SEQUENCE LISTING

<110> UNIVERSITY OF SOUTHERN CALIFORNIA
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<120> OTOPETRIN PROTON CHANNELS AS TARGETS FOR PHARMACEUTICAL DISCOVERY

<130> 043871-0459804

<140> To Be Assigned
<141> 2018-07-27

<150> 62/537,900
<151> 2017-07-27

<160> 9

<170> PatentIn version 3.5

<210> 1
<211> 612
<212> PRT
<213> Homo sapiens

<400> 1

Met Leu Glu Gly Leu Gly Ser Pro Ala Ser Pro Arg Ala Ala Ala Ser
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Ala Ser Val Ala Gly Ser Ser Gly Pro Ala Ala Cys Ser Pro Pro Ser
20 25 30

Ser Ser Ala Pro Arg Ser Pro Glu Ser Pro Ala Pro Arg Arg Gly Gly
35 40 45

Val Arg Ala Ser Val Pro Gln Lys Leu Ala Glu Met Leu Ser Ser Gln
50 55 60

Tyr Gly Leu Ile Val Phe Val Ala Gly Leu Leu Leu Leu Ala Trp
65 70 75 80

Ala Val His Ala Ala Gly Val Ser Lys Ser Asp Leu Leu Cys Phe Leu
85 90 95

Thr Ala Leu Met Leu Leu Gln Leu Leu Trp Met Leu Trp Tyr Val Gly

100 105 110

Arg Ser Ser Ala His Arg Arg Leu Phe Arg Leu Lys Asp Thr His Ala
115 120 125

Gly Ala Gly Trp Leu Arg Gly Ser Ile Thr Leu Phe Ala Val Ile Thr
130 135 140

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

Cys Leu Ser Ala Thr Glu Gly Val Phe Pro Val Thr His Ser Val His
165 170 175

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

Gln Ser Phe Lys Thr Leu Glu Arg Phe Gly Val Ile His Ser Val Phe
195 200 205

Thr Asn Leu Leu Leu Trp Ala Asn Gly Val Leu Asn Glu Ser Lys His
210 215 220

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

Ile Thr Thr Val Leu Asp Asp His Thr Pro Gln Cys Asn Cys Thr Pro
245 250 255

Pro Thr Leu Cys Thr Ala Ile Ser His Gly Ile Tyr Tyr Leu Tyr Pro
260 265 270

Phe Asn Ile Glu Tyr Gln Ile Leu Ala Ser Thr Met Leu Tyr Val Leu
275 280 285

Trp Lys Asn Ile Gly Arg Lys Val Asp Ser His Gln His Gln Lys Met
290 295 300

Gln Phe Lys Ser Asp Gly Val Met Val Gly Ala Val Leu Gly Leu Thr

305 310 315 320

Val Leu Ala Ala Thr Ile Ala Val Val Val Val Tyr Leu Ile His Ile
325 330 335

Gly Arg Ser Lys Thr Lys Ser Glu Ser Ala Leu Ile Met Phe Tyr Leu
340 345 350

Tyr Ala Ile Thr Leu Leu Met Leu Met Gly Ala Ala Gly Leu Ala Gly
355 360 365

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

Pro Ala Arg Lys Leu Asp Ser Asp Leu Leu Val Gly Thr Ala Ser Gly
385 390 395 400

Ser Trp Leu Ile Ser Trp Gly Ser Ile Leu Ala Ile Leu Cys Ala Glu
405 410 415

Gly His Pro Arg Tyr Thr Trp Tyr Asn Leu Pro Tyr Ser Ile Leu Ala
420 425 430

Ile Val Glu Lys Tyr Ile Gln Asn Leu Phe Ile Phe Glu Ser Ile His
435 440 445

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

Thr Val Cys Asn Gly Asn Thr Met Pro Leu Ala Ser Ser Cys Pro Lys
465 470 475 480

Ser Gly Gly Val Ala Arg Asp Val Ala Pro Gln Gly Lys Asp Met Pro
485 490 495

Pro Ala Ala Asn Gly Asn Val Cys Met Arg Glu Ser His Asp Lys Glu
500 505 510

Glu Glu Lys Gln Glu Glu Ser Ser Trp Gly Gly Ser Pro Ser Pro Val

515 520 525

Arg Leu Pro Arg Phe Leu Gln Gly Asn Ala Lys Arg Lys Val Leu Arg
530 535 540

Asn Ile Ala Ala Phe Leu Phe Leu Cys Asn Ile Ser Leu Trp Ile Pro
545 550 555 560

Pro Ala Phe Gly Cys Arg Pro Glu Tyr Asp Asn Gly Leu Glu Glu Ile
565 570 575

Val Phe Gly Phe Glu Pro Trp Ile Ile Val Val Asn Leu Ala Met Pro
580 585 590

Phe Ser Ile Phe Tyr Arg Met His Ala Ala Ala Ser Leu Phe Glu Val
595 600 605

Tyr Cys Lys Ile
610

<210> 2
<211> 562
<212> PRT
<213> Homo sapiens

<400> 2

Met Ser Glu Glu Leu Ala Gln Gly Pro Lys Glu Ser Pro Pro Ala Pro
1 5 10 15

Arg Ala Gly Pro Arg Glu Val Trp Lys Lys Gly Gly Arg Leu Leu Ser
20 25 30

Val Leu Leu Ala Val Asn Val Leu Leu Leu Ala Cys Thr Leu Ile Ser
35 40 45

Gly Gly Ala Phe Asn Lys Val Ala Val Tyr Asp Thr Asp Val Phe Ala
50 55 60

Leu Leu Thr Ala Met Met Leu Leu Ala Thr Leu Trp Ile Leu Phe Tyr
65 70 75 80

```
Leu Leu Arg Thr Val Arg Cys Pro Cys Ala Val Pro Tyr Arg Asp Ala
                85                  90                  95

His Ala Gly Pro Ile Trp Leu Arg Gly Gly Leu Val Leu Phe Gly Ile
            100                 105                 110

Cys Thr Leu Ile Met Asp Val Phe Lys Thr Gly Tyr Tyr Ser Ser Phe
        115                 120                 125

Phe Glu Cys Gln Ser Ala Ile Lys Ile Leu His Pro Leu Ile Gln Ala
    130                 135                 140

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

Cys Val His Val His Leu Asp Leu Thr Trp Cys Gly Leu Met Phe Thr
                165                 170                 175

Leu Thr Thr Asn Leu Ala Ile Trp Met Ala Ala Val Val Asp Glu Ser
            180                 185                 190

Val His Gln Ser His Ser Tyr Ser Ser Ser His Ser Asn Ala Ser His
        195                 200                 205

Ala Arg Leu Ile Ser Asp Gln His Ala Asp Asn Pro Val Gly Gly Asp
    210                 215                 220

Ser Cys Leu Cys Ser Thr Ala Val Cys Gln Ile Phe Gln Gln Gly Tyr
225                 230                 235                 240

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

Met Leu Tyr Val Met Trp Lys Asn Val Gly Arg Phe Leu Ala Ser Thr
            260                 265                 270

Pro Gly His Ser His Thr Pro Thr Pro Val Ser Leu Phe Arg Glu Thr
        275                 280                 285
```

```
Phe Phe Ala Gly Pro Val Leu Gly Leu Leu Leu Phe Val Val Gly Leu
    290                 295                 300

Ala Val Phe Ile Ile Tyr Glu Val Gln Val Ser Gly Asp Gly Ser Arg
305                 310                 315                 320

Thr Arg Gln Ala Leu Val Ile Tyr Tyr Ser Phe Asn Ile Val Cys Leu
                325                 330                 335

Gly Leu Thr Thr Leu Val Ser Leu Ser Gly Ser Ile Ile Tyr Arg Phe
