

SEQUENCE LISTING

<110> Bayer BioScience N.V.
 <120> Armyworm insect resistance management in transgenic plants
 <130> BCS08-2005
 <160> 11
 <170> PatentIn version 3.3
 <210> 1
 <211> 1174
 <212> PRT
 <213> Bacillus thuringiensis

<400> 1

Met Glu Asn Asn Ile Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu Asn
 1 5 10 15

Asn Pro Glu Val Glu Ile Leu Asn Glu Glu Arg Ser Thr Gly Arg Leu
 20 25 30

Pro Leu Asp Ile Ser Leu Ser Leu Thr Arg Phe Leu Leu Ser Glu Phe
 35 40 45

Val Pro Gly Val Gly Val Ala Phe Gly Leu Phe Asp Leu Ile Trp Gly
 50 55 60

Phe Ile Thr Pro Ser Asp Trp Ser Leu Phe Leu Leu Gln Ile Glu Gln
 65 70 75 80

Leu Ile Glu Gln Arg Ile Glu Thr Leu Glu Arg Asn Arg Ala Ile Thr
 85 90 95

Thr Leu Arg Gly Leu Ala Asp Ser Tyr Glu Ile Tyr Ile Glu Ala Leu
 100 105 110

Arg Glu Trp Glu Ala Asn Pro Asn Asn Ala Gln Leu Arg Glu Asp Val
 115 120 125

Arg Ile Arg Phe Ala Asn Thr Asp Asp Ala Leu Ile Thr Ala Ile Asn
 130 135 140

Asn Phe Thr Leu Thr Ser Phe Glu Ile Pro Leu Leu Ser Val Tyr Val
 145 150 155 160

Gln Ala Ala Asn Leu His Leu Ser Leu Leu Arg Asp Ala Val Ser Phe
 165 170 175

Gly Gln Gly Trp Gly Leu Asp Ile Ala Thr Val Asn Asn His Tyr Asn
 180 185 190

Arg Leu Ile Asn Leu Ile His Arg Tyr Thr Lys His Cys Leu Asp Thr
 195 200 205

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

Val Val Arg Gly Pro Gly Phe Thr Gly Gly Asp Ile Leu Arg Arg Thr
 485 490 495
 Ser Gly Gly Pro Phe Ala Tyr Thr Ile Val Asn Ile Asn Gly Gln Leu
 500 510
 Pro Gln Arg Tyr Arg Ala Arg Ile Arg Tyr Ala Ser Thr Thr Asn Leu
 515 520 525
 Arg Ile Tyr Val Thr Val Ala Gly Glu Arg Ile Phe Ala Gly Gln Phe
 530 535 540
 Asn Lys Thr Met Asp Thr Gly Asp Pro Leu Thr Phe Gln Ser Phe Ser
 545 550 555 560
 Tyr Ala Thr Ile Asn Thr Ala Phe Thr Phe Pro Met Ser Gln Ser Ser
 565 570 575
 Phe Thr Val Gly Ala Asp Thr Phe Ser Ser Gly Asn Glu Val Tyr Ile
 580 585 590
 Asp Arg Phe Glu Leu Ile Pro Val Thr Ala Thr Phe Glu Ala Glu Tyr
 595 600 605
 Asp Leu Glu Arg Ala Gln Lys Ala Val Asn Ala Leu Phe Thr Ser Ile
 610 615 620
 Asn Gln Ile Gly Ile Lys Thr Asp Val Thr Asp Tyr His Ile Asp Gln
 625 630 635 640
 Val Ser Asn Leu Val Asp Cys Leu Ser Asp Glu Phe Cys Leu Asp Glu
 645 650 655
 Lys Arg Glu Leu Ser Glu Lys Val Lys His Ala Lys Arg Leu Ser Asp
 660 665 670
 Glu Arg Asn Leu Leu Gln Asp Pro Asn Phe Lys Gly Ile Asn Arg Gln
 675 680 685
 Leu Asp Arg Gly Trp Arg Gly Ser Thr Asp Ile Thr Ile Gln Arg Gly
 690 695 700
 Asp Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Pro Gly Thr Phe Asp
 705 710 715 720
 Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser Lys Leu
 725 730 735
 Lys Pro Tyr Thr Arg Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln
 740 745 750

Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Val
755 760 765

Asn Val Leu Gly Thr Gly Ser Leu Trp Pro Leu Ser Val Gln Ser Pro
770 775 780

Ile Arg Lys Cys Gly Glu Pro Asn Arg Cys Ala Pro His Leu Glu Trp
785 790 795 800

Asn Pro Asp Leu Asp Cys Ser Cys Arg Asp Gly Glu Lys Cys Ala His
805 810 815

His Ser His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu
820 825 830

Asn Glu Asp Leu Asp Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp
835 840 845

Gly His Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu
850 855 860

Val Gly Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg
865 870 875 880

Asp Lys Arg Glu Lys Leu Glu Leu Glu Thr Asn Ile Val Tyr Lys Glu
885 890 895

Ala Lys Glu Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Gln
900 905 910

Leu Gln Ala Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg
915 920 925

Val His Arg Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro
930 935 940

Gly Val Asn Val Asp Ile Phe Glu Glu Leu Lys Gly Arg Ile Phe Thr
945 950 955 960

Ala Phe Phe Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe
965 970 975

Asn Asn Gly Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu
980 985 990

Glu Gln Asn Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala
995 1000 1005

Glu Val Ser Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile
1010 1015 1020

Leu Arg Val Thr Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val

1025 1030 1035
 Thr Ile His Glu Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser
 1040 1045 1050
 Asn Cys Val Glu Glu Glu Val Tyr Pro Asn Asn Thr Val Thr Cys
 1055 1060 1065
 Asn Asp Tyr Thr Ala Asn Gln Glu Glu Tyr Gly Gly Ala Tyr Thr
 1070 1075 1080
 Ser Arg Asn Arg Gly Tyr Asp Glu Thr Tyr Gly Ser Asn Ser Ser
 1085 1090 1095
 Val Pro Ala Asp Tyr Ala Ser Val Tyr Glu Glu Lys Ser Tyr Thr
 1100 1105 1110
 Asp Gly Arg Arg Asp Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly
 1115 1120 1125
 Asp Tyr Thr Pro Leu Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu
 1130 1135 1140
 Tyr Phe Pro Glu Thr Asp Lys Val Trp Ile Glu Ile Gly Glu Thr
 1145 1150 1155
 Glu Gly Thr Phe Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu
 1160 1165 1170
 Glu

