

SEQUENCE LISTING

<110> Jennewein Biotechnologie GmbH

<120> Sialyltransferases and their use in producing sialylated oligosaccharides

<130> P 1703 WO

<160> 188

<170> PatentIn version 3.5

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<213> Campylobacter coli

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<211> 888

<212> DNA

<213> Haemophilus ducreyi

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<212> DNA
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<211> 876
<212> DNA
<213> Campylobacter jejuni

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<212> DNA

<213> Streptococcus agalactiae

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<212> DNA

<213> Alistipes sp.

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<211> 1452

<212> DNA

<213> Alistipes shahii

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<211> 1206

<212> DNA

<213> Actinobacillus suis

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 <213> Haemophilus somnus

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 <213> Haemophilus ducreyi

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 <212> DNA
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<211> 1497

<212> DNA

<213> Photobacterium sp.

<400> 29

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<210> 30

<211> 1449

<212> DNA

<213> Photobacterium leiognathi

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 <211> 2028
 <212> DNA
 <213> Photobacterium damsela

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catccggcag	gcggtgtgat	caacgatatt	atcctgggca	gttttccgga	catgattaat	1260
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ccgacggcctt	ctgatctgcg	cctggtgatt	gcgattatca	aaacgatcac	cgatctggaa	1620
cgtattggcg	acgttgccga	atctattgcg	aaagtcgcgc	tggaatcttt	ttctaacaaa	1680
cagtacaatc	tgctggttag	cctggaatct	ctgggtcaac	ataccgtgcg	catgctgcac	1740
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gatgaccgca	tcgatcaaga	atacgaaagt	attgtccgtc	agctgatggc	ccacatgatg	1860
gaagatccgt	catcgattcc	gaacgttatg	aaagtcatgt	gggcggcccg	ttccatcgaa	1920
cgcgttggtg	atcgttgcca	gaatatgtgt	gaatacatca	tctacttcgt	gaaaggcaaa	1980
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<210> 32
 <211> 1533
 <212> DNA
 <213> Photobacterium damsela

<400> 32	
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cagctgaccc	cgattgacgc cccgagcagc tttctgagcc attcttggga acagacgtgc 180
ggcaccgccga	tcctgaatga aagtgataaa caagcgattt cctttgactt cgtggccccg 240
gaactgaaac	aggatgaaaa atactgtttc acgttcaaag gcatcaccgg tgaccaccgc 300
tacattacga	acaccaccct gaccgttgtg gcaccgacgc tggaagtgtg tatcgatcat 360
gctagtctgc	cgagcctgca acaactgatt cacattatcc aggcgaaaga tgaatacccg 420
tcaaaccaac	gctttgtttc gtggaaacgt gttaccgtcg atgcggacaa cgccaataaa 480
ctgaatatcc	atacctatcc gctgaaaggc aacaatacgt caccggaaat ggttgccggc 540
atcgatgaat	atgcacaatc gaaaaaccgc ctgaatattg aattttacac gaataccgct 600
catgtcttca	acaatctgcc gccgattatc cagccgctgt acaacaacga aaaagtcaaa 660
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ctggctggca	ccagcccggg tgacccgaaa ggcatgggta accgttataa ttggcataaa 840

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gcaggtatcg	ctagctctct	gtattttacc	attccggcgg	ataaagtga	ctttatcgtt	1380
ttcacgagtt	ccgatacgat	taccgaccgt	gaagaagccc	tgaaaagccc	gctgggtccag	1440
gtgatgctga	ccctgggcat	cgtcaaagaa	aaagatgtgc	tgttctgggc	agacctgccg	1500
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<210> 33
 <211> 1269
 <212> DNA
 <213> *Hellobacter acinonychis*

<400> 33						
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gataaatatt	acctaggacg	cgaaataaaa	ggagtgttct	ttaacccttg	tgtattaagc	180
agtcaaatgc	aaacagtgca	ataccttatg	gacaatggcg	aatatagcat	agaacgcttc	240
ttttgcagtg	tttcaacaga	tcgccacgat	tttgatgggg	attaccaa	gattttaccg	300
gtagacgggt	atttaaaagc	acactatccg	ttcgtctgcg	atacattcag	cttattcaaa	360
ggtcacgaag	aaatcttaaa	acacgtgaaa	taccacctga	aaacgtacag	caaagaactt	420
agtgcgggtg	tcttaatggt	attgagtgca	gtggatttag	gatacaaaga	aatataccta	480
gtaggaatcg	acttcggcgc	ctcatcttgg	gggcacttct	atgacgaaag	ccaatcccaa	540
cacttttagca	atcacatggc	agattgtcac	aatatctatt	acgacatgct	gactatttgt	600
ctctgtcaaa	agtatgcaaa	attgtacgca	ttagcaccca	attcaccatt	atcacatttg	660
cttacactaa	atccacaggc	caaataccca	tttgaactat	tagataaacc	tatcgggtat	720
actagcgacc	taattattag	tagcccgttg	gaagagaagt	tgctcgaatt	taagaatatc	780
gaagagaagt	tgcttgagtt	caaaaacata	gaagagaaac	tcttagagtt	caagaatatt	840
gaagagaaac	tattagaatt	taaaaacatc	gaggaaaaac	ttttggagtt	caaaaatata	900
gaagagaaac	tcctagagtt	caagaacatt	gaggaaaagt	tgcttgagtt	caaaaatatt	960
gaggaaaagt	tgctcgaatt	taagaatatc	gaggaaaaac	ttttggaatt	taagaacata	1020

gaagaaaagt tactcgaatt taaaaacatt gaagagaaac tattggaatt taaaaatata 1080
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gaagagaaac ttctcgaag ccgactgaac aacattctac gtaaaatcaa gcggaaaata 1200
cttccattct tttggggcgg aggtgtaacc ccaacattaa aagttagttt ccgttgggga 1260
gctgcataa 1269

<210> 34
<211> 469
<212> PRT
<213> Campylobacter coli
<400> 34

Met Gln Asn Val Ile Ile Ala Gly Asn Gly Pro Ser Leu Gln Ser Ile
1 5 10 15

Asn Tyr Gln Arg Leu Pro Lys Glu Tyr Asp Ile Phe Arg Cys Asn Gln
20 25 30

Phe Tyr Phe Glu Asp Lys Tyr Tyr Leu Gly Lys Asn Ile Lys Ala Ala
35 40 45

Phe Phe Asn Pro Tyr Pro Phe Leu Gln Gln Tyr His Thr Ala Lys Gln
50 55 60

Leu Val Phe Asn Asn Glu Tyr Lys Ile Glu Asn Ile Phe Cys Ser Thr
65 70 75 80

Phe Asn Leu Pro Phe Ile Glu Lys Asp Asn Phe Ile Asn Lys Phe Tyr
85 90 95

Asp Phe Phe Pro Asp Ala Lys Leu Gly His Lys Ile Ile Glu Asn Leu
100 105 110

Lys Glu Phe Tyr Ala Tyr Ile Lys Tyr Asn Glu Ile Tyr Leu Asn Lys
115 120 125

Arg Ile Thr Ser Gly Ile Tyr Met Cys Ala Ile Ala Ile Ala Leu Gly
130 135 140

Tyr Lys Asn Ile Tyr Leu Cys Gly Ile Asp Phe Tyr Glu Gly Glu Thr
145 150 155 160

Ile Tyr Pro Phe Lys Ala Met Ser Lys Asn Ile Lys Lys Ile Phe Pro
165 170 175

Trp Ile Lys Asp Phe Asn Pro Ser Asn Phe His Ser Lys Glu Tyr Asp

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

435

440

445

Lys Gly Gly Tyr Val Lys Met Trp Phe Glu Ile Lys Lys Leu Lys Lys
 450 455 460

Glu Tyr Lys Lys Lys
 465

<210> 35
 <211> 381
 <212> PRT
 <213> Vibrio sp.

<400> 35

Met Asn Asn Asp Asn Ser Thr Thr Thr Asn Asn Asn Ala Ile Glu Ile
 1 5 10 15

Tyr Val Asp Arg Ala Thr Leu Pro Thr Ile Gln Gln Met Thr Lys Ile
 20 25 30

Val Ser Gln Lys Thr Ser Asn Lys Lys Leu Ile Ser Trp Ser Arg Tyr
 35 40 45

Pro Ile Thr Asp Lys Ser Leu Leu Lys Lys Ile Asn Ala Glu Phe Phe
 50 55 60

Lys Glu Gln Phe Glu Leu Thr Glu Ser Leu Lys Asn Ile Ile Leu Ser
 65 70 75 80

Glu Asn Ile Asp Asn Leu Ile Ile His Gly Asn Thr Leu Trp Ser Ile
 85 90 95

Asp Val Val Asp Ile Ile Lys Glu Val Asn Leu Leu Gly Lys Asn Ile
 100 105 110

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

Ile Tyr Glu Phe Ser Lys Leu Pro Glu Ser Glu Gln Lys Tyr Lys Thr
 130 135 140

Ser Leu Ser Lys Asn Asn Ile Lys Phe Ser Ile Asp Gly Thr Asp Ser
 145 150 155 160

Phe Lys Asn Thr Ile Glu Asn Ile Tyr Gly Phe Ser Gln Leu Tyr Pro
 165 170 175

Thr Thr Tyr His Met Leu Arg Ala Asp Ile Phe Asp Thr Thr Leu Lys
 180 185 190

Ile Asn Pro Leu Arg Glu Leu Leu Ser Asn Asn Ile Lys Gln Met Lys
195 200 205

Trp Asp Tyr Phe Lys Asp Phe Asn Tyr Lys Gln Lys Asp Ile Phe Tyr
210 215 220

Ser Leu Thr Asn Phe Asn Pro Lys Glu Ile Gln Glu Asp Phe Asn Lys
225 230 235 240

Asn Ser Asn Lys Asn Phe Ile Phe Ile Gly Ser Asn Ser Ala Thr Ala
245 250 255

Thr Ala Glu Glu Gln Ile Asn Ile Ile Ser Glu Ala Lys Lys Glu Asn
260 265 270

Ser Ser Ile Ile Thr Asn Ser Ile Ser Asp Tyr Asp Leu Phe Phe Lys
275 280 285

Gly His Pro Ser Ala Thr Phe Asn Glu Gln Ile Ile Asn Ala His Asp
290 295 300

Met Ile Glu Ile Asn Asn Lys Ile Pro Phe Glu Ala Leu Ile Met Thr
305 310 315 320

Gly Ile Leu Pro Asp Ala Val Gly Gly Met Gly Ser Ser Val Phe Phe
325 330 335

Ser Ile Pro Lys Glu Val Lys Asn Lys Phe Val Phe Tyr Lys Ser Gly
340 345 350

Thr Asp Ile Glu Asn Asn Ser Leu Ile Gln Val Met Leu Lys Leu Asn
355 360 365

Leu Ile Asn Arg Asp Asn Ile Lys Leu Ile Ser Asp Ile
370 375 380

<210> 36
<211> 390
<212> PRT
<213> Photobacterium sp.

