SEQUENCE LISTING

<110> CSL

<120> Antibodies

<130> A172

<150> EP11175105
<151> 2011-07-22

<150> US 61/510801
<151> 2011-07-22

<150> EP12153310
<151> 2012-01-31

<160> 77

<170> PatentIn version 3.3

<210> 1
<211> 615
<212> PRT
<213> Homo sapiens

<400> 1

```
Met Arg Ala Leu Leu Leu Leu Gly Phe Leu Leu Val Ser Leu Glu Ser
1               5                  10                  15

Thr Leu Ser Ile Pro Pro Trp Glu Ala Pro Lys Glu His Lys Tyr Lys
            20                  25                  30

Ala Glu Glu His Thr Val Val Leu Thr Val Thr Gly Glu Pro Cys His
        35                  40                  45

Phe Pro Phe Gln Tyr His Arg Gln Leu Tyr His Lys Cys Thr His Lys
    50                  55                  60

Gly Arg Pro Gly Pro Gln Pro Trp Cys Ala Thr Thr Pro Asn Phe Asp
65                  70                  75                  80

Gln Asp Gln Arg Trp Gly Tyr Cys Leu Glu Pro Lys Lys Val Lys Asp
                85                  90                  95

His Cys Ser Lys His Ser Pro Cys Gln Lys Gly Gly Thr Cys Val Asn
            100                 105                 110

Met Pro Ser Gly Pro His Cys Leu Cys Pro Gln His Leu Thr Gly Asn
        115                 120                 125
```

His Cys Gln Lys Glu Lys Cys Phe Glu Pro Gln Leu Leu Arg Phe Phe
130 135 140

His Lys Asn Glu Ile Trp Tyr Arg Thr Glu Gln Ala Ala Val Ala Arg
145 150 155 160

Cys Gln Cys Lys Gly Pro Asp Ala His Cys Gln Arg Leu Ala Ser Gln
165 170 175

Ala Cys Arg Thr Asn Pro Cys Leu His Gly Gly Arg Cys Leu Glu Val
180 185 190

Glu Gly His Arg Leu Cys His Cys Pro Val Gly Tyr Thr Gly Ala Phe
195 200 205

Cys Asp Val Asp Thr Lys Ala Ser Cys Tyr Asp Gly Arg Gly Leu Ser
210 215 220

Tyr Arg Gly Leu Ala Arg Thr Thr Leu Ser Gly Ala Pro Cys Gln Pro
225 230 235 240

Trp Ala Ser Glu Ala Thr Tyr Arg Asn Val Thr Ala Glu Gln Ala Arg
245 250 255

Asn Trp Gly Leu Gly Gly His Ala Phe Cys Arg Asn Pro Asp Asn Asp
260 265 270

Ile Arg Pro Trp Cys Phe Val Leu Asn Arg Asp Arg Leu Ser Trp Glu
275 280 285

Tyr Cys Asp Leu Ala Gln Cys Gln Thr Pro Thr Gln Ala Ala Pro Pro
290 295 300

Thr Pro Val Ser Pro Arg Leu His Val Pro Leu Met Pro Ala Gln Pro
305 310 315 320

Ala Pro Pro Lys Pro Gln Pro Thr Thr Arg Thr Pro Pro Gln Ser Gln
325 330 335

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

```
Arg Asn Gly Pro Leu Ser Cys Gly Gln Arg Leu Arg Lys Ser Leu Ser
        355                 360                 365

Ser Met Thr Arg Val Val Gly Gly Leu Val Ala Leu Arg Gly Ala His
    370                 375                 380

Pro Tyr Ile Ala Ala Leu Tyr Trp Gly His Ser Phe Cys Ala Gly Ser
385                 390                 395                 400

Leu Ile Ala Pro Cys Trp Val Leu Thr Ala Ala His Cys Leu Gln Asp
                405                 410                 415

Arg Pro Ala Pro Glu Asp Leu Thr Val Val Leu Gly Gln Glu Arg Arg
            420                 425                 430

Asn His Ser Cys Glu Pro Cys Gln Thr Leu Ala Val Arg Ser Tyr Arg
        435                 440                 445

Leu His Glu Ala Phe Ser Pro Val Ser Tyr Gln His Asp Leu Ala Leu
    450                 455                 460

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

Tyr Val Gln Pro Val Cys Leu Pro Ser Gly Ala Ala Arg Pro Ser Glu
                485                 490                 495

Thr Thr Leu Cys Gln Val Ala Gly Trp Gly His Gln Phe Glu Gly Ala
            500                 505                 510

Glu Glu Tyr Ala Ser Phe Leu Gln Glu Ala Gln Val Pro Phe Leu Ser
        515                 520                 525

Leu Glu Arg Cys Ser Ala Pro Asp Val His Gly Ser Ser Ile Leu Pro
    530                 535                 540

Gly Met Leu Cys Ala Gly Phe Leu Glu Gly Gly Thr Asp Ala Cys Gln
545                 550                 555                 560

Gly Asp Ser Gly Gly Pro Leu Val Cys Glu Asp Gln Ala Ala Glu Arg
                565                 570                 575

Arg Leu Thr Leu Gln Gly Ile Ile Ser Trp Gly Ser Gly Cys Gly Asp
            580                 585                 590
```

```
Arg Asn Lys Pro Gly Val Tyr Thr Asp Val Ala Tyr Tyr Leu Ala Trp
        595                 600                 605

Ile Arg Glu His Thr Val Ser
    610                 615
```

