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<120> UNNATURAL BASE PAIR COMPOSITIONS AND METHODS OF USE

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<151> 2017-12-29

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 <211> 125
 <212> DNA
 <213> Escherichia coli

<400> 6	
aggagtaaaa atgattccgg ggatccgtcg acctgcagtt cgaagttcct attctctaga	60
aagtatagga acttcgaagc agctccagcc tacagaaact aacgaagatt tttaatcgtc	120
ttgtt	125

<210> 7
 <211> 1082
 <212> DNA
 <213> Escherichia coli

<400> 7	
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gattgagaaa caatttggtg aaggctccat catgcgcctg ggtgaagacc gttccatgga	120
tgtggaaacc atctctaccg gttcgctttc actggatatc gcgcttgggg caggtgggtct	180
gccgatgggc cgtatcgtcg aaatctacgg accggaatct tccggtaaaa ccacgtgac	240
gctgcaggtg atcgccgcag cgcagcgtga aggtaaaacc tgtgcgttta tcgatgctga	300
acacgcgctg gacccaatct acgcacgtaa actgggcgtc gatatcgata acctgctgtg	360
ctcccagccg gacaccggcg agcaggcact ggaaatctgt gacgccctgg cgcgttctgg	420
cgcagtagac gttatcgtcg ttgactccgt ggccggcactg acgccgaaag cggaaatcga	480
aggcgaaatc ggcgactctc acatgggcct tgcggcacgt atgatgagcc aggcgatgcg	540
taagctggcg ggtaacctga agcagtcctc cacgctgctg atcttcatca accagatccg	600

tatgaaaatt ggtgtgatgt tcggtaaccc ggaaaccact accggtggta acgcgctgaa	660
attctacgcc tctgttcgtc tcgacatccg tcgtatcggc gcggtgaaag agggcgaaaa	720
cgtgggtgggt agcgaaaccc gcgtgaaagt ggtgaagaac aaaatcgctg cgccgtttaa	780
acaggctgaa ttccagatcc tctacggcga aggtatcaac ttctacggcg aactggttga	840
cctgggcgta aaagagaagc tgatcgagaa agcaggcgcg tggtagctg acaaagggtga	900
gaagatcgggt cagggtaaaag cgaatgcgac tgcctggctg aaagataacc cggaaccgc	960
gaaagagatc gagaagaaag tacgtgagtt gctgctgagc aacccgaact caacgccgga	1020
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tt	1082

<210> 8

<211> 783

<212> PRT

<213> Escherichia coli

<400> 8

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

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

Gln	Val	Pro	Arg	Ala	Gln	His	Ile	Leu	Gln	Gly	Glu	Gln	Gly	Val	Arg
	50					55					60				

Leu	Thr	Pro	Leu	Ala	Leu	Lys	Asp	Phe	His	Arg	Gln	Pro	Val	Tyr	Gly
65					70					75					80

Leu	Tyr	Cys	Arg	Ala	His	Arg	Gln	Leu	Met	Asn	Tyr	Glu	Lys	Arg	Leu
				85					90					95	

Arg	Glu	Gly	Gly	Val	Thr	Val	Tyr	Glu	Ala	Asp	Val	Arg	Pro	Pro	Glu
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

100	105	110
Arg Tyr Leu Met Glu Arg Phe Ile Thr Ser Pro Val Trp Val Glu Gly 115 120 125		
Asp Met His Asn Gly Ala Ile Val Asn Ala Arg Leu Lys Pro His Pro 130 135 140		
Asp Tyr Arg Pro Pro Leu Lys Trp Val Ser Ile Asp Ile Glu Thr Thr 145 150 155 160		
Arg His Gly Glu Leu Tyr Cys Ile Gly Leu Glu Gly Cys Gly Gln Arg 165 170 175		
Ile Val Tyr Met Leu Gly Pro Glu Asn Gly Asp Ala Ser Ala Leu Asp 180 185 190		
Phe Glu Leu Glu Tyr Val Ala Ser Arg Pro Gln Leu Leu Glu Lys Leu 195 200 205		
Asn Ala Trp Phe Ala Asn Tyr Asp Pro Asp Val Ile Ile Gly Trp Asn 210 215 220		
Val Val Gln Phe Asp Leu Arg Met Leu Gln Lys His Ala Glu Arg Tyr 225 230 235 240		
Arg Ile Pro Leu Arg Leu Gly Arg Asp Asn Ser Glu Leu Glu Trp Arg 245 250 255		
Glu His Gly Phe Lys Asn Gly Val Phe Phe Ala Gln Ala Lys Gly Arg 260 265 270		
Leu Ile Ile Asp Gly Ile Glu Ala Leu Lys Ser Ala Phe Trp Asn Phe 275 280 285		
Ser Ser Phe Ser Leu Glu Thr Val Ala Gln Glu Leu Leu Gly Glu Gly 290 295 300		

