Asp	Ser	Leu	Leu	Pro	Pro	Pro	
145					150					155					160	
Ile	Asp	Gly	Leu	Met	Asn	Gly	Leu	Pro	Leu	Ala	His	Glu	Leu	Leu	Ala	
165					170					175						
His	Val	Arg	Asn	Pro	Asp	Ala	Gln	Pro	His	Ser	Ile	Asn	Leu	Thr	Gln	
180					185					190						
Leu	Pro	Ile	Ser	Glu	Ala	Asp	Arg	Leu	Phe	Leu	Ser	Arg	Leu	Cys	Gly	
195					200					205						
Pro	Gly	Asn	Ile	Gln	Ile	Arg	Thr	Ile	Gly	Tyr	Gly	Glu	Ser	Tyr	Ile	
210					215					220						
Asn	Ala	Thr	Gly	Leu	Arg	His	Val	Trp	His	Leu	Arg	Cys	Thr	Asp	Thr	
225					230					235					240	
Leu	Lys	Gly	Pro	Leu	Leu	Glu	Ser	Tyr	Glu	Ile	Cys	Pro	Ile	Pro	Glu	
245					250					255						
Val	Val	Leu	Ala	Ala	Pro	Glu	Asp	Leu	Val	Asp	Ser	Ala	Gln	Arg	Leu	
260					265					270						
Ser	Glu	Val	Cys	Gln	Trp	Leu	Ala	Glu	Ala	Ala	Pro	Thr				
275					280					285						

<210> 149

<211> 1119

<212> DNA

<213> Escherichia coli K12

<400> 149

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ctttgtgcag	cattagccgc	caccatgggg	ttaagtagca	aagccgctgc	agagatggcc	120
gaatcggtta	ctaaccgcga	gcgtccgcca	gttatctgga	ttggcgcgca	ggagtgcacc	180
ggttgtacgg	aatctctgct	tcgtgcaacg	catccaacgg	tagaaaacct	cgtactggag	240
actatctctc	tggagtatca	cgaagtgctt	tccgccgcct	tcggtcacat	ggtcgaagag	300
aacaaacata	acgctctcga	gaagtacaaa	gggcagtatg	tgttagtggg	ggatgggtcc	360
atcccattaa	aagataacgg	tatttattgc	atggttgccg	gtgagccgat	tgtggatcac	420
atccgcaaag	cggcggaagg	cgcagcagcc	attatcgcta	tcggttcctg	ctctgcgtgg	480
ggcgggtgtg	ccgcagctgg	agttaaccca	actggcgtag	tcagcctgca	agaagtcttg	540
ccaggcaaaa	ccgttatcaa	tattccgggc	tgcccgcgga	acccgcacaa	cttcctcgcg	600
accgttgccg	acatcatcac	ttacggcaaa	ccgccgaaac	tggatgacaa	aaaccgtccg	660
accttcgcct	atggccgtct	gattcacgaa	cactgcgaac	gtcgcccgca	cttcgatgct	720
ggtcgttttg	ccaaagagtt	cggtgatgaa	ggccaccgcg	aaggctgggt	cctgtaccac	780
ctcggctgta	aagggccaga	aacttacggc	aactgctcaa	cgtgcaatt	ctgcgatgtt	840
ggcgggtgtg	ggccgggtgg	gattggtcac	ccttgctatg	gctgtaacga	agaaggatc	900
ggcttcata	aaggcatcca	tcagcttgcc	aacgtcgaaa	atcaaactcc	gcgttcacag	960
aaaccggatg	ttaacgctaa	agagggcggc	aacgtctctg	caggcgctat	tggtttgctc	1020
ggcgggtgtg	ttgggttggt	tgccgggtgtc	agcgtgatgg	cggtgcgtga	actgggtcgt	1080
cagcaaaaaga	aagataacgc	tgactcacgg	ggagaataa			1119

<210> 150
 <211> 372
 <212> PRT
 <213> Escherichia coli K12
 <400> 150
 Met Thr Gly Asp Asn Thr Leu Ile His Ser His Gly Ile Asn Arg Arg
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 Asp Phe Met Lys Leu Cys Ala Ala Leu Ala Ala Thr Met Gly Leu Ser
 20 25 30
 Ser Lys Ala Ala Ala Glu Met Ala Glu Ser Val Thr Asn Pro Gln Arg
 35 40 45
 Pro Pro Val Ile Trp Ile Gly Ala Gln Glu Cys Thr Gly Cys Thr Glu
 50 55 60
 Ser Leu Leu Arg Ala Thr His Pro Thr Val Glu Asn Leu Val Leu Glu
 65 70 75 80
 Thr Ile Ser Leu Glu Tyr His Glu Val Leu Ser Ala Ala Phe Gly His
 85 90 95
 Gln Val Glu Glu Asn Lys His Asn Ala Leu Glu Lys Tyr Lys Gly Gln
 100 105 110
 Tyr Val Leu Val Val Asp Gly Ser Ile Pro Leu Lys Asp Asn Gly Ile
 115 120 125
 Tyr Cys Met Val Ala Gly Glu Pro Ile Val Asp His Ile Arg Lys Ala
 130 135 140
 Ala Glu Gly Ala Ala Ala Ile Ile Ala Ile Gly Ser Cys Ser Ala Trp
 145 150 155 160
 Gly Gly Val Ala Ala Ala Gly Val Asn Pro Thr Gly Ala Val Ser Leu
 165 170 175
 Gln Glu Val Leu Pro Gly Lys Thr Val Ile Asn Ile Pro Gly Cys Pro
 180 185 190
 Pro Asn Pro His Asn Phe Leu Ala Thr Val Ala His Ile Ile Thr Tyr
 195 200 205
 Gly Lys Pro Pro Lys Leu Asp Asp Lys Asn Arg Pro Thr Phe Ala Tyr
 210 215 220
 Gly Arg Leu Ile His Glu His Cys Glu Arg Arg Pro His Phe Asp Ala
 225 230 235 240
 Gly Arg Phe Ala Lys Glu Phe Gly Asp Glu Gly His Arg Glu Gly Trp
 245 250 255
 Cys Leu Tyr His Leu Gly Cys Lys Gly Pro Glu Thr Tyr Gly Asn Cys
 260 265 270
 Ser Thr Leu Gln Phe Cys Asp Val Gly Gly Val Trp Pro Val Ala Ile
 275 280 285
 Gly His Pro Cys Tyr Gly Cys Asn Glu Glu Gly Ile Gly Phe His Lys
 290 295 300
 Gly Ile His Gln Leu Ala Asn Val Glu Asn Gln Thr Pro Arg Ser Gln

[illegible][illegible]

```

<210> 152
<211> 328
<212> PRT
<213> Escherichia coli K12
<400> 152
Met Asn Arg Arg Asn Phe Ile Lys Ala Ala Ser Cys Gly Ala Leu Leu
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Thr Gly Ala Leu Pro Ser Val Ser His Ala Ala Ala Glu Asn Arg Pro
          20          25          30
Pro Ile Pro Gly Ser Leu Gly Met Leu Tyr Asp Ser Thr Leu Cys Val
          35          40          45
Gly Cys Gln Ala Cys Val Thr Lys Cys Gln Asp Ile Asn Phe Pro Glu
          50          55          60
Arg Asn Pro Gln Gly Glu Gln Thr Trp Ser Asn Asn Asp Lys Leu Ser
65          70          75          80
Pro Tyr Thr Asn Asn Ile Ile Gln Val Trp Thr Ser Gly Thr Gly Val
          85          90          95
Asn Lys Asp Gln Glu Glu Asn Gly Tyr Ala Tyr Ile Lys Lys Gln Cys
          100          105          110

```


Met His Cys Val Asp Pro Asn Cys Val Ser Val Cys Pro Val Ser Ala
 115 120 125

Leu Lys Lys Asp Pro Lys Thr Gly Ile Val His Tyr Asp Lys Asp Val
 130 135 140

Cys Thr Gly Cys Arg Tyr Cys Met Val Ala Cys Pro Tyr Asn Val Pro
 145 150 155 160

Lys Tyr Asp Tyr Asn Asn Pro Phe Gly Ala Leu His Lys Cys Glu Leu
 165 170 175

Cys Asn Gln Lys Gly Val Glu Arg Leu Asp Lys Gly Gly Leu Pro Gly
 180 185 190

Cys Val Glu Val Cys Pro Ala Gly Ala Val Ile Phe Gly Thr Arg Glu
 195 200 205

Glu Leu Met Ala Glu Ala Lys Lys Arg Leu Ala Leu Lys Pro Gly Ser
 210 215 220

Glu Tyr His Tyr Pro Arg Gln Thr Leu Lys Ser Gly Asp Thr Tyr Leu
 225 230 235 240

His Thr Val Pro Lys Tyr Tyr Pro His Leu Tyr Gly Glu Lys Glu Gly
 245 250 255

Gly Gly Thr Gln Val Leu Val Leu Thr Gly Val Pro Tyr Glu Asn Leu
 260 265 270

Asp Leu Pro Lys Leu Asp Asp Leu Ser Thr Gly Ala Arg Ser Glu Asn
 275 280 285

Ile Gln His Thr Leu Tyr Lys Gly Met Met Leu Pro Leu Ala Val Leu
 290 295 300

Ala Gly Leu Thr Val Leu Val Arg Arg Asn Thr Lys Asn Asp His His
 305 310 315 320

Asp Gly Gly Asp Asp His Glu Ser
 325

<210> 153

<211> 1179

<212> DNA

<213> Escherichia coli K12

<400> 153

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ggaccgttaa tcgtcatctg tatgctcctg attgtgaagc gtctgggtgt cggctctgggc 120
tctgtctctg acctgaacgg cggcttcccg tggggcgtgt ggatcgcgtt tgacctgctg 180
attggcaccg gctttgcctg tggcggctgg gcgctggcgt gggcgggtata cgtctttaac 240
cgtgggcaat accatccgct ggtgcgtccg gcgctggttg cgagtctgtt tggttactca 300
ctgggtggct tgtcgatcac tatcgacgtg ggtcgctact ggaacctgcc gtacttctac 360
attccgggtc acttcaacgt gaactcggta ctgttcgaga cggcgggtctg tatgaccatc 420
tatatcggcg tgatggcact ggagtttgct ccggcactgt ttgaacgtct ggggtggaag 480
gtgtcgctac agcgactaaa caaggtgatg ttcttcatca tcgcgctcgg tgcgctgctg 540
ccgaccatgc accagtcttc aatggggctg ctgatgatct cggcgggcta caaggtgcat 600
ccgttgtggc agagctatga aatgttgccg ctgttctcgc tgctgacggc gttcatcatg 660
ggcttctcga ttgtcatctt tgaaggttcg ctggtgcagg cgggtctgcg tggcaacggg 720
ccggatgaaa agagtctgtt tggttaagctg accaacacca tcagtgtgtt gctggcgatt 780
ttcatcgtgc tgcgcttttg cgagcttata tatcgcgaca agctgtcgtt agcgtttgcc 840
ggtgacttct actccgtgat gttctggatt gaagtcctgc tgatgctctt cccgctggtc 900
gttctgcgtg tggcgaagct gcgtaatgat tcccgcacgc tgttcctgtc agcactgagc 960

```

```

gcactgtag gttgtgcaac ctggcgtctg acctattcgc tgggtggcatt caaccggggc 1020
ggcgggttacg cctacttccc gacctgggaa gaactgttga tttctattgg ttttgtggct 1080
attgagattt gcgcttacat cgtactcatt cgtctactgc cgatacttcc tcctttaaaa 1140
caaaacgatac ataatcgtca tgaggcgagc aaagcatga 1179

```

<210> 154

<211> 392

<212> PRT

<213> Escherichia coli K12

<400> 154

```

Met Ser His Asp Pro Gln Pro Leu Gly Gly Lys Ile Ile Ser Lys Pro
1          5          10          15

```

```

Val Met Ile Phe Gly Pro Leu Ile Val Ile Cys Met Leu Leu Ile Val
          20          25          30

```

```

Lys Arg Leu Val Phe Gly Leu Gly Ser Val Ser Asp Leu Asn Gly Gly
          35          40          45

```

```

Phe Pro Trp Gly Val Trp Ile Ala Phe Asp Leu Leu Ile Gly Thr Gly
          50          55          60

```

```

Phe Ala Cys Gly Gly Trp Ala Leu Ala Trp Ala Val Tyr Val Phe Asn
65          70          75          80

```

```

Arg Gly Gln Tyr His Pro Leu Val Arg Pro Ala Leu Leu Ala Ser Leu
          85          90          95

```