<400> 36

Met Gly Cys Asn Ser Asp Ser Asn His Asn Asn Ser Asp Gly Asn Ile
1 5 10 15

Thr Lys Asn Lys Thr Ile Glu Val Tyr Val Asp Arg Ala Thr Leu Pro
20 25 30

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

Gln Gly Phe Asp Leu Phe Phe Lys Gly His Pro Ser Ala Thr Tyr Asn
290 295 300

Lys Gln Ile Ile Asp Ala His Asn Met Ile Glu Ile Tyr Asn Lys Ile
305 310 315 320

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

Gly Met Gly Ser Ser Val Phe Phe Ser Leu Pro Asn Thr Val Glu Asn
340 345 350

Lys Phe Ile Phe Tyr Lys Ser Asp Thr Asp Ile Glu Asn Asn Ala Leu
355 360 365

Ile Gln Val Met Ile Glu Leu Asn Ile Val Asn Arg Asn Asp Val Lys
370 375 380

Leu Ile Ser Asp Leu Gln
385 390

<210> 37
<211> 388
<212> PRT
<213> Pasteurella multocida

<400> 37

Met Lys Thr Ile Thr Leu Tyr Leu Asp Pro Ala Ser Leu Pro Ala Leu
1 5 10 15

Asn Gln Leu Met Asp Phe Thr Gln Asn Asn Glu Asp Lys Thr His Pro
20 25 30

Arg Ile Phe Gly Leu Ser Arg Phe Lys Ile Pro Asp Asn Ile Ile Thr
35 40 45

Gln Tyr Gln Asn Ile His Phe Val Glu Leu Lys Asp Asn Arg Pro Thr
50 55 60

Glu Ala Leu Phe Thr Ile Leu Asp Gln Tyr Pro Gly Asn Ile Glu Leu
65 70 75 80

Asp Ile His Leu Asn Ile Ala His Ser Val Gln Leu Ile Arg Pro Ile
85 90 95

Leu Ala Tyr Arg Phe Lys His Leu Asp Arg Val Ser Ile Gln Arg Leu
100 105 110

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

Arg Arg Leu Gly Ile Ile Asp Glu Ser Gln Val Ile Phe Trp Asp Ser
370 375 380

Leu Lys Gln Leu
385

<210> 38
<211> 371
<212> PRT
<213> Neisseria meningitidis

<400> 38

Met Gly Leu Lys Lys Ala Cys Leu Thr Val Leu Cys Leu Ile Val Phe
1 5 10 15

Cys Phe Gly Ile Phe Tyr Thr Phe Asp Arg Val Asn Gln Gly Glu Arg
20 25 30

Asn Ala Val Ser Leu Leu Lys Glu Lys Leu Phe Asn Glu Glu Gly Glu
35 40 45

Pro Val Asn Leu Ile Phe Cys Tyr Thr Ile Leu Gln Met Lys Val Ala
50 55 60

Glu Arg Ile Met Ala Gln His Pro Gly Glu Arg Phe Tyr Val Val Leu
65 70 75 80

Met Ser Glu Asn Arg Asn Glu Lys Tyr Asp Tyr Tyr Phe Asn Gln Ile
85 90 95

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

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

Ser Met Leu Leu Pro Lys Val Lys Arg Ile Tyr Leu Ala Ser Leu Glu
130 135 140

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

Lys Thr Phe Asp Asp Gly Thr Gly Asn Leu Ile Gln Ser Ser Ser Tyr
165 170 175

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

Arg Met Met Ile Gly Asp Trp Ser Ile Ala Lys Thr Arg Asn Ala Ser

195

200

205

Asp Glu His Tyr Thr Ile Phe Lys Gly Leu Lys Asn Ile Met Asp Asp
 210 215 220

Gly Arg Arg Lys Met Thr Tyr Leu Pro Leu Phe Asp Ala Ser Glu Leu
 225 230 235 240

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

Pro Asp Lys Glu Met Lys Glu Ile Ser Glu Lys Ala Ala Lys Asn Phe
 260 265 270

Lys Ile Gln Tyr Val Ala Pro His Pro Arg Gln Thr Tyr Gly Leu Ser
 275 280 285

Gly Val Thr Thr Leu Asn Ser Pro Tyr Val Ile Glu Asp Tyr Ile Leu
 290 295 300

Arg Glu Ile Lys Lys Asn Pro His Thr Arg Tyr Glu Ile Tyr Thr Phe
 305 310 315 320

Phe Ser Gly Ala Ala Leu Thr Met Lys Asp Phe Pro Asn Val His Val
 325 330 335

Tyr Ala Leu Lys Pro Ala Ser Leu Pro Glu Asp Tyr Trp Leu Lys Pro
 340 345 350

Val Tyr Ala Leu Phe Thr Gln Ser Gly Ile Pro Ile Leu Thr Phe Asp
 355 360 365

Asp Lys Asn
 370

<210> 39

<211> 283

<212> PRT

<213> Pasteurella multocida

<400> 39

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

Gly Asn Gly Glu Ser Leu Ser Gln Ile Asp Tyr Arg Leu Leu Pro Lys
 20 25 30

Asn Tyr Asp Val Phe Arg Cys Asn Gln Phe Tyr Phe Glu Glu Arg Tyr
 35 40 45

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

<210> 40
 <211> 385

<212> PRT

<213> Pasteurella dagmatis

<400> 40

Met Thr Ile Tyr Leu Asp Pro Ala Ser Leu Pro Thr Leu Asn Gln Leu
1 5 10 15

Met His Phe Thr Lys Glu Ser Glu Asp Lys Glu Thr Ala Arg Ile Phe
20 25 30

Gly Phe Ser Arg Phe Lys Leu Pro Glu Lys Ile Thr Glu Gln Tyr Asn
35 40 45

Asn Ile His Phe Val Glu Ile Lys Asn Asn Arg Pro Thr Glu Asp Ile
50 55 60

Phe Thr Ile Leu Asp Gln Tyr Pro Glu Lys Leu Glu Leu Asp Leu His
65 70 75 80

Leu Asn Ile Ala His Ser Ile Gln Leu Phe His Pro Ile Leu Gln Tyr
85 90 95

Arg Phe Lys His Pro Asp Arg Ile Ser Ile Lys Ser Leu Asn Leu Tyr
100 105 110

Asp Asp Gly Thr Met Glu Tyr Val Asp Leu Glu Lys Glu Glu Asn Lys
115 120 125

Asp Ile Lys Ser Ala Ile Lys Lys Ala Glu Lys Gln Leu Ser Asp Tyr
130 135 140

Leu Leu Thr Gly Lys Ile Asn Phe Asp Asn Pro Thr Leu Ala Arg Tyr
145 150 155 160

Val Trp Gln Ser Gln Tyr Pro Val Lys Tyr His Phe Leu Ser Thr Glu
165 170 175

Tyr Phe Glu Lys Ala Glu Phe Leu Gln Pro Leu Lys Thr Tyr Leu Ala
180 185 190

Gly Lys Tyr Gln Lys Met Asp Trp Ser Ala Tyr Glu Lys Leu Ser Pro
195 200 205

Glu Gln Gln Thr Phe Tyr Leu Lys Leu Val Gly Phe Ser Asp Glu Thr
