SEQUENCE LISTING

<110> Takeda Vaccines, Inc.

<120> DENGUE VACCINE UNIT DOSE AND ADMINISTRATION THEREOF

<130> T08269WO1/MH

<140>
<141>

<150> EP18 192 701.3
<151> 2018-09-05

<150> EP18 192 776.5
<151> 2018-09-05

<150> EP18 192 793.0
<151> 2018-09-05

<150> EP18 192 800.3
<151> 2018-09-05

<150> EP18 192 711.2
<151> 2018-09-05

<150> EP18 192 717.9
<151> 2018-09-05

<150> EP18 192 814.4
<151> 2018-09-05

<150> EP19 154 334.7
<151> 2019-01-29

<150> EP19 161 184.7
<151> 2019-03-07

<150> EP18 192 787.2
<151> 2018-09-05

<150> US16/295,611
<151> 2019-03-07

<160> 16

<170> PatentIn version 3.5

<210> 1
<211> 10723
<212> DNA
<213> chimeric dengue seroytpe 2/1 (MVS)

<400> 1

agttgttagt ctacgtggac cgacaaagac agattctttg agggagctaa gctcaatgta 60

gttctaacag ttttttaatt agagagcaga tctctgatga ataaccaacg gaaaaaggcg 120

aaaaacacgc ctttcaatat gctgaaacgc gagagaaacc gcgtgtcgac tgtgcaacag 180

ctgacaaaga gattctcact tggaatgctg cagggacgag gaccattaaa actgttcatg 240

gccctggtgg cgttccttcg tttcctaaca atcccaccaa cagcagggat attgaagaga 300

tggggaacaa ttaaaaaatc aaaagctatt aatgttttga gagggttcag gaaagagatt 360

ggaaggatgc tgaacatctt gaataggaga cgcagatctg caggcatgat cattatgctg 420

attccaacag tgatggcgtt ccatttaacc acgcgtgggg gagagccgca tatgatagtt 480

agcaagcagg aaagaggaaa gtcacttttg ttcaagacct ctgcaggtgt caacatgtgc 540

accctcattg cgatggattt gggagagttg tgtgaggaca cgatgaccta caaatgcccc 600

cggatcactg aggcggaacc agatgacgtt gactgttggt gcaatgccac ggacacatgg 660

gtgacctatg gaacgtgctc tcaaactggc gaacaccgac gagacaaacg ttccgtcgca 720

ttggccccac acgtggggct tggcctagaa acaagagccg aaacgtggat gtcctctgaa 780

ggtgcttgga aacagataca aaaagtagag acttgggctc tgagacatcc aggattcacg 840

gtgatagccc tttttctagc acatgccata ggaacatcca tcacccagaa agggatcatt 900

ttcattttgc tgatgctggt aacaccatct atggccatgc gatgcgtggg aataggcaac 960

agagacttcg tggaaggact gtcaggagca acatgggtgg atgtggtact ggagcatgga 1020

agttgcgtca ccaccatggc aaaaaacaaa ccaacactgg acattgaact cttgaagacg 1080

gaggtcacaa accctgcagt tctgcgtaaa ttgtgcattg aagctaaaat atcaaacacc 1140

accaccgatt cgagatgtcc aacacaagga gaagccacac tggtggaaga acaagacgcg 1200

aactttgtgt gccgacgaac gttcgtggac agaggctggg gcaatggctg tgggctattc 1260

ggaaaaggta gtctaataac gtgtgccaag tttaagtgtg tgacaaaact agaaggaaag 1320

atagttcaat atgaaaacct aaaatattca gtgatagtca ccgtccacac tggagatcag 1380

caccaggtgg gaaatgagac tacagaacat ggaacaactg caaccataac acctcaagct 1440

cctacgtcgg aaatacagct gaccgactac ggaaccctta cattagattg ttcacctagg 1500

acagggctag attttaacga gatggtgttg ctgacaatga aagaaagatc atggcttgtc 1560

cacaaacaat ggttcctaga cttaccactg ccttggacct ctggggcttc aacatcccaa 1620

gagacttgga acagacaaga tttactggtc acatttaaga cagctcatgc aaagaagcag 1680

gaagtagtcg tactaggatc acaagaagga gcaatgcaca ctgcgctgac tggagcgaca 1740

gaaatccaaa cgtcaggaac gacaacaatt ttcgcaggac acctaaaatg cagactaaaa 1800

atggacaaac taactttaaa agggatgtca tatgtgatgt gcacaggctc attcaagtta 1860

gagaaagaag tggctgagac ccagcatgga actgttctgg tgcaggttaa atatgaagga 1920

acagacgcac catgcaagat tccctttttcg acccaagatg agaaaggagc aacccagaat 1980

gggagattaa taacagccaa ccccatagtc actgacaaag aaaaaccagt caatattgag 2040

gcagaaccac cctttggtga gagctacatc gtggtaggag caggtgaaaa agctttgaaa 2100

ctaagctggt tcaagaaagg aagcagcata gggaaaatgt ttgaagcaac tgcccgagga 2160

gcacgaagga tggccattct gggagacacc gcatgggact tcggttctat aggaggagtg 2220

ttcacgtcta tgggaaaact ggtacaccag gtttttggaa ctgcatatgg agttttgttt 2280

agcggagttt cttggaccat gaaaatagga atagggattc tgctgacatg gctaggatta 2340

aattcaagga acacgtccct ttcgatgatg tgcatcgcag ccggcattgt gacactgtat 2400

ttgggagtca tggtgcaggc cgatagtggt tgcgttgtga gctggaaaaa caaagaactg 2460

aaatgtggca gtgggatttt catcacagac aacgtgcaca catggacaga acaatacaag 2520

ttccaaccag aatccccttc aaaactagct tcagctatcc agaaagccca tgaagaggac 2580

atttgtggaa tccgctcagt aacaagactg gagaatctga tgtggaaaca aataacacca 2640

gaattgaatc acattctatc agaaaatgag gtgaagttaa ctattatgac aggagacatc 2700

aaaggaatca tgcaggcagg aaaacgatct ctgcggcctc agcccactga gctgaagtat 2760

tcatggaaaa catggggcaa agcaaaaatg ctctctacag agtctcataa ccagaccttt 2820

ctcattgatg gccccgaaac agcagaatgc cccaacacaa atagagcttg gaattcgttg 2880

gaagttgaag actatggctt tggagtattc accaccaata tatggctaaa attgaaagaa 2940

aaacaggatg tattctgcga ctcaaaactc atgtcagcgg ccataaaaga caacagagcc 3000

gtccatgccg atatgggtta ttggatagaa agtgcactca atgacacatg gaagatagag 3060

aaagcctctt tcattgaagt taaaaactgc cactggccaa aatcacacac cctctggagc 3120

aatggagtgc tagaaagtga gatgataatt ccaaagaatc tcgctggacc agtgtctcaa 3180

cacaactata gaccaggcta ccatacacaa ataacaggac catggcatct aggtaagctt 3240

gagatggact ttgatttctg tgatggaaca acagtggtag tgactgagga ctgcggaaat 3300

agaggaccct ctttgagaac aaccactgcc tctggaaaac tcataacaga atggtgctgc 3360

cgatcttgca cattaccacc gctaagatac agaggtgagg atgggtgctg gtacgggatg 3420

gaaatcagac cattgaagga gaaagaagag aatttggtca actccttggt cacagctgga 3480

catgggcagg tcgacaactt ttcactagga gtcttgggaa tggcattgtt cctggaggaa 3540

atgcttagga cccgagtagg aacgaaacat gcaatactac tagttgcagt ttcttttgtg 3600

acattgatca cagggaacat gtcctttaga gacctgggaa gagtgatggt tatggtaggc 3660

gccactatga cggatgacat aggtatgggc gtgacttatc ttgccctact agcagccttc 3720

aaagtcagac caacttttgc agctggacta ctcttgagaa agctgacctc caaggaattg 3780

atgatgacta ctataggaat tgtactcctc tcccagagca ccctaccaga gaccattctt 3840

gagttgactg atgcgttagc cttaggcatg atggtcctca aaatggtgag aaatatggaa 3900

aagtatcaat tggcagtgac tatcatggct atcttgtgcg tcccaaacgc agtgatatta 3960

caaaacgcat ggaaagtgag ttgcacaata ttggcagtgg tgtccgtttc cccactgttc 4020

ttaacatcct cacagcaaaa aacagattgg ataccattag cattgacgat caaaggtctc 4080

aatccaacag ctatttttct aacaaccctc tcaagaacca gcaagaaaag gagctggcca 4140

ttaaatgagg ctatcatggc agtcgggatg gtgagcattt tagccagttc tctcctaaaa 4200

aatgatattc ccatgacagg accattagtg gctggagggc tcctcactgt gtgctacgtg 4260

ctcactggac gatcggccga tttggaactg gagagagcag ccgatgtcaa atgggaagac 4320

caggcagaga tatcaggaag cagtccaatc ctgtcaataa caatatcaga agatggtagc 4380

atgtcgataa aaaatgaaga ggaagatcaa acactgacca tactcattag aacaggattg 4440

ctggtgatct caggactttt tcctgtatca ataccaatca cggcagcagc atggtacctg 4500

tgggaagtga agaaacaacg ggccggagta ttgtgggatg ttccttcacc cccacccatg 4560

ggaaaggctg aactggaaga tggagcctat agaattaagc aaaaagggat tcttggatat 4620

tcccagatcg gagccggagt ttacaaagaa ggaacattcc atacaatgtg gcatgtcaca 4680

cgtggcgctg ttctaatgca taaaggaaag aggattgaac catcatgggc ggacgtcaag 4740

aaagacctaa tatcatatgg aggaggctgg aagttagaag gagaatggaa ggaaggagaa 4800

gaagtccagg tattggcact ggagcctgga aaaaatccaa gagccgtcca aacgaaacct 4860

ggtcttttca aaaccaacgc cggaacaata ggtgctgtat ctctggactt ttctcctgga 4920

acgtcaggat ctccaattat cgacaaaaaa ggaaaagttg tgggtcttta tggtaatggt 4980

gttgttacaa ggagtggagc atatgtgagt gctatagccc agactgaaaa aagcattgaa 5040

gacaacccag agatcgaaga tgacattttc cgaaagagaa gactgaccat catggacctc 5100

cacccaggag cgggaaagac gaagagatac cttccggcca tagtcagaga agctataaaa 5160

cggggtttga gaacattaat cttggccccc actagagttg tggcagctga aatggaggaa 5220

gcccttagag gacttccaat aagataccag accccagcca tcagagctgt gcacaccggg 5280

cgggagattg tggacctaat gtgtcatgcc acatttacca tgaggctgct atcaccagtt 5340

agagtgccaa actacaacct gattatcatg gacgaagccc atttcacaga cccagcaagt 5400

atagcagcta gaggatacat ctcaactcga gtggagatgg gtgaggcagc tgggattttt 5460

atgacagcca ctcccccggg aagcagagac ccatttcctc agagcaatgc accaatcata 5520

gatgaagaaa gagaaatccc tgaacgctcg tggaattccg gacatgaatg ggtcacggat 5580

tttaaaggga agactgtttg gttcgttcca agtataaaag caggaaatga tatagcagct 5640

tgcctgagga aaaatggaaa gaaagtgata caactcagta ggaagacctt tgattctgag 5700

tatgtcaaga ctagaaccaa tgattgggac ttcgtggtta caactgacat ttcagaaatg 5760

ggtgccaatt tcaaggctga gagggttata gaccccagac gctgcatgaa accagtcata 5820

ctaacagatg gtgaagagcg ggtgattctg gcaggaccta tgccagtgac ccactctagt 5880

gcagcacaaa gaagagggag aataggaaga aatccaaaaa atgagaatga ccagtacata 5940

tacatggggg aacctctgga aaatgatgaa gactgtgcac actggaaaga agctaaaatg 6000

ctcctagata acatcaacac gccagaagga atcattccta gcatgttcga accagagcgt 6060

gaaaaggtgg atgccattga tggcgaatac cgcttgagag gagaagcaag gaaaaccttt 6120

gtagacttaa tgagaagagg agacctacca gtctggttgg cctacagagt ggcagctgaa 6180

ggcatcaact acgcagacag aaggtggtgt tttgatggag tcaagaacaa ccaaatccta 6240

gaagaaaacg tggaagttga aatctggaca aaagaagggg aaaggaagaa attgaaaccc 6300

agatggttgg atgctaggat ctattctgac ccactggcgc taaaagaatt taaggaattt 6360

gcagccggaa gaaagtctct gaccctgaac ctaatcacag aaatgggtag gctcccaacc 6420

ttcatgactc agaaggcaag agacgcactg gacaacttag cagtgctgca cacggctgag 6480

gcaggtggaa gggcgtacaa ccatgctctc agtgaactgc cggagaccct ggagacattg 6540

cttttactga cacttctggc tacagtcacg ggagggatct ttttattctt gatgagcgca 6600

aggggcatag ggaagatgac cctgggaatg tgctgcataa tcacggctag catcctccta 6660

tggtacgcac aaatacagcc acactggata gcagcttcaa taatactgga gtttttctc 6720

atagttttgc ttattccaga acctgaaaaa cagagaacac cccaagacaa ccaactgacc 6780

tacgttgtca tagccatcct cacagtggtg gccgcaacca tggcaaacga gatgggtttc 6840

ctagaaaaaa cgaagaaaga tctcggattg ggaagcattg caacccagca acccgagagc 6900

aacatcctgg acatagatct acgtcctgca tcagcatgga cgctgtatgc cgtggccaca 6960

acatttgtta caccaatgtt gagacatagc attgaaaatt cctcagtgaa tgtgtcccta 7020

acagctatag ccaaccaagc cacagtgtta atgggtctcg ggaaaggatg gccattgtca 7080

aagatggaca tcggagttcc ccttctcgcc attggatgct actcacaagt caaccccata 7140

actctcacag cagctctttt cttattggta gcacattatg ccatcatagg gccaggactc 7200

caagcaaaag caaccagaga agctcagaaa agagcagcgg cgggcatcat gaaaaaccca 7260

actgtcgatg gaataacagt gattgaccta gatccaatac cttatgatcc gaagtttgaa 7320

aagcagttgg gacaagtaat gctcctagtc ctctgcgtga ctcaagtatt gatgatgagg 7380

actacatggg ctctgtgtga ggctttaacc ttagctaccg ggcccatctc cacattgtgg 7440

gaaggaaatc cagggaggtt ttggaacact accattgcgg tgtcaatggc taacattttt 7500

agagggagtt acttggccgg agctggactt ctcttttcta ttatgaagaa cacaaccaac 7560

acaagaaggg gaactggcaa cataggagag acgcttggag agaaatggaa aagccgattg 7620

aacgcattgg gaaaaagtga attccagatc tacaagaaaa gtggaatcca ggaagtggat 7680

agaaccttag caaaagaagg cattaaaaga ggagaaacgg accatcacgc tgtgtcgcga 7740

ggctcagcaa aactgagatg gttcgttgag agaaacatgg tcacaccaga agggaaagta 7800

gtggacctcg gttgtggcag aggaggctgg tcatactatt gtggaggact aaagaatgta 7860

agagaagtca aaggcctaac aaaaggagga ccaggacacg aagaacccat ccccatgtca 7920

acatatgggt ggaatctagt gcgtcttcaa agtggagttg acgttttctt catcccgcca 7980

gaaaagtgtg acacattatt gtgtgacata ggggagtcat caccaaatcc cacagtggaa 8040

gcaggacgaa cactcagagt ccttaactta gtagaaaatt ggttgaacaa caacactcaa 8100

ttttgcataa aggttctcaa cccatatatg ccctcagtca tagaaaaaat ggaagcacta 8160

caaaggaaat atggaggagc cttagtgagg aatccactct cacgaaactc cacacatgag 8220

atgtactggg tatccaatgc ttccgggaac atagtgtcat cagtgaacat gatttcaagg 8280

atgttgatca acagatttac aatgagatac aagaaagcca cttacgagcc ggatgttgac 8340

ctcggaagcg gaacccgtaa catcgggatt gaaagtgaga taccaaacct agatataatt 8400

gggaaaagaa tagaaaaaat aaagcaagag catgaaacat catggcacta tgaccaagac 8460

cacccataca aaacgtgggc ataccatggt agctatgaaa caaaacagac tggatcagca 8520

tcatccatgg tcaacggagt ggtcaggctg ctgacaaaac cttgggacgt cgtccccatg 8580

gtgacacaga tggcaatgac agacacgact ccatttggac aacagcgcgt ttttaaagag 8640

aaagtggaca cgagaaccca agaaccgaaa gaaggcacga agaaactaat gaaaataaca 8700

gcagagtggc tttggaaaga attagggaag aaaaagacac ccaggatgtg caccagagaa 8760

gaattcacaa gaaaggtgag aagcaatgca gccttggggg ccatattcac tgatgagaac 8820

aagtggaagt cggcacgtga ggctgttgaa gatagtaggt tttgggagct ggttgacaag 8880

gaaaggaatc tccatcttga aggaaagtgt gaaacatgtg tgtacaacat gatgggaaaa 8940

agagagaaga agctagggga attcggcaag gcaaaaggca gcagagccat atggtacatg 9000

tggcttggag cacgcttctt agagtttgaa gccctaggat tcttaaatga agatcactgg 9060

ttctccagag agaactccct gagtggagtg gaaggagaag ggctgcacaa gctaggttac 9120

attctaagag acgtgagcaa gaaagaggga ggagcaatgt atgccgatga caccgcagga 9180

tgggatacaa gaatcacact agaagaccta aaaaatgaag aaatggtaac aaaccacatg 9240

gaaggagaac acaagaaact agccgaggcc attttcaaac taacgtacca aaacaaggtg 9300

gtgcgtgtgc aaagaccaac accaagaggc acagtaatgg acatcatatc gagaagagac 9360

caaagaggta gtggacaagt tggcacctat ggactcaata ctttcaccaa tatggaagcc 9420

caactaatca gacagatgga gggagaagga gtctttaaaa gcattcagca cctaacaatc 9480

acagaagaaa tcgctgtgca aaactggtta gcaagagtgg ggcgcgaaag gttatcaaga 9540

atggccatca gtggagatga ttgtgttgtg aaacctttag atgacaggtt cgcaagcgct 9600

ttaacagctc taaatgacat gggaaagatt aggaaagaca tacaacaatg ggaaccttca 9660

agaggatgga atgattggac acaagtgccc ttctgttcac accatttcca tgagttaatc 9720

atgaaagacg gtcgcgtact cgttgttcca tgtagaaacc aagatgaact gattggcaga 9780

gcccgaatct cccaaggagc agggtggtct ttgcgggaga cggcctgttt ggggaagtct 9840

tacgcccaaa tgtggagctt gatgtacttc cacagacgcg acctcaggct ggcggcaaat 9900

gctatttgct cggcagtacc atcacattgg gttccaacaa gtcgaacaac ctggtccata 9960

catgctaaac atgaatggat gacaacggaa gacatgctga cagtctggaa cagggtgtgg 10020

attcaagaaa acccatggat ggaagacaaa actccagtgg aatcatggga ggaaatccca 10080

tacttgggga aaagagaaga ccaatggtgc ggctcattga ttgggttaac aagcagggcc 10140

acctgggcaa agaacatcca agcagcaata aatcaagtta gatcccttat aggcaatgaa 10200

gaatacacag attacatgcc atccatgaaa agattcagaa gagaagagga agaagcagga 10260

gttctgtggt agaaagcaaa actaacatga aacaaggcta gaagtcaggt cggattaagc 10320

catagtacgg aaaaaactat gctacctgtg agccccgtcc aaggacgtta aaagaagtca 10380

ggccatcata aatgccatag cttgagtaaa ctatgcagcc tgtagctcca cctgagaagg 10440

tgtaaaaaat ccgggaggcc acaaaccatg gaagctgtac gcatggcgta gtggactagc 10500

ggttagagga gacccctccc ttacaaatcg cagcaacaat gggggcccaa ggcgagatga 10560

agctgtagtc tcgctggaag gactagaggt tagaggagac ccccccgaaa caaaaaacag 10620

catattgacg ctgggaaaga ccagagatcc tgctgtctcc tcagcatcat tccaggcaca 10680

gaacgccaga aaatggaatg gtgctgttga atcaacaggt tct 10723

<210> 2
<211> 3391
<212> PRT
<213> chimeric dengue serotype 2/1 (MVS)