<210> 2
<211> 597
<212> PRT
<213> Mus musculus

<400> 2

```
Met Thr Ala Leu Leu Phe Leu Gly Ser Leu Leu Met Ser Leu Asp Leu
1               5                   10                  15

Thr Leu Ser Ala Pro Pro Trp Lys Asp Ser Lys Lys Phe Lys Asp Ala
            20                  25                  30

Pro Asp Gly Pro Thr Val Val Leu Thr Val Asp Gly Arg Leu Cys His
        35                  40                  45

Phe Pro Phe Gln Tyr His Arg Gln Leu His His Lys Cys Ile His Lys
    50                  55                  60

Arg Arg Pro Gly Ser Arg Pro Trp Cys Ala Thr Thr Pro Asn Phe Asp
65                  70                  75                  80

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

His Cys Ser Lys His Asn Pro Cys His Lys Gly Gly Thr Cys Ile Asn
            100                 105                 110

Thr Pro Asn Gly Pro His Cys Leu Cys Pro Glu His Leu Thr Gly Lys
        115                 120                 125

His Cys Gln Lys Glu Lys Cys Phe Glu Pro Gln Leu Leu Lys Phe Phe
    130                 135                 140

His Glu Asn Glu Leu Trp Phe Arg Thr Gly Pro Gly Gly Val Ala Arg
145                 150                 155                 160

Cys Glu Cys Lys Gly Ser Glu Ala His Cys Lys Pro Val Ala Ser Gln
```

