SEQUENCE LISTING

<110> Bonas, Ulla

Boch, Jens

Schornack, Sebastian

Lahaye, Thomas

<120> Modular DNA-Binding Domains and Methods of Use

<130> 53409/383526

<150> EP 09165328.7
<151> 2009-07-13

<150> US 61/225,043
<151> 2009-07-13

<150> DE 10 2009 004 659.3
<151> 2009-01-12

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<170> PatentIn version 3.3

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<222> (15)..(16)

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<222> (8)..(8)
<223> n is a, c, g, or t

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tarannrncn ccct 14

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<223> n is a, c, g, or t

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<223> n is a, c, g, or t

<400> 104
trcntcrnac ncrcrcrrrr rrrct 25

<210> 105
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<222> (17)..(17)

<223> n is a, c, g, or t

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<222> (20)..(22)

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<400> 105

trcccaarac ccnrrcnrcn nn 22

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<400> 106

tanaaarcnr nrcracrnt 19

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<213> Artificial

<220>
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<400> 107
tncatattcr atcrnrtr 18

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<223> n is a, c, g, or t

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tncatataat tcratcrnrt r 21

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tataacaccc tcnacatant 20

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<222> (425)..(458)

<220>

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<222> (459)..(492)

<220>

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<222> (493)..(526)

<220>

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<222> (561)..(594)

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<222> (629)..(662)

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<222> (663)..(696)

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<222> (697)..(730)

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<222> (731)..(764)

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<220>

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<222> (799)..(832)

<220>

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<222> (833)..(866)

<220>

<221> Repeat 17.5

<222> (867)..(886)

<220>

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<222> (887)..(1164)

<400> 110

Met Asp Pro Ile Arg Ser Arg Thr Pro Ser Pro Ala Arg Glu Leu Leu

1 5 10 15

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Pro Gly Pro Gln Pro Asp Gly Val Gln Pro Thr Ala Asp Arg Gly Val
            20                  25                  30

Ser Pro Pro Ala Gly Gly Pro Leu Asp Gly Leu Pro Ala Arg Arg Thr
        35                  40                  45

Met Ser Arg Thr Arg Leu Pro Ser Pro Pro Ala Pro Ser Pro Ala Phe
    50                  55                  60

Ser Ala Gly Ser Phe Ser Asp Leu Leu Arg Gln Phe Asp Pro Ser Leu
65                  70                  75                  80

Phe Asn Thr Ser Leu Phe Asp Ser Leu Pro Pro Phe Gly Ala His His
                85                  90                  95

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

Ala Ala Asp Ala Pro Pro Pro Thr Met Arg Val Ala Val Thr Ala Ala
        115                 120                 125

Arg Pro Pro Arg Ala Lys Pro Ala Pro Arg Arg Arg Ala Ala Gln Pro
    130                 135                 140
```

```
Ser Asp Ala Ser Pro Ala Ala Gln Val Asp Leu Arg Thr Leu Gly Tyr
145                 150                 155                 160

Ser Gln Gln Gln Gln Glu Lys Ile Lys Pro Lys Val Arg Ser Thr Val
                165                 170                 175

Ala Gln His His Glu Ala Leu Val Gly His Gly Phe Thr His Ala His
            180                 185                 190

Ile Val Ala Leu Ser Gln His Pro Ala Ala Leu Gly Thr Val Ala Val
        195                 200                 205

Lys Tyr Gln Asp Met Ile Ala Ala Leu Pro Glu Ala Thr His Glu Ala
    210                 215                 220

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

Leu Leu Thr Val Ala Gly Glu Leu Arg Gly Pro Pro Leu Gln Leu Asp
                245                 250                 255

Thr Gly Gln Leu Leu Lys Ile Ala Lys Arg Gly Gly Val Thr Ala Val
            260                 265                 270
```

```
Glu Ala Val His Ala Trp Arg Asn Ala Leu Thr Gly Ala Pro Leu Asn
        275                 280                 285

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

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala
305                 310                 315                 320