            340                 345                 350

Asp Arg Arg Ala Met Asp His His Lys Asn Pro Thr Arg Thr Leu Asp
        355                 360                 365

Val Ala Leu Leu Met Gly Ala Ala Leu Gly Gln Tyr Ala Ile Ser Tyr
    370                 375                 380

Tyr Ser Ile Val Ala Val Val Ala Gly Thr Pro Gln Asp Leu Leu Ala
385                 390                 395                 400

Gly Leu Asn Leu Thr His Ala Leu Leu Met Ile Ala Gln His Thr Phe
                405                 410                 415

Gln Asn Met Phe Ile Ile Glu Ser Leu His Arg Gly Pro Pro Gly Ala
            420                 425                 430

Glu Pro His Ser Thr His Pro Lys Glu Pro Cys Gln Asp Leu Thr Phe
        435                 440                 445

Thr Asn Leu Asp Ala Leu His Thr Leu Ser Ala Cys Pro Pro Asn Pro
    450                 455                 460

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

Val Ser Thr Pro Arg Ser Gln Trp Arg Arg Gln Cys Leu Lys Asp Ile
                485                 490                 495
```

```
Ser Leu Phe Leu Leu Leu Cys Asn Val Ile Leu Trp Ile Met Pro Ala
            500                 505                 510


Phe Gly Ala Arg Pro His Phe Ser Asn Thr Val Glu Val Asp Phe Tyr
        515                 520                 525


Gly Tyr Ser Leu Trp Ala Val Ile Val Asn Ile Cys Leu Pro Phe Gly
    530                 535                 540


Ile Phe Tyr Arg Met His Ala Val Ser Ser Leu Leu Glu Val Tyr Val
545                 550                 555                 560


Leu Ser
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<210> 3
<211> 596
<212> PRT
<213> Homo sapiens

<400> 3

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Met Gly Arg Gly Ala Arg Ala Ala Ala Ala Gln Ser Arg Trp Gly Arg
1               5                   10                  15


Ala Ser Arg Ala Ser Val Ser Pro Gly Arg Thr Ile Arg Ser Ala Pro
            20                  25                  30


Ala Val Gly Glu Ala Gln Glu Thr Glu Ala Ala Pro Glu Lys Glu Asn
        35                  40                  45


Arg Val Asp Val Gly Ala Glu Glu Arg Ala Ala Ala Thr Arg Pro Arg
    50                  55                  60


Gln Lys Ser Trp Leu Val Arg His Phe Ser Leu Leu Leu Arg Arg Asp
65                  70                  75                  80


Arg Gln Ala Gln Lys Ala Gly Gln Leu Phe Ser Gly Leu Leu Ala Leu
                85                  90                  95
```

```
Asn Val Val Phe Leu Gly Gly Ala Phe Ile Cys Ser Met Ile Phe Asn
            100                 105                 110

Lys Val Ala Val Thr Leu Gly Asp Val Trp Ile Leu Leu Ala Thr Leu
        115                 120                 125

Lys Val Leu Ser Leu Leu Trp Leu Leu Tyr Tyr Val Ala Ser Thr Thr
    130                 135                 140

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

Trp Val Arg Gly Ser Leu Val Leu Phe Gly Ser Cys Thr Phe Cys Leu
                165                 170                 175

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

Gln Leu Asp Leu Val Phe Ser Val Ile Glu Met Val Phe Ile Gly Val
        195                 200                 205

Gln Thr Trp Val Leu Trp Lys His Cys Lys Asp Cys Val Arg Val Gln
    210                 215                 220

Thr Asn Phe Thr Arg Cys Gly Leu Met Leu Thr Leu Ala Thr Asn Leu
225                 230                 235                 240

Leu Leu Trp Val Leu Ala Val Thr Asn Asp Ser Met His Arg Glu Ile
                245                 250                 255

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

Asn Thr Cys Leu Cys Leu Asn Ala Thr Ala Cys Glu Ala Phe Arg Arg
        275                 280                 285

Gly Phe Leu Met Leu Tyr Pro Phe Ser Thr Glu Tyr Cys Leu Ile Cys
    290                 295                 300
```

```
Cys Ala Val Leu Phe Val Met Trp Lys Asn Val Gly Arg His Val Ala
305                 310                 315                 320


Pro His Met Gly Ala His Pro Ala Thr Ala Pro Phe His Leu His Gly
                325                 330                 335


Ala Ile Phe Gly Pro Leu Leu Gly Leu Leu Val Leu Leu Ala Gly Val
            340                 345                 350


Cys Val Phe Val Leu Phe Gln Ile Glu Ala Ser Gly Pro Ala Ile Ala
        355                 360                 365


Cys Gln Tyr Phe Thr Leu Tyr Tyr Ala Phe Tyr Val Ala Val Leu Pro
    370                 375                 380


Thr Met Ser Leu Ala Cys Leu Ala Gly Thr Ala Ile His Gly Leu Glu
385                 390                 395                 400


Glu Arg Glu Leu Asp Thr Val Lys Asn Pro Thr Arg Ser Leu Asp Val
                405                 410                 415


Val Leu Leu Met Gly Ala Ala Leu Gly Gln Met Gly Ile Ala Tyr Phe
            420                 425                 430


Ser Ile Val Ala Ile Val Ala Lys Arg Pro His Glu Leu Leu Asn Arg
        435                 440                 445


Leu Ile Leu Ala Tyr Ser Leu Leu Leu Ile Leu Gln His Ile Ala Gln
    450                 455                 460


Asn Leu Phe Ile Ile Glu Gly Leu His Arg Arg Pro Leu Trp Glu Thr
465                 470                 475                 480


Val Pro Glu Gly Leu Ala Gly Lys Gln Glu Ala Glu Pro Pro Arg Arg
                485                 490                 495


Gly Ser Leu Leu Glu Leu Gly Gln Gly Leu Gln Arg Ala Ser Leu Ala
            500                 505                 510
```

```
Tyr Ile His Ser Tyr Ser His Leu Asn Trp Lys Arg Arg Ala Leu Lys
        515                 520                 525