<400> 2

Met Asn Asn Gln Arg Lys Lys Ala Lys Asn Thr Pro Phe Asn Met Leu
1 5 10 15

Lys Arg Glu Arg Asn Arg Val Ser Thr Val Gln Gln Leu Thr Lys Arg
20 25 30

Phe Ser Leu Gly Met Leu Gln Gly Arg Gly Pro Leu Lys Leu Phe Met
35 40 45

```
Ala Leu Val Ala Phe Leu Arg Phe Leu Thr Ile Pro Pro Thr Ala Gly
    50                  55                  60

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

Leu Arg Gly Phe Arg Lys Glu Ile Gly Arg Met Leu Asn Ile Leu Asn
                85                  90                  95

Arg Arg Arg Arg Ser Ala Gly Met Ile Ile Met Leu Ile Pro Thr Val
            100                 105                 110

Met Ala Phe His Leu Thr Thr Arg Gly Gly Glu Pro His Met Ile Val
        115                 120                 125

Ser Lys Gln Glu Arg Gly Lys Ser Leu Leu Phe Lys Thr Ser Ala Gly
    130                 135                 140

Val Asn Met Cys Thr Leu Ile Ala Met Asp Leu Gly Glu Leu Cys Glu
145                 150                 155                 160

Asp Thr Met Thr Tyr Lys Cys Pro Arg Ile Thr Glu Ala Glu Pro Asp
                165                 170                 175

Asp Val Asp Cys Trp Cys Asn Ala Thr Asp Thr Trp Val Thr Tyr Gly
            180                 185                 190

Thr Cys Ser Gln Thr Gly Glu His Arg Arg Asp Lys Arg Ser Val Ala
        195                 200                 205

Leu Ala Pro His Val Gly Leu Gly Leu Glu Thr Arg Ala Glu Thr Trp
    210                 215                 220

Met Ser Ser Glu Gly Ala Trp Lys Gln Ile Gln Lys Val Glu Thr Trp
225                 230                 235                 240

Ala Leu Arg His Pro Gly Phe Thr Val Ile Ala Leu Phe Leu Ala His
                245                 250                 255

Ala Ile Gly Thr Ser Ile Thr Gln Lys Gly Ile Ile Phe Ile Leu Leu
            260                 265                 270
```

```
Met Leu Val Thr Pro Ser Met Ala Met Arg Cys Val Gly Ile Gly Asn
        275                 280                 285

Arg Asp Phe Val Glu Gly Leu Ser Gly Ala Thr Trp Val Asp Val Val
    290                 295                 300

Leu Glu His Gly Ser Cys Val Thr Thr Met Ala Lys Asn Lys Pro Thr
305                 310                 315                 320

Leu Asp Ile Glu Leu Leu Lys Thr Glu Val Thr Asn Pro Ala Val Leu
                325                 330                 335

Arg Lys Leu Cys Ile Glu Ala Lys Ile Ser Asn Thr Thr Thr Asp Ser
            340                 345                 350

Arg Cys Pro Thr Gln Gly Glu Ala Thr Leu Val Glu Glu Gln Asp Ala
        355                 360                 365

Asn Phe Val Cys Arg Arg Thr Phe Val Asp Arg Gly Trp Gly Asn Gly
    370                 375                 380

Cys Gly Leu Phe Gly Lys Gly Ser Leu Ile Thr Cys Ala Lys Phe Lys
385                 390                 395                 400

Cys Val Thr Lys Leu Glu Gly Lys Ile Val Gln Tyr Glu Asn Leu Lys
                405                 410                 415

Tyr Ser Val Ile Val Thr Val His Thr Gly Asp Gln His Gln Val Gly
            420                 425                 430

Asn Glu Thr Thr Glu His Gly Thr Thr Ala Thr Ile Thr Pro Gln Ala
        435                 440                 445

Pro Thr Ser Glu Ile Gln Leu Thr Asp Tyr Gly Thr Leu Thr Leu Asp
    450                 455                 460

Cys Ser Pro Arg Thr Gly Leu Asp Phe Asn Glu Met Val Leu Leu Thr
465                 470                 475                 480
```

```
Met Lys Glu Arg Ser Trp Leu Val His Lys Gln Trp Phe Leu Asp Leu
                485                 490                 495

Pro Leu Pro Trp Thr Ser Gly Ala Ser Thr Ser Gln Glu Thr Trp Asn
            500                 505                 510

Arg Gln Asp Leu Leu Val Thr Phe Lys Thr Ala His Ala Lys Lys Gln
        515                 520                 525

Glu Val Val Val Leu Gly Ser Gln Glu Gly Ala Met His Thr Ala Leu
    530                 535                 540

Thr Gly Ala Thr Glu Ile Gln Thr Ser Gly Thr Thr Thr Ile Phe Ala
545                 550                 555                 560

Gly His Leu Lys Cys Arg Leu Lys Met Asp Lys Leu Thr Leu Lys Gly
                565                 570                 575

Met Ser Tyr Val Met Cys Thr Gly Ser Phe Lys Leu Glu Lys Glu Val
            580                 585                 590

Ala Glu Thr Gln His Gly Thr Val Leu Val Gln Val Lys Tyr Glu Gly
        595                 600                 605

Thr Asp Ala Pro Cys Lys Ile Pro Phe Ser Thr Gln Asp Glu Lys Gly
    610                 615                 620

Ala Thr Gln Asn Gly Arg Leu Ile Thr Ala Asn Pro Ile Val Thr Asp
625                 630                 635                 640

Lys Glu Lys Pro Val Asn Ile Glu Ala Glu Pro Pro Phe Gly Glu Ser
                645                 650                 655

Tyr Ile Val Val Gly Ala Gly Glu Lys Ala Leu Lys Leu Ser Trp Phe
            660                 665                 670

Lys Lys Gly Ser Ser Ile Gly Lys Met Phe Glu Ala Thr Ala Arg Gly
        675                 680                 685

Ala Arg Arg Met Ala Ile Leu Gly Asp Thr Ala Trp Asp Phe Gly Ser
    690                 695                 700
```

```
Ile Gly Gly Val Phe Thr Ser Met Gly Lys Leu Val His Gln Val Phe
705                 710                 715                 720

Gly Thr Ala Tyr Gly Val Leu Phe Ser Gly Val Ser Trp Thr Met Lys
                725                 730                 735

Ile Gly Ile Gly Ile Leu Leu Thr Trp Leu Gly Leu Asn Ser Arg Asn
            740                 745                 750

Thr Ser Leu Ser Met Met Cys Ile Ala Ala Gly Ile Val Thr Leu Tyr
        755                 760                 765

Leu Gly Val Met Val Gln Ala Asp Ser Gly Cys Val Val Ser Trp Lys
    770                 775                 780

Asn Lys Glu Leu Lys Cys Gly Ser Gly Ile Phe Ile Thr Asp Asn Val
785                 790                 795                 800

His Thr Trp Thr Glu Gln Tyr Lys Phe Gln Pro Glu Ser Pro Ser Lys
                805                 810                 815

Leu Ala Ser Ala Ile Gln Lys Ala His Glu Glu Asp Ile Cys Gly Ile
            820                 825                 830

Arg Ser Val Thr Arg Leu Glu Asn Leu Met Trp Lys Gln Ile Thr Pro
        835                 840                 845

Glu Leu Asn His Ile Leu Ser Glu Asn Glu Val Lys Leu Thr Ile Met
    850                 855                 860

Thr Gly Asp Ile Lys Gly Ile Met Gln Ala Gly Lys Arg Ser Leu Arg
865                 870                 875                 880

Pro Gln Pro Thr Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala
                885                 890                 895

Lys Met Leu Ser Thr Glu Ser His Asn Gln Thr Phe Leu Ile Asp Gly
            900                 905                 910
```

```
Pro Glu Thr Ala Glu Cys Pro Asn Thr Asn Arg Ala Trp Asn Ser Leu
        915                 920                 925

Glu Val Glu Asp Tyr Gly Phe Gly Val Phe Thr Thr Asn Ile Trp Leu
    930                 935                 940

Lys Leu Lys Glu Lys Gln Asp Val Phe Cys Asp Ser Lys Leu Met Ser
945                 950                 955                 960

Ala Ala Ile Lys Asp Asn Arg Ala Val His Ala Asp Met Gly Tyr Trp
                965                 970                 975

Ile Glu Ser Ala Leu Asn Asp Thr Trp Lys Ile Glu Lys Ala Ser Phe
            980                 985                 990

Ile Glu Val Lys Asn Cys His Trp  Pro Lys Ser His Thr  Leu Trp Ser
        995                 1000                1005

Asn Gly  Val Leu Glu Ser Glu  Met Ile Ile Pro Lys  Asn Leu Ala
    1010                1015                1020

Gly Pro  Val Ser Gln His Asn  Tyr Arg Pro Gly Tyr  His Thr Gln
    1025                1030                1035

Ile Thr  Gly Pro Trp His Leu  Gly Lys Leu Glu Met  Asp Phe Asp
    1040                1045                1050

Phe Cys  Asp Gly Thr Thr Val  Val Val Thr Glu Asp  Cys Gly Asn
    1055                1060                1065

Arg Gly  Pro Ser Leu Arg Thr  Thr Thr Ala Ser Gly  Lys Leu Ile
    1070                1075                1080

Thr Glu  Trp Cys Cys Arg Ser  Cys Thr Leu Pro Pro  Leu Arg Tyr
    1085                1090                1095

Arg Gly  Glu Asp Gly Cys Trp  Tyr Gly Met Glu Ile  Arg Pro Leu
    1100                1105                1110

Lys Glu  Lys Glu Glu Asn Leu  Val Asn Ser Leu Val  Thr Ala Gly
    1115                1120                1125
```

```
His Gly  Gln Val Asp Asn Phe  Ser Leu Gly Val Leu  Gly Met Ala
    1130                1135                1140

Leu Phe  Leu Glu Glu Met Leu  Arg Thr Arg Val Gly  Thr Lys His
    1145                1150                1155

Ala Ile  Leu Leu Val Ala Val  Ser Phe Val Thr Leu  Ile Thr Gly
    1160                1165                1170

Asn Met  Ser Phe Arg Asp Leu  Gly Arg Val Met Val  Met Val Gly
    1175                1180                1185

Ala Thr  Met Thr Asp Asp Ile  Gly Met Gly Val Thr  Tyr Leu Ala
    1190                1195                1200

Leu Leu  Ala Ala Phe Lys Val  Arg Pro Thr Phe Ala  Ala Gly Leu
    1205                1210                1215

Leu Leu  Arg Lys Leu Thr Ser  Lys Glu Leu Met Met  Thr Thr Ile
    1220                1225                1230

Gly Ile  Val Leu Leu Ser Gln  Ser Thr Leu Pro Glu  Thr Ile Leu
    1235                1240                1245

Glu Leu  Thr Asp Ala Leu Ala  Leu Gly Met Met Val  Leu Lys Met
    1250                1255                1260

Val Arg  Asn Met Glu Lys Tyr  Gln Leu Ala Val Thr  Ile Met Ala
    1265                1270                1275

Ile Leu  Cys Val Pro Asn Ala  Val Ile Leu Gln Asn  Ala Trp Lys
    1280                1285                1290

Val Ser  Cys Thr Ile Leu Ala  Val Val Ser Val Ser  Pro Leu Phe
    1295                1300                1305

Leu Thr  Ser Ser Gln Gln Lys  Thr Asp Trp Ile Pro  Leu Ala Leu
    1310                1315                1320
```

```
Thr Ile  Lys Gly Leu Asn Pro  Thr Ala Ile Phe Leu  Thr Thr Leu
    1325                1330                1335

Ser Arg  Thr Ser Lys Lys Arg  Ser Trp Pro Leu Asn  Glu Ala Ile
    1340                1345                1350

Met Ala  Val Gly Met Val Ser  Ile Leu Ala Ser Ser  Leu Leu Lys
    1355                1360                1365

Asn Asp  Ile Pro Met Thr Gly  Pro Leu Val Ala Gly  Gly Leu Leu
    1370                1375                1380

Thr Val  Cys Tyr Val Leu Thr  Gly Arg Ser Ala Asp  Leu Glu Leu
    1385                1390                1395

Glu Arg  Ala Ala Asp Val Lys  Trp Glu Asp Gln Ala  Glu Ile Ser
    1400                1405                1410

Gly Ser  Ser Pro Ile Leu Ser  Ile Thr Ile Ser Glu  Asp Gly Ser
    1415                1420                1425

Met Ser  Ile Lys Asn Glu Glu  Glu Asp Gln Thr Leu  Thr Ile Leu
    1430                1435                1440

Ile Arg  Thr Gly Leu Leu Val  Ile Ser Gly Leu Phe  Pro Val Ser
    1445                1450                1455

Ile Pro  Ile Thr Ala Ala Ala  Trp Tyr Leu Trp Glu  Val Lys Lys
    1460                1465                1470

Gln Arg  Ala Gly Val Leu Trp  Asp Val Pro Ser Pro  Pro Pro Met
    1475                1480                1485

Gly Lys  Ala Glu Leu Glu Asp  Gly Ala Tyr Arg Ile  Lys Gln Lys
    1490                1495                1500

Gly Ile  Leu Gly Tyr Ser Gln  Ile Gly Ala Gly Val  Tyr Lys Glu
    1505                1510                1515

Gly Thr  Phe His Thr Met Trp  His Val Thr Arg Gly  Ala Val Leu
    1520                1525                1530
```

```
Met His  Lys Gly Lys Arg Ile  Glu Pro Ser Trp Ala  Asp Val Lys
    1535                1540                1545

Lys Asp  Leu Ile Ser Tyr Gly  Gly Gly Trp Lys Leu  Glu Gly Glu
    1550                1555                1560

Trp Lys  Glu Gly Glu Glu Val  Gln Val Leu Ala Leu  Glu Pro Gly
    1565                1570                1575

Lys Asn  Pro Arg Ala Val Gln  Thr Lys Pro Gly Leu  Phe Lys Thr
    1580                1585                1590

Asn Ala  Gly Thr Ile Gly Ala  Val Ser Leu Asp Phe  Ser Pro Gly
    1595                1600                1605

Thr Ser  Gly Ser Pro Ile Ile  Asp Lys Lys Gly Lys  Val Val Gly
    1610                1615                1620

Leu Tyr  Gly Asn Gly Val Val  Thr Arg Ser Gly Ala  Tyr Val Ser
    1625                1630                1635

Ala Ile  Ala Gln Thr Glu Lys  Ser Ile Glu Asp Asn  Pro Glu Ile
    1640                1645                1650

Glu Asp  Asp Ile Phe Arg Lys  Arg Arg Leu Thr Ile  Met Asp Leu
    1655                1660                1665

His Pro  Gly Ala Gly Lys Thr  Lys Arg Tyr Leu Pro  Ala Ile Val
    1670                1675                1680

Arg Glu  Ala Ile Lys Arg Gly  Leu Arg Thr Leu Ile  Leu Ala Pro
    1685                1690                1695

Thr Arg  Val Val Ala Ala Glu  Met Glu Glu Ala Leu  Arg Gly Leu
    1700                1705                1710

Pro Ile  Arg Tyr Gln Thr Pro  Ala Ile Arg Ala Val  His Thr Gly
    1715                1720                1725
```

```
Arg Glu  Ile Val Asp Leu Met  Cys His Ala Thr Phe  Thr Met Arg
    1730                1735                1740

Leu Leu  Ser Pro Val Arg Val  Pro Asn Tyr Asn Leu  Ile Ile Met
    1745                1750                1755

Asp Glu  Ala His Phe Thr Asp  Pro Ala Ser Ile Ala  Ala Arg Gly
    1760                1765                1770

Tyr Ile  Ser Thr Arg Val Glu  Met Gly Glu Ala Ala  Gly Ile Phe
    1775                1780                1785

Met Thr  Ala Thr Pro Pro Gly  Ser Arg Asp Pro Phe  Pro Gln Ser
    1790                1795                1800

Asn Ala  Pro Ile Ile Asp Glu  Glu Arg Glu Ile Pro  Glu Arg Ser
    1805                1810                1815

Trp Asn  Ser Gly His Glu Trp  Val Thr Asp Phe Lys  Gly Lys Thr
    1820                1825                1830

Val Trp  Phe Val Pro Ser Ile  Lys Ala Gly Asn Asp  Ile Ala Ala
    1835                1840                1845

Cys Leu  Arg Lys Asn Gly Lys  Lys Val Ile Gln Leu  Ser Arg Lys
    1850                1855                1860

Thr Phe  Asp Ser Glu Tyr Val  Lys Thr Arg Thr Asn  Asp Trp Asp
    1865                1870                1875

Phe Val  Val Thr Thr Asp Ile  Ser Glu Met Gly Ala  Asn Phe Lys
    1880                1885                1890

Ala Glu  Arg Val Ile Asp Pro  Arg Arg Cys Met Lys  Pro Val Ile
    1895                1900                1905

Leu Thr  Asp Gly Glu Glu Arg  Val Ile Leu Ala Gly  Pro Met Pro
    1910                1915                1920

Val Thr  His Ser Ser Ala Ala  Gln Arg Arg Gly Arg  Ile Gly Arg
    1925                1930                1935
```

```
Asn Pro  Lys Asn Glu Asn Asp  Gln Tyr Ile Tyr Met  Gly Glu Pro
    1940                1945                1950

Leu Glu  Asn Asp Glu Asp Cys  Ala His Trp Lys Glu  Ala Lys Met
    1955                1960                1965

Leu Leu  Asp Asn Ile Asn Thr  Pro Glu Gly Ile Ile  Pro Ser Met
    1970                1975                1980

Phe Glu  Pro Glu Arg Glu Lys  Val Asp Ala Ile Asp  Gly Glu Tyr
    1985                1990                1995

Arg Leu  Arg Gly Glu Ala Arg  Lys Thr Phe Val Asp  Leu Met Arg
    2000                2005                2010

Arg Gly  Asp Leu Pro Val Trp  Leu Ala Tyr Arg Val  Ala Ala Glu
    2015                2020                2025

Gly Ile  Asn Tyr Ala Asp Arg  Arg Trp Cys Phe Asp  Gly Val Lys
    2030                2035                2040

Asn Asn  Gln Ile Leu Glu Glu  Asn Val Glu Val Glu  Ile Trp Thr
    2045                2050                2055

Lys Glu  Gly Glu Arg Lys Lys  Leu Lys Pro Arg Trp  Leu Asp Ala
    2060                2065                2070

Arg Ile  Tyr Ser Asp Pro Leu  Ala Leu Lys Glu Phe  Lys Glu Phe
    2075                2080                2085

Ala Ala  Gly Arg Lys Ser Leu  Thr Leu Asn Leu Ile  Thr Glu Met
    2090                2095                2100

Gly Arg  Leu Pro Thr Phe Met  Thr Gln Lys Ala Arg  Asp Ala Leu
    2105                2110                2115

Asp Asn  Leu Ala Val Leu His  Thr Ala Glu Ala Gly  Gly Arg Ala
    2120                2125                2130
```

```
Tyr Asn  His Ala Leu Ser Glu  Leu Pro Glu Thr Leu  Glu Thr Leu
    2135                2140                2145

Leu Leu  Leu Thr Leu Leu Ala  Thr Val Thr Gly Gly  Ile Phe Leu
    2150                2155                2160

Phe Leu  Met Ser Ala Arg Gly  Ile Gly Lys Met Thr  Leu Gly Met
    2165                2170                2175

Cys Cys  Ile Ile Thr Ala Ser  Ile Leu Leu Trp Tyr  Ala Gln Ile
    2180                2185                2190

Gln Pro  His Trp Ile Ala Ala  Ser Ile Ile Leu Glu  Phe Phe Leu
    2195                2200                2205

Ile Val  Leu Leu Ile Pro Glu  Pro Glu Lys Gln Arg  Thr Pro Gln
    2210                2215                2220

Asp Asn  Gln Leu Thr Tyr Val  Val Ile Ala Ile Leu  Thr Val Val
    2225                2230                2235

Ala Ala  Thr Met Ala Asn Glu  Met Gly Phe Leu Glu  Lys Thr Lys
    2240                2245                2250

Lys Asp  Leu Gly Leu Gly Ser  Ile Ala Thr Gln Gln  Pro Glu Ser
    2255                2260                2265

Asn Ile  Leu Asp Ile Asp Leu  Arg Pro Ala Ser Ala  Trp Thr Leu
    2270                2275                2280

Tyr Ala  Val Ala Thr Thr Phe  Val Thr Pro Met Leu  Arg His Ser
    2285                2290                2295

Ile Glu  Asn Ser Ser Val Asn  Val Ser Leu Thr Ala  Ile Ala Asn
    2300                2305                2310

Gln Ala  Thr Val Leu Met Gly  Leu Gly Lys Gly Trp  Pro Leu Ser
    2315                2320                2325

Lys Met  Asp Ile Gly Val Pro  Leu Leu Ala Ile Gly  Cys Tyr Ser
    2330                2335                2340
```

```
Gln Val  Asn Pro Ile Thr Leu  Thr Ala Ala Leu Phe  Leu Leu Val
    2345                2350                2355

Ala His  Tyr Ala Ile Ile Gly  Pro Gly Leu Gln Ala  Lys Ala Thr
    2360                2365                2370

Arg Glu  Ala Gln Lys Arg Ala  Ala Ala Gly Ile Met  Lys Asn Pro
    2375                2380                2385

Thr Val  Asp Gly Ile Thr Val  Ile Asp Leu Asp Pro  Ile Pro Tyr
    2390                2395                2400

Asp Pro  Lys Phe Glu Lys Gln  Leu Gly Gln Val Met  Leu Leu Val
    2405                2410                2415

Leu Cys  Val Thr Gln Val Leu  Met Met Arg Thr Thr  Trp Ala Leu
    2420                2425                2430

Cys Glu  Ala Leu Thr Leu Ala  Thr Gly Pro Ile Ser  Thr Leu Trp
    2435                2440                2445

Glu Gly  Asn Pro Gly Arg Phe  Trp Asn Thr Thr Ile  Ala Val Ser
    2450                2455                2460

Met Ala  Asn Ile Phe Arg Gly  Ser Tyr Leu Ala Gly  Ala Gly Leu
    2465                2470                2475

Leu Phe  Ser Ile Met Lys Asn  Thr Thr Asn Thr Arg  Arg Gly Thr
    2480                2485                2490

Gly Asn  Ile Gly Glu Thr Leu  Gly Glu Lys Trp Lys  Ser Arg Leu
    2495                2500                2505

Asn Ala  Leu Gly Lys Ser Glu  Phe Gln Ile Tyr Lys  Lys Ser Gly
    2510                2515                2520

Ile Gln  Glu Val Asp Arg Thr  Leu Ala Lys Glu Gly  Ile Lys Arg
    2525                2530                2535
```

```
Gly Glu  Thr Asp His His Ala  Val Ser Arg Gly Ser  Ala Lys Leu
    2540                2545                2550

Arg Trp  Phe Val Glu Arg Asn  Met Val Thr Pro Glu  Gly Lys Val
    2555                2560                2565

Val Asp  Leu Gly Cys Gly Arg  Gly Gly Trp Ser Tyr  Tyr Cys Gly
    2570                2575                2580

Gly Leu  Lys Asn Val Arg Glu  Val Lys Gly Leu Thr  Lys Gly Gly
    2585                2590                2595

Pro Gly  His Glu Glu Pro Ile  Pro Met Ser Thr Tyr  Gly Trp Asn
    2600                2605                2610

Leu Val  Arg Leu Gln Ser Gly  Val Asp Val Phe Phe  Ile Pro Pro
    2615                2620                2625

Glu Lys  Cys Asp Thr Leu Leu  Cys Asp Ile Gly Glu  Ser Ser Pro
    2630                2635                2640

Asn Pro  Thr Val Glu Ala Gly  Arg Thr Leu Arg Val  Leu Asn Leu
    2645                2650                2655

Val Glu  Asn Trp Leu Asn Asn  Asn Thr Gln Phe Cys  Ile Lys Val
    2660                2665                2670

Leu Asn  Pro Tyr Met Pro Ser  Val Ile Glu Lys Met  Glu Ala Leu
    2675                2680                2685

Gln Arg  Lys Tyr Gly Gly Ala  Leu Val Arg Asn Pro  Leu Ser Arg
    2690                2695                2700

Asn Ser  Thr His Glu Met Tyr  Trp Val Ser Asn Ala  Ser Gly Asn
    2705                2710                2715

Ile Val  Ser Ser Val Asn Met  Ile Ser Arg Met Leu  Ile Asn Arg
    2720                2725                2730

Phe Thr  Met Arg Tyr Lys Lys  Ala Thr Tyr Glu Pro  Asp Val Asp
    2735                2740                2745
```

```
Leu Gly  Ser Gly Thr Arg Asn  Ile Gly Ile Glu Ser  Glu Ile Pro
    2750                2755                2760

Asn Leu  Asp Ile Ile Gly Lys  Arg Ile Glu Lys Ile  Lys Gln Glu
    2765                2770                2775

His Glu  Thr Ser Trp His Tyr  Asp Gln Asp His Pro  Tyr Lys Thr
    2780                2785                2790

Trp Ala  Tyr His Gly Ser Tyr  Glu Thr Lys Gln Thr  Gly Ser Ala
    2795                2800                2805

Ser Ser  Met Val Asn Gly Val  Val Arg Leu Leu Thr  Lys Pro Trp
    2810                2815                2820

Asp Val  Val Pro Met Val Thr  Gln Met Ala Met Thr  Asp Thr Thr
    2825                2830                2835

Pro Phe  Gly Gln Gln Arg Val  Phe Lys Glu Lys Val  Asp Thr Arg
    2840                2845                2850

Thr Gln  Glu Pro Lys Glu Gly  Thr Lys Lys Leu Met  Lys Ile Thr
    2855                2860                2865

Ala Glu  Trp Leu Trp Lys Glu  Leu Gly Lys Lys Lys  Thr Pro Arg
    2870                2875                2880

Met Cys  Thr Arg Glu Glu Phe  Thr Arg Lys Val Arg  Ser Asn Ala
    2885                2890                2895

Ala Leu  Gly Ala Ile Phe Thr  Asp Glu Asn Lys Trp  Lys Ser Ala
    2900                2905                2910

Arg Glu  Ala Val Glu Asp Ser  Arg Phe Trp Glu Leu  Val Asp Lys
    2915                2920                2925

Glu Arg  Asn Leu His Leu Glu  Gly Lys Cys Glu Thr  Cys Val Tyr
    2930                2935                2940
```

```
Asn Met  Met Gly Lys Arg Glu  Lys Lys Leu Gly Glu  Phe Gly Lys
    2945                2950                2955

Ala Lys  Gly Ser Arg Ala Ile  Trp Tyr Met Trp Leu  Gly Ala Arg
    2960                2965                2970

Phe Leu  Glu Phe Glu Ala Leu  Gly Phe Leu Asn Glu  Asp His Trp
    2975                2980                2985

Phe Ser  Arg Glu Asn Ser Leu  Ser Gly Val Glu Gly  Glu Gly Leu
    2990                2995                3000

His Lys  Leu Gly Tyr Ile Leu  Arg Asp Val Ser Lys  Lys Glu Gly
    3005                3010                3015

Gly Ala  Met Tyr Ala Asp Asp  Thr Ala Gly Trp Asp  Thr Arg Ile
    3020                3025                3030

Thr Leu  Glu Asp Leu Lys Asn  Glu Glu Met Val Thr  Asn His Met
    3035                3040                3045

Glu Gly  Glu His Lys Lys Leu  Ala Glu Ala Ile Phe  Lys Leu Thr
    3050                3055                3060

Tyr Gln  Asn Lys Val Val Arg  Val Gln Arg Pro Thr  Pro Arg Gly
    3065                3070                3075

Thr Val  Met Asp Ile Ile Ser  Arg Arg Asp Gln Arg  Gly Ser Gly
    3080                3085                3090

Gln Val  Gly Thr Tyr Gly Leu  Asn Thr Phe Thr Asn  Met Glu Ala
    3095                3100                3105

Gln Leu  Ile Arg Gln Met Glu  Gly Glu Gly Val Phe  Lys Ser Ile
    3110                3115                3120

Gln His  Leu Thr Ile Thr Glu  Glu Ile Ala Val Gln  Asn Trp Leu
    3125                3130                3135

Ala Arg  Val Gly Arg Glu Arg  Leu Ser Arg Met Ala  Ile Ser Gly
    3140                3145                3150
```

```
Asp Asp  Cys Val Val Lys Pro  Leu Asp Asp Arg Phe  Ala Ser Ala
    3155                 3160                 3165

Leu Thr  Ala Leu Asn Asp Met  Gly Lys Ile Arg Lys  Asp Ile Gln
    3170                 3175                 3180

Gln Trp  Glu Pro Ser Arg Gly  Trp Asn Asp Trp Thr  Gln Val Pro
    3185                 3190                 3195

Phe Cys  Ser His His Phe His  Glu Leu Ile Met Lys  Asp Gly Arg
    3200                 3205                 3210

Val Leu  Val Val Pro Cys Arg  Asn Gln Asp Glu Leu  Ile Gly Arg
    3215                 3220                 3225

Ala Arg  Ile Ser Gln Gly Ala  Gly Trp Ser Leu Arg  Glu Thr Ala
    3230                 3235                 3240

Cys Leu  Gly Lys Ser Tyr Ala  Gln Met Trp Ser Leu  Met Tyr Phe
    3245                 3250                 3255

His Arg  Arg Asp Leu Arg Leu  Ala Ala Asn Ala Ile  Cys Ser Ala
    3260                 3265                 3270

Val Pro  Ser His Trp Val Pro  Thr Ser Arg Thr Thr  Trp Ser Ile
    3275                 3280                 3285

His Ala  Lys His Glu Trp Met  Thr Thr Glu Asp Met  Leu Thr Val
    3290                 3295                 3300

Trp Asn  Arg Val Trp Ile Gln  Glu Asn Pro Trp Met  Glu Asp Lys
    3305                 3310                 3315

Thr Pro  Val Glu Ser Trp Glu  Glu Ile Pro Tyr Leu  Gly Lys Arg
    3320                 3325                 3330

Glu Asp  Gln Trp Cys Gly Ser  Leu Ile Gly Leu Thr  Ser Arg Ala
    3335                 3340                 3345
```

```
Thr Trp  Ala Lys Asn Ile Gln  Ala Ala Ile Asn Gln  Val Arg Ser
    3350                 3355                 3360

Leu Ile  Gly Asn Glu Glu Tyr  Thr Asp Tyr Met Pro  Ser Met Lys
    3365                 3370                 3375

Arg Phe  Arg Arg Glu Glu Glu  Glu Ala Gly Val Leu  Trp
    3380                 3385                 3390
```