```

Phe Gly Tyr Ser Leu Gly Gly Leu Ser Ile Thr Ile Asp Val Gly Arg
          100          105          110

```

```

Tyr Trp Asn Leu Pro Tyr Phe Tyr Ile Pro Gly His Phe Asn Val Asn
          115          120          125

```

```

Ser Val Leu Phe Glu Thr Ala Val Cys Met Thr Ile Tyr Ile Gly Val
          130          135          140

```

```

Met Ala Leu Glu Phe Ala Pro Ala Leu Phe Glu Arg Leu Gly Trp Lys
145          150          155          160

```

```

Val Ser Leu Gln Arg Leu Asn Lys Val Met Phe Phe Ile Ile Ala Leu
          165          170          175

```

```

Gly Ala Leu Leu Pro Thr Met His Gln Ser Ser Met Gly Ser Leu Met
          180          185          190

```

```

Ile Ser Ala Gly Tyr Lys Val His Pro Leu Trp Gln Ser Tyr Glu Met
          195          200          205

```

```

Leu Pro Leu Phe Ser Leu Leu Thr Ala Phe Ile Met Gly Phe Ser Ile
          210          215          220

```

```

Val Ile Phe Glu Gly Ser Leu Val Gln Ala Gly Leu Arg Gly Asn Gly
225          230          235          240

```

```

Pro Asp Glu Lys Ser Leu Phe Val Lys Leu Thr Asn Thr Ile Ser Val
          245          250          255

```

```

Leu Leu Ala Ile Phe Ile Val Leu Arg Phe Gly Glu Leu Ile Tyr Arg
          260          265          270

```

```

Asp Lys Leu Ser Leu Ala Phe Ala Gly Asp Phe Tyr Ser Val Met Phe
          275          280          285

```

Trp Ile Glu Val Leu Leu Met Leu Phe Pro Leu Val Val Leu Arg Val
 290 295 300
 Ala Lys Leu Arg Asn Asp Ser Arg Met Leu Phe Leu Ser Ala Leu Ser
 305 310 315 320
 Ala Leu Leu Gly Cys Ala Thr Trp Arg Leu Thr Tyr Ser Leu Val Ala
 325 330 335
 Phe Asn Pro Gly Gly Gly Tyr Ala Tyr Phe Pro Thr Trp Glu Glu Leu
 340 345 350
 Leu Ile Ser Ile Gly Phe Val Ala Ile Glu Ile Cys Ala Tyr Ile Val
 355 360 365
 Leu Ile Arg Leu Leu Pro Ile Leu Pro Pro Leu Lys Gln Asn Asp His
 370 375 380
 Asn Arg His Glu Ala Ser Lys Ala
 385 390

<210> 155
 <211> 1704
 <212> DNA
 <213> Escherichia coli K12
 <400> 155
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 atggaagaga tcgtgaaaaa ccgcgatccg cgcgatgcat ggatgattgt gcaacgtatc 180
 tgtggcgatg gtactaccac tcacgcgctg tcttcggttc gtgcggcaga aagtgcgctg 240
 aatatcgacg ttccgggttaa cgcgcaatac atccgtaaca tcattctggc tgcgcacacc 300
 acgcatgacc atattgttca tttctatcag ctttcggcgc tggactgggt ggacatcact 360
 tctgcactgc aagctgaccc aaccaaagcc tccgaaatgc tgaaaggcgt ttcgacctgg 420
 cacctgaaca gtccggaaga gttcaccaaa gttcagaaca agatcaaaga tctggttgcc 480
 agcggtcagt tgggtatttt cgctaattggc tactgggggc atccggcgat gaaactgccg 540
 ccggaagtga acctgattgc ggtagcgcac tacctgcaag cgttggagtg ccagcgtgac 600
 gctaaccgcg tcgtggcgct gctgggcggt aaaacgccgc acattcagaa cctggcggtg 660
 ggtggtgtcg cgaacccgat caacctcgac gggttgggcg tgctgaacct tgagcgctg 720
 atgtacatca agtctttcat cgacaaactg agcgactttg ttgagcaggt ttataagggt 780
 gataccgcag ttattgccgc gttctacccg gaatggctga cacgcggtaa aggtgcggtg 840
 aactacctga gcgtgccgga attcccgacc gacagtaaaa acggcagctt cctgttcccg 900
 ggcggtctaca ttgagaatgc ggatctgtcc tcgtatcgtc cgatcacttc tcattccgat 960
 gaataacctga tcaaaggcat tcaggaaagc gcgaagcact cctggtataa agacgaagcg 1020
 ccgcaggcac cgtgggaagg caccaccatt ccggcttatg atggttggtc tgacgacggg 1080
 aaataattcct ggggtgaaatc accgactttc tacggcaaaa cggtagaagt ggggcaactg 1140
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 aaccaatata gtgcactgat caccaatatc ggcaaaggcg atcacaccac ctttgtgaag 1380
 ccgaacattc cggcaacggg tgaattcaaa ggtgttggtc tcctcgaagc gccgcgcggt 1440
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 ccatcaacct ggaactctgg tccgcgtaac ttcaatgatg acgtcgggtc ttacgagcag 1560
 tcgctggtgg gtacaccggt tgccgatccg aataaaccgc tggaagtggg gcgtaccatt 1620
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<210> 156
 <211> 567
 <212> PRT
 <213> Escherichia coli K12
 <400> 156
 Met Ser Gln Arg Ile Thr Ile Asp Pro Val Thr Arg Ile Glu Gly His

1	5	10	15
Leu Arg Ile Asp Cys Glu Ile Glu Asn Gly Val Val Ser Lys Ala Trp	20	25	30
Ala Ser Gly Thr Met Trp Arg Gly Met Glu Glu Ile Val Lys Asn Arg	35	40	45
Asp Pro Arg Asp Ala Trp Met Ile Val Gln Arg Ile Cys Gly Val Cys	50	55	60
Thr Thr Thr His Ala Leu Ser Ser Val Arg Ala Ala Glu Ser Ala Leu	65	70	75
Asn Ile Asp Val Pro Val Asn Ala Gln Tyr Ile Arg Asn Ile Ile Leu	85	90	95
Ala Ala His Thr Thr His Asp His Ile Val His Phe Tyr Gln Leu Ser	100	105	110
Ala Leu Asp Trp Val Asp Ile Thr Ser Ala Leu Gln Ala Asp Pro Thr	115	120	125
Lys Ala Ser Glu Met Leu Lys Gly Val Ser Thr Trp His Leu Asn Ser	130	135	140
Pro Glu Glu Phe Thr Lys Val Gln Asn Lys Ile Lys Asp Leu Val Ala	145	150	155
Ser Gly Gln Leu Gly Ile Phe Ala Asn Gly Tyr Trp Gly His Pro Ala	165	170	175
Met Lys Leu Pro Pro Glu Val Asn Leu Ile Ala Val Ala His Tyr Leu	180	185	190
Gln Ala Leu Glu Cys Gln Arg Asp Ala Asn Arg Val Val Ala Leu Leu	195	200	205
Gly Gly Lys Thr Pro His Ile Gln Asn Leu Ala Val Gly Gly Val Ala	210	215	220
Asn Pro Ile Asn Leu Asp Gly Leu Gly Val Leu Asn Leu Glu Arg Leu	225	230	235
Met Tyr Ile Lys Ser Phe Ile Asp Lys Leu Ser Asp Phe Val Glu Gln	245	250	255
Val Tyr Lys Val Asp Thr Ala Val Ile Ala Ala Phe Tyr Pro Glu Trp	260	265	270
Leu Thr Arg Gly Lys Gly Ala Val Asn Tyr Leu Ser Val Pro Glu Phe	275	280	285
Pro Thr Asp Ser Lys Asn Gly Ser Phe Leu Phe Pro Gly Gly Tyr Ile	290	295	300
Glu Asn Ala Asp Leu Ser Ser Tyr Arg Pro Ile Thr Ser His Ser Asp	305	310	315
Glu Tyr Leu Ile Lys Gly Ile Gln Glu Ser Ala Lys His Ser Trp Tyr	325	330	335
Lys Asp Glu Ala Pro Gln Ala Pro Trp Glu Gly Thr Thr Ile Pro Ala			

340					345					350					
Tyr	Asp	Gly	Trp	Ser	Asp	Asp	Gly	Lys	Tyr	Ser	Trp	Val	Lys	Ser	Pro
	355						360					365			
Thr	Phe	Tyr	Gly	Lys	Thr	Val	Glu	Val	Gly	Pro	Leu	Ala	Asn	Met	Leu
	370					375					380				
Val	Lys	Leu	Ala	Ala	Gly	Arg	Glu	Ser	Thr	Gln	Asn	Lys	Leu	Asn	Glu
385					390					395					400
Ile	Val	Ala	Ile	Tyr	Gln	Lys	Leu	Thr	Gly	Asn	Thr	Leu	Glu	Val	Ala
			405						410					415	
Gln	Leu	His	Ser	Thr	Leu	Gly	Arg	Ile	Ile	Gly	Arg	Thr	Val	His	Cys
			420					425					430		
Cys	Glu	Leu	Gln	Asp	Ile	Leu	Gln	Asn	Gln	Tyr	Ser	Ala	Leu	Ile	Thr
		435					440					445			
Asn	Ile	Gly	Lys	Gly	Asp	His	Thr	Thr	Phe	Val	Lys	Pro	Asn	Ile	Pro
	450					455					460				
Ala	Thr	Gly	Glu	Phe	Lys	Gly	Val	Gly	Phe	Leu	Glu	Ala	Pro	Arg	Gly
465					470					475					480
Met	Leu	Ser	His	Trp	Met	Val	Ile	Lys	Asp	Gly	Ile	Ile	Ser	Asn	Tyr
			485						490					495	
Gln	Ala	Val	Val	Pro	Ser	Thr	Trp	Asn	Ser	Gly	Pro	Arg	Asn	Phe	Asn
		500						505					510		
Asp	Asp	Val	Gly	Pro	Tyr	Glu	Gln	Ser	Leu	Val	Gly	Thr	Pro	Val	Ala
	515					520					525				
Asp	Pro	Asn	Lys	Pro	Leu	Glu	Val	Val	Arg	Thr	Ile	His	Ser	Phe	Asp
	530					535					540				
Pro	Cys	Met	Ala	Cys	Ala	Val	His	Val	Val	Asp	Ala	Asp	Gly	Asn	Glu
545				550					555					560	
Val	Val	Ser	Val	Lys	Val	Leu									
			565												

<210> 157

<211> 495

<212> DNA

<213> Escherichia coli K12

<400> 157

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cggattgtcg aagcgcttaga gcaacgatac attctgccgg attatggtga gatcctcgat      120
ggcggcacgg cggaatgga gctgcttggc gacatggcaa atcgcgatca tttgattatt      180
gcggatgcca ttgtctcgaa aaagaacgcg ccgggaacga tgatgatcct gcgggatgaa      240
gaagtccgg cgctgtttac caacaaaatc tctccgcac agcttggcct ggccgacgtc      300
ttgtcggccc tgcgcttcac cggcgagttt ccgaaaaagc tgaccctggt cggcgtgatc      360
ccggaatcgc tggagccaca catcggttta acgccgacgg ttgaagcaat gattgaacct      420
gcgcttgagc aggttctggc tgcgctgcgt gaatctggcg tggaagccat cccacgggag      480
gcgattcatg actga                                     495

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<210> 158

<211> 164

<212> PRT

<213> Escherichia coli K12

<400> 158

Met Arg Ile Leu Val Leu Gly Val Gly Asn Ile Leu Leu Thr Asp Glu
 1 5 10 15

Ala Ile Gly Val Arg Ile Val Glu Ala Leu Glu Gln Arg Tyr Ile Leu
 20 25 30

Pro Asp Tyr Val Glu Ile Leu Asp Gly Gly Thr Ala Gly Met Glu Leu
 35 40 45

Leu Gly Asp Met Ala Asn Arg Asp His Leu Ile Ile Ala Asp Ala Ile
 50 55 60

Val Ser Lys Lys Asn Ala Pro Gly Thr Met Met Ile Leu Arg Asp Glu
 65 70 75 80

Glu Val Pro Ala Leu Phe Thr Asn Lys Ile Ser Pro His Gln Leu Gly
 85 90 95

Leu Ala Asp Val Leu Ser Ala Leu Arg Phe Thr Gly Glu Phe Pro Lys
 100 105 110

Lys Leu Thr Leu Val Gly Val Ile Pro Glu Ser Leu Glu Pro His Ile
 115 120 125

Gly Leu Thr Pro Thr Val Glu Ala Met Ile Glu Pro Ala Leu Glu Gln
 130 135 140

Val Leu Ala Ala Leu Arg Glu Ser Gly Val Glu Ala Ile Pro Arg Glu
 145 150 155 160

Ala Ile His Asp

<210> 159

<211> 489

<212> DNA

<213> Escherichia coli K12

<400> 159

atgactgaag agatagcagg tttccagacc tccccgaagg cgcaagtaca ggcagcgttt 60
 gaagaaattg cccggcggtt gatgcacgat ctctcttttc tgcaccttc aatgccggtg 120
 tatgtttctg attttacgct gttcgaaggc cagtggacgg ggtgtgtgat caccctgtgg 180
 atgctgagtg cagttatctt ccccgccccg gatcaactct ggccgctgcg caaagtgagt 240
 gaaaaaattg gtctgcaact gccgtatggc actatgacct ttaccgttgg cgaactggac 300
 ggtgtttcgc aatatctctc ctgttcgctg atgtcgccgc tttcgcacag catgtcgatt 360
 gaagagggcc aacgcctgac ggatgactgc gcacgaatga tcctttcgct gccagtcacg 420
 aatccggatg taccacacgc agggcgctgc gccctgctgt ttggtcgcag gagtggcgaa 480
 aatgcatga 489

<210> 160

<211> 162

<212> PRT

<213> Escherichia coli K12

<400> 160

Met Thr Glu Glu Ile Ala Gly Phe Gln Thr Ser Pro Lys Ala Gln Val
 1 5 10 15

Gln Ala Ala Phe Glu Glu Ile Ala Arg Arg Ser Met His Asp Leu Ser
 20 25 30

Phe Leu His Pro Ser Met Pro Val Tyr Val Ser Asp Phe Thr Leu Phe
 35 40 45

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

Asn Ala

<210> 161
 <211> 342
 <212> DNA
 <213> Escherichia coli K12
 <400> 161
 atgcatgagt tgtctctttg ccagagcgcc gttgaaatta tccaacggca ggcggagcag 60
 cacgatgtta agcgcgtcac cgccgtgtgg ctggaaattg gcgcgctctc ctgcgttgag 120
 gagagcgccg tccgttttag ttttgaaatt gtctgccacg gaacgggtggc gcaagggtgc 180
 gatttacata tcgtctataa acccgcccag gcttggtgct gggattgcag ccagggtggtg 240
 gagattcatc agcacgatgc gcagtgtccg ctctgtcacg gcgagcgggt gcgtgtcgat 300
 accggcgatt cgctgatcgt caaaagtatt gaagttgaat aa 342

<210> 162
 <211> 113
 <212> PRT
 <213> Escherichia coli K12
 <400> 162
 Met His Glu Leu Ser Leu Cys Gln Ser Ala Val Glu Ile Ile Gln Arg
 1 5 10 15
 Gln Ala Glu Gln His Asp Val Lys Arg Val Thr Ala Val Trp Leu Glu
 20 25 30
 Ile Gly Ala Leu Ser Cys Val Glu Glu Ser Ala Val Arg Phe Ser Phe
 35 40 45
 Glu Ile Val Cys His Gly Thr Val Ala Gln Gly Cys Asp Leu His Ile
 50 55 60
 Val Tyr Lys Pro Ala Gln Ala Trp Cys Trp Asp Cys Ser Gln Val Val
 65 70 75 80
 Glu Ile His Gln His Asp Ala Gln Cys Pro Leu Cys His Gly Glu Arg
 85 90 95
 Leu Arg Val Asp Thr Gly Asp Ser Leu Ile Val Lys Ser Ile Glu Val
 100 105 110

Glu

<210> 163
 <211> 249
 <212> DNA
 <213> Escherichia coli K12
 <400> 163
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 caggttgaag tatgtggtat caagcgcgat gtgaatatcg ccttgatttg tgaaggtaac 120
 cctgccgata tactgggcca gtgggtgctg gtacacgctg gatttgccat gagcatcatc 180
 gacgaagatg aagccaaagc cacattagac gcactgcgcc aaatggatta cgacattacc 240
 agcgcgtga 249

<210> 164
 <211> 82
 <212> PRT
 <213> Escherichia coli K12
 <400> 164
 Met Cys Ile Gly Val Pro Gly Gln Val Leu Ala Val Gly Glu Asp Ile
 1 5 10 15
 His Gln Leu Ala Gln Val Glu Val Cys Gly Ile Lys Arg Asp Val Asn
 20 25 30
 Ile Ala Leu Ile Cys Glu Gly Asn Pro Ala Asp Leu Leu Gly Gln Trp
 35 40 45
 Val Leu Val His Val Gly Phe Ala Met Ser Ile Ile Asp Glu Asp Glu
 50 55 60
 Ala Lys Ala Thr Leu Asp Ala Leu Arg Gln Met Asp Tyr Asp Ile Thr
 65 70 75 80
 Ser Ala

<210> 165
 <211> 1656
 <212> DNA
 <213> Escherichia coli K12
 <400> 165
 atgaatctct ggcaacaaaa ctacgatccc gccgggaata tctggctttc cagtctgata 60
 gcatcgcttc ccattcctgtt tttcttcttt gcgctgatta agctcaaact gaaaggatac 120
 gtcgccgcct cgtggacggg ggcaatcgcc cttgccgtgg ctttgctgtt ctataaaatg 180
 ccggtcgcta acgcgctggc ctcggtgggt tatggtttct tctacgggtt gtggcccatc 240
 gcgtggatca ttattgcagc ggtgttcgct tataagatct cggtgaaaac cgggcagttt 300
 gacatcattc gctcgtctat tctttcgata acccctgacc agcgtctgca aatgctgata 360
 gtcggtttct gtttcggcgc gttccttgaa ggagccgcag gctttggcgc accggtagca 420
 attaccgccg cattgctggg cggcctgggt tttaaaccgc tgtacgccgc cgggctgtgc 480
 ctgattgtta acaccgcgc agtggcattt ggtgcgatgg gcattccaat cctggttgcc 540
 ggacaggtaa caggtatcga cagctttgag attggtcaga tgggtggggcg gcagctaccg 600
 tttatgacca ttatcgtgct gttctggatc atggcgatta tggacggctg gcgcgggtatc 660
 aaagagacgt ggccctgcgg cgtgggttgcg gccggctcgt ttgccatcgc tcagtacctt 720
 agctctaact tcattggggc ggagctgccg gacattatct cttegtgtgt atcactgtct 780
 tgccctgacgc tgttctctca acgctggcag ccagtgcgtg tattccgttt tgggtgattg 840
 ggggcgtcac aggttgatat gacgctggcc cacaccgggt acactgcggg tcaggtgtta 900
 cgtgcctgga caccgttctt gttcctgaca gctaccgtaa cactgtggag tatcccgccg 960
 tttaaagccc tgttcgcata ggggtggcgc ctgtatgagt ggggtgatcaa tattccgggtg 1020
 ccgtacctcg ataaactggg tgcccgtatg ccgccagtgg tcagcgaggc tacagcctat 1080
 gccgcggtgt ttaagtttga ctggttctct gccaccggca ccgccattct gtttgctgca 1140
 ctgctctcga ttgtctggct gaagatgaaa ccgtctgacg ctatcagcac cttcggcagc 1200
 acgctgaaag aactggctct gcccatctac tccatcggtg tgggtgctggc attcgccttt 1260
 atttcgaact attccggact gtcatacaaa ctggcgctgg cactggcgca caccgggtcat 1320