Glu Ile Ser Leu Phe Leu Ile Leu Cys Asn Ile Thr Leu Trp Met Met
    530                 535                 540


Pro Ala Phe Gly Ile His Pro Glu Phe Glu Asn Gly Leu Glu Lys Asp
545                 550                 555                 560


Phe Tyr Gly Tyr Gln Ile Trp Phe Ala Ile Val Asn Phe Gly Leu Pro
                565                 570                 575


Leu Gly Val Phe Tyr Arg Met His Ser Val Gly Gly Leu Val Glu Val
            580                 585                 590


Tyr Leu Gly Ala
        595


<210>  4
<211>  600
<212>  PRT
<213>  Mus musculus

<400>  4

Met Pro Gly Gly Pro Gly Ala Pro Ser Ser Pro Ala Ala Ser Ser Gly
1               5                   10                  15


Ser Ser Arg Ala Ala Pro Ser Gly Ile Ala Ala Cys Pro Leu Ser Pro
            20                  25                  30


Pro Pro Leu Ala Arg Gly Ser Pro Gln Ala Ser Gly Pro Arg Arg Gly
        35                  40                  45


Ala Ser Val Pro Gln Lys Leu Ala Glu Thr Leu Ser Ser Gln Tyr Gly
    50                  55                  60


Leu Asn Val Phe Val Ala Gly Leu Leu Phe Leu Leu Ala Trp Ala Val
65                  70                  75                  80
```

```
His Ala Thr Gly Val Gly Lys Ser Asp Leu Leu Cys Val Leu Thr Ala
                85                  90                  95

Leu Met Leu Leu Gln Leu Leu Trp Met Leu Trp Tyr Val Gly Arg Ser
            100                 105                 110

Tyr Met Gln Arg Arg Leu Ile Arg Pro Lys Asp Thr His Ala Gly Ala
        115                 120                 125

Arg Trp Leu Arg Gly Ser Ile Thr Leu Phe Ala Phe Ile Thr Val Val
    130                 135                 140

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

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

Leu Gln Val Tyr Phe Leu Trp Gly His Ala Lys Asp Ile Ile Met Ser
            180                 185                 190

Phe Lys Thr Leu Glu Arg Phe Gly Val Ile His Ser Val Phe Thr Asn
        195                 200                 205

Leu Leu Leu Trp Ala Asn Ser Val Leu Asn Glu Ser Lys His Gln Leu
    210                 215                 220

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

Ile Val Leu Asp Asp His Thr Pro Gln Cys Asn Cys Thr Pro Pro Ala
                245                 250                 255

Leu Cys Ser Ala Leu Ser His Gly Ile Tyr Tyr Leu Tyr Pro Phe Asn
            260                 265                 270

Ile Glu Tyr Gln Ile Leu Ala Ser Thr Met Leu Tyr Val Leu Trp Lys
        275                 280                 285
```

```
Asn Ile Gly Arg Arg Val Asp Ser Ser Gln His Gln Lys Met Gln Cys
    290                 295                 300

Arg Phe Asp Gly Val Leu Val Gly Ser Val Leu Gly Leu Thr Val Leu
305                 310                 315                 320

Ala Ala Thr Ile Ala Val Val Val Val Tyr Met Ile His Ile Gly Arg
                325                 330                 335

Ser Lys Ser Lys Ser Glu Ser Ala Leu Ile Met Phe Tyr Leu Tyr Ala
            340                 345                 350

Ile Thr Val Leu Leu Leu Met Gly Ala Ala Gly Leu Val Gly Ser Trp
        355                 360                 365

Ile Tyr Arg Val Asp Glu Lys Ser Leu Asp Glu Ser Lys Asn Pro Ala
    370                 375                 380

Arg Lys Leu Asp Val Asp Leu Leu Val Ala Thr Ala Ser Gly Ser Trp
385                 390                 395                 400

Leu Leu Ser Trp Gly Ser Ile Leu Ala Ile Ala Cys Ala Glu Thr Arg
                405                 410                 415

Pro Pro Tyr Thr Trp Tyr Asn Leu Pro Tyr Ser Val Leu Val Ile Val
            420                 425                 430

Glu Lys Tyr Val Gln Asn Ile Phe Ile Ile Glu Ser Val His Leu Glu
        435                 440                 445

Pro Glu Gly Val Pro Glu Asp Val Arg Thr Leu Arg Val Val Thr Val
    450                 455                 460

Cys Ser Ser Glu Ala Ala Ala Leu Ala Ala Ser Thr Leu Gly Ser Gln
465                 470                 475                 480

Gly Met Ala Gln Asp Gly Ser Pro Ala Val Asn Gly Asn Leu Cys Leu
                485                 490                 495
```

```
Gln Gln Arg Cys Gly Lys Glu Asp Gln Glu Ser Gly Trp Glu Gly Ala
            500                 505                 510


Thr Gly Thr Thr Arg Cys Leu Asp Phe Leu Gln Gly Gly Met Lys Arg
        515                 520                 525


Arg Leu Leu Arg Asn Ile Thr Ala Phe Leu Phe Leu Cys Asn Ile Ser
    530                 535                 540


Leu Trp Ile Pro Pro Ala Phe Gly Cys Arg Pro Glu Tyr Asp Asn Gly
545                 550                 555                 560


Leu Glu Glu Ile Val Phe Gly Phe Glu Pro Trp Ile Ile Val Val Asn
                565                 570                 575


Leu Ala Met Pro Phe Ser Ile Phe Tyr Arg Met His Ala Ala Ala Ala
            580                 585                 590


Leu Phe Glu Val Tyr Cys Lys Ile
        595                 600


<210>  5
<211>  563
<212>  PRT
<213>  Mus musculus

<400>  5

Met Ser Glu Glu Leu Val Pro His Pro Asn Glu Ser Leu Pro Gly Pro
1               5                   10                  15


Arg Ala Ser Pro Arg Glu Val Trp Lys Lys Gly Gly Arg Leu Leu Ser
            20                  25                  30


Val Leu Leu Ala Val Asn Val Leu Leu Leu Ala Cys Thr Leu Ile Ser
        35                  40                  45


Gly Gly Ala Phe Asn Lys Val Ala Val Tyr Asp Thr Asp Val Phe Ala
    50                  55                  60


Leu Leu Thr Thr Met Met Leu Leu Ala Ala Leu Trp Ile Val Phe Tyr
```