<210> 3
<211> 10723
<212> DNA
<213> dengue serotype 2 (MVS)

<400> 3

```
agttgttagt ctacgtggac cgacaaagac agattctttg agggagctaa gctcaatgta       60

gttctaacag ttttttaatt agagagcaga tctctgatga ataaccaacg gaaaaaggcg      120

aaaaacacgc ctttcaatat gctgaaacgc gagagaaacc gcgtgtcgac tgtgcaacag      180

ctgacaaaga gattctcact tggaatgctg cagggacgag gaccattaaa actgttcatg      240

gccctggtgg cgttccttcg tttcctaaca atcccaccaa cagcagggat attgaagaga      300

tggggaacaa ttaaaaaatc aaaagctatt aatgttttga gagggttcag gaaagagatt      360

ggaaggatgc tgaacatctt gaataggaga cgcagatctg caggcatgat cattatgctg      420

attccaacag tgatggcgtt ccatttaacc acacgtaacg gagaaccaca catgatcgtc      480

agcagacaag agaaagggaa aagtcttctg tttaaaacag aggttggcgt gaacatgtgt      540

accctcatgg ccatggacct tggtgaattg tgtgaagaca caatcacgta cgagtgtccc      600

cttctcaggc agaatgagcc agaagacata gactgttggt gcaactctac gtccacgtgg      660

gtaacttatg ggacgtgtac caccatggga gaacatagaa gagaaaaaag atcagtggca      720

ctcgttccac atgtgggaat gggactggag acacgaactg aaacatggat gtcatcagaa      780

ggggcctgga aacatgtcca gagaattgaa acttggatct tgagacatcc aggcttcacc      840

atgatggcag caatcctggc atacaccata ggaacgacac atttccaaag agccctgatc      900

ttcatcttac tgacagctgt cactccttca atgacaatgc gttgcatagg aatgtcaaat      960

agagactttg tggaaggggt ttcaggagga agctgggttg acatagtctt agaacatgga     1020

agctgtgtga cgacgatggc aaaaaacaaa ccaacattgg attttgaact gataaaaaca     1080
```