<210> 2
 <211> 789
 <212> PRT
 <213> Bacillus thuringiensis
 <400> 2

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

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

Pro Gly His Ala Leu Ile Gly Phe Glu Ile Ser Asn Asp Ser Ile Thr
 355 360 365

Val Leu Lys Val Tyr Glu Ala Lys Leu Lys Gln Asn Tyr Gln Val Asp
 370 375 380

Lys Asp Ser Leu Ser Glu Val Ile Tyr Gly Asp Met Asp Lys Leu Leu
 385 390 395 400

Cys Pro Asp Gln Ser Glu Gln Ile Tyr Tyr Thr Asn Asn Ile Val Phe
 405 410 415

Pro Asn Glu Tyr Val Ile Thr Lys Ile Asp Phe Thr Lys Lys Met Lys
 420 425 430

Thr Leu Arg Tyr Glu Val Thr Ala Asn Phe Tyr Asp Ser Ser Thr Gly
 435 440 445

Glu Ile Asp Leu Asn Lys Lys Lys Val Glu Ser Ser Glu Ala Glu Tyr
 450 455 460

Arg Thr Leu Ser Ala Asn Asp Asp Gly Val Tyr Met Pro Leu Gly Val
 465 470 475 480

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

Asp Glu Asn Ser Arg Leu Ile Thr Leu Thr Cys Lys Ser Tyr Leu Arg
 500 505 510

Glu Leu Leu Leu Ala Thr Asp Leu Ser Asn Lys Glu Thr Lys Leu Ile
 515 520 525

Val Pro Pro Ser Gly Phe Ile Ser Asn Ile Val Glu Asn Gly Ser Ile
 530 535 540

Glu Glu Asp Asn Leu Glu Pro Trp Lys Ala Asn Asn Lys Asn Ala Tyr
 545 550 555 560

Val Asp His Thr Gly Gly Val Asn Gly Thr Lys Ala Leu Tyr Val His
 565 570 575

Lys Asp Gly Gly Ile Ser Gln Phe Ile Gly Asp Lys Leu Lys Pro Lys
 580 585 590

Thr Glu Tyr Val Ile Gln Tyr Thr Val Lys Gly Lys Pro Ser Ile His
 595 600 605

Leu Lys Asp Glu Asn Thr Gly Tyr Ile His Tyr Glu Asp Thr Asn Asn
 610 615 620

Asn Leu Glu Asp Tyr Gln Thr Ile Asn Lys Arg Phe Thr Thr Gly Thr

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

<210> 3
 <211> 788
 <212> PRT
 <213> Bacillus thuringiensis

<400> 3

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

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

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

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

Leu Asn Thr Glu Leu Ser Lys Glu Ile Leu Lys Ile Ala Asn Glu Gln
85 90 95

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

Met Leu Arg Val Tyr Leu Pro Lys Ile Thr Ser Met Leu Ser Asp Val
115 120 125

Met Lys Gln Asn Tyr Ala Leu Ser Leu Gln Ile Glu Tyr Leu Ser Lys
130 135 140

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

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

Lys Tyr Val Asn Glu Lys Phe Glu Glu Leu Thr Phe Ala Thr Glu Thr
180 185 190

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

Leu Thr Glu Leu Thr Glu Leu Ala Lys Ser Val Thr Lys Asn Asp Val
210 215 220

Asp Gly Phe Glu Phe Tyr Leu Asn Thr Phe His Asp Val Met Val Gly
225 230 235 240

Asn Asn Leu Phe Gly Arg Ser Ala Leu Lys Thr Ala Ser Glu Leu Ile
245 250 255

Thr Lys Glu Asn Val Lys Thr Ser Gly Ser Glu Val Gly Asn Val Tyr
260 265 270

Asn Phe Leu Ile Val Leu Thr Ala Leu Gln Ala Gln Ala Phe Leu Thr
275 280 285

Leu Thr Thr Cys Arg Lys Leu Leu Gly Leu Ala Asp Ile Asp Tyr Thr
290 295 300

Ser Ile Met Asn Glu His Leu Asn Lys Glu Lys Glu Glu Phe Arg Val
305 310 315 320

Asn Ile Leu Pro Thr Leu Ser Asn Thr Phe Ser Asn Pro Asn Tyr Ala
325 330 335

Lys Val Lys Gly Ser Asp Glu Asp Ala Lys Met Ile Val Glu Ala Lys

| | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
| 340 | | | | | | | | | | 345 | | | | | 350 | | | | |
| Pro | Gly | His | Ala | Leu | Ile | Gly | Phe | Glu | Ile | Ser | Asn | Asp | Ser | Ile | Thr | | | | |
| | | 355 | | | | | 360 | | | | | 365 | | | | | | | |
| Val | Leu | Lys | Val | Tyr | Glu | Ala | Lys | Leu | Lys | Gln | Asn | Tyr | Gln | Val | Asp | | | | |
| | 370 | | | | | 375 | | | | | 380 | | | | | | | | |
| Lys | Asp | Ser | Leu | Ser | Glu | Val | Ile | Tyr | Gly | Asp | Met | Asp | Lys | Leu | Leu | | | | |
| 385 | | | | | 390 | | | | | 395 | | | | | 400 | | | | |
| Cys | Pro | Asp | Gln | Ser | Glu | Gln | Ile | Tyr | Tyr | Thr | Asn | Asn | Ile | Val | Phe | | | | |
| | | | | 405 | | | | | 410 | | | | | 415 | | | | | |
| Pro | Asn | Glu | Tyr | Val | Ile | Thr | Lys | Ile | Asp | Phe | Thr | Lys | Lys | Met | Lys | | | | |
| | | | 420 | | | | | 425 | | | | | 430 | | | | | | |
| Thr | Leu | Arg | Tyr | Glu | Val | Thr | Ala | Asn | Phe | Tyr | Asp | Ser | Ser | Thr | Gly | | | | |
| | | 435 | | | | | 440 | | | | | 445 | | | | | | | |
| Glu | Ile | Asp | Leu | Asn | Lys | Lys | Lys | Val | Glu | Ser | Ser | Glu | Ala | Glu | Tyr | | | | |
| | 450 | | | | | 455 | | | | | 460 | | | | | | | | |
| Arg | Thr | Leu | Ser | Ala | Asn | Asp | Asp | Gly | Val | Tyr | Met | Pro | Leu | Gly | Val | | | | |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 | | | | |
| Ile | Ser | Glu | Thr | Phe | Leu | Thr | Pro | Ile | Asn | Gly | Phe | Gly | Leu | Gln | Ala | | | | |
| | | | | 485 | | | | | 490 | | | | | 495 | | | | | |
| Asp | Glu | Asn | Ser | Arg | Leu | Ile | Thr | Leu | Thr | Cys | Lys | Ser | Tyr | Leu | Arg | | | | |
| | | | 500 | | | | | 505 | | | | | 510 | | | | | | |
| Glu | Leu | Leu | Leu | Ala | Thr | Asp | Leu | Ser | Asn | Lys | Glu | Thr | Lys | Leu | Ile | | | | |
| | | 515 | | | | | 520 | | | | | 525 | | | | | | | |
| Val | Pro | Pro | Ser | Gly | Phe | Ile | Ser | Asn | Ile | Val | Glu | Asn | Gly | Ser | Ile | | | | |
| | 530 | | | | | 535 | | | | | 540 | | | | | | | | |
| Glu | Glu | Asp | Asn | Leu | Glu | Pro | Trp | Lys | Ala | Asn | Asn | Lys | Asn | Ala | Tyr | | | | |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 | | | | |
| Val | Asp | His | Thr | Gly | Gly | Val | Asn | Gly | Thr | Lys | Ala | Leu | Tyr | Val | His | | | | |
| | | | | 565 | | | | | 570 | | | | | 575 | | | | | |
| Lys | Asp | Gly | Gly | Ile | Ser | Gln | Phe | Ile | Gly | Asp | Lys | Leu | Lys | Pro | Lys | | | | |
| | | | 580 | | | | | 585 | | | | | 590 | | | | | | |
| Thr | Glu | Tyr | Val | Ile | Gln | Tyr | Thr | Val | Lys | Gly | Lys | Pro | Ser | Ile | His | | | | |
| | | 595 | | | | | 600 | | | | | 605 | | | | | | | |
| Leu | Lys | Asp | Glu | Asn | Thr | Gly | Tyr | Ile | His | Tyr | Glu | Asp | Thr | Asn | Asn | | | | |
| | 610 | | | | | 615 | | | | | 620 | | | | | | | | |

