SEQUENCE LISTING

<110> DNA Script
Institut Pasteur

<120> Variants of a DNA polymerase of the PolX family

<130> PR1898

<160> 16

<170> PatentIn version 3.5

<210> 1
<211> 510
<212> PRT
<213> artificial sequence

<220>
<223> TdT of Mouse

<400> 1

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Met Asp Pro Leu Gln Ala Val His Leu Gly Pro Arg Lys Lys Arg Pro
1               5                  10                  15


Arg Gln Leu Gly Thr Pro Val Ala Ser Thr Pro Tyr Asp Ile Arg Phe
            20                  25                  30


Arg Asp Leu Val Leu Phe Ile Leu Glu Lys Lys Met Gly Thr Thr Arg
        35                  40                  45


Arg Ala Phe Leu Met Glu Leu Ala Arg Arg Lys Gly Phe Arg Val Glu
    50                  55                  60


Asn Glu Leu Ser Asp Ser Val Thr His Ile Val Ala Glu Asn Asn Ser
65                  70                  75                  80


Gly Ser Asp Val Leu Glu Trp Leu Gln Leu Gln Asn Ile Lys Ala Ser
                85                  90                  95


Ser Glu Leu Glu Leu Leu Asp Ile Ser Trp Leu Ile Glu Cys Met Gly
            100                 105                 110


Ala Gly Lys Pro Val Glu Met Met Gly Arg His Gln Leu Val Val Asn
```

```
        115                 120                 125

Arg Asn Ser Ser Pro Ser Pro Val Pro Gly Ser Gln Asn Val Pro Ala
    130                 135                 140

Pro Ala Val Lys Lys Ile Ser Gln Tyr Ala Cys Gln Arg Arg Thr Thr
145                 150                 155                 160

Leu Asn Asn Tyr Asn Gln Leu Phe Thr Asp Ala Leu Asp Ile Leu Ala
                165                 170                 175

Glu Asn Asp Glu Leu Arg Glu Asn Glu Gly Ser Cys Leu Ala Phe Met
            180                 185                 190

Arg Ala Ser Ser Val Leu Lys Ser Leu Pro Phe Pro Ile Thr Ser Met
        195                 200                 205

Lys Asp Thr Glu Gly Ile Pro Cys Leu Gly Asp Lys Val Lys Ser Ile
    210                 215                 220

Ile Glu Gly Ile Ile Glu Asp Gly Glu Ser Ser Glu Ala Lys Ala Val
225                 230                 235                 240

Leu Asn Asp Glu Arg Tyr Lys Ser Phe Lys Leu Phe Thr Ser Val Phe
                245                 250                 255

Gly Val Gly Leu Lys Thr Ala Glu Lys Trp Phe Arg Met Gly Phe Arg
            260                 265                 270

Thr Leu Ser Lys Ile Gln Ser Asp Lys Ser Leu Arg Phe Thr Gln Met
        275                 280                 285

Gln Lys Ala Gly Phe Leu Tyr Tyr Glu Asp Leu Val Ser Cys Val Asn
    290                 295                 300