```

gcattcacct tcttctcgcc gttcctcggc tggctggggg tattcctgac cgggtcggat 1380
acctcatcta acgccttggt cgccgcgctg caagccaccg cagcacaaca aattggcgtc 1440
tctgatctgt tgctggttgc cgccaatacc accggtggcg tcaccggtaa gatgatctcc 1500
ccgcaatcta tcgtatcgc ctgtgcggcg gtaggcctgg tgggcaaaga gtctgatttg 1560
ttccgcttta ctgtcaaaca cagcctgac ttcacctgta tagtgggcgt gatcaccacg 1620
cttcaggctt atgtcttaac gtggatgatt ccttaa 1656

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<210> 166

<211> 551

<212> PRT

<213> Escherichia coli K12

<400> 166

```

Met Asn Leu Trp Gln Gln Asn Tyr Asp Pro Ala Gly Asn Ile Trp Leu
1          5          10          15

```

```

Ser Ser Leu Ile Ala Ser Leu Pro Ile Leu Phe Phe Phe Phe Ala Leu
          20          25          30

```

```

Ile Lys Leu Lys Leu Lys Gly Tyr Val Ala Ala Ser Trp Thr Val Ala
          35          40          45

```

```

Ile Ala Leu Ala Val Ala Leu Leu Phe Tyr Lys Met Pro Val Ala Asn
          50          55          60

```

```

Ala Leu Ala Ser Val Val Tyr Gly Phe Phe Tyr Gly Leu Trp Pro Ile
65          70          75          80

```

```

Ala Trp Ile Ile Ile Ala Ala Val Phe Val Tyr Lys Ile Ser Val Lys
          85          90          95

```

```

Thr Gly Gln Phe Asp Ile Ile Arg Ser Ser Ile Leu Ser Ile Thr Pro
          100          105          110

```

```

Asp Gln Arg Leu Gln Met Leu Ile Val Gly Phe Cys Phe Gly Ala Phe
          115          120          125

```

```

Leu Glu Gly Ala Ala Gly Phe Gly Ala Pro Val Ala Ile Thr Ala Ala
          130          135          140

```

```

Leu Leu Val Gly Leu Gly Phe Lys Pro Leu Tyr Ala Ala Gly Leu Cys
145          150          155          160

```

```

Leu Ile Val Asn Thr Ala Pro Val Ala Phe Gly Ala Met Gly Ile Pro
          165          170          175

```

```

Ile Leu Val Ala Gly Gln Val Thr Gly Ile Asp Ser Phe Glu Ile Gly
          180          185          190

```

```

Gln Met Val Gly Arg Gln Leu Pro Phe Met Thr Ile Ile Val Leu Phe
          195          200          205

```

```

Trp Ile Met Ala Ile Met Asp Gly Trp Arg Gly Ile Lys Glu Thr Trp
210          215          220

```

```

Pro Ala Val Val Val Ala Gly Gly Ser Phe Ala Ile Ala Gln Tyr Leu
225          230          235          240

```

```

Ser Ser Asn Phe Ile Gly Pro Glu Leu Pro Asp Ile Ile Ser Ser Leu
          245          250          255

```

```

Val Ser Leu Leu Cys Leu Thr Leu Phe Leu Lys Arg Trp Gln Pro Val
          260          265          270

```

Arg Val Phe Arg Phe Gly Asp Leu Gly Ala Ser Gln Val Asp Met Thr
 275 280 285
 Leu Ala His Thr Gly Tyr Thr Ala Gly Gln Val Leu Arg Ala Trp Thr
 290 295 300
 Pro Phe Leu Phe Leu Thr Ala Thr Val Thr Leu Trp Ser Ile Pro Pro
 305 310 315 320
 Phe Lys Ala Leu Phe Ala Ser Gly Gly Ala Leu Tyr Glu Trp Val Ile
 325 330 335
 Asn Ile Pro Val Pro Tyr Leu Asp Lys Leu Val Ala Arg Met Pro Pro
 340 345 350
 Val Val Ser Glu Ala Thr Ala Tyr Ala Ala Val Phe Lys Phe Asp Trp
 355 360 365
 Phe Ser Ala Thr Gly Thr Ala Ile Leu Phe Ala Ala Leu Leu Ser Ile
 370 375 380
 Val Trp Leu Lys Met Lys Pro Ser Asp Ala Ile Ser Thr Phe Gly Ser
 385 390 395 400
 Thr Leu Lys Glu Leu Ala Leu Pro Ile Tyr Ser Ile Gly Met Val Leu
 405 410 415
 Ala Phe Ala Phe Ile Ser Asn Tyr Ser Gly Leu Ser Ser Thr Leu Ala
 420 425 430
 Leu Ala Leu Ala His Thr Gly His Ala Phe Thr Phe Phe Ser Pro Phe
 435 440 445
 Leu Gly Trp Leu Gly Val Phe Leu Thr Gly Ser Asp Thr Ser Ser Asn
 450 455 460
 Ala Leu Phe Ala Ala Leu Gln Ala Thr Ala Ala Gln Gln Ile Gly Val
 465 470 475 480
 Ser Asp Leu Leu Leu Val Ala Ala Asn Thr Thr Gly Gly Val Thr Gly
 485 490 495
 Lys Met Ile Ser Pro Gln Ser Ile Ala Ile Ala Cys Ala Ala Val Gly
 500 505 510
 Leu Val Gly Lys Glu Ser Asp Leu Phe Arg Phe Thr Val Lys His Ser
 515 520 525
 Leu Ile Phe Thr Cys Ile Val Gly Val Ile Thr Thr Leu Gln Ala Tyr
 530 535 540
 Val Leu Thr Trp Met Ile Pro
 545 550