65 70 75 80

Leu Leu Arg Thr Ala Arg Cys Pro Asp Ala Val Pro Tyr Arg Asp Ala
85 90 95

His Ala Gly Pro Ile Trp Leu Arg Gly Gly Leu Val Leu Phe Gly Ile
100 105 110

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

Phe Glu Cys Gln Ser Ala Ile Lys Ile Leu His Pro Ile Ile Gln Ala
130 135 140

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

Cys Ile His Thr His Leu Asp Leu Thr Arg Cys Gly Leu Met Phe Thr
165 170 175

Leu Ala Thr Asn Leu Ala Ile Trp Met Ala Ala Val Val Asp Glu Ser
180 185 190

Val His Gln Ala His Ser Tyr Ser Gly Ser His Gly Asn Thr Ser His
195 200 205

Thr Arg Leu Asn Pro Asp Ser Lys Arg Ala Gly Gly Ala Ala Glu Glu
210 215 220

Asp Pro Cys Leu Cys Ser Thr Ala Ile Cys Gln Ile Phe Gln Gln Gly
225 230 235 240

Tyr Phe Tyr Leu Tyr Pro Phe Asn Ile Glu Tyr Ser Leu Phe Ala Ser
245 250 255

Thr Met Leu Tyr Val Met Trp Lys Asn Val Gly Arg Leu Leu Ala Ser
260 265 270

Thr His Gly His Gly His Thr Pro Ser Arg Val Ser Leu Phe Arg Glu

```
        275                 280                 285

Thr Phe Phe Ala Gly Pro Val Leu Gly Leu Leu Leu Phe Val Val Gly
    290                 295                 300

Leu Ala Val Phe Ile Leu Tyr Glu Val Gln Val Ser Gly Glu Arg Gly
305                 310                 315                 320

His Thr Arg Gln Ala Leu Val Ile Tyr Tyr Ser Phe Asn Ile Val Cys
                325                 330                 335

Leu Gly Leu Met Thr Leu Val Ser Leu Ser Gly Ser Val Ile Tyr Arg
            340                 345                 350

Phe Asp Arg Arg Ala Met Asp His His Lys Asn Pro Thr Arg Thr Leu
        355                 360                 365

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

Tyr Tyr Ser Ile Val Ala Val Val Val Gly Ser Pro Arg Asp Leu Gln
385                 390                 395                 400

Gly Ala Leu Asn Leu Ser His Ala Leu Leu Met Ile Ala Gln His Thr
                405                 410                 415

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

Ala Glu Pro Arg Glu Met Pro Pro Lys Glu Pro Cys Gln Gly Ile Thr
        435                 440                 445

Phe Ala Asn Leu Asp Ala Ile Arg Thr Leu Pro Ser Cys Pro Pro Thr
    450                 455                 460

Pro Arg Leu Val Ile Pro Asn Leu Glu Ser Pro Gln Glu Ala Val Ala
465                 470                 475                 480

Ile Ile Ser Ala Pro Arg Cys His Trp Arg Arg Arg Cys Leu Lys Asp
```

485 490 495

Ile Ser Leu Phe Leu Leu Leu Cys Asn Val Ile Leu Trp Ile Met Pro
500 505 510

Ala Phe Gly Ala Arg Pro His Phe Ser Asn Thr Val Glu Val Asp Phe
515 520 525

Tyr Gly Tyr Ser Leu Trp Ala Ala Ile Val Asn Ile Cys Leu Pro Phe
530 535 540

Gly Ile Phe Tyr Arg Met His Ala Val Ser Ser Leu Leu Glu Val Tyr
545 550 555 560

Val Leu Ser

<210> 6
<211> 577
<212> PRT
<213> Mus musculus

<400> 6

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

Pro Glu Ala Lys Thr Thr Glu Gly Ala Ser Ser Tyr Asp Gln Ala Asp
20 25 30

Met Glu Thr Lys His Ala Gly Ser Pro Cys Pro Pro Lys Gln Lys Ser
35 40 45

Trp Leu Ala Arg His Phe Ser Leu Leu Leu Arg Arg Asp Arg Gln Ala
50 55 60

Gln Lys Ala Gly Gln Leu Phe Ser Gly Leu Leu Ala Leu Asn Val Val
65 70 75 80

Phe Leu Gly Gly Ala Phe Ile Cys Ser Met Ile Phe Asn Lys Val Ser
85 90 95

```
Val Thr Leu Gly Asp Val Trp Ile Leu Leu Ala Ala Leu Lys Val Leu
            100                 105                 110

Ser Leu Leu Trp Leu Leu Tyr Tyr Thr Val Gly Thr Thr Arg Lys Pro
        115                 120                 125

His Ala Val Leu Tyr Arg Asp Pro His Ala Gly Pro Ile Trp Val Arg
    130                 135                 140

Gly Ser Leu Val Leu Phe Gly Ser Cys Thr Val Cys Leu Asn Ile Phe
145                 150                 155                 160

Arg Met Gly Tyr Asp Val Ser His Ile His Cys Lys Ser Glu Val Glu
                165                 170                 175

Leu Ile Phe Pro Ala Ile Glu Ile Val Phe Met Ile Ile Gln Thr Trp
            180                 185                 190

Val Leu Trp Arg His Cys Lys Asp Cys Val Gln Val Gln Thr Asn Phe
        195                 200                 205

Thr Arg Cys Gly Leu Met Leu Thr Leu Ala Thr Asn Leu Leu Met Trp
    210                 215                 220

Val Leu Ala Val Thr Asn Asp Ser Met His Arg Glu Ile Glu Ala Glu
225                 230                 235                 240

Leu Asp Ala Leu Met Glu Lys Phe Ser Gly Asn Gly Thr Asn Thr Cys
                245                 250                 255

Met Cys Leu Asn Thr Thr Val Cys Glu Val Phe Arg Lys Gly Tyr Leu
            260                 265                 270

Met Leu Tyr Pro Phe Ser Thr Glu Tyr Cys Leu Ile Cys Cys Ala Val
        275                 280                 285

Leu Phe Val Met Trp Lys Asn Val Ser Arg Ser Leu Ala Ala His Thr
    290                 295                 300
```

```
Gly Ala His Pro Asn Arg Ser Pro Phe Arg Leu His Gly Thr Ile Phe
305                 310                 315                 320

Gly Pro Leu Leu Gly Leu Leu Ala Leu Val Ala Gly Val Cys Val Phe
                325                 330                 335

Val Leu Phe Gln Ile Glu Ala Ser Gly Pro Asp Ile Ala Arg Gln Tyr
            340                 345                 350

Phe Thr Leu Tyr Tyr Ala Phe Tyr Val Ala Val Leu Pro Thr Met Ser
        355                 360                 365

Leu Ala Cys Leu Ala Gly Thr Ala Ile His Gly Leu Glu Glu Arg Glu
    370                 375                 380

Leu Asp Thr Leu Lys Asn Pro Thr Arg Ser Leu Asp Val Val Leu Leu
385                 390                 395                 400

Met Gly Ala Ala Leu Gly Gln Met Gly Ile Ala Tyr Phe Ser Ile Val
                405                 410                 415

Ala Ile Val Ala Thr Gln Pro His Glu Leu Leu Asn Gln Leu Ile Leu
            420                 425                 430

Ala Tyr Ser Leu Leu Leu Ile Leu Gln His Ile Thr Gln Asn Leu Phe
        435                 440                 445

Ile Ile Glu Gly Leu His Arg Arg Pro Leu Trp Glu Pro Ala Val Ser
    450                 455                 460

Gly Val Met Glu Lys Gln Asp Val Glu Leu Pro Arg Arg Gly Ser Leu
465                 470                 475                 480

Arg Glu Leu Gly Gln Asp Leu Arg Arg Ala Ser Arg Ala Tyr Ile His
                485                 490                 495

Ser Phe Ser His Leu Asn Trp Lys Arg Arg Met Leu Lys Glu Ile Ser
            500                 505                 510
```

```
Leu Phe Leu Ile Leu Cys Asn Ile Thr Leu Trp Met Met Pro Ala Phe
        515                 520                 525


Gly Ile His Pro Glu Phe Glu Asn Gly Leu Glu Lys Asp Phe Tyr Gly
    530                 535                 540


Tyr Arg Thr Trp Phe Thr Ile Val Asn Phe Gly Leu Pro Leu Gly Val
545                 550                 555                 560


Phe Tyr Arg Met His Ser Val Gly Gly Leu Val Glu Val Tyr Leu Gly
                565                 570                 575


Ala
```

<210> 7
<211> 977
<212> PRT
<213> Drosophila

<400> 7

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Met Gln Arg Cys Pro Tyr Ile His Glu Met Arg Glu Arg Leu Leu Asp
1               5                   10                  15