210 215 220

Lys Gln Leu Phe His Thr Glu Gln Thr Lys Phe Ile Phe Thr Gly Thr
225 230 235 240

Thr Thr Trp Glu Gly Asn Thr Asp Ile Arg Glu Tyr Tyr Ala Lys Gln
245 250 255

Gln Leu Asn Leu Leu Lys His Phe Thr His Ser Glu Gly Asp Leu Phe
260 265 270

Ile Gly Asp Gln Tyr Lys Ile Tyr Phe Lys Gly His Pro Arg Gly Gly
275 280 285

Asp Ile Asn Asp Tyr Ile Leu Lys His Ala Lys Asp Ile Thr Asn Ile
290 295 300

Pro Ala Asn Ile Ser Phe Glu Ile Leu Met Met Thr Gly Leu Leu Pro
305 310 315 320

Asp Lys Val Gly Gly Val Ala Ser Ser Leu Tyr Phe Ser Leu Pro Lys
325 330 335

Glu Lys Ile Ser His Ile Ile Phe Thr Ser Asn Lys Lys Ile Lys Asn
340 345 350

Lys Glu Asp Ala Leu Asn Asp Pro Tyr Val Arg Val Met Leu Arg Leu
355 360 365

Gly Met Ile Asp Lys Ser Gln Ile Ile Phe Trp Asp Ser Leu Lys Gln
370 375 380

Leu
385

<210> 41
<211> 390
<212> PRT
<213> Photobacterium phosphoreum

<400> 41

Met Gly Cys Asn Ser Asp Ser Lys His Asn Asn Ser Asp Gly Asn Ile
1 5 10 15

Thr Lys Asn Lys Thr Ile Glu Val Tyr Val Asp Arg Ala Thr Leu Pro
20 25 30

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

Lys Leu Ile Ser Trp Ser Arg Tyr Pro Ile Asn Asp Glu Thr Leu Leu
50 55 60

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

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

Gly Met Gly Ser Ser Val Phe Phe Ser Leu Pro Asn Thr Val Glu Asn
340 345 350

Lys Phe Ile Phe Tyr Lys Ser Asp Thr Asp Ile Glu Asn Asn Ala Leu
355 360 365

Ile Gln Val Met Ile Glu Leu Asn Ile Val Asn Arg Asn Asp Val Lys
370 375 380

Leu Ile Ser Asp Leu Gln
385 390

<210> 42
<211> 417
<212> PRT
<213> Avibacterium paragallinarum

<400> 42

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

Trp Cys Gln Lys Met Glu Ile Tyr Leu Asp Tyr Ala Ser Leu Pro Ser
20 25 30

Leu Asn Met Ile Leu Asn Leu Val Glu Asn Lys Asn Asn Glu Lys Val
35 40 45

Glu Arg Ile Ile Gly Phe Glu Arg Phe Asp Phe Asn Lys Glu Ile Leu
50 55 60

Asn Ser Phe Ser Lys Glu Arg Ile Glu Phe Ser Lys Val Ser Ile Leu
65 70 75 80

Asp Ile Lys Glu Phe Ser Asp Lys Leu Tyr Leu Asn Ile Glu Lys Ser
85 90 95

Asp Thr Pro Val Asp Leu Ile Ile His Thr Asn Leu Asp His Ser Val
100 105 110

Arg Ser Leu Leu Ser Ile Phe Lys Thr Leu Ser Pro Leu Phe His Lys
115 120 125

Ile Asn Ile Glu Lys Leu Tyr Leu Tyr Asp Asp Gly Ser Gly Asn Tyr
130 135 140

Val Asp Leu Tyr Gln His Arg Gln Glu Asn Ile Ser Ala Ile Leu Ile

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

405

410

415

Phe

<210> 43

<211> 430

<212> PRT

<213> Campylobacter jejuni

<400> 43

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

Gln Asn Ile Ile Ile Ala Gly Asn Gly Pro Ser Leu Lys Asn Ile Asn
 20 25 30

Tyr Lys Arg Leu Pro Arg Glu Tyr Asp Val Phe Arg Cys Asn Gln Phe
 35 40 45

Tyr Phe Glu Asp Lys Tyr Tyr Leu Gly Lys Lys Ile Lys Ala Val Phe
 50 55 60

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

Ile Leu Lys Asn Glu Tyr Glu Ile Lys Asn Ile Phe Cys Ser Thr Phe
 85 90 95

Asn Leu Pro Phe Ile Glu Ser Asn Asp Phe Leu His Gln Phe Tyr Asn
 100 105 110

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

Glu Phe Tyr Ala Tyr Ile Lys Tyr Asn Glu Ile Tyr Phe Asn Lys Arg
 130 135 140

Ile Thr Ser Gly Val Tyr Met Cys Ala Ile Ala Ile Ala Leu Gly Tyr
 145 150 155 160

Lys Thr Ile Tyr Leu Cys Gly Ile Asp Phe Tyr Glu Gly Asp Val Ile
 165 170 175

Tyr Pro Phe Glu Ala Met Ser Thr Asn Ile Lys Thr Ile Phe Pro Gly
 180 185 190

Ile Lys Asp Phe Lys Pro Ser Asn Cys His Ser Lys Glu Tyr Asp Ile
 195 200 205

Glu	Ala	Leu	Lys	Leu	Leu	Lys	Ser	Ile	Tyr	Lys	Val	Asn	Ile	Tyr	Ala
210						215					220				
Leu	Cys	Asp	Asp	Ser	Ile	Leu	Ala	Asn	His	Phe	Pro	Leu	Ser	Ile	Asn
225					230					235					240
Ile	Asn	Asn	Asn	Phe	Thr	Leu	Glu	Asn	Lys	His	Asn	Asn	Ser	Ile	Asn
				245					250					255	
Asp	Ile	Leu	Leu	Thr	Asp	Asn	Thr	Pro	Gly	Val	Ser	Phe	Tyr	Lys	Asn
			260					265						270	
Gln	Leu	Lys	Ala	Asp	Asn	Lys	Ile	Met	Leu	Asn	Phe	Tyr	Asn	Ile	Leu
		275					280						285		
His	Ser	Lys	Asp	Asn	Leu	Ile	Lys	Phe	Leu	Asn	Lys	Glu	Ile	Ala	Val
	290					295					300				
Leu	Lys	Lys	Gln	Thr	Thr	Gln	Arg	Ala	Lys	Ala	Arg	Ile	Gln	Asn	His
305					310					315					320
Leu	Ser	Tyr	Lys	Leu	Gly	Gln	Ala	Leu	Ile	Ile	Asn	Ser	Lys	Ser	Val
				325					330					335	
Leu	Gly	Phe	Leu	Ser	Leu	Pro	Phe	Ile	Ile	Leu	Ser	Ile	Val	Ile	Ser
			340					345					350		
His	Lys	Gln	Glu	Gln	Lys	Ala	Tyr	Lys	Phe	Lys	Val	Lys	Lys	Asn	Pro
		355					360					365			
Asn	Leu	Ala	Leu	Pro	Pro	Leu	Glu	Thr	Tyr	Pro	Asp	Tyr	Asn	Glu	Ala
	370					375					380				
Leu	Lys	Glu	Lys	Glu	Cys	Phe	Thr	Tyr	Lys	Leu	Gly	Glu	Glu	Phe	Ile
385					390					395					400
Lys	Ala	Gly	Lys	Asn	Trp	Tyr	Gly	Glu	Gly	Tyr	Ile	Lys	Phe	Ile	Phe
				405					410					415	
Lys	Asp	Val	Pro	Arg	Leu	Lys	Arg	Glu	Phe	Glu	Lys	Gly	Glu		
			420					425					430		