<210> 167

<211> 963

<212> DNA

<213> Lactobacillus plantarum WCFS1

<400> 167

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ttgtcaagca tgccaaatca tcaaaaagtt gtgttagtcg gcgacggcgc tgttggttct    60
agttacgctt ttgcatggc acaacaagga attgctgaag aatttgtaat tgtcgatggt    120
gttaaagatc ggacaaaggg tgacgccctt gatcttgaag acgccaagc attcaccgct    180
cccaagaaga tttactcagg cgaatattca gattgtaagg acgctgactt agttgttatt    240

```

```

acagccggtg cgctcaaaa gcctggtgaa tcacgttttag acttagttaa caagaattta 300
aatatcctat catccattgt caaaccagtt gttgactccg gctttgacgg catcttctta 360
gttgctgcta accctgttga catcttaact tacgctactt ggaaattctc aggtttccca 420
aaggatcgtg tcattggttc agggacttcc ttagactctt cacgtttacg cgttgcgta 480
ggcaaacaat tcaatgttga tctcgttcc gttgatgctt acatcatggg tgaacacggt 540
gattctgaat ttgctgctta ctcaactgca accatcggga cagtcacgt tcgcgatgtc 600
gctaaggaac aaggcgtttc tgacgaagat ttagccaagt tagaagacgg tgttcgtaac 660
aaagcttacg acatcatcaa cttgaagggt gccacgttct acggtatcgg gactgcttta 720
atgcggattt ccaaagccat tttacgtgat gaaaatgccg ttttaccagt aggtgcctac 780
atggacggcc aatacggctt aaacgacatt tatatcggga ctccggctgt gattggtgga 840
actggtttga aacaaatcat cgaatcacca ctttcagctg acgaactcaa gaagatgcaa 900
gattccgccg caactttgaa aaaagtgtt aacgacggt tagctgaatt agaaaataaa 960
taa 963

```

<210> 168

<211> 320

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 168

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Met Ser Ser Met Pro Asn His Gln Lys Val Val Leu Val Gly Asp Gly
1          5          10          15

Ala Val Gly Ser Ser Tyr Ala Phe Ala Met Ala Gln Gln Gly Ile Ala
20          25          30

Glu Glu Phe Val Ile Val Asp Val Val Lys Asp Arg Thr Lys Gly Asp
35          40          45

Ala Leu Asp Leu Glu Asp Ala Gln Ala Phe Thr Ala Pro Lys Lys Ile
50          55          60

Tyr Ser Gly Glu Tyr Ser Asp Cys Lys Asp Ala Asp Leu Val Val Ile
65          70          75          80

Thr Ala Gly Ala Pro Gln Lys Pro Gly Glu Ser Arg Leu Asp Leu Val
85          90          95

Asn Lys Asn Leu Asn Ile Leu Ser Ser Ile Val Lys Pro Val Val Asp
100         105         110

Ser Gly Phe Asp Gly Ile Phe Leu Val Ala Ala Asn Pro Val Asp Ile
115         120         125

Leu Thr Tyr Ala Thr Trp Lys Phe Ser Gly Phe Pro Lys Asp Arg Val
130         135         140

Ile Gly Ser Gly Thr Ser Leu Asp Ser Ser Arg Leu Arg Val Ala Leu
145         150         155         160

Gly Lys Gln Phe Asn Val Asp Pro Arg Ser Val Asp Ala Tyr Ile Met
165         170         175

Gly Glu His Gly Asp Ser Glu Phe Ala Ala Tyr Ser Thr Ala Thr Ile
180         185         190

Gly Thr Arg Pro Val Arg Asp Val Ala Lys Glu Gln Gly Val Ser Asp
195         200         205

Glu Asp Leu Ala Lys Leu Glu Asp Gly Val Arg Asn Lys Ala Tyr Asp
210         215         220

Ile Ile Asn Leu Lys Gly Ala Thr Phe Tyr Gly Ile Gly Thr Ala Leu
225         230         235         240

```

Met	Arg	Ile	Ser	Lys	Ala	Ile	Leu	Arg	Asp	Glu	Asn	Ala	Val	Leu	Pro
				245					250					255	
Val	Gly	Ala	Tyr	Met	Asp	Gly	Gln	Tyr	Gly	Leu	Asn	Asp	Ile	Tyr	Ile
			260					265					270		
Gly	Thr	Pro	Ala	Val	Ile	Gly	Gly	Thr	Gly	Leu	Lys	Gln	Ile	Ile	Glu
		275					280					285			
Ser	Pro	Leu	Ser	Ala	Asp	Glu	Leu	Lys	Lys	Met	Gln	Asp	Ser	Ala	Ala
	290					295					300				
Thr	Leu	Lys	Lys	Val	Leu	Asn	Asp	Gly	Leu	Ala	Glu	Leu	Glu	Asn	Lys
305					310					315					320

<210> 169

<211> 930

<212> DNA

<213> Lactobacillus plantarum WCFS1

<400> 169

atgataaga	agcaacgcaa	agtcgtaatt	gttgggtgatg	gctcgggtggg	ttcatcattt	60
gcctttttcat	tgggccaaaa	ttgcgcccta	gatgaactcg	ttatcgttga	cttgggttaaa	120
acgcacgcag	agggggacgt	taaggatttg	gaagatgttg	ccgcctttac	gaatgcgacc	180
aacattcata	ccggtgaata	tgcggatgcg	cgtgatgctg	acatcgttgt	cattacgggt	240
ggtgtgcctc	gtaagcctgg	tgagagtcgt	ttagatttga	ttaaccgcaa	tacgaagatt	300
ctggaatcca	tcgtcaaacc	agtggttgcg	agtggtttta	atggttgctt	cgttatctca	360
agtaatcccg	tcgatatttt	gacttcgatg	acgcaacggt	tatccgggtt	tccacggcat	420
cgggtcattg	gtaccgggac	ttccttggt	acggcgcggt	tacgggtcgc	cttgggtcag	480
aagttgaatg	ttgccaccac	tgcagttgat	gctgcggtac	ttggagaaca	tggtgatagt	540
tccatcgtta	attttgatga	aattatgatc	aatgctcagc	ccttaaagac	ggtcacaacg	600
gtcgatgatc	agttcaaagc	tgaaatcgag	caagctgttc	gtggtaaagg	tggtcaaatc	660
attagtcaga	agggggccac	gttctatggg	gtcgcgctta	gtttgatgca	aatctgcgca	720
gcaattttga	acgatgaaaa	tgctgagttg	attgctctcg	ccgctttgtc	tggtcaatat	780
ggcatthaacg	atttgtactt	ggggtcaccc	gcattatta	accgcaacgg	gtcccaaaaa	840
gtgatcgaag	ctgagctatc	agatgatgag	cgtgcccgga	tgcaacattt	cgcagccaag	900
atgctgacca	tgatgaatgt	ggcatcataa				930

<210> 170

<211> 309

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 170

Met Asp Lys Lys Gln Arg Lys Val Val Ile Val Gly Asp Gly Ser Val
1 5 10 15

Gly Ser Ser Phe Ala Phe Ser Leu Val Gln Asn Cys Ala Leu Asp Glu
20 25 30

Leu Val Ile Val Asp Leu Val Lys Thr His Ala Glu Gly Asp Val Lys
35 40 45

Asp Leu Glu Asp Val Ala Ala Phe Thr Asn Ala Thr Asn Ile His Thr
50 55 60

Gly Glu Tyr Ala Asp Ala Arg Asp Ala Asp Ile Val Val Ile Thr Ala
65 70 75 80

Gly Val Pro Arg Lys Pro Gly Glu Ser Arg Leu Asp Leu Ile Asn Arg
85 90 95

Asn Thr Lys Ile Leu Glu Ser Ile Val Lys Pro Val Val Ala Ser Gly
100 105 110

Phe Asn Gly Cys Phe Val Ile Ser Ser Asn Pro Val Asp Ile Leu Thr
 115 120 125
 Ser Met Thr Gln Arg Leu Ser Gly Phe Pro Arg His Arg Val Ile Gly
 130 135 140
 Thr Gly Thr Ser Leu Asp Thr Ala Arg Leu Arg Val Ala Leu Ala Gln
 145 150 155 160
 Lys Leu Asn Val Ala Thr Thr Ala Val Asp Ala Ala Val Leu Gly Glu
 165 170 175
 His Gly Asp Ser Ser Ile Val Asn Phe Asp Glu Ile Met Ile Asn Ala
 180 185 190
 Gln Pro Leu Lys Thr Val Thr Thr Val Asp Asp Gln Phe Lys Ala Glu
 195 200 205
 Ile Glu Gln Ala Val Arg Gly Lys Gly Gly Gln Ile Ile Ser Gln Lys
 210 215 220
 Gly Ala Thr Phe Tyr Gly Val Ala Val Ser Leu Met Gln Ile Cys Arg
 225 230 235 240
 Ala Ile Leu Asn Asp Glu Asn Ala Glu Leu Ile Val Ser Ala Ala Leu
 245 250 255
 Ser Gly Gln Tyr Gly Ile Asn Asp Leu Tyr Leu Gly Ser Pro Ala Ile
 260 265 270
 Ile Asn Arg Asn Gly Leu Gln Lys Val Ile Glu Ala Glu Leu Ser Asp
 275 280 285
 Asp Glu Arg Ala Arg Met Gln His Phe Ala Ala Lys Met Leu Thr Met
 290 295 300
 Met Asn Val Ala Ser
 305

<210> 171

<211> 1593

<212> DNA

<213> Lactobacillus plantarum WCFS1

<400> 171

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ttctggcaga	ttagtccaac	ggtcctcacc	gcctcaatth	tgcaggcgat	tcataaagcc	180
ctccccatct	tatggatctt	atthggcgcc	ttactcatgc	tcaactgttt	gcgtgccact	240
ggtgcaatcg	accggattaa	ccagggtctt	caaagtttgt	ctgctgacat	gcggctacaa	300
accgttttgg	tagccttctt	atthgggggc	ttgattgaag	gtgtctcggg	cttcggggacc	360
ccagcgatgg	tactgcacc	attactaatt	gcactcggct	tttcacccat	ggcggccggt	420
atcttggcct	tagtggctga	ctcgaccccc	gcagcggtcg	gcgccgttgg	aacaccattg	480
accgtgggac	tgagtaattg	gaccgaaaaa	gcattccgtct	tgaacttgat	tggcctgcgc	540
atcacgcaac	tcatattatt	cgthgggtgcg	ctaattgccag	cgggtgctcat	tttaattctc	600
atcatgtggt	ttggccctaa	ggcacaccgc	ttgaaaagct	ggctttccgt	cttaccttgg	660
gcgttagtga	tcggtttcgt	ttacagtcta	ctggcactcc	tcagtgtctg	gctagtgggt	720
tatgaatttg	tttcaatcat	cgcaccgctg	ggaacgctgg	ttattgccat	catcacgatc	780
cgattgcact	ggttgtttacc	aaagtcgagc	cagttgacgc	catggcggac	gaacgggatg	840
gcagcccaga	cgcctgcgcc	tagtccgatg	aacctgatga	ccgcttggtt	tccttacctg	900
ttggtcggtg	tgctattact	cgctagccgg	gtcgtgacac	caatcaaaca	ggttttgacc	960
cgttatgcta	acttatcggt	gtcccacatt	ctaggttata	gtcaaataca	ctctgattgg	1020
gaactcctct	attcgccagg	gacaattctg	gcggtagcgg	ccatcattgg	gttactagta	1080

```

caagcccgtt cattaagcc cttactacca actgcccatt cggtcacccg ttcgatgggc 1140
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ttgaatcagg ccaacctacc cagcatgccca atgtatatcg ccaagtttat cgcaacctat 1260
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```

<210> 172

<211> 530

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 172

```

Met Ile Phe Ile Ala Ser Ala Ala Ile Ile Leu Pro Leu Ile Leu Leu
1           5           10           15

```

```

Gly Gly Leu Asn Leu Ser Ala Thr Arg Gly Met Thr Ile Ser Ala Leu
20           25           30

```

```

Val Val Ile Ile Thr Gly Tyr Phe Phe Trp Gln Ile Ser Pro Thr Val
35           40           45

```

```

Leu Thr Ala Ser Ile Leu Gln Ala Ile His Lys Ala Leu Pro Ile Leu
50           55           60

```