165 170 175

Ala Cys Ser Ile Asn Pro Cys Leu Asn Gly Gly Ser Cys Leu Leu Val
180 185 190

Glu Asp His Pro Leu Cys Arg Cys Pro Thr Gly Tyr Thr Gly Tyr Phe
195 200 205

Cys Asp Leu Asp Leu Trp Ala Thr Cys Tyr Glu Gly Arg Gly Leu Ser
210 215 220

Tyr Arg Gly Gln Ala Gly Thr Thr Gln Ser Gly Ala Pro Cys Gln Arg
225 230 235 240

Trp Thr Val Glu Ala Thr Tyr Arg Asn Met Thr Glu Lys Gln Ala Leu
245 250 255

Ser Trp Gly Leu Gly His His Ala Phe Cys Arg Asn Pro Asp Asn Asp
260 265 270

Thr Arg Pro Trp Cys Phe Val Trp Ser Gly Asp Arg Leu Ser Trp Asp
275 280 285

Tyr Cys Gly Leu Glu Gln Cys Gln Thr Pro Thr Phe Ala Pro Leu Val
290 295 300

Val Pro Glu Ser Gln Glu Glu Ser Pro Ser Gln Ala Pro Ser Leu Ser
305 310 315 320

His Ala Pro Asn Asp Ser Thr Asp His Gln Thr Ser Leu Ser Lys Thr
325 330 335

Asn Thr Met Gly Cys Gly Gln Arg Phe Arg Lys Gly Leu Ser Ser Phe
340 345 350

Met Arg Val Val Gly Gly Leu Val Ala Leu Pro Gly Ser His Pro Tyr
355 360 365

Ile Ala Ala Leu Tyr Trp Gly Asn Asn Phe Cys Ala Gly Ser Leu Ile
370 375 380

Ala Pro Cys Trp Val Leu Thr Ala Ala His Cys Leu Gln Asn Arg Pro
385 390 395 400

Ala Pro Glu Glu Leu Thr Val Val Leu Gly Gln Asp Arg His Asn Gln
405 410 415

Ser Cys Glu Trp Cys Gln Thr Leu Ala Val Arg Ser Tyr Arg Leu His
420 425 430

Glu Gly Phe Ser Ser Ile Thr Tyr Gln His Asp Leu Ala Leu Leu Arg
435 440 445

Leu Gln Glu Ser Lys Thr Asn Ser Cys Ala Ile Leu Ser Pro His Val
450 455 460

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

Leu Cys Glu Val Ala Gly Trp Gly His Gln Phe Glu Gly Ala Glu Glu
485 490 495

Tyr Ser Thr Phe Leu Gln Glu Ala Gln Val Pro Phe Ile Ala Leu Asp
500 505 510

Arg Cys Ser Asn Ser Asn Val His Gly Asp Ala Ile Leu Pro Gly Met
515 520 525

Leu Cys Ala Gly Phe Leu Glu Gly Gly Thr Asp Ala Cys Gln Gly Asp
530 535 540

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

Thr Leu Arg Gly Val Ile Ser Trp Gly Ser Gly Cys Gly Asp Arg Asn
565 570 575

Lys Pro Gly Val Tyr Thr Asp Val Ala Asn Tyr Leu Ala Trp Ile Gln
580 585 590

Lys His Ile Ala Ser
595

<210> 3
<211> 595
<212> PRT
<213> Rattus norvegicus

<400> 3

```
Met Thr Ala Leu Leu Phe Leu Gly Ser Leu Leu Met Ser Leu Asp Leu
1               5                  10                  15

Thr Leu Ser Ala Pro Pro Trp Lys Ser Lys Glu Phe Lys Asp Gly Ala
            20                  25                  30

Gly Asp Pro Ser Val Val Leu Thr Val Asp Gly Lys Leu Cys His Phe
        35                  40                  45

Pro Phe Gln Tyr His Arg Arg Leu Tyr His Lys Cys Ile His Lys Gly
    50                  55                  60

Gln Pro Gly Ser Arg Pro Trp Cys Ala Thr Thr Pro Asn Phe Asp Glu
65                  70                  75                  80

Asp Gln Gln Trp Gly Tyr Cys Leu Glu Pro Lys Lys Val Lys Asp His
                85                  90                  95

Cys Ser Lys His Ser Pro Cys His Lys Gly Gly Thr Cys Val Asn Thr
            100                 105                 110

Pro Asn Gly Pro His Cys Leu Cys Pro Glu His Leu Thr Gly Lys His
        115                 120                 125

Cys Gln Arg Glu Lys Cys Phe Glu Ser Gln Leu Leu Lys Phe Phe His
    130                 135                 140

Glu Asn Glu Ile Trp Phe Arg Thr Gly Pro Gly Gly Val Ala Arg Cys
145                 150                 155                 160

Gln Cys Lys Gly Pro Gln Ala Val Cys Lys Leu Leu Thr Ser Gln Val
                165                 170                 175

Cys Arg Val Asn Pro Cys Leu Asn Gly Gly Thr Cys Leu Leu Val Glu
            180                 185                 190

Asp His Arg Leu Cys His Cys Pro Ala Gly Tyr Ala Gly Pro Phe Cys
        195                 200                 205

Asp Leu Asp Leu Lys Ala Thr Cys Tyr Glu Asp Arg Gly Leu Ser Tyr
    210                 215                 220
```

