SEQUENCE LISTING

<110> Inari Agriculture, Inc.

<120> IMPROVED HOMOLOGY DEPENDENT REPAIR
GENOME EDITING

<130> 16536-20006.40

<140> Not Yet Assigned
<141> Concurrently Herewith

<150> US 62/866,317
<151> 2019-06-25

<160> 149

<170> FastSEQ for Windows Version 4.0

<210> 1
<211> 261
<212> PRT
<213> Unknown

<220>
<223> Bacteria (eubacteria)

<400> 1

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

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

<210> 2
<211> 269
<212> PRT
<213> Escherichia coli str. K-12 substr. MG1655

<400> 2

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

<210> 3
<211> 287
<212> PRT
<213> Unknown

<220>
<223> Bacteriophage SPP1 35 protein

<400> 3
Met Ala Thr Lys Lys Gln Glu Glu Leu Lys Asn Ala Leu Ala Gln Gln
 1   5   10   15
Asn Gly Ala Val Pro Gln Thr Pro Val Lys Pro Gln Asp Lys Val Lys
            20   25   30
Gly Tyr Leu Glu Arg Met Met Pro Ala Ile Lys Asp Val Leu Pro Lys
        35   40   45
His Leu Asp Ala Asp Arg Leu Ser Arg Ile Ala Met Asn Val Ile Arg
    50   55   60
Thr Asn Pro Lys Leu Leu Glu Cys Asp Thr Ala Ser Leu Met Gly Ala
65   70   75   80
Val Leu Glu Ser Ala Lys Leu Gly Val Glu Pro Gly Leu Leu Gly Gln
                85   90   95
Ala Tyr Ile Leu Pro Tyr Thr Asn Tyr Lys Lys Lys Thr Val Glu Ala
            100   105   110
Gln Phe Ile Leu Gly Tyr Lys Gly Leu Leu Asp Leu Val Arg Arg Ser
        115   120   125
Gly His Val Ser Thr Ile Ser Ala Gln Thr Val Tyr Lys Asn Asp Thr
    130   135   140
Phe Glu Tyr Glu Tyr Gly Leu Asp Asp Lys Leu Val His Arg Pro Ala
145   150   155   160
Pro Phe Gly Thr Asp Arg Gly Glu Pro Val Gly Tyr Tyr Ala Val Ala
                165   170   175
Lys Met Lys Asp Gly Gly Tyr Asn Phe Leu Val Met Ser Lys Gln Asp
            180   185   190
Val Glu Lys His Arg Asp Ala Phe Ser Lys Ser Lys Asn Arg Glu Gly
        195   200   205
Val Val Tyr Gly Pro Trp Ala Asp His Phe Asp Ala Met Ala Lys Lys
    210   215   220
Thr Val Leu Arg Gln Leu Ile Asn Tyr Leu Pro Ile Ser Val Glu Gln
225   230   235   240
Leu Ser Gly Val Ala Ala Asp Glu Arg Thr Gly Ser Glu Leu His Asn
                245   250   255
Gln Phe Ala Asp Asp Asp Asn Ile Ile Asn Val Asp Ile Asn Thr Gly
            260   265   270
Glu Ile Ile Asp His Gln Glu Lys Leu Gly Gly Glu Thr Asn Glu
        275   280   285

<210> 4
<211> 205
<212> PRT
<213> Salmonella virus P22

<400> 4
Met Ser Lys Glu Phe Tyr Ala Arg Leu Ala Glu Ile Gln Glu His Leu

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


<210> 5
<211> 471
<212> PRT
<213> Saccharomyces cerevisiae S288C

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

```
                165                 170                 175
Asp Glu Ile Ser Glu Ser Ser Arg Thr Asn Thr Leu His Glu Asn Gln
            180                 185                 190
Glu Gln Gln Gln Tyr Pro Asn Lys Arg Arg Gln Leu Thr Lys Val Thr
        195                 200                 205
Asn Thr Asn Pro Asp Ser Thr Lys Asn Leu Val Lys Ile Glu Asn Thr
    210                 215                 220
Val Ser Arg Gly Thr Pro Met Met Ala Ala Pro Ala Glu Ala Asn Ser
225                 230                 235                 240
Lys Asn Ser Ser Asn Lys Asp Thr Asp Leu Lys Ser Leu Asp Ala Ser
                245                 250                 255
Lys Gln Asp Gln Asp Asp Leu Leu Asp Asp Ser Leu Met Phe Ser Asp
            260                 265                 270
Asp Phe Gln Asp Asp Asp Leu Ile Asn Met Gly Asn Thr Asn Ser Asn
        275                 280                 285
Val Leu Thr Thr Glu Lys Asp Pro Val Val Ala Lys Gln Ser Pro Thr
    290                 295                 300
Ala Ser Ser Asn Pro Glu Ala Glu Gln Ile Thr Phe Val Thr Ala Lys
305                 310                 315                 320
Ala Ala Thr Ser Val Gln Asn Glu Arg Tyr Ile Gly Glu Glu Ser Ile
                325                 330                 335
Phe Asp Pro Lys Tyr Gln Ala Gln Ser Ile Arg His Thr Val Asp Gln
            340                 345                 350
Thr Thr Ser Lys His Ile Pro Ala Ser Val Leu Lys Asp Lys Thr Met
        355                 360                 365
Thr Thr Ala Arg Asp Ser Val Tyr Glu Lys Phe Ala Pro Lys Gly Lys
    370                 375                 380
Gln Leu Ser Met Lys Asn Asn Asp Lys Glu Leu Gly Pro His Met Leu
385                 390                 395                 400
Glu Gly Ala Gly Asn Gln Val Pro Arg Glu Thr Thr Pro Ile Lys Thr
                405                 410                 415
Asn Ala Thr Ala Phe Pro Pro Ala Ala Ala Pro Arg Phe Ala Pro Pro
            420                 425                 430
Ser Lys Val Val His Pro Asn Gly Asn Gly Ala Val Pro Ala Val Pro
        435                 440                 445
Gln Gln Arg Ser Thr Arg Arg Glu Val Gly Arg Pro Lys Ile Asn Pro
    450                 455                 460
Leu His Ala Arg Lys Pro Thr
465                 470


<210> 6
<211> 469
<212> PRT
<213> Schizosaccharomyces pombe

<400> 6
Met Ser Phe Glu Gln Lys Gln His Val Ala Ser Glu Asp Gln Gly His
 1               5                  10                  15
Phe Asn Thr Ala Tyr Ser His Glu Glu Phe Asn Phe Leu Gln Ser Ser
            20                  25                  30
Leu Thr Arg Lys Leu Gly Pro Glu Tyr Val Ser Arg Arg Ser Gly Pro
        35                  40                  45
Gly Gly Phe Ser Val Ser Tyr Ile Glu Ser Trp Lys Ala Ile Glu Leu
```

```
    50                  55                  60
Ala Asn Glu Ile Phe Gly Phe Asn Gly Trp Ser Ser Ser Ile Arg Ser
65                  70                  75                  80
Ile Asn Val Asp Phe Met Asp Glu Asn Lys Glu Asn Gly Arg Ile Ser
                85                  90                  95
Leu Gly Leu Ser Val Ile Val Arg Val Thr Ile Lys Asp Gly Ala Tyr
            100                 105                 110
His Glu Asp Ile Gly Tyr Gly Ser Ile Asp Asn Cys Arg Gly Lys Ala
        115                 120                 125
Ser Ala Phe Glu Lys Cys Lys Lys Glu Gly Thr Thr Asp Ala Leu Lys
    130                 135                 140
Arg Ala Leu Arg Asn Phe Gly Asn Ser Leu Gly Asn Cys Met Tyr Asp
145                 150                 155                 160
Lys Tyr Tyr Leu Arg Glu Val Gly Lys Met Lys Pro Pro Thr Tyr His
                165                 170                 175
Phe Asp Ser Gly Asp Leu Phe Arg Lys Thr Asp Pro Ala Ala Arg Glu
            180                 185                 190
Ser Phe Ile Lys Lys Gln Lys Thr Leu Asn Ser Thr Arg Thr Val Asn
        195                 200                 205
Asn Gln Pro Leu Val Asn Lys Gly Glu Gln Leu Ala Pro Arg Arg Ala
    210                 215                 220
Ala Glu Leu Asn Asp Glu Gln Thr Arg Glu Ile Glu Met Tyr Ala Asp
225                 230                 235                 240
Glu Glu Leu Asp Asn Ile Phe Val Glu Asp Asp Ile Ile Ala His Leu
                245                 250                 255
Ala Val Ala Glu Asp Thr Ala His Pro Ala Ala Asn Asn His His Ser
            260                 265                 270
Glu Lys Ala Gly Thr Gln Ile Asn Asn Lys Asp Lys Gly Ser His Asn
        275                 280                 285
Ser Ala Lys Pro Val Gln Arg Ser His Thr Tyr Pro Val Ala Val Pro
    290                 295                 300
Gln Asn Thr Ser Asp Ser Val Gly Asn Ala Val Thr Asp Thr Ser Pro
305                 310                 315                 320
Lys Thr Leu Phe Asp Pro Leu Lys Pro Asn Thr Gly Thr Pro Ser Pro
                325                 330                 335
Lys Phe Ile Ser Ala Arg Ala Ala Ala Ala Ala Glu Gly Val Val Ser
            340                 345                 350
Ala Pro Phe Thr Asn Asn Phe Asn Pro Arg Leu Asp Ser Pro Ser Ile
        355                 360                 365
Arg Lys Thr Ser Ile Ile Asp His Ser Lys Ser Leu Pro Val Gln Arg
    370                 375                 380
Ala Ser Val Leu Pro Ile Ile Lys Gln Ser Ser Gln Thr Ser Pro Val
385                 390                 395                 400
Ser Asn Asn Ser Met Ile Arg Asp Ser Glu Ser Ile Ile Asn Glu Arg
                405                 410                 415
Lys Glu Asn Ile Gly Leu Ile Gly Val Lys Arg Ser Leu His Asp Ser
            420                 425                 430
Thr Thr Ser His Asn Lys Ser Asp Leu Met Arg Thr Asn Ser Asp Pro
        435                 440                 445
Gln Ser Ala Met Arg Ser Arg Glu Asn Tyr Asp Ala Thr Val Asp Lys
    450                 455                 460
Lys Ala Lys Lys Gly
465
```

<210> 7
<211> 436
<212> PRT
<213> Kluyveromyces lactis

<400> 7
Met Glu Asp Thr Gly Ser Gly Lys Asn Gly Lys Asp Asp Ile Gln Thr
 1   5   10   15
Lys Leu Asp Lys Lys Leu Gly Pro Glu Tyr Ile Ser Lys Arg Val Gly
            20   25   30
Phe Gly Ser Ser Arg Val Ala Tyr Ile Glu Gly Trp Lys Ala Ile Asn
        35   40   45
Leu Ala Asn Gln Ile Phe Gly Tyr Asp Gly Trp Ser Thr Glu Val Lys
    50   55   60
Asn Val Thr Ile Asp Phe Leu Asp Glu Arg Gln Gly Arg Phe Ser Ile
65   70   75   80
Gly Cys Thr Ala Ile Val Arg Val Ser Leu Ala Asp Gly Thr Phe Arg
                85   90   95
Glu Asp Ile Gly Tyr Gly Thr Val Glu Asn Glu Arg Arg Lys Ala Ser
            100   105   110
Ala Phe Glu Arg Ala Lys Lys Ser Ala Val Thr Asp Ala Leu Lys Arg
        115   120   125
Ser Leu Arg Gly Phe Gly Asn Ala Leu Gly Asn Cys Leu Tyr Asp Lys
    130   135   140
Asp Phe Leu Ala Lys Ile Asp Lys Val Lys Phe Asp Pro Pro Asp Phe
145   150   155   160
Asp Glu Gly Asn Leu Phe Arg Pro Ala Asp Glu Leu Ser Glu Met Ser
                165   170   175
Arg Ser Asn Met Val Gly Asp Ala His Thr Glu Gly Pro Ser Leu Lys
            180   185   190
Lys Arg Ser Leu Thr Asn Glu Asp Arg Asn Ala Val Pro Ser Ala Pro
        195   200   205
Ala Gln Gln Thr Tyr Arg Ser Asn Asn His Thr Thr Gln Lys Arg Ala
    210   215   220
Pro Lys Ala Gln Ala Val Thr Ala Ser Ala Ser Pro Asn Glu Glu Thr
225   230   235   240
Ser Asn Gln Gln Gln Asp Pro Asp Asp Leu Leu Asp Asp Ser Phe Met
                245   250   255
Phe Ser Asp Glu Ile Gln Asp Asp Asp Leu Leu Asn Met Asn Thr Thr
            260   265   270
Thr Asn Asn Lys Asn Ser Thr Asn Ser Ser Thr Thr Thr Thr Thr Ile
        275   280   285
Ser Asp Glu Ala Thr Gly Ile Ile Ser Pro Val Thr Phe Val Thr Ala
    290   295   300
Lys Ala Ala Thr Ser Leu Gln His Lys Asp Pro Ile Pro Ser Gly Ser
305   310   315   320
Met Phe Asp Pro Lys Phe Gln Ala Gln Ser Ile Arg His Thr Val Asp
                325   330   335
Gln Ser Val Ser Thr Pro Val Arg Ala Thr Ile Leu Lys Glu Lys Gly
            340   345   350
Leu Asp Ser Asp Arg Ser Ser Ile Tyr Ser Lys Phe Ala Pro Lys Gly
        355   360   365
Lys Glu Leu Ser Gly Thr Thr Thr Asn Ser Glu Pro Tyr Val Ala Ala

```
    370                 375                 380
Pro Gln Thr Ser Ala Thr Glu Ser Asn Arg Ser Thr Pro Thr Arg Ser
385                 390                 395                 400
Asn Ala Gln Leu Ala Gly Pro Gln Pro Ala Pro Gln Leu Gln Gly Pro
                405                 410                 415
Gln Arg Thr Gln Leu Gly Arg Pro Arg Met Leu Gln Gln Pro Asn Arg
            420                 425                 430
Arg Asn Val Ser
        435


<210> 8
<211> 226
<212> PRT
<213> Unknown

<220>
<223> Bacteria (eubacteria)

<400> 8
Met Thr Pro Asp Ile Ile Leu Gln Arg Thr Gly Ile Asp Val Arg Ala
 1               5                  10                  15
Val Glu Gln Gly Asp Asp Ala Trp His Lys Leu Arg Leu Gly Val Ile
            20                  25                  30
Thr Ala Ser Glu Val His Asn Val Ile Ala Lys Pro Arg Ser Gly Lys
        35                  40                  45
Lys Trp Pro Asp Met Lys Met Ser Tyr Phe His Thr Leu Leu Ala Glu
    50                  55                  60
Val Cys Thr Gly Val Ala Pro Glu Val Asn Ala Lys Ala Leu Ala Trp
65                  70                  75                  80
Gly Lys Gln Tyr Glu Asn Asp Ala Arg Thr Leu Phe Glu Phe Thr Ser
                85                  90                  95
Gly Val Asn Val Thr Glu Ser Pro Ile Ile Tyr Arg Asp Glu Ser Met
            100                 105                 110
Arg Thr Ala Cys Ser Pro Asp Gly Leu Cys Ser Asp Gly Asn Gly Leu
        115                 120                 125
Glu Leu Lys Cys Pro Phe Thr Ser Arg Asp Phe Met Lys Phe Arg Leu
    130                 135                 140
Gly Gly Phe Glu Ala Ile Lys Ser Ala Tyr Met Ala Gln Val Gln Tyr
145                 150                 155                 160
Ser Met Trp Val Thr Arg Lys Asn Ala Trp Tyr Phe Ala Asn Tyr Asp
                165                 170                 175
Pro Arg Met Lys Arg Glu Gly Leu His Tyr Val Val Ile Glu Arg Asp
            180                 185                 190
Glu Lys Tyr Met Ala Ser Phe Asp Glu Ile Val Pro Glu Phe Ile Glu
        195                 200                 205
Lys Met Asp Glu Ala Leu Ala Glu Ile Gly Phe Val Phe Gly Glu Gln
    210                 215                 220
Trp Arg
225


<210> 9
<211> 866
```