<210> 44
 <211> 395
 <212> PRT
 <213> Heliobacter acinonychis

 <400> 44

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

Glu Leu Glu Arg Gln Lys Glu Leu Glu Arg Gln Lys Glu Leu Glu Arg
260 265 270

Gln Lys Glu Leu Glu Arg Gln Lys Glu Leu Glu Arg Gln Lys Glu Leu
275 280 285

Glu Arg Gln Lys Glu Leu Glu Arg Gln Lys Glu Leu Glu Arg Gln Lys
290 295 300

Glu Leu Glu Arg Gln Lys Glu Leu Glu Arg Gln Lys Glu Leu Glu Arg
305 310 315 320

Gln Lys Glu Leu Glu Arg Gln Lys Glu Leu Glu Arg Gln Lys Glu Leu
325 330 335

Glu Leu Glu Arg Ser Leu Lys Ala Arg Leu Lys Ala Val Leu Ala Ser
340 345 350

Lys Gly Ile Arg Gly Asp Asn Leu Ile Ile Val Ser Leu Lys Asp Thr
355 360 365

Tyr Arg Leu Phe Lys Gly Gly Phe Ala Leu Leu Leu Asp Leu Lys Ala
370 375 380

Leu Lys Ser Ile Ile Lys Ala Phe Leu Lys Arg
385 390 395

<210> 45
<211> 260
<212> PRT
<213> Campylobacter jejuni

<400> 45

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

Ile Asp Tyr Ser Arg Leu Pro Asn Asp Phe Asp Val Phe Arg Cys Asn
20 25 30

Gln Phe Tyr Phe Glu Asp Lys Tyr Tyr Leu Gly Lys Lys Cys Lys Ala
35 40 45

Val Phe Tyr Asn Pro Ile Leu Phe Phe Glu Gln Tyr Tyr Thr Leu Lys
50 55 60

His Leu Ile Gln Asn Gln Glu Tyr Glu Thr Glu Leu Ile Met Cys Ser
65 70 75 80

Asn Tyr Asn Gln Ala His Leu Glu Asn Glu Asn Phe Val Lys Thr Phe
85 90 95

Tyr Asp Tyr Phe Pro Asp Ala His Leu Gly Tyr Asp Phe Phe Lys Gln
100 105 110

Leu Lys Asp Phe Asn Ala Tyr Phe Lys Phe His Glu Ile Tyr Phe Asn
115 120 125

Gln Arg Ile Thr Ser Gly Val Tyr Met Cys Ala Val Ala Ile Ala Leu
130 135 140

Gly Tyr Lys Glu Ile Tyr Leu Ser Gly Ile Asp Phe Tyr Gln Asn Gly
145 150 155 160

Ser Ser Tyr Ala Phe Asp Thr Lys Gln Lys Asn Leu Leu Lys Leu Ala
165 170 175

Pro Asn Phe Lys Asn Asp Asn Ser His Tyr Ile Gly His Ser Lys Asn
180 185 190

Thr Asp Ile Lys Ala Leu Glu Phe Leu Glu Lys Thr Tyr Lys Ile Lys
195 200 205

Leu Tyr Cys Leu Cys Pro Asn Ser Leu Leu Ala Asn Phe Ile Glu Leu
210 215 220

Ala Pro Asn Leu Asn Ser Asn Phe Ile Ile Gln Glu Lys Asn Asn Tyr
225 230 235 240

Thr Lys Asp Ile Leu Ile Pro Ser Ser Glu Ala Tyr Gly Lys Phe Ser
245 250 255

Lys Asn Ile Asn
260

<210> 46
<211> 298
<212> PRT
<213> Streptococcus entericus

<400> 46

Met Lys Lys Val Tyr Phe Cys His Thr Val Tyr His Leu Leu Ile Thr
1 5 10 15

Leu Cys Lys Ile Ser Val Glu Glu Gln Val Glu Ile Ile Val Phe Asp
20 25 30

Thr Val Ser Asn His Glu Leu Ile Val Gln Lys Ile Arg Asp Val Phe

35

40

45

Val Asn Thr Thr Val Leu Phe Ala Glu Gln Asn Thr Asp Phe Ser Ile
50 55 60

Leu Glu Ile Asp Arg Ala Thr Asp Ile Tyr Val Phe Asn Asp Trp Thr
65 70 75 80

Pro Ile Gly Ala Tyr Leu Arg Lys Asn Lys Leu Phe Tyr His Leu Ile
85 90 95

Glu Asp Gly Tyr Asn Tyr His Glu Tyr Asn Val Tyr Ala Asn Ala Leu
100 105 110

Thr Met Lys Arg Arg Leu Leu Asn Phe Val Leu Arg Arg Glu Glu Pro
115 120 125

Ser Gly Phe Ser Arg Tyr Val Arg Ser Ile Glu Val Asn Arg Val Lys
130 135 140

Tyr Leu Pro Asn Asp Cys Arg Lys Ser Lys Trp Val Glu Lys Pro Arg
145 150 155 160

Ser Ala Leu Phe Glu Asn Leu Val Pro Glu His Lys Gln Lys Ile Ile
165 170 175

Thr Ile Phe Gly Leu Glu Asn Tyr Gln Asp Ser Leu Arg Gly Val Leu
180 185 190

Val Leu Thr Gln Pro Leu Val Gln Asp Tyr Trp Asp Arg Asp Ile Thr
195 200 205

Thr Glu Glu Glu Gln Leu Glu Phe Tyr Arg Gln Ile Val Glu Ser Tyr
210 215 220

Gly Glu Gly Glu Gln Val Phe Phe Lys Ile His Pro Arg Asp Lys Val
225 230 235 240

Asp Tyr Ser Ser Leu Thr Asn Val Ile Phe Leu Lys Lys Asn Val Pro
245 250 255

Met Glu Val Tyr Glu Leu Ile Ala Asp Cys His Phe Thr Lys Gly Ile
260 265 270

Thr His Ser Ser Thr Ala Leu Asp Phe Leu Ser Cys Val Asp Lys Lys
275 280 285

Ile Thr Leu Lys Gln Met Lys Ala Asn Ser

<210> 47
 <211> 295
 <212> PRT
 <213> Haemophilus ducreyi

<400> 47

Met Lys Glu Ile Ala Ile Ile Ser Asn Gln Arg Met Phe Phe Leu Tyr
 1 5 10 15

Cys Leu Leu Thr Asn Lys Asn Val Glu Asp Val Phe Phe Ile Phe Glu
 20 25 30

Lys Gly Ala Met Pro Asn Asn Leu Thr Ser Ile Ser His Phe Ile Val
 35 40 45

Leu Asp His Ser Lys Ser Glu Cys Tyr Asp Phe Phe Tyr Phe Asn Phe
 50 55 60

Ile Ser Cys Lys Tyr Arg Leu Arg Gly Leu Asp Val Tyr Gly Ala Asp
 65 70 75 80

His Ile Lys Gly Ala Lys Phe Phe Leu Glu Arg His Arg Phe Phe Val
 85 90 95

Val Glu Asp Gly Met Met Asn Tyr Ser Lys Asn Met Tyr Ala Phe Ser
 100 105 110

Leu Phe Arg Thr Arg Asn Pro Val Ile Leu Pro Gly Gly Phe His Pro
 115 120 125

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

Ile Ala His Lys Arg Glu Ile Ile Asn Ile Lys Thr Leu Trp Gln Ala
 145 150 155 160

Lys Thr Ala Thr Glu Lys Thr Lys Ile Leu Ser Phe Phe Glu Ile Asp
 165 170 175

Met Gln Glu Ile Ser Val Ile Lys Asn Arg Ser Phe Val Leu Tyr Thr
 180 185 190

Gln Pro Leu Ser Glu Asp Lys Leu Leu Thr Glu Ala Glu Lys Ile Asp
 195 200 205

Ile Tyr Arg Thr Ile Leu Thr Lys Tyr Asn His Ser Gln Thr Val Ile
 210 215 220

Lys Pro His Pro Arg Asp Lys Thr Asp Tyr Lys Gln Leu Phe Pro Asp
225 230 235 240

Ala Tyr Val Met Lys Gly Thr Tyr Pro Ser Glu Leu Leu Thr Leu Leu
245 250 255

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

Asp Tyr Pro Lys Glu Lys Ile Asp Phe Tyr Gly Thr Ala Val His Pro
275 280 285

Lys Leu Leu Asp Phe Phe Asp
290 295

<210> 48
<211> 488
<212> PRT
<213> Alistipes sp.