gaagccaaac agcctgccac cctaaggaag tactgtatag aggcaaagct aaccaacaca 1140

acaacagaat ctcgctgccc aacacaaggg gaacccagcc taaatgaaga gcaggacaaa 1200

aggttcgtct gcaaacactc catggtagac agaggatggg gaaatggatg tggactattt 1260

ggaaagggag gcattgtgac ctgtgctatg ttcagatgca aaaagaacat ggaaggaaaa 1320

gttgtgcaac cagaaaactt ggaatacacc attgtgataa cacctcactc aggggaagag 1380

catgcagtcg gaaatgacac aggaaaacat ggcaaggaaa tcaaaataac accacagagt 1440

tccatcacag aagcagaatt gacaggttat ggcactgtca caatggagtg ctctccaaga 1500

acgggcctcg acttcaatga gatggtgttg ctgcagatgg aaaataaagc ttggctggtg 1560

cacaggcaat ggttcctaga cctgccgtta ccatggttgc ccggagcgga cacacaaggg 1620

tcaaattgga tacagaaaga gacattggtc actttcaaaa atccccatgc gaagaaacag 1680

gatgttgttg ttttaggatc ccaagaaggg gccatgcaca cagcacttac aggggccaca 1740

gaaatccaaa tgtcatcagg aaacttactc ttcacaggac atctcaagtg caggctgaga 1800

atggacaagc tacagctcaa aggaatgtca tactctatgt gcacaggaaa gtttaaagtt 1860

gtgaaggaaa tagcagaaac acaacatgga acaatagtta tcagagtgca atatgaaggg 1920

gacggctctc catgcaagat ccctttgag ataatggatt tggaaaaaag acatgtctta 1980

ggtcgcctga ttacagtcaa cccaattgtg acagaaaaag atagcccagt caacatagaa 2040

gcagaacctc catttggaga cagctacatc atcataggag tagagccggg acaactgaag 2100

ctcaactggt ttaagaaagg aagttctatc ggccaaatgt ttgagacaac aatgaggggg 2160

gcgaagagaa tggccatttt aggtgacaca gcctgggatt ttggatcctt gggaggagtg 2220

tttacatcta taggaaaggc tctccaccaa gtctttggag caatctatgg agctgccttc 2280

agtggggttt catggactat gaaaatcctc ataggagtca ttatcacatg gataggaatg 2340

aattcacgca gcacctcact gtctgtgaca ctagtattgg tgggaattgt gacactgtat 2400

ttgggagtca tggtgcaggc cgatagtggt tgcgttgtga gctggaaaaa caaagaactg 2460

aaatgtggca gtgggatttt catcacagac aacgtgcaca catggacaga acaatacaag 2520

ttccaaccag aatccccttc aaaactagct tcagctatcc agaaagccca tgaagaggac 2580

atttgtggaa tccgctcagt aacaagactg gagaatctga tgtggaaaca aataacacca 2640

gaattgaatc acattctatc agaaaatgag gtgaagttaa ctattatgac aggagacatc 2700

aaaggaatca tgcaggcagg aaaacgatct ctgcggcctc agcccactga gctgaagtat 2760

tcatggaaaa catggggcaa agcaaaaatg ctctctacag agtctcataa ccagaccttt 2820

ctcattgatg gccccgaaac agcagaatgc cccaacacaa atagagcttg gaattcgttg 2880

gaagttgaag actatggctt tggagtattc accaccaata tatggctaaa attgaaagaa 2940

aaacaggatg tattctgcga ctcaaaactc atgtcagcgg ccataaaaga caacagagcc 3000

gtccatgccg atatgggtta ttggatagaa agtgcactca atgacacatg gaagatagag 3060

aaagcctctt tcattgaagt taaaaactgc cactggccaa aatcacacac cctctggagc 3120

aatggagtgc tagaaagtga gatgataatt ccaaagaatc tcgctggacc agtgtctcaa 3180

cacaactata gaccaggcta ccatacacaa ataacaggac catggcatct aggtaagctt 3240

gagatggact ttgatttctg tgatggaaca acagtggtag tgactgagga ctgcggaaat 3300

agaggaccct ctttgagaac aaccactgcc tctggaaaac tcataacaga atggtgctgc 3360

cgatcttgca cattaccacc gctaagatac agaggtgagg atgggtgctg gtacgggatg 3420

gaaatcagac cattgaagga gaaagaagag aatttggtca actccttggt cacagctgga 3480

catgggcagg tcgacaactt ttcactagga gtcttgggaa tggcattgtt cctggaggaa 3540

atgcttagga cccgagtagg aacgaaacat gcaatactac tagttgcagt ttcttttgtg 3600

acattgatca cagggaacat gtcctttaga gacctgggaa gagtgatggt tatggtaggc 3660

gccactatga cggatgacat aggtatgggc gtgacttatc ttgccctact agcagccttc 3720

aaagtcagac caacttttgc agctggacta ctcttgagaa agctgacctc caaggaattg 3780

atgatgacta ctataggaat tgtactcctc tcccagagca ccataccaga gaccattctt 3840

gagttgactg atgcgttagc cttaggcatg atggtcctca aaatggtgag aaatatggaa 3900

aagtatcaat tggcagtgac tatcatggct atcttgtgcg tcccaaacgc agtgatatta 3960

caaaacgcat ggaaagtgag ttgcacaata ttggcagtgg tgtccgtttc cccactgttc 4020

ttaacatcct cacagcaaaa aacagattgg ataccattag cattgacgat caaaggtctc 4080

aatccaacag ctatttttct aacaaccctc tcaagaacca gcaagaaaag gagctggcca 4140

ttaaatgagg ctatcatggc agtcgggatg gtgagcattt tagccagttc tctcctaaaa 4200

aatgatattc ccatgacagg accattagtg gctggagggc tcctcactgt gtgctacgtg 4260

ctcactggac gatcggccga tttggaactg gagagagcag ccgatgtcaa atgggaagac 4320

caggcagaga tatcaggaag cagtccaatc ctgtcaataa caatatcaga agatggtagc 4380

atgtcgataa aaaatgaaga ggaagaacaa acactgacca tactcattag aacaggattg 4440

ctggtgatct caggactttt tcctgtatca ataccaatca cggcagcagc atggtacctg 4500

tgggaagtga agaaacaacg ggccggagta ttgtgggatg ttccttcacc cccacccatg 4560

ggaaaggctg aactggaaga tggagcctat agaattaagc aaaaagggat tcttggatat 4620

tcccagatcg gagccggagt ttacaaagaa ggaacattcc atacaatgtg gcatgtcaca 4680

cgtggcgctg ttctaatgca taaaggaaag aggattgaac catcatgggc ggacgtcaag 4740

aaagacctaa tatcatatgg aggaggctgg aagttagaag gagaatggaa ggaaggagaa 4800

gaagtccagg tattggcact ggagcctgga aaaaatccaa gagccgtcca aacgaaacct 4860

ggtcttttca aaaccaacgc cggaacaata ggtgctgtat ctctggactt ttctcctgga 4920

acgtcaggat ctccaattat cgacaaaaaa ggaaaagttg tgggtcttta tggtaatggt 4980

gttgttacaa ggagtggagc atatgtgagt gctatagccc agactgaaaa aagcattgaa 5040

gacaacccag agatcgaaga tgacattttc cgaaagagaa gactgaccat catggacctc 5100

cacccaggag cgggaaagac gaagagatac cttccggcca tagtcagaga agctataaaa 5160

cggggtttga gaacattaat cttggccccc actagagttg tggcagctga aatggaggaa 5220

gcccttagag gacttccaat aagataccag accccagcca tcagagctgt gcacaccggg 5280

cgggagattg tggacctaat gtgtcatgcc acatttacca tgaggctgct atcaccagtt 5340

agagtgccaa actacaacct gattatcatg gacgaagccc atttcacaga cccagcaagt 5400

atagcagcta gaggatacat ctcaactcga gtggagatgg gtgaggcagc tgggattttt 5460

atgacagcca ctcccccggg aagcagagac ccatttcctc agagcaatgc accaatcata 5520

gatgaagaaa gagaaatccc tgaacgctcg tggaattccg gacatgaatg ggtcacggat 5580

tttaaaggga agactgtttg gttcgttcca agtataaaag caggaaatga tatagcagct 5640

tgcctgagga aaaatggaaa gaaagtgata caactcagta ggaagacctt tgattctgag 5700

tatgtcaaga ctagaaccaa tgattgggac ttcgtggtta caactgacat ttcagaaatg 5760

ggtgccaatt tcaaggctga gagggttata gaccccagac gctgcatgaa accagtcata 5820

ctaacagatg gtgaagagcg ggtgattctg gcaggaccta tgccagtgac ccactctagt 5880

gcagcacaaa gaagagggag aataggaaga aatccaaaaa atgagaatga ccagtacata 5940

tacatggggg aacctctgga aaatgatgaa gactgtgcac actggaaaga agctaaaatg 6000

ctcctagata acatcaacac gccagaagga atcattccta gcatgttcga accagagcgt 6060

gaaaaggtgg atgccattga tggcgaatac cgcttgagag gagaagcaag gaaaaccttt 6120

gtagacttaa tgagaagagg agacctacca gtctggttgg cctacagagt ggcagctgaa 6180

ggcatcaact acgcagacag aaggtggtgt tttgatggag tcaagaacaa ccaaatccta 6240

gaagaaaacg tggaagttga aatctggaca aaagaagggg aaaggaagaa attgaaaccc 6300

agatggttgg atgctaggat ctattctgac ccactggcgc taaaagaatt taaggaattt 6360

gcagccggaa gaaagtctct gaccctgaac ctaatcacag aaatgggtag gctcccaacc 6420

ttcatgactc agaaggcaag agacgcactg gacaacttag cagtgctgca cacggctgag 6480

gcaggtggaa gggcgtacaa ccatgctctc agtgaactgc cggagaccct ggagacattg 6540

cttttactga cacttctggc tacagtcacg ggagggatct ttttattctt gatgagcgca 6600

aggggcatag ggaagatgac cctgggaatg tgctgcataa tcacggctag catcctccta 6660

tggtacgcac aaatacagcc acactggata gcagcttcaa taatactgga gtttttttctc 6720

atagttttgc ttattccaga acctgaaaaa cagagaacac cccaagacaa ccaactgacc 6780

tacgttgtca tagccatcct cacagtggtg gccgcaacca tggcaaacga gatgggtttc 6840

ctagaaaaaa cgaagaaaga tctcggattg ggaagcattg caacccagca acccgagagc 6900

aacatcctgg acatagatct acgtcctgca tcagcatgga cgctgtatgc cgtggccaca 6960

acatttgtta caccaatgtt gagacatagc attgaaaatt cctcagtgaa tgtgtcccta 7020

acagctatag ccaaccaagc cacagtgtta atgggtctcg ggaaaggatg gccattgtca 7080

aagatggaca tcggagttcc ccttctcgcc attggatgct actcacaagt caaccccata 7140

actctcacag cagctctttt cttattggta gcacattatg ccatcatagg gccaggactc 7200

caagcaaaag caaccagaga agctcagaaa agagcagcgg cgggcatcat gaaaaaccca 7260

actgtcgatg gaataacagt gattgaccta gatccaatac cttatgatcc aaagtttgaa 7320

aagcagttgg gacaagtaat gctcctagtc ctctgcgtga ctcaagtatt gatgatgagg 7380

actacatggg ctctgtgtga ggctttaacc ttagctaccg ggcccatctc cacattgtgg 7440

gaaggaaatc cagggaggtt ttggaacact accattgcgg tgtcaatggc taacattttt 7500

agagggagtt acttggccgg agctggactt ctcttttcta ttatgaagaa cacaaccaac 7560

acaagaaggg gaactggcaa cataggagag acgcttggag agaaatggaa aagccgattg 7620

aacgcattgg gaaaaagtga attccagatc tacaagaaaa gtggaatcca ggaagtggat 7680

agaaccttag caaaagaagg cattaaaaga ggagaaacgg accatcacgc tgtgtcgcga 7740

ggctcagcaa aactgagatg gttcgttgag agaaacatgg tcacaccaga agggaaagta 7800

gtggacctcg gttgtggcag aggaggctgg tcatactatt gtggaggact aaagaatgta 7860

agagaagtca aaggcctaac aaaaggagga ccaggacacg aagaacccat ccccatgtca 7920

acatatgggt ggaatctagt gcgtcttcaa agtggagttg acgttttctt catcccgcca 7980

gaaaagtgtg acacattatt gtgtgacata ggggagtcat caccaaatcc cacagtggaa 8040

gcaggacgaa cactcagagt ccttaactta gtagaaaatt ggttgaacaa caacactcaa 8100

ttttgcataa aggttctcaa cccatatatg ccctcagtca tagaaaaaat ggaagcacta 8160

caaaggaaat atggaggagc cttagtgagg aatccactct cacgaaactc cacacatgag 8220

atgtactggg tatccaatgc ttccgggaac atagtgtcat cagtgaacat gatttcaagg 8280

atgttgatca acagatttac aatgagatac aagaaagcca cttacgagcc ggatgttgac 8340

ctcggaagcg gaacccgtaa catcgggatt gaaagtgaga taccaaacct agatataatt 8400

gggaaaagaa tagaaaaaat aaagcaagag catgaaacat catggcacta tgaccaagac 8460

cacccataca aaacgtgggc ataccatggt agctatgaaa caaaacagac tggatcagca 8520

tcatccatgg tcaacggagt ggtcaggctg ctgacaaaac cttgggacgt cgtccccatg 8580

gtgacacaga tggcaatgac agacacgact ccatttggac aacagcgcgt ttttaaagag 8640

aaagtggaca cgagaaccca agaaccgaaa gaaggcacga agaaactaat gaaaataaca 8700

gcagagtggc tttggaaaga attagggaag aaaaagacac ccaggatgtg caccagagaa 8760

gaattcacaa gaaaggtgag aagcaatgca gccttggggg ccgtattcac tgatgagaac 8820

aagtggaagt cggcacgtga ggctgttgaa gatagtaggt tttgggagct ggttgacaag 8880

gaaaggaatc tccatcttga aggaaagtgt gaaacatgtg tgtacaacat gatgggaaaa 8940

agagagaaga agctagggga attcggcaag gcaaaaggca gcagagccat atggtacatg 9000

tggcttggag cacgcttctt agagtttgaa gccctaggat tcttaaatga agatcactgg 9060

ttctccagag agaactccct gagtggagtg gaaggagaag ggctgcacaa gctaggttac 9120

attctaagag acgtgagcaa gaaagaggga ggagcaatgt atgccgatga caccgcagga 9180

tgggatacaa gaatcacact agaagaccta aaaaatgaag aaatggtaac aaaccacatg 9240

gaaggagaac acaagaaact agccgaggcc attttcaaac taacgtacca aaacaaggtg 9300

gtgcgtgtgc aaagaccaac accaagaggc acagtaatgg acatcatatc gagaagagac 9360

caaagaggta gtggacaagt tggcacctat ggactcaata ctttcaccaa tatggaagcc 9420

caactaatca gacagatgga gggagaagga gtctttaaaa gcattcagca cctaacaatc 9480

acagaagaaa tcgctgtgca aaactggtta gcaagagtgg ggcgcgaaag gttatcaaga 9540

atggccatca gtggagatga ttgtgttgtg aaacctttag atgacaggtt cgcaagcgct 9600

ttaacagctc taaatgacat gggaaagatt aggaaagaca tacaacaatg ggaaccttca 9660

agaggatgga atgattggac acaagtgccc ttctgttcac accatttcca tgagttaatc 9720

atgaaagacg gtcgcgtact cgttgttcca tgtagaaacc aagatgaact gattggcaga 9780

gcccgaatct cccaaggagc agggtggtct ttgcgggaga cggcctgttt ggggaagtct 9840

tacgcccaaa tgtggagctt gatgtacttc cacagacgcg acctcaggct ggcggcaaat 9900

gctatttgct cggcagtacc atcacattgg gttccaacaa gtcgaacaac ctggtccata 9960

catgctaaac atgaatggat gacaacggaa gacatgctga cagtctggaa cagggtgtgg 10020

attcaagaaa acccatggat ggaagacaaa actccagtgg aatcatggga ggaaatccca 10080

tacttgggga aaagagaaga ccaatggtgc ggctcattga ttgggttaac aagcagggcc 10140

acctgggcaa agaacatcca agcagcaata aatcaagtta gatcccttat aggcaatgaa 10200

gaatacacag attacatgcc atccatgaaa agattcagaa gagaagagga agaagcagga 10260

gttctgtggt agaaagcaaa actaacatga aacaaggcta gaagtcaggt cggattaagc 10320

catagtacgg aaaaaactat gctacctgtg agccccgtcc aaggacgtta aaagaagtca 10380

ggccatcata aatgccatag cttgagtaaa ctatgcagcc tgtagctcca cctgagaagg 10440

tgtaaaaaat ccgggaggcc acaaaccatg gaagctgtac gcatggcgta gtggactagc 10500

ggttagagga gacccctccc ttacaaatcg cagcaacaat gggggcccaa ggcgagatga 10560

agctgtagtc tcgctggaag gactagaggt tagaggagac ccccccgaaa caaaaaacag 10620

catattgacg ctgggaaaga ccagagatcc tgctgtctcc tcagcatcat tccaggcaca 10680

gaacgccaga aaatggaatg gtgctgttga atcaacaggt tct 10723

<210> 4

<211> 3391
<212> PRT
<213> dengue seroytpe 2 (MVS)