<212> PRT
<213> Unknown

<220>
<223> Rac bacterial prophage RecE exonuclease

<400> 9
Met Ser Thr Lys Pro Leu Phe Leu Leu Arg Lys Ala Lys Lys Ser Ser
 1   5   10   15
Gly Glu Pro Asp Val Val Leu Trp Ala Ser Asn Asp Phe Glu Ser Thr
            20   25   30
Cys Ala Thr Leu Asp Tyr Leu Ile Val Lys Ser Gly Lys Lys Leu Ser
        35   40   45
Ser Tyr Phe Lys Ala Val Ala Thr Asn Phe Pro Val Val Asn Asp Leu
    50   55   60
Pro Ala Glu Gly Glu Ile Asp Phe Thr Trp Ser Glu Arg Tyr Gln Leu
65   70   75   80
Ser Lys Asp Ser Met Thr Trp Glu Leu Lys Pro Gly Ala Ala Pro Asp
                85   90   95
Asn Ala His Tyr Gln Gly Asn Thr Asn Val Asn Gly Glu Asp Met Thr
            100   105   110
Glu Ile Glu Glu Asn Met Leu Leu Pro Ile Ser Gly Gln Glu Leu Pro
        115   120   125
Ile Arg Trp Leu Ala Gln His Gly Ser Glu Lys Pro Val Thr His Val
    130   135   140
Ser Arg Asp Gly Leu Gln Ala Leu His Ile Ala Arg Ala Glu Glu Leu
145   150   155   160
Pro Ala Val Thr Ala Leu Ala Val Ser His Lys Thr Ser Leu Leu Asp
                165   170   175
Pro Leu Glu Ile Arg Glu Leu His Lys Leu Val Arg Asp Thr Asp Lys
            180   185   190
Val Phe Pro Asn Pro Gly Asn Ser Asn Leu Gly Leu Ile Thr Ala Phe
        195   200   205
Phe Glu Ala Tyr Leu Asn Ala Asp Tyr Thr Asp Arg Gly Leu Leu Thr
    210   215   220
Lys Glu Trp Met Lys Gly Asn Arg Val Ser His Ile Thr Arg Thr Ala
225   230   235   240
Ser Gly Ala Asn Ala Gly Gly Gly Asn Leu Thr Asp Arg Gly Glu Gly
                245   250   255
Phe Val His Asp Leu Thr Ser Leu Ala Arg Asp Val Ala Thr Gly Val
            260   265   270
Leu Ala Arg Ser Met Asp Leu Asp Ile Tyr Asn Leu His Pro Ala His
        275   280   285
Ala Lys Arg Ile Glu Glu Ile Ile Ala Glu Asn Lys Pro Pro Phe Ser
    290   295   300
Val Phe Arg Asp Lys Phe Ile Thr Met Pro Gly Gly Leu Asp Tyr Ser
305   310   315   320
Arg Ala Ile Val Val Ala Ser Val Lys Glu Ala Pro Ile Gly Ile Glu
                325   330   335
Val Ile Pro Ala His Val Thr Glu Tyr Leu Asn Lys Val Leu Thr Glu
            340   345   350
Thr Asp His Ala Asn Pro Asp Pro Glu Ile Val Asp Ile Ala Cys Gly
        355   360   365
Arg Ser Ser Ala Pro Met Pro Gln Arg Val Thr Glu Glu Gly Lys Gln

```
    370                 375                 380
Asp Asp Glu Glu Lys Pro Gln Pro Ser Gly Thr Thr Ala Val Glu Gln
385                 390                 395                 400
Gly Glu Ala Glu Thr Met Glu Pro Asp Ala Thr Glu His His Gln Asp
                405                 410                 415
Thr Gln Pro Leu Asp Ala Gln Ser Gln Val Asn Ser Val Asp Ala Lys
            420                 425                 430
Tyr Gln Glu Leu Arg Ala Glu Leu His Glu Ala Arg Lys Asn Ile Pro
        435                 440                 445
Ser Lys Asn Pro Val Asp Asp Asp Lys Leu Leu Ala Ala Ser Arg Gly
    450                 455                 460
Glu Phe Val Asp Gly Ile Ser Asp Pro Asn Asp Pro Lys Trp Val Lys
465                 470                 475                 480
Gly Ile Gln Thr Arg Asp Cys Val Tyr Gln Asn Gln Pro Glu Thr Glu
                485                 490                 495
Lys Thr Ser Pro Asp Met Asn Gln Pro Glu Pro Val Val Gln Gln Glu
            500                 505                 510
Pro Glu Ile Ala Cys Asn Ala Cys Gly Gln Thr Gly Gly Asp Asn Cys
        515                 520                 525
Pro Asp Cys Gly Ala Val Met Gly Asp Ala Thr Tyr Gln Glu Thr Phe
    530                 535                 540
Asp Glu Glu Ser Gln Val Glu Ala Lys Glu Asn Asp Pro Glu Glu Met
545                 550                 555                 560
Glu Gly Ala Glu His Pro His Asn Glu Asn Ala Gly Ser Asp Pro His
                565                 570                 575
Arg Asp Cys Ser Asp Glu Thr Gly Glu Val Ala Asp Pro Val Ile Val
            580                 585                 590
Glu Asp Ile Glu Pro Gly Ile Tyr Tyr Gly Ile Ser Asn Glu Asn Tyr
        595                 600                 605
His Ala Gly Pro Gly Ile Ser Lys Ser Gln Leu Asp Asp Ile Ala Asp
    610                 615                 620
Thr Pro Ala Leu Tyr Leu Trp Arg Lys Asn Ala Pro Val Asp Thr Thr
625                 630                 635                 640
Lys Thr Lys Thr Leu Asp Leu Gly Thr Ala Phe His Cys Arg Val Leu
                645                 650                 655
Glu Pro Glu Glu Phe Ser Asn Arg Phe Ile Val Ala Pro Glu Phe Asn
            660                 665                 670
Arg Arg Thr Asn Ala Gly Lys Glu Glu Glu Lys Ala Phe Leu Met Glu
        675                 680                 685
Cys Ala Ser Thr Gly Lys Thr Val Ile Thr Ala Glu Glu Gly Arg Lys
    690                 695                 700
Ile Glu Leu Met Tyr Gln Ser Val Met Ala Leu Pro Leu Gly Gln Trp
705                 710                 715                 720
Leu Val Glu Ser Ala Gly His Ala Glu Ser Ser Ile Tyr Trp Glu Asp
                725                 730                 735
Pro Glu Thr Gly Ile Leu Cys Arg Cys Arg Pro Asp Lys Ile Ile Pro
            740                 745                 750
Glu Phe His Trp Ile Met Asp Val Lys Thr Thr Ala Asp Ile Gln Arg
        755                 760                 765
Phe Lys Thr Ala Tyr Tyr Asp Tyr Arg Tyr His Val Gln Asp Ala Phe
    770                 775                 780
Tyr Ser Asp Gly Tyr Glu Ala Gln Phe Gly Val Gln Pro Thr Phe Val
785                 790                 795                 800
Phe Leu Val Ala Ser Thr Thr Ile Glu Cys Gly Arg Tyr Pro Val Glu
```

```
                805                 810                 815
Ile Phe Met Met Gly Glu Glu Ala Lys Leu Ala Gly Gln Gln Glu Tyr
            820                 825                 830
His Arg Asn Leu Arg Thr Leu Ser Asp Cys Leu Asn Thr Asp Glu Trp
        835                 840                 845
Pro Ala Ile Lys Thr Leu Ser Leu Pro Arg Trp Ala Lys Glu Tyr Ala
    850                 855                 860
Asn Asp
865
```

<210> 10
<211> 23
<212> PRT
<213> Unknown

<220>
<223> Maize opaque-2 nuclear localization signal

<400> 10
```
Arg Lys Arg Lys Glu Ser Asn Arg Glu Ser Ala Arg Arg Ser Arg Arg
 1               5                  10                  15
Ser Arg Tyr Arg Lys Lys Val
            20
```

<210> 11
<211> 7
<212> PRT
<213> Unknown

<220>
<223> SV40 large T antigen NLS

<400> 11
```
Pro Lys Lys Lys Arg Lys Val
 1               5
```

<210> 12
<211> 4
<212> PRT
<213> Artificial Sequence

<220>
<223> Class II monopartite NLS consensus

<220>
<221> VARIANT
<222> 2, 4
<223> Xaa = Lys or Arg

<220>
<221> VARIANT

<222> 3
<223> Xaa = Any Amino Acid

<400> 12
Lys Xaa Xaa Xaa
 1

<210> 13
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
<223> Bipartite NLS consensus

<220>
<221> VARIANT
<222> 1, 2
<223> Xaa = Lys or Arg

<220>
<221> VARIANT
<222> 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
<223> Xaa = Any Amino Acid, and up to two
can be present or absent

<220>
<221> VARIANT
<222> 15, 16, 17, 18, 19
<223> Xaa = Any Amino Acid, and at least three
are either Lys or Arg

<400> 13
Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 1   5   10   15
Xaa Xaa Xaa

<210> 14
<211> 6
<212> PRT
<213> Unknown

<220>
<223> Class 5 Plant NLS

<220>
<221> VARIANT
<222> 5
<223> Xaa = Lys or Arg

<220>

<221> VARIANT
<222> 6
<223> Xaa = Trp, Phe, or Tyr

<400> 14
Leu Gly Lys Arg Xaa Xaa
 1   5

<210> 15
<211> 15
<212> PRT
<213> Unknown

<220>
<223> tobacco c2 NLS

<400> 15
Gln Pro Ser Leu Lys Arg Met Lys Ile Gln Pro Ser Ser Gln Pro
 1   5   10   15

<210> 16
<211> 14
<212> PRT
<213> Unknown

<220>
<223> Extended SV40 Nuclear Localization Domain

<400> 16
Ala Ser Pro Lys Lys Lys Arg Lys Val Glu Ala Ser Gly Ser
 1   5   10

<210> 17
<211> 11
<212> PRT
<213> Unknown

<220>
<223> cell-penetrating peptide (CPP)

<400> 17
Tyr Gly Arg Lys Lys Arg Arg Gln Arg Arg Arg
 1   5   10

<210> 18
<211> 12
<212> PRT
<213> Unknown

<220>

<223> cell-penetrating peptide (CPP)

<400> 18
Arg Arg Gln Arg Arg Thr Ser Lys Leu Met Lys Arg
 1   5   10

<210> 19
<211> 27
<212> PRT
<213> Unknown

<220>
<223> cell-penetrating peptide (CPP)

<400> 19
Gly Trp Thr Leu Asn Ser Ala Gly Tyr Leu Leu Gly Lys Ile Asn Leu
 1   5   10   15
Lys Ala Leu Ala Ala Leu Ala Lys Lys Ile Leu
            20   25

<210> 20
<211> 33
<212> PRT
<213> Unknown

<220>
<223> cell-penetrating peptide (CPP)

<400> 20
Lys Ala Leu Ala Trp Glu Ala Lys Leu Ala Lys Ala Leu Ala Lys Ala
 1   5   10   15
Leu Ala Lys His Leu Ala Lys Ala Leu Ala Lys Ala Leu Lys Cys Glu
            20   25   30
Ala

<210> 21
<211> 16
<212> PRT
<213> Unknown

<220>
<223> cell-penetrating peptide (CPP)

<400> 21
Arg Gln Ile Lys Ile Trp Phe Gln Asn Arg Arg Met Lys Trp Lys Lys
 1   5   10   15

<210> 22
<211> 11

<212> PRT
<213> Unknown

<220>
<223> cell-penetrating peptide (CPP)

<400> 22
Tyr Gly Arg Lys Lys Arg Arg Gln Arg Arg Arg
 1   5   10

<210> 23
<211> 8
<212> PRT
<213> Unknown

<220>
<223> cell-penetrating peptide (CPP)

<400> 23
Arg Lys Lys Arg Arg Gln Arg Arg
 1   5

<210> 24
<211> 11
<212> PRT
<213> Unknown

<220>
<223> cell-penetrating peptide (CPP)

<400> 24
Tyr Ala Arg Ala Ala Ala Arg Gln Ala Arg Ala
 1   5   10

<210> 25
<211> 11
<212> PRT
<213> Unknown

<220>
<223> cell-penetrating peptide (CPP)

<400> 25
Thr His Arg Leu Pro Arg Arg Arg Arg Arg Arg
 1   5   10

<210> 26
<211> 11
<212> PRT
<213> Unknown

<220>
<223> cell-penetrating peptide (CPP)

<400> 26
Gly Gly Arg Arg Ala Arg Arg Arg Arg Arg Arg
 1   5   10

<210> 27
<211> 1307
<212> PRT
<213> Unknown

<220>
<223> Acidaminococcus sp.

<400> 27
Met Thr Gln Phe Glu Gly Phe Thr Asn Leu Tyr Gln Val Ser Lys Thr
 1   5   10   15
Leu Arg Phe Glu Leu Ile Pro Gln Gly Lys Thr Leu Lys His Ile Gln
            20   25   30
Glu Gln Gly Phe Ile Glu Glu Asp Lys Ala Arg Asn Asp His Tyr Lys
        35   40   45
Glu Leu Lys Pro Ile Ile Asp Arg Ile Tyr Lys Thr Tyr Ala Asp Gln
    50   55   60
Cys Leu Gln Leu Val Gln Leu Asp Trp Glu Asn Leu Ser Ala Ala Ile
65   70   75   80
Asp Ser Tyr Arg Lys Glu Lys Thr Glu Glu Thr Arg Asn Ala Leu Ile
                85   90   95
Glu Glu Gln Ala Thr Tyr Arg Asn Ala Ile His Asp Tyr Phe Ile Gly
            100   105   110
Arg Thr Asp Asn Leu Thr Asp Ala Ile Asn Lys Arg His Ala Glu Ile
        115   120   125
Tyr Lys Gly Leu Phe Lys Ala Glu Leu Phe Asn Gly Lys Val Leu Lys
    130   135   140
Gln Leu Gly Thr Val Thr Thr Thr Glu His Glu Asn Ala Leu Leu Arg
145   150   155   160
Ser Phe Asp Lys Phe Thr Thr Tyr Phe Ser Gly Phe Tyr Glu Asn Arg
                165   170   175
Lys Asn Val Phe Ser Ala Glu Asp Ile Ser Thr Ala Ile Pro His Arg
            180   185   190
Ile Val Gln Asp Asn Phe Pro Lys Phe Lys Glu Asn Cys His Ile Phe
        195   200   205
Thr Arg Leu Ile Thr Ala Val Pro Ser Leu Arg Glu His Phe Glu Asn
    210   215   220
Val Lys Lys Ala Ile Gly Ile Phe Val Ser Thr Ser Ile Glu Glu Val
225   230   235   240
Phe Ser Phe Pro Phe Tyr Asn Gln Leu Leu Thr Gln Thr Gln Ile Asp
                245   250   255
Leu Tyr Asn Gln Leu Leu Gly Gly Ile Ser Arg Glu Ala Gly Thr Glu
            260   265   270
Lys Ile Lys Gly Leu Asn Glu Val Leu Asn Leu Ala Ile Gln Lys Asn
        275   280   285

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Asp Glu Thr Ala His Ile Ile Ala Ser Leu Pro His Arg Phe Ile Pro
    290                 295                 300
Leu Phe Lys Gln Ile Leu Ser Asp Arg Asn Thr Leu Ser Phe Ile Leu
305                 310                 315                 320
Glu Glu Phe Lys Ser Asp Glu Glu Val Ile Gln Ser Phe Cys Lys Tyr
                325                 330                 335
Lys Thr Leu Leu Arg Asn Glu Asn Val Leu Glu Thr Ala Glu Ala Leu
            340                 345                 350
Phe Asn Glu Leu Asn Ser Ile Asp Leu Thr His Ile Phe Ile Ser His
        355                 360                 365
Lys Lys Leu Glu Thr Ile Ser Ser Ala Leu Cys Asp His Trp Asp Thr
    370                 375                 380
Leu Arg Asn Ala Leu Tyr Glu Arg Arg Ile Ser Glu Leu Thr Gly Lys
385                 390                 395                 400
Ile Thr Lys Ser Ala Lys Glu Lys Val Gln Arg Ser Leu Lys His Glu
                405                 410                 415
Asp Ile Asn Leu Gln Glu Ile Ile Ser Ala Ala Gly Lys Glu Leu Ser
            420                 425                 430
Glu Ala Phe Lys Gln Lys Thr Ser Glu Ile Leu Ser His Ala His Ala
        435                 440                 445
Ala Leu Asp Gln Pro Leu Pro Thr Thr Leu Lys Lys Gln Glu Glu Lys
    450                 455                 460
Glu Ile Leu Lys Ser Gln Leu Asp Ser Leu Leu Gly Leu Tyr His Leu
465                 470                 475                 480
Leu Asp Trp Phe Ala Val Asp Glu Ser Asn Glu Val Asp Pro Glu Phe
                485                 490                 495
Ser Ala Arg Leu Thr Gly Ile Lys Leu Glu Met Glu Pro Ser Leu Ser
            500                 505                 510
Phe Tyr Asn Lys Ala Arg Asn Tyr Ala Thr Lys Lys Pro Tyr Ser Val
        515                 520                 525
Glu Lys Phe Lys Leu Asn Phe Gln Met Pro Thr Leu Ala Ser Gly Trp
    530                 535                 540
Asp Val Asn Lys Glu Lys Asn Asn Gly Ala Ile Leu Phe Val Lys Asn
545                 550                 555                 560
Gly Leu Tyr Tyr Leu Gly Ile Met Pro Lys Gln Lys Gly Arg Tyr Lys
                565                 570                 575
Ala Leu Ser Phe Glu Pro Thr Glu Lys Thr Ser Glu Gly Phe Asp Lys
            580                 585                 590
Met Tyr Tyr Asp Tyr Phe Pro Asp Ala Ala Lys Met Ile Pro Lys Cys
        595                 600                 605
Ser Thr Gln Leu Lys Ala Val Thr Ala His Phe Gln Thr His Thr Thr
    610                 615                 620
Pro Ile Leu Leu Ser Asn Asn Phe Ile Glu Pro Leu Glu Ile Thr Lys
625                 630                 635                 640
Glu Ile Tyr Asp Leu Asn Asn Pro Glu Lys Glu Pro Lys Lys Phe Gln
                645                 650                 655
Thr Ala Tyr Ala Lys Lys Thr Gly Asp Gln Lys Gly Tyr Arg Glu Ala
            660                 665                 670
Leu Cys Lys Trp Ile Asp Phe Thr Arg Asp Phe Leu Ser Lys Tyr Thr
        675                 680                 685
Lys Thr Thr Ser Ile Asp Leu Ser Ser Leu Arg Pro Ser Ser Gln Tyr
    690                 695                 700
Lys Asp Leu Gly Glu Tyr Tyr Ala Glu Leu Asn Pro Leu Leu Tyr His
705                 710                 715                 720
```