Lys Ser Ile Asp Asn Pro Trp Asp Arg Met Asp Glu Ile Asp Arg Arg
 305 310 315 320

Phe Ala Glu Asp Lys Pro Ala Leu Ala Thr Tyr Asn Leu Lys Asp Cys
 325 330 335

Glu Leu Val Thr Gln Ile Phe His Lys Thr Glu Ile Met Pro Phe Leu
 340 345 350

Leu Glu Arg Ala Thr Val Asn Gly Leu Pro Val Asp Arg His Gly Gly
 355 360 365

Ser Val Ala Ala Phe Gly His Leu Tyr Phe Pro Arg Met His Arg Ala
 370 375 380

Gly Tyr Val Ala Pro Asn Leu Gly Glu Val Pro Pro His Ala Ser Pro
 385 390 395 400

Gly Gly Tyr Val Met Asp Ser Arg Pro Gly Leu Tyr Asp Ser Val Leu
 405 410 415

Val Leu Asp Tyr Lys Ser Leu Tyr Pro Ser Ile Ile Arg Thr Phe Leu
 420 425 430

Ile Asp Pro Val Gly Leu Val Glu Gly Met Ala Gln Pro Asp Pro Glu
 435 440 445

His Ser Thr Glu Gly Phe Leu Asp Ala Trp Phe Ser Arg Glu Lys His
 450 455 460

Cys Leu Pro Glu Ile Val Thr Asn Ile Trp His Gly Arg Asp Glu Ala
 465 470 475 480

Lys Arg Gln Gly Asn Lys Pro Leu Ser Gln Ala Leu Lys Ile Ile Met
 485 490 495

Asn Ala Phe Tyr Gly Val Leu Gly Thr Thr Ala Cys Arg Phe Phe Asp

500	505	510
Pro Arg Leu Ala Ser Ser Ile Thr Met Arg Gly His Gln Ile Met Arg		
515	520	525
Gln Thr Lys Ala Leu Ile Glu Ala Gln Gly Tyr Asp Val Ile Tyr Gly		
530	535	540
Asp Thr Asp Ser Thr Phe Val Trp Leu Lys Gly Ala His Ser Glu Glu		
545	550	555
Glu Ala Ala Lys Ile Gly Arg Ala Leu Val Gln His Val Asn Ala Trp		
565	570	575
Trp Ala Glu Thr Leu Gln Lys Gln Arg Leu Thr Ser Ala Leu Glu Leu		
580	585	590
Glu Tyr Glu Thr His Phe Cys Arg Phe Leu Met Pro Thr Ile Arg Gly		
595	600	605
Ala Asp Thr Gly Ser Lys Lys Arg Tyr Ala Gly Leu Ile Gln Glu Gly		
610	615	620
Asp Lys Gln Arg Met Val Phe Lys Gly Leu Glu Thr Val Arg Thr Asp		
625	630	635
Trp Thr Pro Leu Ala Gln Gln Phe Gln Gln Glu Leu Tyr Leu Arg Ile		
645	650	655
Phe Arg Asn Glu Pro Tyr Gln Glu Tyr Val Arg Glu Thr Ile Asp Lys		
660	665	670
Leu Met Ala Gly Glu Leu Asp Ala Arg Leu Val Tyr Arg Lys Arg Leu		
675	680	685
Arg Arg Pro Leu Ser Glu Tyr Gln Arg Asn Val Pro Pro His Val Arg		
690	695	700

Ala Ala Arg Leu Ala Asp Glu Glu Asn Gln Lys Arg Gly Arg Pro Leu
705 710 715 720

Gln Tyr Gln Asn Arg Gly Thr Ile Lys Tyr Val Trp Thr Thr Asn Gly
725 730 735

Pro Glu Pro Leu Asp Tyr Gln Arg Ser Pro Leu Asp Tyr Glu His Tyr
740 745 750

Leu Thr Arg Gln Leu Gln Pro Val Ala Glu Gly Ile Leu Pro Phe Ile
755 760 765

Glu Asp Asn Phe Ala Thr Leu Met Thr Gly Gln Leu Gly Leu Phe
770 775 780

<210> 9
<211> 320
<212> PRT
<213> Escherichia coli

<400> 9
Met Ala Ile Ser Ser Arg Asn Thr Leu Leu Ala Ala Leu Ala Phe Ile
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Ala Phe Gln Ala Gln Ala Val Asn Val Thr Val Ala Tyr Gln Thr Ser
20 25 30