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

Thr Phe Leu Pro Asp Ala Leu Val Thr Met Thr Gly Gly Phe Arg Arg
```

325 330 335

Gly Lys Met Thr Gly His Asp Val Asp Phe Leu Ile Thr Ser Pro Glu
340 345 350

Ala Thr Glu Asp Glu Glu Gln Gln Leu Leu His Lys Val Thr Asp Phe
355 360 365

Trp Lys Gln Gln Gly Leu Leu Leu Tyr Cys Asp Ile Leu Glu Ser Thr
370 375 380

Phe Glu Lys Phe Lys Gln Pro Ser Arg Lys Val Asp Ala Leu Asp His
385 390 395 400

Phe Gln Lys Cys Phe Leu Ile Leu Lys Leu Asp His Gly Arg Val His
405 410 415

Ser Glu Lys Ser Gly Gln Gln Glu Gly Lys Gly Trp Lys Ala Ile Arg
420 425 430

Val Asp Leu Val Met Cys Pro Tyr Asp Arg Arg Ala Phe Ala Leu Leu
435 440 445

Gly Trp Thr Gly Ser Arg Gln Phe Glu Arg Asp Leu Arg Arg Tyr Ala
450 455 460

Thr His Glu Arg Lys Met Met Leu Asp Asn His Ala Leu Tyr Asp Arg
465 470 475 480

Thr Lys Arg Val Phe Leu Glu Ala Glu Ser Glu Glu Glu Ile Phe Ala
485 490 495

His Leu Gly Leu Asp Tyr Ile Glu Pro Trp Glu Arg Asn Ala
500 505 510

<210> 2
<211> 494
<212> PRT
<213> artificial sequence

<220>
<223> Pol µ humane

<400> 2

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

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

Tyr Leu Val Glu Pro Arg Met Gly Arg Ser Arg Arg Ala Phe Leu Thr
        35                  40                  45

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

Glu Ala Thr His Val Val Met Glu Glu Thr Ser Ala Glu Glu Ala Val
65                  70                  75                  80

Ser Trp Gln Glu Arg Arg Met Ala Ala Ala Pro Pro Gly Cys Thr Pro
                85                  90                  95

Pro Ala Leu Leu Asp Ile Ser Trp Leu Thr Glu Ser Leu Gly Ala Gly
            100                 105                 110

Gln Pro Val Pro Val Glu Cys Arg His Arg Leu Glu Val Ala Gly Pro
        115                 120                 125

Arg Lys Gly Pro Leu Ser Pro Ala Trp Met Pro Ala Tyr Ala Cys Gln
    130                 135                 140

Arg Pro Thr Pro Leu Thr His His Asn Thr Gly Leu Ser Glu Ala Leu
145                 150                 155                 160

Glu Ile Leu Ala Glu Ala Ala Gly Phe Glu Gly Ser Glu Gly Arg Leu
                165                 170                 175

Leu Thr Phe Cys Arg Ala Ala Ser Val Leu Lys Ala Leu Pro Ser Pro
            180                 185                 190
```

```
Val Thr Thr Leu Ser Gln Leu Gln Gly Leu Pro His Phe Gly Glu His
        195                 200                 205

Ser Ser Arg Val Val Gln Glu Leu Leu Glu His Gly Val Cys Glu Glu
    210                 215                 220

Val Glu Arg Val Arg Arg Ser Glu Arg Tyr Gln Thr Met Lys Leu Phe
225                 230                 235                 240

Thr Gln Ile Phe Gly Val Gly Val Lys Thr Ala Asp Arg Trp Tyr Arg
                245                 250                 255

Glu Gly Leu Arg Thr Leu Asp Asp Leu Arg Glu Gln Pro Gln Lys Leu
            260                 265                 270

Thr Gln Gln Gln Lys Ala Gly Leu Gln His His Gln Asp Leu Ser Thr
        275                 280                 285

Pro Val Leu Arg Ser Asp Val Asp Ala Leu Gln Gln Val Val Glu Glu
    290                 295                 300

Ala Val Gly Gln Ala Leu Pro Gly Ala Thr Val Thr Leu Thr Gly Gly
305                 310                 315                 320

Phe Arg Arg Gly Lys Leu Gln Gly His Asp Val Asp Phe Leu Ile Thr