```
Ile Ser Phe Gln Arg Ile Ala Glu Lys Glu Ile Met Asp Ala Val Glu
                725                 730                 735
Thr Gly Lys Leu Tyr Leu Phe Gln Ile Tyr Asn Lys Asp Phe Ala Lys
            740                 745                 750
Gly His His Gly Lys Pro Asn Leu His Thr Leu Tyr Trp Thr Gly Leu
        755                 760                 765
Phe Ser Pro Glu Asn Leu Ala Lys Thr Ser Ile Lys Leu Asn Gly Gln
    770                 775                 780
Ala Glu Leu Phe Tyr Arg Pro Lys Ser Arg Met Lys Arg Met Ala His
785                 790                 795                 800
Arg Leu Gly Glu Lys Met Leu Asn Lys Lys Leu Lys Asp Gln Lys Thr
                805                 810                 815
Pro Ile Pro Asp Thr Leu Tyr Gln Glu Leu Tyr Asp Tyr Val Asn His
            820                 825                 830
Arg Leu Ser His Asp Leu Ser Asp Glu Ala Arg Ala Leu Leu Pro Asn
        835                 840                 845
Val Ile Thr Lys Glu Val Ser His Glu Ile Ile Lys Asp Arg Arg Phe
    850                 855                 860
Thr Ser Asp Lys Phe Phe Phe His Val Pro Ile Thr Leu Asn Tyr Gln
865                 870                 875                 880
Ala Ala Asn Ser Pro Ser Lys Phe Asn Gln Arg Val Asn Ala Tyr Leu
                885                 890                 895
Lys Glu His Pro Glu Thr Pro Ile Ile Gly Ile Asp Arg Gly Glu Arg
            900                 905                 910
Asn Leu Ile Tyr Ile Thr Val Ile Asp Ser Thr Gly Lys Ile Leu Glu
        915                 920                 925
Gln Arg Ser Leu Asn Thr Ile Gln Gln Phe Asp Tyr Gln Lys Lys Leu
    930                 935                 940
Asp Asn Arg Glu Lys Glu Arg Val Ala Ala Arg Gln Ala Trp Ser Val
945                 950                 955                 960
Val Gly Thr Ile Lys Asp Leu Lys Gln Gly Tyr Leu Ser Gln Val Ile
                965                 970                 975
His Glu Ile Val Asp Leu Met Ile His Tyr Gln Ala Val Val Val Leu
            980                 985                 990
Glu Asn Leu Asn Phe Gly Phe Lys Ser Lys Arg Thr Gly Ile Ala Glu
        995                 1000                1005
Lys Ala Val Tyr Gln Gln Phe Glu Lys Met Leu Ile Asp Lys Leu Asn
    1010                1015                1020
Cys Leu Val Leu Lys Asp Tyr Pro Ala Glu Lys Val Gly Gly Val Leu
1025                1030                1035                1040
Asn Pro Tyr Gln Leu Thr Asp Gln Phe Thr Ser Phe Ala Lys Met Gly
                1045                1050                1055
Thr Gln Ser Gly Phe Leu Phe Tyr Val Pro Ala Pro Tyr Thr Ser Lys
            1060                1065                1070
Ile Asp Pro Leu Thr Gly Phe Val Asp Pro Phe Val Trp Lys Thr Ile
        1075                1080                1085
Lys Asn His Glu Ser Arg Lys His Phe Leu Glu Gly Phe Asp Phe Leu
    1090                1095                1100
His Tyr Asp Val Lys Thr Gly Asp Phe Ile Leu His Phe Lys Met Asn
1105                1110                1115                1120
Arg Asn Leu Ser Phe Gln Arg Gly Leu Pro Gly Phe Met Pro Ala Trp
                1125                1130                1135
Asp Ile Val Phe Glu Lys Asn Glu Thr Gln Phe Asp Ala Lys Gly Thr
            1140                1145                1150
```

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Pro Phe Ile Ala Gly Lys Arg Ile Val Pro Val Ile Glu Asn His Arg
        1155                1160                1165
Phe Thr Gly Arg Tyr Arg Asp Leu Tyr Pro Ala Asn Glu Leu Ile Ala
    1170                1175                1180
Leu Leu Glu Glu Lys Gly Ile Val Phe Arg Asp Gly Ser Asn Ile Leu
1185                1190                1195                1200
Pro Lys Leu Leu Glu Asn Asp Asp Ser His Ala Ile Asp Thr Met Val
                1205                1210                1215
Ala Leu Ile Arg Ser Val Leu Gln Met Arg Asn Ser Asn Ala Ala Thr
            1220                1225                1230
Gly Glu Asp Tyr Ile Asn Ser Pro Val Arg Asp Leu Asn Gly Val Cys
        1235                1240                1245
Phe Asp Ser Arg Phe Gln Asn Pro Glu Trp Pro Met Asp Ala Asp Ala
    1250                1255                1260
Asn Gly Ala Tyr His Ile Ala Leu Lys Gly Gln Leu Leu Leu Asn His
1265                1270                1275                1280
Leu Lys Glu Ser Lys Asp Leu Lys Leu Gln Asn Gly Ile Ser Asn Gln
                1285                1290                1295
Asp Trp Leu Ala Tyr Ile Gln Glu Leu Arg Asn
            1300                1305


<210> 28
<211> 1228
<212> PRT
<213> Unknown

<220>
<223> Lachnospiraceae bacterium

<400> 28
Met Ser Lys Leu Glu Lys Phe Thr Asn Cys Tyr Ser Leu Ser Lys Thr
 1               5                  10                  15
Leu Arg Phe Lys Ala Ile Pro Val Gly Lys Thr Gln Glu Asn Ile Asp
            20                  25                  30
Asn Lys Arg Leu Leu Val Glu Asp Glu Lys Arg Ala Glu Asp Tyr Lys
        35                  40                  45
Gly Val Lys Lys Leu Leu Asp Arg Tyr Tyr Leu Ser Phe Ile Asn Asp
    50                  55                  60
Val Leu His Ser Ile Lys Leu Lys Asn Leu Asn Asn Tyr Ile Ser Leu
65                  70                  75                  80
Phe Arg Lys Lys Thr Arg Thr Glu Lys Glu Asn Lys Glu Leu Glu Asn
                85                  90                  95
Leu Glu Ile Asn Leu Arg Lys Glu Ile Ala Lys Ala Phe Lys Gly Asn
            100                 105                 110
Glu Gly Tyr Lys Ser Leu Phe Lys Lys Asp Ile Ile Glu Thr Ile Leu
        115                 120                 125
Pro Glu Phe Leu Asp Asp Lys Asp Glu Ile Ala Leu Val Asn Ser Phe
    130                 135                 140
Asn Gly Phe Thr Thr Ala Phe Thr Gly Phe Phe Asp Asn Arg Glu Asn
145                 150                 155                 160
Met Phe Ser Glu Glu Ala Lys Ser Thr Ser Ile Ala Phe Arg Cys Ile
                165                 170                 175
Asn Glu Asn Leu Thr Arg Tyr Ile Ser Asn Met Asp Ile Phe Glu Lys
```

```
            180                 185                 190
Val Asp Ala Ile Phe Asp Lys His Glu Val Gln Glu Ile Lys Glu Lys
        195                 200                 205
Ile Leu Asn Ser Asp Tyr Asp Val Glu Asp Phe Phe Glu Gly Glu Phe
    210                 215                 220
Phe Asn Phe Val Leu Thr Gln Glu Gly Ile Asp Val Tyr Asn Ala Ile
225                 230                 235                 240
Ile Gly Gly Phe Val Thr Glu Ser Gly Glu Lys Ile Lys Gly Leu Asn
                245                 250                 255
Glu Tyr Ile Asn Leu Tyr Asn Gln Lys Thr Lys Gln Lys Leu Pro Lys
            260                 265                 270
Phe Lys Pro Leu Tyr Lys Gln Val Leu Ser Asp Arg Glu Ser Leu Ser
        275                 280                 285
Phe Tyr Gly Glu Gly Tyr Thr Ser Asp Glu Glu Val Leu Glu Val Phe
    290                 295                 300
Arg Asn Thr Leu Asn Lys Asn Ser Glu Ile Phe Ser Ser Ile Lys Lys
305                 310                 315                 320
Leu Glu Lys Leu Phe Lys Asn Phe Asp Glu Tyr Ser Ser Ala Gly Ile
                325                 330                 335
Phe Val Lys Asn Gly Pro Ala Ile Ser Thr Ile Ser Lys Asp Ile Phe
            340                 345                 350
Gly Glu Trp Asn Val Ile Arg Asp Lys Trp Asn Ala Glu Tyr Asp Asp
        355                 360                 365
Ile His Leu Lys Lys Lys Ala Val Val Thr Glu Lys Tyr Glu Asp Asp
    370                 375                 380
Arg Arg Lys Ser Phe Lys Lys Ile Gly Ser Phe Ser Leu Glu Gln Leu
385                 390                 395                 400
Gln Glu Tyr Ala Asp Ala Asp Leu Ser Val Val Glu Lys Leu Lys Glu
                405                 410                 415
Ile Ile Ile Gln Lys Val Asp Glu Ile Tyr Lys Val Tyr Gly Ser Ser
            420                 425                 430
Glu Lys Leu Phe Asp Ala Asp Phe Val Leu Glu Lys Ser Leu Lys Lys
        435                 440                 445
Asn Asp Ala Val Val Ala Ile Met Lys Asp Leu Leu Asp Ser Val Lys
    450                 455                 460
Ser Phe Glu Asn Tyr Ile Lys Ala Phe Phe Gly Glu Gly Lys Glu Thr
465                 470                 475                 480
Asn Arg Asp Glu Ser Phe Tyr Gly Asp Phe Val Leu Ala Tyr Asp Ile
                485                 490                 495
Leu Leu Lys Val Asp His Ile Tyr Asp Ala Ile Arg Asn Tyr Val Thr
            500                 505                 510
Gln Lys Pro Tyr Ser Lys Asp Lys Phe Lys Leu Tyr Phe Gln Asn Pro
        515                 520                 525
Gln Phe Met Gly Gly Trp Asp Lys Asp Lys Glu Thr Asp Tyr Arg Ala
    530                 535                 540
Thr Ile Leu Arg Tyr Gly Ser Lys Tyr Tyr Leu Ala Ile Met Asp Lys
545                 550                 555                 560
Lys Tyr Ala Lys Cys Leu Gln Lys Ile Asp Lys Asp Asp Val Asn Gly
                565                 570                 575
Asn Tyr Glu Lys Ile Asn Tyr Lys Leu Leu Pro Gly Pro Asn Lys Met
            580                 585                 590
Leu Pro Lys Val Phe Phe Ser Lys Lys Trp Met Ala Tyr Tyr Asn Pro
        595                 600                 605
Ser Glu Asp Ile Gln Lys Ile Tyr Lys Asn Gly Thr Phe Lys Lys Gly
```

```
    610                 615                 620
Asp Met Phe Asn Leu Asn Asp Cys His Lys Leu Ile Asp Phe Phe Lys
625                 630                 635                 640
Asp Ser Ile Ser Arg Tyr Pro Lys Trp Ser Asn Ala Tyr Asp Phe Asn
                645                 650                 655
Phe Ser Glu Thr Glu Lys Tyr Lys Asp Ile Ala Gly Phe Tyr Arg Glu
            660                 665                 670
Val Glu Glu Gln Gly Tyr Lys Val Ser Phe Glu Ser Ala Ser Lys Lys
        675                 680                 685
Glu Val Asp Lys Leu Val Glu Glu Gly Lys Leu Tyr Met Phe Gln Ile
    690                 695                 700
Tyr Asn Lys Asp Phe Ser Asp Lys Ser His Gly Thr Pro Asn Leu His
705                 710                 715                 720
Thr Met Tyr Phe Lys Leu Leu Phe Asp Glu Asn Asn His Gly Gln Ile
                725                 730                 735
Arg Leu Ser Gly Gly Ala Glu Leu Phe Met Arg Arg Ala Ser Leu Lys
            740                 745                 750
Lys Glu Glu Leu Val Val His Pro Ala Asn Ser Pro Ile Ala Asn Lys
        755                 760                 765
Asn Pro Asp Asn Pro Lys Lys Thr Thr Thr Leu Ser Tyr Asp Val Tyr
    770                 775                 780
Lys Asp Lys Arg Phe Ser Glu Asp Gln Tyr Glu Leu His Ile Pro Ile
785                 790                 795                 800
Ala Ile Asn Lys Cys Pro Lys Asn Ile Phe Lys Ile Asn Thr Glu Val
                805                 810                 815
Arg Val Leu Leu Lys His Asp Asp Asn Pro Tyr Val Ile Gly Ile Asp
            820                 825                 830
Arg Gly Glu Arg Asn Leu Leu Tyr Ile Val Val Val Asp Gly Lys Gly
        835                 840                 845
Asn Ile Val Glu Gln Tyr Ser Leu Asn Glu Ile Ile Asn Asn Phe Asn
    850                 855                 860
Gly Ile Arg Ile Lys Thr Asp Tyr His Ser Leu Leu Asp Lys Lys Glu
865                 870                 875                 880
Lys Glu Arg Phe Glu Ala Arg Gln Asn Trp Thr Ser Ile Glu Asn Ile
                885                 890                 895
Lys Glu Leu Lys Ala Gly Tyr Ile Ser Gln Val Val His Lys Ile Cys
            900                 905                 910
Glu Leu Val Glu Lys Tyr Asp Ala Val Ile Ala Leu Glu Asp Leu Asn
        915                 920                 925
Ser Gly Phe Lys Asn Ser Arg Val Lys Val Glu Lys Gln Val Tyr Gln
    930                 935                 940
Lys Phe Glu Lys Met Leu Ile Asp Lys Leu Asn Tyr Met Val Asp Lys
945                 950                 955                 960
Lys Ser Asn Pro Cys Ala Thr Gly Gly Ala Leu Lys Gly Tyr Gln Ile
                965                 970                 975
Thr Asn Lys Phe Glu Ser Phe Lys Ser Met Ser Thr Gln Asn Gly Phe
            980                 985                 990
Ile Phe Tyr Ile Pro Ala Trp Leu Thr Ser Lys Ile Asp Pro Ser Thr
        995                 1000                1005
Gly Phe Val Asn Leu Leu Lys Thr Lys Tyr Thr Ser Ile Ala Asp Ser
    1010                1015                1020
Lys Lys Phe Ile Ser Ser Phe Asp Arg Ile Met Tyr Val Pro Glu Glu
1025                1030                1035                1040
Asp Leu Phe Glu Phe Ala Leu Asp Tyr Lys Asn Phe Ser Arg Thr Asp
```

```
                1045                1050                1055
Ala Asp Tyr Ile Lys Lys Trp Lys Leu Tyr Ser Tyr Gly Asn Arg Ile
            1060                1065                1070
Arg Ile Phe Arg Asn Pro Lys Lys Asn Asn Val Phe Asp Trp Glu Glu
        1075                1080                1085
Val Cys Leu Thr Ser Ala Tyr Lys Glu Leu Phe Asn Lys Tyr Gly Ile
    1090                1095                1100
Asn Tyr Gln Gln Gly Asp Ile Arg Ala Leu Leu Cys Glu Gln Ser Asp
1105                1110                1115                1120
Lys Ala Phe Tyr Ser Ser Phe Met Ala Leu Met Ser Leu Met Leu Gln
                1125                1130                1135
Met Arg Asn Ser Ile Thr Gly Arg Thr Asp Val Asp Phe Leu Ile Ser
            1140                1145                1150
Pro Val Lys Asn Ser Asp Gly Ile Phe Tyr Asp Ser Arg Asn Tyr Glu
        1155                1160                1165
Ala Gln Glu Asn Ala Ile Leu Pro Lys Asn Ala Asp Ala Asn Gly Ala
    1170                1175                1180
Tyr Asn Ile Ala Arg Lys Val Leu Trp Ala Ile Gly Gln Phe Lys Lys
1185                1190                1195                1200
Ala Glu Asp Glu Lys Leu Asp Lys Val Lys Ile Ala Ile Ser Asn Lys
                1205                1210                1215
Glu Trp Leu Glu Tyr Ala Gln Thr Ser Val Lys His
            1220                1225
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<210> 29
<211> 1300
<212> PRT
<213> Francisella novicida

<400> 29

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