<400> 4

```
Met Asn Asn Gln Arg Lys Lys Ala Lys Asn Thr Pro Phe Asn Met Leu
1               5                  10                  15


Lys Arg Glu Arg Asn Arg Val Ser Thr Val Gln Gln Leu Thr Lys Arg
            20                  25                  30


Phe Ser Leu Gly Met Leu Gln Gly Arg Gly Pro Leu Lys Leu Phe Met
        35                  40                  45


Ala Leu Val Ala Phe Leu Arg Phe Leu Thr Ile Pro Pro Thr Ala Gly
    50                  55                  60


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


Leu Arg Gly Phe Arg Lys Glu Ile Gly Arg Met Leu Asn Ile Leu Asn
                85                  90                  95


Arg Arg Arg Arg Ser Ala Gly Met Ile Ile Met Leu Ile Pro Thr Val
            100                 105                 110


Met Ala Phe His Leu Thr Thr Arg Asn Gly Glu Pro His Met Ile Val
        115                 120                 125


Ser Arg Gln Glu Lys Gly Lys Ser Leu Leu Phe Lys Thr Glu Val Gly
    130                 135                 140


Val Asn Met Cys Thr Leu Met Ala Met Asp Leu Gly Glu Leu Cys Glu
145                 150                 155                 160


Asp Thr Ile Thr Tyr Glu Cys Pro Leu Leu Arg Gln Asn Glu Pro Glu
                165                 170                 175


Asp Ile Asp Cys Trp Cys Asn Ser Thr Ser Thr Trp Val Thr Tyr Gly
            180                 185                 190
```

```
Thr Cys Thr Thr Met Gly Glu His Arg Arg Glu Lys Arg Ser Val Ala
        195                 200                 205

Leu Val Pro His Val Gly Met Gly Leu Glu Thr Arg Thr Glu Thr Trp
    210                 215                 220

Met Ser Ser Glu Gly Ala Trp Lys His Val Gln Arg Ile Glu Thr Trp
225                 230                 235                 240

Ile Leu Arg His Pro Gly Phe Thr Met Met Ala Ala Ile Leu Ala Tyr
                245                 250                 255

Thr Ile Gly Thr Thr His Phe Gln Arg Ala Leu Ile Phe Ile Leu Leu
            260                 265                 270

Thr Ala Val Thr Pro Ser Met Thr Met Arg Cys Ile Gly Met Ser Asn
        275                 280                 285

Arg Asp Phe Val Glu Gly Val Ser Gly Gly Ser Trp Val Asp Ile Val
    290                 295                 300

Leu Glu His Gly Ser Cys Val Thr Thr Met Ala Lys Asn Lys Pro Thr
305                 310                 315                 320

Leu Asp Phe Glu Leu Ile Lys Thr Glu Ala Lys Gln Pro Ala Thr Leu
                325                 330                 335

Arg Lys Tyr Cys Ile Glu Ala Lys Leu Thr Asn Thr Thr Thr Glu Ser
            340                 345                 350

Arg Cys Pro Thr Gln Gly Glu Pro Ser Leu Asn Glu Glu Gln Asp Lys
        355                 360                 365

Arg Phe Val Cys Lys His Ser Met Val Asp Arg Gly Trp Gly Asn Gly
    370                 375                 380

Cys Gly Leu Phe Gly Lys Gly Gly Ile Val Thr Cys Ala Met Phe Arg
385                 390                 395                 400

Cys Lys Lys Asn Met Glu Gly Lys Val Val Gln Pro Glu Asn Leu Glu
                405                 410                 415
```

```
Tyr Thr Ile Val Ile Thr Pro His Ser Gly Glu Glu His Ala Val Gly
            420                 425                 430

Asn Asp Thr Gly Lys His Gly Lys Glu Ile Lys Ile Thr Pro Gln Ser
        435                 440                 445

Ser Ile Thr Glu Ala Glu Leu Thr Gly Tyr Gly Thr Val Thr Met Glu
    450                 455                 460

Cys Ser Pro Arg Thr Gly Leu Asp Phe Asn Glu Met Val Leu Leu Gln
465                 470                 475                 480

Met Glu Asn Lys Ala Trp Leu Val His Arg Gln Trp Phe Leu Asp Leu
                485                 490                 495

Pro Leu Pro Trp Leu Pro Gly Ala Asp Thr Gln Gly Ser Asn Trp Ile
            500                 505                 510

Gln Lys Glu Thr Leu Val Thr Phe Lys Asn Pro His Ala Lys Lys Gln
        515                 520                 525

Asp Val Val Val Leu Gly Ser Gln Glu Gly Ala Met His Thr Ala Leu
    530                 535                 540

Thr Gly Ala Thr Glu Ile Gln Met Ser Ser Gly Asn Leu Leu Phe Thr
545                 550                 555                 560

Gly His Leu Lys Cys Arg Leu Arg Met Asp Lys Leu Gln Leu Lys Gly
                565                 570                 575

Met Ser Tyr Ser Met Cys Thr Gly Lys Phe Lys Val Val Lys Glu Ile
            580                 585                 590

Ala Glu Thr Gln His Gly Thr Ile Val Ile Arg Val Gln Tyr Glu Gly
        595                 600                 605

Asp Gly Ser Pro Cys Lys Ile Pro Phe Glu Ile Met Asp Leu Glu Lys
    610                 615                 620
```

```
Arg His Val Leu Gly Arg Leu Ile Thr Val Asn Pro Ile Val Thr Glu
625                 630                 635                 640

Lys Asp Ser Pro Val Asn Ile Glu Ala Glu Pro Pro Phe Gly Asp Ser
                645                 650                 655

Tyr Ile Ile Ile Gly Val Glu Pro Gly Gln Leu Lys Leu Asn Trp Phe
            660                 665                 670

Lys Lys Gly Ser Ser Ile Gly Gln Met Phe Glu Thr Thr Met Arg Gly
        675                 680                 685

Ala Lys Arg Met Ala Ile Leu Gly Asp Thr Ala Trp Asp Phe Gly Ser
    690                 695                 700

Leu Gly Gly Val Phe Thr Ser Ile Gly Lys Ala Leu His Gln Val Phe
705                 710                 715                 720

Gly Ala Ile Tyr Gly Ala Ala Phe Ser Gly Val Ser Trp Thr Met Lys
                725                 730                 735

Ile Leu Ile Gly Val Ile Ile Thr Trp Ile Gly Met Asn Ser Arg Ser
            740                 745                 750

Thr Ser Leu Ser Val Thr Leu Val Leu Val Gly Ile Val Thr Leu Tyr
        755                 760                 765

Leu Gly Val Met Val Gln Ala Asp Ser Gly Cys Val Val Ser Trp Lys
    770                 775                 780

Asn Lys Glu Leu Lys Cys Gly Ser Gly Ile Phe Ile Thr Asp Asn Val
785                 790                 795                 800

His Thr Trp Thr Glu Gln Tyr Lys Phe Gln Pro Glu Ser Pro Ser Lys
                805                 810                 815

Leu Ala Ser Ala Ile Gln Lys Ala His Glu Glu Asp Ile Cys Gly Ile
            820                 825                 830

Arg Ser Val Thr Arg Leu Glu Asn Leu Met Trp Lys Gln Ile Thr Pro
        835                 840                 845
```

```
Glu Leu Asn His Ile Leu Ser Glu Asn Glu Val Lys Leu Thr Ile Met
    850                 855                 860

Thr Gly Asp Ile Lys Gly Ile Met Gln Ala Gly Lys Arg Ser Leu Arg
865                 870                 875                 880

Pro Gln Pro Thr Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala
                885                 890                 895

Lys Met Leu Ser Thr Glu Ser His Asn Gln Thr Phe Leu Ile Asp Gly
            900                 905                 910

Pro Glu Thr Ala Glu Cys Pro Asn Thr Asn Arg Ala Trp Asn Ser Leu
        915                 920                 925

Glu Val Glu Asp Tyr Gly Phe Gly Val Phe Thr Thr Asn Ile Trp Leu
    930                 935                 940

Lys Leu Lys Glu Lys Gln Asp Val Phe Cys Asp Ser Lys Leu Met Ser
945                 950                 955                 960

Ala Ala Ile Lys Asp Asn Arg Ala Val His Ala Asp Met Gly Tyr Trp
                965                 970                 975

Ile Glu Ser Ala Leu Asn Asp Thr Trp Lys Ile Glu Lys Ala Ser Phe
            980                 985                 990

Ile Glu Val Lys Asn Cys His Trp  Pro Lys Ser His Thr  Leu Trp Ser
        995                 1000                1005

Asn Gly  Val Leu Glu Ser Glu  Met Ile Ile Pro Lys  Asn Leu Ala
    1010                1015                1020

Gly Pro  Val Ser Gln His Asn  Tyr Arg Pro Gly Tyr  His Thr Gln
    1025                1030                1035

Ile Thr  Gly Pro Trp His Leu  Gly Lys Leu Glu Met  Asp Phe Asp
    1040                1045                1050
```

```
Phe Cys  Asp Gly Thr Thr Val  Val Val Thr Glu Asp  Cys Gly Asn
    1055                1060                1065

Arg Gly  Pro Ser Leu Arg Thr  Thr Thr Ala Ser Gly  Lys Leu Ile
    1070                1075                1080

Thr Glu  Trp Cys Cys Arg Ser  Cys Thr Leu Pro Pro  Leu Arg Tyr
    1085                1090                1095

Arg Gly  Glu Asp Gly Cys Trp  Tyr Gly Met Glu Ile  Arg Pro Leu
    1100                1105                1110

Lys Glu  Lys Glu Glu Asn Leu  Val Asn Ser Leu Val  Thr Ala Gly
    1115                1120                1125

His Gly  Gln Val Asp Asn Phe  Ser Leu Gly Val Leu  Gly Met Ala
    1130                1135                1140

Leu Phe  Leu Glu Glu Met Leu  Arg Thr Arg Val Gly  Thr Lys His
    1145                1150                1155

Ala Ile  Leu Leu Val Ala Val  Ser Phe Val Thr Leu  Ile Thr Gly
    1160                1165                1170

Asn Met  Ser Phe Arg Asp Leu  Gly Arg Val Met Val  Met Val Gly
    1175                1180                1185

Ala Thr  Met Thr Asp Asp Ile  Gly Met Gly Val Thr  Tyr Leu Ala
    1190                1195                1200

Leu Leu  Ala Ala Phe Lys Val  Arg Pro Thr Phe Ala  Ala Gly Leu
    1205                1210                1215

Leu Leu  Arg Lys Leu Thr Ser  Lys Glu Leu Met Met  Thr Thr Ile
    1220                1225                1230

Gly Ile  Val Leu Leu Ser Gln  Ser Thr Ile Pro Glu  Thr Ile Leu
    1235                1240                1245

Glu Leu  Thr Asp Ala Leu Ala  Leu Gly Met Met Val  Leu Lys Met
    1250                1255                1260
```

```
Val Arg  Asn Met Glu Lys Tyr  Gln Leu Ala Val Thr  Ile Met Ala
    1265                1270                1275

Ile Leu  Cys Val Pro Asn Ala  Val Ile Leu Gln Asn  Ala Trp Lys
    1280                1285                1290

Val Ser  Cys Thr Ile Leu Ala  Val Val Ser Val Ser  Pro Leu Phe
    1295                1300                1305

Leu Thr  Ser Ser Gln Gln Lys  Thr Asp Trp Ile Pro  Leu Ala Leu
    1310                1315                1320

Thr Ile  Lys Gly Leu Asn Pro  Thr Ala Ile Phe Leu  Thr Thr Leu
    1325                1330                1335

Ser Arg  Thr Ser Lys Lys Arg  Ser Trp Pro Leu Asn  Glu Ala Ile
    1340                1345                1350

Met Ala  Val Gly Met Val Ser  Ile Leu Ala Ser Ser  Leu Leu Lys
    1355                1360                1365

Asn Asp  Ile Pro Met Thr Gly  Pro Leu Val Ala Gly  Gly Leu Leu
    1370                1375                1380

Thr Val  Cys Tyr Val Leu Thr  Gly Arg Ser Ala Asp  Leu Glu Leu
    1385                1390                1395

Glu Arg  Ala Ala Asp Val Lys  Trp Glu Asp Gln Ala  Glu Ile Ser
    1400                1405                1410

Gly Ser  Ser Pro Ile Leu Ser  Ile Thr Ile Ser Glu  Asp Gly Ser
    1415                1420                1425

Met Ser  Ile Lys Asn Glu Glu  Glu Glu Gln Thr Leu  Thr Ile Leu
    1430                1435                1440

Ile Arg  Thr Gly Leu Leu Val  Ile Ser Gly Leu Phe  Pro Val Ser
    1445                1450                1455
```

```
Ile Pro  Ile Thr Ala Ala Ala  Trp Tyr Leu Trp Glu  Val Lys Lys
    1460                1465                1470

Gln Arg  Ala Gly Val Leu Trp  Asp Val Pro Ser Pro  Pro Pro Met
    1475                1480                1485

Gly Lys  Ala Glu Leu Glu Asp  Gly Ala Tyr Arg Ile  Lys Gln Lys
    1490                1495                1500

Gly Ile  Leu Gly Tyr Ser Gln  Ile Gly Ala Gly Val  Tyr Lys Glu
    1505                1510                1515

Gly Thr  Phe His Thr Met Trp  His Val Thr Arg Gly  Ala Val Leu
    1520                1525                1530

Met His  Lys Gly Lys Arg Ile  Glu Pro Ser Trp Ala  Asp Val Lys
    1535                1540                1545

Lys Asp  Leu Ile Ser Tyr Gly  Gly Gly Trp Lys Leu  Glu Gly Glu
    1550                1555                1560

Trp Lys  Glu Gly Glu Glu Val  Gln Val Leu Ala Leu  Glu Pro Gly
    1565                1570                1575

Lys Asn  Pro Arg Ala Val Gln  Thr Lys Pro Gly Leu  Phe Lys Thr
    1580                1585                1590

Asn Ala  Gly Thr Ile Gly Ala  Val Ser Leu Asp Phe  Ser Pro Gly
    1595                1600                1605

Thr Ser  Gly Ser Pro Ile Ile  Asp Lys Lys Gly Lys  Val Val Gly
    1610                1615                1620

Leu Tyr  Gly Asn Gly Val Val  Thr Arg Ser Gly Ala  Tyr Val Ser
    1625                1630                1635

Ala Ile  Ala Gln Thr Glu Lys  Ser Ile Glu Asp Asn  Pro Glu Ile
    1640                1645                1650

Glu Asp  Asp Ile Phe Arg Lys  Arg Arg Leu Thr Ile  Met Asp Leu
    1655                1660                1665
```

```
His Pro  Gly Ala Gly Lys Thr  Lys Arg Tyr Leu Pro  Ala Ile Val
    1670                1675                1680

Arg Glu  Ala Ile Lys Arg Gly  Leu Arg Thr Leu Ile  Leu Ala Pro
    1685                1690                1695

Thr Arg  Val Val Ala Ala Glu  Met Glu Glu Ala Leu  Arg Gly Leu
    1700                1705                1710

Pro Ile  Arg Tyr Gln Thr Pro  Ala Ile Arg Ala Val  His Thr Gly
    1715                1720                1725

Arg Glu  Ile Val Asp Leu Met  Cys His Ala Thr Phe  Thr Met Arg
    1730                1735                1740

Leu Leu  Ser Pro Val Arg Val  Pro Asn Tyr Asn Leu  Ile Ile Met
    1745                1750                1755

Asp Glu  Ala His Phe Thr Asp  Pro Ala Ser Ile Ala  Ala Arg Gly
    1760                1765                1770

Tyr Ile  Ser Thr Arg Val Glu  Met Gly Glu Ala Ala  Gly Ile Phe
    1775                1780                1785

Met Thr  Ala Thr Pro Pro Gly  Ser Arg Asp Pro Phe  Pro Gln Ser
    1790                1795                1800

Asn Ala  Pro Ile Ile Asp Glu  Glu Arg Glu Ile Pro  Glu Arg Ser
    1805                1810                1815

Trp Asn  Ser Gly His Glu Trp  Val Thr Asp Phe Lys  Gly Lys Thr
    1820                1825                1830

Val Trp  Phe Val Pro Ser Ile  Lys Ala Gly Asn Asp  Ile Ala Ala
    1835                1840                1845

Cys Leu  Arg Lys Asn Gly Lys  Lys Val Ile Gln Leu  Ser Arg Lys
    1850                1855                1860
```

```
Thr Phe  Asp Ser Glu Tyr Val  Lys Thr Arg Thr Asn  Asp Trp Asp
    1865                1870                1875

Phe Val  Val Thr Thr Asp Ile  Ser Glu Met Gly Ala  Asn Phe Lys
    1880                1885                1890

Ala Glu  Arg Val Ile Asp Pro  Arg Arg Cys Met Lys  Pro Val Ile
    1895                1900                1905

Leu Thr  Asp Gly Glu Glu Arg  Val Ile Leu Ala Gly  Pro Met Pro
    1910                1915                1920

Val Thr  His Ser Ser Ala Ala  Gln Arg Arg Gly Arg  Ile Gly Arg
    1925                1930                1935

Asn Pro  Lys Asn Glu Asn Asp  Gln Tyr Ile Tyr Met  Gly Glu Pro
    1940                1945                1950

Leu Glu  Asn Asp Glu Asp Cys  Ala His Trp Lys Glu  Ala Lys Met
    1955                1960                1965

Leu Leu  Asp Asn Ile Asn Thr  Pro Glu Gly Ile Ile  Pro Ser Met
    1970                1975                1980

Phe Glu  Pro Glu Arg Glu Lys  Val Asp Ala Ile Asp  Gly Glu Tyr
    1985                1990                1995

Arg Leu  Arg Gly Glu Ala Arg  Lys Thr Phe Val Asp  Leu Met Arg
    2000                2005                2010

Arg Gly  Asp Leu Pro Val Trp  Leu Ala Tyr Arg Val  Ala Ala Glu
    2015                2020                2025

Gly Ile  Asn Tyr Ala Asp Arg  Arg Trp Cys Phe Asp  Gly Val Lys
    2030                2035                2040

Asn Asn  Gln Ile Leu Glu Glu  Asn Val Glu Val Glu  Ile Trp Thr
    2045                2050                2055

Lys Glu  Gly Glu Arg Lys Lys  Leu Lys Pro Arg Trp  Leu Asp Ala
    2060                2065                2070
```

```
Arg Ile  Tyr Ser Asp Pro Leu  Ala Leu Lys Glu Phe  Lys Glu Phe
    2075                 2080                 2085

Ala Ala  Gly Arg Lys Ser Leu  Thr Leu Asn Leu Ile  Thr Glu Met
    2090                 2095                 2100

Gly Arg  Leu Pro Thr Phe Met  Thr Gln Lys Ala Arg  Asp Ala Leu
    2105                 2110                 2115

Asp Asn  Leu Ala Val Leu His  Thr Ala Glu Ala Gly  Gly Arg Ala
    2120                 2125                 2130

Tyr Asn  His Ala Leu Ser Glu  Leu Pro Glu Thr Leu  Glu Thr Leu
    2135                 2140                 2145

Leu Leu  Leu Thr Leu Leu Ala  Thr Val Thr Gly Gly  Ile Phe Leu
    2150                 2155                 2160

Phe Leu  Met Ser Ala Arg Gly  Ile Gly Lys Met Thr  Leu Gly Met
    2165                 2170                 2175

Cys Cys  Ile Ile Thr Ala Ser  Ile Leu Leu Trp Tyr  Ala Gln Ile
    2180                 2185                 2190

Gln Pro  His Trp Ile Ala Ala  Ser Ile Ile Leu Glu  Phe Phe Leu
    2195                 2200                 2205

Ile Val  Leu Leu Ile Pro Glu  Pro Glu Lys Gln Arg  Thr Pro Gln
    2210                 2215                 2220

Asp Asn  Gln Leu Thr Tyr Val  Val Ile Ala Ile Leu  Thr Val Val
    2225                 2230                 2235

Ala Ala  Thr Met Ala Asn Glu  Met Gly Phe Leu Glu  Lys Thr Lys
    2240                 2245                 2250

Lys Asp  Leu Gly Leu Gly Ser  Ile Ala Thr Gln Gln  Pro Glu Ser
    2255                 2260                 2265
```

```
Asn Ile  Leu Asp Ile Asp Leu  Arg Pro Ala Ser Ala  Trp Thr Leu
    2270                 2275                 2280

Tyr Ala  Val Ala Thr Thr Phe  Val Thr Pro Met Leu  Arg His Ser
    2285                 2290                 2295

Ile Glu  Asn Ser Ser Val Asn  Val Ser Leu Thr Ala  Ile Ala Asn
    2300                 2305                 2310

Gln Ala  Thr Val Leu Met Gly  Leu Gly Lys Gly Trp  Pro Leu Ser
    2315                 2320                 2325

Lys Met  Asp Ile Gly Val Pro  Leu Leu Ala Ile Gly  Cys Tyr Ser
    2330                 2335                 2340

Gln Val  Asn Pro Ile Thr Leu  Thr Ala Ala Leu Phe  Leu Leu Val
    2345                 2350                 2355

Ala His  Tyr Ala Ile Ile Gly  Pro Gly Leu Gln Ala  Lys Ala Thr
    2360                 2365                 2370

Arg Glu  Ala Gln Lys Arg Ala  Ala Ala Gly Ile Met  Lys Asn Pro
    2375                 2380                 2385

Thr Val  Asp Gly Ile Thr Val  Ile Asp Leu Asp Pro  Ile Pro Tyr
    2390                 2395                 2400

Asp Pro  Lys Phe Glu Lys Gln  Leu Gly Gln Val Met  Leu Leu Val
    2405                 2410                 2415

Leu Cys  Val Thr Gln Val Leu  Met Met Arg Thr Thr  Trp Ala Leu
    2420                 2425                 2430

Cys Glu  Ala Leu Thr Leu Ala  Thr Gly Pro Ile Ser  Thr Leu Trp
    2435                 2440                 2445

Glu Gly  Asn Pro Gly Arg Phe  Trp Asn Thr Thr Ile  Ala Val Ser
    2450                 2455                 2460

Met Ala  Asn Ile Phe Arg Gly  Ser Tyr Leu Ala Gly  Ala Gly Leu
    2465                 2470                 2475
```

```
Leu Phe  Ser Ile Met Lys Asn  Thr Thr Asn Thr Arg  Arg Gly Thr
    2480                2485                2490

Gly Asn  Ile Gly Glu Thr Leu  Gly Glu Lys Trp Lys  Ser Arg Leu
    2495                2500                2505

Asn Ala  Leu Gly Lys Ser Glu  Phe Gln Ile Tyr Lys  Lys Ser Gly
    2510                2515                2520

Ile Gln  Glu Val Asp Arg Thr  Leu Ala Lys Glu Gly  Ile Lys Arg
    2525                2530                2535

Gly Glu  Thr Asp His His Ala  Val Ser Arg Gly Ser  Ala Lys Leu
    2540                2545                2550

Arg Trp  Phe Val Glu Arg Asn  Met Val Thr Pro Glu  Gly Lys Val
    2555                2560                2565

Val Asp  Leu Gly Cys Gly Arg  Gly Gly Trp Ser Tyr  Tyr Cys Gly
    2570                2575                2580

Gly Leu  Lys Asn Val Arg Glu  Val Lys Gly Leu Thr  Lys Gly Gly
    2585                2590                2595

Pro Gly  His Glu Glu Pro Ile  Pro Met Ser Thr Tyr  Gly Trp Asn
    2600                2605                2610

Leu Val  Arg Leu Gln Ser Gly  Val Asp Val Phe Phe  Ile Pro Pro
    2615                2620                2625

Glu Lys  Cys Asp Thr Leu Leu  Cys Asp Ile Gly Glu  Ser Ser Pro
    2630                2635                2640

Asn Pro  Thr Val Glu Ala Gly  Arg Thr Leu Arg Val  Leu Asn Leu
    2645                2650                2655

Val Glu  Asn Trp Leu Asn Asn  Asn Thr Gln Phe Cys  Ile Lys Val
    2660                2665                2670
```

```
Leu Asn  Pro Tyr Met Pro Ser  Val Ile Glu Lys Met  Glu Ala Leu
    2675                2680                2685

Gln Arg  Lys Tyr Gly Gly Ala  Leu Val Arg Asn Pro  Leu Ser Arg
    2690                2695                2700

Asn Ser  Thr His Glu Met Tyr  Trp Val Ser Asn Ala  Ser Gly Asn
    2705                2710                2715

Ile Val  Ser Ser Val Asn Met  Ile Ser Arg Met Leu  Ile Asn Arg
    2720                2725                2730

Phe Thr  Met Arg Tyr Lys Lys  Ala Thr Tyr Glu Pro  Asp Val Asp
    2735                2740                2745

Leu Gly  Ser Gly Thr Arg Asn  Ile Gly Ile Glu Ser  Glu Ile Pro
    2750                2755                2760

Asn Leu  Asp Ile Ile Gly Lys  Arg Ile Glu Lys Ile  Lys Gln Glu
    2765                2770                2775

His Glu  Thr Ser Trp His Tyr  Asp Gln Asp His Pro  Tyr Lys Thr
    2780                2785                2790

Trp Ala  Tyr His Gly Ser Tyr  Glu Thr Lys Gln Thr  Gly Ser Ala
    2795                2800                2805

Ser Ser  Met Val Asn Gly Val  Val Arg Leu Leu Thr  Lys Pro Trp
    2810                2815                2820

Asp Val  Val Pro Met Val Thr  Gln Met Ala Met Thr  Asp Thr Thr
    2825                2830                2835

Pro Phe  Gly Gln Gln Arg Val  Phe Lys Glu Lys Val  Asp Thr Arg
    2840                2845                2850

Thr Gln  Glu Pro Lys Glu Gly  Thr Lys Lys Leu Met  Lys Ile Thr
    2855                2860                2865

Ala Glu  Trp Leu Trp Lys Glu  Leu Gly Lys Lys Lys  Thr Pro Arg
    2870                2875                2880
```

```
Met Cys  Thr Arg Glu Glu Phe  Thr Arg Lys Val Arg  Ser Asn Ala
    2885                2890                2895

Ala Leu  Gly Ala Val Phe Thr  Asp Glu Asn Lys Trp  Lys Ser Ala
    2900                2905                2910

Arg Glu  Ala Val Glu Asp Ser  Arg Phe Trp Glu Leu  Val Asp Lys
    2915                2920                2925

Glu Arg  Asn Leu His Leu Glu  Gly Lys Cys Glu Thr  Cys Val Tyr
    2930                2935                2940

Asn Met  Met Gly Lys Arg Glu  Lys Lys Leu Gly Glu  Phe Gly Lys
    2945                2950                2955

Ala Lys  Gly Ser Arg Ala Ile  Trp Tyr Met Trp Leu  Gly Ala Arg
    2960                2965                2970

Phe Leu  Glu Phe Glu Ala Leu  Gly Phe Leu Asn Glu  Asp His Trp
    2975                2980                2985

Phe Ser  Arg Glu Asn Ser Leu  Ser Gly Val Glu Gly  Glu Gly Leu
    2990                2995                3000

His Lys  Leu Gly Tyr Ile Leu  Arg Asp Val Ser Lys  Lys Glu Gly
    3005                3010                3015

Gly Ala  Met Tyr Ala Asp Asp  Thr Ala Gly Trp Asp  Thr Arg Ile
    3020                3025                3030

Thr Leu  Glu Asp Leu Lys Asn  Glu Glu Met Val Thr  Asn His Met
    3035                3040                3045

Glu Gly  Glu His Lys Lys Leu  Ala Glu Ala Ile Phe  Lys Leu Thr
    3050                3055                3060

Tyr Gln  Asn Lys Val Val Arg  Val Gln Arg Pro Thr  Pro Arg Gly
    3065                3070                3075
```

```
Thr Val  Met Asp Ile Ile Ser  Arg Arg Asp Gln Arg  Gly Ser Gly
    3080                 3085                 3090

Gln Val  Gly Thr Tyr Gly Leu  Asn Thr Phe Thr Asn  Met Glu Ala
    3095                 3100                 3105

Gln Leu  Ile Arg Gln Met Glu  Gly Glu Gly Val Phe  Lys Ser Ile
    3110                 3115                 3120

Gln His  Leu Thr Ile Thr Glu  Glu Ile Ala Val Gln  Asn Trp Leu
    3125                 3130                 3135

Ala Arg  Val Gly Arg Glu Arg  Leu Ser Arg Met Ala  Ile Ser Gly
    3140                 3145                 3150

Asp Asp  Cys Val Val Lys Pro  Leu Asp Asp Arg Phe  Ala Ser Ala
    3155                 3160                 3165

Leu Thr  Ala Leu Asn Asp Met  Gly Lys Ile Arg Lys  Asp Ile Gln
    3170                 3175                 3180

Gln Trp  Glu Pro Ser Arg Gly  Trp Asn Asp Trp Thr  Gln Val Pro
    3185                 3190                 3195

Phe Cys  Ser His His Phe His  Glu Leu Ile Met Lys  Asp Gly Arg
    3200                 3205                 3210

Val Leu  Val Val Pro Cys Arg  Asn Gln Asp Glu Leu  Ile Gly Arg
    3215                 3220                 3225

Ala Arg  Ile Ser Gln Gly Ala  Gly Trp Ser Leu Arg  Glu Thr Ala
    3230                 3235                 3240

Cys Leu  Gly Lys Ser Tyr Ala  Gln Met Trp Ser Leu  Met Tyr Phe
    3245                 3250                 3255

His Arg  Arg Asp Leu Arg Leu  Ala Ala Asn Ala Ile  Cys Ser Ala
    3260                 3265                 3270

Val Pro  Ser His Trp Val Pro  Thr Ser Arg Thr Thr  Trp Ser Ile
    3275                 3280                 3285
```

```
His Ala  Lys His Glu Trp Met  Thr Thr Glu Asp Met  Leu Thr Val
    3290                3295                3300

Trp Asn  Arg Val Trp Ile Gln  Glu Asn Pro Trp Met  Glu Asp Lys
    3305                3310                3315

Thr Pro  Val Glu Ser Trp Glu  Glu Ile Pro Tyr Leu  Gly Lys Arg
    3320                3325                3330

Glu Asp  Gln Trp Cys Gly Ser  Leu Ile Gly Leu Thr  Ser Arg Ala
    3335                3340                3345

Thr Trp  Ala Lys Asn Ile Gln  Ala Ala Ile Asn Gln  Val Arg Ser
    3350                3355                3360

Leu Ile  Gly Asn Glu Glu Tyr  Thr Asp Tyr Met Pro  Ser Met Lys
    3365                3370                3375

Arg Phe  Arg Arg Glu Glu Glu  Glu Ala Gly Val Leu  Trp
    3380                3385                3390
```