                325                 330                 335

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

Arg Leu Gln Asp Gln Gly Leu Ile Leu Tyr His Gln His Gln His Ser
        355                 360                 365

Cys Cys Glu Ser Pro Thr Arg Leu Ala Gln Gln Ser His Met Asp Ala
    370                 375                 380

Phe Glu Arg Ser Phe Cys Ile Phe Arg Leu Pro Gln Pro Pro Gly Ala
385                 390                 395                 400
```

```
Ala Val Gly Gly Ser Thr Arg Pro Cys Pro Ser Trp Lys Ala Val Arg
                405                 410                 415


Val Asp Leu Val Val Ala Pro Val Ser Gln Phe Pro Phe Ala Leu Leu
            420                 425                 430


Gly Trp Thr Gly Ser Lys Leu Phe Gln Arg Glu Leu Arg Arg Phe Ser
        435                 440                 445


Arg Lys Glu Lys Gly Leu Trp Leu Asn Ser His Gly Leu Phe Asp Pro
    450                 455                 460


Glu Gln Lys Thr Phe Phe Gln Ala Ala Ser Glu Glu Asp Ile Phe Arg
465                 470                 475                 480


His Leu Gly Leu Glu Tyr Leu Pro Pro Glu Gln Arg Asn Ala
                485                 490


<210>  3
<211>  401
<212>  PRT
<213>  artificial sequence

<220>
<223>  truncated TdT of mouse

<400>  3

Thr Met Gly Ser Ser His His His His His His Ser Ser Gly Leu Val
1               5                   10                  15


Pro Arg Gly Ser His Met Ser Pro Ser Pro Val Pro Gly Ser Gln Asn
            20                  25                  30


Val Pro Ala Pro Ala Val Lys Lys Ile Ser Gln Tyr Ala Cys Gln Arg
        35                  40                  45


Arg Thr Thr Leu Asn Asn Tyr Asn Gln Leu Phe Thr Asp Ala Leu Asp
    50                  55                  60


Ile Leu Ala Glu Asn Asp Glu Leu Arg Glu Asn Glu Gly Ser Cys Leu
```

```
65                  70                  75                  80

Ala Phe Met Arg Ala Ser Ser Val Leu Lys Ser Leu Pro Phe Pro Ile
                85                  90                  95

Thr Ser Met Lys Asp Thr Glu Gly Ile Pro Cys Leu Gly Asp Lys Val
            100                 105                 110

Lys Ser Ile Ile Glu Gly Ile Ile Glu Asp Gly Glu Ser Ser Glu Ala
        115                 120                 125

Lys Ala Val Leu Asn Asp Glu Arg Tyr Lys Ser Phe Lys Leu Phe Thr
    130                 135                 140

Ser Val Phe Gly Val Gly Leu Lys Thr Ala Glu Lys Trp Phe Arg Met
145                 150                 155                 160

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

Thr Gln Met Gln Lys Ala Gly Phe Leu Tyr Tyr Glu Asp Leu Val Ser
            180                 185                 190

Cys Val Asn Arg Pro Glu Ala Glu Ala Val Ser Met Leu Val Lys Glu
        195                 200                 205

Ala Val Val Thr Phe Leu Pro Asp Ala Leu Val Thr Met Thr Gly Gly
    210                 215                 220

Phe Arg Arg Gly Lys Met Thr Gly His Asp Val Asp Phe Leu Ile Thr
225                 230                 235                 240

Ser Pro Glu Ala Thr Glu Asp Glu Glu Gln Gln Leu Leu His Lys Val
                245                 250                 255

Thr Asp Phe Trp Lys Gln Gln Gly Leu Leu Leu Tyr Cys Asp Ile Leu
            260                 265                 270

Glu Ser Thr Phe Glu Lys Phe Lys Gln Pro Ser Arg Lys Val Asp Ala
```