```
            180                 185                 190
Asn Asp Ile Pro Thr Ser Ile Ile Tyr Arg Ile Val Asp Asp Asn Leu
        195                 200                 205
Pro Lys Phe Leu Glu Asn Lys Ala Lys Tyr Glu Ser Leu Lys Asp Lys
    210                 215                 220
Ala Pro Glu Ala Ile Asn Tyr Glu Gln Ile Lys Lys Asp Leu Ala Glu
225                 230                 235                 240
Glu Leu Thr Phe Asp Ile Asp Tyr Lys Thr Ser Glu Val Asn Gln Arg
                245                 250                 255
Val Phe Ser Leu Asp Glu Val Phe Glu Ile Ala Asn Phe Asn Asn Tyr
            260                 265                 270
Leu Asn Gln Ser Gly Ile Thr Lys Phe Asn Thr Ile Ile Gly Gly Lys
        275                 280                 285
Phe Val Asn Gly Glu Asn Thr Lys Arg Lys Gly Ile Asn Glu Tyr Ile
    290                 295                 300
Asn Leu Tyr Ser Gln Gln Ile Asn Asp Lys Thr Leu Lys Lys Tyr Lys
305                 310                 315                 320
Met Ser Val Leu Phe Lys Gln Ile Leu Ser Asp Thr Glu Ser Lys Ser
                325                 330                 335
Phe Val Ile Asp Lys Leu Glu Asp Asp Ser Asp Val Val Thr Thr Met
            340                 345                 350
Gln Ser Phe Tyr Glu Gln Ile Ala Ala Phe Lys Thr Val Glu Glu Lys
        355                 360                 365
Ser Ile Lys Glu Thr Leu Ser Leu Leu Phe Asp Asp Leu Lys Ala Gln
    370                 375                 380
Lys Leu Asp Leu Ser Lys Ile Tyr Phe Lys Asn Asp Lys Ser Leu Thr
385                 390                 395                 400
Asp Leu Ser Gln Gln Val Phe Asp Asp Tyr Ser Val Ile Gly Thr Ala
                405                 410                 415
Val Leu Glu Tyr Ile Thr Gln Gln Ile Ala Pro Lys Asn Leu Asp Asn
            420                 425                 430
Pro Ser Lys Lys Glu Gln Glu Leu Ile Ala Lys Lys Thr Glu Lys Ala
        435                 440                 445
Lys Tyr Leu Ser Leu Glu Thr Ile Lys Leu Ala Leu Glu Glu Phe Asn
    450                 455                 460
Lys His Arg Asp Ile Asp Lys Gln Cys Arg Phe Glu Glu Ile Leu Ala
465                 470                 475                 480
Asn Phe Ala Ala Ile Pro Met Ile Phe Asp Glu Ile Ala Gln Asn Lys
                485                 490                 495
Asp Asn Leu Ala Gln Ile Ser Ile Lys Tyr Gln Asn Gln Gly Lys Lys
            500                 505                 510
Asp Leu Leu Gln Ala Ser Ala Glu Asp Asp Val Lys Ala Ile Lys Asp
        515                 520                 525
Leu Leu Asp Gln Thr Asn Asn Leu Leu His Lys Leu Lys Ile Phe His
    530                 535                 540
Ile Ser Gln Ser Glu Asp Lys Ala Asn Ile Leu Asp Lys Asp Glu His
545                 550                 555                 560
Phe Tyr Leu Val Phe Glu Glu Cys Tyr Phe Glu Leu Ala Asn Ile Val
                565                 570                 575
Pro Leu Tyr Asn Lys Ile Arg Asn Tyr Ile Thr Gln Lys Pro Tyr Ser
            580                 585                 590
Asp Glu Lys Phe Lys Leu Asn Phe Glu Asn Ser Thr Leu Ala Asn Gly
        595                 600                 605
Trp Asp Lys Asn Lys Glu Pro Asp Asn Thr Ala Ile Leu Phe Ile Lys
```

```
    610                 615                 620
Asp Asp Lys Tyr Tyr Leu Gly Val Met Asn Lys Lys Asn Asn Lys Ile
625                 630                 635                 640
Phe Asp Asp Lys Ala Ile Lys Glu Asn Lys Gly Glu Gly Tyr Lys Lys
                645                 650                 655
Ile Val Tyr Lys Leu Leu Pro Gly Ala Asn Lys Met Leu Pro Lys Val
            660                 665                 670
Phe Phe Ser Ala Lys Ser Ile Lys Phe Tyr Asn Pro Ser Glu Asp Ile
        675                 680                 685
Leu Arg Ile Arg Asn His Ser Thr His Thr Lys Asn Gly Ser Pro Gln
    690                 695                 700
Lys Gly Tyr Glu Lys Phe Glu Phe Asn Ile Glu Asp Cys Arg Lys Phe
705                 710                 715                 720
Ile Asp Phe Tyr Lys Gln Ser Ile Ser Lys His Pro Glu Trp Lys Asp
                725                 730                 735
Phe Gly Phe Arg Phe Ser Asp Thr Gln Arg Tyr Asn Ser Ile Asp Glu
            740                 745                 750
Phe Tyr Arg Glu Val Glu Asn Gln Gly Tyr Lys Leu Thr Phe Glu Asn
        755                 760                 765
Ile Ser Glu Ser Tyr Ile Asp Ser Val Val Asn Gln Gly Lys Leu Tyr
    770                 775                 780
Leu Phe Gln Ile Tyr Asn Lys Asp Phe Ser Ala Tyr Ser Lys Gly Arg
785                 790                 795                 800
Pro Asn Leu His Thr Leu Tyr Trp Lys Ala Leu Phe Asp Glu Arg Asn
                805                 810                 815
Leu Gln Asp Val Val Tyr Lys Leu Asn Gly Glu Ala Glu Leu Phe Tyr
            820                 825                 830
Arg Lys Gln Ser Ile Pro Lys Lys Ile Thr His Pro Ala Lys Glu Ala
        835                 840                 845
Ile Ala Asn Lys Asn Lys Asp Asn Pro Lys Lys Glu Ser Val Phe Glu
    850                 855                 860
Tyr Asp Leu Ile Lys Asp Lys Arg Phe Thr Glu Asp Lys Phe Phe Phe
865                 870                 875                 880
His Cys Pro Ile Thr Ile Asn Phe Lys Ser Ser Gly Ala Asn Lys Phe
                885                 890                 895
Asn Asp Glu Ile Asn Leu Leu Leu Lys Glu Lys Ala Asn Asp Val His
            900                 905                 910
Ile Leu Ser Ile Asp Arg Gly Glu Arg His Leu Ala Tyr Tyr Thr Leu
        915                 920                 925
Val Asp Gly Lys Gly Asn Ile Ile Lys Gln Asp Thr Phe Asn Ile Ile
    930                 935                 940
Gly Asn Asp Arg Met Lys Thr Asn Tyr His Asp Lys Leu Ala Ala Ile
945                 950                 955                 960
Glu Lys Asp Arg Asp Ser Ala Arg Lys Asp Trp Lys Lys Ile Asn Asn
                965                 970                 975
Ile Lys Glu Met Lys Glu Gly Tyr Leu Ser Gln Val Val His Glu Ile
            980                 985                 990
Ala Lys Leu Val Ile Glu Tyr Asn Ala Ile Val Val Phe Glu Asp Leu
        995                 1000                1005
Asn Phe Gly Phe Lys Arg Gly Arg Phe Lys Val Glu Lys Gln Val Tyr
    1010                1015                1020
Gln Lys Leu Glu Lys Met Leu Ile Glu Lys Leu Asn Tyr Leu Val Phe
1025                1030                1035                1040
Lys Asp Asn Glu Phe Asp Lys Thr Gly Gly Val Leu Arg Ala Tyr Gln
```

```
                1045                1050                1055
Leu Thr Ala Pro Phe Glu Thr Phe Lys Lys Met Gly Lys Gln Thr Gly
            1060                1065                1070
Ile Ile Tyr Tyr Val Pro Ala Gly Phe Thr Ser Lys Ile Cys Pro Val
        1075                1080                1085
Thr Gly Phe Val Asn Gln Leu Tyr Pro Lys Tyr Glu Ser Val Ser Lys
    1090                1095                1100
Ser Gln Glu Phe Phe Ser Lys Phe Asp Lys Ile Cys Tyr Asn Leu Asp
1105                1110                1115                1120
Lys Gly Tyr Phe Glu Phe Ser Phe Asp Tyr Lys Asn Phe Gly Asp Lys
                1125                1130                1135
Ala Ala Lys Gly Lys Trp Thr Ile Ala Ser Phe Gly Ser Arg Leu Ile
            1140                1145                1150
Asn Phe Arg Asn Ser Asp Lys Asn His Asn Trp Asp Thr Arg Glu Val
        1155                1160                1165
Tyr Pro Thr Lys Glu Leu Glu Lys Leu Leu Lys Asp Tyr Ser Ile Glu
    1170                1175                1180
Tyr Gly His Gly Glu Cys Ile Lys Ala Ala Ile Cys Gly Glu Ser Asp
1185                1190                1195                1200
Lys Lys Phe Phe Ala Lys Leu Thr Ser Val Leu Asn Thr Ile Leu Gln
                1205                1210                1215
Met Arg Asn Ser Lys Thr Gly Thr Glu Leu Asp Tyr Leu Ile Ser Pro
            1220                1225                1230
Val Ala Asp Val Asn Gly Asn Phe Phe Asp Ser Arg Gln Ala Pro Lys
        1235                1240                1245
Asn Met Pro Gln Asp Ala Asp Ala Asn Gly Ala Tyr His Ile Gly Leu
    1250                1255                1260
Lys Gly Leu Met Leu Leu Gly Arg Ile Lys Asn Asn Gln Glu Gly Lys
1265                1270                1275                1280
Lys Leu Asn Leu Val Ile Lys Asn Glu Glu Tyr Phe Glu Phe Val Gln
                1285                1290                1295
Asn Arg Asn Asn
            1300


<210> 30
<211> 1320
<212> PRT
<213> Unknown

<220>
<223> CasJ (wild type)

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

```
Thr Asp Gln Ile Gln Leu Thr Lys Glu Tyr Tyr Lys Val Ile Ala Lys
                85                  90                  95
Lys Ala Cys Phe Asp Trp Phe Trp Thr Asn Asp Arg Gly Met Lys Phe
            100                 105                 110
Pro Thr Ser Ser Ile Ile Ser Phe Asn Ser Leu Lys Ser Ser Asp Lys
        115                 120                 125
Ser Lys Thr Ser Asp Asn Leu Asp Arg Lys Lys Lys Ile Leu Asp Tyr
    130                 135                 140
Trp Lys Gly Asn Ile Phe Lys Thr Gln Lys Ala Ile Lys Asp Val Leu
145                 150                 155                 160
Asp Ile Thr Glu Asp Ile Gln Lys Ala Ile Glu Glu Lys Lys Ser His
                165                 170                 175
Arg Glu Ile Asn Arg Val Asn His Arg Lys Met Gly Ile His Leu Ile
            180                 185                 190
His Leu Ile Asn Asp Thr Leu Val Pro Leu Cys Asn Gly Ser Ile Phe
        195                 200                 205
Phe Gly Asn Ile Ser Lys Leu Asp Phe Cys Glu Ser Glu Asn Glu Lys
    210                 215                 220
Leu Ile Asp Phe Ala Ser Thr Glu Lys Gln Asp Glu Arg Lys Phe Leu
225                 230                 235                 240
Leu Ser Lys Ile Asn Glu Ile Lys Gln Tyr Phe Glu Asp Asn Gly Gly
                245                 250                 255
Asn Val Pro Phe Ala Arg Ala Thr Leu Asn Arg His Thr Ala Asn Gln
            260                 265                 270
Lys Pro Asp Arg Tyr Asn Glu Glu Ile Lys Lys Leu Val Asn Glu Leu
        275                 280                 285
Gly Val Asn Ser Leu Val Arg Ser Leu Lys Ser Lys Thr Ile Glu Glu
    290                 295                 300
Ile Lys Thr His Phe Glu Phe Glu Asn Lys Asn Lys Ile Asn Glu Leu
305                 310                 315                 320
Lys Asn Ser Phe Val Leu Ser Ile Val Glu Lys Ile Gln Leu Phe Lys
                325                 330                 335
Tyr Lys Thr Ile Pro Ala Ser Val Arg Phe Leu Leu Ala Asp Tyr Phe
            340                 345                 350
Glu Glu Gln Lys Leu Ser Thr Lys Glu Glu Ala Leu Thr Ile Phe Glu
        355                 360                 365
Glu Ile Gly Lys Pro Gln Asn Ile Gly Phe Asp Tyr Ile Gln Leu Lys
    370                 375                 380
Glu Lys Asp Asn Phe Thr Leu Lys Lys Tyr Pro Leu Lys Gln Ala Phe
385                 390                 395                 400
Asp Tyr Ala Trp Glu Asn Leu Ala Arg Leu Asp Gln Asn Pro Lys Ala
                405                 410                 415
Asn Gln Phe Ser Val Asp Glu Cys Lys Arg Phe Phe Lys Glu Val Phe
            420                 425                 430
Ser Met Glu Met Asp Asn Ile Asn Phe Lys Thr Tyr Ala Leu Leu Leu
        435                 440                 445
Ala Leu Lys Glu Lys Thr Thr Ala Phe Asp Lys Lys Gly Glu Gly Ala
    450                 455                 460
Ala Lys Asn Lys Ser Glu Ile Ile Glu Gln Ile Lys Gly Val Phe Glu
465                 470                 475                 480
Glu Leu Asp Gln Pro Phe Lys Ile Ile Ala Asn Thr Leu Arg Glu Glu
                485                 490                 495
Val Ile Lys Lys Glu Asp Glu Leu Asn Val Leu Lys Arg Gln Tyr Arg
            500                 505                 510
```

```
Glu Thr Asp Arg Lys Ile Lys Thr Leu Gln Asn Glu Ile Lys Lys Ile
        515                 520                 525
Lys Asn Gln Ile Lys Asn Leu Glu Asn Ser Lys Lys Tyr Ser Phe Pro
    530                 535                 540
Glu Ile Ile Lys Trp Ile Asp Leu Thr Glu Gln Glu Gln Leu Leu Asp
545                 550                 555                 560
Lys Asn Lys Gln Ala Lys Ser Asn Tyr Gln Lys Ala Lys Gly Asp Leu
                565                 570                 575
Gly Leu Ile Arg Gly Ser Gln Lys Thr Ser Ile Asn Asp Tyr Phe Tyr
            580                 585                 590
Leu Thr Asp Lys Val Tyr Arg Lys Leu Ala Gln Asp Phe Gly Lys Lys
        595                 600                 605
Met Ala Asp Leu Arg Glu Lys Leu Leu Asp Lys Asn Asp Val Asn Lys
    610                 615                 620
Ile Lys Tyr Leu Ser Tyr Ile Val Lys Asp Asn Gln Gly Tyr Gln Tyr
625                 630                 635                 640
Thr Leu Leu Lys Pro Leu Glu Asp Lys Asn Ala Glu Ile Ile Glu Leu
                645                 650                 655
Lys Ser Glu Pro Asn Gly Asp Leu Lys Leu Phe Glu Ile Lys Ser Leu
            660                 665                 670
Thr Ser Lys Thr Leu Asn Lys Phe Ile Lys Asn Lys Gly Ala Tyr Lys
        675                 680                 685
Glu Phe His Ser Ala Glu Phe Glu His Lys Lys Ile Lys Glu Asp Trp
    690                 695                 700
Lys Asn Tyr Lys Tyr Asn Ser Asp Phe Ile Val Lys Leu Lys Lys Cys
705                 710                 715                 720
Leu Ser His Ser Asp Met Ala Asn Thr Gln Asn Trp Lys Ala Phe Gly
                725                 730                 735
Trp Asp Leu Asp Lys Cys Lys Ser Tyr Glu Thr Ile Glu Lys Glu Ile
            740                 745                 750
Asp Gln Lys Ser Tyr Gln Leu Val Glu Ile Lys Leu Ser Lys Thr Thr
        755                 760                 765
Ile Glu Lys Trp Val Lys Glu Asn Asn Tyr Leu Leu Leu Pro Ile Val
    770                 775                 780
Asn Gln Asp Ile Thr Ala Glu Lys Leu Lys Val Asn Thr Asn Gln Phe
785                 790                 795                 800
Thr Lys Asp Trp Gln His Ile Phe Glu Lys Asn Pro Asn His Arg Leu
                805                 810                 815
His Pro Glu Phe Asn Ile Ala Tyr Arg Gln Pro Thr Lys Asp Tyr Ala
            820                 825                 830
Lys Glu Gly Glu Lys Arg Tyr Ser Arg Phe Gln Leu Thr Gly Gln Phe
        835                 840                 845
Met Tyr Glu Tyr Ile Pro Gln Asp Ala Asn Tyr Ile Ser Arg Lys Glu
    850                 855                 860
Gln Ile Thr Leu Phe Asn Asp Lys Glu Glu Gln Lys Ile Gln Val Glu
865                 870                 875                 880
Thr Phe Asn Asn Gln Ile Ala Lys Ile Leu Asn Ala Glu Asp Phe Tyr
                885                 890                 895
Val Ile Gly Ile Asp Arg Gly Ile Thr Gln Leu Ala Thr Leu Cys Val
            900                 905                 910
Leu Asn Lys Asn Gly Val Ile Gln Gly Gly Phe Glu Ile Phe Thr Arg
        915                 920                 925
Glu Phe Asp Tyr Thr Asn Lys Gln Trp Lys His Thr Lys Leu Lys Glu
    930                 935                 940
```

```
Asn Arg Asn Ile Leu Asp Ile Ser Asn Leu Lys Val Glu Thr Thr Val
945                 950                 955                 960
Asn Gly Glu Lys Val Leu Val Asp Leu Ser Glu Val Lys Thr Tyr Leu
                965                 970                 975
Arg Asp Glu Asn Gly Glu Pro Met Lys Asn Glu Lys Gly Val Ile Leu
            980                 985                 990
Thr Lys Asp Asn Leu Gln Lys Ile Lys Leu Lys Gln Leu Ala Tyr Asp
        995                 1000                1005
Arg Lys Leu Gln Tyr Lys Met Gln His Glu Pro Glu Leu Val Leu Ser
    1010                1015                1020
Phe Leu Asp Arg Leu Glu Asn Lys Glu Gln Ile Pro Asn Leu Leu Ala
1025                1030                1035                1040
Ser Thr Lys Leu Ile Ser Ala Tyr Lys Glu Gly Thr Ala Tyr Ala Asp
                1045                1050                1055
Ile Asp Ile Glu Gln Phe Trp Asn Ile Leu Gln Thr Phe Gln Thr Ile
            1060                1065                1070
Val Asp Lys Phe Gly Gly Ile Glu Asn Ala Lys Lys Thr Met Glu Phe
        1075                1080                1085
Arg Gln Tyr Thr Glu Leu Asp Ala Ser Phe Asp Leu Lys Asn Gly Val
    1090                1095                1100
Val Ala Asn Met Val Gly Val Val Lys Phe Ile Met Glu Lys Tyr Asn
1105                1110                1115                1120
Tyr Lys Thr Phe Ile Ala Leu Glu Asp Leu Thr Phe Ala Phe Gly Gln
                1125                1130                1135
Ser Ile Asp Gly Ile Asn Gly Glu Arg Leu Arg Ser Thr Lys Glu Asp
            1140                1145                1150
Lys Glu Val Asp Phe Lys Glu Gln Glu Asn Ser Thr Leu Ala Gly Leu
        1155                1160                1165
Gly Thr Tyr His Phe Phe Glu Met Gln Leu Leu Lys Lys Leu Ser Lys
    1170                1175                1180
Thr Gln Ile Gly Asn Glu Ile Lys His Phe Val Pro Ala Phe Arg Ser
1185                1190                1195                1200
Thr Glu Asn Tyr Glu Lys Ile Val Arg Lys Asp Lys Asn Val Lys Ala
                1205                1210                1215
Lys Ile Val Ser Tyr Pro Phe Gly Ile Val Ser Phe Val Asn Pro Arg
            1220                1225                1230
Asn Thr Ser Ile Ser Cys Pro Asn Cys Lys Asn Ala Asn Lys Ser Asn
        1235                1240                1245
Arg Ile Lys Lys Glu Asn Asp Arg Ile Leu Cys Lys His Asn Ile Glu
    1250                1255                1260
Lys Thr Lys Gly Asn Cys Gly Phe Asp Thr Ala Asn Phe Asp Glu Asn
1265                1270                1275                1280
Lys Leu Arg Ala Glu Asn Lys Gly Lys Asn Phe Lys Tyr Ile Ser Ser
                1285                1290                1295
Gly Asp Ala Asn Ala Ala Tyr Asn Ile Ala Val Lys Leu Leu Glu Asp
            1300                1305                1310
Lys Ile Phe Glu Ile Asn Lys Lys
        1315                1320
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<210> 31
<211> 178
<212> PRT
<213> Escherichia coli

<400> 31
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 32
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> ERF protein motif

<220>
<221> VARIANT
<222> 2
<223> Xaa = Gly, Ser, or Ala

<220>
<221> VARIANT
<222> 3, 4
<223> Xaa = Any Amino Acid

<220>
<221> VARIANT
<222> 5
<223> Xaa = Ser or Thr

<220>
<221> VARIANT
<222> 7

<223> Xaa = Ala, Val, Leu, Ile, Met, or Phe

<220>
<221> VARIANT
<222> 8
<223> Xaa = Lys, Arg, Glu, Asp, Asn, Thr, or Ser

<220>
<221> VARIANT
<222> 9
<223> Xaa = Lys or Arg

<220>
<221> VARIANT
<222> 11
<223> Xaa = Any Amino Acid

<220>
<221> VARIANT
<222> 12
<223> Xaa = Ala, Val, Leu, Ile, Met, or Phe

<220>
<221> VARIANT
<222> 13, 14
<223> Xaa = Any Amino Acid

<220>
<221> VARIANT
<222> 15, 16
<223> Xaa = Ala, Val, Leu, Ile, Met, or Phe

<400> 32
Gly Xaa Xaa Xaa Xaa Tyr Xaa Xaa Xaa Tyr Xaa Xaa Xaa Xaa Xaa Xaa
 1   5   10   15

<210> 33
<211> 20
<212> PRT
<213> Unknown

<220>
<223> FMDV 2A self-processing peptide sequence

<400> 33
Gln Leu Leu Asn Phe Asp Leu Leu Lys Leu Ala Gly Asp Val Glu Ser
 1   5   10   15
Asn Pro Gly Pro
            20

<210> 34
<211> 178
<212> PRT
<213> Escherichia coli APEC Ol

<400> 34
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 35
<211> 178
<212> PRT
<213> Escherichia coli UTI89

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