Arg Gly Gln Ala Lys Thr Thr Leu Ser Gly Ala Pro Cys Gln Arg Trp
225 230 235 240

Ala Ser Glu Ala Thr Tyr Arg Asn Met Thr Glu Thr Gln Ala Leu Ser
245 250 255

Trp Gly Leu Gly His His Ala Phe Cys Arg Asn Pro Asp Asn Asp Thr
260 265 270

Arg Pro Trp Cys Tyr Val Trp Ser Gly Asp Arg Leu Ser Trp Asp Tyr
275 280 285

Cys Asp Leu Glu Gln Cys Gln Met Pro Thr Leu Thr Ser Pro Val Ser
290 295 300

Pro Glu Ser His Asp Met Leu Lys Pro Arg Pro Pro Ile Leu Gln Ser
305 310 315 320

Ser Pro Arg Asp Ser Thr Arg Asn Gln Asn Val Val Ser Arg Thr Ser
325 330 335

Thr Val Val Cys Gly Gln Arg Phe Arg Lys Arg Leu Ser Ser Leu Arg
340 345 350

Arg Val Val Gly Gly Leu Val Ala Leu Pro Gly Ser His Pro Tyr Ile
355 360 365

Ala Ala Leu Tyr Trp Gly Asp Ser Phe Cys Ala Gly Ser Leu Ile Asp
370 375 380

Pro Cys Trp Val Leu Thr Ala Ala His Cys Leu Gln Lys Arg Pro Ala
385 390 395 400

Pro Glu Glu Leu Thr Val Val Leu Gly Gln Asp Arg His Asn Gln Ser
405 410 415

Cys Glu Arg Cys Gln Thr Leu Ala Val His Ser Tyr Arg Leu His Glu
420 425 430

Gly Phe Ser Ser Lys Thr Tyr Gln His Asp Leu Ala Leu Leu Arg Leu
435 440 445

Arg Gly Arg Lys Asn Ser Cys Ala Ile Leu Ser Pro His Val Gln Pro
450 455 460

Val Cys Leu Pro Ser Ser Ala Ala Pro Pro Ser Glu Thr Val Leu Cys
465 470 475 480

Glu Val Ala Gly Trp Gly His Gln Phe Glu Gly Ala Glu Glu Tyr Ala
485 490 495

Thr Phe Leu Gln Glu Ala Gln Val Pro Phe Ile Ser Leu Asp Arg Cys
500 505 510

Ser Ser Ser Asn Val His Gly Asp Ala Ile Leu Pro Gly Met Leu Cys
515 520 525

Ala Gly Phe Leu Glu Gly Gly Ala Asp Ala Cys Gln Gly Asp Ser Gly
530 535 540

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

Arg Gly Val Ile Ser Trp Gly Ser Gly Cys Gly Asp Arg Asn Lys Pro
565 570 575

Gly Val Tyr Thr Asp Val Ala Asn Tyr Leu Asp Trp Ile Gln Glu His
580 585 590

Thr Ala Phe
595

<210> 4
<211> 129
<212> PRT
<213> Homo sapiens

<400> 4

Glu Val Gln Leu Leu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Lys Tyr
20 25 30

Ile Met Gln Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

Ser Gly Ile Arg Pro Ser Gly Gly Thr Thr Val Tyr Ala Asp Ser Val

50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Ala Leu Pro Arg Ser Gly Tyr Leu Ile Ser Pro His Tyr Tyr
100 105 110

Tyr Tyr Ala Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser
115 120 125

Ser

<210> 5
<211> 110
<212> PRT
<213> Homo sapiens

<400> 5

Gln Ser Glu Leu Thr Gln Pro Pro Ser Ala Ser Gly Thr Pro Gly Gln
1 5 10 15

Arg Val Thr Ile Ser Cys Ser Gly Ser Ser Ser Asn Ile Gly Arg Asn
20 25 30

Tyr Val Tyr Trp Tyr Gln Gln Val Pro Gly Thr Ala Pro Lys Leu Leu
35 40 45

Ile Tyr Ser Asn Asn Gln Arg Pro Ser Gly Val Pro Asp Arg Phe Ser
50 55 60

Gly Ser Lys Ser Gly Thr Ser Ala Ser Leu Val Ile Ser Gly Leu Arg
65 70 75 80

Ser Glu Asp Glu Ala Asp Tyr Tyr Cys Ala Ala Trp Asp Ala Ser Leu
85 90 95

Arg Gly Val Phe Gly Gly Gly Thr Lys Leu Thr Val Leu Gly
100 105 110

<210> 6
<211> 5
<212> PRT
<213> Homo sapiens

<400> 6

Lys Tyr Ile Met Gln
1 5

<210> 7
<211> 17
<212> PRT
<213> Homo sapiens

<400> 7

Gly Ile Arg Pro Ser Gly Gly Thr Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 8
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Heavy chain CDR2 showing variations

<220>
<221> V-segment
<222> (3)..(3)
<223> Xaa is selected from Arg, Asn, and Asp

<220>
<221> V-segment
<222> (4)..(4)
<223> Xaa is selcted from Pro, Val, Ile and Met

<220>
<221> V-segment
<222> (5)..(5)
<223> Xaa is selected from Ser, Pro and Ala

<220>
<221> V-segment
<222> (6)..(6)
<223> Xaa is selected from Gly, Leu, Val and Thr

<220>
<221> V-segment
<222> (7)..(7)
<223> Xaa is selected from Gly, Tyr, Gln, Lys, Arg, Asn and Met

<220>
<221> V-segment
<222> (8)..(8)
<223> Xaa is selected from Thr, Gly and Ser

<400> 8

Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 9
<211> 20
<212> PRT
<213> Homo sapiens

<400> 9

Ala Leu Pro Arg Ser Gly Tyr Leu Ile Ser Pro His Tyr Tyr Tyr Tyr
1 5 10 15

Ala Leu Asp Val
20

<210> 10
<211> 20
<212> PRT
<213> Artificial

<220>
<223> Heavy chain CDR3 showing variations

<220>
<221> V-segment
<222> (9)..(9)
<223> Xaa is selected from Ala, Met and Val

<220>
<221> V-segment
<222> (10)..(10)
<223> Xaa is selcted from Ser and Lys

<220>
<221> V-segment
<222> (11)..(11)
<223> Xaa is selected from Pro, Lys, Thr and His

<220>
<221> V-segment

<222> (12)..(12)
<223> Xaa is selected from His, Asn, Gly and Gln

<400> 10

Ala Leu Pro Arg Ser Gly Tyr Leu Xaa Xaa Xaa Xaa Tyr Tyr Tyr Tyr
1 5 10 15

Ala Leu Asp Val
20

<210> 11
<211> 13
<212> PRT
<213> Homo sapiens

<400> 11

Ser Gly Ser Ser Ser Asn Ile Gly Arg Asn Tyr Val Tyr
1 5 10

<210> 12
<211> 7
<212> PRT
<213> Homo sapiens

<400> 12

Ser Asn Asn Gln Arg Pro Ser
1 5

<210> 13
<211> 10
<212> PRT
<213> Homo sapiens

<400> 13

Ala Ala Trp Asp Ala Ser Leu Arg Gly Val
1 5 10

<210> 14
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Light chain CDR3 showing variations