Asn Leu Glu Asp Tyr Gln Thr Ile Asn Lys Arg Phe Thr Thr Gly Thr
625 630 635 640

Asp Leu Lys Gly Val Tyr Leu Ile Leu Lys Ser Gln Asn Gly Asp Glu
645 650 655

Ala Trp Gly Asp Asn Phe Ile Ile Leu Glu Ile Ser Pro Ser Glu Lys
660 665 670

Leu Leu Ser Pro Glu Leu Ile Asn Thr Asn Asn Trp Thr Ser Thr Gly
675 680 685

Ser Thr Asn Ile Ser Gly Asn Thr Leu Thr Leu Tyr Gln Gly Gly Arg
690 695 700

Gly Ile Leu Lys Gln Asn Leu Gln Leu Asp Ser Phe Ser Thr Tyr Arg
705 710 715 720

Val Tyr Phe Ser Val Ser Gly Asp Ala Asn Val Arg Ile Arg Asn Ser
725 730 735

Arg Glu Val Leu Phe Glu Lys Arg Tyr Met Ser Gly Ala Lys Asp Val
740 745 750

Ser Glu Met Phe Thr Thr Lys Phe Glu Lys Asp Asn Phe Tyr Ile Glu
755 760 765

Leu Ser Gln Gly Asn Asn Leu Tyr Gly Gly Pro Ile Val His Phe Tyr
770 775 780

Asp Val Ser Ile Lys
785

<210> 5
<211> 789
<212> PRT
<213> Artificial

<220>
<223> designed sequence

<400> 5

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

Ile Asp Tyr Phe Asn Gly Ile Tyr Gly Phe Ala Thr Gly Ile Lys Asp
20 25 30

Ile Met Asn Met Ile Phe Lys Thr Asp Thr Gly Gly Asp Leu Thr Leu
35 40 45

Asp Glu Ile Leu Lys Asn Gln Gln Leu Leu Asn Asp Ile Ser Gly Lys

50

55

60

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

Leu Asn Thr Glu Leu Ser Lys Glu Ile Leu Lys Ile Ala Asn Glu Gln
85 90 95

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

Met Leu Arg Val Tyr Leu Pro Lys Ile Thr Ser Met Leu Ser Asp Val
115 120 125

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

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

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

Lys Tyr Val Asn Glu Lys Phe Glu Glu Leu Thr Phe Ala Thr Glu Thr
180 185 190

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

Leu Thr Glu Leu Thr Glu Leu Ala Lys Ser Val Thr Lys Asn Asp Val
210 215 220

Asp Gly Phe Glu Phe Tyr Leu Asn Thr Phe His Asp Val Met Val Gly
225 230 235 240

Asn Asn Leu Phe Gly Arg Ser Ala Leu Lys Thr Ala Ser Glu Leu Ile
245 250 255

Thr Lys Glu Asn Val Lys Thr Ser Gly Ser Glu Val Gly Asn Val Tyr
260 265 270

Asn Phe Leu Ile Val Leu Thr Ala Leu Gln Ala Gln Ala Phe Leu Thr
275 280 285

Leu Thr Thr Cys Arg Lys Leu Leu Gly Leu Ala Asp Ile Asp Tyr Thr
290 295 300

Ser Ile Met Asn Glu His Leu Asn Lys Glu Lys Glu Glu Phe Arg Val
305 310 315 320

Asn Ile Leu Pro Thr Leu Ser Asn Thr Phe Ser Asn Pro Asn Tyr Ala
325 330 335

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

Leu Lys Asp Glu Asn Thr Gly Tyr Ile His Tyr Glu Asp Thr Asn Asn
610 615 620

Asn Leu Glu Asp Tyr Gln Thr Ile Asn Lys Arg Phe Thr Thr Gly Thr
625 630 635 640

Asp Leu Lys Gly Val Tyr Leu Ile Leu Lys Ser Gln Asn Gly Asp Glu
645 650 655

Ala Trp Gly Asp Asn Phe Ile Ile Leu Glu Ile Ser Pro Ser Glu Lys
660 665 670

Leu Leu Ser Pro Glu Leu Ile Asn Thr Asn Asn Trp Thr Ser Thr Gly
675 680 685

Ser Thr Asn Ile Ser Gly Asn Thr Leu Thr Leu Tyr Gln Gly Gly Arg
690 695 700

Gly Ile Leu Lys Gln Asn Leu Gln Leu Asp Ser Phe Ser Thr Tyr Arg
705 710 715 720

Val Tyr Phe Ser Val Ser Gly Asp Ala Asn Val Arg Ile Arg Asn Ser
725 730 735

Arg Glu Val Leu Phe Glu Lys Arg Tyr Met Ser Gly Ala Lys Asp Val
740 745 750

Ser Glu Met Phe Thr Thr Lys Phe Glu Lys Asp Asn Phe Tyr Ile Glu
755 760 765

Leu Ser Gln Gly Asn Asn Leu Tyr Gly Gly Pro Ile Val His Phe Tyr
770 775 780

Asp Val Ser Ile Lys
785

<210> 6
<211> 1178
<212> PRT
<213> Bacillus thuringiensis

<400> 6

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

Ser Asn Pro Glu Val Glu Val Leu Gly Gly Glu Arg Ile Glu Thr Gly
20 25 30

Tyr Thr Pro Ile Asp Ile Ser Leu Ser Leu Thr Gln Phe Leu Leu Ser
35 40 45

Glu Phe Val Pro Gly Ala Gly Phe Val Leu Gly Leu Val Asp Ile Ile

50

55

60

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

Glu Gln Leu Ile Asn Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
85 90 95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Gln Ile Tyr Ala Glu
100 105 110