Gln Pro Arg Glu Thr Leu Gln Leu Glu Asn Met Glu Arg Ala Asn Leu
            20                  25                  30


Leu Asp Asn Arg Gln Ser Ala Ser Glu Ser Asn Gln Leu Gln Gly Asp
        35                  40                  45


Gly Tyr His Thr Ser Pro Ala His Gln Arg Thr Pro Leu Val Pro His
    50                  55                  60


Asp Leu Gly Glu Asp Phe Asn Leu Asp Phe Asp Asp Asp Phe Pro Ile
65                  70                  75                  80


Asp Ala Arg Arg Pro Lys Asn Ala Asn Asp Ile His Pro Ala Val Leu
                85                  90                  95
```

```
Thr Arg Pro Gln Gln Arg Thr Ser Leu Phe Ile Val Thr Ser Leu Val
            100                 105                 110

Tyr Ala Ile Leu Leu Ile Val Val Cys Ile Ala Tyr Val Ile Ser Asp
        115                 120                 125

Val Thr Thr His Arg Leu Pro Val Leu Tyr Tyr Glu Thr Phe Phe Thr
    130                 135                 140

Tyr Leu Tyr Gly Val Ser Ile Leu Phe Leu Leu Tyr Val Phe Cys Phe
145                 150                 155                 160

Leu Leu Gln Glu Ser Ser Cys Cys Asn Gly Gly Asn Gly Gly Ser Lys
                165                 170                 175

Pro Lys Pro Gln Pro Lys Glu Lys Lys Ser Lys Lys Ala Lys Asn Ala
            180                 185                 190

Asp Pro Ala Asp Ser Lys Asp Ala Lys Gly Ser Lys Asp Ser Gly Lys
        195                 200                 205

Ala Ala Lys Gly Ala Ala Tyr Gln His Thr Leu Ala Lys Phe Leu Glu
    210                 215                 220

Ala Pro Val Asp Ala Glu Val Ala Val Thr Pro Lys Asn Val Arg Lys
225                 230                 235                 240

Arg Lys Thr Thr His Ser Asp Leu Thr His Gly Ser Phe Phe Leu Arg
                245                 250                 255

Val Gly Ala Ile Ala Phe Gly Leu Gly Ala Met Ile Tyr Ile Gly Leu
            260                 265                 270

Glu Phe Gly Ser Phe Phe Glu Ile Pro Phe Asp Ser Pro Cys His His
        275                 280                 285

Ile Leu Ile Gly Val Asn Pro Leu Leu Gln Met Ile Phe Thr Phe Met
    290                 295                 300
```

```
Gln Met Tyr Phe Ile Phe Met Asn Ala Arg Thr Arg Pro Pro Phe Gln
305                 310                 315                 320


Leu Asn Ile His Arg Phe Lys Val Ile Ala Arg Phe Gly Leu Met His
                325                 330                 335


Val Val Ala Thr Asn Ile Cys Val Trp Ile Arg Thr Leu Val Lys Glu
            340                 345                 350


Ser Leu Leu Glu Ile Thr Ile Tyr His Gln Lys Asn Glu Pro Glu Ala
        355                 360                 365


Gly Ala Ser Ser Ile Ala His Ser Ile Arg Gln His Ala Leu Arg His
    370                 375                 380


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


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


Asn Val Leu Ser Lys Leu Val Arg Asn Thr Val Asp Gly Ile Ser Lys
            420                 425                 430


Ser Leu Gly Met Gly Gly Asp Gln Ala Leu Asp Ser Ser Thr Thr Ser
        435                 440                 445


Ser Ser Thr Thr Thr Thr Thr Arg Ala Pro Phe Thr Thr Pro Asn Tyr
    450                 455                 460


Gln Trp His Ser Thr Thr Met Ala Arg Lys Leu Lys Lys Phe Ile Thr
465                 470                 475                 480


Ser Ala Thr Thr Ala Ala Thr Thr Ala Ala Gly Ser Ser Ser Thr Ala
                485                 490                 495


Ser Ser Thr Thr Thr Ile Ser Pro Thr Ile Ser Ser Thr Thr Ile Pro
            500                 505                 510
```

```
Ser Thr Thr Ile Ser Ser Thr Thr Ile Ser Ser Ser Thr Thr Phe Ser
        515                 520                 525

Pro Phe Ser Pro Ser Thr Thr Thr Thr Thr Thr Thr Ala Ala Ala
    530                 535                 540

Leu Asn Leu Glu Thr Ser Gly Ser Glu Ser Pro Phe Gly Gly Leu Gln
545                 550                 555                 560

Arg Ile Leu Ser Ser Ala Ala Pro Pro Ser Leu Ala Pro Val Asp Gly
                565                 570                 575

Phe Gly Ser Ala Ser Ala Ala Thr Pro Thr Ser Gly Ser Gly Ala Gly
            580                 585                 590

Ser Phe Val Asp Ser Phe Leu Ala Ser Thr Leu Ser Pro Ala Ser Ser
        595                 600                 605

Thr Glu Gly Ser Ala Ser Ile Met Asn Asn Leu Phe Gly Gln Gly Pro
    610                 615                 620

Met Glu Asn Ser Phe Gln Thr Tyr Thr Asp Leu Gly His Glu Glu Ala
625                 630                 635                 640

Thr Gly Leu Val Ser Phe Glu Asn Leu Glu Ser Leu Asp Asn Ile Tyr
                645                 650                 655

Pro Ala Ala Leu Ser Ser Asn Ile Gly Thr Leu Asn Ser Thr Ala Cys
            660                 665                 670

Gly Arg Ile Asp Ile Met Gly Thr Ile Val Tyr Asp Ser Ala Pro Tyr
        675                 680                 685

Leu Tyr Pro Phe Ile Ile Glu Tyr Ser Leu Ile Gly Ala Val Val Leu
    690                 695                 700

Tyr Val Met Trp Lys His Ile Gly Arg Tyr Pro Gly Arg Met Asn Asp
705                 710                 715                 720
```

```
Glu Asp Leu Glu His Arg Leu Glu Val Met Leu Ser Arg Arg Ala Val
               725                 730                 735

Ala Met Ala Gln Gln Ala Arg Ser Gly Arg Val Asp Cys Val Gly Ser
            740                 745                 750

Ser Lys Gly Leu Phe Phe Gly Leu Leu Leu Leu Val Gly Ala Leu Ile
        755                 760                 765

Cys Leu Ile Leu Phe Phe Val Leu Val Arg His Gln Gln Phe Ser Leu
    770                 775                 780

Leu Ala Ile Tyr Leu Ala Asp Ala Ser His Cys Ile Leu Met Ala Phe
785                 790                 795                 800

Ala Ile Leu Ala Ile Ile Val Gly Phe Ile Arg Val Lys Asn Leu Lys
                805                 810                 815

Phe Arg Cys Glu Glu Gln Ser Asn Leu Asn Asp Ile Leu Leu Arg Ile
            820                 825                 830

Ser Ala Phe Gly Leu Phe Thr Tyr Ser Val Phe Ser Ile Ile Ala Gly
        835                 840                 845