<220>
<221> V-segment
<222> (2)..(2)
<223> Xaa is selected from Ala and Ser

<220>
<221> V-segment
<222> (4)..(6)
<223> Xaa can be any amino acid

<220>
<221> V-segment
<222> (7)..(7)
<223> Xaa is selected from Leu and Val

<220>
<221> V-segment
<222> (9)..(10)
<223> Xaa can be any amino acid

<400> 14

Ala Xaa Trp Xaa Xaa Xaa Xaa Arg Xaa Xaa
1 5 10

<210> 15
<211> 124
<212> PRT
<213> Artificial

<220>
<223> stop template to generate diverse antibodies

<220>
<221> misc_feature
<222> (30)..(35)
<223> Xaa can be any naturally occurring amino acid (except Cys)

<400> 15

Glu Val Gln Leu Leu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Xaa Xaa Xaa
20 25 30

Xaa Xaa Xaa Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

Ser Gly Ile Arg Pro Ser Gly Gly Thr Thr Val Tyr Ala Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys

85 90 95

Ala Arg Ala Leu Pro Arg Ser Gly Tyr Leu Ile Ser Pro His Tyr Tyr
100 105 110

Tyr Tyr Ala Leu Asp Val Trp Gly Gln Gly Thr Thr
115 120

<210> 16
<211> 53
<212> DNA
<213> Artificial

<220>
<223> Mutagenic trimer mix

<220>
<221> misc_feature
<222> (20)..(37)
<223> n is a, c, g, or t

<400> 16
agcaagcggt tttacctttn nnnnnnnnnn nnnnnnntgg gttcgccagg cac 53

<210> 17
<211> 133
<212> PRT
<213> Artificial

<220>
<223> stop template to generate diverse antibodies

<220>
<221> misc_feature
<222> (52)..(57)
<223> Xaa can be any naturally occurring amino acid (except Cys)

<400> 17

Glu Val Gln Leu Leu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Lys Tyr
20 25 30

Ile Met Gln Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

Ser Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Thr Val Tyr Ala Asp Ser Val

50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Ala Leu Pro Arg Ser Gly Tyr Leu Ile Ser Pro His Tyr Tyr
100 105 110

Tyr Tyr Ala Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser
115 120 125

Ser Ala Ser Thr Lys
130

<210> 18
<211> 56
<212> DNA
<213> Artificial

<220>
<223> Mutagenic trimer mix

<220>
<221> misc_feature
<222> (20)..(37)
<223> n is a, c, g, or t

<400> 18
ggaatgggtt agcggtattn nnnnnnnnnn nnnnnnnacc gtttatgcag atagcg 56

<210> 19
<211> 133
<212> PRT
<213> Artificial

<220>
<223> stop template to generate diverse antibodies

<220>
<221> misc_feature
<222> (100)..(105)
<223> Xaa can be any naturally occurring amino acid (except Cys)

<400> 19

Glu Val Gln Leu Leu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly

1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Lys Tyr
20 25 30

Ile Met Gln Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

Ser Gly Ile Arg Pro Ser Gly Gly Thr Thr Val Tyr Ala Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Ala Xaa Xaa Xaa Xaa Xaa Xaa Leu Ile Ser Pro His Tyr Tyr
100 105 110

Tyr Tyr Ala Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser
115 120 125

Ser Ala Ser Thr Lys
130

<210> 20
<211> 57
<212> DNA
<213> Artificial

<220>
<223> Mutagenic trimer mix

<220>
<221> misc_feature
<222> (20)..(37)
<223> n is a, c, g, or t

<400> 20
ttattattgc gcacgtgcan nnnnnnnnnn nnnnnnnctg atttctccgc attatta 57

<210> 21
<211> 133
<212> PRT
<213> Artificial

<220>
<223> stop template to generate diverse antibodies

<220>
<221> misc_feature
<222> (105)..(110)
<223> Xaa can be any naturally occurring amino acid (except Cys)

<400> 21

Glu Val Gln Leu Leu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Lys Tyr
20 25 30

Ile Met Gln Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

Ser Gly Ile Arg Pro Ser Gly Gly Thr Thr Val Tyr Ala Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Ala Leu Pro Arg Ser Gly Xaa Xaa Xaa Xaa Xaa Xaa Tyr Tyr
100 105 110

Tyr Tyr Ala Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser
115 120 125

Ser Ala Ser Thr Lys
130

<210> 22
<211> 56
<212> DNA
<213> Artificial

<220>
<223> Mutagenic trimer mix

<220>
<221> misc_feature

<222> (18)..(35)
<223> n is a, c, g, or t

<400> 22
cactgcctcg tagcggtnnn nnnnnnnnnn nnnnntatta ttattatgcc ctggat 56

<210> 23
<211> 120
<212> PRT
<213> Artificial

<220>
<223> stop template to generate diverse antibodies

<220>
<221> misc_feature
<222> (27)..(32)
<223> Xaa can be any naturally occurring amino acid (except Cys)