Ser Phe Arg Glu Trp Glu Ala Asp Pro Thr Asn Pro Ala Leu Arg Glu
115 120 125

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

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

Tyr Val Gln Ala Ala Asn Leu His Leu Ser Val Leu Arg Asp Val Ser
165 170 175

Val Phe Gly Gln Arg Trp Gly Phe Asp Ala Ala Thr Ile Asn Ser Arg
180 185 190

Tyr Asn Asp Leu Thr Arg Leu Ile Gly Asn Tyr Thr Asp Tyr Ala Val
195 200 205

Arg Trp Tyr Asn Thr Gly Leu Glu Arg Val Trp Gly Pro Asp Ser Arg
210 215 220

Asp Trp Val Arg Tyr Asn Gln Phe Arg Arg Glu Leu Thr Leu Thr Val
225 230 235 240

Leu Asp Ile Val Ala Leu Phe Pro Asn Tyr Asp Ser Arg Arg Tyr Pro
245 250 255

Ile Arg Thr Val Ser Gln Leu Thr Arg Glu Ile Tyr Thr Asn Pro Val
260 265 270

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

Arg Ser Ile Arg Ser Pro His Leu Met Asp Ile Leu Asn Ser Ile Thr
290 295 300

Ile Tyr Thr Asp Ala His Arg Gly Tyr Tyr Tyr Trp Ser Gly His Gln
305 310 315 320

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

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

Thr Ala Thr Leu Glu Ala Glu Tyr Asn Leu Glu Arg Ala Gln Lys Ala
 610 615 620
 Val Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asn
 625 630 635 640
 Val Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Thr Tyr Leu
 645 650 655
 Ser Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val
 660 665 670
 Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Ser
 675 680 685
 Asn Phe Lys Asp Ile Asn Arg Gln Pro Glu Arg Gly Trp Gly Gly Ser
 690 695 700
 Thr Gly Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
 705 710 715 720
 Val Thr Leu Ser Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
 725 730 735
 Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Phe Thr Arg Tyr Gln Leu
 740 745 750
 Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
 755 760 765
 Tyr Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu
 770 775 780
 Trp Pro Leu Ser Ala Gln Ser Pro Ile Gly Lys Cys Gly Glu Pro Asn
 785 790 795 800
 Arg Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys
 805 810 815
 Arg Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp
 820 825 830
 Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val
 835 840 845
 Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu
 850 855 860
 Glu Phe Leu Glu Glu Lys Pro Leu Val Gly Glu Ala Leu Ala Arg Val
 865 870 875 880

Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Glu Trp
 885 890 895
 Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu
 900 905 910
 Phe Val Asn Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr Asn Ile Ala
 915 920 925
 Met Ile His Ala Ala Asp Lys Arg Val His Ser Ile Arg Glu Ala Tyr
 930 935 940
 Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu
 945 950 955 960
 Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg
 965 970 975
 Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Ser Cys Trp Asn
 980 985 990
 Val Lys Gly His Val Asp Val Glu Glu Gln Asn Asn Gln Arg Ser Val
 995 1000 1005
 Leu Val Val Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg
 1010 1015 1020
 Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys
 1025 1030 1035
 Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn
 1040 1045 1050
 Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu Glu Ile
 1055 1060 1065
 Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr Val Asn Gln
 1070 1075 1080
 Glu Glu Tyr Gly Gly Ala Tyr Thr Ser Arg Asn Arg Gly Tyr Asn
 1085 1090 1095
 Glu Ala Pro Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr Glu Glu
 1100 1105 1110
 Lys Ser Tyr Thr Asp Gly Arg Arg Glu Asn Pro Cys Glu Phe Asn
 1115 1120 1125
 Arg Gly Tyr Arg Asp Tyr Thr Pro Leu Pro Val Gly Tyr Val Thr
 1130 1135 1140
 Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp Ile Glu

1145

1150

1155

Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser Val Glu Leu
 1160 1165 1170

Leu Leu Met Glu Glu
 1175

<210> 7
 <211> 1177
 <212> PRT
 <213> Artificial

<220>
 <223> designed sequence

<400> 7

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

Ser Asn Pro Glu Val Glu Val Leu Gly Gly Glu Arg Ile Glu Thr Gly
 20 25 30

Tyr Thr Pro Ile Asp Ile Ser Leu Ser Leu Thr Gln Phe Leu Leu Ser
 35 40 45

Glu Phe Val Pro Gly Ala Gly Phe Val Leu Gly Leu Val Asp Ile Ile
 50 55 60

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

Glu Gln Leu Ile Asn Gln Arg Ile Glu Glu Phe Ala Arg Asn Gln Ala
 85 90 95

Ile Ser Arg Leu Glu Gly Leu Ser Asn Leu Tyr Gln Ile Tyr Ala Glu
 100 105 110

Ser Phe Arg Glu Trp Glu Ala Asp Pro Thr Asn Pro Ala Leu Arg Glu
 115 120 125

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

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

Tyr Val Gln Ala Ala Asn Leu His Leu Ser Val Leu Arg Asp Val Ser
 165 170 175

Val Phe Gly Gln Arg Trp Gly Phe Asp Ala Ala Thr Ile Asn Ser Arg
 180 185 190

Tyr Asn Asp Leu Thr Arg Leu Ile Gly Asn Tyr Thr Asp His Ala Val
195 200 205

Arg Trp Tyr Asn Thr Gly Leu Glu Arg Val Trp Gly Pro Asp Ser Arg
210 215 220

Asp Trp Ile Arg Tyr Asn Gln Phe Arg Arg Glu Leu Thr Leu Thr Val
225 230 235 240

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

Ile Arg Thr Val Ser Gln Leu Thr Arg Glu Ile Tyr Thr Asn Pro Val
260 265 270

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

Gly Ser Ile Arg Ser Pro His Leu Met Asp Ile Leu Asn Ser Ile Thr
290 295 300

Ile Tyr Thr Asp Ala His Arg Gly Glu Tyr Tyr Trp Ser Gly His Gln
305 310 315 320

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

Leu Tyr Gly Thr Met Gly Asn Ala Ala Pro Gln Gln Arg Ile Val Ala
340 345 350

Gln Leu Gly Gln Gly Val Tyr Arg Thr Leu Ser Ser Thr Leu Tyr Arg
355 360 365

Arg Pro Phe Asn Ile Gly Ile Asn Asn Gln Gln Leu Ser Val Leu Asp
370 375 380

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

Tyr Arg Lys Ser Gly Thr Val Asp Ser Leu Asp Glu Ile Pro Pro Gln
405 410 415

Asn Asn Asn Val Pro Pro Arg Gln Gly Phe Ser His Arg Leu Ser His
420 425 430

Val Ser Met Phe Arg Ser Gly Phe Ser Asn Ser Ser Val Ser Ile Ile
435 440 445

Arg Ala Pro Met Phe Ser Trp Ile His Arg Ser Ala Glu Phe Asn Asn
450 455 460

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

465 470 475 480
 Thr Leu Gln Ser Gly Thr Thr Val Val Arg Gly Pro Gly Phe Thr Gly
 485 490 495
 Gly Asp Ile Leu Arg Arg Thr Ser Gly Gly Pro Phe Ala Tyr Thr Ile
 500 505 510
 Val Asn Ile Asn Gly Gln Leu Pro Gln Arg Tyr Arg Ala Arg Ile Arg
 515 520 525
 Tyr Ala Ser Thr Thr Asn Leu Arg Ile Tyr Val Thr Val Ala Gly Glu
 530 535 540
 Arg Ile Phe Ala Gly Gln Phe Asn Lys Thr Met Asp Thr Gly Asp Pro
 545 550 555 560
 Leu Thr Phe Gln Ser Phe Ser Tyr Ala Thr Ile Asn Thr Ala Phe Thr
 565 570 575
 Phe Pro Met Ser Gln Ser Ser Phe Thr Val Gly Ala Asp Thr Phe Ser
 580 585 590
 Ser Gly Asn Glu Val Tyr Ile Asp Arg Phe Glu Leu Ile Pro Val Thr
 595 600 605
 Ala Thr Leu Glu Ala Glu Tyr Asn Leu Glu Arg Ala Gln Lys Ala Val
 610 615 620
 Asn Ala Leu Phe Thr Ser Thr Asn Gln Leu Gly Leu Lys Thr Asn Val
 625 630 635 640
 Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Thr Tyr Leu Ser
 645 650 655
 Asp Glu Phe Cys Leu Asp Glu Lys Arg Glu Leu Ser Glu Lys Val Lys
 660 665 670
 His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Ser Asn
 675 680 685
 Phe Lys Asp Ile Asn Arg Gln Pro Glu Arg Gly Trp Gly Gly Ser Thr
 690 695 700
 Gly Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
 705 710 715 720
 Thr Leu Ser Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
 725 730 735
 Lys Ile Asp Glu Ser Lys Leu Lys Ala Phe Thr Arg Tyr Gln Leu Arg
 740 745 750

Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Ser Ile Arg Tyr
 755 760 765

Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
 770 775 780

Pro Leu Ser Ala Gln Ser Pro Ile Gly Lys Cys Gly Glu Pro Asn Arg
 785 790 795 800

Cys Ala Pro His Leu Glu Trp Asn Pro Asp Leu Asp Cys Ser Cys Arg
 805 810 815

Asp Gly Glu Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile
 820 825 830

Asp Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile
 835 840 845

Phe Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu
 850 855 860

Phe Leu Glu Glu Lys Pro Leu Val Gly Glu Ala Leu Ala Arg Val Lys
 865 870 875 880

Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Glu Trp Glu
 885 890 895

Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe
 900 905 910

Val Asn Ser Gln Tyr Asp Gln Leu Gln Ala Asp Thr Asn Ile Ala Met
 915 920 925

Ile His Ala Ala Asp Lys Arg Val His Ser Ile Arg Glu Ala Tyr Leu
 930 935 940

Pro Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu
 945 950 955 960

Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn
 965 970 975

Val Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Ser Cys Trp Asn Val
 980 985 990

Lys Gly His Val Asp Val Glu Glu Gln Asn Asn Gln Arg Ser Val Leu
 995 1000 1005

Val Val Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val
 1010 1015 1020

Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu
1025 1030 1035

Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn
1040 1045 1050

Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu Glu Glu Ile Tyr
1055 1060 1065

Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr Val Asn Gln Glu
1070 1075 1080

Glu Tyr Gly Gly Ala Tyr Thr Ser Arg Asn Arg Gly Tyr Asn Glu
1085 1090 1095

Ala Pro Ser Val Pro Ala Asp Tyr Ala Ser Val Tyr Glu Glu Lys
1100 1105 1110

Ser Tyr Thr Asp Gly Arg Arg Glu Asn Pro Cys Glu Phe Asn Arg
1115 1120 1125

Gly Tyr Arg Asp Tyr Thr Pro Leu Pro Val Gly Tyr Val Thr Lys
1130 1135 1140

Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp Ile Glu Ile
1145 1150 1155

Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser Val Glu Leu Leu
1160 1165 1170

Leu Met Glu Glu
1175

<210> 8
<211> 1155
<212> PRT
<213> Bacillus thuringiensis
<400> 8

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

Ser Asn Pro Glu Val Glu Val Leu Gly Gly Glu Arg Ile Glu Thr Gly
20 25 30

Tyr Thr Pro Ile Asp Ile Ser Leu Ser Leu Thr Gln Phe Leu Leu Ser
35 40 45

Glu Phe Val Pro Gly Ala Gly Phe Val Leu Gly Leu Val Asp Ile Ile
50 55 60

Trp Gly Ile Phe Gly Pro Ser Gln Trp Asp Ala Phe Leu Val Gln Ile
Page 26

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

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

Asn Glu Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp Val
 625 630 635 640
 Thr Asp Tyr His Ile Asp Gln Val Ser Asn Leu Val Glu Cys Leu Ser
 645 650 655
 Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val Lys
 660 665 670
 His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro Asn
 675 680 685
 Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser Thr
 690 695 700
 Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr Val
 705 710 715 720
 Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln
 725 730 735
 Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu Arg
 740 745 750
 Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg Tyr
 755 760 765
 Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu Trp
 770 775 780
 Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser His
 785 790 795 800
 His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu Asp
 805 810 815
 Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His Ala
 820 825 830
 Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly Glu
 835 840 845
 Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys Arg
 850 855 860
 Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys Glu
 865 870 875 880
 Ser Val Asp Ala Leu Phe Val Asn Ser Gln Tyr Asp Arg Leu Gln Ala
 885 890 895