275 280 285

Leu Asp His Phe Gln Lys Cys Phe Leu Ile Leu Lys Leu Asp His Gly
290 295 300

Arg Val His Ser Glu Lys Ser Gly Gln Gln Glu Gly Lys Gly Trp Lys
305 310 315 320

Ala Ile Arg Val Asp Leu Val Met Cys Pro Tyr Asp Arg Arg Ala Phe
325 330 335

Ala Leu Leu Gly Trp Thr Gly Ser Arg Gln Phe Glu Arg Asp Leu Arg
340 345 350

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

Tyr Asp Arg Thr Lys Arg Val Phe Leu Glu Ala Glu Ser Glu Glu Glu
370 375 380

Ile Phe Ala His Leu Gly Leu Asp Tyr Ile Glu Pro Trp Glu Arg Asn
385 390 395 400

Ala

<210> 4
<211> 11
<212> PRT
<213> artificial sequence

<220>
<223> semi-conservative sequence

<220>
<221> MISC_FEATURE
<222> (1)..(1)
<223> X=M, I, V, L

<220>
<221> MISC_FEATURE
<222> (2)..(2)

<223> X=T, A, M, Q

<220>
<221> MISC_FEATURE
<222> (10)..(10)
<223> X=M, K, E, Q, L, S, P, R, D

<220>
<221> MISC_FEATURE
<222> (11)..(11)
<223> X=T, I, M, F, K, V, Y, E, Q, H, S, R, D

<400> 4

Xaa Xaa Gly Gly Phe Arg Arg Gly Lys Xaa Xaa
1 5 10

<210> 5
<211> 13
<212> PRT
<213> artificial sequence

<220>
<223> semi-conservative region

<220>
<221> MISC_FEATURE
<222> (1)..(1)
<223> X=A, C, G, S

<220>
<221> MISC_FEATURE
<222> (2)..(2)
<223> X=L, T, R

<220>
<221> MISC_FEATURE
<222> (5)..(5)
<223> X=W, Y

<220>
<221> MISC_FEATURE
<222> (6)..(6)
<223> X=T, S, I

<220>
<221> MISC_FEATURE
<222> (10)..(10)
<223> X=Q, L, H, F, Y, N, E, D,

<220>
<221> MISC_FEATURE
<222> (11)..(11)
<223> X=F, Y

<400> 5

Xaa Xaa Leu Gly Xaa Xaa Gly Ser Arg Xaa Xaa Glu Arg
1 5 10

<210> 6
<211> 11
<212> PRT
<213> artificial sequence

<220>
<223> semi-conservative region

<220>
<221> MISC_FEATURE
<222> (2)..(2)
<223> X=D, E, S, P, A, K

<220>
<221> MISC_FEATURE
<222> (4)..(4)
<223> X=I, L, M, V, A, T

<220>
<221> MISC_FEATURE
<222> (5)..(5)
<223> X=E, Q, P, Y, L, K, G, N

<220>
<221> MISC_FEATURE
<222> (7)..(7)
<223> X=W, S, V, E, R, Q, T, C, K, H

<220>
<221> MISC_FEATURE
<222> (8)..(8)
<223> X=E, Q, D, H, L

<400> 6

Leu Xaa Tyr Xaa Xaa Pro Xaa Xaa Arg Asn Ala
1 5 10

<210> 7

<211> 20
<212> DNA
<213> artificial sequence

<220>
<223> primer

<400> 7
taatacgact cactataggg 20

<210> 8
<211> 19
<212> DNA
<213> artificial sequence

<220>
<223> primer

<400> 8
gctagttatt gctcagcgg 19

<210> 9
<211> 494
<212> PRT
<213> Pan troglodytes

<400> 9

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

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

Tyr Leu Val Glu Pro Arg Met Gly Arg Ser Arg Arg Ala Phe Leu Thr
35 40 45

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

Glu Ala Thr His Val Val Met Glu Glu Thr Ser Ala Glu Glu Ala Val
65 70 75 80

Ser Trp Gln Glu Arg Arg Met Ala Ala Ala Pro Pro Gly Cys Thr Pro
85 90 95

```
Pro Ala Leu Leu Asp Ile Ser Trp Leu Thr Glu Ser Leu Gly Ala Gly
            100                 105                 110

Gln Pro Val Pro Val Glu Cys Arg His Arg Leu Glu Val Ala Gly Pro
        115                 120                 125

Arg Lys Gly Pro Leu Ser Pro Ala Trp Met Pro Ala Tyr Val Cys Gln
    130                 135                 140

Arg Pro Thr Pro Leu Thr His His Asn Thr Gly Leu Ser Glu Ala Leu
145                 150                 155                 160

Glu Thr Leu Ala Glu Ala Ala Gly Phe Glu Gly Ser Glu Gly Arg Leu
                165                 170                 175

Leu Thr Phe Cys Arg Ala Ala Ser Val Leu Lys Ala Leu Pro Ser Pro
            180                 185                 190

Val Thr Thr Leu Ser Gln Leu Gln Gly Leu Pro His Phe Gly Glu His
        195                 200                 205

Ser Ser Arg Val Val Gln Glu Leu Leu Glu His Gly Val Cys Glu Glu
    210                 215                 220

Val Glu Arg Val Gln Arg Ser Glu Arg Tyr Gln Thr Met Lys Leu Phe
225                 230                 235                 240

Thr Gln Ile Phe Gly Val Gly Val Lys Thr Ala Asp Arg Trp Tyr Arg
                245                 250                 255

Glu Gly Leu Arg Thr Leu Asp Asp Leu Arg Glu Gln Pro Gln Lys Leu
            260                 265                 270

Thr Gln Gln Gln Lys Ala Gly Leu Gln His His Gln Asp Leu Ser Thr
        275                 280                 285

Pro Val Leu Arg Ser Asp Val Asp Ala Leu Gln Gln Val Val Glu Glu
    290                 295                 300
```

```
Ala Val Gly Gln Ala Leu Pro Gly Ala Thr Val Thr Leu Thr Gly Gly
305                 310                 315                 320

Phe Arg Arg Gly Lys Leu Gln Gly His Asp Val Asp Phe Leu Ile Thr
                325                 330                 335

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

Arg Leu Gln Asp Gln Gly Leu Ile Leu Tyr His Gln His Gln His Ser
        355                 360                 365

Cys Trp Glu Ser Pro Thr Arg Leu Ala Gln Gln Ser His Met Asp Ala
    370                 375                 380

Phe Glu Arg Ser Phe Cys Ile Phe Arg Leu Pro Gln Pro Pro Gly Ala
385                 390                 395                 400

Ala Val Gly Gly Ser Thr Arg Pro Cys Pro Ser Trp Lys Ala Val Arg
                405                 410                 415

Val Asp Leu Val Val Ala Pro Val Ser Gln Phe Pro Phe Ala Leu Leu
            420                 425                 430

Gly Trp Thr Gly Ser Lys Leu Phe Gln Arg Glu Leu Arg Arg Phe Ser
        435                 440                 445

Arg Lys Glu Lys Gly Leu Trp Leu Asn Ser His Gly Leu Phe Asp Pro
    450                 455                 460

Glu Gln Lys Thr Phe Phe Gln Ala Ala Ser Glu Glu Asp Ile Phe Arg
465                 470                 475                 480

His Leu Gly Leu Glu Tyr Leu Pro Pro Glu Gln Arg Asn Ala
                485                 490
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<210> 10
<211> 496

<212> PRT
<213> Mus musculus

<400> 10