<400> 23

Gln Ser Val Leu Thr Gln Pro Pro Ser Ala Ser Gly Thr Pro Gly Gln
1 5 10 15

Arg Val Thr Ile Ser Cys Ser Gly Ser Ser Xaa Xaa Xaa Xaa Xaa Xaa
20 25 30

Tyr Val Tyr Trp Tyr Gln Gln Leu Pro Gly Thr Ala Pro Lys Leu Leu
35 40 45

Ile Tyr Ser Asn Asn Gln Arg Pro Ser Gly Val Pro Asp Arg Phe Ser
50 55 60

Gly Ser Lys Ser Gly Thr Ser Ala Ser Leu Ala Ile Ser Gly Leu Arg
65 70 75 80

Ser Glu Asp Glu Ala Asp Tyr Tyr Cys Ala Ala Trp Asp Ala Ser Leu
85 90 95

Arg Gly Val Phe Gly Gly Gly Thr Lys Leu Thr Val Leu Gly Gln Pro
100 105 110

Lys Ala Ala Pro Ser Val Thr Leu
115 120

<210> 24
<211> 55
<212> DNA

<213> Artificial

<220>
<223> Mutagenic trimer mix

<220>
<221> misc_feature
<222> (18)..(35)
<223> n is a, c, g, or t

<400> 24
gctgtagcgg tagcagcnnn nnnnnnnnnn nnnnntatgt gtattggtat cagca 55

<210> 25
<211> 120
<212> PRT
<213> Artificial

<220>
<223> stop template to generate diverse antibodies

<220>
<221> misc_feature
<222> (90)..(95)
<223> Xaa can be any naturally occurring amino acid (except Cys)

<400> 25

Gln Ser Val Leu Thr Gln Pro Pro Ser Ala Ser Gly Thr Pro Gly Gln
1 5 10 15

Arg Val Thr Ile Ser Cys Ser Gly Ser Ser Ser Asn Ile Gly Arg Asn
20 25 30

Tyr Val Tyr Trp Tyr Gln Gln Leu Pro Gly Thr Ala Pro Lys Leu Leu
35 40 45

Ile Tyr Ser Asn Asn Gln Arg Pro Ser Gly Val Pro Asp Arg Phe Ser
50 55 60

Gly Ser Lys Ser Gly Thr Ser Ala Ser Leu Ala Ile Ser Gly Leu Arg
65 70 75 80

Ser Glu Asp Glu Ala Asp Tyr Tyr Cys Xaa Xaa Xaa Xaa Xaa Xaa Leu
85 90 95

Arg Gly Val Phe Gly Gly Gly Thr Lys Leu Thr Val Leu Gly Gln Pro
100 105 110

Lys Ala Ala Pro Ser Val Thr Leu
115 120

<210> 26
<211> 57
<212> DNA
<213> Artificial

<220>
<223> Mutagenic trimer mix

<220>
<221> misc_feature
<222> (22)..(39)
<223> n is a, c, g, or t

<400> 26
gatgaagccg attattattg tnnnnnnnnn nnnnnnnnnc tgcgtggtgt ttttggt 57

<210> 27
<211> 120
<212> PRT
<213> Artificial

<220>
<223> stop template to generate diverse antibodies

<220>
<221> misc_feature
<222> (94)..(99)
<223> Xaa can be any naturally occurring amino acid (except Cys)

<400> 27

Gln Ser Val Leu Thr Gln Pro Pro Ser Ala Ser Gly Thr Pro Gly Gln
1 5 10 15

Arg Val Thr Ile Ser Cys Ser Gly Ser Ser Ser Asn Ile Gly Arg Asn
20 25 30

Tyr Val Tyr Trp Tyr Gln Gln Leu Pro Gly Thr Ala Pro Lys Leu Leu
35 40 45

Ile Tyr Ser Asn Asn Gln Arg Pro Ser Gly Val Pro Asp Arg Phe Ser
50 55 60

Gly Ser Lys Ser Gly Thr Ser Ala Ser Leu Ala Ile Ser Gly Leu Arg
65 70 75 80

Ser Glu Asp Glu Ala Asp Tyr Tyr Cys Ala Ala Trp Asp Xaa Xaa Xaa
85 90 95

Xaa Xaa Xaa Phe Gly Gly Gly Thr Lys Leu Thr Val Leu Gly Gln Pro
100 105 110

Lys Ala Ala Pro Ser Val Thr Leu
115 120

<210> 28
<211> 55
<212> DNA
<213> Artificial

<220>
<223> Mutagenic trimer mix

<220>
<221> misc_feature
<222> (20)..(37)
<223> n is a, c, g, or t

<400> 28
ttattgtgca gcatgggatn nnnnnnnnnn nnnnnnnttt ggtggtggca ccaaa 55

<210> 29
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 29

Gly Ile Asn Val Pro Leu Tyr Gly Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 30
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 30