Asp Thr Asn Ile Ala Met Ile His Ala Ala Asp Lys Arg Val His Ser
900 905 910

Ile Arg Glu Ala Tyr Leu Pro Glu Leu Ser Val Ile Pro Gly Val Asn
915 920 925

Ala Ala Ile Phe Glu Glu Leu Glu Gly Arg Ile Phe Thr Ala Phe Ser
930 935 940

Leu Tyr Asp Ala Arg Asn Val Ile Lys Asn Gly Asp Phe Asn Asn Gly
945 950 955 960

Leu Ser Cys Trp Asn Val Lys Gly His Val Asp Val Glu Glu Gln Asn
965 970 975

Asn His Arg Ser Val Leu Val Val Pro Glu Trp Glu Ala Glu Val Ser
980 985 990

Gln Glu Val Arg Val Cys Pro Gly Arg Gly Tyr Ile Leu Arg Val Thr
995 1000 1005

Ala Tyr Lys Glu Gly Tyr Gly Glu Gly Cys Val Thr Ile His Glu
1010 1015 1020

Ile Glu Asn Asn Thr Asp Glu Leu Lys Phe Ser Asn Cys Val Glu
1025 1030 1035

Glu Glu Val Tyr Pro Asn Asn Thr Val Thr Cys Asn Asp Tyr Thr
1040 1045 1050

Ala Thr Gln Glu Glu Tyr Glu Gly Thr Tyr Thr Ser Arg Asn Arg
1055 1060 1065

Gly Tyr Asp Gly Ala Tyr Glu Ser Asn Ser Ser Val Pro Ala Asp
1070 1075 1080

Tyr Ala Ser Ala Tyr Glu Glu Lys Ala Tyr Thr Asp Gly Arg Arg
1085 1090 1095

Asp Asn Pro Cys Glu Ser Asn Arg Gly Tyr Gly Asp Tyr Thr Pro
1100 1105 1110

Leu Pro Ala Gly Tyr Val Thr Lys Glu Leu Glu Tyr Phe Pro Glu
1115 1120 1125

Thr Asp Lys Val Trp Ile Glu Ile Gly Glu Thr Glu Gly Thr Phe
1130 1135 1140

Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1145 1150 1155

<210> 9

<211> 605
<212> PRT
<213> Artificial

<220>
<223> designed sequence

<400> 9

Met Glu Asn Asn Ile Gln Asn Gln Cys Val Pro Tyr Asn Cys Leu Asn
1 5 10 15

Asn Pro Glu Val Glu Ile Leu Asn Glu Glu Arg Ser Thr Gly Arg Leu
20 25 30

Pro Leu Asp Ile Ser Leu Ser Leu Thr Arg Phe Leu Leu Ser Glu Phe
35 40 45

Val Pro Gly Val Gly Val Ala Phe Gly Leu Phe Asp Leu Ile Trp Gly
50 55 60

Phe Ile Thr Pro Ser Asp Trp Ser Leu Phe Leu Leu Gln Ile Glu Gln
65 70 75 80

Leu Ile Glu Gln Arg Ile Glu Thr Leu Glu Arg Asn Arg Ala Ile Thr
85 90 95

Thr Leu Arg Gly Leu Ala Asp Ser Tyr Glu Ile Tyr Ile Glu Ala Leu
100 105 110

Arg Glu Trp Glu Ala Asn Pro Asn Asn Ala Gln Leu Arg Glu Asp Val
115 120 125

Arg Ile Arg Phe Ala Asn Thr Asp Asp Ala Leu Ile Thr Ala Ile Asn
130 135 140

Asn Phe Thr Leu Thr Ser Phe Glu Ile Pro Leu Leu Ser Val Tyr Val
145 150 155 160

Gln Ala Ala Asn Leu His Leu Ser Leu Leu Arg Asp Ala Val Ser Phe
165 170 175

Gly Gln Gly Trp Gly Leu Asp Ile Ala Thr Val Asn Asn His Tyr Asn
180 185 190

Arg Leu Ile Asn Leu Ile His Arg Tyr Thr Lys His Cys Leu Asp Thr
195 200 205

Tyr Asn Gln Gly Leu Glu Asn Leu Arg Gly Thr Asn Thr Arg Gln Trp
210 215 220

Ala Arg Phe Asn Gln Phe Arg Arg Asp Leu Thr Leu Thr Val Leu Asp
225 230 235 240

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

515 520 525
 Arg Ile Tyr Val Thr Val Ala Gly Glu Arg Ile Phe Ala Gly Gln Phe
 530 535 540
 Asn Lys Thr Met Asp Thr Gly Asp Pro Leu Thr Phe Gln Ser Phe Ser
 545 550 555 560
 Tyr Ala Thr Ile Asn Thr Ala Phe Thr Phe Pro Met Ser Gln Ser Ser
 565 570 575
 Phe Thr Val Gly Ala Asp Thr Phe Ser Ser Gly Asn Glu Val Tyr Ile
 580 585 590
 Asp Arg Phe Glu Leu Ile Pro Val Thr Ala Thr Leu Glu
 595 600 605