```
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130                 135                 140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145                 150                 155                 160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165                 170                 175
Pro Phe
```

<210> 36
<211> 178
<212> PRT
<213> Unknown

<220>
<223> Proteobacteria

<400> 36

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

<210> 37
<211> 178
<212> PRT
<213> Unknown

<220>
<223> Escherichia

<400> 37

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

<210> 38
<211> 178
<212> PRT
<213> Shigella flexneri

<400> 38

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

Pro Phe

<210> 39
<211> 178
<212> PRT
<213> Escherichia coli

<400> 39
Met Ala Ser Lys Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 40
<211> 178
<212> PRT
<213> Escherichia coli

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

```
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115                 120                 125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130                 135                 140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145                 150                 155                 160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165                 170                 175
Pro Phe
```

<210> 41
<211> 178
<212> PRT
<213> Escherichia coli

<400> 41

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

<210> 42
<211> 178
<212> PRT
<213> Escherichia coli

<400> 42

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

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

<210> 43
<211> 178
<212> PRT
<213> Escherichia coli

<400> 43

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

<210> 44
<211> 178
<212> PRT
<213> Escherichia coli

<400> 44
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Ser Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 45
<211> 178
<212> PRT
<213> Escherichia coli

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

Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Ser Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 46
<211> 178
<212> PRT
<213> Escherichia coli

<400> 46
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Ser Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 47
<211> 178
<212> PRT
<213> Escherichia coli

<400> 47
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30

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

<210> 48
<211> 178
<212> PRT
<213> Escherichia coli

<400> 48

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

<210> 49
<211> 178
<212> PRT
<213> Escherichia coli

<400> 49
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Ser Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 50
<211> 178
<212> PRT
<213> Unknown

<220>
<223> Escherichia

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

```
            100                 105                 110
Leu Gly Gly Arg Gln Ser Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115                 120                 125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130                 135                 140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145                 150                 155                 160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165                 170                 175
Pro Phe
```

<210> 51
<211> 178
<212> PRT
<213> Escherichia coli

<400> 51

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

<210> 52
<211> 177
<212> PRT
<213> Escherichia coli

<400> 52

```
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1               5                  10                  15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
```

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

<210> 53
<211> 178
<212> PRT
<213> Escherichia coli

<400> 53

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

<210> 54
<211> 178
<212> PRT
<213> Escherichia coli

<220>
<221> VARIANT
<222> 111
<223> Xaa = Any Amino Acid

<400> 54
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Xaa Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 55
<211> 178
<212> PRT
<213> Escherichia coli

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

Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 56
<211> 178
<212> PRT
<213> Escherichia coli

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

<210> 57
<211> 178
<212> PRT
<213> Escherichia coli

<400> 57

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

<210> 58
<211> 178
<212> PRT
<213> Escherichia coli

<400> 58

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

Pro Phe

<210> 59
<211> 178
<212> PRT
<213> Escherichia coli

<400> 59
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Ile Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 60
<211> 178
<212> PRT
<213> Shigella dysenteriae 1617

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

```
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115                 120                 125
Gly Gly Gln Leu Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130                 135                 140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145                 150                 155                 160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165                 170                 175
Pro Phe
```

<210> 61
<211> 178
<212> PRT
<213> Escherichia albertii

```
<400> 61
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1               5                  10                  15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20                  25                  30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35                  40                  45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50                  55                  60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65                  70                  75                  80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Leu Asp
                85                  90                  95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115                 120                 125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130                 135                 140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145                 150                 155                 160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165                 170                 175
Pro Phe
```

<210> 62
<211> 178
<212> PRT
<213> Escherichia coli

```
<400> 62
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1               5                  10                  15
```

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

<210> 63
<211> 178
<212> PRT
<213> Escherichia coli

<400> 63

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

<210> 64
<211> 178
<212> PRT
<213> Escherichia coli

<400> 64
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Pro Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 65
<211> 178
<212> PRT
<213> Unknown

<220>
<223> Enterobacteriaceae

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

```
                85                  90                  95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115                 120                 125
Gly Gly Gln Leu Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130                 135                 140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145                 150                 155                 160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165                 170                 175
Pro Phe
```

<210> 66
<211> 178
<212> PRT
<213> Escherichia coli

<400> 66

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

<210> 67
<211> 178
<212> PRT
<213> Escherichia coli

<400> 67

```
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
```

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

<210> 68
<211> 178
<212> PRT
<213> Escherichia coli

<400> 68

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

<210> 69
<211> 178
<212> PRT
<213> Unknown

<220>
<223> Escherichia

<400> 69
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Ser Gly Gly Ala Pro Thr Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 70
<211> 178
<212> PRT
<213> Escherichia coli

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

Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 71
<211> 178
<212> PRT
<213> Escherichia coli

<400> 71
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Gly Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 72
<211> 178
<212> PRT
<213> Escherichia albertii

<400> 72

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

<210> 73
<211> 178
<212> PRT
<213> Escherichia albertii

<400> 73

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

Pro Phe

<210> 74
<211> 188
<212> PRT
<213> Escherichia coli

<400> 74
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe Ser Gly
145   150   155   160
Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala Pro Ala Ala Pro Ser Asn
                165   170   175
Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
            180   185

<210> 75
<211> 177
<212> PRT
<213> Unknown

<220>
<223> Citrobacter

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

65 70 75 80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Val Glu
85 90 95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
100 105 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ala Gly
115 120 125
Gly Gly Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly
130 135 140
Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala Pro
145 150 155 160
Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro
165 170 175
Phe

<210> 76
<211> 178
<212> PRT
<213> Citrobacter koseri

<400> 76
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
1 5 10 15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
20 25 30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
35 40 45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
50 55 60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65 70 75 80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
85 90 95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
100 105 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Met Gly
115 120 125
Gly Gly Gln Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
130 135 140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser
145 150 155 160
Ala Pro Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
165 170 175
Pro Phe

<210> 77
<211> 171
<212> PRT
<213> Escherichia coli ECC-1470

<400> 77
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115   120   125
Gly Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala
145   150   155   160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp
                165   170

<210> 78
<211> 178
<212> PRT
<213> Citrobacter koseri

<400> 78
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Val Pro Ala Gly Gly Asn Met Gly
        115   120   125
Gly Gly Gln Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser
145   150   155   160
Ala Pro Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 79
<211> 178
<212> PRT
<213> Citrobacter koseri

<400> 79
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Lys Tyr Ile Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Met Gly
        115   120   125
Gly Gly Gln Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser
145   150   155   160
Ala Pro Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 80
<211> 171
<212> PRT
<213> Unknown

<220>
<223> Shigella

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

```
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85                  90                  95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly
        115                 120                 125
Gly Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe Ser Gly Gly
    130                 135                 140
Ala Gln Ser Arg Pro Gln Gln Ser Ala Pro Ala Ala Pro Ser Asn Glu
145                 150                 155                 160
Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170
```

<210> 81
<211> 174
<212> PRT
<213> Unknown

<220>
<223> Enterobacteriaceae

<400> 81

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

<210> 82
<211> 174
<212> PRT
<213> Citrobacter freundii complex

<400> 82

```
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
```

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

<210> 83
<211> 174
<212> PRT
<213> Unknown

<220>
<223> Citrobacter

<400> 83

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

<210> 84
<211> 174
<212> PRT
<213> Citrobacter youngae

<400> 84
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Val Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Gly Gln Gln
        115   120   125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
    130   135   140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala Pro Ala Ala Pro
145   150   155   160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165   170

<210> 85
<211> 174
<212> PRT
<213> Citrobacter werkmanii

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

```
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
    130                 135                 140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala Pro Ala Ala Pro
145                 150                 155                 160
Ser Asn Glu Pro Ser Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170
```

<210> 86
<211> 174
<212> PRT
<213> Citrobacter sp. MGH109

<400> 86

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

<210> 87
<211> 175
<212> PRT
<213> Unknown

<220>
<223> Enterobacteriaceae

<400> 87

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

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


<210> 88
<211> 174
<212> PRT
<213> Unknown

<220>
<223> Citrobacter

<400> 88
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1               5                  10                  15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20                  25                  30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35                  40                  45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50                  55                  60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65                  70                  75                  80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85                  90                  95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Gln Gln Gln
        115                 120                 125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
    130                 135                 140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala Pro Ala Pro
145                 150                 155                 160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170


<210> 89
<211> 174
<212> PRT
<213> Unknown
```

<220>
<223> Proteobacteria

<400> 89
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Gly Gln Gln
        115   120   125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
    130   135   140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala Pro Ala Pro
145   150   155   160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165   170

<210> 90
<211> 155
<212> PRT
<213> Escherichia coli PA5

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

145 150 155

<210> 91
<211> 174
<212> PRT
<213> Enterobacter aerogenes

<400> 91
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
1 5 10 15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
20 25 30
Phe Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
35 40 45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
50 55 60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65 70 75 80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
85 90 95
Lys Tyr Thr Thr Glu Ile Val Val Asn Val Gly Gly Thr Met Gln Met
100 105 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Ser Gly Gly Gln Gln
115 120 125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
130 135 140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ala Pro Ala Ala Pro
145 150 155 160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
165 170

<210> 92
<211> 176
<212> PRT
<213> Enterobacter cloacae

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

```
        115                 120                 125
Gln Gln Gln Gly Gly Trp Gly Arg His Gln Gln Pro Gln Gly Gly Asn
    130                 135                 140
Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala Pro
145                 150                 155                 160
Ala Pro Ser Asn Glu Pro Pro Met Asp Leu Asp Asp Asp Ile Pro Phe
                165                 170                 175


<210> 93
<211> 174
<212> PRT
<213> Enterobacter cloacae

<400> 93
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1               5                  10                  15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20                  25                  30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35                  40                  45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50                  55                  60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65                  70                  75                  80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Ala Glu
                85                  90                  95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Ser Gln Gln
        115                 120                 125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
    130                 135                 140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala Pro Ala Pro
145                 150                 155                 160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170


<210> 94
<211> 178
<212> PRT
<213> Klebsiella sp. G5

<400> 94
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1               5                  10                  15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20                  25                  30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35                  40                  45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50                  55                  60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
```

65 70 75 80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Glu
85 90 95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
100 105 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Met Gly
115 120 125
Gly Gly Gln Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
130 135 140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser
145 150 155 160
Ala Pro Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
165 170 175
Pro Phe

<210> 95
<211> 175
<212> PRT
<213> Klebsiella oxytoca

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

<210> 96
<211> 178
<212> PRT
<213> Unknown

<220>
<223> Enterobacteriaceae

<400> 96
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Ala Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Met Gly
        115   120   125
Gly Gly Gln Gly Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln
    130   135   140
Gly Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser
145   150   155   160
Ala Pro Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165   170   175
Pro Phe

<210> 97
<211> 178
<212> PRT
<213> Enterobacter lignolyticus

<400> 97
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Ser Ala Gly Gly Asn Met Gly
        115   120   125
Gly Gly Gln Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly
    130   135   140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser
145   150   155   160

```
Ala Pro Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165                 170                 175
Pro Phe
```

<210> 98
<211> 176
<212> PRT
<213> Serratia marcescens

<400> 98

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

<210> 99
<211> 174
<212> PRT
<213> Enterobacter cloacae complex

<400> 99

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

```
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Ser Gly Ala Pro Ala Gly Gly Gly Gln Gln
        115                 120                 125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
    130                 135                 140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala Pro Ala Pro
145                 150                 155                 160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170
```

<210> 100
<211> 176
<212> PRT
<213> Enterobacter cloacae complex

<400> 100

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

<210> 101
<211> 175
<212> PRT
<213> Unknown

<220>
<223> Enterobacteriaceae

<400> 101

```
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1               5                  10                  15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
```

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


<210> 102
<211> 175
<212> PRT
<213> Unknown

<220>
<223> Enterobacteriaceae

<400> 102
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1               5                  10                  15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20                  25                  30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35                  40                  45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50                  55                  60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65                  70                  75                  80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Glu
                85                  90                  95
Lys Tyr Thr Thr Glu Ile Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gln Gly Ala Gly Ala Pro Ala Gly Gly Gly Gln
        115                 120                 125
Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln
    130                 135                 140
Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ala Pro Ala Ala
145                 150                 155                 160
Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170                 175
```

<210> 103
<211> 176
<212> PRT
<213> Enterobacter cloacae

<400> 103
Met Ala Ser Lys Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Leu Pro Ser Gly Ser Ala Val Cys Ser
            20   25   30
Val Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Leu Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Ser Gln Asn
        115   120   125
Gln Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn
    130   135   140
Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala Pro
145   150   155   160
Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165   170   175

<210> 104
<211> 175
<212> PRT
<213> Klebsiella oxytoca

<400> 104
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gln Gly Ala Gly Ala Pro Ala Gly Gly Gly Gln
        115   120   125
Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln
    130   135   140

```
Tyr Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ala Pro Ala Ala
145                 150                 155                 160
Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170                 175