```

Trp Ile Leu Phe Gly Ala Leu Leu Met Leu Asn Cys Leu Arg Ala Thr
65           70           75           80

```

```

Gly Ala Ile Asp Arg Ile Asn Gln Gly Phe Gln Ser Leu Ser Ala Asp
85           90           95

```

```

Met Arg Leu Gln Thr Val Leu Val Ala Phe Leu Phe Gly Gly Leu Ile
100          105          110

```

```

Glu Gly Val Ser Gly Phe Gly Thr Pro Ala Met Val Thr Ala Pro Leu
115          120          125

```

```

Leu Ile Ala Leu Gly Phe Ser Pro Met Ala Ala Val Ile Leu Ala Leu
130          135          140

```

```

Val Ala Asp Ser Thr Pro Ala Ala Phe Gly Ala Val Gly Thr Pro Leu
145          150          155          160

```

```

Thr Val Gly Leu Ser Asn Val Thr Glu Lys Ala Ser Val Leu Asn Leu
165          170          175

```

```

Ile Gly Leu Arg Ile Thr Gln Leu Asp Leu Phe Val Gly Ala Leu Met
180          185          190

```

```

Pro Ala Val Leu Ile Leu Ile Leu Ile Met Trp Phe Gly Pro Lys Ala
195          200          205

```

```

His Arg Leu Lys Ser Trp Leu Ser Val Leu Pro Trp Ala Leu Val Ile
210          215          220

```

```

Gly Phe Val Tyr Ser Leu Leu Ala Leu Leu Ser Ala Trp Leu Val Gly
225          230          235          240

```

```

Tyr Glu Phe Val Ser Ile Ile Ala Pro Leu Gly Thr Leu Val Ile Ala
245          250          255

```

Ile Ile Thr Ile Arg Leu His Trp Leu Leu Pro Lys Ser Ser Gln Leu
 260 265 270
 Thr Pro Trp Arg Thr Asn Gly Met Ala Ala Gln Thr Pro Ala Pro Ser
 275 280 285
 Pro Met Asn Leu Met Thr Ala Trp Phe Pro Tyr Leu Leu Val Val Val
 290 295 300
 Leu Leu Leu Ala Ser Arg Val Val Thr Pro Ile Lys Gln Val Leu Thr
 305 310 315 320
 Arg Tyr Ala Asn Leu Ser Trp Ser His Ile Leu Gly Tyr Ser Gln Ile
 325 330 335
 Asn Ser Asp Trp Glu Leu Leu Tyr Ser Pro Gly Thr Ile Leu Ala Val
 340 345 350
 Ala Ala Ile Ile Gly Leu Leu Val Gln Ala Arg Ser Leu Lys Pro Leu
 355 360 365
 Leu Pro Thr Ala His Ser Val Ile Arg Ser Met Gly Asn Thr Ala Ile
 370 375 380
 Ala Leu Gly Val Thr Leu Ile Met Val Gln Val Phe Thr Asn Ser Gly
 385 390 395 400
 Leu Asn Gln Ala Asn Leu Pro Ser Met Pro Met Tyr Ile Ala Lys Phe
 405 410 415
 Ile Ala Thr Tyr Leu Ala Gly Val Trp Val Ile Met Ala Pro Phe Leu
 420 425 430
 Gly Gln Leu Gly Ala Phe Val Thr Gly Ser Thr Thr Val Ser Thr Leu
 435 440 445
 Thr Phe Ala Gln Ile Gln Ala Asp Ile Ala Ala Asn Ala Ser Leu Lys
 450 455 460
 Pro Thr Ile Ile Leu Ala Ala Gln Leu Val Gly Ala Ala Ala Gly Asn
 465 470 475 480
 Met Val Cys Val His Asn Ile Val Ala Val Ser Ser Val Val Gly Leu
 485 490 495
 Ser Gly Gln Glu Gly Ala Ile Leu Arg Lys Thr Leu Leu Pro Gly Leu
 500 505 510
 Gly Tyr Ala Leu Leu Ile Gly Val Ala Gly Trp Leu Leu Leu Arg Leu
 515 520 525

Leu Ala
 530

<210> 173

<211> 1275

<212> DNA

<213> Lactobacillus plantarum WCFS1

<400> 173

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aattacgccg	gtaagttagt	gtcgcaagct	gcaacatatc	ataacaaatt	atcagaacag	120
gaaacggtcg	agaagtcgct	ggataatcca	atcggctccg	ataagctgga	ggaacttgct	180
cgtgggaagc	acaatattgt	gattattagt	tctgatcaca	cgcgcccagt	tccttcacat	240

```

attatcaccc cgatcctatt gcggcgggtta cggtcagtgg cgcccgatgc acggattcgg 300
atcctcgtag ctactggttt ccatcggcca tcaacccacg aagaattggt gaataagtat 360
ggtgaagaca tcgtcaataa cgaagaaatc gtgatgcatg tctcaaccga tgacagtagt 420
atggtcaaga ttggccaatt accatctggc ggcgattgca ttattaataa ggtcgtgct 480
gaagcagatt tgctaattct cgaaggcttt atcgaatcac atttctttgc tggtttttca 540
ggtggtcggg agtccgtttt acctgggatt gcttcataca agacgattat ggcgaaccat 600
tccggcgaat ttattaactc accgaaggcc cggaccggta atttaatgca taattcgatt 660
cataaggata tgggtgtacgc tgctcggacc gctaaacttg cctttattat caatgttggt 720
ttagacgaag ataaaaaaat cattgggtca tttgccggtg acatggaagc cgcccataaa 780
gtgggctgtg actttgtcaa agaactttct agtgtaccag ccattgattg tgacattgctg 840
atttcgacga atggtgggta tccgcttgat caaaatattt atcaggccgt taaaggaatg 900
accgctgctg aagcaacaaa caaagaaggc ggcacgatta ttatggttgc cggtgctcgt 960
gatggtcacg gtggtgaagg gttttatcac aacttagctg acgttgatga tcctaaggaa 1020
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caaatctttg ctcgaatctt agttcatcat cacgtgattt ttgtgtcaga cctcgttgat 1140
cctgatttga ttacgaatat gcatatggaa ctagccaaga cgtttagatga agccatggaa 1200
aaggcctacg cacgcgaggg tcaagccgct aaagtgacgg ttattcctga tggtttaggc 1260
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```

<210> 174

<211> 424

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 174

Met Val Ala Ile Asp Leu Pro Tyr Asp Lys Arg Thr Ile Thr Ala Gln
1 5 10 15

Ile Asp Asp Glu Asn Tyr Ala Gly Lys Leu Val Ser Gln Ala Ala Thr
20 25 30

Tyr His Asn Lys Leu Ser Glu Gln Glu Thr Val Glu Lys Ser Leu Asp
35 40 45

Asn Pro Ile Gly Ser Asp Lys Leu Glu Glu Leu Ala Arg Gly Lys His
50 55 60

Asn Ile Val Ile Ile Ser Ser Asp His Thr Arg Pro Val Pro Ser His
65 70 75 80

Ile Ile Thr Pro Ile Leu Leu Arg Arg Leu Arg Ser Val Ala Pro Asp
85 90 95

Ala Arg Ile Arg Ile Leu Val Ala Thr Gly Phe His Arg Pro Ser Thr
100 105 110

His Glu Glu Leu Val Asn Lys Tyr Gly Glu Asp Ile Val Asn Asn Glu
115 120 125

Glu Ile Val Met His Val Ser Thr Asp Asp Ser Ser Met Val Lys Ile
130 135 140

Gly Gln Leu Pro Ser Gly Gly Asp Cys Ile Ile Asn Lys Val Ala Ala
145 150 155 160

Glu Ala Asp Leu Leu Ile Ser Glu Gly Phe Ile Glu Ser His Phe Phe
165 170 175

Ala Gly Phe Ser Gly Gly Arg Lys Ser Val Leu Pro Gly Ile Ala Ser
180 185 190

Tyr Lys Thr Ile Met Ala Asn His Ser Gly Glu Phe Ile Asn Ser Pro
195 200 205

Lys Ala Arg Thr Gly Asn Leu Met His Asn Ser Ile His Lys Asp Met
 210 215 220
 Val Tyr Ala Ala Arg Thr Ala Lys Leu Ala Phe Ile Ile Asn Val Val
 225 230 235 240
 Leu Asp Glu Asp Lys Lys Ile Ile Gly Ser Phe Ala Gly Asp Met Glu
 245 250 255
 Ala Ala His Lys Val Gly Cys Asp Phe Val Lys Glu Leu Ser Ser Val
 260 265 270
 Pro Ala Ile Asp Cys Asp Ile Ala Ile Ser Thr Asn Gly Gly Tyr Pro
 275 280 285
 Leu Asp Gln Asn Ile Tyr Gln Ala Val Lys Gly Met Thr Ala Ala Glu
 290 295 300
 Ala Thr Asn Lys Glu Gly Gly Thr Ile Ile Met Val Ala Gly Ala Arg
 305 310 315 320
 Asp Gly His Gly Gly Glu Gly Phe Tyr His Asn Leu Ala Asp Val Asp
 325 330 335
 Asp Pro Lys Glu Phe Leu Asp Gln Ala Ile Asn Thr Pro Arg Leu Lys
 340 345 350
 Thr Ile Pro Asp Gln Trp Thr Ala Gln Ile Phe Ala Arg Ile Leu Val
 355 360 365
 His His His Val Ile Phe Val Ser Asp Leu Val Asp Pro Asp Leu Ile
 370 375 380
 Thr Asn Met His Met Glu Leu Ala Lys Thr Leu Asp Glu Ala Met Glu
 385 390 395 400
 Lys Ala Tyr Ala Arg Glu Gly Gln Ala Ala Lys Val Thr Val Ile Pro
 405 410 415
 Asp Gly Leu Gly Val Ile Val Lys
 420

<210> 175

<211> 741

<212> DNA

<213> Lactobacillus plantarum WCFS1

<400> 175

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gctgcccac agttagaagc gggcaaaaca gcggcattag gttttgcca tgctgattta      120
gatcgtcaac gccgcaatgg ctttccggag gtcattctac gtgctggtaa gacggcaacc      180
caaattgtgg gtatcgtgca agccttgtcc caacagacgt tgccgatttt aacgaccggg      240
ttatccgcag aaaaattcgc ggcactccaa ccagcggtac caacggctgt ctatcatgcc      300
actgcgcagt gtatgacggg cggggaacaa cccgcaccga aaacaccagg gtacattgct      360
gtggtgacgg cggggacctc cgatcaaccg gttgctgaag aagcagcagt aaccgcggaa      420
acttttggca atcgtgttga acgagtctat gacgtgggtg ttgcgggaat ccaccgactg      480
tttgccaagt tggatgtgat tcgtggtgcc cgggtggtca ttgtgattgc gggcatggaa      540
ggtgcgctgg ccagtgtcgt tgggtgacta gttgataagc ccgtgattgc agtgccgacc      600
agcgttggtt atggtactag ttttcaaggt atgaccgcgc tattgaccat gctcaatagc      660
tgtgcgctcg ggattaccgt tgtcaacatt gataacggct ttggtgccgc ctactcagct      720
agtatggtca atcaaatgta a                                     741