 <210> 10
 <211> 1148
 <212> PRT
 <213> artificial

 <220>
 <223> designed sequence

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

Asn Phe Thr Leu Thr Ser Phe Glu Ile Pro Leu Leu Ser Val Tyr Val
145 150 155 160

Gln Ala Ala Asn Leu His Leu Ser Leu Leu Arg Asp Ala Val Ser Phe
165 170 175

Gly Gln Gly Trp Gly Leu Asp Ile Ala Thr Val Asn Asn His Tyr Asn
180 185 190

Arg Leu Ile Asn Leu Ile His Arg Tyr Thr Lys His Cys Leu Asp Thr
195 200 205

Tyr Asn Gln Gly Leu Glu Asn Leu Arg Gly Thr Asn Thr Arg Gln Trp
210 215 220

Ala Arg Phe Asn Gln Phe Arg Arg Asp Leu Thr Leu Thr Val Leu Asp
225 230 235 240

Ile Val Ala Leu Phe Pro Asn Tyr Asp Val Arg Thr Tyr Pro Ile Gln
245 250 255

Thr Ser Ser Gln Leu Thr Arg Glu Ile Tyr Thr Ser Ser Val Ile Glu
260 265 270

Asp Ser Pro Val Ser Ala Asn Ile Pro Asn Gly Phe Asn Arg Ala Glu
275 280 285

Phe Gly Val Arg Pro Pro His Leu Met Asp Phe Met Asn Ser Leu Phe
290 295 300

Val Thr Ala Glu Thr Val Arg Ser Gln Thr Val Trp Gly Gly His Leu
305 310 315 320

Val Ser Ser Arg Asn Thr Ala Gly Asn Arg Ile Asn Phe Pro Ser Tyr
325 330 335

Gly Val Phe Asn Pro Gly Gly Ala Ile Trp Ile Ala Asp Glu Asp Pro
340 345 350

Arg Pro Phe Tyr Arg Thr Leu Ser Asp Pro Val Phe Val Arg Gly Gly
355 360 365

Phe Gly Asn Pro His Tyr Val Leu Gly Leu Arg Gly Val Ala Phe Gln
370 375 380

Gln Thr Gly Thr Asn His Thr Arg Thr Phe Arg Asn Ser Gly Thr Ile
385 390 395 400

Asp Ser Leu Asp Glu Ile Pro Pro Gln Asp Asn Ser Gly Ala Pro Trp
405 410 415

Asn Asp Tyr Ser His Val Leu Asn His Val Thr Phe Val Arg Trp Pro

| 420 | | | | | | | | | | 425 | | | | | | | | | | 430 | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|-----|--|--|--|--|--|--|--|--|--|--|
| Gly | Glu | Ile | Ser | Gly | Ser | Asp | Ser | Trp | Arg | Ala | Pro | Met | Phe | Ser | Trp | | | | | | | | | | | | | | | |
| | | 435 | | | | | 440 | | | | | 445 | | | | | | | | | | | | | | | | | | |
| Thr | His | Arg | Ser | Ala | Thr | Pro | Thr | Asn | Thr | Ile | Asp | Pro | Glu | Arg | Ile | | | | | | | | | | | | | | | |
| | 450 | | | | | 455 | | | | | 460 | | | | | | | | | | | | | | | | | | | |
| Thr | Gln | Ile | Pro | Leu | Val | Lys | Ala | His | Thr | Leu | Gln | Ser | Gly | Thr | Thr | | | | | | | | | | | | | | | |
| 465 | | | | | 470 | | | | | 475 | | | | | 480 | | | | | | | | | | | | | | | |
| Val | Val | Arg | Gly | Pro | Gly | Phe | Thr | Gly | Gly | Asp | Ile | Leu | Arg | Arg | Thr | | | | | | | | | | | | | | | |
| | | | | 485 | | | | | 490 | | | | | 495 | | | | | | | | | | | | | | | | |
| Ser | Gly | Gly | Pro | Phe | Ala | Tyr | Thr | Ile | Val | Asn | Ile | Asn | Gly | Gln | Leu | | | | | | | | | | | | | | | |
| | | | 500 | | | | | 505 | | | | | 510 | | | | | | | | | | | | | | | | | |
| Pro | Gln | Arg | Tyr | Arg | Ala | Arg | Ile | Arg | Tyr | Ala | Ser | Thr | Thr | Asn | Leu | | | | | | | | | | | | | | | |
| | | 515 | | | | | 520 | | | | | 525 | | | | | | | | | | | | | | | | | | |
| Arg | Ile | Tyr | Val | Thr | Val | Ala | Gly | Glu | Arg | Ile | Phe | Ala | Gly | Gln | Phe | | | | | | | | | | | | | | | |
| | 530 | | | | | 535 | | | | | 540 | | | | | | | | | | | | | | | | | | | |
| Asn | Lys | Thr | Met | Asp | Thr | Gly | Asp | Pro | Leu | Thr | Phe | Gln | Ser | Phe | Ser | | | | | | | | | | | | | | | |
| 545 | | | | | 550 | | | | | 555 | | | | | 560 | | | | | | | | | | | | | | | |
| Tyr | Ala | Thr | Ile | Asn | Thr | Ala | Phe | Thr | Phe | Pro | Met | Ser | Gln | Ser | Ser | | | | | | | | | | | | | | | |
| | | | | 565 | | | | | 570 | | | | | 575 | | | | | | | | | | | | | | | | |
| Phe | Thr | Val | Gly | Ala | Asp | Thr | Phe | Ser | Ser | Gly | Asn | Glu | Val | Tyr | Ile | | | | | | | | | | | | | | | |
| | | | 580 | | | | | 585 | | | | | 590 | | | | | | | | | | | | | | | | | |
| Asp | Arg | Phe | Glu | Leu | Ile | Pro | Val | Thr | Ala | Thr | Leu | Glu | Ala | Glu | Ser | | | | | | | | | | | | | | | |
| | | 595 | | | | | 600 | | | | | 605 | | | | | | | | | | | | | | | | | | |
| Asp | Leu | Glu | Arg | Ala | Gln | Lys | Ala | Val | Asn | Ala | Leu | Phe | Thr | Ser | Ser | | | | | | | | | | | | | | | |
| | 610 | | | | | 615 | | | | | 620 | | | | | | | | | | | | | | | | | | | |
| Asn | Gln | Ile | Gly | Leu | Lys | Thr | Asp | Val | Thr | Asp | Tyr | His | Ile | Asp | Arg | | | | | | | | | | | | | | | |
| 625 | | | | | 630 | | | | | 635 | | | | | 640 | | | | | | | | | | | | | | | |
| Val | Ser | Asn | Leu | Val | Glu | Cys | Leu | Ser | Asp | Glu | Phe | Cys | Leu | Asp | Glu | | | | | | | | | | | | | | | |
| | | | | 645 | | | | | 650 | | | | | 655 | | | | | | | | | | | | | | | | |
| Lys | Lys | Glu | Leu | Ser | Glu | Lys | Val | Lys | His | Ala | Lys | Arg | Leu | Ser | Asp | | | | | | | | | | | | | | | |
| | | | 660 | | | | | 665 | | | | | 670 | | | | | | | | | | | | | | | | | |
| Glu | Arg | Asn | Leu | Leu | Gln | Asp | Pro | Asn | Phe | Arg | Gly | Ile | Asn | Arg | Gln | | | | | | | | | | | | | | | |
| | | 675 | | | | | 680 | | | | | 685 | | | | | | | | | | | | | | | | | | |
| Leu | Asp | Arg | Gly | Trp | Arg | Gly | Ser | Thr | Asp | Ile | Thr | Ile | Gln | Gly | Gly | | | | | | | | | | | | | | | |
| | 690 | | | | | 695 | | | | | 700 | | | | | | | | | | | | | | | | | | | |

Asp Asp Val Phe Lys Glu Asn Tyr Val Thr Leu Leu Gly Thr Phe Asp
 705 710 715 720
 Glu Cys Tyr Pro Thr Tyr Leu Tyr Gln Lys Ile Asp Glu Ser Lys Leu
 725 730 735
 Lys Ala Tyr Thr Arg Tyr Gln Leu Arg Gly Tyr Ile Glu Asp Ser Gln
 740 745 750
 Asp Leu Glu Ile Tyr Leu Ile Arg Tyr Asn Ala Lys His Glu Thr Val
 755 760 765
 Asn Val Pro Gly Thr Gly Ser Leu Trp Pro Leu Ser Ala Pro Ser Pro
 770 775 780
 Ile Gly Lys Cys Ala His His Ser His His Phe Ser Leu Asp Ile Asp
 785 790 795 800
 Val Gly Cys Thr Asp Leu Asn Glu Asp Leu Gly Val Trp Val Ile Phe
 805 810 815
 Lys Ile Lys Thr Gln Asp Gly His Ala Arg Leu Gly Asn Leu Glu Phe
 820 825 830
 Leu Glu Glu Lys Pro Leu Val Gly Glu Ala Leu Ala Arg Val Lys Arg
 835 840 845
 Ala Glu Lys Lys Trp Arg Asp Lys Arg Glu Lys Leu Glu Trp Glu Thr
 850 855 860
 Asn Ile Val Tyr Lys Glu Ala Lys Glu Ser Val Asp Ala Leu Phe Val
 865 870 875 880
 Asn Ser Gln Tyr Asp Arg Leu Gln Ala Asp Thr Asn Ile Ala Met Ile
 885 890 895
 His Ala Ala Asp Lys Arg Val His Ser Ile Arg Glu Ala Tyr Leu Pro
 900 905 910
 Glu Leu Ser Val Ile Pro Gly Val Asn Ala Ala Ile Phe Glu Glu Leu
 915 920 925
 Glu Gly Arg Ile Phe Thr Ala Phe Ser Leu Tyr Asp Ala Arg Asn Val
 930 935 940
 Ile Lys Asn Gly Asp Phe Asn Asn Gly Leu Ser Cys Trp Asn Val Lys
 945 950 955 960
 Gly His Val Asp Val Glu Glu Gln Asn Asn His Arg Ser Val Leu Val
 965 970 975