<210> 5
<211> 10717
<212> DNA
<213> chimeric dengue serotype 2/3 (MVS)

<400> 5

```
agttgttagt ctacgtggac cgacaaagac agattctttg agggagctaa gctcaatgta       60

gttctaacag ttttttaatt agagagcaga tctctgatga ataaccaacg gaaaaaggcg      120

aaaaacacgc ctttcaatat gctgaaacgc gagagaaacc gcgtgtcgac tgtgcaacag      180

ctgacaaaga gattctcact tggaatgctg cagggacgag gaccattaaa actgttcatg      240

gccctggtgg cgttccttcg tttcctaaca atcccaccaa cagcagggat attgaagaga      300

tggggaacaa ttaaaaaatc aaaagctatt aatgttttga gagggttcag gaaagagatt      360

ggaaggatgc tgaacatctt gaataggaga cgcagatctg caggcatgat cattatgctg      420

attccaacag tgatggcgtt ccatttaacc acgcgtgatg gagagccgcg catgattgtg      480

gggaagaatg aaagaggaaa atccctactt ttcaagacag cctctggaat caacatgtgc      540
```

acactcatag ctatggatct gggagagatg tgtgatgaca cggtcactta caaatgcccc 600

cacattaccg aagtggagcc tgaagacatt gactgctggt gcaaccttac atcgacatgg 660

gtgacttatg gaacatgcaa tcaagctgga gagcatagac gcgataagag atcagtggcg 720

ttagctcccc atgttggcat gggactggac acacgcactc aaacctggat gtcggctgaa 780

ggagcttgga gacaagtcga gaaggtagag acatgggccc ttaggcaccc agggtttacc 840

atactagccc tatttcttgc ccattacata ggcacttcct tgacccagaa agtggttatt 900

tttatactat taatgctggt taccccatcc atgacaatga gatgtgtagg agtaggaaac 960

agagattttg tggaaggcct atcgggagct acgtgggttg acgtggtgct cgagcacggt 1020

gggtgtgtga ctaccatggc taagaacaag cccacgctgg acatagagct tcagaagacc 1080

gaggccaccc aactggcgac cctaaggaag ctatgcattg agggaaaaat taccaacata 1140

acaaccgact caagatgtcc cacccaaggg gaagcgattt tacctgagga gcaggaccag 1200

aactacgtgt gtaagcatac atacgtggac agaggctggg gaaacggttg tggtttgttt 1260

ggcaagggaa gcttggtgac atgcgcgaaa tttcaatgtt tagaatcaat agagggaaaa 1320

gtggtgcaac atgagaacct caaatacacc gtcatcatca cagtgcacac aggagaccaa 1380

caccaggtgg gaaatgaaac gcagggagtc acggctgaga taacacccca ggcatcaacc 1440

gctgaagcca ttttacctga atatggaacc ctcgggctag aatgctcacc acggacaggt 1500

ttggatttca atgaaatgat ctcattgaca atgaagaaca aagcatggat ggtacataga 1560

caatggttct ttgacttacc cctaccatgg acatcaggag cttcagcaga aacaccaact 1620

tggaacagga aagagcttct tgtgacattt aaaaatgcac atgcaaaaaa gcaagaagta 1680

gttgttcttg gatcacaaga gggagcaatg catacagcac tgacaggagc tacagagatc 1740

caaacctcag gaggcacaag tatctttgcg gggcacttaa aatgtagact caagatggac 1800

aaattggaac tcaaggggat gagctatgca atgtgcttga gtagctttgt gttgaagaaa 1860

gaagtctccg aaacgcagca tgggacaata ctcattaagg ttgagtacaa aggggaagat 1920

gcaccctgca agattccttt ctccacggag gatggacaag gaaaagctct caatggcaga 1980

ctgatcacag ccaatccagt ggtgaccaag aaggaggagc ctgtcaacat tgaggctgaa 2040

cctccttttg gagaaagtaa catagtaatt ggaattggag acaaagccct gaaaatcaac 2100

tggtacaaga agggaagctc gattgggaag atgttcgagg ccactgccag aggtgcaagg 2160

cgcatggcca tcttgggaga cacagcctgg gactttggat cagtgggtgg tgttttgaat 2220

tcattaggga aaatggtcca ccaaatattt gggagtgctt acacagccct atttggtgga 2280

gtctcctgga tgatgaaaat tggaataggt gtcctcttaa cctggatagg gttgaactca 2340

aaaaatactt ctatgtcatt ttcatgcatc gcggccggca ttgtgacact gtatttggga 2400

gtcatggtgc aggccgatag tggttgcgtt gtgagctgga aaaacaaaga actgaaatgt 2460

ggcagtggga ttttcatcac agacaacgtg cacacatgga cagaacaata caagttccaa 2520

ccagaatccc cttcaaaact agcttcagct atccagaaag cccatgaaga ggacatttgt 2580

ggaatccgct cagtaacaag actggagaat ctgatgtgga aacaaataac accagaattg 2640

aatcacattc tatcagaaaa tgaggtgaag ttaactatta tgacaggaga catcaaagga 2700

atcatgcagg caggaaaacg atctctgcgg cctcagccca ctgagctgaa gtattcatgg 2760

aaaacatggg gcaaagcaaa aatgctctct acagagtctc ataaccagac ctttctcatt 2820

gatggccccg aaacagcaga atgccccaac acaaatagag cttggaattc gttggaagtt 2880

gaagactatg gctttggagt attcaccacc aatatatggc taaaattgaa agaaaaacag 2940

gatgtattct gcgactcaaa actcatgtca gcggccataa aagacaacag agccgtccat 3000

gccgatatgg gttattggat agaaagtgca ctcaatgaca catggaagat agagaaagcc 3060

tctttcattg aagttaaaaa ctgccactgg ccaaaatcac acaccctctg gagcaatgga 3120

gtgctagaaa gtgagatgat aattccaaag aatctcgctg gaccagtgtc tcaacacaac 3180

tatagaccag gctaccatac acaaataaca ggaccatggc atctaggtaa gcttgagatg 3240

gactttgatt tctgtgatgg aacaacagtg gtagtgactg aggactgcgg aaatagagga 3300

ccctctttga gaacaaccac tgcctctgga aaactcataa cagaatggtg ctgccgatct 3360

tgcacattac caccgctaag atacagaggt gaggatgggt gctggtacgg gatggaaatc 3420

agaccattga aggagaaaga agagaatttg gtcaactcct tggtcacagc tggacatggg 3480

caggtcgaca acttttcact aggagtcttg ggaatggcat tgttcctgga ggaaatgctt 3540

aggacccgag taggaacgaa acatgcaata ctactagttg cagtttcttt tgtgacattg 3600

atcacaggga acatgtcctt tagagacctg ggaagagtga tggttatggt aggcgccact 3660

atgacggatg acataggtat gggcgtgact tatcttgccc tactagcagc cttcaaagtc 3720

agaccaactt ttgcagctgg actactcttg agaaagctga cctccaagga attgatgatg 3780

actactatag gaattgtact cctctcccag agcaccatac cagagaccat tcttgagttg 3840

actgatgcgt tagccttagg catgatggtc ctcaaaatgg tgagaaatat ggaaaagtat 3900

caattggcag tgactatcat ggctatcttg tgcgtcccaa acgcagtgat attacaaaac 3960

gcatggaaag tgagttgcac aatattggca gtggtgtccg tttccccact gttcttaaca 4020

tcctcacagc aaaaaacaga ttggatacca ttagcattga cgatcaaagg tctcaatcca 4080

acagctattt ttctaacaac cctctcaaga accagcaaga aaaggagctg gccattaaat 4140

gaggctatca tggcagtcgg gatggtgagc attttagcca gttctctcct aaaaaatgat 4200

attcccatga caggaccatt agtggctgga gggctcctca ctgtgtgcta cgtgctcact 4260

ggacgatcgg ccgatttgga actggagaga gcagccgatg tcaaatggga agaccaggca 4320

gagatatcag gaagcagtcc aatcctgtca ataacaatat cagaagatgg tagcatgtcg 4380

ataaaaaatg aagaggaaga acaaacactg accatactca ttagaacagg attgctggtg 4440

atctcaggac tttttcctgt atcaatacca atcacggcag cagcatggta cctgtgggaa 4500

gtgaagaaac aacgggccgg agtattgtgg gatgttcctt cacccccacc catgggaaag 4560

gctgaactgg aagatggagc ctatagaatt aagcaaaaag ggattcttgg atattcccag 4620

atcggagccg gagtttacaa agaaggaaca ttccatacaa tgtggcatgt cacacgtggc 4680

gctgttctaa tgcataaagg aaagaggatt gaaccatcat gggcggacgt caagaaagac 4740

ctaatatcat atggaggagg ctggaagtta gaaggagaat ggaaggaagg agaagaagtc 4800

caggtattgg cactggagcc tggaaaaaat ccaagagccg tccaaacgaa acctggtctt 4860

ttcaaaacca acgccggaac aataggtgct gtatctctgg acttttctcc tggaacgtca 4920

ggatctccaa ttatcgacaa aaaaggaaaa gttgtgggtc tttatggtaa tggtgttgtt 4980

acaaggagtg gagcatatgt gagtgctata gcccagactg aaaaaagcat tgaagacaac 5040

ccagagatcg aagatgacat tttccgaaag agaagactga ccatcatgga cctccaccca 5100

ggagcgggaa agacgaagag ataccttccg gccatagtca gagaagctat aaaacggggt 5160

ttgagaacat taatcttggc ccccactaga gttgtggcag ctgaaatgga ggaagccctt 5220

agaggacttc caataagata ccagacccca gccatcagag ctgtgcacac cgggcgggag 5280

attgtggacc taatgtgtca tgccacattt accatgaggc tgctatcacc agttagagtg 5340

ccaaactaca acctgattat catggacgaa gcccatttca cagacccagc aagtatagca 5400

gctagaggat acatctcaac tcgagtggag atgggtgagg cagctgggat ttttatgaca 5460

gccactcccc cgggaagcag agacccattt cctcagagca atgcaccaat catagatgaa 5520

gaaagagaaa tccctgaacg ctcgtggaat tccggacatg aatgggtcac ggattttaaa 5580

gggaagactg tttggttcgt tccaagtata aaagcaggaa atgatatagc agcttgcctg 5640

aggaaaaatg gaaagaaagt gatacaactc agtaggaaga cctttgattc tgagtatgtc 5700

aagactagaa ccaatgattg ggacttcgtg gttacaactg acatttcaga aatgggtgcc 5760

aatttcaagg ctgagagggt tatagacccc agacgctgca tgaaaccagt catactaaca 5820

gatggtgaag agcgggtgat tctggcagga cctatgccag tgacccactc tagtgcagca 5880

caaagaagag ggagaatagg aagaaatcca aaaaatgaga atgaccagta catatacatg 5940

ggggaacctc tggaaaatga tgaagactgt gcacactgga aagaagctaa aatgctccta 6000

gataacatca acacgccaga aggaatcatt cctagcatgt tcgaaccaga gcgtgaaaag 6060

gtggatgcca ttgatggcga ataccgcttg agaggagaag caaggaaaac ctttgtagac 6120

ttaatgagaa gaggagacct accagtctgg ttggcctaca gagtggcagc tgaaggcatc 6180

aactacgcag acagaaggtg gtgttttgat ggagtcaaga acaaccaaat cctagaagaa 6240

aacgtggaag ttgaaatctg gacaaaagaa ggggaaagga agaaattgaa acccagatgg 6300

ttggatgcta ggatctattc tgacccactg gcgctaaaag aatttaagga atttgcagcc 6360

ggaagaaagt ctctgaccct gaacctaatc acagaaatgg gtaggctccc aaccttcatg 6420

actcagaagg caagagacgc actggacaac ttagcagtgc tgcacacggc tgaggcaggt 6480

ggaagggcgt acaaccatgc tctcagtgaa ctgccggaga ccctggagac attgctttta 6540

ctgacacttc tggctacagt cacgggaggg atctttttat tcttgatgag cgcaaggggc 6600

atagggaaga tgaccctggg aatgtgctgc ataatcacgg ctagcatcct cctatggtac 6660

gcacaaatac agccacactg gatagcagct tcaataatac tggagttttt tctcatagtt 6720

ttgcttattc cagaacctga aaaacagaga acaccccaag acaaccaact gacctacgtt 6780

gtcatagcca tcctcacagt ggtggccgca accatggcaa acgagatggg tttcctagaa 6840

aaaacgaaga aagatctcgg attgggaagc attgcaaccc agcaacccga gagcaacatc 6900

ctggacatag atctacgtcc tgcatcagca tggacgctgt atgccgtggc cacaacattt 6960

gttacaccaa tgttgagaca tagcattgaa aattcctcag tgaatgtgtc cctaacagct 7020

atagccaacc aagccacagt gttaatgggt ctcgggaaag gatggccatt gtcaaagatg 7080

gacatcggag ttccccttct cgccattgga tgctactcac aagtcaaccc cataactctc 7140

acagcagctc ttttcttatt ggtagcacat tatgccatca tagggccagg actccaagca 7200

aaagcaacca gagaagctca gaaaagagca gcggcgggca tcatgaaaaa cccaactgtc 7260

gatggaataa cagtgattga cctagatcca ataccttatg atccaaagtt tgaaaagcag 7320

ttgggacaag taatgctcct agtcctctgc gtgactcaag tattgatgat gaggactaca 7380

tgggctctgt gtgaggcttt aaccttagct accgggccca tctccacatt gtgggaagga 7440

aatccaggga ggttttggaa cactaccatt gcggtgtcaa tggctaacat ttttagaggg 7500

agttacttgg ccggagctgg acttctcttt tctattatga agaacacaac caacacaaga 7560

aggggaactg gcaacatagg agagacgctt ggagagaaat ggaaaagccg attgaacgcg 7620

ttgggaaaaa gtgaattcca gatctacaag aaaagtggaa tccaggaagt ggatagaacc 7680

ttagcaaaag aaggcattaa aagaggagaa acggaccatc acgctgtgtc gcgaggctca 7740

gcaaaactga gatggttcgt tgagagaaac atggtcacac cagaagggaa agtagtggac 7800

ctcggttgtg gcagaggagg ctggtcatac tattgtggag gactaaagaa tgtaagagaa 7860

gtcaaaggcc taacaaaagg aggaccagga cacgaagaac ccatccccat gtcaacatat 7920

gggtggaatc tagtgcgtct tcaaagtgga gttgacgttt tcttcatccc gccagaaaag 7980

tgtgacacat tattgtgtga cataggggag tcatcaccaa atcccacagt ggaagcagga 8040

cgaacactca gagtccttaa cttagtagaa aattggttga acaacaacac tcaattttgc 8100

ataaaggttc tcaacccata tatgccctca gtcatagaaa aaatggaagc actacaaagg 8160

aaatatggag gagccttagt gaggaatcca ctctcacgaa actccacaca tgagatgtac 8220

tgggtatcca atgcttccgg gaacatagtg tcatcagtga acatgatttc aaggatgttg 8280

atcaacagat ttacaatgag atacaagaaa gccacttacg agccggatgt tgacctcgga 8340

agcggaaccc gtaacatcgg gattgaaagt gagataccaa acctagatat aattgggaaa 8400

agaatagaaa aaataaagca agagcatgaa acatcatggc actatgacca agaccaccca 8460

tacaaaacgt gggcatacca tggtagctat gaaacaaaac agactggatc agcatcatcc 8520

atggtcaacg gagtggtcag gctgctgaca aaaccttggg acgtcgtccc catggtgaca 8580

cagatggcaa tgacagacac gactccattt ggacaacagc gcgtttttaa agagaaagtg 8640

gacacgagaa cccaagaacc gaaagaaggc acgaagaaac taatgaaaat aacagcagag 8700

tggctttgga aagaattagg gaagaaaaag acacccagga tgtgcaccag agaagaattc 8760

acaagaaagg tgagaagcaa tgcagccttg ggggccatat tcactgatga gaacaagtgg 8820

aagtcggcac gtgaggctgt tgaagatagt aggttttggg agctggttga caaggaaagg 8880

aatctccatc ttgaaggaaa gtgtgaaaca tgtgtgtaca acatgatggg aaaaagagag 8940

aagaagctag gggaattcgg caaggcaaaa ggcagcagag ccatatggta catgtggctt 9000

ggagcacgct tcttagagtt tgaagcccta ggattcttaa atgaagatca ctggttctcc 9060

agagagaact ccctgagtgg agtggaagga gaagggctgc acaagctagg ttacattcta 9120

agagacgtga gcaagaaaga gggaggagca atgtatgccg atgacaccgc aggatgggat 9180

acaagaatca cactagaaga cctaaaaaat gaagaaatgg taacaaacca catggaagga 9240

gaacacaaga aactagccga ggccattttc aaactaacgt accaaaacaa ggtggtgcgt 9300

gtgcaaagac caacaccaag aggcacagta atggacatca tatcgagaag agaccaaaga 9360

ggtagtggac aagttggcac ctatggactc aatactttca ccaatatgga agcccaacta 9420

atcagacaga tggagggaga aggagtcttt aaaagcattc agcacctaac aatcacagaa 9480

gaaatcgctg tgcaaaactg gttagcaaga gtggggcgcg aaaggttatc aagaatggcc 9540

atcagtggag atgattgtgt tgtgaaacct ttagatgaca ggttcgcaag cgctttaaca 9600

gctctaaatg acatgggaaa gattaggaaa gacatacaac aatgggaacc ttcaagagga 9660

tggaatgatt ggacacaagt gcccttctgt tcacaccatt tccatgagtt aatcatgaaa 9720

gacggtcgcg tactcgttgt tccatgtaga aaccaagatg aactgattgg cagagcccga 9780

atctcccaag gagcagggtg gtctttgcgg gagacggcct gtttggggaa gtcttacgcc 9840

caaatgtgga gcttgatgta cttccacaga cgcgacctca ggctggcggc aaatgctatt 9900

tgctcggcag taccatcaca ttgggttcca acaagtcgaa caacctggtc catacatgct 9960

aaacatgaat ggatgacaac ggaagacatg ctgacagtct ggaacagggt gtggattcaa 10020

gaaaacccat ggatggaaga caaaactcca gtggaatcat gggaggaaat cccatacttg 10080

gggaaaagag aagaccaatg gtgcggctca ttgattgggt taacaagcag ggccacctgg 10140

gcaaagaaca tccaagcagc aataaatcaa gttagatccc ttataggcaa tgaagaatac 10200

acagattaca tgccatccat gaaaagattc agaagagaag aggaagaagc aggagttctg 10260

tggtagaaag caaaactaac atgaaacaag gctagaagtc aggtcggatt aagccatagt 10320

acggaaaaaa ctatgctacc tgtgagcccc gtccaaggac gttaaaagaa gtcaggccat 10380

cataaatgcc atagcttgag taaactatgc agcctgtagc tccacctgag aaggtgtaaa 10440

aaatccggga ggccacaaac catggaagct gtacgcatgg cgtagtggac tagcggttag 10500

aggagacccc tcccttacaa atcgcagcaa caatgggggc ccaaggcgag atgaagctgt 10560

agtctcgctg gaaggactag aggttagagg agacccccc gaaacaaaaa acagcatatt 10620

gacgctggga aagaccagag atcctgctgt ctcctcagca tcattccagg cacagaacgc 10680

cagaaaatgg aatggtgctg ttgaatcaac aggttct 10717

<210> 6
<211> 3389
<212> PRT
<213> chimeric dengue serotype 2/3 (MVS)