His Gly Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser Asn Gly Gly
                325                 330                 335

Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys
            340                 345                 350

Gln Ala His Gly Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser Asn
        355                 360                 365

Ser Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val
    370                 375                 380

Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala
385                 390                 395                 400
```

Ser Asn Gly Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu
405 410 415

Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala
420 425 430

Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Ala
435 440 445

Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val
450 455 460

Val Ala Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu Thr Val
465 470 475 480

Gln Ala Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu
485 490 495

Gln Val Val Ala Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu
500 505 510

Thr Val Gln Ala Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr
515 520 525

```
Pro Glu Gln Val Val Ala Ile Ala Ser His Asp Gly Gly Lys Gln Ala
    530                 535                 540

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

Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser His Asp Gly Gly Lys
                565                 570                 575

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala
            580                 585                 590

His Gly Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser Asn Gly Gly
        595                 600                 605

Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys
    610                 615                 620

Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Asn
625                 630                 635                 640

Ser Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Ala Leu Leu Pro Val
                645                 650                 655
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Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala
660 665 670

Ser Asn Ser Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu
675 680 685

Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala
690 695 700

Ile Ala Ser His Asp Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg
705 710 715 720

Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val
725 730 735

Val Ala Ile Ala Ser His Asp Gly Gly Lys Gln Ala Leu Glu Thr Val
740 745 750

Gln Arg Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu
755 760 765

Gln Val Val Ala Ile Ala Ser His Asp Gly Gly Lys Gln Ala Leu Glu

770 775 780

Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr
785 790 795 800

Pro Gln Gln Val Val Ala Ile Ala Ser Asn Gly Gly Gly Arg Pro Ala
805 810 815

Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala His Gly
820 825 830

Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser His Asp Gly Gly Lys
835 840 845

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala
850 855 860

His Gly Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser Asn Gly Gly
865 870 875 880

Gly Arg Pro Ala Leu Glu Ser Ile Val Ala Gln Leu Ser Arg Pro Asp
885 890 895

Pro Ala Leu Ala Ala Leu Thr Asn Asp His Leu Val Ala Leu Ala Cys

900 905 910

Leu Gly Gly Arg Pro Ala Leu Asp Ala Val Lys Lys Gly Leu Pro His
915 920 925

Ala Pro Ala Leu Ile Lys Arg Thr Asn Arg Arg Ile Pro Glu Arg Thr
930 935 940

Ser His Arg Val Ala Asp His Ala Gln Val Val Arg Val Leu Gly Phe
945 950 955 960

Phe Gln Cys His Ser His Pro Ala Gln Ala Phe Asp Asp Ala Met Thr
965 970 975

Gln Phe Gly Met Ser Arg His Gly Leu Leu Gln Leu Phe Arg Arg Val
980 985 990

Gly Val Thr Glu Leu Glu Ala Arg Ser Gly Thr Leu Pro Pro Ala Ser
995 1000 1005

Gln Arg Trp Asp Arg Ile Leu Gln Ala Ser Gly Met Lys Arg Ala
1010 1015 1020

```
Lys Pro  Ser Pro Thr Ser Thr  Gln Thr Pro Asp Gln  Ala Ser Leu
    1025                1030                1035

His Ala  Phe Ala Asp Ser Leu  Glu Arg Asp Leu Asp  Ala Pro Ser
    1040                1045                1050

Pro Met  His Glu Gly Asp Gln  Thr Arg Ala Ser Ser  Arg Lys Arg
    1055                1060                1065

Ser Arg  Ser Asp Arg Ala Val  Thr Gly Pro Ser Ala  Gln Gln Ser
    1070                1075                1080

Phe Glu  Val Arg Val Pro Glu  Gln Arg Asp Ala Leu  His Leu Pro
    1085                1090                1095

Leu Ser  Trp Arg Val Lys Arg  Pro Arg Thr Ser Ile  Gly Gly Gly
    1100                1105                1110

Leu Pro  Asp Pro Gly Thr Pro  Thr Ala Ala Asp Leu  Ala Ala Ser
    1115                1120                1125

Ser Thr  Val Met Arg Glu Gln  Asp Glu Asp Pro Phe  Ala Gly Ala
    1130                1135                1140
```