<210> 105
<211> 175
<212> PRT
<213> Klebsiella oxytoca

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


<210> 106
<211> 184
<212> PRT
<213> Unknown

<220>
<223> Pantoea

<400> 106
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1               5                  10                  15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20                  25                  30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35                  40                  45
Asn Lys Glu Ile Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50                  55                  60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
```

65 70 75 80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Gln Asp Gln Gly Gly Gln Asp
85 90 95
Arg Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
100 105 110
Leu Gly Gly Arg Gln Gln Gly Gly Ala Ser Ala Gly Gly Ala Pro Met
115 120 125
Gly Gly Gly Gln Gln Ser Gly Gly Asn Asn Asn Gly Trp Gly Gln Pro
130 135 140
Gln Gln Pro Gln Gly Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg
145 150 155 160
Pro Gln Pro Gln Ser Ala Pro Ala Ser Asn Asn Asn Glu Pro Pro Met
165 170 175
Asp Phe Asp Asp Asp Ile Pro Phe
180

<210> 107
<211> 175
<212> PRT
<213> Klebsiella oxytoca

<400> 107
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
1 5 10 15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
20 25 30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
35 40 45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
50 55 60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65 70 75 80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Glu
85 90 95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
100 105 110
Leu Gly Gly Arg Gln Gln Gly Ala Gly Ala Pro Ala Gly Gly Gly Gln
115 120 125
Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln
130 135 140
Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ala Pro Ala Ala
145 150 155 160
Pro Ser Asn Glu Thr Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
165 170 175

<210> 108
<211> 176
<212> PRT
<213> Unknown

<220>
<223> Enterobacteriaceae

<400> 108
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Gln Lys Glu Lys Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Ser Leu Gln Thr Arg Lys Trp Gln Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Ile Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gln Ser Ala Gly
        115   120   125
Gly Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Ser Gly Asn Gln
    130   135   140
Phe Ser Gly Gly Gln Gln Gln Ser Arg Pro Ala Gln Asn Ser Ala Pro
145   150   155   160
Ala Thr Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165   170   175

<210> 109
<211> 174
<212> PRT
<213> Klebsiella pneumoniae

<400> 109
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20   25   30
Phe Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys His Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Gly Gln Gln
        115   120   125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
    130   135   140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ala Pro Ala Ala Pro
145   150   155   160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165   170

<210> 110
<211> 171
<212> PRT
<213> Klebsiella pneumoniae

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

<210> 111
<211> 173
<212> PRT
<213> Unknown

<220>
<223> Enterobacteriaceae

<400> 111
Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly Gln
 1   5   10   15
Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn Phe
            20   25   30
Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu Met
        35   40   45
Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu Ala
    50   55   60
Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile Glu
65   70   75   80
Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp Lys
                85   90   95
Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met Leu

```
            100                 105                 110
Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Gly Gln Gln Gln
        115                 120                 125
Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe Ser
    130                 135                 140
Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ala Pro Ala Ala Pro Ser
145                 150                 155                 160
Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170
```

<210> 112
<211> 174
<212> PRT
<213> Klebsiella pneumoniae

<400> 112

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

<210> 113
<211> 175
<212> PRT
<213> Unknown

<220>
<223> Gammaproteobacteria

<400> 113

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

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

<210> 114
<211> 173
<212> PRT
<213> Enterobacter aerogenes

<400> 114

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

<210> 115
<211> 174
<212> PRT
<213> Enterobacter aerogenes

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

<210> 116
<211> 177
<212> PRT
<213> Unknown

<220>
<223> Serratia

<400> 116
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Gln Lys Glu Lys Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Ser Leu Gln Thr Arg Lys Trp Gln Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Thr Thr Glu Ile Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gln Ser Ala Gly
        115   120   125
Gly Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln
    130   135   140
Phe Ser Gly Gly Gln Gln Gln Ser Arg Pro Ala Gln Asn Ser Ala Pro

145 150 155 160
Ala Ala Ser Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro
165 170 175
Phe

<210> 117
<211> 174
<212> PRT
<213> Yokenella regensburgei

<400> 117
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
1 5 10 15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
20 25 30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
35 40 45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
50 55 60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65 70 75 80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Glu
85 90 95
Lys Tyr Thr Thr Glu Ile Val Val Asn Val Gly Gly Thr Met Gln Met
100 105 110
Leu Gly Gly Arg Gln Gln Gly Gly Ala Pro Ala Gly Gly Gly Gln Gln
115 120 125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
130 135 140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala Pro Ala Pro
145 150 155 160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
165 170

<210> 118
<211> 178
<212> PRT
<213> Raoultella terrigena

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

```
                85                  90                  95
Lys Tyr Thr Thr Glu Ile Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Gly Gln Gln
        115                 120                 125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gln Gln Pro Gln Gly
    130                 135                 140
Gly Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ala
145                 150                 155                 160
Pro Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile
                165                 170                 175
Pro Phe
```

<210> 119
<211> 174
<212> PRT
<213> Klebsiella pneumoniae

<400> 119

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

<210> 120
<211> 181
<212> PRT
<213> Unknown

<220>
<223> Yersinia

<400> 120

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

<210> 121
<211> 174
<212> PRT
<213> Klebsiella pneumoniae

<400> 121

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

<210> 122
<211> 180
<212> PRT
<213> Cronobacter condimenti

<400> 122
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Leu Arg Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35   40   45
Met Lys Glu Val Thr Glu Trp His Ser Val Val Leu Tyr Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Ile Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Gln Asp Gln Ser Gly Gln Asp
                85   90   95
Arg Tyr Ser Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Met Gly
        115   120   125
Gly Gly Gln Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gln
    130   135   140
Gln Ser Gly Gly Ala Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln
145   150   155   160
Gln Gln Ala Pro Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp
                165   170   175
Asp Ile Pro Phe
            180

<210> 123
<211> 174
<212> PRT
<213> Klebsiella sp. 10982

<400> 123
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20   25   30
Phe Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110

```
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Gly Gln Gln
        115                 120                 125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Ser Gln Phe
    130                 135                 140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ala Pro Ala Ala Pro
145                 150                 155                 160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170
```

<210> 124
<211> 458
<212> PRT
<213> Klebsiella pneumoniae

<400> 124

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

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


<210> 125
<211> 176
<212> PRT
<213> Trabulsiella guamensis

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


<210> 126
<211> 176
```

<212> PRT
<213> Enterobacter cloacae

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

<210> 127
<211> 177
<212> PRT
<213> Trabulsiella odontotermitis

<400> 127
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Val Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gln Gly Ala Gly Ala Pro Ala Gly Gly Gly Gln
        115   120   125
Pro Gln Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly
    130   135   140
Ala Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala
145   150   155   160

Pro Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro
                165   170   175
Phe

<210> 128
<211> 177
<212> PRT
<213> Trabulsiella odontotermitis

<400> 128
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Val Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gln Gly Ala Gly Ala Pro Ala Gly Gly Gly Gln
        115   120   125
Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gln Gln Gly Gly
    130   135   140
Ala Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala
145   150   155   160
Pro Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro
                165   170   175
Phe

<210> 129
<211> 174
<212> PRT
<213> Kosakonia radicincitans

<400> 129
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Gln Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80

```
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Glu
                85                  90                  95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100                 105                 110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Gly Gln Gln
        115                 120                 125
Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln Phe
    130                 135                 140
Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ser Ala Pro Ala Pro
145                 150                 155                 160
Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165                 170
```

<210> 130
<211> 177
<212> PRT
<213> Serratia marcescens

<400> 130

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

<210> 131
<211> 175
<212> PRT
<213> Unknown

<220>
<223> Kluyvera

<400> 131
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Ala Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Gly Gln Gln
        115   120   125
Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln
    130   135   140
Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala Pro Ala
145   150   155   160
Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165   170   175

<210> 132
<211> 175
<212> PRT
<213> Enterobacter asburiae

<400> 132
Met Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly
 1   5   10   15
Gln Asp Pro Glu Val Arg Tyr Met Pro Ser Gly Gly Ala Val Ala Asn
            20   25   30
Ile Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu
        35   40   45
Met Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu
    50   55   60
Ala Glu Val Ala Gly Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile
65   70   75   80
Glu Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Ala Glu
                85   90   95
Lys Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met
            100   105   110
Leu Gly Gly Arg Gln Gly Gly Gly Thr Pro Ala Gly Gly Gly Gln Gln
        115   120   125
Gln Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly Asn Gln
    130   135   140
Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Gln Ser Ala Pro Ala
145   150   155   160
Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro Phe
                165   170   175

<210> 133
<211> 193
<212> PRT
<213> Artificial Sequence

<220>
<223> c2 NLS-SSB fusion protein

<400> 133
Met Gln Pro Ser Leu Lys Arg Met Lys Ile Gln Pro Ser Ser Gln Pro
 1   5   10   15
Ala Ser Arg Gly Val Asn Lys Val Ile Leu Val Gly Asn Leu Gly Gln
            20   25   30
Asp Pro Glu Val Arg Tyr Met Pro Asn Gly Gly Ala Val Ala Asn Ile
        35   40   45
Thr Leu Ala Thr Ser Glu Ser Trp Arg Asp Lys Ala Thr Gly Glu Met
    50   55   60
Lys Glu Gln Thr Glu Trp His Arg Val Val Leu Phe Gly Lys Leu Ala
65   70   75   80
Glu Val Ala Ser Glu Tyr Leu Arg Lys Gly Ser Gln Val Tyr Ile Glu
                85   90   95
Gly Gln Leu Arg Thr Arg Lys Trp Thr Asp Gln Ser Gly Gln Asp Arg
            100   105   110
Tyr Thr Thr Glu Val Val Val Asn Val Gly Gly Thr Met Gln Met Leu
        115   120   125
Gly Gly Arg Gln Gly Gly Gly Ala Pro Ala Gly Gly Asn Ile Gly Gly
    130   135   140
Gly Gln Pro Gln Gly Gly Trp Gly Gln Pro Gln Gln Pro Gln Gly Gly
145   150   155   160
Asn Gln Phe Ser Gly Gly Ala Gln Ser Arg Pro Gln Gln Ser Ala Pro
                165   170   175
Ala Ala Pro Ser Asn Glu Pro Pro Met Asp Phe Asp Asp Asp Ile Pro
            180   185   190
Phe

<210> 134
<211> 277
<212> PRT
<213> Artificial Sequence

<220>
<223> c2 NLS-Bacteriophage Lambda Red beta SSAP-fusion protein

<400> 134
Met Gln Pro Ser Leu Lys Arg Met Lys Ile Gln Pro Ser Ser Gln Pro
 1   5   10   15
Met Ser Thr Ala Leu Ala Thr Leu Ala Gly Lys Leu Ala Glu Arg Val
            20   25   30
Gly Met Asp Ser Val Asp Pro Gln Glu Leu Ile Thr Thr Leu Arg Gln
        35   40   45
Thr Ala Phe Lys Gly Asp Ala Ser Asp Ala Gln Phe Ile Ala Leu Leu

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

<210> 135
<211> 241
<212> PRT
<213> Artificial Sequence

<220>
<223> c2 NLS-Bacteriophage Lambda Red Exonuclease-fusion protein

<400> 135

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

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

<210> 136
<211> 692
<212> PRT
<213> Homo sapiens

<400> 136

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

```
    210                 215                 220
Val Gln Val His Val Asn Lys Leu Asp Met Phe Arg Asn Met Pro Glu
225                 230                 235                 240
Ile Leu His His Leu Thr Thr Asp Arg Asn Thr Gln Ile His Ala Cys
                245                 250                 255
Arg His Pro Lys Ala Glu Glu Tyr Phe Gln Trp Ser Lys Leu Pro Cys
            260                 265                 270
Gly Ile Thr Ser Arg Asn Arg Ile Pro Leu His Ile Ile Ser Ile Lys
        275                 280                 285
Pro Ser Thr Met Trp Phe Gly Glu Arg Ser Arg Lys Thr Asn Val Ile
    290                 295                 300
Val Arg Thr Gly Glu Ser Ser Tyr Arg Ala Cys Phe Ser Phe His Ser
305                 310                 315                 320
Ser Tyr Ser Glu Ile Lys Asp Phe Leu Ser Tyr Leu Cys Pro Val Asn
                325                 330                 335
Ala Tyr Pro Asn Val Ile Pro Val Gly Thr Thr Met Asp Lys Val Val
            340                 345                 350
Glu Ile Leu Lys Pro Leu Cys Arg Ser Ser Gln Ser Thr Glu Pro Lys
        355                 360                 365
Tyr Lys Pro Leu Gly Lys Leu Lys Arg Ala Arg Thr Val His Arg Asp
    370                 375                 380
Ser Glu Glu Glu Asp Asp Tyr Leu Phe Asp Asp Pro Leu Pro Ile Pro
385                 390                 395                 400
Leu Arg His Lys Val Pro Tyr Pro Glu Thr Phe His Pro Glu Val Phe
                405                 410                 415
Ser Met Thr Ala Val Ser Glu Lys Gln Pro Glu Lys Leu Arg Gln Thr
            420                 425                 430
Pro Gly Cys Cys Arg Ala Glu Cys Met Gln Ser Ser Arg Phe Thr Asn
        435                 440                 445
Phe Val Asp Cys Glu Glu Ser Asn Ser Glu Ser Glu Glu Glu Val Gly
    450                 455                 460
Ile Pro Ala Ser Leu Gln Gly Asp Leu Gly Ser Val Leu His Leu Gln
465                 470                 475                 480
Lys Ala Asp Gly Asp Val Pro Gln Trp Glu Val Phe Phe Lys Arg Asn
                485                 490                 495
Asp Glu Ile Thr Asp Glu Ser Leu Glu Asn Phe Pro Ser Ser Thr Val
            500                 505                 510
Ala Gly Gly Ser Gln Ser Pro Lys Leu Phe Ser Asp Ser Asp Gly Glu
        515                 520                 525
Ser Thr His Ile Ser Ser Gln Asn Ser Ser Gln Ser Thr His Ile Thr
    530                 535                 540
Glu Gln Gly Ser Gln Gly Trp Asp Ser Gln Ser Asp Thr Val Leu Leu
545                 550                 555                 560
Ser Ser Gln Glu Arg Asn Ser Gly Asp Ile Thr Ser Leu Asp Lys Ala
                565                 570                 575
Asp Tyr Arg Pro Thr Ile Lys Glu Asn Ile Pro Ala Ser Leu Met Glu
            580                 585                 590
Gln Asn Val Ile Cys Pro Lys Asp Thr Tyr Ser Asp Leu Lys Ser Arg
        595                 600                 605
Asp Lys Asp Val Thr Ile Val Pro Ser Thr Gly Glu Pro Thr Thr Leu
    610                 615                 620
Ser Ser Glu Thr His Ile Pro Glu Glu Lys Ser Leu Leu Asn Leu Ser
625                 630                 635                 640
Thr Asn Ala Asp Ser Gln Ser Ser Ser Asp Phe Glu Val Pro Ser Thr
```

```
                645                 650                 655
Pro Glu Ala Glu Leu Pro Lys Arg Glu His Leu Gln Tyr Leu Tyr Glu
            660                 665                 670
Lys Leu Ala Thr Gly Glu Ser Ile Ala Val Lys Lys Arg Lys Cys Ser
        675                 680                 685
Leu Leu Asp Thr
    690
```

<210> 137
<211> 708
<212> PRT
<213> Actinidia chinensis var. chinensis

<400> 137

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

```
305                 310                 315                 320
Ala Arg Gly Asp Leu Asp Pro Phe Thr Lys Met Pro Ile Gln Gly Val
                325                 330                 335
Asn Asn Gly Ala Gly Leu Val Asp Glu Gly Met Tyr Lys Leu Asn Asn
            340                 345                 350
Phe Lys Ser Glu Gly Phe Ala Ser Leu Glu Ala Lys Arg Arg Phe Met
        355                 360                 365
Ala Pro Arg Ser Thr Pro Lys His Arg Asn Pro Ile Thr Glu Thr Cys
    370                 375                 380
Ser Thr Val Glu His Ile Thr Glu Asp Ala Asp Ala Cys Lys Thr Asn
385                 390                 395                 400
Cys Ser Leu Glu Ser Leu Leu Asp Ser Arg Tyr Phe Asp Val Ala Ser
                405                 410                 415
Pro Ser Glu Gly Tyr Val Lys His Gly Val Ala Ala Lys Ser Pro Glu
            420                 425                 430
Ser Lys Ser Pro Ser His Gly Ser His Asp Lys Glu Glu Ile Leu Gly
        435                 440                 445
Glu Gly Asp Asn Arg Ser Pro Gln Asp Pro Leu Leu Gln Gln Phe Lys
    450                 455                 460
His Ser Ile Pro Lys Leu Cys Met Thr Leu Gln Lys Glu Arg Ala Lys
465                 470                 475                 480
Ser Val Ala Asp Ser Gly Gln Asp Lys Thr Arg Lys Glu Asn Thr Lys
                485                 490                 495
Val Ile Val Arg Ser Ser Tyr Phe Gln His Lys Leu Val Lys Glu Asn
            500                 505                 510
Asp Lys Glu Asn Ile Lys Glu Asp Val Thr Thr Asp Lys Gly Glu Asn
        515                 520                 525
Ile Asn Pro Lys Arg Glu His Lys Ser Ala Ser Asp Gly Gly Glu Ala
    530                 535                 540
Lys Thr Arg Ile Lys Asn Arg Lys Thr Ile Val Arg Ser Ser Tyr Phe
545                 550                 555                 560
Leu His Lys Ser Val Asn Glu Asn Asp Gln Asp Asn Arg His Glu Lys
                565                 570                 575
Leu Ile Ile Asn Asp Asp Phe Thr Thr His Thr His Glu Asn Gly Ile
            580                 585                 590
Pro Glu Ser Ala Ser Gly Asp Gly Tyr Phe Asn Asn Ser Ile Val Lys
        595                 600                 605
Arg Lys Val Ser Pro Val Asp Ser Val Gln Met Glu Lys Thr Asn Tyr
    610                 615                 620
Lys Cys Met Arg Met Asp Ala Ser Leu Pro Ile Glu Ser Ser Ser Ile
625                 630                 635                 640
Ser Thr Leu Asn Asn Thr Thr Met Glu Thr Lys Ala Glu Gly Gly Lys
                645                 650                 655
Phe Gly Ser Asn Ile Ser His Leu Lys Asn Tyr Ser Asp Ile Ala Glu
            660                 665                 670
Lys Ser Ile Glu Arg Phe Val Ser Val Ile Ser Ser Phe Lys Cys Ser
        675                 680                 685
Ser Ser Gly Ser Ser Ala Ser Gly Leu Arg Ala Pro Leu Arg Asn Thr
    690                 695                 700
Glu His Met Tyr
705
```