<400> 48

Met Ala Leu Leu Ser Gly Thr Ala Ala Cys Ser Asp Asp Glu Val Ser
1 5 10 15

Gln Asn Leu Ile Val Ile Asn Gly Gly Glu His Phe Leu Ser Leu Asp
20 25 30

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

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

Glu Gly Pro Ala Gly Tyr Ser Glu Val Glu Leu Ser Leu Asp Glu Asn
65 70 75 80

Pro Gly Ala Ala Arg Ser Ala Gln Leu Ala Phe Ala Cys Gly Asp Ala
85 90 95

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

Ser Pro Asp Tyr Tyr Phe Tyr Val Thr Phe Gly Thr Met Pro Thr Leu
115 120 125

Tyr Ala Gly Ile His Leu Leu Ser His Asp Lys Pro Gly Tyr Val Phe
130 135 140

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

Phe Lys Pro His Pro Ala Asp Thr Thr Ser Ala Gly Tyr Glu Thr Glu
405 410 415

Phe Pro Gly Leu Thr Leu Leu Pro Gly Gln Met Pro Phe Glu Ile Phe
420 425 430

Val Trp Ser Leu Ile Asp Arg Val Asp Met Ile Gly Gly Tyr Pro Ser
435 440 445

Thr Val Phe Leu Thr Val Pro Val Asp Lys Val Arg Phe Ile Phe Ala
450 455 460

Ala Asp Ala Ala Ser Leu Val Arg Pro Leu Asn Ile Leu Phe Arg Asp
465 470 475 480

Ala Thr Asp Val Glu Trp Met Gln
485

<210> 49
<211> 291
<212> PRT
<213> Campylobacter jejuni

<400> 49

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

Asp Tyr Ser Arg Leu Pro Asn Asp Phe Asp Val Phe Arg Cys Asn Gln
20 25 30

Phe Tyr Phe Glu Asp Lys Tyr Tyr Leu Gly Lys Lys Cys Lys Ala Val
35 40 45

Phe Tyr Thr Pro Asn Phe Phe Phe Glu Gln Tyr Tyr Thr Leu Lys His
50 55 60

Leu Ile Gln Asn Gln Glu Tyr Glu Thr Glu Leu Ile Met Cys Ser Asn
65 70 75 80

Tyr Asn Gln Ala His Leu Glu Asn Glu Asn Phe Val Lys Thr Phe Tyr
85 90 95

Asp Tyr Phe Pro Asp Ala His Leu Gly Tyr Asp Phe Phe Lys Gln Leu
100 105 110

Lys Glu Phe Asn Ala Tyr Phe Lys Phe His Glu Ile Tyr Phe Asn Gln
115 120 125

Arg Ile Thr Ser Gly Val Tyr Met Cys Ala Val Ala Ile Ala Leu Gly
130 135 140

Tyr Lys Glu Ile Tyr Leu Ser Gly Ile Asp Phe Tyr Gln Asn Gly Ser
145 150 155 160

Ser Tyr Ala Phe Asp Thr Lys Gln Glu Asn Leu Leu Lys Leu Ala Pro
165 170 175

Asp Phe Lys Asn Asp Arg Ser His Tyr Ile Gly His Ser Lys Asn Thr
180 185 190

Asp Ile Lys Ala Leu Glu Phe Leu Glu Lys Thr Tyr Lys Ile Lys Leu
195 200 205

Tyr Cys Leu Cys Pro Asn Ser Leu Leu Ala Asn Phe Ile Glu Leu Ala
210 215 220

Pro Asn Leu Asn Ser Asn Phe Ile Ile Gln Glu Lys Asn Asn Tyr Thr
225 230 235 240

Lys Asp Ile Leu Ile Pro Ser Ser Glu Ala Tyr Gly Lys Phe Ser Lys
245 250 255

Asn Ile Asn Phe Lys Lys Ile Lys Ile Lys Glu Asn Val Tyr Tyr Lys
260 265 270

Leu Ile Lys Asp Leu Leu Arg Leu Pro Ser Asp Ile Lys His Tyr Phe
275 280 285

Lys Gly Lys
290

<210> 50
<211> 312
<212> PRT
<213> Streptococcus agalactiae

<400> 50

Met Thr Asn Arg Lys Ile Tyr Val Cys His Thr Leu Tyr His Leu Leu
1 5 10 15

Ile Cys Leu Tyr Lys Glu Glu Ile Tyr Ser Asn Leu Glu Ile Ile Leu
20 25 30

Ser Ser Ser Ile Pro Asp Val Asp Asn Leu Glu Lys Lys Leu Lys Ser
35 40 45

Lys Thr Ile Asn Ile His Ile Leu Glu Glu Ser Ser Gly Glu Ser Glu

50

55

60

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

Asp Ser Asn Cys Phe Ile Phe Asn Asp Ala Thr Pro Ile Gly Arg Thr
85 90 95

Leu Ile Lys His Gly Ile Tyr Tyr Asn Leu Ile Glu Asp Gly Leu Asn
100 105 110

Cys Phe Thr Tyr Ser Ile Phe Ser Gln Lys Leu Trp Lys Tyr Tyr Val
115 120 125

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

Cys Leu Gly Ile Glu Val Asn Ser Leu Val Asn Leu Pro Lys Asp Pro
145 150 155 160

Arg Tyr Lys Lys Phe Ile Glu Val Pro Arg Lys Glu Leu Phe Asp Asn
165 170 175

Val Thr Glu Tyr Gln Lys Glu Met Ala Ile Asn Leu Phe Gly Ala Val
180 185 190

Arg Val Ser Ile Lys Ser Pro Ser Val Leu Val Leu Thr Gln Pro Leu
195 200 205

Ser Ile Asp Lys Glu Phe Met Ser Tyr Asn Asn Lys Ile Glu Thr Ser
210 215 220

Glu Glu Gln Phe Asn Phe Tyr Lys Ser Ile Val Asn Glu Tyr Ile Asn
225 230 235 240

Lys Gly Tyr Asn Val Tyr Leu Lys Val His Pro Arg Asp Val Val Asp
245 250 255

Tyr Ser Lys Leu Pro Val Glu Leu Leu Pro Ser Asn Val Pro Met Glu
260 265 270

Ile Ile Glu Leu Met Leu Thr Gly Arg Phe Glu Cys Gly Ile Thr His
275 280 285

Ser Ser Thr Ala Leu Asp Phe Leu Thr Cys Val Asp Lys Lys Ile Thr
290 295 300

Leu Val Asp Leu Lys Asp Ile Lys

305

310

<210> 51
 <211> 410
 <212> PRT
 <213> Bibersteinia trehalosi

<400> 51

Met Glu Phe Cys Lys Met Ala Thr Thr Gln Lys Ile Cys Val Tyr Leu
 1 5 10 15

Asp Tyr Ala Thr Ile Pro Ser Leu Asn Tyr Ile Leu His Phe Ala Gln
 20 25 30

His Phe Glu Asp Gln Glu Thr Ile Arg Leu Phe Gly Leu Ser Arg Phe
 35 40 45

His Ile Pro Glu Ser Val Ile Gln Arg Tyr Pro Lys Gly Val Val Gln
 50 55 60

Phe Tyr Pro Asn Gln Glu Lys Asp Phe Ser Ala Leu Leu Leu Ala Leu
 65 70 75 80

Lys Asn Ile Leu Ile Glu Val Lys Gln Gln Gln Arg Lys Cys Glu Ile
 85 90 95

Glu Leu His Leu Asn Leu Phe His Tyr Gln Leu Leu Leu Leu Pro Phe
 100 105 110

Leu Ser Leu Tyr Leu Asp Thr Gln Asp Tyr Cys His Leu Thr Leu Lys
 115 120 125

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

Leu Ala Pro Asp Leu Ala Ala Gln Ile Gln Phe Glu Lys Gln Gln Phe
 145 150 155 160

Asp Glu Leu Val Val Lys Lys Ser Phe Lys Leu Ser Leu Leu Ser Arg
 165 170 175

Tyr Phe Trp Gly Lys Leu Phe Glu Ser Glu Tyr Ile Trp Phe Asn Gln
 180 185 190

Ala Ile Leu Gln Lys Ala Glu Leu Gln Ile Leu Lys Gln Glu Ile Ser
 195 200 205

Ser Ser Arg Gln Met Asp Phe Ala Ile Tyr Gln Gln Met Ser Asp Glu
 210 215 220

Gln Lys Gln Leu Val Leu Glu Ile Leu Asn Ile Asp Leu Asn Lys Val
225 230 235 240

Ala Tyr Leu Lys Gln Leu Met Glu Asn Gln Pro Ser Phe Leu Phe Leu
245 250 255

Gly Thr Thr Leu Phe Asn Ile Thr Gln Glu Thr Lys Thr Trp Leu Met
260 265 270

Gln Met His Val Asp Leu Ile Gln Gln Tyr Cys Leu Pro Ser Gly Gln
275 280 285

Phe Phe Asn Asn Lys Ala Gly Tyr Leu Cys Phe Tyr Lys Gly His Pro
290 295 300

Asn Glu Lys Glu Met Asn Gln Met Ile Leu Ser Gln Phe Lys Asn Leu
305 310 315 320

Ile Ala Leu Pro Asp Asp Ile Pro Leu Glu Ile Leu Leu Leu Leu Gly