Ser Leu Lys Val Leu Glu Ser Glu Pro Ser Leu Leu Val Thr Thr Thr
    850                 855                 860

Gly Gly Val Ala Val Phe Gln Val Ile Leu Gln Leu Leu Phe Ile Ala
865                 870                 875                 880

Asp Val Ser Arg Arg Arg Val His Leu Pro Glu His Asp Arg Ser Lys
                885                 890                 895

Pro Gly Arg Gln Ile Val Thr Phe Leu Leu Ile Cys Asn Val Ala Met
            900                 905                 910

Phe Ala Ile Tyr Thr Phe Glu Ala Gln Lys Val Phe Ala Asn Pro Val
        915                 920                 925
```

```
Ser Arg Tyr Val Gln Leu Glu Phe Tyr Gly Phe Val Pro Trp Ser Ile
    930                 935                 940

Ile Gln Arg Ile Thr Leu Pro Leu Cys Ile Phe His Arg Phe His Ser
945                 950                 955                 960

Ala Val Thr Leu Ala Glu Ile Trp Lys Thr Thr Tyr Lys Ala Arg Leu
                965                 970                 975

Glu
```

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<212> PRT
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Met Ser Leu Ile Asn Leu Lys Ser Lys Asp Met Tyr Asp Glu Pro Ile
1               5                   10                  15

Asn Leu Trp Arg Thr Lys Gln Arg Val His Tyr His His Asp Val Ile
            20                  25                  30

Ser Lys Gly Asn Asp Ser His Arg Ser Ser Asp Ala Cys Glu Tyr Ile
        35                  40                  45

Thr Ile Ser Ala Pro Lys Lys Ser Gly Ser Phe Ser Arg Ser Pro Pro
    50                  55                  60

Ser Ser Leu Pro Thr Ser Val Pro Gly Thr Pro Arg His Ser Val Ala
65                  70                  75                  80

Ala Thr Ser Asn Gln Val Ile Arg Tyr Ala Arg Thr Ser Cys Asp His
                85                  90                  95

Cys Gly His His Ser Ile Pro Val Met Ser Pro His Pro Ile Ser Pro
            100                 105                 110
```

```
Leu Ala Lys Ser Gln Thr Asn Leu Asp Leu Val Glu His Gly Ser Gln
        115                 120                 125

Arg Gln Ala Leu Leu Pro Leu Pro Thr Val Gly Met His His Glu Asp
    130                 135                 140

Ser Ala Cys Thr Leu Gln Val Ser Arg Arg Pro Ser Leu Leu Leu Gln
145                 150                 155                 160

Glu Ile Leu Thr Gln Arg Pro Pro Leu Phe Gly Arg Arg Asp Gly Asn
                165                 170                 175

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

Ala Ser Gly Ser Thr Ala Thr Ile Asn Phe Gln Ser Gly Ala Thr Ser
        195                 200                 205

Ala Arg Asn Gly Ser Thr Ala Phe Phe Asp Asn Gly Ala Lys Ser Phe
    210                 215                 220

Gln Ala Lys Gln Gln Lys Asp Lys Asn Arg Arg Thr Gly Asn Asp Ala
225                 230                 235                 240

Ile Ser Ser Ala Leu Ser Ala Thr Tyr Cys Lys Leu Leu Val Leu Leu
                245                 250                 255

Gly Val Cys Leu Pro Ile Thr Glu Val Ile Ser Asp Gln Ile Pro Thr
            260                 265                 270

Tyr Val Tyr Gln Gly Phe Tyr Val Tyr Leu Tyr Val Gly Ser Ile Leu
        275                 280                 285

Phe Val Ile Phe Leu Tyr Ile Ser Ala Phe Arg Asn Arg Ser Leu Phe
    290                 295                 300

Asn Ala Leu Lys Asp Tyr His Glu Lys Asn Ser Asn Val His Leu Lys
305                 310                 315                 320
```

```
His Lys Val Thr His Phe Gly Ser Phe Tyr Leu Arg Val Gly Ala Ile
                325                 330                 335

Ala Phe Ala Ile Gly Thr Met Val Tyr Ser Gly Leu Glu Phe Gly Gln
            340                 345                 350

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

Ile Thr Pro Ile Cys Arg Met Val Leu Cys Ile Ala Gln Val Gln Phe
    370                 375                 380

Ile Phe Leu Asn Thr Thr Tyr Met Asp Met Ala Arg His Lys Val Thr
385                 390                 395                 400

Ser Arg Phe Gly Leu Met His Met Val Ala Thr Asn Leu Cys Glu Trp
                405                 410                 415

Leu Tyr Val Leu Val Glu Glu Thr Lys His Glu Ile Phe His Ile Ser
            420                 425                 430

Gln His Glu Val Asp Pro Ala His Asp Leu Val Ile His Asn Ser Ser
        435                 440                 445

Met Ser Arg Thr Asp Trp Ala Ala Val Asn Glu Ser Leu His Gln His
    450                 455                 460

His His His His Ala Leu Asn Asn Thr Leu Val Ala Asn Val Ser Ser
465                 470                 475                 480

Val Ile Val Asn Met Thr Ile Thr Pro Ser Pro Thr Pro Ala Ala Phe
                485                 490                 495

Ser Gly Cys Ser Arg Thr Thr Ile Met Gly Ala Leu Val Gln Gln Leu
            500                 505                 510

Ser Pro Phe Leu Phe Pro Cys Thr Ile Glu Tyr Ser Leu Ile Cys Ala
        515                 520                 525
```

```
Val Ile Leu Phe Glu Met Trp Lys Thr Val Lys Ser Ile Pro Asp Ile
    530                 535                 540

Asp Lys Thr Arg Lys Asn Ser Val Lys Pro Ala Ala Ala Lys Pro Ala
545                 550                 555                 560

His His Phe Ser Val Asp Cys Ser Gln Ser His Lys Gly Leu Phe Phe
                565                 570                 575

Gly Ile Leu Ile Ile Val Met Thr Ile Ile Ser Met Ile Met Tyr Phe
            580                 585                 590

Val Leu Tyr Thr Gln Pro Gly Tyr Glu Leu Val Ala Thr Gln Glu Val
        595                 600                 605

Thr Leu Trp Glu Thr Phe Met Tyr Phe Met Cys Ala Ala Ala Val Ile
    610                 615                 620

Thr Gly Met Ile Leu Met Arg Asp Leu Arg Tyr Ile Lys Asn Thr Ser
625                 630                 635                 640

Asp Glu His His Ser Met Asp Leu Asp Asn Leu Leu Leu Ile Val Ala
                645                 650                 655

Gln Thr Gly Val Tyr Leu Tyr Gly Met Phe Ser Ile Leu Gly Ser Tyr
            660                 665                 670

Phe Ala Lys Trp Asp Thr Val Pro Asp Arg Val Glu Gly Ile Ile Ala
        675                 680                 685

Glu Val Phe Gly Val Val Gln Thr Ser Leu Gln Thr Met Phe Ile Leu