Gly Ile Asn Val Pro Val Gln Gly Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 31
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 31

Gly Ile Asp Ile Pro Thr Lys Gly Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 32
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 32

Gly Ile Asp Met Pro Thr Lys Gly Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 33
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 33

Gly Ile Asn Pro Ala Thr Arg Thr Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 34
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 34

Gly Ile Asn Pro Ala Thr Lys Thr Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 35
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 35

Gly Ile Asp Val Pro Val Arg Gly Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 36
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 36

Gly Ile Asn Pro Ala Thr Arg Ser Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 37
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 37

Gly Ile Asn Pro Ala Thr Asn Thr Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 38
<211> 17
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR2

<400> 38

Gly Ile Asn Pro Ala Thr Met Thr Thr Val Tyr Ala Asp Ser Val Lys
1 5 10 15

Gly

<210> 39
<211> 20
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR3

<400> 39

Ala Leu Pro Arg Ser Gly Tyr Leu Met Lys Lys Asn Tyr Tyr Tyr Tyr
1 5 10 15

Ala Leu Asp Val
20

<210> 40
<211> 20
<212> PRT

<213> Artificial

<220>
<223> Affinity-matured HCDR3

<400> 40

Ala Leu Pro Arg Ser Gly Tyr Leu Met Lys Thr Gly Tyr Tyr Tyr Tyr
1 5 10 15

Ala Leu Asp Val
20

<210> 41
<211> 20
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR3

<400> 41

Ala Leu Pro Arg Ser Gly Tyr Leu Val Lys Lys Gln Tyr Tyr Tyr Tyr
1 5 10 15

Ala Leu Asp Val
20

<210> 42
<211> 20
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR3

<400> 42

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

Ala Leu Asp Val
20

<210> 43
<211> 20
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured HCDR3

<400> 43

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

Ala Leu Asp Val
20

<210> 44
<211> 13
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR1

<400> 44

Ser Gly Ser Ser Glu Met Thr Val His His Tyr Val Tyr
1 5 10

<210> 45
<211> 13
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR1

<400> 45

Ser Gly Ser Ser Phe Ser His Pro His His Tyr Val Tyr
1 5 10

<210> 46
<211> 13
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR1

<400> 46

Ser Gly Ser Ser Glu Phe Val Glu Tyr Asn Tyr Val Tyr
1 5 10

<210> 47
<211> 13
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR1

<400> 47

Ser Gly Ser Ser Asp Thr Asn Ser His His Tyr Val Tyr
1 5 10

<210> 48
<211> 13
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR1

<400> 48

Ser Gly Ser Ser Trp Thr Glu Gln His Asn Tyr Val Tyr
1 5 10

<210> 49
<211> 13
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR1

<400> 49

Ser Gly Ser Ser Val Met Val Thr Asn His Tyr Val Tyr
1 5 10

<210> 50
<211> 13
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR1

<400> 50

Ser Gly Ser Ser Gly Met Val Glu Gln Asn Tyr Val Tyr
1 5 10

<210> 51
<211> 13
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR1

<400> 51

Ser Gly Ser Ser Phe Lys Val Glu Glu Thr Tyr Val Tyr
1 5 10

<210> 52
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 52

Ala Ser Trp Tyr Asn Asp Leu Arg Gly Val
1 5 10

<210> 53
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 53

Ala Ser Trp Glu Ile Pro Leu Arg Gly Val
1 5 10

<210> 54
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 54

Ala Ser Trp Thr Asn Glu Leu Arg Gly Val
1 5 10

<210> 55
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 55

Ala Ser Trp Trp Asn Asp Leu Arg Gly Val
1 5 10

<210> 56
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 56

Ala Ser Trp Glu Leu Pro Leu Arg Gly Val
1 5 10

<210> 57
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 57

Ala Ser Trp Ser Ile Pro Leu Arg Gly Val
1 5 10

<210> 58
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 58

Ala Ser Trp Glu Val Pro Leu Arg Gly Val
1 5 10

<210> 59
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 59

Ala Ala Trp Asp Pro Gln Val Arg Leu Ala

1 5 10

<210> 60
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 60

Ala Ala Trp Asp Gln Gln Val Arg Leu Asp
1 5 10

<210> 61
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 61

Ala Ala Trp Asp Gln Gln Val Arg Lys Thr
1 5 10

<210> 62
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 62

Ala Ala Trp Asp Glu Arg Val Arg Leu Met
1 5 10

<210> 63
<211> 10
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured LCDR3