Ala Asp Asp Phe Pro Ala Phe Asn Glu Glu Glu Leu Ala Trp Leu
1145 1150 1155

Met Glu Leu Leu Pro Gln
1160

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<211> 1321
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<222> (429)..(463)

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<222> (954)..(988)

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<222> (989)..(1023)

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<222> (1044)..(1321)

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1               5                  10                  15

Ser Gly Pro Gln Pro Asp Gly Val Gln Pro Thr Ala Asp Arg Gly Val
            20                  25                  30

Ser Pro Pro Ala Gly Gly Pro Leu Asp Gly Leu Pro Ala Arg Arg Thr
        35                  40                  45

Met Ser Arg Thr Arg Leu Pro Ser Pro Pro Ala Pro Ser Pro Ala Phe
    50                  55                  60
```

```
Ser Ala Asp Ser Phe Ser Asp Leu Leu Arg Gln Phe Asp Pro Ser Leu
65                  70                  75                  80

Phe Asn Thr Ser Leu Phe Asp Ser Leu Pro Pro Phe Gly Ala His His
                85                  90                  95

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

Ala Ala Asp Ala Pro Pro Pro Thr Met Arg Val Ala Val Thr Ala Ala
        115                 120                 125

Arg Pro Pro Arg Ala Lys Pro Ala Pro Arg Arg Arg Ala Ala Gln Pro
    130                 135                 140

Ser Asp Ala Ser Pro Ala Ala Gln Val Asp Leu Arg Thr Leu Gly Tyr
145                 150                 155                 160

Ser Gln Gln Gln Gln Glu Lys Ile Lys Pro Lys Val Arg Ser Thr Val
                165                 170                 175

Ala Gln His His Glu Ala Leu Val Gly His Gly Phe Thr His Ala His
```

180 185 190

Ile Val Ala Leu Ser Gln His Pro Ala Ala Leu Gly Thr Val Ala Val
195 200 205

Lys Tyr Gln Asp Met Ile Ala Ala Leu Pro Glu Ala Thr His Glu Ala
210 215 220

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

Leu Leu Thr Val Ala Gly Glu Leu Arg Gly Pro Pro Leu Gln Leu Asp
245 250 255

Thr Gly Gln Leu Leu Lys Ile Ala Lys Arg Gly Gly Val Thr Ala Val
260 265 270

Glu Ala Val His Ala Trp Arg Asn Ala Leu Thr Gly Ala Pro Leu Asn
275 280 285

Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Asn Asn Gly Gly Lys
290 295 300

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala

305 310 315 320

Pro His Asp Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Ile Gly
325 330 335

Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu
340 345 350

Cys Gln Ala Pro His Asp Leu Thr Pro Glu Gln Val Val Ala Ile Ala
355 360 365

Ser Asn Gly Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu
370 375 380

Pro Val Leu Cys Gln Ala Pro His Cys Leu Thr Pro Glu Gln Val Val
385 390 395 400

Ala Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu Thr Val Gln
405 410 415

Ala Leu Leu Pro Val Leu Cys Gln Ala Pro His Cys Leu Thr Pro Glu
420 425 430

```
Gln Val Val Ala Ile Ala Ser Asn Gly Gly Gly Lys Gln Ala Leu Glu
        435                 440                 445

Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala Pro His Asp Leu
    450                 455                 460

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

Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala Pro
                485                 490                 495

His Asp Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser His Asp Gly
            500                 505                 510

Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys
        515                 520                 525

Gln Ala Pro His Asp Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser
    530                 535                 540