Val Pro Glu Trp Glu Ala Glu Val Ser Gln Glu Val Arg Val Cys Pro
980 985 990

Gly Arg Gly Tyr Ile Leu Arg Val Thr Ala Tyr Lys Glu Gly Tyr Gly
995 1000 1005

Glu Gly Cys Val Thr Ile His Glu Ile Glu Asn Asn Thr Asp Glu
1010 1015 1020

Leu Lys Phe Ser Asn Cys Val Glu Glu Glu Val Tyr Pro Asn Asn
1025 1030 1035

Thr Val Thr Cys Asn Asp Tyr Thr Ala Thr Gln Glu Glu Tyr Glu
1040 1045 1050

Gly Thr Tyr Thr Ser Arg Asn Arg Gly Tyr Asp Gly Ala Tyr Glu
1055 1060 1065

Ser Asn Ser Ser Val Pro Ala Asp Tyr Ala Ser Ala Tyr Glu Glu
1070 1075 1080

Lys Ala Tyr Thr Asp Gly Arg Arg Asp Asn Pro Cys Glu Ser Asn
1085 1090 1095

Arg Gly Tyr Gly Asp Tyr Thr Pro Leu Pro Ala Gly Tyr Val Thr
1100 1105 1110

Lys Glu Leu Glu Tyr Phe Pro Glu Thr Asp Lys Val Trp Ile Glu
1115 1120 1125

Ile Gly Glu Thr Glu Gly Thr Phe Ile Val Asp Ser Val Glu Leu
1130 1135 1140

Leu Leu Met Glu Glu
1145

<210> 11
<211> 1156
<212> PRT
<213> artificial

<220>
<223> designed sequence

<400> 11

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

Ser Asn Pro Glu Val Glu Val Leu Gly Gly Glu Arg Ile Glu Thr Gly
20 25 30

Tyr Thr Pro Ile Asp Ile Ser Leu Ser Leu Thr Gln Phe Leu Leu Ser
35 40 45

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

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

Leu Tyr Gly Thr Met Gly Asn Ala Ala Pro Gln Gln Arg Ile Val Ala
 340 345 350

Gln Leu Gly Gln Gly Val Tyr Arg Thr Leu Ser Ser Thr Leu Tyr Arg
 355 360 365

Arg Pro Phe Asn Ile Gly Ile Asn Asn Gln Gln Leu Ser Val Leu Asp
 370 375 380

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

Tyr Arg Lys Ser Gly Thr Val Asp Ser Leu Asp Glu Ile Pro Pro Gln
 405 410 415

Asn Asn Asn Val Pro Pro Arg Gln Gly Phe Ser His Arg Leu Ser His
 420 425 430

Val Ser Met Phe Arg Ser Gly Phe Ser Asn Ser Ser Val Ser Ile Ile
 435 440 445

Arg Ala Pro Met Phe Ser Trp Ile His Arg Ser Ala Glu Phe Asn Asn
 450 455 460

Ile Ile Ala Ser Asp Ser Ile Thr Gln Ile Pro Ala Val Lys Gly Asn
 465 470 475 480

Phe Leu Phe Asn Gly Ser Val Ile Ser Gly Pro Gly Phe Thr Gly Gly
 485 490 495

Asp Leu Val Arg Leu Asn Ser Ser Gly Asn Asn Ile Gln Asn Arg Gly
 500 505 510

Tyr Ile Glu Val Pro Ile His Phe Pro Ser Thr Ser Thr Arg Tyr Arg
 515 520 525

Val Arg Val Arg Tyr Ala Ser Val Thr Pro Ile His Leu Asn Val Asn
 530 535 540

Trp Gly Asn Ser Ser Ile Phe Ser Asn Thr Val Pro Ala Thr Ala Thr
 545 550 555 560

Ser Leu Asp Asn Leu Gln Ser Ser Asp Phe Gly Tyr Phe Glu Ser Ala
 565 570 575

Asn Ala Phe Thr Ser Ser Leu Gly Asn Ile Val Gly Val Arg Asn Phe
 580 585 590

Ser Gly Thr Ala Gly Val Ile Ile Asp Arg Phe Glu Phe Ile Pro Val
595 600

Thr Ala Thr Leu Glu Ala Glu Ser Asp Leu Glu Arg Ala Gln Lys Ala
610 615 620

Val Asn Ala Leu Phe Thr Ser Ser Asn Gln Ile Gly Leu Lys Thr Asp
625 630 635 640

Val Thr Asp Tyr His Ile Asp Arg Val Ser Asn Leu Val Glu Cys Leu
645 650 655

Ser Asp Glu Phe Cys Leu Asp Glu Lys Lys Glu Leu Ser Glu Lys Val
660 665 670

Lys His Ala Lys Arg Leu Ser Asp Glu Arg Asn Leu Leu Gln Asp Pro
675 680 685

Asn Phe Arg Gly Ile Asn Arg Gln Leu Asp Arg Gly Trp Arg Gly Ser
690 695 700

Thr Asp Ile Thr Ile Gln Gly Gly Asp Asp Val Phe Lys Glu Asn Tyr
705 710 715 720

Val Thr Leu Leu Gly Thr Phe Asp Glu Cys Tyr Pro Thr Tyr Leu Tyr
725 730 735

Gln Lys Ile Asp Glu Ser Lys Leu Lys Ala Tyr Thr Arg Tyr Gln Leu
740 745 750

Arg Gly Tyr Ile Glu Asp Ser Gln Asp Leu Glu Ile Tyr Leu Ile Arg
755 760 765

Tyr Asn Ala Lys His Glu Thr Val Asn Val Pro Gly Thr Gly Ser Leu
770 775 780

Trp Pro Leu Ser Ala Pro Ser Pro Ile Gly Lys Cys Ala His His Ser
785 790 795 800

His His Phe Ser Leu Asp Ile Asp Val Gly Cys Thr Asp Leu Asn Glu
805 810 815

Asp Leu Gly Val Trp Val Ile Phe Lys Ile Lys Thr Gln Asp Gly His
820 825 830

Ala Arg Leu Gly Asn Leu Glu Phe Leu Glu Glu Lys Pro Leu Val Gly
835 840 845

Glu Ala Leu Ala Arg Val Lys Arg Ala Glu Lys Lys Trp Arg Asp Lys
850 855 860

Arg Glu Lys Leu Glu Trp Glu Thr Asn Ile Val Tyr Lys Glu Ala Lys

| | | | | | | |
|-----------------|----------|-----------------|----------|-----------------|----------|-------------|
| 865 | | 870 | | 875 | | 880 |
| Glu Ser Val Asp | Ala 885 | Leu Phe Val Asn | Ser 890 | Gln Tyr Asp Arg | Leu 895 | Gln |
| Ala Asp Thr | Asn 900 | Ile Ala Met Ile | His 905 | Ala Ala Asp Lys | Arg 910 | Val His |
| Ser Ile Arg | Glu 915 | Ala Tyr Leu Pro | Glu 920 | Leu Ser Val Ile | Pro 925 | Gly Val |
| Asn Ala Ala | Ile 930 | Phe Glu Glu | Leu 935 | Gly Arg Ile | Phe 940 | Thr Ala Phe |
| Ser Leu Tyr Asp | Ala 945 | Arg Asn Val Ile | Lys 950 | Asn Gly Asp Phe | Asn 955 | Asn 960 |
| Gly Leu Ser Cys | Trp 965 | Asn Val Lys Gly | His 970 | Val Asp Val Glu | Glu 975 | Gln |
| Asn Asn His | Arg 980 | Ser Val Leu Val | Val 985 | Pro Glu Trp Glu | Ala 990 | Glu Val |
| Ser Gln Glu | Val 995 | Arg Val Cys Pro | Gly 1000 | Arg Gly Tyr Ile | Leu 1005 | Arg Val |
| Thr Ala Tyr | Lys 1010 | Glu Gly Tyr | Gly 1015 | Glu Gly Cys Val | Thr 1020 | Ile His |
| Glu Ile Glu | Asn 1025 | Asn Thr Asp | Glu 1030 | Leu Lys Phe Ser | Asn 1035 | Cys Val |
| Glu Glu Glu | Val 1040 | Tyr Pro Asn | Asn 1045 | Thr Val Thr Cys | Asn 1050 | Asp Tyr |
| Thr Ala Thr | Gln 1055 | Glu Glu Tyr | Glu 1060 | Gly Thr Tyr Thr | Ser 1065 | Arg Asn |
| Arg Gly Tyr | Asp 1070 | Gly Ala Tyr | Glu 1075 | Ser Asn Ser Ser | Val 1080 | Pro Ala |
| Asp Tyr Ala | Ser 1085 | Ala Tyr Glu | Glu 1090 | Lys Ala Tyr Thr | Asp 1095 | Gly Arg |
| Arg Asp Asn | Pro 1100 | Cys Glu Ser | Asn 1105 | Arg Gly Tyr Gly | Asp 1110 | Tyr Thr |
| Pro Leu Pro | Ala 1115 | Gly Tyr Val | Thr 1120 | Lys Glu Leu Glu | Tyr 1125 | Phe Pro |
| Glu Thr Asp | Lys 1130 | Val Trp Ile | Glu 1135 | Ile Gly Glu Thr | Glu 1140 | Gly Thr |

Phe Ile Val Asp Ser Val Glu Leu Leu Leu Met Glu Glu
1145 1150 1155