<400> 63

Ala Ala Trp Asp Asn Gln Val Arg Leu Gly
1 5 10

<210> 64
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Sequencing primer

<400> 64
gtccttgacc aggcagccca g 21

<210> 65
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Sequencing primer

<400> 65
gtgagttagc tcactcatta g 21

<210> 66
<211> 21
<212> DNA
<213> Artificial

<220>
<223> Sequencing primer

<400> 66
ttttcatcgg cattttcggt c 21

<210> 67
<211> 24
<212> DNA
<213> Artificial

<220>
<223> Sequencing primer

<400> 67
ccatctgatg agcagttgaa atct 24

<210> 68
<211> 24
<212> DNA
<213> Artificial

<220>
<223> Sequencing primer

<400> 68

gttcccgccc tcctctgagg agct 24

<210> 69
<211> 23
<212> DNA
<213> Artificial

<220>
<223> Sequencing primer

<400> 69
agcggataac aatttcacac agg 23

<210> 70
<211> 19
<212> DNA
<213> Artificial

<220>
<223> Sequencing primer

<400> 70
ggttctggca aatattctg 19

<210> 71
<211> 19
<212> DNA
<213> Artificial

<220>
<223> Sequencing primer

<400> 71
gttgcaccga ccgaatgta 19

<210> 72
<211> 25
<212> DNA
<213> Artificial

<220>
<223> Sequencing primer

<400> 72
accgtgagct ggaacagcgg tgcgc 25

<210> 73
<211> 129
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured vH region

<400> 73

Glu Val Gln Leu Leu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Lys Tyr
20 25 30

Ile Met Gln Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

Ser Gly Ile Asp Ile Pro Thr Lys Gly Thr Val Tyr Ala Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Ala Leu Pro Arg Ser Gly Tyr Leu Ile Ser Pro His Tyr Tyr
100 105 110

Tyr Tyr Ala Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser
115 120 125

Ser

<210> 74
<211> 129
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured vH region

<400> 74

Glu Val Gln Leu Leu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Lys Tyr
20 25 30

Ile Met Gln Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val

35 40 45

Ser Gly Ile Asn Val Pro Val Gln Gly Thr Val Tyr Ala Asp Ser Val
50 55 60

Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Ala Leu Pro Arg Ser Gly Tyr Leu Ile Ser Pro His Tyr Tyr
100 105 110

Tyr Tyr Ala Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val Ser
115 120 125

Ser

<210> 75
<211> 120
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured vL region

<400> 75

Gln Ser Val Leu Thr Gln Pro Pro Ser Ala Ser Gly Thr Pro Gly Gln
1 5 10 15

Arg Val Thr Ile Ser Cys Ser Gly Ser Ser Glu Met Thr Val His His
20 25 30

Tyr Val Tyr Trp Tyr Gln Gln Leu Pro Gly Thr Ala Pro Lys Leu Leu
35 40 45

Ile Tyr Ser Asn Asn Gln Arg Pro Ser Gly Val Pro Asp Arg Phe Ser
50 55 60

Gly Ser Lys Ser Gly Thr Ser Ala Ser Leu Ala Ile Ser Gly Leu Arg
65 70 75 80

Ser Glu Asp Glu Ala Asp Tyr Tyr Cys Ala Ala Trp Asp Ala Ser Leu

85 90 95

Arg Gly Val Phe Gly Gly Gly Thr Lys Leu Thr Val Leu Gly Gln Pro
100 105 110

Lys Ala Ala Pro Ser Val Thr Leu
115 120

<210> 76
<211> 130
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured vH region

<400> 76

Glu Val Gln Leu Leu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Lys Tyr
20 25 30

Ile Met Gln Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

Ser Gly Ile Asp Met Pro Thr Lys Gly Gly Thr Val Tyr Ala Asp Ser
50 55 60

Val Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr Leu
65 70 75 80

Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr
85 90 95

Cys Ala Arg Ala Leu Pro Arg Ser Gly Tyr Leu Ile Ser Pro His Tyr
100 105 110

Tyr Tyr Tyr Ala Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr Val
115 120 125

Ser Ser
130

<210> 77

<211> 131
<212> PRT
<213> Artificial

<220>
<223> Affinity-matured vH region

<400> 77

Glu Val Gln Leu Leu Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Lys Tyr
20 25 30

Ile Met Gln Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

Ser Gly Ile Asn Val Pro Leu Tyr Gly Gly Gly Thr Val Tyr Ala Asp
50 55 60

Ser Val Lys Gly Arg Phe Thr Ile Ser Arg Asp Asn Ser Lys Asn Thr
65 70 75 80

Leu Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr
85 90 95

Tyr Cys Ala Arg Ala Leu Pro Arg Ser Gly Tyr Leu Ile Ser Pro His
100 105 110

Tyr Tyr Tyr Tyr Ala Leu Asp Val Trp Gly Gln Gly Thr Thr Val Thr
115 120 125

Val Ser Ser
130