Asn Gly Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro
545                 550                 555                 560
```

Val Leu Cys Gln Ala Pro His Asp Leu Thr Pro Glu Gln Val Val Ala
565 570 575

Ile Ala Ser His Asp Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg
580 585 590

Leu Leu Pro Val Leu Cys Gln Ala Pro His Asp Leu Thr Pro Glu Gln
595 600 605

Val Val Ala Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu Thr
610 615 620

Val Gln Ala Leu Leu Pro Val Leu Cys Gln Ala Pro His Cys Leu Thr
625 630 635 640

Pro Glu Gln Val Val Ala Ile Ala Ser His Asp Gly Gly Lys Gln Ala
645 650 655

Leu Glu Thr Val Gln Ala Leu Leu Pro Val Leu Cys Gln Ala Pro His
660 665 670

Asp Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Asn Ile Gly Gly
675 680 685

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Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln
    690                 695                 700

Ala Pro His Asp Leu Thr Arg Glu Gln Val Val Ala Ile Ala Ser His
705                 710                 715                 720

Asp Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val
                725                 730                 735

Leu Cys Gln Ala Pro His Asp Leu Thr Pro Glu Gln Val Val Ala Ile
            740                 745                 750

Ala Ser Asn Gly Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu
        755                 760                 765

Leu Pro Val Leu Cys Gln Ala Pro His Asp Leu Thr Pro Glu Gln Val
    770                 775                 780

Val Ala Ile Ala Ser His Asp Gly Gly Lys Gln Ala Leu Glu Thr Val
785                 790                 795                 800

Gln Arg Leu Leu Pro Val Leu Cys Gln Ala Pro His Asp Leu Thr Pro
                805                 810                 815
```

Glu Gln Val Val Ala Ile Ala Ser Asn Gly Gly Gly Lys Gln Ala Leu
820 825 830

Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala Pro His Asp
835 840 845

Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser His Asp Gly Gly Lys
850 855 860

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala
865 870 875 880

Pro His Asp Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser His Asp
885 890 895

Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu
900 905 910

Cys Gln Ala Pro His Asp Leu Thr Pro Glu Gln Val Val Ala Ile Ala
915 920 925

Ser Asn Gly Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu
930 935 940

Pro Val Leu Cys Gln Ala Pro His Asp Leu Thr Pro Glu Gln Val Val
945 950 955 960

Ala Ile Ala Ser Asn Gly Gly Gly Lys Gln Ala Leu Glu Thr Val Gln
965 970 975

Ala Leu Leu Pro Val Leu Cys Gln Ala Pro His Asp Leu Thr Pro Glu
980 985 990

Gln Val Val Ala Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu
995 1000 1005

Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala Pro His Asp
1010 1015 1020

Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Asn Gly Gly Gly
1025 1030 1035

Lys Gln Ala Leu Glu Ser Ile Phe Ala Gln Leu Ser Arg Pro Asp
1040 1045 1050

Pro Ala Leu Ala Ala Leu Thr Asn Asp Arg Leu Val Ala Leu Ala
1055 1060 1065

```
Cys Ile  Gly Gly Arg Ser Ala  Leu Asn Ala Val Lys  Asp Gly Leu
    1070                 1075                 1080

Pro Asn  Ala Leu Thr Leu Ile  Arg Arg Ala Asn Ser  Arg Ile Pro
    1085                 1090                 1095

Glu Arg  Thr Ser His Leu Val  Ala Asp His Thr Gln  Val Val Arg
    1100                 1105                 1110

Val Leu  Gly Phe Phe Gln Cys  His Ser His Pro Ala  Gln Ala Phe
    1115                 1120                 1125

Asp Glu  Ala Met Thr Gln Phe  Gly Met Ser Arg His  Gly Leu Leu
    1130                 1135                 1140

Gln Leu  Phe Arg Arg Val Gly  Val Thr Glu Leu Glu  Ala Arg Ser
    1145                 1150                 1155

Gly Thr  Leu Pro Pro Ala Ser  Gln Arg Trp Asp Arg  Ile Leu Gln
    1160                 1165                 1170

Ala Ser  Gly Met Lys Arg Ala  Lys Pro Ser Pro Thr  Ser Thr Gln
```