325 330 335

Val Ile Pro Ser Lys Val Gly Gly Phe Ala Ser Ser Ala Leu Phe Asn
340 345 350

Phe Thr Pro Ala Gln Ile Glu Asn Ile Ile Phe Phe Thr Pro Arg Tyr
355 360 365

Phe Glu Lys Asp Asn Arg Leu His Ala Thr Gln Tyr Arg Leu Met Gln
370 375 380

Gly Leu Ile Glu Leu Gly Tyr Leu Asp Ala Glu Lys Ser Val Thr His
385 390 395 400

Phe Glu Ile Met Gln Leu Leu Thr Lys Glu
405 410

<210> 52
<211> 406
<212> PRT
<213> Haemophilus parahaemolyticus

<400> 52

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

Thr Ile Pro Thr Leu Asn Tyr Phe Tyr His Phe Thr Glu Asn Lys Asp
20 25 30

Asp Ile Ala Thr Ile Arg Leu Phe Gly Leu Gly Arg Phe Asn Ile Ser
 35 40 45

Lys Ser Ile Ile Glu Ser Tyr Pro Glu Gly Ile Ile Arg Tyr Cys Pro
 50 55 60

Ile Ile Phe Glu Asp Gln Thr Ala Phe Gln Gln Leu Phe Ile Thr Leu
 65 70 75 80

Leu Thr Glu Asp Ser Phe Cys Gln Tyr Arg Phe Asn Phe His Ile Asn
 85 90 95

Leu Phe His Ser Trp Lys Met Leu Ile Pro Leu Leu His Ile Ile Trp
 100 105 110

Gln Phe Lys His Lys Val Leu Asp Ile Lys Leu Asn Phe Tyr Asp Asp
 115 120 125

Gly Ser Glu Gly Leu Val Thr Leu Ser Lys Ile Glu Gln Asn Tyr Ser
 130 135 140

Ser Glu Ile Leu Gln Lys Ile Ile Asp Ile Asp Ser Gln Ser Phe Tyr
 145 150 155 160

Ala Asp Lys Leu Ser Phe Leu Asp Glu Asp Ile Ala Arg Tyr Leu Trp
 165 170 175

Asn Ser Leu Phe Glu Ser His Tyr Tyr Leu Leu Asn Asp Phe Leu Leu
 180 185 190

Lys Asn Glu Lys Leu Ser Leu Leu Lys Asn Ser Ile Lys Tyr Cys His
 195 200 205

Ile Met Asp Leu Glu Arg Tyr Leu Gln Phe Thr Gln Glu Glu Lys Asp
 210 215 220

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

Ile Lys Ile Phe Gln Gln Lys Lys Thr Phe Ile Phe Thr Gly Thr Thr
 245 250 255

Ile Phe Ser Leu Pro Lys Glu Glu Glu Glu Thr Leu Tyr Arg Leu His
 260 265 270

Leu Asn Ala Ile Leu Asn Tyr Ile His Pro Asn Gly Lys Tyr Phe Ile
 275 280 285

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

Met Asn Ser Arg Leu Glu Lys Ser Phe Glu Lys Ala Val Met Leu Pro
305 310 315 320

Asp Asn Ile Pro Phe Glu Ile Leu Tyr Leu Ile Gly Cys Lys Pro Asp
325 330 335

Lys Ile Gly Gly Phe Val Ser Thr Ser Tyr Phe Ser Cys Asp Lys Lys
340 345 350

Asn Ile Ala Asp Leu Leu Phe Ile Ser Ala Arg Gln Glu Glu Val Arg
355 360 365

Lys Asn Asp Tyr Leu Phe Asn Ile Gln Tyr Gln Leu Arg Asp Met Met
370 375 380

Ile Lys Thr Gly Phe Ile Gln Glu Glu Lys Thr His Phe Tyr Ser Asp
385 390 395 400

Ile Pro Ile Phe Ile Ser
405

<210> 53
<211> 300
<212> PRT
<213> Haemophilus somnus

<400> 53

Met Lys Tyr Asn Ile Lys Ile Lys Ala Ile Val Ile Val Ser Ser Leu
1 5 10 15

Arg Met Leu Leu Ile Phe Leu Met Leu Asn Lys Tyr His Leu Asp Glu
20 25 30

Val Leu Phe Val Phe Asn Glu Gly Phe Glu Leu His Lys Lys Tyr Lys
35 40 45

Ile Lys His Tyr Val Ala Ile Lys Lys Lys Ile Thr Lys Phe Trp Arg
50 55 60

Leu Tyr Tyr Lys Leu Tyr Phe Tyr Arg Phe Lys Ile Asp Arg Ile Pro
65 70 75 80

Val Tyr Gly Ala Asp His Leu Gly Trp Thr Asp Tyr Phe Leu Lys Tyr
85 90 95

Phe Asp Phe Tyr Leu Ile Glu Asp Gly Ile Ala Asn Phe Ser Pro Lys
100 105 110

Arg Tyr Glu Ile Asn Leu Thr Arg Asn Ile Pro Val Phe Gly Phe His
115 120 125

Lys Thr Val Lys Lys Ile Tyr Leu Thr Ser Leu Glu Asn Val Pro Ser
130 135 140

Asp Ile Arg His Lys Val Glu Leu Ile Ser Leu Glu His Leu Trp Lys
145 150 155 160

Thr Arg Thr Ala Gln Glu Gln His Asn Ile Leu Asp Phe Phe Ala Phe
165 170 175

Asn Leu Asp Ser Leu Ile Ser Leu Lys Met Lys Lys Tyr Ile Leu Phe
180 185 190

Thr Gln Cys Leu Ser Glu Asp Arg Val Ile Ser Glu Gln Glu Lys Ile
195 200 205

Ala Ile Tyr Gln His Ile Ile Lys Asn Tyr Asp Glu Arg Leu Leu Val
210 215 220

Ile Lys Pro His Pro Arg Glu Thr Thr Asp Tyr Gln Lys Tyr Phe Glu
225 230 235 240

Asn Val Phe Val Tyr Gln Asp Val Val Pro Ser Glu Leu Phe Glu Leu
245 250 255

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

Phe Lys Tyr Asp Arg Asn Ile Val Asp Phe Tyr Gly Thr Arg Ile His
275 280 285

Asp Lys Ile Tyr Gln Trp Phe Gly Asp Ile Lys Phe
290 295 300

<210> 54
<211> 381
<212> PRT
<213> *Vibrio harveyi*

<400> 54

Met Asp Ser Ser Pro Glu Asn Thr Ser Ser Thr Leu Glu Ile Tyr Ile
1 5 10 15

Asp Ser Ala Thr Leu Pro Ser Leu Gln His Met Val Lys Ile Ile Asp

20

25

30

Glu Gln Ser Gly Asn Lys Lys Leu Ile Asn Trp Lys Arg Tyr Pro Ile
 35 40 45

Asp Asp Glu Leu Leu Leu Asp Lys Ile Asn Ala Leu Ser Phe Ser Asp
 50 55 60

Thr Thr Asp Leu Thr Arg Tyr Met Glu Ser Ile Leu Leu Ile Gly Asp
 65 70 75 80

Ile Lys Arg Val Val Ile Asn Gly Asn Ser Leu Ser Asn Tyr Asn Ile
 85 90 95

Val Gly Val Met Arg Ser Ile Asn Ala Leu Gly Leu Asp Leu Asp Val
 100 105 110

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

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

Ser Lys Asn Asn Ile Leu Ala Ala Val Asn Gly Ile Gly Ser Tyr Asp
 145 150 155 160

Ser Gly Ser Pro Glu Asn Ile Tyr Gly Phe Ala Gln Ile Tyr Pro Ala
 165 170 175

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

Gly Leu Ile Arg Asp Ile Leu Gly Asp Asn Val Lys Gln Met Lys Trp
 195 200 205

Gly Gln Phe Leu Gly Phe Asn Glu Glu Gln Lys Glu Leu Phe Tyr Gln
 210 215 220

Leu Thr Ser Phe Asn Pro Asp Lys Ile Gln Ala Gln Tyr Lys Glu Ser
 225 230 235 240

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

Ala Glu Gln Gln Ile Asn Ile Ile Lys Glu Ala Lys Lys Leu Asp Ser
 260 265 270

Glu Ile Ile Pro Asn Ser Ile Asp Gly Tyr Asp Leu Phe Phe Lys Gly

275

280

285

His Pro Ser Ala Thr Tyr Asn Gln Gln Ile Val Asp Ala His Asp Met
 290 295 300

Thr Glu Ile Tyr Asn Arg Thr Pro Phe Glu Val Leu Ala Met Thr Ser
 305 310 315 320

Ser Leu Pro Asp Ala Val Gly Gly Met Gly Ser Ser Leu Phe Phe Ser
 325 330 335

Leu Pro Lys Thr Val Glu Thr Lys Phe Ile Phe Tyr Lys Ser Gly Thr
 340 345 350

Asp Ile Glu Ser Asn Ala Leu Ile Gln Val Met Leu Lys Leu Gly Ile
 355 360 365

Ile Thr Asp Glu Lys Val Arg Phe Thr Thr Asp Ile Lys
 370 375 380

<210> 55

<211> 483

<212> PRT

<213> Alistipes sp.