Ala Glu Pro Ala Lys Val Ala Gln Ala Asp Asn Thr Phe Ala Lys Glu
35 40 45

Ser Gly Ala Thr Val Asp Trp Arg Lys Phe Asp Ser Gly Ala Ser Ile
50 55 60

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

Ser Pro Leu Ala Val Ala Ala Ser Gln Gln Val Pro Ile Glu Val Phe
85 90 95

Leu Leu Ala Ser Lys Leu Gly Asn Ser Glu Ala Leu Val Val Lys Lys
100 105 110

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

Phe Ile Ser Thr Thr His Tyr Ser Leu Leu Ala Ala Leu Lys His Trp
130 135 140

Gly Ile Lys Pro Gly Gln Val Glu Ile Val Asn Leu Gln Pro Pro Ala
145 150 155 160

Ile Ile Ala Ala Trp Gln Arg Gly Asp Ile Asp Gly Ala Tyr Val Trp
165 170 175

Ala Pro Ala Val Asn Ala Leu Glu Lys Asp Gly Lys Val Leu Thr Asp
180 185 190

Ser Glu Gln Val Gly Gln Trp Gly Ala Pro Thr Leu Asp Val Trp Val
195 200 205

Val Arg Lys Asp Phe Ala Glu Lys His Pro Glu Val Val Lys Ala Phe
210 215 220

Ala Lys Ser Ala Ile Asp Ala Gln Gln Pro Tyr Ile Ala Asn Pro Asp
225 230 235 240

Ala Trp Leu Lys Gln Pro Glu Asn Ile Ser Lys Leu Ala Arg Leu Ser
245 250 255

Gly Val Pro Glu Gly Asp Val Pro Gly Leu Val Lys Gly Asn Thr Tyr
260 265 270

Leu Thr Pro Gln Gln Gln Thr Ala Glu Leu Thr Gly Pro Val Asn Lys
275 280 285

Ala Ile Ile Asp Thr Ala Gln Phe Leu Lys Glu Gln Gly Lys Val Pro

290

295

300

Ala Val Ala Asn Asp Tyr Ser Gln Tyr Val Thr Ser Arg Phe Val Gln
 305 310 315 320

<210> 10

<211> 91

<212> PRT

<213> Escherichia coli

<400> 10

Met Ala Ser Val Ser Ile Ser Cys Pro Ser Cys Ser Ala Thr Asp Gly
 1 5 10 15

Val Val Arg Asn Gly Lys Ser Thr Ala Gly His Gln Arg Tyr Leu Cys
 20 25 30

Ser His Cys Arg Lys Thr Trp Gln Leu Gln Phe Thr Tyr Thr Ala Ser
 35 40 45

Gln Pro Gly Thr His Gln Lys Ile Ile Asp Met Ala Met Asn Gly Val
 50 55 60

Gly Cys Arg Ala Thr Ala Arg Ile Met Gly Val Gly Leu Asn Thr Ile
 65 70 75 80

Leu Arg His Leu Lys Asn Ser Gly Arg Ser Arg
 85 90

<210> 11

<211> 167

<212> PRT

<213> Escherichia coli

<400> 11

Met Pro Gly Asn Cys Pro His Tyr Gly Arg Trp Pro Gln His Asp Phe
 1 5 10 15

Thr Ser Leu Lys Lys Leu Arg Pro Gln Ser Val Thr Ser Arg Ile Gln
 20 25 30

Pro Gly Ser Asp Val Ile Val Cys Ala Glu Met Asp Glu Gln Trp Gly
35 40 45

Tyr Val Gly Ala Lys Ser Arg Gln Arg Trp Leu Phe Tyr Ala Tyr Asp
50 55 60

Arg Leu Arg Lys Thr Val Val Ala His Val Phe Gly Glu Arg Thr Met
65 70 75 80

Ala Thr Leu Gly Arg Leu Met Ser Leu Met Ser Pro Phe Asp Val Val
85 90 95

Ile Trp Met Thr Asp Gly Trp Pro Leu Tyr Glu Ser Arg Leu Lys Gly
100 105 110

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

Asn Leu Asn Leu Arg Gln His Leu Ala Arg Leu Gly Arg Lys Ser Leu
130 135 140

Ser Phe Ser Lys Ser Val Glu Leu His Asp Lys Val Ile Gly His Tyr
145 150 155 160

Leu Asn Ile Lys His Tyr Gln
165

<210> 12

<211> 511

<212> PRT

<213> Escherichia coli

<400> 12

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

Ala Leu Arg Lys Val Arg Gln Ala Val Phe Pro Ile Tyr Gly Asn Gln
20 25 30

Glu Val Thr Lys Phe Leu Leu Ile Gly Ser Ile Lys Phe Phe Ile Ile
35 40 45

Leu Ala Leu Thr Leu Thr Arg Asp Thr Lys Asp Thr Leu Ile Val Thr
50 55 60

Gln Cys Gly Ala Glu Ala Ile Ala Phe Leu Lys Ile Tyr Gly Val Leu
65 70 75 80

Pro Ala Ala Thr Ala Phe Ile Ala Leu Tyr Ser Lys Met Ser Asn Ala
85 90 95

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

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

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

Ser Gly Gly Met Ala Val Leu Ala Lys Ile Ala Thr His Trp Thr Ser
145 150 155 160

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

Leu Leu Phe Trp Gln Phe Ala Asn Asp Val Val Asn Val Asp Gln Ala
180 185 190

Lys Arg Phe Tyr Pro Leu Phe Ala Gln Met Ser Gly Leu Ala Pro Val
195 200 205

Leu Ala Gly Gln Tyr Val Val Arg Phe Ala Ser Lys Ala Val Asn Phe
210 215 220

Glu Ala Ser Met His Arg Leu Thr Ala Ala Val Thr Phe Ala Gly Ile

225		230		235		240									
Met	Ile	Cys	Ile	Phe	Tyr	Gln	Leu	Ser	Ser	Ser	Tyr	Val	Glu	Arg	Thr
				245					250					255	
Glu	Ser	Ala	Lys	Pro	Ala	Ala	Asp	Asn	Glu	Gln	Ser	Ile	Lys	Pro	Lys
			260					265					270		
Lys	Lys	Lys	Pro	Lys	Met	Ser	Met	Val	Glu	Ser	Gly	Lys	Phe	Leu	Ala
		275					280					285			
Ser	Ser	Gln	Tyr	Leu	Arg	Leu	Ile	Ala	Met	Leu	Val	Leu	Gly	Tyr	Gly
	290					295					300				
Leu	Ser	Ile	Asn	Phe	Thr	Glu	Ile	Met	Trp	Lys	Ser	Leu	Val	Lys	Lys
305					310					315					320
Gln	Tyr	Pro	Asp	Pro	Leu	Asp	Tyr	Gln	Arg	Phe	Met	Gly	Asn	Phe	Ser
				325					330					335	
Ser	Ala	Val	Gly	Leu	Ser	Thr	Cys	Ile	Val	Ile	Phe	Phe	Gly	Val	His
			340					345					350		
Val	Ile	Arg	Leu	Leu	Gly	Trp	Lys	Val	Gly	Ala	Leu	Ala	Thr	Pro	Gly
		355					360					365			
Ile	Met	Ala	Ile	Leu	Ala	Leu	Pro	Phe	Phe	Ala	Cys	Ile	Leu	Leu	Gly
	370					375					380				
Leu	Asp	Ser	Pro	Ala	Arg	Leu	Glu	Ile	Ala	Val	Ile	Phe	Gly	Thr	Ile
385					390					395					400
Gln	Ser	Leu	Leu	Ser	Lys	Thr	Ser	Lys	Tyr	Ala	Leu	Phe	Asp	Pro	Thr
				405					410					415	
Thr	Gln	Met	Ala	Tyr	Ile	Pro	Leu	Asp	Asp	Glu	Ser	Lys	Val	Lys	Gly
			420					425					430		

Lys Ala Ala Ile Asp Val Leu Gly Ser Arg Ile Gly Lys Ser Gly Gly
435 440 445

Ser Leu Ile Gln Gln Gly Leu Val Phe Val Phe Gly Asn Ile Ile Asn
450 455 460

Ala Ala Pro Val Val Gly Val Val Tyr Tyr Ser Val Leu Val Ala Trp
465 470 475 480

Met Ser Ala Ala Gly Arg Leu Ser Gly Leu Phe Gln Ala Gln Thr Glu
485 490 495

Met Asp Lys Ala Asp Lys Met Glu Ala Lys Thr Asn Lys Glu Lys
500 505 510

<210> 13
<211> 257
<212> PRT
<213> Escherichia coli

<400> 13
Met Ile Lys Arg Thr Leu Leu Ala Ala Ala Ile Phe Ser Ala Leu Pro
1 5 10 15