1175 1180 1185

Thr Pro Asp Gln Ala Ser Leu His Ala Phe Ala Asp Ser Leu Glu
1190 1195 1200

Arg Asp Leu Asp Ala Pro Ser Pro Met His Glu Gly Asp Gln Thr
1205 1210 1215

Arg Ala Ser Ser Arg Lys Arg Ser Arg Ser Asp Arg Ala Val Thr
1220 1225 1230

Gly Pro Ser Ala Gln Gln Ser Phe Glu Val Arg Val Pro Glu Gln
1235 1240 1245

Arg Asp Ala Leu His Leu Pro Leu Leu Ser Trp Gly Val Lys Arg
1250 1255 1260

Pro Arg Thr Arg Ile Gly Gly Leu Leu Asp Pro Gly Thr Pro Met
1265 1270 1275

Asp Ala Asp Leu Val Ala Ser Ser Thr Val Val Trp Glu Gln Asp
1280 1285 1290

Ala Asp Pro Phe Ala Gly Thr Ala Asp Asp Phe Pro Ala Phe Asn

1295 1300 1305

Glu Glu Glu Leu Ala Trp Leu Met Glu Leu Leu Pro His
1310 1315 1320

<210> 112
<211> 960
<212> PRT
<213> Xanthomonas campestris pv. armoraciae

<220>
<221> N-terminus
<222> (1)..(288)

<220>
<221> Repeat 1
<222> (289)..(322)

<220>
<221> Repeat 2
<222> (323)..(356)

<220>
<221> Repeat 3
<222> (357)..(390)

<220>
<221> Repeat 4

<222> (391)..(424)

<220>

<221> Repeat 5

<222> (425)..(458)

<220>

<221> Repeat 6

<222> (459)..(492)

<220>

<221> Repeat 7

<222> (493)..(526)

<220>

<221> Repeat 8

<222> (527)..(560)

<220>

<221> Repeat 9

<222> (561)..(594)

<220>

<221> Repeat 10

<222> (595)..(628)

<220>

<221> Repeat 11

<222> (629)..(662)

<220>

<221> Repeat 11.5

<222> (663)..(682)

<220>

<221> C-terminus

<222> (683)..(960)

<400> 112

```
Met Asp Pro Ile Arg Ser Arg Thr Pro Ser Pro Ala Arg Glu Leu Leu
1               5                  10                  15

Ser Gly Pro Gln Pro Asp Gly Val Gln Pro Thr Ala Asp Arg Gly Val
            20                  25                  30

Ser Pro Pro Ala Gly Gly Pro Leu Asp Gly Leu Pro Ala Arg Arg Thr
        35                  40                  45

Met Ser Arg Thr Arg Leu Pro Ser Pro Pro Ala Pro Ser Pro Ala Phe
    50                  55                  60

Ser Ala Asp Ser Phe Ser Asp Leu Leu Arg Gln Phe Asp Pro Ser Leu
65                  70                  75                  80

Phe Asn Thr Ser Leu Phe Asp Ser Leu Pro Pro Phe Gly Ala His His
                85                  90                  95
```