<400> 55

Met Ala Ser Cys Ser Asp Asp Asp Lys Glu Gln Thr Gly Phe Gln Ile
 1 5 10 15

Asp Asp Gly Ser Gly Phe Leu Ser Leu Asp Ala Ala Ala Arg Ser Gly
 20 25 30

Ser Ile Ala Ile Thr Ala Asn Asn Ser Trp Ser Val Thr Gln Asp Lys
 35 40 45

Asp Ser Glu Trp Leu Thr Leu Ser Thr Thr Ser Gly Ala Ala Gly Arg
 50 55 60

Thr Glu Ile Gly Ile Met Leu Glu Ala Asn Pro Gly Glu Ala Arg Asn
 65 70 75 80

Ala Gly Leu Thr Phe Asn Ser Gly Gly Arg Thr Tyr Pro Phe Val Ile
 85 90 95

Thr Gln Ser Ala His Val Thr Ala Asp Phe Asp Asp Ala Asp His Cys
 100 105 110

Phe Tyr Ile Thr Phe Gly Thr Leu Pro Thr Leu Tyr Ala Gly Leu His
 115 120 125

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

Ile Gly Asp Tyr Gly Thr Ala Tyr Asp Ile Phe Phe Lys Pro His Pro
385 390 395 400

Ala Asp Ser Ser Ser Ser Asn Tyr Glu Glu Arg Phe Glu Gly Leu Thr
405 410 415

Leu Leu Pro Gly Gln Met Pro Phe Glu Ile Phe Val Trp Ser Leu Leu
420 425 430

Asp Lys Val Asp Leu Ile Gly Gly Tyr Ser Ser Thr Val Phe Leu Thr
435 440 445

Val Pro Val Glu Lys Thr Gly Phe Ile Phe Ala Ala Asn Ala Glu Ser
450 455 460

Leu Pro Arg Pro Leu Asn Val Leu Phe Arg Asn Ala Glu His Val Arg
465 470 475 480

Trp Ile Gln

<210> 56
<211> 483
<212> PRT
<213> Alistipes shahii

<400> 56

Met Asp Asp Gly Thr Pro Ser Val Ser Ile Asn Gly Gly Thr Asp Phe
1 5 10 15

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

Pro Ala Pro Trp Ser Val Thr Leu Ala Pro Glu Asn Tyr Gly Gln Asp
35 40 45

Glu Lys Pro Asp Trp Leu Thr Leu Ser Ala Glu Glu Gly Pro Ala Gly
50 55 60

Tyr Ser Glu Ile Asp Val Thr Phe Ala Glu Asn Pro Gly Pro Ala Arg
65 70 75 80

Ser Ala Ser Leu Leu Phe Ser Cys Asp Gly Lys Thr Leu Ala Phe Thr
85 90 95

Val Ser Gln Ser Ala Gly Gly Thr Gly Phe Asp Ala Pro Asp Tyr Tyr
100 105 110

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

Ser Ser Ala Ala Ser Glu Gln Gln Gln Ala Ala Tyr Val Glu Arg Ile
370 375 380

Ile Gln Gln Tyr Gly Ser Asp Tyr Asp Ile Phe Phe Lys Pro His Pro
385 390 395 400

Ala Asp Ser Ser Ser Ala Gly Tyr Pro Asp Arg Phe Glu Gly Leu Thr
405 410 415

Leu Leu Pro Gly Gln Met Pro Phe Glu Ile Phe Val Trp Ala Leu Leu
420 425 430

Asp Lys Ile Asp Met Ile Gly Gly Tyr Pro Ser Thr Thr Phe Ile Ser
435 440 445

Val Pro Leu Asp Lys Val Gly Phe Leu Phe Ala Ala Asp Ala Asp Gly
450 455 460

Leu Val Arg Pro Leu Asn Ile Leu Phe Arg Asp Ala Ala Asn Val Glu
465 470 475 480

Trp Ile Gln

<210> 57

<211> 401

<212> PRT

<213> Actinobacillus suis

<400> 57

Met Glu Arg Thr Pro Gln Leu Gln Ala Val Asp Ile Tyr Ile Asp Phe
1 5 10 15

Ala Thr Ile Pro Ser Leu Ser Tyr Phe Leu His Phe Leu Lys His Lys
20 25 30

His Asp Asp Gln Arg Leu Arg Leu Phe Ser Leu Ala Arg Phe Glu Met
35 40 45

Pro Gln Thr Leu Ile Glu Gln Tyr Glu Gly Ile Ile Gln Phe Ser Arg
50 55 60

Asn Val Glu His Asn Val Glu Pro Leu Leu Glu Gln Leu Gln Thr Ile
65 70 75 80

Leu Ser Gln Glu Gly Lys Gln Phe Glu Leu His Leu His Leu Asn Leu
85 90 95

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

Leu Ala Lys Leu Phe Phe Leu Thr Ser Thr Asp Glu Gln Glu Arg Gln
355 360 365

Leu Ser Asp Gly Tyr Ile Lys Gln Tyr Ala Leu Ala Gln Ala Met Leu
370 375 380

Glu Met Gln Leu Val Ser Gln Glu Gln Val Tyr Tyr Cys Ser Leu Ser
385 390 395 400

Ser

<210> 58

<211> 401

<212> PRT

<213> Actinobacillus capsulatus

<400> 58

Met Glu Arg Ile Pro Gln Leu Gln Ala Val Asp Ile Tyr Ile Asp Phe
1 5 10 15

Ala Thr Ile Pro Ser Leu Ser Tyr Phe Leu His Phe Leu Lys His Lys
20 25 30

His Asp His Gln Arg Leu Arg Leu Phe Ser Leu Ala Arg Phe Glu Met
35 40 45

Pro Gln Thr Val Ile Glu Gln Tyr Glu Gly Ile Ile Gln Phe Ser Arg
50 55 60

Asn Val Glu His Asn Val Glu Gln Leu Leu Glu Gln Leu Gln Thr Ile
65 70 75 80

Leu Ser Gln Glu Gly Lys Gln Phe Glu Leu His Leu His Leu Asn Leu
85 90 95

Phe His Ser Phe Glu Met Phe Leu Asn Leu Ser Pro Thr Tyr Thr Lys
100 105 110

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

Ser Glu Gly Val Met Lys Gln Tyr Gln Leu Gln Gln Ser Asn Ser Leu
130 135 140

Ala Gln Asp Leu Ala Ser Thr Lys Ala Ser Leu Val Ser Leu Phe Lys
145 150 155 160

Asn Gly Glu Gly Ala Phe Ser Gln Ile Asp Leu Ile Arg Tyr Val Trp

165

170

175

Asn Ala Val Leu Glu Thr His Tyr Tyr Leu Leu Ser Asp His Phe Leu
 180 185 190

Ala His Glu Lys Leu Gln Pro Leu Lys Ile Glu Leu Gly His Tyr Gln
 195 200 205

Leu Leu Asn Leu Ser Ala Tyr Gln Tyr Leu Ser Ser Glu Asp Leu Leu
 210 215 220

Trp Leu Lys Gln Ile Leu Lys Ile Asp Ala Glu Leu Glu Ser Leu Met
 225 230 235 240

His Lys Leu Thr Thr Gln Pro Val Tyr Phe Phe Ser Gly Thr Thr Phe
 245 250 255

Phe Asn Ile Ser Phe Glu Asp Lys Gln Arg Leu Ala Asn Ile His Ala
 260 265 270

Ile Leu Ile Arg Glu His Leu Asp Pro Asn Ser Gln Leu Phe Ile Gly
 275 280 285

Glu Pro Tyr Leu Phe Val Phe Lys Gly His Pro Asn Ser Pro Glu Ile
 290 295 300

Asn Gln Ala Leu Arg Glu Tyr Tyr Pro Asn Ala Ile Phe Leu Pro Glu
 305 310 315 320

Asn Ile Pro Phe Glu Ile Leu Thr Leu Leu Gly Phe Ser Pro Gln Lys
 325 330 335

Ile Gly Gly Phe Ala Ser Thr Ile His Val Asn Ser Glu Gln Ser Lys
 340 345 350

Leu Ala Lys Leu Phe Phe Leu Thr Ser Thr Asp Glu Gln Glu Arg Asn
 355 360 365

Arg Ser Asp Gly Tyr Ile Lys Gln Tyr Ala Leu Ala Gln Ala Met Leu
 370 375 380

Glu Met Gln Leu Val Ser Gln Glu Gln Val Tyr Tyr Cys Ser Leu Ser
 385 390 395 400

Ser

<210> 59

<211> 311
<212> PRT
<213> Haemophilus somnus

<400> 59

Met Phe Arg Glu Asp Asn Met Asn Leu Ile Ile Cys Cys Thr Pro Leu
1 5 10 15

Gln Val Ile Ile Ala Glu Lys Ile Ile Glu Arg Tyr Pro Glu Gln Lys
20 25 30

Phe Tyr Gly Val Met Leu Glu Ser Phe Tyr Asn Asp Lys Phe Asp Phe
35 40 45

Tyr Glu Asn Lys Leu Lys His Leu Cys His Glu Phe Phe Cys Ile Lys
50 55 60

Ile Ala Arg Phe Lys Leu Glu Arg Tyr Lys Asn Leu Leu Ser Leu Leu
65 70 75 80

Lys Ile Lys Asn Lys Thr Phe Asp Arg Val Phe Leu Ala Asn Ile Glu
85 90 95

Lys Arg Tyr Ile His Ile Ile Leu Ser Asn Ile Phe Phe Lys Glu Leu
100 105 110

Tyr Thr Phe Asp Asp Gly Thr Ala Asn Ile Ala Pro Asn Ser His Leu
115 120 125

Tyr Gln Glu Tyr Asp His Ser Leu Lys Lys Arg Ile Thr Asp Ile Leu
130 135 140

Leu Pro Asn His Tyr Asn Ser Asn Lys Val Lys Asn Ile Ser Lys Leu
145 150 155 160

His Tyr Ser Ile Tyr Arg Cys Lys Asn Asn Ile Ile Asp Asn Ile Glu
165 170 175

Tyr Met Pro Leu Phe Asn Leu Glu Lys Lys Tyr Thr Ala Gln Asp Lys
180 185 190

Ser Ile Ser Ile Leu Leu Gly Gln Pro Ile Phe Tyr Asp Glu Glu Lys
195 200 205

Asn Ile Arg Leu Ile Lys Glu Val Ile Ala Lys Phe Lys Ile Asp Tyr
210 215 220

Tyr Phe Pro His Pro Arg Glu Asp Tyr Tyr Ile Asp Asn Val Ser Tyr
225 230 235 240

Ile Lys Thr Pro Leu Ile Phe Glu Glu Phe Tyr Ala Glu Arg Ser Ile
245 250 255

Glu Asn Ser Ile Lys Ile Tyr Thr Phe Phe Ser Ser Ala Val Leu Asn
260 265 270

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

Leu Thr Glu Lys Ala Tyr Leu Asp Cys Tyr Asp Ile Leu Lys Asp Phe
290 295 300

Gly Ile Lys Val Ile Asp Ile
305 310

<210> 60
<211> 399
<212> PRT
<213> Haemophilus ducreyi

<400> 60

Met Leu Ile Gln Gln Asn Leu Glu Ile Tyr Leu Asp Tyr Ala Thr Ile
1 5 10 15

Pro Ser Leu Ala Cys Phe Met His Phe Ile Gln His Lys Asp Asp Val
20 25 30

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

Ile Ile Asp Arg Tyr Pro Ala Asn His Leu Phe Tyr His Asn Ile Asp
50 55 60

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

Gln Glu Asn Lys Arg Phe Gln Ile Asn Leu His Leu Asn Leu Phe His
85 90 95

Ser Ile Asp Leu Phe Phe Ala Ile Tyr Pro Ile Tyr Gln Gln Tyr Gln
100 105 110

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

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

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

<210> 61
<211> 497
<212> PRT
<213> Photobacterium leiognathi

<400> 61

Met Cys Asn Asp Asn Gln Asn Thr Val Asp Val Val Val Ser Thr Val
1 5 10 15

Asn Asp Asn Val Ile Glu Asn Asn Thr Tyr Gln Val Lys Pro Ile Asp
20 25 30

Thr Pro Thr Thr Phe Asp Ser Tyr Ser Trp Ile Gln Thr Cys Gly Thr
35 40 45

Pro Ile Leu Lys Asp Asp Glu Lys Tyr Ser Leu Ser Phe Asp Phe Val
50 55 60

Ala Pro Glu Leu Asp Gln Asp Glu Lys Phe Cys Phe Glu Phe Thr Gly
65 70 75 80

Asp Val Asp Gly Lys Arg Tyr Val Thr Gln Thr Asn Leu Thr Val Val
85 90 95

Ala Pro Thr Leu Glu Val Tyr Val Asp His Ala Ser Leu Pro Ser Leu
100 105 110

Gln Gln Leu Met Lys Ile Ile Gln Gln Lys Asn Glu Tyr Ser Gln Asn
115 120 125

Glu Arg Phe Ile Ser Trp Gly Arg Ile Gly Leu Thr Glu Asp Asn Ala
130 135 140

Glu Lys Leu Asn Ala His Ile Tyr Pro Leu Ala Gly Asn Asn Thr Ser
145 150 155 160

Gln Glu Leu Val Asp Ala Val Ile Asp Tyr Ala Asp Ser Lys Asn Arg
165 170 175

Leu Asn Leu Glu Leu Asn Thr Asn Thr Ala His Ser Phe Pro Asn Leu
180 185 190

Ala Pro Ile Leu Arg Ile Ile Ser Ser Lys Ser Asn Ile Leu Ile Ser
195 200 205

Asn Ile Asn Leu Tyr Asp Asp Gly Ser Ala Glu Tyr Val Asn Leu Tyr
210 215 220

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

Phe Trp Ser Asp Leu Pro Asp Cys Ser Ser Gly Val Cys Ile Ala Gln
485 490 495

Tyr

<210> 62
<211> 498
<212> PRT
<213> Photobacterium sp.