<400> 6

Met Asn Asn Gln Arg Lys Lys Ala Lys Asn Thr Pro Phe Asn Met Leu
1 5 10 15

Lys Arg Glu Arg Asn Arg Val Ser Thr Val Gln Gln Leu Thr Lys Arg
20 25 30

Phe Ser Leu Gly Met Leu Gln Gly Arg Gly Pro Leu Lys Leu Phe Met
35 40 45

Ala Leu Val Ala Phe Leu Arg Phe Leu Thr Ile Pro Pro Thr Ala Gly
50 55 60

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

Leu Arg Gly Phe Arg Lys Glu Ile Gly Arg Met Leu Asn Ile Leu Asn
85 90 95

Arg Arg Arg Arg Ser Ala Gly Met Ile Ile Met Leu Ile Pro Thr Val
100 105 110

Met Ala Phe His Leu Thr Thr Arg Asp Gly Glu Pro Arg Met Ile Val
115 120 125

```
Gly Lys Asn Glu Arg Gly Lys Ser Leu Leu Phe Lys Thr Ala Ser Gly
    130                 135                 140

Ile Asn Met Cys Thr Leu Ile Ala Met Asp Leu Gly Glu Met Cys Asp
145                 150                 155                 160

Asp Thr Val Thr Tyr Lys Cys Pro His Ile Thr Glu Val Glu Pro Glu
                165                 170                 175

Asp Ile Asp Cys Trp Cys Asn Leu Thr Ser Thr Trp Val Thr Tyr Gly
            180                 185                 190

Thr Cys Asn Gln Ala Gly Glu His Arg Arg Asp Lys Arg Ser Val Ala
        195                 200                 205

Leu Ala Pro His Val Gly Met Gly Leu Asp Thr Arg Thr Gln Thr Trp
    210                 215                 220

Met Ser Ala Glu Gly Ala Trp Arg Gln Val Glu Lys Val Glu Thr Trp
225                 230                 235                 240

Ala Leu Arg His Pro Gly Phe Thr Ile Leu Ala Leu Phe Leu Ala His
                245                 250                 255

Tyr Ile Gly Thr Ser Leu Thr Gln Lys Val Val Ile Phe Ile Leu Leu
            260                 265                 270

Met Leu Val Thr Pro Ser Met Thr Met Arg Cys Val Gly Val Gly Asn
        275                 280                 285

Arg Asp Phe Val Glu Gly Leu Ser Gly Ala Thr Trp Val Asp Val Val
    290                 295                 300

Leu Glu His Gly Gly Cys Val Thr Thr Met Ala Lys Asn Lys Pro Thr
305                 310                 315                 320

Leu Asp Ile Glu Leu Gln Lys Thr Glu Ala Thr Gln Leu Ala Thr Leu
                325                 330                 335
```

```
Arg Lys Leu Cys Ile Glu Gly Lys Ile Thr Asn Ile Thr Thr Asp Ser
            340                 345                 350

Arg Cys Pro Thr Gln Gly Glu Ala Ile Leu Pro Glu Glu Gln Asp Gln
        355                 360                 365

Asn Tyr Val Cys Lys His Thr Tyr Val Asp Arg Gly Trp Gly Asn Gly
    370                 375                 380

Cys Gly Leu Phe Gly Lys Gly Ser Leu Val Thr Cys Ala Lys Phe Gln
385                 390                 395                 400

Cys Leu Glu Ser Ile Glu Gly Lys Val Val Gln His Glu Asn Leu Lys
                405                 410                 415

Tyr Thr Val Ile Ile Thr Val His Thr Gly Asp Gln His Gln Val Gly
            420                 425                 430

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

Ala Glu Ala Ile Leu Pro Glu Tyr Gly Thr Leu Gly Leu Glu Cys Ser
    450                 455                 460

Pro Arg Thr Gly Leu Asp Phe Asn Glu Met Ile Ser Leu Thr Met Lys
465                 470                 475                 480

Asn Lys Ala Trp Met Val His Arg Gln Trp Phe Phe Asp Leu Pro Leu
                485                 490                 495

Pro Trp Thr Ser Gly Ala Ser Ala Glu Thr Pro Thr Trp Asn Arg Lys
            500                 505                 510

Glu Leu Leu Val Thr Phe Lys Asn Ala His Ala Lys Lys Gln Glu Val
        515                 520                 525

Val Val Leu Gly Ser Gln Glu Gly Ala Met His Thr Ala Leu Thr Gly
    530                 535                 540

Ala Thr Glu Ile Gln Thr Ser Gly Gly Thr Ser Ile Phe Ala Gly His
545                 550                 555                 560
```

```
Leu Lys Cys Arg Leu Lys Met Asp Lys Leu Glu Leu Lys Gly Met Ser
                565                 570                 575

Tyr Ala Met Cys Leu Ser Ser Phe Val Leu Lys Lys Glu Val Ser Glu
            580                 585                 590

Thr Gln His Gly Thr Ile Leu Ile Lys Val Glu Tyr Lys Gly Glu Asp
        595                 600                 605

Ala Pro Cys Lys Ile Pro Phe Ser Thr Glu Asp Gly Gln Gly Lys Ala
    610                 615                 620

Leu Asn Gly Arg Leu Ile Thr Ala Asn Pro Val Val Thr Lys Lys Glu
625                 630                 635                 640

Glu Pro Val Asn Ile Glu Ala Glu Pro Pro Phe Gly Glu Ser Asn Ile
                645                 650                 655

Val Ile Gly Ile Gly Asp Lys Ala Leu Lys Ile Asn Trp Tyr Lys Lys
            660                 665                 670

Gly Ser Ser Ile Gly Lys Met Phe Glu Ala Thr Ala Arg Gly Ala Arg
        675                 680                 685

Arg Met Ala Ile Leu Gly Asp Thr Ala Trp Asp Phe Gly Ser Val Gly
    690                 695                 700

Gly Val Leu Asn Ser Leu Gly Lys Met Val His Gln Ile Phe Gly Ser
705                 710                 715                 720

Ala Tyr Thr Ala Leu Phe Gly Gly Val Ser Trp Met Met Lys Ile Gly
                725                 730                 735

Ile Gly Val Leu Leu Thr Trp Ile Gly Leu Asn Ser Lys Asn Thr Ser
            740                 745                 750

Met Ser Phe Ser Cys Ile Ala Ala Gly Ile Val Thr Leu Tyr Leu Gly
        755                 760                 765
```

```
Val Met Val Gln Ala Asp Ser Gly Cys Val Val Ser Trp Lys Asn Lys
    770                 775                 780

Glu Leu Lys Cys Gly Ser Gly Ile Phe Ile Thr Asp Asn Val His Thr
785                 790                 795                 800

Trp Thr Glu Gln Tyr Lys Phe Gln Pro Glu Ser Pro Ser Lys Leu Ala
                805                 810                 815

Ser Ala Ile Gln Lys Ala His Glu Glu Asp Ile Cys Gly Ile Arg Ser
            820                 825                 830

Val Thr Arg Leu Glu Asn Leu Met Trp Lys Gln Ile Thr Pro Glu Leu
        835                 840                 845

Asn His Ile Leu Ser Glu Asn Glu Val Lys Leu Thr Ile Met Thr Gly
    850                 855                 860

Asp Ile Lys Gly Ile Met Gln Ala Gly Lys Arg Ser Leu Arg Pro Gln
865                 870                 875                 880

Pro Thr Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala Lys Met
                885                 890                 895

Leu Ser Thr Glu Ser His Asn Gln Thr Phe Leu Ile Asp Gly Pro Glu
            900                 905                 910

Thr Ala Glu Cys Pro Asn Thr Asn Arg Ala Trp Asn Ser Leu Glu Val
        915                 920                 925

Glu Asp Tyr Gly Phe Gly Val Phe Thr Thr Asn Ile Trp Leu Lys Leu
    930                 935                 940

Lys Glu Lys Gln Asp Val Phe Cys Asp Ser Lys Leu Met Ser Ala Ala
945                 950                 955                 960

Ile Lys Asp Asn Arg Ala Val His Ala Asp Met Gly Tyr Trp Ile Glu
                965                 970                 975

Ser Ala Leu Asn Asp Thr Trp Lys Ile Glu Lys Ala Ser Phe Ile Glu
            980                 985                 990
```

```
Val Lys Asn Cys His Trp Pro Lys  Ser His Thr Leu Trp  Ser Asn Gly
        995                 1000                1005


Val Leu  Glu Ser Glu Met Ile  Ile Pro Lys Asn Leu  Ala Gly Pro
    1010                1015                1020


Val Ser  Gln His Asn Tyr Arg  Pro Gly Tyr His Thr  Gln Ile Thr
    1025                1030                1035


Gly Pro  Trp His Leu Gly Lys  Leu Glu Met Asp Phe  Asp Phe Cys
    1040                1045                1050


Asp Gly  Thr Thr Val Val Val  Thr Glu Asp Cys Gly  Asn Arg Gly
    1055                1060                1065


Pro Ser  Leu Arg Thr Thr Thr  Ala Ser Gly Lys Leu  Ile Thr Glu
    1070                1075                1080


Trp Cys  Cys Arg Ser Cys Thr  Leu Pro Pro Leu Arg  Tyr Arg Gly
    1085                1090                1095


Glu Asp  Gly Cys Trp Tyr Gly  Met Glu Ile Arg Pro  Leu Lys Glu
    1100                1105                1110


Lys Glu  Glu Asn Leu Val Asn  Ser Leu Val Thr Ala  Gly His Gly
    1115                1120                1125


Gln Val  Asp Asn Phe Ser Leu  Gly Val Leu Gly Met  Ala Leu Phe
    1130                1135                1140


Leu Glu  Glu Met Leu Arg Thr  Arg Val Gly Thr Lys  His Ala Ile
    1145                1150                1155


Leu Leu  Val Ala Val Ser Phe  Val Thr Leu Ile Thr  Gly Asn Met
    1160                1165                1170


Ser Phe  Arg Asp Leu Gly Arg  Val Met Val Met Val  Gly Ala Thr
    1175                1180                1185
```

```
Met Thr  Asp Asp Ile Gly Met  Gly Val Thr Tyr Leu  Ala Leu Leu
    1190                1195                1200

Ala Ala  Phe Lys Val Arg Pro  Thr Phe Ala Ala Gly  Leu Leu Leu
    1205                1210                1215

Arg Lys  Leu Thr Ser Lys Glu  Leu Met Met Thr Thr  Ile Gly Ile
    1220                1225                1230

Val Leu  Leu Ser Gln Ser Thr  Ile Pro Glu Thr Ile  Leu Glu Leu
    1235                1240                1245

Thr Asp  Ala Leu Ala Leu Gly  Met Met Val Leu Lys  Met Val Arg
    1250                1255                1260

Asn Met  Glu Lys Tyr Gln Leu  Ala Val Thr Ile Met  Ala Ile Leu
    1265                1270                1275

Cys Val  Pro Asn Ala Val Ile  Leu Gln Asn Ala Trp  Lys Val Ser
    1280                1285                1290

Cys Thr  Ile Leu Ala Val Val  Ser Val Ser Pro Leu  Phe Leu Thr
    1295                1300                1305

Ser Ser  Gln Gln Lys Thr Asp  Trp Ile Pro Leu Ala  Leu Thr Ile
    1310                1315                1320

Lys Gly  Leu Asn Pro Thr Ala  Ile Phe Leu Thr Thr  Leu Ser Arg
    1325                1330                1335

Thr Ser  Lys Lys Arg Ser Trp  Pro Leu Asn Glu Ala  Ile Met Ala
    1340                1345                1350

Val Gly  Met Val Ser Ile Leu  Ala Ser Ser Leu Leu  Lys Asn Asp
    1355                1360                1365

Ile Pro  Met Thr Gly Pro Leu  Val Ala Gly Gly Leu  Leu Thr Val
    1370                1375                1380

Cys Tyr  Val Leu Thr Gly Arg  Ser Ala Asp Leu Glu  Leu Glu Arg
    1385                1390                1395
```

```
Ala Ala  Asp Val Lys Trp Glu  Asp Gln Ala Glu Ile  Ser Gly Ser
    1400                1405                1410

Ser Pro  Ile Leu Ser Ile Thr  Ile Ser Glu Asp Gly  Ser Met Ser
    1415                1420                1425

Ile Lys  Asn Glu Glu Glu Glu  Gln Thr Leu Thr Ile  Leu Ile Arg
    1430                1435                1440

Thr Gly  Leu Leu Val Ile Ser  Gly Leu Phe Pro Val  Ser Ile Pro
    1445                1450                1455

Ile Thr  Ala Ala Ala Trp Tyr  Leu Trp Glu Val Lys  Lys Gln Arg
    1460                1465                1470

Ala Gly  Val Leu Trp Asp Val  Pro Ser Pro Pro Pro  Met Gly Lys
    1475                1480                1485

Ala Glu  Leu Glu Asp Gly Ala  Tyr Arg Ile Lys Gln  Lys Gly Ile
    1490                1495                1500

Leu Gly  Tyr Ser Gln Ile Gly  Ala Gly Val Tyr Lys  Glu Gly Thr
    1505                1510                1515

Phe His  Thr Met Trp His Val  Thr Arg Gly Ala Val  Leu Met His
    1520                1525                1530

Lys Gly  Lys Arg Ile Glu Pro  Ser Trp Ala Asp Val  Lys Lys Asp
    1535                1540                1545

Leu Ile  Ser Tyr Gly Gly Gly  Trp Lys Leu Glu Gly  Glu Trp Lys
    1550                1555                1560

Glu Gly  Glu Glu Val Gln Val  Leu Ala Leu Glu Pro  Gly Lys Asn
    1565                1570                1575

Pro Arg  Ala Val Gln Thr Lys  Pro Gly Leu Phe Lys  Thr Asn Ala
    1580                1585                1590
```

```
Gly Thr  Ile Gly Ala Val Ser  Leu Asp Phe Ser Pro  Gly Thr Ser
    1595                1600                1605

Gly Ser  Pro Ile Ile Asp Lys  Lys Gly Lys Val Val  Gly Leu Tyr
    1610                1615                1620

Gly Asn  Gly Val Val Thr Arg  Ser Gly Ala Tyr Val  Ser Ala Ile
    1625                1630                1635

Ala Gln  Thr Glu Lys Ser Ile  Glu Asp Asn Pro Glu  Ile Glu Asp
    1640                1645                1650

Asp Ile  Phe Arg Lys Arg Arg  Leu Thr Ile Met Asp  Leu His Pro
    1655                1660                1665

Gly Ala  Gly Lys Thr Lys Arg  Tyr Leu Pro Ala Ile  Val Arg Glu
    1670                1675                1680

Ala Ile  Lys Arg Gly Leu Arg  Thr Leu Ile Leu Ala  Pro Thr Arg
    1685                1690                1695

Val Val  Ala Ala Glu Met Glu  Glu Ala Leu Arg Gly  Leu Pro Ile
    1700                1705                1710

Arg Tyr  Gln Thr Pro Ala Ile  Arg Ala Val His Thr  Gly Arg Glu
    1715                1720                1725

Ile Val  Asp Leu Met Cys His  Ala Thr Phe Thr Met  Arg Leu Leu
    1730                1735                1740

Ser Pro  Val Arg Val Pro Asn  Tyr Asn Leu Ile Ile  Met Asp Glu
    1745                1750                1755

Ala His  Phe Thr Asp Pro Ala  Ser Ile Ala Ala Arg  Gly Tyr Ile
    1760                1765                1770

Ser Thr  Arg Val Glu Met Gly  Glu Ala Ala Gly Ile  Phe Met Thr
    1775                1780                1785

Ala Thr  Pro Pro Gly Ser Arg  Asp Pro Phe Pro Gln  Ser Asn Ala
    1790                1795                1800
```

```
Pro Ile  Ile Asp Glu Glu Arg  Glu Ile Pro Glu Arg  Ser Trp Asn
    1805                1810                1815

Ser Gly  His Glu Trp Val Thr  Asp Phe Lys Gly Lys  Thr Val Trp
    1820                1825                1830

Phe Val  Pro Ser Ile Lys Ala  Gly Asn Asp Ile Ala  Ala Cys Leu
    1835                1840                1845

Arg Lys  Asn Gly Lys Lys Val  Ile Gln Leu Ser Arg  Lys Thr Phe
    1850                1855                1860

Asp Ser  Glu Tyr Val Lys Thr  Arg Thr Asn Asp Trp  Asp Phe Val
    1865                1870                1875

Val Thr  Thr Asp Ile Ser Glu  Met Gly Ala Asn Phe  Lys Ala Glu