```
Met Leu Pro Lys Arg Arg Arg Val Arg Ala Gly Ser Pro His Ser Ala
1               5                  10                  15

Val Ala Ser Ser Thr Pro Pro Ser Val Val Arg Phe Pro Asp Val Ala
            20                  25                  30

Ile Tyr Leu Ala Glu Pro Arg Met Gly Arg Ser Arg Arg Ala Phe Leu
        35                  40                  45

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

Ser Lys Val Thr His Val Val Met Glu Gly Thr Ser Ala Lys Glu Ala
65                  70                  75                  80

Ile Cys Trp Gln Lys Asn Met Asp Ala Leu Pro Thr Gly Cys Pro Gln
                85                  90                  95

Pro Ala Leu Leu Asp Ile Ser Trp Phe Thr Glu Ser Met Ala Ala Gly
            100                 105                 110

Gln Pro Val Arg Glu Glu Gly Arg His His Leu Glu Val Ala Glu Pro
        115                 120                 125

Arg Lys Glu Pro Pro Val Ser Ala Ser Met Pro Ala Tyr Ala Cys Gln
    130                 135                 140

Arg Pro Ser Pro Leu Thr His His Asn Thr Leu Leu Ser Glu Ala Leu
145                 150                 155                 160

Glu Thr Leu Ala Glu Ala Ala Gly Phe Glu Ala Asn Glu Gly Arg Leu
                165                 170                 175

Leu Ser Phe Ser Arg Ala Asp Ser Val Leu Lys Ser Leu Pro Cys Pro
            180                 185                 190
```

```
Val Ala Ser Leu Ser Gln Leu His Gly Leu Pro Tyr Phe Gly Glu His
        195                 200                 205

Ser Thr Arg Val Ile Gln Glu Leu Leu Glu His Gly Thr Cys Glu Glu
    210                 215                 220

Val Lys Gln Val Arg Cys Ser Glu Arg Tyr Gln Thr Met Lys Leu Phe
225                 230                 235                 240

Thr Gln Val Phe Gly Val Gly Val Lys Thr Ala Asn Arg Trp Tyr Gln
                245                 250                 255

Glu Gly Leu Arg Thr Leu Asp Glu Leu Arg Glu Gln Pro Gln Arg Leu
            260                 265                 270

Thr Gln Gln Gln Lys Ala Gly Leu Gln Tyr Tyr Gln Asp Leu Ser Thr
        275                 280                 285

Pro Val Arg Arg Ala Asp Ala Glu Ala Leu Gln Gln Leu Ile Glu Ala
    290                 295                 300

Ala Val Arg Gln Thr Leu Pro Gly Ala Thr Val Thr Leu Thr Gly Gly
305                 310                 315                 320

Phe Arg Arg Gly Lys Leu Gln Gly His Asp Val Asp Phe Leu Ile Thr
                325                 330                 335

His Pro Glu Glu Gly Gln Glu Val Gly Leu Leu Pro Lys Val Met Ser
            340                 345                 350

Cys Leu Gln Ser Gln Gly Leu Val Leu Tyr His Gln Tyr His Arg Ser
        355                 360                 365

His Leu Ala Asp Ser Ala His Asn Leu Arg Gln Arg Ser Ser Thr Met
    370                 375                 380

Asp Ala Phe Glu Arg Ser Phe Cys Ile Leu Gly Leu Pro Gln Pro Gln
385                 390                 395                 400
```

```
Gln Ala Ala Leu Ala Gly Ala Leu Pro Pro Cys Pro Thr Trp Lys Ala
                405                 410                 415