Ala Tyr Ala Gly Leu Thr Ser Ile Thr Ala Gly Tyr Asp Phe Thr Asp
20 25 30

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

Ala Lys Val Glu Asn Ala Thr Leu Leu Phe Asn Leu Ser Gln Gly Arg
50 55 60

Arg Asp Tyr Glu Thr Glu His Phe Asn Ala Thr Arg Gly Gln Gly Ala
65 70 75 80

Val Trp Tyr Lys Trp Asn Asn Trp Leu Thr Thr Arg Thr Gly Ile Ala
85 90 95

Phe Ala Asp Asn Thr Pro Val Phe Ala Arg Gln Asp Phe Arg Gln Asp
100 105 110

Ile Asn Leu Ala Leu Leu Pro Lys Thr Leu Phe Thr Thr Gly Tyr Arg
115 120 125

Tyr Thr Lys Tyr Tyr Asp Asp Val Glu Val Asp Ala Trp Gln Gly Gly
130 135 140

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

Tyr Asp Ser Ser Asp Ala Gly Gly Ser Tyr Ser Asn Met Ile Ser Val
165 170 175

Arg Leu Asn Asp Pro Arg Gly Thr Gly Tyr Thr Gln Leu Trp Leu Ser
180 185 190

Arg Gly Thr Gly Ala Tyr Thr Tyr Asp Trp Thr Pro Glu Thr Arg Tyr
195 200 205

Gly Ser Met Lys Ser Val Ser Leu Gln Arg Ile Gln Pro Leu Thr Glu
210 215 220

Gln Leu Asn Leu Gly Leu Thr Ala Gly Lys Val Trp Tyr Asp Thr Pro
225 230 235 240

Thr Asp Asp Tyr Asn Gly Leu Gln Leu Ala Ala His Leu Thr Trp Lys
245 250 255

Phe

<210> 14

<211> 91

<212> PRT

<213> Escherichia coli

<400> 14

Met Pro Ser Thr Pro Glu Glu Lys Lys Lys Val Leu Thr Arg Val Arg
1 5 10 15

Arg Ile Arg Gly Gln Ile Asp Ala Leu Glu Arg Ser Leu Glu Gly Asp
20 25 30

Ala Glu Cys Arg Ala Ile Leu Gln Gln Ile Ala Ala Val Arg Gly Ala
35 40 45

Ala Asn Gly Leu Met Ala Glu Val Leu Glu Ser His Ile Arg Glu Thr
50 55 60

Phe Asp Arg Asn Asp Cys Tyr Ser Arg Glu Val Ser Gln Ser Val Asp
65 70 75 80

Asp Thr Ile Glu Leu Val Arg Ala Tyr Leu Lys
85 90

<210> 15

<211> 369

<212> PRT

<213> Escherichia coli

<400> 15

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

Ile Val Glu Ile Asp Val Ala Pro Pro Lys Lys Gly Glu Val Leu Ile
20 25 30

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

Gly Asp Asp Pro Glu Gly Val Phe Pro Val Val Leu Gly His Glu Gly
50 55 60

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

Gly Asp His Val Ile Pro Leu Tyr Thr Ala Glu Cys Gly Glu Cys Glu
85 90 95

Phe Cys Arg Ser Gly Lys Thr Asn Leu Cys Val Ala Val Arg Glu Thr
100 105 110

Gln Gly Lys Gly Leu Met Pro Asp Gly Thr Thr Arg Phe Ser Tyr Asn
115 120 125

Gly Gln Pro Leu Tyr His Tyr Met Gly Cys Ser Thr Phe Ser Glu Tyr
130 135 140

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

His Glu His Val Cys Leu Leu Gly Cys Gly Val Thr Thr Gly Ile Gly
165 170 175

Ala Val His Asn Thr Ala Lys Val Gln Pro Gly Asp Ser Val Ala Val
180 185 190

Phe Gly Leu Gly Ala Ile Gly Leu Ala Val Val Gln Gly Ala Arg Gln
195 200 205

Ala Lys Ala Gly Arg Ile Ile Ala Ile Asp Thr Asn Pro Lys Lys Phe
210 215 220

Asp Leu Ala Arg Arg Phe Gly Ala Thr Asp Cys Ile Asn Pro Asn Asp
225 230 235 240

Tyr Asp Lys Pro Ile Lys Asp Val Leu Leu Asp Ile Asn Lys Trp Gly
245 250 255

Ile Asp His Thr Phe Glu Cys Ile Gly Asn Val Asn Val Met Arg Ala
260 265 270

Ala Leu Glu Ser Ala His Arg Gly Trp Gly Gln Ser Val Ile Ile Gly

275

280

285

Val Ala Gly Ala Gly Gln Glu Ile Ser Thr Arg Pro Phe Gln Leu Val
 290 295 300

Thr Gly Arg Val Trp Lys Gly Ser Ala Phe Gly Gly Val Lys Gly Arg
 305 310 315 320

Ser Gln Leu Pro Gly Met Val Glu Asp Ala Met Lys Gly Asp Ile Asp
 325 330 335

Leu Glu Pro Phe Val Thr His Thr Met Ser Leu Asp Glu Ile Asn Asp
 340 345 350

Ala Phe Asp Leu Met His Glu Gly Lys Ser Ile Arg Thr Val Ile Arg
 355 360 365

Tyr

<210> 16

<211> 277

<212> PRT

<213> Escherichia coli

<400> 16

Met Glu Leu Ile Glu Lys His Ala Ser Phe Gly Gly Trp Gln Asn Val
 1 5 10 15

Tyr Arg His Tyr Ser Gln Ser Leu Lys Cys Glu Met Asn Val Gly Val
 20 25 30

Tyr Leu Pro Pro Lys Ala Ala Asn Glu Lys Leu Pro Val Leu Tyr Trp
 35 40 45

Leu Ser Gly Leu Thr Cys Asn Glu Gln Asn Phe Ile Thr Lys Ser Gly
 50 55 60

Met Gln Arg Tyr Ala Ala Glu His Asn Ile Ile Val Val Ala Pro Asp

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

Lys Leu Asn Met Arg
275

<210> 17

<211> 179

<212> PRT

<213> Escherichia coli

<400> 17

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

Thr Ser Lys Lys Ala Ala Lys Val Glu Arg Thr Ala Lys Lys Ser Arg
20 25 30

Val Gln Ala Arg Glu Ala Arg Ala Ala Val Glu Glu Asn Lys Lys Ala
35 40 45

Gln Leu Glu Arg Asp Lys Gln Leu Ser Glu Gln Gln Lys Gln Ala Ala