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

Ala Ala Asp Ala Pro Pro Pro Thr Met Arg Val Ala Val Thr Ala Ala
115 120 125

Arg Pro Pro Arg Ala Lys Pro Ala Pro Arg Arg Arg Ala Ala Gln Pro
130 135 140

Ser Asp Ala Ser Pro Ala Ala Gln Val Asp Leu Arg Thr Leu Gly Tyr
145 150 155 160

Ser Gln Gln Gln Gln Glu Lys Ile Lys Pro Lys Val Arg Ser Thr Val
165 170 175

Ala Gln His His Glu Ala Leu Val Gly His Gly Phe Thr His Ala His
180 185 190

Ile Val Ala Leu Ser Gln His Pro Ala Ala Leu Gly Thr Val Ala Val
195 200 205

Lys Tyr Gln Asp Met Ile Ala Ala Leu Pro Glu Ala Thr His Glu Ala
210 215 220

```
Ile Val Gly Val Gly Lys Gln Trp Ser Gly Ala Arg Ala Leu Glu Ala
225                 230                 235                 240

Leu Leu Thr Val Ala Gly Glu Leu Arg Gly Pro Pro Leu Gln Leu Asp
                245                 250                 255

Thr Gly Gln Leu Leu Lys Ile Ala Lys Arg Gly Gly Val Thr Ala Val
            260                 265                 270

Glu Ala Val His Ala Trp Arg Asn Ala Leu Thr Gly Ala Pro Leu Asn
        275                 280                 285

Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Asn Ile Gly Gly Lys
    290                 295                 300

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala
305                 310                 315                 320

His Gly Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser His Asp Gly
                325                 330                 335

Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys
            340                 345                 350
```

Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Asn
355 360 365

Ile Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Ala Leu Leu Pro Val
370 375 380

Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala
385 390 395 400

Ser His Asp Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu
405 410 415

Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Gln Gln Val Val Ala
420 425 430

Ile Ala Ser His Asp Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg
435 440 445

Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Gln Gln Val
450 455 460

Val Ala Ile Ala Ser His Asp Gly Gly Lys Gln Ala Leu Glu Thr Val
465 470 475 480

Gln Arg Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Gln
485 490 495

Gln Val Val Ala Ile Ala Ser Asn Ser Gly Gly Lys Gln Ala Leu Glu
500 505 510

Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr
515 520 525

Pro Gln Gln Val Val Ala Ile Ala Ser Asn Ser Gly Gly Lys Gln Ala
530 535 540

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

Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser Asn Ser Gly Gly Lys
565 570 575

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala
580 585 590

His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser His Asp Gly

595 600 605

Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys
610 615 620

Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Asn
625 630 635 640

Ile Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val
645 650 655

Leu Cys Gln Ala His Gly Leu Thr Pro Gln Gln Val Val Ala Ile Ala
660 665 670

Ser Asn Gly Gly Gly Arg Pro Ala Leu Glu Ser Ile Val Ala Gln Leu
675 680 685

Ser Arg Pro Asp Pro Ala Leu Ala Ala Leu Thr Asn Asp His Leu Val
690 695 700

Ala Leu Ala Cys Leu Gly Gly Arg Pro Ala Leu Asp Ala Val Lys Lys
705 710 715 720

Gly Leu Pro His Ala Pro Ala Leu Ile Lys Arg Thr Asn Arg Arg Ile

725 730 735

Pro Glu Arg Thr Ser His Arg Val Ala Asp His Ala Gln Val Val Arg
740 745 750

Val Leu Gly Phe Phe Gln Cys His Ser His Pro Ala Gln Ala Phe Asp
755 760 765

Asp Ala Met Thr Gln Phe Gly Met Ser Arg His Gly Leu Leu Gln Leu
770 775 780

Phe Arg Arg Val Gly Val Thr Glu Leu Glu Ala Arg Ser Gly Thr Leu
785 790 795 800

Pro Pro Ala Ser Gln Arg Trp Asp Arg Ile Leu Gln Ala Ser Gly Met
805 810 815

Lys Arg Ala Lys Pro Ser Pro Thr Ser Thr Gln Thr Pro Asp Gln Ala
820 825 830

Ser Leu His Ala Phe Ala Asp Ser Leu Glu Arg Asp Leu Asp Ala Pro
835 840 845

Ser Pro Met His Glu Gly Asp Gln Thr Arg Ala Ser Ser Arg Lys Arg
850 855 860

Ser Arg Ser Asp Arg Ala Val Thr Gly Pro Ser Ala Gln Gln Ser Phe
865 870 875 880

Glu Val Arg Val Pro Glu Gln Arg Asp Ala Leu His Leu Pro Leu Leu
885 890 895

Ser Trp Gly Val Lys Arg Pro Arg Thr Arg Ile Gly Gly Leu Leu Asp
900 905 910

Pro Gly Thr Pro Met Asp Ala Asp Leu Val Ala Ser Ser Thr Val Val
915 920 925

Trp Glu Gln Asp Ala Asp Pro Phe Ala Gly Thr Ala Asp Asp Phe Pro
930 935 940

Ala Phe Asn Glu Glu Glu Leu Ala Trp Leu Met Glu Leu Leu Pro Gln
945 950 955 960

<210> 113
<211> 1062
<212> PRT
<213> Xanthomonas campestris pv. armoraciae

<220>
<221> N-terminus
<222> (1)..(288)