    690                 695                 700

His Ser Ser His Arg Arg Cys Arg Gly Thr Asn Gln Val Arg Arg Lys
705                 710                 715                 720

Pro Gly Arg Glu Ile Ile Thr Phe Leu Leu Val Ala Asn Ile Ala Ile
                725                 730                 735
```

```
Trp Phe Val Asn Thr Leu Ile Lys Gly Arg Ala Val Phe Arg Glu Ser
            740                 745                 750


His Leu Glu Phe Phe Gly Val Trp Gly Trp Thr Ile Ile Thr His Ile
        755                 760                 765


Ser Met Pro Leu Ala Ile Phe Tyr Arg Phe His Ser Thr Ile Cys Leu
    770                 775                 780


Phe Glu Val Trp Lys Ile Thr Tyr Lys Ala Lys Ala His
785                 790                 795


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Met Asp Ser Ser Pro Asp Leu Ser Leu Lys Leu Arg Arg Gly Ser Ser
1               5                   10                  15


Asp Ser Arg Asp Asn Phe Tyr Met Asp Phe Ala Gln Gly Ile Asp Ser
            20                  25                  30


Asp Ile Glu Glu Val Asp Asn Thr Ala Asn Asn Gln Glu Ala Gly Glu
        35                  40                  45


Val Pro Pro Pro Pro Leu Pro Thr Val Ser Leu Ala Glu Glu Val Leu
    50                  55                  60


Leu Leu Val Ala Pro Pro Pro Pro Pro Pro Ser Leu Leu Gly Gln Pro
65                  70                  75                  80


Leu Pro Thr Leu Thr Glu Thr Asp Asp Ile Pro Pro Thr Pro Thr Pro
                85                  90                  95
```

```
Pro Pro Gln Gln Lys Asp Asp Glu Gly Asp Asp Glu Asp Glu Arg Glu
            100                 105                 110

Glu Pro Val Pro Glu Gln Asp Gln Gly Ala Pro Ala Ala Pro Ser Pro
        115                 120                 125

Pro Gly Ser Pro Ile Asn Ser Val Leu Glu Leu Glu Leu Ile Pro Pro
    130                 135                 140

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

Gly Glu Gly Glu Glu Thr Asp Asp Ala Glu Glu Val Ala Ala Ile Pro
                165                 170                 175

Pro Pro His Glu Met Leu Asp Ile Glu Ser Asn Pro Asp Glu Glu Glu
            180                 185                 190

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

Glu Asp Glu Glu Glu Asp Asp Asp Lys Ser Thr Pro Pro Pro Pro Leu
    210                 215                 220

Pro Pro Leu Pro Ser Asn Phe Ser Tyr Val Gln Gly His Asn Leu Gly
225                 230                 235                 240

Gln Val Thr Pro Pro Leu Thr Lys Ser Pro Ser Asn Ser Pro Ser Pro
                245                 250                 255

Pro Val Thr Pro Pro Pro Cys Pro Glu Leu Asn Ile Ser Arg Met Val
            260                 265                 270

Ser Pro Pro Ala Gln His Ile Ser Gln Ile Pro Pro Leu Thr Pro Ser
        275                 280                 285

Asp Glu Ser Glu Gly Glu Ala Glu Ser Gln Pro Asn Ser Pro Pro Leu
    290                 295                 300
```

```
Arg Leu Asp Ala Glu Gln Pro Pro Pro Asp Met Asp Gln Pro Glu Pro
305                 310                 315                 320

Glu Asp Gln Pro Pro Glu Pro Glu Asn Glu Pro Glu Pro Glu Pro Glu
                325                 330                 335

Pro Glu Pro Glu Pro Glu Pro Val Ser Gly Ala Arg Glu Asp Tyr Ser
            340                 345                 350

Arg Ser Leu Asp Asn Glu Asp Glu Ser Thr Thr Ile Thr Thr Pro Pro
        355                 360                 365

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

Phe Ala Glu Leu Asp Glu Asp Arg Gly Phe Ile Pro Pro Pro Pro Leu
385                 390                 395                 400

Glu Gln Glu Pro Glu Glu Glu Val Glu Glu Glu Glu Glu Glu Glu Glu
                405                 410                 415

Glu Glu Leu Thr Lys Glu Thr Asp Glu Ile Ser Val Asp Arg Glu Ser
            420                 425                 430

Leu Gln Asp Gln Gly Gly Asp Ser Ile Ser Ser Pro Arg Pro Ala Ser
        435                 440                 445

Ile Leu Thr Gly Ser Ile Ser Thr Ser Val Gly Gly Gly Ala Gly Gly
    450                 455                 460

Ser Pro Lys Pro Glu Ser Arg Gly Pro Ser Arg Ser Gly Ser Gln Arg
465                 470                 475                 480

Ser Gln Leu Arg Ser Gly Ser Gln Gln Gly Ser Ile Ala Glu Ser Arg
                485                 490                 495

Gly Gly Ser Arg Ile Gly Ser Arg Thr Gly Ser Val Ala Ser Ala Gln
            500                 505                 510
```

```
Ala Ala Gly Val Leu Ser Pro Gln Ala Ser Leu Lys Ser Gln Thr Ser
        515                 520                 525


Ile Arg Ser Gln Gly Gln Ala Gly Val Arg Ser Pro Ala Gly Ser Ile
    530                 535                 540


Lys Ser Gly Ser Gln Arg Met Gln Ser Pro Gln Ala Gly Glu Gly Ala
545                 550                 555                 560


Pro Ala Met Pro Ser Pro Pro Leu Met Arg Ser Pro Pro Pro Glu Leu
                565                 570                 575


Ala Arg Gln Met His Ser Pro Pro Arg Ile Thr Thr Pro Pro Arg Val
            580                 585                 590


Cys Ser Pro Pro Leu Val Ser Ser Pro Pro Lys Leu Ala Glu Ser Ala
        595                 600                 605


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


Ser Ser Ser Thr Ala Glu Pro Leu Glu Pro Ser Lys Pro Glu Pro Leu
625                 630                 635                 640


Lys Pro Pro Ile Ala Thr Val Ser Tyr Gln Asp Glu Gln Lys Pro Ser
                645                 650                 655


Pro Pro Pro Thr Ala Ala Ala Ala Pro Ala Val Thr Thr Thr Ala Ala
            660                 665                 670


Thr Thr Ala Val Thr Ser Gln Pro Arg Ser His Phe Thr Ser Ser His
        675                 680                 685


His His Tyr His Leu Pro His Gln Phe Gln His Pro His His Gln Asn
    690                 695                 700


His His Thr His Ser Val Arg Val Pro Thr Pro Thr Val Pro Ser Ser
705                 710                 715                 720
```

```
Tyr Ala Pro Pro Pro Pro Pro Asp Ser Gly Ser Ser Ser Ser Pro Val
                725                 730                 735


Asp Arg Arg Arg Leu Phe Met Ala Gly Val Ala Pro Pro Ile Ala Ala
            740                 745                 750