50 55 60

Leu Ala Lys Glu Tyr Lys Ala Gln Val Lys Gln Leu Ile Glu Met Asn
65 70 75 80

Arg Ile Thr Ile Ala Asn Gly Asp Ile Gly Phe Asn Phe Thr Asp Gly
85 90 95

Asn Leu Ile Lys Lys Ile Phe Val Asp Lys Leu Thr Gln Ala Gln Leu
100 105 110

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

Glu Gly Glu Tyr Ala Ile Ile Pro Ala Ser Val Ala Asp Lys Ile Ala
130 135 140

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

Glu Gln Asp Glu Asp Asp Pro Tyr Ala Asp Phe Lys Val Pro Asp Asp
165 170 175

Leu Met Trp

<210> 18

<211> 403

<212> PRT

<213> Escherichia coli

<400> 18

Met Ser Thr Arg Thr Pro Ser Ser Ser Ser Ser Arg Leu Met Leu Thr
1 5 10 15

Ile Gly Leu Cys Phe Leu Val Ala Leu Met Glu Gly Leu Asp Leu Gln
20 25 30

Ala Ala Gly Ile Ala Ala Gly Gly Ile Ala Gln Ala Phe Ala Leu Asp
35 40 45

Lys Met Gln Met Gly Trp Ile Phe Ser Ala Gly Ile Leu Gly Leu Leu
50 55 60

Pro Gly Ala Leu Val Gly Gly Met Leu Ala Asp Arg Tyr Gly Arg Lys
65 70 75 80

Arg Ile Leu Ile Gly Ser Val Ala Leu Phe Gly Leu Phe Ser Leu Ala
85 90 95

Thr Ala Ile Ala Trp Asp Phe Pro Ser Leu Val Phe Ala Arg Leu Met
100 105 110

Thr Gly Val Gly Leu Gly Ala Ala Leu Pro Asn Leu Ile Ala Leu Thr
115 120 125

Ser Glu Ala Ala Gly Pro Arg Phe Arg Gly Thr Ala Val Ser Leu Met
130 135 140

Tyr Cys Gly Val Pro Ile Gly Ala Ala Leu Ala Ala Thr Leu Gly Phe
145 150 155 160

Ala Gly Ala Asn Leu Ala Trp Gln Thr Val Phe Trp Val Gly Gly Val
165 170 175

Val Pro Leu Ile Leu Val Pro Leu Leu Met Arg Trp Leu Pro Glu Ser
180 185 190

Ala Val Phe Ala Gly Glu Lys Gln Ser Ala Pro Pro Leu Arg Ala Leu
195 200 205

Phe Ala Pro Glu Thr Ala Thr Ala Thr Leu Leu Leu Trp Leu Cys Tyr
210 215 220

Phe Phe Thr Leu Leu Val Val Tyr Met Leu Ile Asn Trp Leu Pro Leu
225 230 235 240

Leu Leu Val Glu Gln Gly Phe Gln Pro Ser Gln Ala Ala Gly Val Met
245 250 255

Phe Ala Leu Gln Met Gly Ala Ala Ser Gly Thr Leu Met Leu Gly Ala
260 265 270

Leu Met Asp Lys Leu Arg Pro Val Thr Met Ser Leu Leu Ile Tyr Ser
275 280 285

Gly Met Leu Ala Ser Leu Leu Ala Leu Gly Thr Val Ser Ser Phe Asn
290 295 300

Gly Met Leu Leu Ala Gly Phe Val Ala Gly Leu Phe Ala Thr Gly Gly
305 310 315 320

Gln Ser Val Leu Tyr Ala Leu Ala Pro Leu Phe Tyr Ser Ser Gln Ile
325 330 335

Arg Ala Thr Gly Val Gly Thr Ala Val Ala Val Gly Arg Leu Gly Ala

340

345

350

Met Ser Gly Pro Leu Leu Ala Gly Lys Met Leu Ala Leu Gly Thr Gly
 355 360 365

Thr Val Gly Val Met Ala Ala Ser Ala Pro Gly Ile Leu Val Ala Gly
 370 375 380

Leu Ala Val Phe Ile Leu Met Ser Arg Arg Ser Arg Ile Gln Pro Cys
 385 390 395 400

Ala Asp Ala

<210> 19

<211> 337

<212> PRT

<213> Escherichia coli

<400> 19

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

Met His Ala Ile Arg His Gln Tyr Ser Leu Glu Asn Val Arg Gln Ile
 20 25 30

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

Gly Asp Gly Leu Gln Gly Ser Ser Phe Asn Tyr Gly Phe Gly Ala His
 50 55 60

Ser Asp Leu Glu Trp Ile Glu Ala Ala Ala Asp Val Val Lys His Ala
 65 70 75 80

Lys Ile Ala Thr Leu Leu Leu Pro Gly Ile Gly Thr Ile His Asp Leu
 85 90 95

Lys Asn Ala Trp Gln Ala Gly Ala Arg Val Val Arg Val Ala Thr His

100					105					110					
Cys	Thr	Glu	Ala	Asp	Val	Ser	Ala	Gln	His	Ile	Gln	Tyr	Ala	Arg	Glu
		115					120					125			
Leu	Gly	Met	Asp	Thr	Val	Gly	Phe	Leu	Met	Met	Ser	His	Met	Thr	Thr
	130					135					140				
Pro	Glu	Asn	Leu	Ala	Lys	Gln	Ala	Lys	Leu	Met	Glu	Gly	Tyr	Gly	Ala
145					150					155					160
Thr	Cys	Ile	Tyr	Val	Val	Asp	Ser	Gly	Gly	Ala	Met	Asn	Met	Ser	Asp
				165					170					175	
Ile	Arg	Asp	Arg	Phe	Arg	Ala	Leu	Lys	Ala	Val	Leu	Lys	Pro	Glu	Thr
			180					185					190		
Gln	Thr	Gly	Met	His	Ala	His	His	Asn	Leu	Ser	Leu	Gly	Val	Ala	Asn
		195					200					205			
Ser	Ile	Glu	Ala	Val	Glu	Glu	Gly	Cys	Asp	Arg	Ile	Asp	Ala	Ser	Leu
	210					215					220				
Ala	Gly	Met	Gly	Ala	Gly	Ala	Gly	Asn	Ala	Pro	Leu	Glu	Val	Phe	Ile
225					230					235					240
Ala	Ala	Ala	Asp	Lys	Leu	Gly	Trp	Gln	His	Gly	Thr	Asp	Leu	Tyr	Ala
				245					250					255	
Leu	Met	Asp	Ala	Ala	Asp	Asp	Leu	Val	Arg	Pro	Leu	Gln	Asp	Arg	Pro
			260					265					270		
Val	Arg	Val	Asp	Arg	Glu	Thr	Leu	Ala	Leu	Gly	Tyr	Ala	Gly	Val	Tyr
		275					280					285			
Ser	Ser	Phe	Leu	Arg	His	Cys	Glu	Thr	Ala	Ala	Ala	Arg	Tyr	Gly	Leu
	290					295					300				