Val Arg Val Asp Leu Val Val Thr Pro Ser Ser Gln Phe Pro Phe Ala
            420                 425                 430


Leu Leu Gly Trp Thr Gly Ser Gln Phe Phe Glu Arg Glu Leu Arg Arg
        435                 440                 445


Phe Ser Arg Gln Glu Lys Gly Leu Trp Leu Asn Ser His Gly Leu Phe
    450                 455                 460


Asp Pro Glu Gln Lys Arg Val Phe His Ala Thr Ser Glu Glu Asp Val
465                 470                 475                 480


Phe Arg Leu Leu Gly Leu Lys Tyr Leu Pro Pro Glu Gln Arg Asn Ala
                485                 490                 495


<210>  11
<211>  509
<212>  PRT
<213>  Canis lupus

<400>  11

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


Arg Gln Met Gly Ala Pro Met Val Ser Pro Pro His Asn Ile Lys Phe
            20                  25                  30


Gln Asp Leu Val Leu Tyr Ile Leu Glu Lys Lys Met Gly Thr Thr Arg
        35                  40                  45


Arg Ala Phe Leu Met Glu Leu Ala Arg Arg Lys Gly Phe Arg Val Asp
    50                  55                  60


Asn Glu Phe Ser Asp Ser Ile Thr His Ile Val Ala Glu Asn Asn Ser
65                  70                  75                  80
```

```
Gly Ser Asp Val Leu Glu Trp Leu Gln Val Gln Asn Ile Lys Ala Ser
                85                  90                  95

Ser Gln Leu Glu Leu Leu Asp Ile Ser Trp Leu Ile Glu Ser Met Gly
            100                 105                 110

Ala Gly Lys Pro Val Glu Met Thr Gly Lys His Gln Leu Met Arg Arg
        115                 120                 125

Asp Tyr Thr Ala Ser Pro Asn Pro Glu Leu Gln Lys Thr Leu Pro Val
    130                 135                 140

Ala Val Lys Lys Ile Ser Gln Tyr Ala Cys Gln Arg Arg Thr Thr Leu
145                 150                 155                 160

Asn Asn Tyr Asn Asn Val Phe Thr Asp Ala Phe Glu Val Leu Ala Glu
                165                 170                 175

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

Ala Ala Ser Val Leu Lys Ser Leu Pro Phe Thr Ile Ile Ser Met Lys
        195                 200                 205

Asp Thr Glu Gly Ile Pro Cys Leu Gly Asp Gln Val Lys Cys Ile Ile
    210                 215                 220

Glu Glu Ile Ile Glu Asp Gly Glu Ser Ser Glu Val Lys Ala Val Leu
225                 230                 235                 240

Asn Asp Glu Arg Tyr Gln Ser Phe Lys Leu Phe Thr Ser Val Phe Gly
                245                 250                 255

Val Gly Leu Lys Thr Ser Glu Lys Trp Phe Arg Met Gly Phe Arg Thr
            260                 265                 270

Leu Ser Lys Ile Lys Ser Asp Lys Ser Leu Lys Phe Thr Pro Met Gln
        275                 280                 285
```

```
Lys Ala Gly Phe Leu Tyr Tyr Glu Asp Leu Val Ser Cys Val Thr Arg
    290                 295                 300

Ala Glu Ala Glu Ala Val Gly Val Leu Val Lys Glu Ala Val Gly Ala
305                 310                 315                 320

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

Lys Lys Met Gly His Asp Val Asp Phe Leu Ile Thr Ser Pro Gly Ser
            340                 345                 350

Thr Asp Glu Asp Glu Glu Gln Leu Leu Pro Lys Val Ile Asn Leu Trp
        355                 360                 365

Glu Arg Lys Gly Leu Leu Leu Tyr Cys Asp Leu Val Glu Ser Thr Phe
    370                 375                 380

Glu Lys Leu Lys Leu Pro Ser Arg Lys Val Asp Ala Leu Asp His Phe
385                 390                 395                 400

Gln Lys Cys Phe Leu Ile Leu Lys Leu His His Gln Arg Val Asp Gly
                405                 410                 415

Gly Lys Cys Ser Gln Gln Glu Gly Lys Thr Trp Lys Ala Ile Arg Val
            420                 425                 430

Asp Leu Val Met Cys Pro Tyr Glu Arg Arg Ala Phe Ala Leu Leu Gly
        435                 440                 445