<210> 138

<211> 1062
<212> PRT
<213> Mus musculus

<400> 138
Met Glu Pro Leu Asp Glu Leu Asp Leu Leu Leu Leu Glu Glu Asp Gly
 1   5   10   15
Gly Ala Glu Ala Val Pro Arg Val Glu Leu Leu Arg Lys Lys Ala Asp
            20   25   30
Ala Leu Phe Pro Glu Thr Val Leu Ser Arg Gly Val Asp Asn Arg Tyr
        35   40   45
Leu Val Leu Ala Val Glu Thr Ser Gln Asn Glu Arg Gly Ala Glu Glu
    50   55   60
Lys Arg Leu His Val Thr Ala Ser Gln Asp Arg Glu His Glu Val Leu
65   70   75   80
Cys Ile Leu Arg Asn Gly Trp Ser Ser Val Pro Val Glu Pro Gly Asp
                85   90   95
Ile Val His Leu Glu Gly Asp Cys Thr Ser Glu Pro Trp Ile Ile Asp
            100   105   110
Asp Asp Phe Gly Tyr Phe Ile Leu Tyr Pro Asp Met Met Ile Ser Gly
        115   120   125
Thr Ser Val Ala Ser Ser Ile Arg Cys Leu Arg Arg Ala Val Leu Ser
    130   135   140
Glu Thr Phe Arg Gly Ser Asp Pro Ala Thr Arg Gln Met Leu Ile Gly
145   150   155   160
Thr Ile Leu His Glu Val Phe Gln Lys Ala Ile Ser Glu Ser Phe Ala
                165   170   175
Pro Glu Arg Leu Gln Glu Leu Ala Leu Gln Thr Leu Arg Glu Val Arg
            180   185   190
His Leu Lys Glu Met Tyr Arg Leu Asn Leu Ser Gln Asp Glu Ile Leu
        195   200   205
Cys Glu Val Glu Glu Tyr Leu Pro Ser Phe Ser Lys Trp Ala Glu Asp
    210   215   220
Phe Met Arg Lys Gly Pro Ser Ser Glu Phe Pro Gln Met Gln Leu Ser
225   230   235   240
Leu Pro Ser Asp Gly Ser Asn Arg Ser Ser Pro Cys Asn Ile Glu Val
                245   250   255
Val Lys Ser Leu Asp Ile Glu Glu Ser Ile Trp Ser Pro Arg Phe Gly
            260   265   270
Leu Lys Gly Lys Ile Asp Val Thr Val Gly Val Lys Ile His Arg Asp
        275   280   285
Cys Lys Met Lys Tyr Lys Val Met Pro Leu Glu Leu Lys Thr Gly Lys
    290   295   300
Glu Ser Asn Ser Ile Glu His Arg Ser Gln Val Val Leu Tyr Thr Leu
305   310   315   320
Leu Ser Gln Glu Arg Arg Glu Asp Pro Glu Ala Gly Trp Leu Leu Tyr
                325   330   335
Leu Lys Thr Gly Gln Met Tyr Pro Val Pro Ala Asn His Leu Asp Lys
            340   345   350
Arg Glu Leu Leu Lys Leu Arg Asn Trp Leu Ala Ala Ser Leu Leu His
        355   360   365
Arg Val Ser Arg Ala Ala Pro Gly Glu Glu Ala Arg Leu Ser Ala Leu
    370   375   380
Pro Gln Ile Ile Glu Glu Glu Lys Thr Cys Lys Tyr Cys Ser Gln Ile

385 390 395 400
Gly Asn Cys Ala Leu Tyr Ser Arg Ala Val Glu Glu Gln Gly Asp Asp
405 410 415
Ala Ser Ile Pro Glu Ala Met Leu Ser Lys Ile Gln Glu Glu Thr Arg
420 425 430
His Leu Gln Leu Ala His Leu Lys Tyr Phe Ser Leu Trp Cys Leu Met
435 440 445
Leu Thr Leu Glu Ser Gln Ser Lys Asp Asn Arg Lys Thr His Gln Ser
450 455 460
Ile Trp Leu Thr Pro Ala Ser Glu Leu Glu Glu Ser Gly Asn Cys Val
465 470 475 480
Gly Asn Leu Val Arg Thr Glu Pro Val Ser Arg Val Cys Asp Gly Gln
485 490 495
Tyr Leu His Asn Phe Gln Arg Lys Asn Gly Pro Met Pro Ala Thr Asn
500 505 510
Leu Met Ala Gly Asp Arg Ile Ile Leu Ser Gly Glu Glu Arg Lys Leu
515 520 525
Phe Ala Leu Ser Lys Gly Tyr Val Lys Lys Met Asn Lys Ala Ala Val
530 535 540
Thr Cys Leu Leu Asp Arg Asn Leu Ser Thr Leu Pro Ala Thr Thr Val
545 550 555 560
Phe Arg Leu Asp Arg Glu Glu Arg His Gly Asp Ile Ser Thr Pro Leu
565 570 575
Gly Asn Leu Ser Lys Leu Met Glu Ser Thr Asp Pro Ser Lys Arg Leu
580 585 590
Arg Glu Leu Ile Ile Asp Phe Arg Glu Pro Gln Phe Ile Ala Tyr Leu
595 600 605
Ser Ser Val Leu Pro His Asp Ala Lys Asp Thr Val Ala Asn Ile Leu
610 615 620
Lys Gly Leu Asn Lys Pro Gln Arg Gln Ala Met Lys Arg Val Leu Leu
625 630 635 640
Ser Lys Asp Tyr Thr Leu Ile Val Gly Met Pro Gly Thr Gly Lys Thr
645 650 655
Thr Thr Ile Cys Ala Leu Val Arg Ile Leu Ser Ala Cys Gly Phe Ser
660 665 670
Val Leu Leu Thr Ser Tyr Thr His Ser Ala Val Asp Asn Ile Leu Leu
675 680 685
Lys Leu Ala Lys Phe Lys Val Gly Phe Leu Arg Leu Gly Gln Ser His
690 695 700
Lys Val His Pro Asp Ile Gln Lys Phe Thr Glu Glu Glu Ile Cys Arg
705 710 715 720
Ser Arg Ser Ile Ala Ser Leu Ala His Leu Glu Glu Leu Tyr Asn Ser
725 730 735
His Pro Ile Val Ala Thr Thr Cys Met Gly Ile Asn His Pro Ile Phe
740 745 750
Ser Arg Lys Thr Phe Asp Phe Cys Ile Val Asp Glu Ala Ser Gln Ile
755 760 765
Ser Gln Pro Val Cys Leu Gly Pro Leu Phe Phe Ser Arg Arg Phe Val
770 775 780
Leu Val Gly Asp His Gln Gln Leu Pro Pro Leu Val Val Asn Arg Glu
785 790 795 800
Ala Arg Ala Leu Gly Met Ser Glu Ser Leu Phe Lys Arg Leu Glu Arg
805 810 815
Asn Glu Ser Ala Val Val Gln Leu Thr Val Gln Tyr Arg Met Asn Arg

```
            820                 825                 830
Lys Ile Met Ser Leu Ser Asn Lys Leu Thr Tyr Ala Gly Lys Leu Glu
        835                 840                 845
Cys Gly Ser Asp Arg Val Ala Asn Ala Val Leu Ala Leu Pro Asn Leu
    850                 855                 860
Lys Asp Ala Arg Leu Ser Leu Gln Leu Tyr Ala Asp Tyr Ser Asp Ser
865                 870                 875                 880
Pro Trp Leu Ala Gly Val Leu Glu Pro Asp Asn Pro Val Cys Phe Leu
                885                 890                 895
Asn Thr Asp Lys Val Pro Ala Pro Glu Gln Val Glu Asn Gly Gly Val
            900                 905                 910
Ser Asn Val Thr Glu Ala Arg Leu Ile Val Phe Leu Thr Ser Thr Phe
        915                 920                 925
Ile Lys Ala Gly Cys Ser Pro Ser Asp Ile Gly Val Ile Ala Pro Tyr
    930                 935                 940
Arg Gln Gln Leu Arg Ile Ile Ser Asp Leu Leu Ala Arg Ser Ser Val
945                 950                 955                 960
Gly Met Val Glu Val Asn Thr Val Asp Lys Tyr Gln Gly Arg Asp Lys
                965                 970                 975
Ser Leu Ile Leu Val Ser Phe Val Arg Ser Asn Glu Asp Gly Thr Leu
            980                 985                 990
Gly Glu Leu Leu Lys Asp Trp Arg Arg Leu Asn Val Ala Leu Thr Arg
        995                 1000                1005
Ala Lys His Lys Leu Ile Leu Leu Gly Ser Val Ser Ser Leu Lys Arg
    1010                1015                1020
Phe Pro Pro Leu Gly Thr Leu Phe Asp His Leu Asn Ala Glu Gln Leu
1025                1030                1035                1040
Ile Leu Asp Leu Pro Ser Arg Glu His Glu Ser Leu Ser His Ile Leu
                1045                1050                1055
Gly Asp Cys Gln Arg Asp
            1060


<210> 139
<211> 702
<212> PRT
<213> Saccharomyces cerevisiae

<400> 139
Met Gly Ile Gln Gly Leu Leu Pro Gln Leu Lys Pro Ile Gln Asn Ala
 1               5                  10                  15
Val Ser Leu Arg Arg Tyr Glu Gly Glu Val Leu Ala Ile Asp Gly Tyr
            20                  25                  30
Ala Trp Leu His Arg Ala Ala Cys Ser Cys Ala Tyr Glu Leu Ala Met
        35                  40                  45
Gly Lys Pro Thr Asp Lys Tyr Leu Gln Phe Phe Ile Lys Arg Phe Ser
    50                  55                  60
Leu Leu Lys Thr Phe Lys Val Glu Pro Tyr Leu Val Phe Asp Gly Asp
65                  70                  75                  80
Ala Ile Pro Val Lys Lys Ser Thr Glu Ser Lys Arg Arg Asp Lys Arg
                85                  90                  95
Lys Glu Asn Lys Ala Ile Ala Glu Arg Leu Trp Ala Cys Gly Glu Lys
            100                 105                 110
Lys Asn Ala Met Asp Tyr Phe Gln Lys Cys Val Asp Ile Thr Pro Glu
```

```
        115                 120                 125
Met Ala Lys Cys Ile Ile Cys Tyr Cys Lys Leu Asn Gly Ile Arg Tyr
    130                 135                 140
Ile Val Ala Pro Phe Glu Ala Asp Ser Gln Met Val Tyr Leu Glu Gln
145                 150                 155                 160
Lys Asn Ile Val Gln Gly Ile Ile Ser Glu Asp Ser Asp Leu Leu Val
                165                 170                 175
Phe Gly Cys Arg Arg Leu Ile Thr Lys Leu Asn Asp Tyr Gly Glu Cys
            180                 185                 190
Leu Glu Ile Cys Arg Asp Asn Phe Ile Lys Leu Pro Lys Lys Phe Pro
        195                 200                 205
Leu Gly Ser Leu Thr Asn Glu Glu Ile Ile Thr Met Val Cys Leu Ser
    210                 215                 220
Gly Cys Asp Tyr Thr Asn Gly Ile Pro Lys Val Gly Leu Ile Thr Ala
225                 230                 235                 240
Met Lys Leu Val Arg Arg Phe Asn Thr Ile Glu Arg Ile Ile Leu Ser
                245                 250                 255
Ile Gln Arg Glu Gly Lys Leu Met Ile Pro Asp Thr Tyr Ile Asn Glu
            260                 265                 270
Tyr Glu Ala Ala Val Leu Ala Phe Gln Phe Gln Arg Val Phe Cys Pro
        275                 280                 285
Ile Arg Lys Lys Ile Val Ser Leu Asn Glu Ile Pro Leu Tyr Leu Lys
    290                 295                 300
Asp Thr Glu Ser Lys Arg Lys Arg Leu Tyr Ala Cys Ile Gly Phe Val
305                 310                 315                 320
Ile His Arg Glu Thr Gln Lys Lys Gln Ile Val His Phe Asp Asp Asp
                325                 330                 335
Ile Asp His His Leu His Leu Lys Ile Ala Gln Gly Asp Leu Asn Pro
            340                 345                 350
Tyr Asp Phe His Gln Pro Leu Ala Asn Arg Glu His Lys Leu Gln Leu
        355                 360                 365
Ala Ser Lys Ser Asn Ile Glu Phe Gly Lys Thr Asn Ser Thr Asn Ser
    370                 375                 380
Glu Ala Lys Val Lys Pro Ile Glu Ser Phe Phe Gln Lys Met Thr Lys
385                 390                 395                 400
Leu Asp His Tyr Pro Lys Val Ala Asn Asn Ile His Ser Leu Arg Gln
                405                 410                 415
Ala Glu Asp Lys Leu Thr Met Ala Ile Lys Arg Arg Lys Leu Ser Asn
            420                 425                 430
Ala Asn Val Val Gln Glu Thr Leu Lys Asp Thr Arg Ser Lys Phe Phe
        435                 440                 445
Asn Lys Pro Ser Met Thr Val Val Glu Asn Phe Lys Glu Lys Gly Asp
    450                 455                 460
Ser Thr Gln Asp Phe Lys Glu Asp Thr Asn Ser Gln Ser Leu Glu Glu
465                 470                 475                 480
Pro Val Ser Glu Ser Gln Leu Ser Thr Gln Ile Pro Ser Ser Phe Ile
                485                 490                 495
Thr Thr Asn Leu Glu Asp Asp Asp Asn Leu Ser Glu Glu Val Ser Glu
            500                 505                 510
Val Val Ser Asp Thr Glu Glu Asp Arg Lys Asn Ser Glu Gly Lys Ile
        515                 520                 525
Ile Gly Asn Glu Ile Tyr Asn Thr Asp Asp Asp Gly Asp Gly Asp Thr
    530                 535                 540
Ser Glu Asp Tyr Ser Glu Thr Ala Glu Ser Arg Val Pro Thr Ser Ser
```

545 550 555 560
Thr Thr Ser Phe Pro Gly Ser Ser Gln Arg Ser Ile Ser Gly Cys Thr
565 570 575
Lys Val Leu Gln Lys Phe Arg Tyr Ser Ser Ser Phe Ser Gly Val Asn
580 585 590
Ala Asn Arg Gln Pro Leu Phe Pro Arg His Val Asn Gln Lys Ser Arg
595 600 605
Gly Met Val Tyr Val Asn Gln Asn Arg Asp Asp Asp Cys Asp Asp Asn
610 615 620
Asp Gly Lys Asn Gln Ile Met Gln Arg Pro Leu Leu Arg Lys Ser Leu
625 630 635 640
Ile Gly Ala Arg Ser Gln Arg Ile Val Ile Asp Met Lys Ser Val Asp
645 650 655
Glu Arg Lys Ser Phe Asn Ser Ser Pro Ile Leu His Glu Glu Ser Lys
660 665 670
Lys Arg Asp Ile Glu Thr Thr Lys Ser Ser Gln Ala Arg Pro Ala Val
675 680 685
Arg Ser Ile Ser Leu Leu Ser Gln Phe Val Tyr Lys Gly Lys
690 695 700