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

Gly Gln Glu Asp Met Ile Val Asp Val Ala Leu Asp Leu Arg Asn Asn
 325 330 335

Lys

<210> 20

<211> 316

<212> PRT

<213> Escherichia coli

<400> 20

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

Asp Leu Met Ile Lys Ile Leu Arg His Gly Gln His Leu Glu Met Ala
 20 25 30

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

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

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

Gly Ala His Val Lys Asn Asp Ala Ala Leu Arg Glu Ala Lys Pro Asp
 85 90 95

Ile Arg Leu Ile Asp Leu Thr Pro Ala Ala Ile Gly Pro Tyr Cys Val
 100 105 110

Pro Val Val Asn Leu Glu Ala Asn Val Asp Gln Leu Asn Val Asn Met
 115 120 125

Val Thr Cys Gly Gly Gln Ala Thr Ile Pro Met Val Ala Ala Val Ser
 130 135 140

Arg Val Ala Arg Val His Tyr Ala Glu Ile Ile Ala Ser Ile Ala Ser
 145 150 155 160

Lys Ser Ala Gly Pro Gly Thr Arg Ala Asn Ile Asp Glu Phe Thr Glu
 165 170 175

Thr Thr Ser Arg Ala Ile Glu Val Val Gly Gly Ala Ala Lys Gly Lys
 180 185 190

Ala Ile Ile Val Leu Asn Pro Ala Glu Pro Pro Leu Met Met Arg Asp
 195 200 205

Thr Val Tyr Val Leu Ser Asp Glu Ala Ser Gln Asp Asp Ile Glu Ala
 210 215 220

Ser Ile Asn Glu Met Ala Glu Ala Val Gln Ala Tyr Val Pro Gly Tyr
 225 230 235 240

Arg Leu Lys Gln Arg Val Gln Phe Glu Val Ile Pro Gln Asp Lys Pro
 245 250 255

Val Asn Leu Pro Gly Val Gly Gln Phe Ser Gly Leu Lys Thr Ala Val
 260 265 270

Trp Leu Glu Val Glu Gly Ala Ala His Tyr Leu Pro Ala Tyr Ala Gly
 275 280 285

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

Ala Gln Ser Leu Ala Arg Lys Ala Gly Glu Ala Ala
 305 310 315

<210> 21

<211> 269
<212> PRT
<213> Escherichia coli

<400> 21

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

Ala Glu Gln Gly Glu Ala Ile Ala Pro Leu Arg Asp Leu Ile Gly Ile
20 25 30

Asp Asn Ala Glu Ala Ala Tyr Ala Ile Gln His Ile Asn Val Gln Tyr
35 40 45

Asp Val Ala Gln Gly Arg Arg Val Val Gly Arg Lys Val Gly Leu Thr
50 55 60

His Pro Lys Val Gln Gln Gln Leu Gly Val Asp Gln Pro Asp Phe Gly
65 70 75 80

Thr Leu Phe Ala Asp Met Cys Tyr Gly Asp Asn Glu Ile Ile Pro Phe
85 90 95

Ser Arg Val Leu Gln Pro Arg Ile Glu Ala Glu Ile Ala Leu Val Leu
100 105 110

Asn Arg Asp Leu Pro Ala Thr Asp Ile Thr Phe Asp Glu Leu Tyr Asn
115 120 125

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

Arg Asp Trp Ser Ile Gln Phe Val Asp Thr Val Ala Asp Asn Ala Ser
145 150 155 160

Cys Gly Val Tyr Val Ile Gly Gly Pro Ala Gln Arg Pro Ala Gly Leu
165 170 175

Asp Leu Lys Asn Cys Ala Met Lys Met Thr Arg Asn Asn Glu Glu Val

180

185

190

Ser Ser Gly Arg Gly Ser Glu Cys Leu Gly His Pro Leu Asn Ala Ala
 195 200 205

Val Trp Leu Ala Arg Lys Met Ala Ser Leu Gly Glu Pro Leu Arg Thr
 210 215 220

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

Ala Gly Asp Arg Phe Glu Ala His Ile Glu Gly Ile Gly Ser Val Ala
 245 250 255

Ala Thr Phe Ser Ser Ala Ala Pro Lys Gly Ser Leu Ser
 260 265

<210> 22

<211> 293

<212> PRT

<213> Escherichia coli

<400> 22

Met Gln Glu Lys Met Met Ser Tyr Gln Pro Gln Thr Glu Ala Ala Thr
 1 5 10 15

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

Phe Asn Asp Cys Gly Gln Gly Asp Glu Thr Val Val Leu Leu His Gly
 35 40 45

Ser Gly Pro Gly Ala Thr Gly Trp Ala Asn Phe Ser Arg Asn Ile Asp
 50 55 60

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

Trp Gly Lys Ser Asp Ser Ile Val Asn Ser Gly Ser Arg Ser Asp Leu

85

90

95

Asn Ala Arg Ile Leu Lys Ser Val Val Asp Gln Leu Asp Ile Ala Lys
 100 105 110

Ile His Leu Leu Gly Asn Ser Met Gly Gly His Ser Ser Val Ala Phe
 115 120 125

Thr Leu Asn Trp Pro Glu Arg Val Gly Lys Leu Val Leu Met Gly Gly
 130 135 140

Gly Thr Gly Gly Met Ser Leu Phe Thr Pro Met Pro Thr Glu Gly Ile
 145 150 155 160

Lys Arg Leu Asn Gln Leu Tyr Arg Gln Pro Thr Ile Glu Asn Leu Lys
 165 170 175

Leu Met Met Asp Ile Phe Val Phe Asp Thr Ser Asp Leu Thr Asp Ala
 180 185 190

Leu Phe Glu Ala Arg Leu Asn Asn Met Leu Ser Arg Arg Asp His Leu
 195 200 205

Glu Asn Phe Val Lys Ser Leu Glu Ala Asn Pro Lys Gln Phe Pro Asp
 210 215 220

Phe Gly Pro Arg Leu Ala Glu Ile Lys Ala Gln Thr Leu Ile Val Trp
 225 230 235 240

Gly Arg Asn Asp Arg Phe Val Pro Met Asp Ala Gly Leu Arg Leu Leu
 245 250 255

Ser Gly Ile Ala Gly Ser Glu Leu His Ile Phe Arg Asp Cys Gly His
 260 265 270

Trp Ala Gln Trp Glu His Ala Asp Ala Phe Asn Gln Leu Val Leu Asn
 275 280 285

Phe Leu Ala Arg Pro
290

<210> 23

<211> 314

<212> PRT

<213> Escherichia coli

<400> 23

Met His Ala Tyr Leu His Cys Leu Ser His Ser Pro Leu Val Gly Tyr
1 5 10 15

Val Asp Pro Ala Gln Glu Val Leu Asp Glu Val Asn Gly Val Ile Ala