<220>
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<222> (527)..(560)

<220>

<221> Repeat 9

<222> (561)..(594)

<220>

<221> Repeat 10

<222> (595)..(628)

<220>

<221> Repeat 11

<222> (629)..(662)

<220>

<221> Repeat 12

<222> (663)..(696)

<220>

<221> Repeat 13

<222> (697)..(730)

<220>

<221> Repeat 14

<222> (731)..(764)

<220>

<221> Repeat 14.5

<222> (765)..(784)

<220>

<221> C-terminus

<222> (785)..(1062)

<400> 113

Met Asp Pro Ile Arg Ser Arg Thr Pro Ser Pro Ala Arg Glu Leu Leu
1 5 10 15

Ser Gly Pro Gln Pro Asp Gly Val Gln Pro Thr Ala Asp Arg Gly Val
20 25 30

Ser Pro Pro Ala Gly Gly Pro Leu Asp Gly Leu Pro Ala Arg Arg Thr
35 40 45

Met Ser Arg Thr Arg Leu Pro Ser Pro Pro Ala Pro Ser Pro Ala Phe
50 55 60

Ser Ala Asp Ser Phe Ser Asp Leu Leu Arg Gln Phe Asp Pro Ser Leu
65 70 75 80

Phe Asn Thr Ser Leu Phe Asp Ser Leu Pro Pro Phe Gly Ala His His
85 90 95

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

Ala Ala Asp Ala Pro Pro Pro Thr Met Arg Val Ala Val Thr Ala Ala
115 120 125

Arg Pro Pro Arg Ala Lys Pro Ala Pro Arg Arg Arg Ala Ala Gln Pro
130 135 140

Ser Asp Ala Ser Pro Ala Ala Gln Val Asp Leu Arg Thr Leu Gly Tyr
145 150 155 160

Ser Gln Gln Gln Gln Glu Lys Ile Lys Pro Lys Val Arg Ser Thr Val
165 170 175

Ala Gln His His Glu Ala Leu Val Gly His Gly Phe Thr His Ala His
180 185 190

Ile Val Ala Leu Ser Gln His Pro Ala Ala Leu Gly Thr Val Ala Val
195 200 205

Lys Tyr Gln Asp Met Ile Ala Ala Leu Pro Glu Ala Thr His Glu Ala
210 215 220

```
Ile Val Gly Val Gly Lys Gln Trp Ser Gly Ala Arg Ala Leu Glu Ala
225                 230                 235                 240

Leu Leu Thr Val Ala Gly Glu Leu Arg Gly Pro Pro Leu Gln Leu Asp
                245                 250                 255

Thr Gly Gln Leu Leu Lys Ile Ala Lys Arg Gly Gly Val Thr Ala Val
            260                 265                 270

Glu Ala Val His Ala Trp Arg Asn Ala Leu Thr Gly Ala Pro Leu Asn
        275                 280                 285

Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Asn Ile Gly Gly Lys
    290                 295                 300

Gln Ala Leu Glu Thr Val Gln Ala Leu Leu Pro Val Leu Cys Gln Ala
305                 310                 315                 320

His Gly Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser His Asp Gly
                325                 330                 335

Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys
```

340 345 350

Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser His
355 360 365

Asp Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val
370 375 380

Leu Cys Gln Ala His Gly Leu Thr Pro Gln Gln Val Val Ala Ile Ala
385 390 395 400

Ser Asn Gly Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu
405 410 415

Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala
420 425 430

Ile Ala Ser Asn Ser Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Ala
435 440 445

Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Gln Gln Val
450 455 460

Val Ala Ile Ala Ser Asn Ser Gly Gly Lys Gln Ala Leu Glu Thr Val

465 470 475 480

Gln Ala Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu
485 490 495

Gln Val Val Ala Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu
500 505 510

Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr
515 520 525

Pro Gln Gln Val Val Ala Ile Ala Ser His Asp Gly Gly Lys Gln Ala
530 535 540

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

Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser Asn Gly Gly Gly Lys
565 570 575

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Ala
580 585 590

```
His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala Ser Asn Ile Gly
        595                 600                 605

Gly Lys Gln Ala Leu Glu Thr Val Gln Ala Leu Leu Pro Val Leu Cys
    610                 615                 620

Gln Ala His Gly Leu Thr Pro Gln Gln Val Val Ala Ile Ala Ser Asn
625                 630                 635                 640

Ser Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Ala Leu Leu Pro Val
                645                 650                 655

Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala Ile Ala
            660                 665                 670

Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu
        675                 680                 685

Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val Val Ala
    690                 695                 700

Ile Ala Ser Asn Gly Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg
705                 710                 715                 720
```

Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu Gln Val
725 730 735

Val Ala Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu Thr Val
740 745 750

Gln Ala Leu Leu Pro Val Leu Cys Gln Ala His Gly Leu Thr Pro Glu
755 760 765

Gln Val Val Ala Ile Ala Ser Asn Gly Gly Gly Arg Pro Ala Leu Glu
770 775 780

Ser Ile Val Ala Gln Leu Ser Arg Pro Asp Pro Ala Leu Ala Ala Leu
785 790 795 800

Thr Asn Asp His Leu Val Ala Leu Ala Cys Leu Gly Gly Arg Pro Ala
805 810 815

Leu Asp Ala Val Lys Lys Gly Leu Pro His Ala Pro Ala Leu Ile Lys
820 825 830

Arg Thr Asn Arg Arg Ile Pro Glu Arg Thr Ser His Arg Val Ala Asp
835 840 845

His Ala Gln Val Val Arg Val Leu Gly Phe Phe Gln Cys His Ser His
850 855 860

Pro Ala Gln Ala Phe Asp Asp Ala Met Thr Gln Phe Gly Met Ser Arg
865 870 875 880

His Gly Leu Leu Gln Leu Phe Arg Arg Val Gly Val Thr Glu Leu Glu
885 890 895

Ala Arg Ser Gly Thr Leu Pro Pro Ala Ser Gln Arg Trp Asp Arg Ile
900 905 910

Leu Gln Ala Ser Gly Met Lys Arg Ala Lys Pro Ser Pro Thr Ser Thr
915 920 925

Gln Thr Pro Asp Gln Ala Ser Leu His Ala Phe Ala Asp Ser Leu Glu
930 935 940

Arg Asp Leu Asp Ala Pro Ser Pro Met His Glu Gly Asp Gln Thr Arg
945 950 955 960

Ala Ser Ser Arg Lys Arg Ser Arg Ser Asp Arg Ala Val Thr Gly Pro
965 970 975

```
Ser Ala Gln Gln Ser Phe Glu Val Arg Val Pro Glu Gln Arg Asp Ala
            980                 985                 990

Leu His Leu Pro Leu Ser Trp Arg  Val Lys Arg Pro Arg  Thr Ser Ile
        995                 1000                1005

Gly Gly  Gly Leu Pro Asp Pro  Gly Thr Pro Thr Ala  Ala Asp Leu
    1010                1015                1020

Ala Ala  Ser Ser Thr Val Met  Arg Glu Gln Asp Glu  Asp Pro Phe
    1025                1030                1035

Ala Gly  Ala Ala Asp Asp Phe  Pro Ala Phe Asn Glu  Glu Glu Leu
    1040                1045                1050

Ala Trp  Leu Met Glu Leu Leu  Pro Gln
    1055                1060
```