Gly Ala Gly Ser Leu Met Ala Met Pro Ala Glu Pro Ala Val Ala Ile
        755                 760                 765


Ser Pro Gly Arg Val Ser Ala Arg Ser Gly Ser Gln His His Val Thr
    770                 775                 780


Ile Asp Glu Ser Ser Leu Pro Ser His Lys Gly Asn Ile Gln Glu Thr
785                 790                 795                 800


Pro Gly Pro Ser Gly Leu Ile Ile Gly Gly Gly Asp Gly Asp Gly Asp
                805                 810                 815


Arg Asp Ile Gly Gly Gly Gly Gly Pro Asp Ser Ser Asp Pro Pro Ser
            820                 825                 830


Ser Pro Gly Gly Ser Ser Ser Gln Pro Ala Leu Ser Gly Ser Gln Ala
        835                 840                 845


Asp Gly Gln Leu Ala Leu Met Tyr His Ser His Gln Leu Thr Asn Tyr
    850                 855                 860


Pro Val Leu Pro Ala Ile Lys Arg Thr His Arg Pro Ser Phe Val Tyr
865                 870                 875                 880


Pro Pro Met Pro Arg Val Lys Ala Gly Asp Ala Leu Ala Thr Leu Phe
                885                 890                 895


Ser Ala Leu Tyr Gly Lys Leu Leu Val Val Met Gly Ile Ala Phe Pro
            900                 905                 910


Met Ala Glu Val Ile Ser Thr Tyr Ile Pro Pro Ser Phe Tyr Glu Val
        915                 920                 925
```

```
Tyr Tyr Leu Tyr Leu Tyr Ile Gly Ser Met Ile Phe Leu Leu Phe Met
    930                 935                 940

Tyr Ala Thr Leu Ile Trp Gly Arg Pro Lys Leu Pro Val Pro Ile Ala
945                 950                 955                 960

Ser Pro Ser Lys Ser Ala Thr Lys Ala Ser Gly Thr Asp Ser Met Asp
                965                 970                 975

Glu Ser Asp Thr Asp Ser Asn Ser Val His His Arg Leu Pro Pro Pro
            980                 985                 990

Ile Pro Val Arg Arg Pro Ser Leu  Leu Ser Pro Leu Gly  Arg Arg Asp
        995                 1000                1005

Ala His  Tyr Gly Ser Phe Tyr  Leu Arg Met Gly Ala  Val Ala Phe
    1010                1015                1020

Gly Ile  Gly Ser Met Ile Tyr  Ser Gly Leu Glu Phe  Gly Gln Tyr
    1025                1030                1035

Phe Glu  Leu Asn Pro Asp Thr  Lys Cys His Asn Val  Leu Leu Ala
    1040                1045                1050

Leu Thr  Pro Ala Thr Arg Met  Ala Phe Ile Phe Ile  Gln Met Tyr
    1055                1060                1065

Phe Ile  Phe Leu Asn Asn Glu  Gln Ile Lys Val Tyr  Arg Tyr Lys
    1070                1075                1080

Ile Ile  Ala Arg Phe Gly Leu  Met His Met Ile Gly  Thr Asn Leu
    1085                1090                1095

Ala Val  Trp Leu Asn Val Leu  Ile Gln Glu Thr Lys  His Glu Ile
    1100                1105                1110

Leu Thr  Phe Tyr Asn Pro Glu  Asn Arg Thr Leu Arg  Ile Ser His
    1115                1120                1125
```

```
Arg Ile  Pro Gly His Ser Arg  Gly His Ala Ile Ile  Gln His Asp
    1130                1135                1140


Pro Thr  Ala His Leu Arg Val  Pro Arg Gly Leu Lys  Gly Pro Tyr
    1145                1150                1155


Gln Ile  Phe Glu Cys Arg Arg  Thr Asn Ile Ile Gly  Thr Leu Val
    1160                1165                1170


Gln Asp  Ala Ser Pro Phe Leu  Phe Pro Cys Thr Ile  Glu Tyr Ser
    1175                1180                1185


Leu Ile  Cys Ala Ala Ile Leu  Tyr Val Met Trp Arg  Ser Ile Ser
    1190                1195                1200


Arg Pro  Gln Thr Pro Thr Pro  Gln Arg Pro Asp Met  Ile Ser Ser
    1205                1210                1215


Pro Met  Lys Arg Ser Pro His  His Tyr Ser Val Asp  Cys Ala Arg
    1220                1225                1230


Ala His  Lys Gly Leu Phe Val  Gly Ile Leu Ile Leu  Val Leu Thr
    1235                1240                1245


Ile Ile  Ser Leu Ile Ile Phe  Phe Val Leu Ile Ser  Arg Pro Glu
    1250                1255                1260


Phe Val  Ala Met Ala Val Thr  Glu Val Thr Ile Cys  Glu Leu Leu
    1265                1270                1275


Ile Tyr  Gly Thr Ala Thr Ile  Ala Thr Leu Val Gly  Met Ile Gln
    1280                1285                1290


Ile Arg  His Leu Gln Tyr Asp  Ala Tyr Arg Ser Phe  Ser Leu Asp
    1295                1300                1305


Asp Ile  Leu Leu Val Gly Ala  Gln Thr Gly Ser Phe  Leu Tyr Asn
    1310                1315                1320
```

```
Ile Phe  Thr Val Ile Ala Gly  His Phe Thr Leu Arg  Ser Asp Asp
    1325                1330                1335


Met Leu  Val Pro Ile Asn Ala  Leu Ala Ser Ile Val  Gln Thr Ala
    1340                1345                1350


Cys Gln  Thr Met Phe Ile Leu  Asp Ala Ser Arg Arg  Gln Ala Val
    1355                1360                1365


Ser Pro  Glu His Leu Arg Lys  Lys Pro Gly Arg Glu  Ile Val Thr
    1370                1375                1380


Phe Met  Leu Val Val Asn Leu  Ala Met Trp Ala Ile  Ser Thr Leu
    1385                1390                1395


Glu Lys  Ser Arg Ala Glu Ser  His Pro Ile Gln Leu  Asn Phe Tyr
    1400                1405                1410


Gly Leu  Trp Ala Trp Thr Ile  Ile Thr His Val Ser  Met Pro Leu
    1415                1420                1425


Ala Ile  Phe Tyr Arg Phe His  Ser Thr Val Cys Leu  Cys Glu Ile
    1430                1435                1440


Trp Lys  Arg Ala Tyr Lys Leu  Lys Pro Thr Tyr Met  Xaa Glu Phe
    1445                1450                1455


Ala Arg  Ser Arg Ile Gln Ser  Ile Ala Gln Gln Gln  Gln Phe Cys
    1460                1465                1470


Glu Asp  Leu Lys Thr Asn Leu  Ser Tyr Cys Tyr Cys  Ser Thr Thr
    1475                1480                1485


Leu Ala  Gly Gly Glu Leu Glu  Thr Val Glu Glu Val  Asp Ser Gly
    1490                1495                1500


Glu Ser  Asn Ser Ala Glu Asp  Ala Gly Ala Gly Ala  Gly Ser Gly
    1505                1510                1515
```

```
Gly Ser  Arg Gly Ser Gly Gly  Gly Ala Gly Ala Ala  Glu Ala Gly
    1520                1525                1530


Glu Ala  Gly Glu Glu Gly Gln  Gln Gly Gly Asp Ser  Ser Cys Gly
    1535                1540                1545


Leu Lys  Ala Pro Ile Arg Ala  Leu Ser Pro Gln Ser  Leu Asn Thr
    1550                1555                1560


Glu Lys  Ala Phe Cys Pro Val  Tyr Val Ile Asn Gly  Glu
    1565                1570                1575
```