20 25 30

Ser Ala Arg Glu Arg Ile Ala Ala Phe Ser Pro Glu Leu Val Val Leu
35 40 45

Phe Ala Pro Asp His Tyr Asn Gly Phe Phe Tyr Asp Val Met Pro Pro
50 55 60

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

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

Ala Val Met Lys Ser Gly Ile Asp Leu Ala Val Ser Tyr Cys Met Gln
100 105 110

Val Asp His Gly Phe Ala Gln Pro Leu Glu Phe Leu Leu Gly Gly Leu
115 120 125

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

Leu Pro Gly Phe Gln Arg Thr Arg Met Leu Gly Glu Ala Ile Gly Arg
145 150 155 160

Phe Thr Ser Thr Leu Asn Lys Arg Val Leu Phe Leu Gly Ser Gly Gly
165 170 175

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

Met Arg Asp Arg Leu Leu Gly Ser Gly Lys Asp Leu Pro Ala Ser Glu
195 200 205

Arg Glu Leu Arg Gln Gln Arg Val Ile Ser Ala Ala Glu Lys Phe Val
210 215 220

Glu Asp Gln Arg Thr Leu His Pro Leu Asn Pro Ile Trp Asp Asn Gln
225 230 235 240

Phe Met Thr Leu Leu Glu Gln Gly Arg Ile Gln Glu Leu Asp Ala Val
245 250 255

Ser Asn Glu Glu Leu Ser Ala Ile Ala Gly Lys Ser Thr His Glu Ile
260 265 270

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

Arg Ser Glu Gly Arg Tyr Tyr Arg Pro Ile Pro Glu Trp Ile Ala Gly
290 295 300

Phe Gly Ser Leu Ser Ala Arg Thr Glu Asn
305 310

<210> 24

<211> 554

<212> PRT

<213> Escherichia coli

<400> 24

Met Ala Ile Gln His Pro Asp Ile Gln Pro Ala Val Asn His Ser Val
1 5 10 15

Gln Val Ala Ile Ala Gly Ala Gly Pro Val Gly Leu Met Met Ala Asn
20 25 30

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

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

Arg Thr Met Gln Ser Val Gly Leu Val Asp Asp Val Leu Pro His Thr
65 70 75 80

Thr Pro Trp His Ala Met Arg Phe Leu Thr Pro Lys Gly Arg Cys Phe
85 90 95

Ala Asp Ile Gln Pro Met Thr Asp Glu Phe Gly Trp Pro Arg Arg Asn
100 105 110

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

Arg Phe Pro Asn Val Arg Cys Leu Phe Ser Arg Glu Leu Glu Ala Phe
130 135 140

Ser Gln Gln Asp Asp Glu Val Thr Leu His Leu Lys Thr Ala Glu Gly
145 150 155 160

Gln Arg Glu Ile Val Lys Ala Gln Trp Leu Val Ala Cys Asp Gly Gly
165 170 175

Ala Ser Phe Val Arg Arg Thr Leu Asn Val Pro Phe Glu Gly Lys Thr
180 185 190

Ala Pro Asn Gln Trp Ile Val Val Asp Ile Ala Asn Asp Pro Leu Ser
195 200 205

Thr Pro His Ile Tyr Leu Cys Cys Asp Pro Val Arg Pro Tyr Val Ser

210

215

220

Ala Ala Leu Pro His Ala Val Arg Arg Phe Glu Phe Met Val Met Pro
 225 230 235 240

Gly Glu Thr Glu Glu Gln Leu Arg Glu Pro Gln Asn Met Arg Lys Leu
 245 250 255

Leu Ser Lys Val Leu Pro Asn Pro Asp Asn Val Glu Leu Ile Arg Gln
 260 265 270

Arg Val Tyr Thr His Asn Ala Arg Leu Ala Gln Arg Phe Arg Ile Asp
 275 280 285

Arg Val Leu Leu Ala Gly Asp Ala Ala His Ile Met Pro Val Trp Gln
 290 295 300

Gly Gln Gly Tyr Asn Ser Gly Met Arg Asp Ala Phe Asn Leu Ala Trp
 305 310 315 320

Lys Leu Ala Leu Val Ile Gln Gly Lys Ala Arg Asp Ala Leu Leu Asp
 325 330 335

Thr Tyr Gln Gln Glu Arg Arg Asp His Ala Lys Ala Met Ile Asp Leu
 340 345 350

Ser Val Thr Ala Gly Asn Val Leu Ala Pro Pro Lys Arg Trp Gln Gly
 355 360 365

Thr Leu Arg Asp Gly Val Ser Trp Leu Leu Asn Tyr Leu Pro Pro Val
 370 375 380

Lys Arg Tyr Phe Leu Glu Met Arg Phe Lys Pro Met Pro Gln Tyr Tyr
 385 390 395 400

Gly Gly Ala Leu Val Arg Glu Gly Glu Ala Lys His Ser Pro Val Gly
 405 410 415

Lys Met Phe Ile Gln Pro Lys Val Thr Leu Glu Asn Gly Asp Val Thr
420 425 430

Leu Leu Asp Asn Ala Ile Gly Ala Asn Phe Ala Val Ile Gly Trp Gly
435 440 445

Cys Asn Pro Leu Trp Gly Met Ser Asp Glu Gln Ile Gln Gln Trp Arg
450 455 460

Ala Leu Gly Thr Arg Phe Ile Gln Val Val Pro Glu Val Gln Ile His
465 470 475 480

Thr Ala Gln Asp Asn His Asp Gly Val Leu Arg Val Gly Asp Thr Gln
485 490 495

Gly Arg Leu Arg Ser Trp Phe Ala Gln His Asn Ala Ser Leu Val Val
500 505 510

Met Arg Pro Asp Arg Phe Val Ala Ala Thr Ala Ile Pro Gln Thr Leu
515 520 525

Gly Asn Thr Leu Asn Lys Leu Ala Ser Val Met Thr Leu Thr Arg Pro
530 535 540

Asp Ala Asp Val Ser Val Glu Lys Val Ala
545 550

<210> 25

<211> 315

<212> PRT

<213> Escherichia coli

<400> 25

Met Ile Phe Tyr Cys Ala Leu Ser Ile Gly Arg Val Phe Ser Ala Thr
1 5 10 15

Ile Lys Thr Cys Pro Asn Val His Gln Val His His Val Val Leu Thr
20 25 30

Ile Glu Met Ser Ile Asn Met Gln Asn Asn Glu Gln Thr Glu Tyr Lys
35 40 45

Thr Val Arg Gly Leu Thr Arg Gly Leu Met Leu Leu Asn Met Leu Asn
50 55 60

Lys Leu Asp Gly Gly Ala Ser Val Gly Leu Leu Ala Glu Leu Ser Gly
65 70 75 80

Leu His Arg Thr Thr Val Arg Arg Leu Leu Glu Thr Leu Gln Glu Glu
85 90 95

Gly Tyr Val Arg Arg Ser Pro Ser Asp Asp Ser Phe Arg Leu Thr Ile
100 105 110