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<210> 176

<211> 246

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 176

Met Ala Thr Thr Ala Glu Ile Leu Gln Gln Val Ala Ala Gly Gln Leu
 1 5 10 15

Ser Pro Thr Ala Ala Ala Gln Gln Leu Glu Ala Gly Lys Thr Ala Ala
 20 25 30

Leu Gly Phe Ala Asn Val Asp Leu Asp Arg Gln Arg Arg Asn Gly Phe
 35 40 45

Pro Glu Val Ile Tyr Gly Ala Gly Lys Thr Ala Thr Gln Ile Val Gly
 50 55 60

Ile Val Gln Ala Leu Ser Gln Gln Thr Leu Pro Ile Leu Thr Thr Arg
 65 70 75 80

Leu Ser Ala Glu Lys Phe Ala Ala Leu Gln Pro Ala Leu Pro Thr Ala
 85 90 95

Val Tyr His Ala Thr Ala Gln Cys Met Thr Val Gly Glu Gln Pro Ala
 100 105 110

Pro Lys Thr Pro Gly Tyr Ile Ala Val Val Thr Ala Gly Thr Ser Asp
 115 120 125

Gln Pro Val Ala Glu Glu Ala Ala Val Thr Ala Glu Thr Phe Gly Asn
 130 135 140

Arg Val Glu Arg Val Tyr Asp Val Gly Val Ala Gly Ile His Arg Leu
 145 150 155 160

Phe Ala Lys Leu Asp Val Ile Arg Gly Ala Arg Val Val Ile Val Ile
 165 170 175

Ala Gly Met Glu Gly Ala Leu Ala Ser Val Val Gly Gly Leu Val Asp
 180 185 190

Lys Pro Val Ile Ala Val Pro Thr Ser Val Gly Tyr Gly Thr Ser Phe
 195 200 205

Gln Gly Met Thr Ala Leu Leu Thr Met Leu Asn Ser Cys Ala Ser Gly
 210 215 220

Ile Thr Val Val Asn Ile Asp Asn Gly Phe Gly Ala Ala Tyr Ser Ala
 225 230 235 240

Ser Met Val Asn Gln Met
 245

<210> 177

<211> 792

<212> DNA

<213> Lactobacillus plantarum WCFS1

<400> 177

atgcaaacac tttatttaga cgcttttttcg gggatttagcg gtgatatggt tctgggcgcg 60
 ttactcgatt taggacttga ttttgagcaa ttaaaaaccg aattggctaa gttacacgtg 120
 cacggttatg aattaacgca gcaacgggaa gccagagta gcatctatgg cacgagcttt 180
 gatgttcagg ttgcgggtgg taaggaccat gggtttgtgg aacatcacca tcatcagcat 240
 gaagctgggc atcatcatga tcatgaagcg cgtcatttag ctgatattga ggcgttaatt 300
 gacggcagtg acttatcaga taccgtgaaa caccacgcga aagcgatctt tatggaaatt 360
 gcgcaagcgg aagcagcggg tcatcacatg ccactagctg aagttcattt ccatgaagtg 420

```

ggcgcggttg attcgattgt tgatattgtg ggctgctgta ttggggttga attgatgcag 480
attgataacca tcatggcttc accgttaagt gatggtagtg gttttattaa cgttgcccac 540
ggtcagatgc cagttcccgt accagccgtg atgcagatgc gagttggtag tgccattccg 600
attcaacaac ggttggtatg gcatactgaa ttgattaccc ccaactgggat gggcttggtc 660
aagacgctcg tacgtgaatt cggaccgtta ccggaaaatg ccgtgccaac tagagttggt 720
tatggggttg gtaaaccgga cacgggtggt ttcaatgcac tgcgagccgt attattcgaa 780
aaaaaaaaact aa 792

```

<210> 178

<211> 263

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 178

```

Met Gln Thr Leu Tyr Leu Asp Ala Phe Ser Gly Ile Ser Gly Asp Met
1          5          10          15

```

```

Phe Leu Gly Ala Leu Leu Asp Leu Gly Leu Asp Phe Glu Gln Leu Lys
          20          25          30

```

```

Thr Glu Leu Ala Lys Leu His Val His Gly Tyr Glu Leu Thr Gln Gln
          35          40          45

```

```

Arg Glu Ala Gln Ser Ser Ile Tyr Gly Thr Ser Phe Asp Val Gln Val
50          55          60

```

```

Ala Gly Gly Lys Asp His Gly Phe Val Glu His His His His Gln His
65          70          75          80

```

```

Glu Ala Gly His His His Asp His Glu Ala Arg His Leu Ala Asp Ile
          85          90          95

```

```

Glu Ala Leu Ile Asp Gly Ser Asp Leu Ser Asp Thr Val Lys His His
100         105         110

```

```

Ala Lys Ala Ile Phe Met Glu Ile Ala Gln Ala Glu Ala Ala Val His
115         120         125

```

```

His Met Pro Leu Ala Glu Val His Phe His Glu Val Gly Ala Leu Asp
130         135         140

```

```

Ser Ile Val Asp Ile Val Gly Cys Cys Ile Gly Leu Glu Leu Met Gln
145         150         155         160

```

```

Ile Asp Thr Ile Met Ala Ser Pro Leu Ser Asp Gly Ser Gly Phe Ile
165         170         175

```

```

Asn Val Ala His Gly Gln Met Pro Val Pro Val Pro Ala Val Met Gln
180         185         190

```

```

Met Arg Val Gly Ser Ala Ile Pro Ile Gln Gln Arg Leu Asp Val His
195         200         205

```

```

Thr Glu Leu Ile Thr Pro Thr Gly Met Gly Leu Val Lys Thr Leu Val
210         215         220

```

```

Arg Glu Phe Gly Pro Leu Pro Glu Asn Ala Val Pro Thr Arg Val Gly
225         230         235         240

```

```

Tyr Gly Phe Gly Lys Arg Asp Thr Gly Gly Phe Asn Ala Leu Arg Ala
245         250         255

```

```

Val Leu Phe Glu Lys Lys Asn
260

```

<210> 179
 <211> 432
 <212> DNA
 <213> Lactobacillus plantarum WCFS1
 <400> 179
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 ttattaacgg cgggcgcata cgatgtgttt ttcacgccca ttcagatgaa gaaagatcgg 120
 ccggcgacaa agttaacggt tttgggaaac gttaacgata aggacttact gactaagttg 180
 atttttacaag aaacgacgac gattgggtgta cgttaccaga cgtggcaacg tactattatg 240
 caacggcact tcctgacggt cgcaacgccg tacgggtgacg ttcaagttaa agtggcgaca 300
 tatcaagata ttgagaagaa gatgccggaa tatgcggatt gtgcccagct ggcgcagcaa 360
 tttcatattc cgtttagaac ggtctaccag gcagccttag tggcgggtaga tcaattagat 420
 gaggaggcgt aa 432

<210> 180
 <211> 143
 <212> PRT
 <213> Lactobacillus plantarum WCFS1
 <400> 180
 Met Ile Glu Ala Asn Leu Asp Asp Gln Thr Gly Glu Gly Leu Gly Tyr
 1 5 10 15
 Val Met Asn Gln Leu Leu Thr Ala Gly Ala Tyr Asp Val Phe Phe Thr
 20 25 30
 Pro Ile Gln Met Lys Lys Asp Arg Pro Ala Thr Lys Leu Thr Val Leu
 35 40 45
 Gly Asn Val Asn Asp Lys Asp Leu Leu Thr Lys Leu Ile Leu Gln Glu
 50 55 60
 Thr Thr Thr Ile Gly Val Arg Tyr Gln Thr Trp Gln Arg Thr Ile Met
 65 70 75 80
 Gln Arg His Phe Leu Thr Val Ala Thr Pro Tyr Gly Asp Val Gln Val
 85 90 95
 Lys Val Ala Thr Tyr Gln Asp Ile Glu Lys Lys Met Pro Glu Tyr Ala
 100 105 110
 Asp Cys Ala Gln Leu Ala Gln Gln Phe His Ile Pro Phe Arg Thr Val
 115 120 125
 Tyr Gln Ala Ala Leu Val Ala Val Asp Gln Leu Asp Glu Glu Ala
 130 135 140

<210> 181
 <211> 717
 <212> DNA
 <213> Lactobacillus plantarum WCFS1
 <400> 181
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 ggtgttcatt gtagttccgt attaaagggg accaagtatc ggggttccgg tcatatTTTT 120
 gccattacaa cttgggggttt tgggattagc gttgccttat tcattttttg caatgtttgc 180
 attaacccgg caatggtttt ggcgcagtg ctattaggaa atatcgcatg gtctttatTT 240
 attccgtatt ccgttgccga agtgcttggt ggggtcgtgg gctcagtgat cgtttgatc 300
 atgtatgctg atcattttta agcctcaaca gatgagattt caccattac aattcggaac 360
 ttattctgta cggcaccagc cgttcgtaac ttaccgcgga atttctttgt ggaattatTT 420
 gatacatTTa tttttatTTc gggtatTTta gcgatttctg agattaaaac gccgggaatc 480
 gtgccaatTg gcgttggcct acttgatatg gccattggga tgggacttgg tgggtccaact 540
 gggttcgcaa tgaacttagc tcgagatatg gggccccgga ttgccacgc catcttacc 600
 attgccataa agccgatag tgattggcaa tacgggtatca ttgtgccagg aattgcgccc 660

tttgtcgggg cagcaattgc cgcttggttt atgcatggct tttttggaat taattaa 717

<210> 182

<211> 238

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 182

Met Val His Gln Leu Ile Ala Glu Phe Met Gly Thr Ala Leu Met Ile
1 5 10 15

Ile Phe Gly Val Gly Val His Cys Ser Ser Val Leu Lys Gly Thr Lys
20 25 30

Tyr Arg Gly Ser Gly His Ile Phe Ala Ile Thr Thr Trp Gly Phe Gly
35 40 45

Ile Ser Val Ala Leu Phe Ile Phe Gly Asn Val Cys Ile Asn Pro Ala
50 55 60

Met Val Leu Ala Gln Cys Leu Leu Gly Asn Ile Ala Trp Ser Leu Phe
65 70 75 80

Ile Pro Tyr Ser Val Ala Glu Val Leu Gly Gly Val Val Gly Ser Val
85 90 95

Ile Val Trp Ile Met Tyr Ala Asp His Phe Lys Ala Ser Thr Asp Glu
100 105 110

Ile Ser Pro Ile Thr Ile Arg Asn Leu Phe Cys Thr Ala Pro Ala Val
115 120 125

Arg Asn Leu Pro Arg Asn Phe Phe Val Glu Leu Phe Asp Thr Phe Ile
130 135 140

Phe Ile Ser Gly Ile Leu Ala Ile Ser Glu Ile Lys Thr Pro Gly Ile
145 150 155 160

Val Pro Ile Gly Val Gly Leu Leu Val Trp Ala Ile Gly Met Gly Leu
165 170 175

Gly Gly Pro Thr Gly Phe Ala Met Asn Leu Ala Arg Asp Met Gly Pro
180 185 190

Arg Ile Ala His Ala Ile Leu Pro Ile Ala Asn Lys Ala Asp Ser Asp
195 200 205

Trp Gln Tyr Gly Ile Ile Val Pro Gly Ile Ala Pro Phe Val Gly Ala
210 215 220

Ala Ile Ala Ala Trp Phe Met His Gly Phe Phe Gly Ile Asn
225 230 235

<210> 183

<211> 831

<212> DNA

<213> Lactobacillus plantarum WCFS1

<400> 183

atggcaacat tagcaacaaa aaaagcaacg ttagtagcag cattaaagga tttacaacgg	60
gtcaccgtag ccttttctgg tgggatcgac agtaccttag ttttgaagat ggccctcgat	120
gttttaggcc gtgacaatgt gaccgctgtg gttgcgaact ctgaattatt tacggatgaa	180
gaattcgata aagcgatgag tttagccgaa gaactaggtg ctaacgttca aggaactacg	240
ctagactact tgagcgatga ccacatcaag aacaacacgc ctgatagctg gtactatgcg	300
aagaagatgt tctacagccg gttgaatgac attgcggcta ataacggtag tgccgctgtc	360

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ttagacggta tgatcaagaa tgatgaaaat gattatcgtc ctgggtttgaa ggcccgtagt 420
gaagcggggg cccggagctt gttacaagaa gctgatttct tcaagactga cgttcggggc 480
ttggcacaag aactcggttt gacgaactgg aataaagtgg cgtcattgctc tgtatcttca 540
cggttcccat acgggacgac gttgacacat gacaatattg ctcaagtaat ggccgcccga 600
aaatatttgc gtagtttagg ttttccaacg gtccgggttc gtttccacaa tgatattgcg 660
cggatcgaat taccagaagc gcgaattggt gatttcttag tctttaacga ccgcgttaac 720
cgtcaattac aatcacttgg attccgctac gttacccttg atttaggtgg cttccgtagt 780
ggtcggatga atgatacggt gaccaaggca caattggcca ctttcgccta g 831

```

<210> 184

<211> 276

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 184

```

Met Ala Thr Leu Ala Thr Lys Lys Ala Thr Leu Val Ala Ala Leu Lys
1          5          10          15

```

```

Asp Leu Gln Arg Val Thr Val Ala Phe Ser Gly Gly Ile Asp Ser Thr
          20          25          30

```

```

Leu Val Leu Lys Met Ala Leu Asp Val Leu Gly Arg Asp Asn Val Thr
          35          40          45

```

```

Ala Val Val Ala Asn Ser Glu Leu Phe Thr Asp Glu Glu Phe Asp Lys
          50          55          60

```

```

Ala Met Ser Leu Ala Glu Glu Leu Gly Ala Asn Val Gln Gly Thr Thr
65          70          75          80

```

```

Leu Asp Tyr Leu Ser Asp Asp His Ile Lys Asn Asn Thr Pro Asp Ser
          85          90          95

```

```

Trp Tyr Tyr Ala Lys Lys Met Phe Tyr Ser Arg Leu Asn Asp Ile Ala
          100          105          110

```