<210> 140
<211> 486
<212> PRT
<213> Unknown

<220>
<223> herpesvirus

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

```
Thr Leu Leu His Pro Asp Glu Ala Asn Cys Leu Asp Tyr Gly Phe Met
        195                 200                 205
Gln Ser Pro Gln Asn Gly Ile Phe Gly Val Ser Leu Asp Phe Ala Ala
    210                 215                 220
Asn Val Lys Thr Asp Thr Glu Gly Arg Leu Gln Phe Asp Pro Asn Cys
225                 230                 235                 240
Lys Val Tyr Glu Ile Lys Cys Arg Phe Lys Tyr Thr Phe Ala Lys Met
                245                 250                 255
Glu Cys Asp Pro Ile Tyr Ala Ala Tyr Gln Arg Leu Tyr Glu Ala Pro
            260                 265                 270
Gly Lys Leu Ala Leu Lys Asp Phe Phe Tyr Ser Ile Ser Lys Pro Ala
        275                 280                 285
Val Glu Tyr Val Gly Leu Gly Lys Leu Pro Ser Glu Ser Asp Tyr Leu
    290                 295                 300
Val Ala Tyr Asp Gln Glu Trp Glu Ala Cys Pro Arg Lys Lys Arg Lys
305                 310                 315                 320
Leu Thr Pro Leu His Asn Leu Ile Arg Glu Cys Ile Leu His Asn Ser
                325                 330                 335
Thr Thr Glu Ser Asp Val Tyr Val Leu Thr Asp Pro Gln Asp Thr Arg
            340                 345                 350
Gly Gln Ile Ser Ile Lys Ala Arg Phe Lys Ala Asn Leu Phe Val Asn
        355                 360                 365
Val Arg His Ser Tyr Phe Tyr Gln Val Leu Leu Gln Ser Ser Ile Val
    370                 375                 380
Glu Glu Tyr Ile Gly Leu Asp Ser Gly Ile Pro Arg Leu Gly Ser Pro
385                 390                 395                 400
Lys Tyr Tyr Ile Ala Thr Gly Phe Phe Arg Lys Arg Gly Tyr Gln Asp
                405                 410                 415
Pro Val Asn Cys Thr Ile Gly Gly Asp Ala Leu Asp Pro His Val Glu
            420                 425                 430
Ile Pro Thr Leu Leu Ile Val Thr Pro Val Tyr Phe Pro Arg Gly Ala
        435                 440                 445
Lys His Arg Leu Leu His Gln Ala Ala Asn Phe Trp Ser Arg Ser Ala
    450                 455                 460
Lys Asp Thr Phe Pro Tyr Ile Lys Trp Asp Phe Ser Tyr Leu Ser Ala
465                 470                 475                 480
Asn Val Pro His Ser Pro
                485
```

<210> 141
<211> 521
<212> PRT
<213> Unknown

<220>
<223> UL12 exonuclease

<400> 141

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

```
        35                  40                  45
Glu Leu Thr Asp Tyr Thr Phe Ser Arg Tyr Ile Leu Tyr His Leu Ala
    50                  55                  60
Pro Ser Glu Leu Lys Glu Ala Ile His Pro Leu Tyr His Arg Leu Asn
65                  70                  75                  80
Tyr Ile Ala Asp Val Ile Lys Arg Gly Thr Ser Glu Gly Arg Trp Leu
                85                  90                  95
Gly Tyr Pro Tyr Ser Cys Ile Leu Asp Thr Glu Asp Glu Leu Arg Asn
            100                 105                 110
Glu Ser Arg Arg Asn Thr Ser Ser Pro Ser Asp His Ala Leu Arg Trp
        115                 120                 125
Cys Leu Leu Val Glu Ser Phe Thr Ile Glu Gln Ala Asn Cys Asp Leu
    130                 135                 140
Trp His Ile Phe Arg Gln Ser Leu Leu Thr Ala Ser Ser Val Lys Trp
145                 150                 155                 160
Thr Asp Asp Gly Lys Leu Asp Thr Val Gly Ile Met Ser Asp Asn Ser
                165                 170                 175
Thr Ala Tyr Val Glu Thr Cys Ser Val Ala Phe Gly Lys His Asn Glu
            180                 185                 190
Pro Leu Ala Lys Ser Leu Val Thr Met Phe Cys Leu Asn His Ser Arg
        195                 200                 205
His Val His Asn Thr Ser Pro Arg Arg Glu Asn Val Phe Val Phe Glu
    210                 215                 220
Asp Val Ser Asp Arg Thr Ile Gln Ser Glu Ser Asp Tyr Ser Cys Gly
225                 230                 235                 240
Leu Met Ile Asp Thr Arg Thr Gly Met Val Gly Ala Ser Leu Asp Met
                245                 250                 255
Leu Val Cys Glu Arg Asp Pro Phe Gly Leu Leu Gln Pro Asp Ser Glu
            260                 265                 270
Asn Gln Ala Ile Glu Thr Tyr Glu Ile Lys Cys Arg Ala Lys Tyr Ala
        275                 280                 285
Phe Cys Pro Asp Lys Arg Ser Glu Leu Ser Gln Cys Tyr Glu Arg Leu
    290                 295                 300
Leu Asn Val Arg Thr Met Gly Ser Leu Arg Leu Phe Ile Ser Ala Ile
305                 310                 315                 320
Gln Arg Pro Cys Val Asp Tyr Phe Gln Pro Gly Asn Val Pro Arg Ser
                325                 330                 335
Lys Glu Ala Leu Ile Thr Ser Asn Glu Glu Trp Lys Val Gly Asn Ser
            340                 345                 350
Ala Tyr His Ala Ala Gln Ser Arg Ile Arg Cys Asn Ala Phe Asp Lys
        355                 360                 365
Cys His Leu Glu Leu Asn Ser Asn Val Gln Ser Arg Val Trp Leu Phe
    370                 375                 380
Gly Glu Pro Asp Leu Glu Thr Asp Thr Ile Tyr Pro Leu Pro Trp Asp
385                 390                 395                 400
Thr Gly Lys Leu Ser Leu Asp Val Pro Ile Phe Ser Asn Pro Arg His
                405                 410                 415
Pro Asn Phe Lys Gln Ile Tyr Leu Gln Thr Tyr Val Ala Ala Gly Tyr
            420                 425                 430
Phe Gly Glu Arg Arg Thr Thr Pro Phe Leu Val Thr Phe Ile Gly Arg
        435                 440                 445
Trp Arg Lys Arg Arg Glu Phe Gly Lys Lys Phe Ser Leu Ile Ala Asp
    450                 455                 460
Ser Gly Leu Gly Lys Pro Ile Ser Thr Val His Ala Asp Gln Ala Ile
```

```
465                 470                 475                 480
Pro Val Leu Leu Ile Val Thr Pro Val Ile Val Asp Glu Ala Phe Tyr
                485                 490                 495
Gly Glu Ile Glu Ser Ala Gly Cys Arg Ala Phe Gly Glu Leu Val Lys
            500                 505                 510
Gln Leu Trp Ala Lys Gln Pro His Thr
        515                 520
```

<210> 142
<211> 664
<212> PRT
<213> Escherichia coli

<400> 142

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

305 310 315 320
His Lys Asp Pro Ile Ala Leu Asn Lys Tyr Ile Cys Glu Tyr Leu Thr
325 330 335
Thr Lys Gly Val Phe Glu Asn Glu Glu Thr Asp Leu Gly Thr Val Asp
340 345 350
Val Leu Gln Ser Ser Glu Thr Gln Thr Asp Ala Val Glu Thr Glu Val
355 360 365
Ser Asp Ile Pro Lys Asn Glu Thr Ala Pro Glu Ala Glu Pro Ser Val
370 375 380
Glu Arg Glu Gly Pro Phe Tyr Phe Leu Phe Ala Asp Lys Asp Gly Glu
385 390 395 400
Lys Tyr Gly Arg Ala Asn Lys Leu Ser Gly Leu Asp Lys Ala Leu Ala
405 410 415
Ala Gly Ala Thr Glu Ile Thr Lys Glu Glu Tyr Phe Ala Arg Lys Asn
420 425 430
Gly Thr Tyr Thr Gly Leu Pro Gln Asn Val Asp Thr Ala Glu Asp Ser
435 440 445
Glu Gln Pro Glu Pro Ile Lys Val Thr Ala Asp Glu Val Asn Lys Ile
450 455 460
Met Gln Ala Ala Asn Ile Ser Gln Pro Asp Ala Asp Lys Leu Leu Ala
465 470 475 480
Ala Ser Arg Gly Glu Phe Val Glu Glu Ile Ser Asp Pro Asn Asp Pro
485 490 495
Lys Trp Val Lys Gly Ile Gln Thr Arg Asp Ser Val Asn Gln Asn Gln
500 505 510
His Glu Ser Glu Arg Asn Tyr Gln Lys Ala Glu Gln Asn Ser Thr Asn
515 520 525
Ala Leu Gln Asn Glu Pro Glu Thr Lys Gln Pro Glu Pro Val Ala Gln
530 535 540
Gln Glu Val Glu Lys Val Cys Thr Ala Cys Gly Gln Thr Gly Gly Gly
545 550 555 560
Asn Cys Pro Asp Cys Gly Ala Val Met Gly Asp Ala Thr Tyr Gln Glu
565 570 575
Thr Phe Asp Glu Glu Tyr Gln Val Glu Val Gln Glu Asp Asp Pro Glu
580 585 590
Glu Met Glu Gly Ala Glu His Pro His Lys Glu Asn Thr Gly Gly Asn
595 600 605
Gln His His Asn Ser Asp Asn Glu Thr Gly Glu Thr Ala Asp His Ser
610 615 620
Ile Lys Val Asn Gly His His Glu Ile Thr Ser Thr Ser Arg Ala Gly
625 630 635 640
Ile His Leu Met Ile Asp Leu Glu Thr Met Gly Lys Asn Pro Asp Ala
645 650 655
Pro Ile Ile Cys Asn Arg Leu Ile
660

<210> 143
<211> 300
<212> PRT
<213> Unknown

<220>
<223> Enterobacteria phage T7

<400> 143
Met Ala Leu Leu Asp Leu Lys Gln Phe Tyr Glu Leu Arg Glu Gly Cys
 1   5   10   15
Asp Asp Lys Gly Ile Leu Val Met Asp Gly Asp Trp Leu Val Phe Gln
            20   25   30
Ala Met Ser Ala Ala Glu Phe Asp Ala Ser Trp Glu Glu Glu Ile Trp
        35   40   45
His Arg Cys Cys Asp His Ala Lys Ala Arg Gln Ile Leu Glu Asp Ser
    50   55   60
Ile Lys Ser Tyr Glu Thr Arg Lys Lys Ala Trp Ala Gly Ala Pro Ile
65   70   75   80
Val Leu Ala Phe Thr Asp Ser Val Asn Trp Arg Lys Glu Leu Val Asp
                85   90   95
Pro Asn Tyr Lys Ala Asn Arg Lys Ala Val Lys Lys Pro Val Gly Tyr
            100   105   110
Phe Glu Phe Leu Asp Ala Leu Phe Glu Arg Glu Glu Phe Tyr Cys Ile
        115   120   125
Arg Glu Pro Met Leu Glu Gly Asp Asp Val Met Gly Val Ile Ala Ser
    130   135   140
Asn Pro Ser Ala Phe Gly Ala Arg Lys Ala Val Ile Ile Ser Cys Asp
145   150   155   160
Lys Asp Phe Lys Thr Ile Pro Asn Cys Asp Phe Leu Trp Cys Thr Thr
                165   170   175
Gly Asn Ile Leu Thr Gln Thr Glu Glu Ser Ala Asp Trp Trp His Leu
            180   185   190
Phe Gln Thr Ile Lys Gly Asp Ile Thr Asp Gly Tyr Ser Gly Ile Ala
        195   200   205
Gly Trp Gly Asp Thr Ala Glu Asp Phe Leu Asn Asn Pro Phe Ile Thr
    210   215   220
Glu Pro Lys Thr Ser Val Leu Lys Ser Gly Lys Asn Lys Gly Gln Glu
225   230   235   240
Val Thr Lys Trp Val Lys Arg Asp Pro Glu Pro His Glu Thr Leu Trp
                245   250   255
Asp Cys Ile Lys Ser Ile Gly Ala Lys Ala Gly Met Thr Glu Glu Asp
            260   265   270
Ile Ile Lys Gln Gly Gln Met Ala Arg Ile Leu Arg Phe Asn Glu Tyr
        275   280   285
Asn Phe Ile Asp Lys Glu Ile Tyr Leu Trp Arg Pro
    290   295   300

<210> 144
<211> 267
<212> PRT
<213> Escherichia coli

<400> 144
Met Lys Phe Val Ser Phe Asn Ile Asn Gly Leu Arg Ala Arg Pro His
 1   5   10   15
Gln Leu Glu Ala Ile Val Glu Lys His Gln Pro Asp Val Ile Gly Leu
            20   25   30
Gln Glu Thr Lys Val His Asp Asp Met Phe Pro Leu Glu Glu Val Ala
        35   40   45

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

<210> 145
<211> 236
<212> PRT
<213> Mus musculus

<400> 145

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

```
Leu Asp Thr Leu Pro Ala Leu Arg Gly Leu Asp Arg Ala His Ser His
145                 150                 155                 160
Gly Thr Arg Ala Gln Gly Arg Lys Ser Tyr Ser Leu Ala Ser Leu Phe
                165                 170                 175
His Arg Tyr Phe Gln Ala Glu Pro Ser Ala Ala His Ser Ala Glu Gly
            180                 185                 190
Asp Val His Thr Leu Leu Leu Ile Phe Leu His Arg Ala Pro Glu Leu
        195                 200                 205
Leu Ala Trp Ala Asp Glu Gln Ala Arg Ser Trp Ala His Ile Glu Pro
    210                 215                 220
Met Tyr Val Pro Pro Asp Gly Pro Ser Leu Glu Ala
225                 230                 235


<210> 146
<211> 43
<212> DNA
<213> Unknown

<220>
<223> Hammerhead ribozyme

<400> 146
aaattactga tgagtccgtg aggacgaaac gagtaagctc gtc                    43

<210> 147
<211> 68
<212> DNA
<213> Unknown

<220>
<223> Hepatitis delta virus (HDV) ribozyme

<400> 147
ggccggcatg gtcccagcct cctcgctggc gccggctggg caacatgctt cggcatggcg 60
aatgggac                                                          68

<210> 148
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid linker

<400> 148
Met Ala Pro Lys Lys Lys Arg Lys Val Gly Gly Ser Gly Ser
 1               5                  10


<210> 149
<211> 2243
<212> DNA
<213> Solanum lycopersicum
```

<400> 149
atcgtatcca gtgcaccata ttttttggcg attaccactc atattattgt gtttagtaga 60
tattttaggt gcataattga tctcttcttt aaaactaggg gcacttatta ttatacatcc 120
acttgacact tgctttagtt ggctattttt tttatttttt atttttgtc aactacccca 180
atttaaattt tatttgatta agatattttt atggacctac tttataatta aaaatatttt 240
ctatttgaaa aggaaggaca aaaatcatac aattttggtc caactactcc tctcttttt 300
tttttggctt tataaaaaag gaaagtgatt agtaataaat aattaaataa tgaaaaaagg 360
aggaaataaa attttcgaat taaaatgtaa aagagaaaaa ggagagggag taatcattgt 420
ttaactttat ctaaagtacc ccaattcgat tttacatgta tatcaaatta tacaaatatt 480
ttattaaaat atagatattg aataatttta ttattcttga acatgtaaat aaaaattatc 540
tattatttca atttttatat aaactattat ttgaaatctc aattatgatt ttttaatatc 600
actttctatc catgataatt tcagcttaaa aagttttgtc aataattaca ttaattttgt 660
tgatgaggat gacaagattt cggtcatcaa ttacatatac acaaattgaa atagtaagca 720
acttgatttt ttttctcata atgataatga caaagacacg aaaagacaat tcaatattca 780
cattgattta tttttatatg ataataatta caataataat attcttataa agaaagagat 840
caattttgac tgatccaaaa atttatttat ttttactata ccaacgtcac taattatatc 900
taataatgta aaacaattca atcttactta aatattaatt tgaaataaac tatttttata 960
acgaaattac taaatttatc caataacaaa aaggtcttaa gaagacataa attctttttt 1020
tgtaatgctc aaataaattt gagtaaaaaa gaatgaaatt gagtgatttt tttttaatca 1080
taagaaaata aataattaat ttcaatataa taaaacagta atataatttc ataaatggaa 1140
ttcaatactt acctcttaga tataaaaaat aaatataaaa ataaagtgtt tctaataaac 1200
ccgcaattta aataaaatat ttaatatttt caatcaaatt taaataatta tattaaaata 1260
tcgtagaaaa agagcaatat ataatacaag aaagaagatt taagtacaat tatcaactat 1320
tattatactc taattttgtt atatttaatt tcttacggtt aaggtcatgt tcacgataaa 1380
ctcaaaatac gctgtatgag gacatatttt aaattttaac caataataaa actaagttat 1440
ttttagtata ttttttttgtt taacgtgact taatttttct tttctagagg agcgtgtaag 1500
tgtcaacctc attctcctaa ttttcccaac cacataaaaa aaaaataaag gtagcttttg 1560
cgtgttgatt tggtacacta cacgtcatta ttacacgtgt tttcgtatga ttggttaatc 1620
catgaggcgg tttcctctag agtcggccat accatctata aaataaagct ttctgcagct 1680
catttttca tcttctatct gatttctatt ataatttctc tgaattgcct tcaaatttct 1740
ctttcaaggt tagaattttt ctctattttt tggtttttgt ttgtttagat tctgagttta 1800
gttaatcagg tgctgttaaa gccctaaatt ttgagttttt ttcggttgtt ttgatggaaa 1860
atacctaaca attgagtttt ttcatgttgt tttgtcggag aatgcctaca attggagttc 1920
ctttcgttgt tttgatgaga aagcccctaa tttgagtgtt tttccgtcga tttgatttta 1980
aaggtttata ttcgagtttt tttcgtcggt ttaatgagaa ggcctaaaat aggagttttt 2040
ctggttgatt tgactaaaaa agccatggaa ttttgtgttt ttgatgtcgc tttggttctc 2100
aaggcctaag atctgagttt ctccggttgt tttgatgaaa aagccctaaa attggagttt 2160
ttatcttgtg ttttaggttg ttttaatcct tataatttga gttttttcgt tgttctgatt 2220
gttgttttta tgaatttcct gca 2243