Lys Val Arg Gln Leu Ser Glu Gly Phe Arg Asp Glu Gln Trp Ile Ser
115 120 125

Ala Leu Ala Ala Pro Leu Leu Gly Asp Leu Leu Arg Glu Val Val Trp
130 135 140

Pro Thr Asp Val Ser Thr Leu Asp Val Asp Ala Met Val Val Arg Glu
145 150 155 160

Thr Thr His Arg Phe Ser Arg Leu Ser Phe His Arg Ala Met Val Gly
165 170 175

Arg Arg Leu Pro Leu Leu Lys Thr Ala Ser Gly Leu Thr Trp Leu Ala
180 185 190

Phe Cys Pro Glu Gln Asp Arg Lys Glu Leu Ile Glu Met Leu Ala Ser
195 200 205

Arg Pro Gly Asp Asp Tyr Gln Leu Ala Arg Glu Pro Leu Lys Leu Glu
210 215 220

Ala Ile Leu Ala Arg Ala Arg Lys Glu Gly Tyr Gly Gln Asn Tyr Arg

85

90

95

Ser Met Val Glu Arg Ser Gly Val Glu Ala Cys Lys Ala Ala Val His
 100 105 110

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

Asp Asp Gln Asp Ala Ile Ala Val Glu Ala Ala Cys Thr Asn Val Pro
 130 135 140

Ala Leu Phe Leu Asp Val Ser Asp Gln Thr Pro Ile Asn Ser Ile Ile
 145 150 155 160

Phe Ser His Glu Asp Gly Thr Arg Leu Gly Val Glu His Leu Val Ala
 165 170 175

Leu Gly His Gln Gln Ile Ala Leu Leu Ala Gly Pro Leu Ser Ser Val
 180 185 190

Ser Ala Arg Leu Arg Leu Ala Gly Trp His Lys Tyr Leu Thr Arg Asn
 195 200 205

Gln Ile Gln Pro Ile Ala Glu Arg Glu Gly Asp Trp Ser Ala Met Ser
 210 215 220

Gly Phe Gln Gln Thr Met Gln Met Leu Asn Glu Gly Ile Val Pro Thr
 225 230 235 240

Ala Met Leu Val Ala Asn Asp Gln Met Ala Leu Gly Ala Met Arg Ala
 245 250 255

Ile Thr Glu Ser Gly Leu Arg Val Gly Ala Asp Ile Ser Val Val Gly
 260 265 270

Tyr Asp Asp Thr Glu Asp Ser Ser Cys Tyr Ile Pro Pro Leu Thr Thr
 275 280 285

Ile Lys Gln Asp Phe Arg Leu Leu Gly Gln Thr Ser Val Asp Arg Leu
290 295 300

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

Val Ser Leu Val Lys Arg Lys Thr Thr Leu Ala Pro Asn Thr Gln Thr
325 330 335

Ala Ser Pro Arg Ala Leu Ala Asp Ser Leu Met Gln Leu Ala Arg Gln
340 345 350

Val Ser Arg Leu Glu Ser Gly Gln
355 360

<210> 27

<211> 353

<212> PRT

<213> Escherichia coli

<400> 27

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

Gln Ile Glu Lys Gln Phe Gly Lys Gly Ser Ile Met Arg Leu Gly Glu
20 25 30

Asp Arg Ser Met Asp Val Glu Thr Ile Ser Thr Gly Ser Leu Ser Leu
35 40 45

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

Ile Tyr Gly Pro Glu Ser Ser Gly Lys Thr Thr Leu Thr Leu Gln Val
65 70 75 80

Ile Ala Ala Ala Gln Arg Glu Gly Lys Thr Cys Ala Phe Ile Asp Ala
85 90 95

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

Asp Asn Leu Leu Cys Ser Gln Pro Asp Thr Gly Glu Gln Ala Leu Glu
115 120 125

Ile Cys Asp Ala Leu Ala Arg Ser Gly Ala Val Asp Val Ile Val Val
130 135 140

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

Gly Asp Ser His Met Gly Leu Ala Ala Arg Met Met Ser Gln Ala Met
165 170 175

Arg Lys Leu Ala Gly Asn Leu Lys Gln Ser Asn Thr Leu Leu Ile Phe
180 185 190

Ile Asn Gln Ile Arg Met Lys Ile Gly Val Met Phe Gly Asn Pro Glu
195 200 205

Thr Thr Thr Gly Gly Asn Ala Leu Lys Phe Tyr Ala Ser Val Arg Leu
210 215 220

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

Ser Glu Thr Arg Val Lys Val Val Lys Asn Lys Ile Ala Ala Pro Phe
245 250 255

Lys Gln Ala Glu Phe Gln Ile Leu Tyr Gly Glu Gly Ile Asn Phe Tyr
260 265 270

Gly Glu Leu Val Asp Leu Gly Val Lys Glu Lys Leu Ile Glu Lys Ala
275 280 285

Gly Ala Trp Tyr Ser Tyr Lys Gly Glu Lys Ile Gly Gln Gly Lys Ala

290

295

300

Asn Ala Thr Ala Trp Leu Lys Asp Asn Pro Glu Thr Ala Lys Glu Ile
 305 310 315 320

Glu Lys Lys Val Arg Glu Leu Leu Leu Ser Asn Pro Asn Ser Thr Pro
 325 330 335

Asp Phe Ser Val Asp Asp Ser Glu Gly Val Ala Glu Thr Asn Glu Asp
 340 345 350

Phe

<210> 28

<211> 49

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
 oligonucleotide

<400> 28

ctgtataaaa ccacagccaa tcaaacgaaa ccaggctata ctcaagcct

49

<210> 29

<211> 49

<212> DNA

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic
 oligonucleotide

<400> 29

ttttataaat acacagccaa tcaaacgaaa ccaggctata ctcaagcct

49

<210> 30

<211> 133

<212> DNA

<213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic polynucleotide

<400> 30
 ctcagcgggtg gcagcagcct aggttaacta tttttctttg ttggcttttg cttccatttt 60
 gtcggcctgg taatgactcc aacttattga tagtgtttta tgttcagata atgcccgatg 120
 actttgtcat gca 133

<210> 31
 <211> 133
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic polynucleotide

<220>
 <221> modified_base
 <222> (22)..(22)
 <223> a, c, t, g, unknown or other

<400> 31
 ctcagcgggtg gcagcagcct angttaatca tttttctttg ttggtttttg cttccatttt 60
 atctgcttgg taatgactcc aacttattga tagtgtttta tgttcagata atgcccgatg 120
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<220>
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