Trp Thr Gly Ser Arg Gln Phe Glu Arg Asp Leu Arg Arg Tyr Ala Ser
    450                 455                 460

His Glu Arg Lys Met Ile Leu Asp Asn His Ala Leu Tyr Asp Lys Thr
465                 470                 475                 480

Lys Lys Ile Phe Leu Lys Ala Glu Ser Glu Glu Glu Ile Phe Ala His
                485                 490                 495
```

Leu Gly Leu Asp Tyr Ile Glu Pro Trp Glu Arg Asn Ala
500 505

<210> 12
<211> 506
<212> PRT
<213> Gallus gallus

<400> 12

Met Glu Arg Ile Arg Pro Pro Thr Val Val Ser Gln Arg Lys Arg Gln
1 5 10 15

Lys Gly Met Tyr Ser Pro Lys Leu Ser Cys Gly Tyr Glu Ile Lys Phe
20 25 30

Asn Lys Leu Val Ile Phe Ile Met Gln Arg Lys Met Gly Met Thr Arg
35 40 45

Arg Thr Phe Leu Met Glu Leu Ala Arg Ser Lys Gly Phe Arg Val Glu
50 55 60

Ser Glu Leu Ser Asp Ser Val Thr His Ile Val Ala Glu Asn Asn Ser
65 70 75 80

Tyr Pro Glu Val Leu Asp Trp Leu Lys Gly Gln Ala Val Gly Asp Ser
85 90 95

Ser Arg Phe Glu Ile Leu Asp Ile Ser Trp Leu Thr Ala Cys Met Glu
100 105 110

Met Gly Arg Pro Val Asp Leu Glu Lys Lys Tyr His Leu Val Glu Gln
115 120 125

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

Phe Thr Ala Ser Lys Val Ser Gln Tyr Ser Cys Gln Arg Lys Thr Thr
145 150 155 160

Leu Asn Asn Cys Asn Lys Lys Phe Thr Asp Ala Phe Glu Ile Met Ala

165 170 175

Glu Asn Tyr Glu Phe Lys Glu Asn Glu Ile Phe Cys Leu Glu Phe Leu
180 185 190

Arg Ala Ala Ser Val Leu Lys Ser Leu Pro Phe Pro Val Thr Arg Met
195 200 205

Lys Asp Ile Gln Gly Leu Pro Cys Met Gly Asp Arg Val Arg Asp Val
210 215 220

Ile Glu Glu Ile Ile Glu Glu Gly Glu Ser Ser Arg Ala Lys Asp Val
225 230 235 240

Leu Asn Asp Glu Arg Tyr Lys Ser Phe Lys Glu Phe Thr Ser Val Phe
245 250 255

Gly Val Gly Val Lys Thr Ser Glu Lys Trp Phe Arg Met Gly Leu Arg
260 265 270

Thr Val Glu Glu Val Lys Ala Asp Lys Thr Leu Lys Leu Ser Lys Met
275 280 285

Gln Arg Ala Gly Phe Leu Tyr Tyr Glu Asp Leu Val Ser Cys Val Ser
290 295 300

Lys Ala Glu Ala Asp Ala Val Ser Ser Ile Val Lys Asn Thr Val Cys
305 310 315 320

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

Gly Lys Lys Ile Gly His Asp Ile Asp Phe Leu Ile Thr Ser Pro Gly
340 345 350

Gln Arg Glu Asp Asp Glu Leu Leu His Lys Gly Leu Leu Leu Tyr Cys
355 360 365

Asp Ile Ile Glu Ser Thr Phe Val Lys Glu Gln Ile Pro Ser Arg His

370 375 380

Val Asp Ala Met Asp His Phe Gln Lys Cys Phe Ala Ile Leu Lys Leu
385 390 395 400

Tyr Gln Pro Arg Val Asp Asn Ser Ser Tyr Asn Met Ser Lys Lys Cys
405 410 415

Asp Met Ala Glu Val Lys Asp Trp Lys Ala Ile Arg Val Asp Leu Val
420 425 430

Ile Thr Pro Phe Glu Gln Tyr Ala Tyr Ala Leu Leu Gly Trp Thr Gly
435 440 445

Ser Arg Gln Phe Gly Arg Asp Leu Arg Arg Tyr Ala Thr His Glu Arg
450 455 460

Lys Met Met Leu Asp Asn His Ala Leu Tyr Asp Lys Arg Lys Arg Val
465 470 475 480

Phe Leu Lys Ala Gly Ser Glu Glu Glu Ile Phe Ala His Leu Gly Leu
485 490 495

Asp Tyr Val Glu Pro Trp Glu Arg Asn Ala
500 505

<210> 13
<211> 509
<212> PRT
<213> Homo sapiens

<400> 13

Met Asp Pro Pro Arg Ala Ser His Leu Ser Pro Arg Lys Lys Arg Pro
1 5 10 15

Arg Gln Thr Gly Ala Leu Met Ala Ser Ser Pro Gln Asp Ile Lys Phe
20 25 30

Gln Asp Leu Val Val Phe Ile Leu Glu Lys Lys Met Gly Thr Thr Arg
35 40 45