<400> 62

Met Ser Glu Glu Asn Thr Gln Ser Ile Ile Lys Asn Asp Ile Asn Lys
1 5 10 15

Thr Ile Ile Asp Glu Glu Tyr Val Asn Leu Glu Pro Ile Asn Gln Ser
20 25 30

Asn Ile Ser Phe Thr Lys His Ser Trp Val Gln Thr Cys Gly Thr Gln
35 40 45

Gln Leu Leu Thr Glu Gln Asn Lys Glu Ser Ile Ser Leu Ser Val Val
50 55 60

Ala Pro Arg Leu Asp Asp Asp Glu Lys Tyr Cys Phe Asp Phe Asn Gly
65 70 75 80

Val Ser Asn Lys Gly Glu Lys Tyr Ile Thr Lys Val Thr Leu Asn Val
85 90 95

Val Ala Pro Ser Leu Glu Val Tyr Val Asp His Ala Ser Leu Pro Thr
100 105 110

Leu Gln Gln Leu Met Asp Ile Ile Lys Ser Glu Glu Glu Asn Pro Thr
115 120 125

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

Met Lys Glu Leu Asn Ile Thr Ser Phe Ala Leu Ile Asn Asn His Thr
145 150 155 160

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

Arg Leu Asn Val Lys Leu Ser Ser Asn Thr Ala His Ser Phe Asp Asn
180 185 190

Leu Val Pro Ile Leu Lys Glu Leu Asn Ser Phe Asn Asn Val Thr Val

195

200

205

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

Tyr Asn Trp Arg Asp Thr Leu Asn Lys Thr Asp Asn Leu Lys Ile Gly
 225 230 235 240

Lys Asp Tyr Leu Glu Asp Val Ile Asn Gly Ile Asn Glu Asp Thr Ser
 245 250 255

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

Asn Tyr His Phe Leu Arg Lys Asp Tyr Leu Thr Leu Glu Pro Ser Leu
 275 280 285

His Glu Leu Arg Asp Tyr Ile Gly Asp Ser Leu Lys Gln Met Gln Trp
 290 295 300

Asp Gly Phe Lys Lys Phe Asn Ser Lys Gln Gln Glu Leu Phe Leu Ser
 305 310 315 320

Ile Val Asn Phe Asp Lys Gln Lys Leu Gln Asn Glu Tyr Asn Ser Ser
 325 330 335

Asn Leu Pro Asn Phe Val Phe Thr Gly Thr Thr Val Trp Ala Gly Asn
 340 345 350

His Glu Arg Glu Tyr Tyr Ala Lys Gln Gln Ile Asn Val Ile Asn Asn
 355 360 365

Ala Ile Asn Glu Ser Ser Pro His Tyr Leu Gly Asn Ser Tyr Asp Leu
 370 375 380

Phe Phe Lys Gly His Pro Gly Gly Gly Ile Ile Asn Thr Leu Ile Met
 385 390 395 400

Gln Asn Tyr Pro Ser Met Val Asp Ile Pro Ser Lys Ile Ser Phe Glu
 405 410 415

Val Leu Met Met Thr Asp Met Leu Pro Asp Ala Val Ala Gly Ile Ala
 420 425 430

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

Phe Thr Ser Thr Glu Thr Ile Thr Asp Arg Glu Thr Ala Leu Arg Ser

450

455

460

Pro Leu Val Gln Val Met Ile Lys Leu Gly Ile Val Lys Glu Glu Asn
 465 470 475 480

Val Leu Phe Trp Ala Asp Leu Pro Asn Cys Glu Thr Gly Val Cys Ile
 485 490 495

Ala Val

<210> 63

<211> 482

<212> PRT

<213> Photobacterium leiognathi

<400> 63

Met Asn Asp Asn Gln Asn Thr Val Asp Val Val Val Ser Thr Val Asn
 1 5 10 15

Asp Asn Val Ile Glu Asn Asn Thr Tyr Gln Val Lys Pro Ile Asp Thr
 20 25 30

Pro Thr Thr Phe Asp Ser Tyr Ser Trp Ile Gln Thr Cys Gly Thr Pro
 35 40 45

Ile Leu Lys Asp Asp Glu Lys Tyr Ser Leu Ser Phe Asp Phe Val Ala
 50 55 60

Pro Glu Leu Asp Gln Asp Glu Lys Phe Cys Phe Glu Phe Thr Gly Asp
 65 70 75 80

Val Asp Gly Lys Arg Tyr Val Thr Gln Thr Asn Leu Thr Val Val Ala
 85 90 95

Pro Thr Leu Glu Val Tyr Val Asp His Ala Ser Leu Pro Ser Leu Gln
 100 105 110

Gln Leu Met Lys Ile Ile Gln Gln Lys Asn Glu Tyr Ser Gln Asn Glu
 115 120 125

Arg Phe Ile Ser Trp Gly Arg Ile Arg Leu Thr Glu Asp Asn Ala Glu
 130 135 140

Lys Leu Asn Ala His Ile Tyr Pro Leu Ala Gly Asn Asn Thr Ser Gln
 145 150 155 160

Glu Leu Val Asp Ala Val Ile Asp Tyr Ala Asp Ser Lys Asn Arg Leu
 165 170 175

Asn	Leu	Glu	Leu	Asn	Thr	Asn	Thr	Gly	His	Ser	Phe	Arg	Asn	Ile	Ala	180	185	190
Pro	Ile	Leu	Arg	Ala	Thr	Ser	Ser	Lys	Asn	Asn	Ile	Leu	Ile	Ser	Asn	195	200	205
Ile	Asn	Leu	Tyr	Asp	Asp	Gly	Ser	Ala	Glu	Tyr	Val	Ser	Leu	Tyr	Asn	210	215	220
Trp	Lys	Asp	Thr	Asp	Asn	Lys	Ser	Gln	Lys	Leu	Ser	Asp	Ser	Phe	Leu	225	230	235
Val	Leu	Lys	Asp	Tyr	Leu	Asn	Gly	Ile	Ser	Ser	Glu	Lys	Pro	Asn	Gly	245	250	255
Ile	Tyr	Ser	Ile	Tyr	Asn	Trp	His	Gln	Leu	Tyr	His	Ser	Ser	Tyr	Tyr	260	265	270
Phe	Leu	Arg	Lys	Asp	Tyr	Leu	Thr	Val	Glu	Thr	Lys	Leu	His	Asp	Leu	275	280	285
Arg	Glu	Tyr	Leu	Gly	Gly	Ser	Leu	Lys	Gln	Met	Ser	Trp	Asp	Thr	Phe	290	295	300
Ser	Gln	Leu	Ser	Lys	Gly	Asp	Lys	Glu	Leu	Phe	Leu	Asn	Ile	Val	Gly	305	310	315
Phe	Asp	Gln	Glu	Lys	Leu	Gln	Gln	Glu	Tyr	Gln	Gln	Ser	Glu	Leu	Pro	325	330	335
Asn	Phe	Val	Phe	Thr	Gly	Thr	Thr	Thr	Trp	Ala	Gly	Gly	Glu	Thr	Lys	340	345	350
Glu	Tyr	Tyr	Ala	Gln	Gln	Gln	Val	Asn	Val	Val	Asn	Asn	Ala	Ile	Asn	355	360	365
Glu	Thr	Ser	Pro	Tyr	Tyr	Leu	Gly	Arg	Glu	His	Asp	Leu	Phe	Phe	Lys	370	375	380
Gly	His	Pro	Arg	Gly	Gly	Ile	Ile	Asn	Asp	Ile	Ile	Leu	Gly	Ser	Phe	385	390	395
Asn	Asn	Met	Ile	Asp	Ile	Pro	Ala	Lys	Val	Ser	Phe	Glu	Val	Leu	Met	405	410	415
Met	Thr	Gly	Met	Leu	Pro	Asp	Thr	Val	Gly	Gly	Ile	Ala	Ser	Ser	Leu	420	425	430

Tyr Phe Ser Ile Pro Ala Glu Lys Val Ser Phe Ile Val Phe Thr Ser
435 440 445

Ser Asp Thr Ile Thr Asp Arg Glu Asp Ala Leu Lys Ser Pro Leu Val
450 455 460

Gln Val Met Met Thr Leu Gly Ile Val Lys Glu Lys Asp Val Leu Phe
465 470 475 480

Trp Cys

<210> 64

<211> 675

<212> PRT

<213> Photobacterium damsela

<400> 64

Met Lys Lys Ile Leu Thr Val Leu Ser Ile Phe Ile Leu Ser Ala Cys
1 5 10 15

Asn Ser Asp Asn Thr Ser Leu Lys Glu Thr Val Ser Ser Asn Ser Ala
20 25 30

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

Ser Ser Phe Leu Ser His Ser Trp Glu Gln Thr Cys Gly Thr Pro Ile
50 55 60

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

Glu Leu Lys Gln Asp Glu Lys Tyr Cys Phe Thr Phe Lys Gly Ile Thr
85 90 95

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

Thr Leu Glu Val Tyr Ile Asp His Ala Ser Leu Pro Ser Leu Gln Gln
115 120 125

Leu Ile His Ile Ile Gln Ala Lys Asp Glu Tyr Pro Ser Asn Gln Arg
130 135 140

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

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

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

Met Leu Asp
675

<210> 65
<211> 510
<212> PRT
<213> Photobacterium damsela

<400> 65

Met Lys Lys Ile Leu Thr Val Leu Ser Ile Phe Ile Leu Ser Ala Cys
1 5 10 15

Asn Ser Asp Asn Thr Ser Leu Lys Glu Thr Val Ser Ser Asn Ser Ala
20 25 30

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

Ser Ser Phe Leu Ser His Ser Trp Glu Gln Thr Cys Gly Thr Pro Ile
50 55 60

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

Glu Leu Lys Gln Asp Glu Lys Tyr Cys Phe Thr Phe Lys Gly Ile Thr
85 90 95

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

Thr Leu Glu Val Tyr Ile Asp His Ala Ser Leu Pro Ser Leu Gln Gln
115 120 125

Leu Ile His Ile Ile Gln Ala Lys Asp Glu Tyr Pro Ser Asn Gln Arg
130 135 140

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

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

Met Val Ala Ala Ile Asp Glu Tyr Ala Gln Ser Lys Asn Arg Leu Asn
180 185 190

Ile Glu Phe Tyr Thr Asn Thr Ala His Val Phe Asn Asn Leu Pro Pro
195 200 205

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

Asp Thr Ile Thr Asp Arg Glu Glu Ala Leu Lys Ser Pro Leu Val Gln
465 470 475 480

Val Met Leu Thr Leu Gly Ile Val Lys Glu Lys Asp Val Leu Phe Trp
485 490 495

Ala Asp Leu Pro Asp Cys Ser Ser Gly Val Cys Ile Asp Lys
500 505 510

<210> 66

<211> 422

<212> PRT

<213> Heliobacter acinonychis

<400> 66

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Arg Cys Asn Gln Phe Tyr Phe Glu Asp Lys Tyr Tyr Leu Gly Arg Glu
35 40 45

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

Thr Val Gln Tyr Leu Met Asp Asn Gly Glu Tyr Ser Ile Glu Arg Phe
65 70 75 80

Phe Cys Ser Val Ser Thr Asp Arg His Asp Phe Asp Gly Asp Tyr Gln
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Thr Ile Leu Pro Val Asp Gly Tyr Leu Lys Ala His Tyr Pro Phe Val
100 105 110

Cys Asp Thr Phe Ser Leu Phe Lys Gly His Glu Glu Ile Leu Lys His
115 120 125

Val Lys Tyr His Leu Lys Thr Tyr Ser Lys Glu Leu Ser Ala Gly Val
130 135 140

Leu Met Leu Leu Ser Ala Val Val Leu Gly Tyr Lys Glu Ile Tyr Leu
145 150 155 160

Val Gly Ile Asp Phe Gly Ala Ser Ser Trp Gly His Phe Tyr Asp Glu
165 170 175

Ser Gln Ser Gln His Phe Ser Asn His Met Ala Asp Cys His Asn Ile

180

185

190

Tyr Tyr Asp Met Leu Thr Ile Cys Leu Cys Gln Lys Tyr Ala Lys Leu
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Tyr Ala Leu Ala Pro Asn Ser Pro Leu Ser His Leu Leu Thr Leu Asn
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Pro Gln Ala Lys Tyr Pro Phe Glu Leu Leu Asp Lys Pro Ile Gly Tyr
 225 230 235 240

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

Lys Leu Leu Glu Phe Lys Asn Ile Glu Glu Lys Leu Leu Glu Phe Lys
 275 280 285

Asn Ile Glu Glu Lys Leu Leu Glu Phe Lys Asn Ile Glu Glu Lys Leu
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Leu Glu Phe Lys Asn Ile Glu Glu Lys Leu Leu Glu Phe Lys Asn Ile
 305 310 315 320

Glu Glu Lys Leu Leu Glu Phe Lys Asn Ile Glu Glu Lys Leu Leu Glu
 325 330 335

Phe Lys Asn Ile Glu Glu Lys Leu Leu Glu Phe Lys Asn Ile Glu Glu
 340 345 350

Lys Leu Leu Glu Phe Lys Asn Ile Glu Glu Lys Leu Leu Glu Phe Lys
 355 360 365

Asn Ile Glu Glu Lys Leu Leu Glu Phe Lys Asn Ile Glu Glu Lys Leu
 370 375 380

Leu Ala Ser Arg Leu Asn Asn Ile Leu Arg Lys Ile Lys Arg Lys Ile
 385 390 395 400

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 405 410 415

Phe Arg Trp Gly Ala Ala
 420

<210> 67

<211> 2851
<212> DNA
<213> Artificial Sequence

<220>

<223> Expression fragment < Ptet-lacY-FRT-add1-FRT>

<400> 67

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<210> 68

<211> 6521

<212> DNA

<213> Artificial Sequence

<220>

<223> Transposon cassette <Ptet-glmUM-PT5-glmS-FRT-dhfr-FRT>

<400> 68

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<210> 69

<211> 3919

<212> DNA

<213> Artificial Sequence

<220>

<223> Expression cassette <Ptet-glmSm-gnal-FRT-aacC1-FRT>

<400> 69

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c g c a g a a t a a	a t a a a t c c t g	g t g t c c c t g t	t g a t a c c g g g	a a g c c c t g g g	c c a a c t t t t g	1860
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g g a g a a a a a a	a t c a c t g g a t	a t a c c a c c g t	t g a t a t a t c c	c a a t g g c a t c	g t a a a g a a c a	2040
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