```

Ala Asn Asn Gly Ser Ala Ala Val Leu Asp Gly Met Ile Lys Asn Asp
          115          120          125

```

```

Glu Asn Asp Tyr Arg Pro Gly Leu Lys Ala Arg Ser Glu Ala Gly Ala
          130          135          140

```

```

Arg Ser Leu Leu Gln Glu Ala Asp Phe Phe Lys Thr Asp Val Arg Ala
145          150          155          160

```

```

Leu Ala Gln Glu Leu Gly Leu Thr Asn Trp Asn Lys Val Ala Ser Cys
          165          170          175

```

```

Ser Val Ser Ser Arg Phe Pro Tyr Gly Thr Thr Leu Thr His Asp Asn
          180          185          190

```

```

Ile Ala Gln Val Met Ala Ala Glu Lys Tyr Leu Arg Ser Leu Gly Phe
          195          200          205

```

```

Pro Thr Val Arg Val Arg Phe His Asn Asp Ile Ala Arg Ile Glu Leu
210          215          220

```

```

Pro Glu Ala Arg Ile Gly Asp Phe Leu Val Phe Asn Asp Arg Val Asn
225          230          235          240

```

```

Arg Gln Leu Gln Ser Leu Gly Phe Arg Tyr Val Thr Leu Asp Leu Gly
          245          250          255

```

```

Gly Phe Arg Ser Gly Arg Met Asn Asp Thr Leu Thr Lys Ala Gln Leu

```

260

265

270

Ala Thr Phe Ala

275

<210> 185

<211> 999

<212> DNA

<213> Lactobacillus plantarum WCFS1

<400> 185

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aaagaaaacc cagatgttga agttaaatta gttccagaat tacttactga agacaacggt      120
gacttagcta aaggcttcga cggtgccgat gtataccaac aaaaggacta tactgctgaa      180
gtattgaaca agttagccga cgaaggggtt aagaacatct ctcttcgtaa cgttggtggt      240
gataacttgg acgttcctac tgttaaagca cgtggcttaa acatttctaa cgtacctgca      300
tactcaccaa atgcgattgc tgaattatca gtaacgcaat tgatgcaatt attacgtcaa      360
acccattgtt tcaataagaa gttagctaag caagacttcc gttgggcacc agatattgcc      420
aaggaattaa acaccatgac tgttggtggt atcgggtactg gtcggattgg ccgtgctgcc      480
atcgatatatt tcaaaggctt cggcgctaag gttatcggtt acgatgttta ccggaatgct      540
gaacttgaaa aggaaggcat gtacgttgac accttggaac aattatacgc ccaagctgat      600
gttatcacgt tacacgttcc tgcattgaag gataactacc acatgttgaa tgcggatgcc      660
ttcagcaaga tgaagatgg cgccatcac ttgaactttg ctcggtgggac actcatcgat      720
tcagaagact tgatcaaagc cttagacagt ggcaaagtgt ccggtgccgc tcttgatacg      780
tatgaatacg aaactaagat cttcaacaaa gaccttgaag gtcaaacgat tgatgacaag      840
gtcttcatga acttgttcaa ccgcgacaat gttttgatta caccacatac ggctttctac      900
actgaaactg ccgttcacaa catggtgcac gtttcaatga acagtaacaa acaattcatc      960
gaaactggta aagctgatac gcaagttaag tttgactaa      999

```

<210> 186

<211> 332

<212> PRT

<213> Lactobacillus plantarum WCFS1

<400> 186

```

Met Lys Ile Ile Ala Tyr Ala Val Arg Asp Asp Glu Arg Pro Phe Phe
1           5           10           15

Asp Thr Trp Met Lys Glu Asn Pro Asp Val Glu Val Lys Leu Val Pro
          20           25           30

Glu Leu Leu Thr Glu Asp Asn Val Asp Leu Ala Lys Gly Phe Asp Gly
35           40           45

Ala Asp Val Tyr Gln Gln Lys Asp Tyr Thr Ala Glu Val Leu Asn Lys
50           55           60

Leu Ala Asp Glu Gly Val Lys Asn Ile Ser Leu Arg Asn Val Gly Val
65           70           75           80

Asp Asn Leu Asp Val Pro Thr Val Lys Ala Arg Gly Leu Asn Ile Ser
          85           90           95

Asn Val Pro Ala Tyr Ser Pro Asn Ala Ile Ala Glu Leu Ser Val Thr
          100          105          110

Gln Leu Met Gln Leu Leu Arg Gln Thr Pro Leu Phe Asn Lys Lys Leu
          115          120          125

Ala Lys Gln Asp Phe Arg Trp Ala Pro Asp Ile Ala Lys Glu Leu Asn
          130          135          140

Thr Met Thr Val Gly Val Ile Gly Thr Gly Arg Ile Gly Arg Ala Ala
145          150          155          160

```

Ile Asp Ile Phe Lys Gly Phe Gly Ala Lys Val Ile Gly Tyr Asp Val
 165 170 175
 Tyr Arg Asn Ala Glu Leu Glu Lys Glu Gly Met Tyr Val Asp Thr Leu
 180 185 190
 Asp Glu Leu Tyr Ala Gln Ala Asp Val Ile Thr Leu His Val Pro Ala
 195 200 205
 Leu Lys Asp Asn Tyr His Met Leu Asn Ala Asp Ala Phe Ser Lys Met
 210 215 220
 Lys Asp Gly Ala Tyr Ile Leu Asn Phe Ala Arg Gly Thr Leu Ile Asp
 225 230 235 240
 Ser Glu Asp Leu Ile Lys Ala Leu Asp Ser Gly Lys Val Ala Gly Ala
 245 250 255
 Ala Leu Asp Thr Tyr Glu Tyr Glu Thr Lys Ile Phe Asn Lys Asp Leu
 260 265 270
 Glu Gly Gln Thr Ile Asp Asp Lys Val Phe Met Asn Leu Phe Asn Arg
 275 280 285
 Asp Asn Val Leu Ile Thr Pro His Thr Ala Phe Tyr Thr Glu Thr Ala
 290 295 300
 Val His Asn Met Val His Val Ser Met Asn Ser Asn Lys Gln Phe Ile
 305 310 315 320
 Glu Thr Gly Lys Ala Asp Thr Gln Val Lys Phe Asp
 325 330

<210> 187

<211> 1716

<212> DNA

<213> Escherichia coli K12

<400> 187

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tctggtcagg	gcgacgcgct	ggctgtcggt	ttccctggct	cactactaga	attgtggcgg	180
gtgctgaaaag	cctgcgtcac	cgccgacaaa	attattctga	tgcaggccgc	caatacaggc	240
ctgaccgaag	gatcgacgcc	aaacggtaac	gattatgatc	gcatgtcgt	tatcatcagc	300
accctgcgtc	tcgacaagct	gcacgttctt	ggcaagggcg	aacagggtgt	ggcctatccg	360
ggcaccacgc	tctattcgct	ggaaaaagcc	ctcaaaccgc	tgggacgcga	accgcactca	420
gtgattggat	catcggtgat	aggcgcatcg	gtcatcgcg	gtatttgtaa	caactccggc	480
ggctcgctgg	tgcaacgtgg	cccggcgtat	accgaaatgt	cgttattcgc	gcgtataaat	540
gaagacggca	aactgacgct	ggtgaaccat	ctggggattg	atctgggcga	aacgccggag	600
cagatcctta	gcaagctgga	tgatgatcgc	atcaaagatg	acgatgtgcg	tcacgatggg	660
cgctacgccc	acgattatga	ctatgtccac	cgcgttcgtg	atattgaagc	cgacacgccc	720
gcacgttata	acgccgatcc	tgatcggtta	tttgaatctt	ctgggtgcgc	cgggaagctg	780
gcggctcttg	cagtacgtct	tgataccttc	gaagcgga	aaaatcagca	ggtgttttat	840
atcggcacca	accagccgga	agtgtgacc	gaaatccgcc	gtcatattct	ggctaacttc	900
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tacggcaaaag	acaccttcct	gatgattgat	aagttaggca	ccgacaagat	gccgttcttc	1020
tttaattctca	agggacgcac	cgatgcgatg	ctggagaaag	tgaaattctt	ccgtccgcgt	1080
tttactgacc	gtgcatgca	aaaattcggg	cacctgttcc	ccagccattt	accgccgcgc	1140
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gtgggcgaag	ccaaatcggt	gctgggtggat	tatttcaaac	aggccgaagg	cgatttcttt	1260
gtctgtacgc	cggaggaagg	cagcaaagcg	tttttacacc	gtttcgccgc	tgcgggcgca	1320
gcaattcggt	atcaggcggt	gcattccgat	gaagtcgaag	acattctggc	gttgatatac	1380
gctctgcggc	gtaacgacac	cgagtgggat	gagcatttac	cgccggagat	cgacagccag	1440
ctggtgcaca	agctctatta	cggccatttt	atgtgctatg	tcttccatca	ggattacata	1500


```

gtgaaaaaag gcgtggatgt gcatgcgta aaagaacaga tgctggaact gctacagcag 1560
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ttgcagaagt tctatcgcca gaacgatccg accaacagca tgaatccggg gatcggtaaa 1680
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```

<210> 188

<211> 571

<212> PRT

<213> Escherichia coli K12

<400> 188

```

Met Ser Ser Met Thr Thr Thr Asp Asn Lys Ala Phe Leu Asn Glu Leu
1          5          10          15

```

```

Ala Arg Leu Val Gly Ser Ser His Leu Leu Thr Asp Pro Ala Lys Thr
20          25          30

```

```

Ala Arg Tyr Arg Lys Gly Phe Arg Ser Gly Gln Gly Asp Ala Leu Ala
35          40          45

```

```

Val Val Phe Pro Gly Ser Leu Leu Glu Leu Trp Arg Val Leu Lys Ala
50          55          60

```

```

Cys Val Thr Ala Asp Lys Ile Ile Leu Met Gln Ala Ala Asn Thr Gly
65          70          75          80

```

```

Leu Thr Glu Gly Ser Thr Pro Asn Gly Asn Asp Tyr Asp Arg Asp Val
85          90          95

```

```

Val Ile Ile Ser Thr Leu Arg Leu Asp Lys Leu His Val Leu Gly Lys
100         105         110

```

```

Gly Glu Gln Val Leu Ala Tyr Pro Gly Thr Thr Leu Tyr Ser Leu Glu
115         120         125

```

```

Lys Ala Leu Lys Pro Leu Gly Arg Glu Pro His Ser Val Ile Gly Ser
130         135         140

```

```

Ser Cys Ile Gly Ala Ser Val Ile Gly Gly Ile Cys Asn Asn Ser Gly
145         150         155         160

```

```

Gly Ser Leu Val Gln Arg Gly Pro Ala Tyr Thr Glu Met Ser Leu Phe
165         170         175

```

```

Ala Arg Ile Asn Glu Asp Gly Lys Leu Thr Leu Val Asn His Leu Gly
180         185         190

```

```

Ile Asp Leu Gly Glu Thr Pro Glu Gln Ile Leu Ser Lys Leu Asp Asp
195         200         205

```

```

Asp Arg Ile Lys Asp Asp Asp Val Arg His Asp Gly Arg His Ala His
210         215         220

```

```

Asp Tyr Asp Tyr Val His Arg Val Arg Asp Ile Glu Ala Asp Thr Pro
225         230         235         240

```

```

Ala Arg Tyr Asn Ala Asp Pro Asp Arg Leu Phe Glu Ser Ser Gly Cys
245         250         255

```

```

Ala Gly Lys Leu Ala Val Phe Ala Val Arg Leu Asp Thr Phe Glu Ala
260         265         270

```