```
Arg Ala Phe Leu Met Glu Leu Ala Arg Arg Lys Gly Phe Arg Val Glu
    50                  55                  60

Asn Glu Leu Ser Asp Ser Val Thr His Ile Val Ala Glu Asn Asn Ser
65                  70                  75                  80

Gly Ser Asp Val Leu Glu Trp Leu Gln Ala Gln Lys Val Gln Val Ser
                85                  90                  95

Ser Gln Pro Glu Leu Leu Asp Val Ser Trp Leu Ile Glu Cys Ile Arg
            100                 105                 110

Ala Gly Lys Pro Val Glu Met Thr Gly Lys His Gln Leu Val Val Arg
        115                 120                 125

Arg Asp Tyr Ser Asp Ser Thr Asn Pro Gly Pro Pro Lys Thr Pro Pro
    130                 135                 140

Ile Ala Val Gln Lys Ile Ser Gln Tyr Ala Cys Gln Arg Arg Thr Thr
145                 150                 155                 160

Leu Asn Asn Cys Asn Gln Ile Phe Thr Asp Ala Phe Asp Ile Leu Ala
                165                 170                 175

Glu Asn Cys Glu Phe Arg Glu Asn Glu Asp Ser Cys Val Thr Phe Met
            180                 185                 190

Arg Ala Ala Ser Val Leu Lys Ser Leu Pro Phe Thr Ile Ile Ser Met
        195                 200                 205

Lys Asp Thr Glu Gly Ile Pro Cys Leu Gly Ser Lys Val Lys Gly Ile
    210                 215                 220

Ile Glu Glu Ile Ile Glu Asp Gly Glu Ser Ser Glu Val Lys Ala Val
225                 230                 235                 240

Leu Asn Asp Glu Arg Tyr Gln Ser Phe Lys Leu Phe Thr Ser Val Phe
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Gly Val Gly Leu Lys Thr Ser Glu Lys Trp Phe Arg Met Gly Phe Arg
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Thr Leu Ser Lys Val Arg Ser Asp Lys Ser Leu Lys Phe Thr Arg Met
        275                 280                 285

Gln Lys Ala Gly Phe Leu Tyr Tyr Glu Asp Leu Val Ser Cys Val Thr
    290                 295                 300

Arg Ala Glu Ala Glu Ala Val Ser Val Leu Val Lys Glu Ala Val Trp
305                 310                 315                 320

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

Gly Lys Lys Met Gly His Asp Val Asp Phe Leu Ile Thr Ser Pro Gly
            340                 345                 350

Ser Thr Glu Asp Glu Glu Gln Leu Leu Gln Lys Val Met Asn Leu Trp
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Glu Lys Lys Gly Leu Leu Leu Tyr Tyr Asp Leu Val Glu Ser Thr Phe
    370                 375                 380

Glu Lys Leu Arg Leu Pro Ser Arg Lys Val Asp Ala Leu Asp His Phe
385                 390                 395                 400

Gln Lys Cys Phe Leu Ile Phe Lys Leu Pro Arg Gln Arg Val Asp Ser
                405                 410                 415

Asp Gln Ser Ser Trp Gln Glu Gly Lys Thr Trp Lys Ala Ile Arg Val
            420                 425                 430

Asp Leu Val Leu Cys Pro Tyr Glu Arg Arg Ala Phe Ala Leu Leu Gly
        435                 440                 445

Trp Thr Gly Ser Arg Gln Phe Glu Arg Asp Leu Arg Arg Tyr Ala Thr
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His Glu Arg Lys Met Ile Leu Asp Asn His Ala Leu Tyr Asp Lys Thr
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Lys Arg Ile Phe Leu Lys Ala Glu Ser Glu Glu Glu Ile Phe Ala His
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Leu Gly Leu Asp Tyr Ile Glu Pro Trp Glu Arg Asn Ala
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