```

Glu Lys Asn Gln Gln Val Phe Tyr Ile Gly Thr Asn Gln Pro Glu Val
275         280         285

```

Leu Thr Glu Ile Arg Arg His Ile Leu Ala Asn Phe Glu Asn Leu Pro
 290 295 300

Val Ala Gly Glu Tyr Met His Arg Asp Ile Tyr Asp Ile Ala Glu Lys
 305 310 315 320

Tyr Gly Lys Asp Thr Phe Leu Met Ile Asp Lys Leu Gly Thr Asp Lys
 325 330 335

Met Pro Phe Phe Phe Asn Leu Lys Gly Arg Thr Asp Ala Met Leu Glu
 340 345 350

Lys Val Lys Phe Phe Arg Pro His Phe Thr Asp Arg Ala Met Gln Lys
 355 360 365

Phe Gly His Leu Phe Pro Ser His Leu Pro Pro Arg Met Lys Asn Trp
 370 375 380

Arg Asp Lys Tyr Glu His His Leu Leu Leu Lys Met Ala Gly Asp Gly
 385 390 395 400

Val Gly Glu Ala Lys Ser Trp Leu Val Asp Tyr Phe Lys Gln Ala Glu
 405 410 415

Gly Asp Phe Phe Val Cys Thr Pro Glu Glu Gly Ser Lys Ala Phe Leu
 420 425 430

His Arg Phe Ala Ala Ala Gly Ala Ala Ile Arg Tyr Gln Ala Val His
 435 440 445

Ser Asp Glu Val Glu Asp Ile Leu Ala Leu Asp Ile Ala Leu Arg Arg
 450 455 460

Asn Asp Thr Glu Trp Tyr Glu His Leu Pro Pro Glu Ile Asp Ser Gln
 465 470 475 480

Leu Val His Lys Leu Tyr Tyr Gly His Phe Met Cys Tyr Val Phe His
 485 490 495

Gln Asp Tyr Ile Val Lys Lys Gly Val Asp Val His Ala Leu Lys Glu
 500 505 510

Gln Met Leu Glu Leu Leu Gln Gln Arg Gly Ala Gln Tyr Pro Ala Glu
 515 520 525

His Asn Val Gly His Leu Tyr Lys Ala Pro Glu Thr Leu Gln Lys Phe
 530 535 540

Tyr Arg Glu Asn Asp Pro Thr Asn Ser Met Asn Pro Gly Ile Gly Lys
 545 550 555 560

Thr Ser Lys Arg Lys Asn Trp Gln Glu Val Glu
 565 570

<210> 189

<211> 2874

<212> DNA

<213> Escherichia coli K12

<400> 189

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 ctgaccggcc agattgtgcc gaaagatatt caacttgcca caccaccgca ggttggcgca 180

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ccggcgaccg aatacgccgc actggcagaa ctcaaggcta ttgccagtcg caataaacgc 240
ttcacgtctt acatcggcct gggttacacc gccgtgcagc taccgccggt taccctgcgt 300
aacatgctgg aaaatccggg ctggtatacc gcgtacactc cgatatcaacc tgaagtctcc 360
cagggccgccc ttgaagcact gctcaacttc cagcaggtaa cgctggattt gactggactg 420
gatattggcct ctgcttctct tctggacgag gccaccgctg ccgccgaagc aatggcgatg 480
gcgaaacgcg tcagcaaaact gaaaaatgcc aaccgcttct tcgtggcttc cgatgtgcat 540
ccgcaaacgc tggatgtggt ccgtactcgt gccgaaacct ttggttttga agtgattgtc 600
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gtattcccgg caggtgtggc agacaaatac tggccgacag tgaaacgtct ggatgatgtt 2820
tacggcgacc gtaacctgtt ctgctcctgc gtaccgatta gcgaataacca gtaa 2874

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<210> 190

<211> 957

<212> PRT

<213> Escherichia coli K12

<400> 190

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Arg His Ile Gly Pro Asp Ala Ala Gln Gln Gln Glu Met Leu Asn Ala
20 25 30

Val Gly Ala Gln Ser Leu Asn Ala Leu Thr Gly Gln Ile Val Pro Lys
35 40 45

Asp Ile Gln Leu Ala Thr Pro Pro Gln Val Gly Ala Pro Ala Thr Glu
50 55 60

Tyr	Ala	Ala	Leu	Ala	Glu	Leu	Lys	Ala	Ile	Ala	Ser	Arg	Asn	Lys	Arg	
65					70					75					80	
Phe	Thr	Ser	Tyr	Ile	Gly	Met	Gly	Tyr	Thr	Ala	Val	Gln	Leu	Pro	Pro	
				85					90					95		
Val	Ile	Leu	Arg	Asn	Met	Leu	Glu	Asn	Pro	Gly	Trp	Tyr	Thr	Ala	Tyr	
			100					105					110			
Thr	Pro	Tyr	Gln	Pro	Glu	Val	Ser	Gln	Gly	Arg	Leu	Glu	Ala	Leu	Leu	
		115					120					125				
Asn	Phe	Gln	Gln	Val	Thr	Leu	Asp	Leu	Thr	Gly	Leu	Asp	Met	Ala	Ser	
	130					135					140					
Ala	Ser	Leu	Leu	Asp	Glu	Ala	Thr	Ala	Ala	Ala	Glu	Ala	Met	Ala	Met	
145					150					155					160	
Ala	Lys	Arg	Val	Ser	Lys	Leu	Lys	Asn	Ala	Asn	Arg	Phe	Phe	Val	Ala	
				165				170						175		
Ser	Asp	Val	His	Pro	Gln	Thr	Leu	Asp	Val	Val	Arg	Thr	Arg	Ala	Glu	
			180					185					190			
Thr	Phe	Gly	Phe	Glu	Val	Ile	Val	Asp	Asp	Ala	Gln	Lys	Val	Leu	Asp	
		195					200					205				
His	Gln	Asp	Val	Phe	Gly	Val	Leu	Leu	Gln	Gln	Val	Gly	Thr	Thr	Gly	
	210					215					220					
Glu	Ile	His	Asp	Tyr	Thr	Ala	Leu	Ile	Ser	Glu	Leu	Lys	Ser	Arg	Lys	
225					230					235					240	
Ile	Val	Val	Ser	Val	Ala	Ala	Asp	Ile	Met	Ala	Leu	Val	Leu	Leu	Thr	
				245					250						255	
Ala	Pro	Gly	Lys	Gln	Gly	Ala	Asp	Ile	Val	Phe	Gly	Ser	Ala	Gln	Arg	
			260					265					270			
Phe	Gly	Val	Pro	Met	Gly	Tyr	Gly	Gly	Pro	His	Ala	Ala	Phe	Phe	Ala	
		275					280					285				
Ala	Lys	Asp	Glu	Tyr	Lys	Arg	Ser	Met	Pro	Gly	Arg	Ile	Ile	Gly	Val	
	290					295					300					
Ser	Lys	Asp	Ala	Ala	Gly	Asn	Thr	Ala	Leu	Arg	Met	Ala	Met	Gln	Thr	
305					310					315					320	
Arg	Glu	Gln	His	Ile	Arg	Arg	Glu	Lys	Ala	Asn	Ser	Asn	Ile	Cys	Thr	
				325					330					335		
Ser	Gln	Val	Leu	Leu	Ala	Asn	Ile	Ala	Ser	Leu	Tyr	Ala	Val	Tyr	His	
			340					345					350			
Gly	Pro	Val	Gly	Leu	Lys	Arg	Ile	Ala	Asn	Arg	Ile	His	Arg	Leu	Thr	
		355					360					365				
Asp	Ile	Leu	Ala	Ala	Gly	Leu	Gln	Gln	Lys	Gly	Leu	Lys	Leu	Arg	His	
	370					375					380					
Ala	His	Tyr	Phe	Asp	Thr	Leu	Cys	Val	Glu	Val	Ala	Asp	Lys	Ala	Gly	
385					390					395					400	

Val Leu Thr Arg Ala Glu Ala Ala Glu Ile Asn Leu Arg Ser Asp Ile
 405 410 415
 Leu Asn Ala Val Gly Ile Thr Leu Asp Glu Thr Thr Thr Arg Glu Asn
 420 425 430
 Val Met Gln Leu Phe Asn Val Leu Leu Gly Asp Asn His Gly Leu Asp
 435 440 445
 Ile Asp Thr Leu Asp Lys Asp Val Ala His Asp Ser Arg Ser Ile Gln
 450 455 460
 Pro Ala Met Leu Arg Asp Asp Glu Ile Leu Thr His Pro Val Phe Asn
 465 470 475 480
 Arg Tyr His Ser Glu Thr Glu Met Met Arg Tyr Met His Ser Leu Glu
 485 490 495
 Arg Lys Asp Leu Ala Leu Asn Gln Ala Met Ile Pro Leu Gly Ser Cys
 500 505 510
 Thr Met Lys Leu Asn Ala Ala Ala Glu Met Ile Pro Ile Thr Trp Pro
 515 520 525
 Glu Phe Ala Glu Leu His Pro Phe Cys Pro Pro Glu Gln Ala Glu Gly
 530 535 540
 Tyr Gln Gln Met Ile Ala Gln Leu Ala Asp Trp Leu Val Lys Leu Thr
 545 550 555 560
 Gly Tyr Asp Ala Val Cys Met Gln Pro Asn Ser Gly Ala Gln Gly Glu
 565 570 575
 Tyr Ala Gly Leu Leu Ala Ile Arg His Tyr His Glu Ser Arg Asn Glu
 580 585 590
 Gly His Arg Asp Ile Cys Leu Ile Pro Ala Ser Ala His Gly Thr Asn
 595 600 605
 Pro Ala Ser Ala His Met Ala Gly Met Gln Val Val Val Val Ala Cys
 610 615 620
 Asp Lys Asn Gly Asn Ile Asp Leu Thr Asp Leu Arg Ala Lys Ala Glu
 625 630 635 640
 Gln Ala Gly Asp Asn Leu Ser Cys Ile Met Val Thr Tyr Pro Ser Thr
 645 650 655
 His Gly Val Tyr Glu Glu Thr Ile Arg Glu Val Cys Glu Val Val His
 660 665 670
 Gln Phe Gly Gly Gln Val Tyr Leu Asp Gly Ala Asn Met Asn Ala Gln
 675 680 685
 Val Gly Ile Thr Ser Pro Gly Phe Ile Gly Ala Asp Val Ser His Leu
 690 695 700
 Asn Leu His Lys Thr Phe Cys Ile Pro His Gly Gly Gly Gly Pro Gly
 705 710 715 720
 Met Gly Pro Ile Gly Val Lys Ala His Leu Ala Pro Phe Val Pro Gly
 725 730 735

His Ser Val Val Gln Ile Glu Gly Met Leu Thr Arg Gln Gly Ala Val
 740 745 750
 Ser Ala Ala Pro Phe Gly Ser Ala Ser Ile Leu Pro Ile Ser Trp Met
 755 760 765
 Tyr Ile Arg Met Met Gly Ala Glu Gly Leu Lys Lys Ala Ser Gln Val
 770 775 780
 Ala Ile Leu Asn Ala Asn Tyr Ile Ala Ser Arg Leu Gln Asp Ala Phe
 785 790 795 800
 Pro Val Leu Tyr Thr Gly Arg Asp Gly Arg Val Ala His Glu Cys Ile
 805 810 815
 Leu Asp Ile Arg Pro Leu Lys Glu Glu Thr Gly Ile Ser Glu Leu Asp
 820 825 830
 Ile Ala Lys Arg Leu Ile Asp Tyr Gly Phe His Ala Pro Thr Met Ser
 835 840 845
 Phe Pro Val Ala Gly Thr Leu Met Val Glu Pro Thr Glu Ser Glu Ser
 850 855 860
 Lys Val Glu Leu Asp Arg Phe Ile Asp Ala Met Leu Ala Ile Arg Ala
 865 870 875 880
 Glu Ile Asp Gln Val Lys Ala Gly Val Trp Pro Leu Glu Asp Asn Pro
 885 890 895
 Leu Val Asn Ala Pro His Ile Gln Ser Glu Leu Val Ala Glu Trp Ala
 900 905 910
 His Pro Tyr Ser Arg Glu Val Ala Val Phe Pro Ala Gly Val Ala Asp
 915 920 925
 Lys Tyr Trp Pro Thr Val Lys Arg Leu Asp Asp Val Tyr Gly Asp Arg
 930 935 940
 Asn Leu Phe Cys Ser Cys Val Pro Ile Ser Glu Tyr Gln
 945 950 955

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Ala Gln Glu Leu Leu Gly Asp Met Val Phe Val Asp Leu Pro Glu Val
35 40 45

Gly Ala Thr Val Ser Ala Gly Asp Asp Cys Ala Val Ala Glu Ser Val
50 55 60

Lys Ala Ala Ser Asp Ile Tyr Ala Pro Val Ser Gly Glu Ile Val Ala
65 70 75 80

Val Asn Asp Ala Leu Ser Asp Ser Pro Glu Leu Val Asn Ser Glu Pro
85 90 95

Tyr Ala Gly Gly Trp Ile Phe Lys Ile Lys Ala Ser Asp Glu Ser Glu
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<213> Escherichia coli K12

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<212> PRT

<213> Escherichia coli K12

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Gln Ile Asp Glu His His Ala Val Arg Thr Asp Ala Gly Met Phe Asp
35 40 45

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Val	Asn	Ser 115	Ala	Thr	Arg	Glu	Lys 120	Asp	Leu	Ser	Trp	Ile 125	Thr	Gln	His
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