    1880                1885                1890

Arg Val  Ile Asp Pro Arg Arg  Cys Met Lys Pro Val  Ile Leu Thr
    1895                1900                1905

Asp Gly  Glu Glu Arg Val Ile  Leu Ala Gly Pro Met  Pro Val Thr
    1910                1915                1920

His Ser  Ser Ala Ala Gln Arg  Arg Gly Arg Ile Gly  Arg Asn Pro
    1925                1930                1935

Lys Asn  Glu Asn Asp Gln Tyr  Ile Tyr Met Gly Glu  Pro Leu Glu
    1940                1945                1950

Asn Asp  Glu Asp Cys Ala His  Trp Lys Glu Ala Lys  Met Leu Leu
    1955                1960                1965

Asp Asn  Ile Asn Thr Pro Glu  Gly Ile Ile Pro Ser  Met Phe Glu
    1970                1975                1980

Pro Glu  Arg Glu Lys Val Asp  Ala Ile Asp Gly Glu  Tyr Arg Leu
    1985                1990                1995
```

```
Arg Gly  Glu Ala Arg Lys Thr  Phe Val Asp Leu Met  Arg Arg Gly
    2000                 2005                 2010

Asp Leu  Pro Val Trp Leu Ala  Tyr Arg Val Ala Ala  Glu Gly Ile
    2015                 2020                 2025

Asn Tyr  Ala Asp Arg Arg Trp  Cys Phe Asp Gly Val  Lys Asn Asn
    2030                 2035                 2040

Gln Ile  Leu Glu Glu Asn Val  Glu Val Glu Ile Trp  Thr Lys Glu
    2045                 2050                 2055

Gly Glu  Arg Lys Lys Leu Lys  Pro Arg Trp Leu Asp  Ala Arg Ile
    2060                 2065                 2070

Tyr Ser  Asp Pro Leu Ala Leu  Lys Glu Phe Lys Glu  Phe Ala Ala
    2075                 2080                 2085

Gly Arg  Lys Ser Leu Thr Leu  Asn Leu Ile Thr Glu  Met Gly Arg
    2090                 2095                 2100

Leu Pro  Thr Phe Met Thr Gln  Lys Ala Arg Asp Ala  Leu Asp Asn
    2105                 2110                 2115

Leu Ala  Val Leu His Thr Ala  Glu Ala Gly Gly Arg  Ala Tyr Asn
    2120                 2125                 2130

His Ala  Leu Ser Glu Leu Pro  Glu Thr Leu Glu Thr  Leu Leu Leu
    2135                 2140                 2145

Leu Thr  Leu Leu Ala Thr Val  Thr Gly Gly Ile Phe  Leu Phe Leu
    2150                 2155                 2160

Met Ser  Ala Arg Gly Ile Gly  Lys Met Thr Leu Gly  Met Cys Cys
    2165                 2170                 2175

Ile Ile  Thr Ala Ser Ile Leu  Leu Trp Tyr Ala Gln  Ile Gln Pro
    2180                 2185                 2190

His Trp  Ile Ala Ala Ser Ile  Ile Leu Glu Phe Phe  Leu Ile Val
    2195                 2200                 2205
```

```
Leu Leu  Ile Pro Glu Pro Glu  Lys Gln Arg Thr Pro  Gln Asp Asn
    2210                2215                2220

Gln Leu  Thr Tyr Val Val Ile  Ala Ile Leu Thr Val  Val Ala Ala
    2225                2230                2235

Thr Met  Ala Asn Glu Met Gly  Phe Leu Glu Lys Thr  Lys Lys Asp
    2240                2245                2250

Leu Gly  Leu Gly Ser Ile Ala  Thr Gln Gln Pro Glu  Ser Asn Ile
    2255                2260                2265

Leu Asp  Ile Asp Leu Arg Pro  Ala Ser Ala Trp Thr  Leu Tyr Ala
    2270                2275                2280

Val Ala  Thr Thr Phe Val Thr  Pro Met Leu Arg His  Ser Ile Glu
    2285                2290                2295

Asn Ser  Ser Val Asn Val Ser  Leu Thr Ala Ile Ala  Asn Gln Ala
    2300                2305                2310

Thr Val  Leu Met Gly Leu Gly  Lys Gly Trp Pro Leu  Ser Lys Met
    2315                2320                2325

Asp Ile  Gly Val Pro Leu Leu  Ala Ile Gly Cys Tyr  Ser Gln Val
    2330                2335                2340

Asn Pro  Ile Thr Leu Thr Ala  Ala Leu Phe Leu Leu  Val Ala His
    2345                2350                2355

Tyr Ala  Ile Ile Gly Pro Gly  Leu Gln Ala Lys Ala  Thr Arg Glu
    2360                2365                2370

Ala Gln  Lys Arg Ala Ala Ala  Gly Ile Met Lys Asn  Pro Thr Val
    2375                2380                2385

Asp Gly  Ile Thr Val Ile Asp  Leu Asp Pro Ile Pro  Tyr Asp Pro
    2390                2395                2400
```

```
Lys Phe  Glu Lys Gln Leu Gly  Gln Val Met Leu Leu  Val Leu Cys
    2405                 2410                 2415

Val Thr  Gln Val Leu Met Met  Arg Thr Thr Trp Ala  Leu Cys Glu
    2420                 2425                 2430

Ala Leu  Thr Leu Ala Thr Gly  Pro Ile Ser Thr Leu  Trp Glu Gly
    2435                 2440                 2445

Asn Pro  Gly Arg Phe Trp Asn  Thr Thr Ile Ala Val  Ser Met Ala
    2450                 2455                 2460

Asn Ile  Phe Arg Gly Ser Tyr  Leu Ala Gly Ala Gly  Leu Leu Phe
    2465                 2470                 2475

Ser Ile  Met Lys Asn Thr Thr  Asn Thr Arg Arg Gly  Thr Gly Asn
    2480                 2485                 2490

Ile Gly  Glu Thr Leu Gly Glu  Lys Trp Lys Ser Arg  Leu Asn Ala
    2495                 2500                 2505

Leu Gly  Lys Ser Glu Phe Gln  Ile Tyr Lys Lys Ser  Gly Ile Gln
    2510                 2515                 2520

Glu Val  Asp Arg Thr Leu Ala  Lys Glu Gly Ile Lys  Arg Gly Glu
    2525                 2530                 2535

Thr Asp  His His Ala Val Ser  Arg Gly Ser Ala Lys  Leu Arg Trp
    2540                 2545                 2550

Phe Val  Glu Arg Asn Met Val  Thr Pro Glu Gly Lys  Val Val Asp
    2555                 2560                 2565

Leu Gly  Cys Gly Arg Gly Gly  Trp Ser Tyr Tyr Cys  Gly Gly Leu
    2570                 2575                 2580

Lys Asn  Val Arg Glu Val Lys  Gly Leu Thr Lys Gly  Gly Pro Gly
    2585                 2590                 2595

His Glu  Glu Pro Ile Pro Met  Ser Thr Tyr Gly Trp  Asn Leu Val
    2600                 2605                 2610
```

```
Arg Leu  Gln Ser Gly Val Asp  Val Phe Phe Ile Pro  Pro Glu Lys
    2615                 2620                 2625

Cys Asp  Thr Leu Leu Cys Asp  Ile Gly Glu Ser Ser  Pro Asn Pro
    2630                 2635                 2640

Thr Val  Glu Ala Gly Arg Thr  Leu Arg Val Leu Asn  Leu Val Glu
    2645                 2650                 2655

Asn Trp  Leu Asn Asn Asn Thr  Gln Phe Cys Ile Lys  Val Leu Asn
    2660                 2665                 2670

Pro Tyr  Met Pro Ser Val Ile  Glu Lys Met Glu Ala  Leu Gln Arg
    2675                 2680                 2685

Lys Tyr  Gly Gly Ala Leu Val  Arg Asn Pro Leu Ser  Arg Asn Ser
    2690                 2695                 2700

Thr His  Glu Met Tyr Trp Val  Ser Asn Ala Ser Gly  Asn Ile Val
    2705                 2710                 2715

Ser Ser  Val Asn Met Ile Ser  Arg Met Leu Ile Asn  Arg Phe Thr
    2720                 2725                 2730

Met Arg  Tyr Lys Lys Ala Thr  Tyr Glu Pro Asp Val  Asp Leu Gly
    2735                 2740                 2745

Ser Gly  Thr Arg Asn Ile Gly  Ile Glu Ser Glu Ile  Pro Asn Leu
    2750                 2755                 2760

Asp Ile  Ile Gly Lys Arg Ile  Glu Lys Ile Lys Gln  Glu His Glu
    2765                 2770                 2775

Thr Ser  Trp His Tyr Asp Gln  Asp His Pro Tyr Lys  Thr Trp Ala
    2780                 2785                 2790

Tyr His  Gly Ser Tyr Glu Thr  Lys Gln Thr Gly Ser  Ala Ser Ser
    2795                 2800                 2805
```

```
Met Val  Asn Gly Val Val Arg  Leu Leu Thr Lys Pro  Trp Asp Val
    2810                 2815                 2820

Val Pro  Met Val Thr Gln Met  Ala Met Thr Asp Thr  Thr Pro Phe
    2825                 2830                 2835

Gly Gln  Gln Arg Val Phe Lys  Glu Lys Val Asp Thr  Arg Thr Gln
    2840                 2845                 2850

Glu Pro  Lys Glu Gly Thr Lys  Lys Leu Met Lys Ile  Thr Ala Glu
    2855                 2860                 2865

Trp Leu  Trp Lys Glu Leu Gly  Lys Lys Lys Thr Pro  Arg Met Cys
    2870                 2875                 2880

Thr Arg  Glu Glu Phe Thr Arg  Lys Val Arg Ser Asn  Ala Ala Leu
    2885                 2890                 2895

Gly Ala  Ile Phe Thr Asp Glu  Asn Lys Trp Lys Ser  Ala Arg Glu
    2900                 2905                 2910

Ala Val  Glu Asp Ser Arg Phe  Trp Glu Leu Val Asp  Lys Glu Arg
    2915                 2920                 2925

Asn Leu  His Leu Glu Gly Lys  Cys Glu Thr Cys Val  Tyr Asn Met
    2930                 2935                 2940

Met Gly  Lys Arg Glu Lys Lys  Leu Gly Glu Phe Gly  Lys Ala Lys
    2945                 2950                 2955

Gly Ser  Arg Ala Ile Trp Tyr  Met Trp Leu Gly Ala  Arg Phe Leu
    2960                 2965                 2970

Glu Phe  Glu Ala Leu Gly Phe  Leu Asn Glu Asp His  Trp Phe Ser
    2975                 2980                 2985

Arg Glu  Asn Ser Leu Ser Gly  Val Glu Gly Glu Gly  Leu His Lys
    2990                 2995                 3000

Leu Gly  Tyr Ile Leu Arg Asp  Val Ser Lys Lys Glu  Gly Gly Ala
    3005                 3010                 3015
```

```
Met Tyr  Ala Asp Asp Thr Ala  Gly Trp Asp Thr Arg  Ile Thr Leu
    3020                3025                3030

Glu Asp  Leu Lys Asn Glu Glu  Met Val Thr Asn His  Met Glu Gly
    3035                3040                3045

Glu His  Lys Lys Leu Ala Glu  Ala Ile Phe Lys Leu  Thr Tyr Gln
    3050                3055                3060

Asn Lys  Val Val Arg Val Gln  Arg Pro Thr Pro Arg  Gly Thr Val
    3065                3070                3075

Met Asp  Ile Ile Ser Arg Arg  Asp Gln Arg Gly Ser  Gly Gln Val
    3080                3085                3090

Gly Thr  Tyr Gly Leu Asn Thr  Phe Thr Asn Met Glu  Ala Gln Leu
    3095                3100                3105

Ile Arg  Gln Met Glu Gly Glu  Gly Val Phe Lys Ser  Ile Gln His
    3110                3115                3120

Leu Thr  Ile Thr Glu Glu Ile  Ala Val Gln Asn Trp  Leu Ala Arg
    3125                3130                3135

Val Gly  Arg Glu Arg Leu Ser  Arg Met Ala Ile Ser  Gly Asp Asp
    3140                3145                3150

Cys Val  Val Lys Pro Leu Asp  Asp Arg Phe Ala Ser  Ala Leu Thr
    3155                3160                3165

Ala Leu  Asn Asp Met Gly Lys  Ile Arg Lys Asp Ile  Gln Gln Trp
    3170                3175                3180

Glu Pro  Ser Arg Gly Trp Asn  Asp Trp Thr Gln Val  Pro Phe Cys
    3185                3190                3195

Ser His  His Phe His Glu Leu  Ile Met Lys Asp Gly  Arg Val Leu
    3200                3205                3210
```

```
Val Val  Pro Cys Arg Asn Gln  Asp Glu Leu Ile Gly  Arg Ala Arg
    3215                 3220                 3225

Ile Ser  Gln Gly Ala Gly Trp  Ser Leu Arg Glu Thr  Ala Cys Leu
    3230                 3235                 3240

Gly Lys  Ser Tyr Ala Gln Met  Trp Ser Leu Met Tyr  Phe His Arg
    3245                 3250                 3255

Arg Asp  Leu Arg Leu Ala Ala  Asn Ala Ile Cys Ser  Ala Val Pro
    3260                 3265                 3270

Ser His  Trp Val Pro Thr Ser  Arg Thr Thr Trp Ser  Ile His Ala
    3275                 3280                 3285

Lys His  Glu Trp Met Thr Thr  Glu Asp Met Leu Thr  Val Trp Asn
    3290                 3295                 3300

Arg Val  Trp Ile Gln Glu Asn  Pro Trp Met Glu Asp  Lys Thr Pro
    3305                 3310                 3315

Val Glu  Ser Trp Glu Glu Ile  Pro Tyr Leu Gly Lys  Arg Glu Asp
    3320                 3325                 3330

Gln Trp  Cys Gly Ser Leu Ile  Gly Leu Thr Ser Arg  Ala Thr Trp
    3335                 3340                 3345

Ala Lys  Asn Ile Gln Ala Ala  Ile Asn Gln Val Arg  Ser Leu Ile
    3350                 3355                 3360

Gly Asn  Glu Glu Tyr Thr Asp  Tyr Met Pro Ser Met  Lys Arg Phe
    3365                 3370                 3375

Arg Arg  Glu Glu Glu Glu Ala  Gly Val Leu Trp
    3380                 3385
```

<210> 7
<211> 10723
<212> DNA
<213> chimeric dengue seroytpe 2/4 (MVS)

<220>
<221> r
<222> (3773)..(3773)
<223> a or g

<400> 7
agttgttagt ctacgtggac cgacaaagac agattctttg agggagctaa gctcaatgta 60

gttctaacag ttttttaatt agagagcaga tctctgatga ataaccaacg gaaaaaggcg 120

aaaaacacgc ctttcaatat gctgaaacgc gagagaaacc gcgtgtcgac tgtgcaacag 180

ctgacaaaga gattctcact tggaatgctg cagggacgag gacctttaaa actgttcatg 240

gccctggtgg cgttccttcg tttcctaaca atcccaccaa cagcagggat attgaagaga 300

tggggaacaa ttaaaaaatc aaaagctatt aatgttttga gagggttcag gaaagagatt 360

ggaaggatgc tgaacatctt gaataggaga cgcagctctg caggcatgat cattatgctg 420

attccaacag tgatggcgtt ccatttaacc acgcgtgatg gcgaacccct catgatagtg 480

gcaaaacatg aaaggggggag acctctcttg tttaagacaa cagaggggat caacaaatgc 540

actctcattg ccatggactt gggtgaaatg tgtgaggaca ctgtcacgta taaatgcccc 600

ttactggtca ataccgaacc tgaagacatt gattgctggt gcaatctcac gtctacctgg 660

gtcatgtatg ggacatgcac ccagagcgga gaacggagac gagagaagcg ctcagtagct 720

ttaacaccac attcaggaat gggattggaa acaagagctg agacatggat gtcatcggaa 780

ggggcttgga agcatgctca gagagtagag agctggatac tcagaaaccc aggattcgcg 840

ctcttggcag gatttatggc ttatatgatt gggcaaacag gaatccagcg aactgtcttc 900

tttgtcctaa tgatgctggt cgccccatcc tacggaatgc gatgcgtagg agtaggaaac 960

agagactttg tggaaggagt ctcaggtgga gcatgggtcg atctggtgct agaacatgga 1020

ggatgcgtca caaccatggc ccagggaaaa ccaaccttgg attttgaact gactaagaca 1080

acagccaagg aagtggctct gttaagaacc tattgcattg aagcctcaat atcaaacata 1140

accacggcaa caagatgtcc aacgcaagga gagccttatc taaaagagga acaagaccaa 1200

cagtacattt gccggagaga tgtggtagac agagggtggg gcaatggctg tggcttgttt 1260

ggaaaaggag gagttgtgac atgtgcgaag ttttcatgtt cggggaagat aacaggcaat 1320

ttggtccaaa ttgagaacct tgaatacaca gtggttgtaa cagtccacaa tggagacacc 1380

catgcagtag gaaatgacac gtccaatcat ggagttacag ccacgataac tcccaggtca 1440

ccatcggtgg aagtcaaatt gccggactat ggagaactaa cactcgattg tgaacccagg 1500

tctggaattg actttaatga gatgattctg atgaaaatga aaaagaaaac atggcttgtg 1560

cataagcaat ggtttttgga tctacctcta ccatggacag caggagcaga cacatcagag 1620

gttcactgga attacaaaga gagaatggtg acatttaagg ttcctcatgc caagagacag 1680

gatgtgacag tgctgggatc tcaggaagga gccatgcatt ctgccctcgc tggagccaca 1740

gaagtggact ccggtgatgg aaatcacatg tttgcaggac atctcaagtg caaagtccgt 1800

atggagaaat tgagaatcaa gggaatgtca tacacgatgt gttcaggaaa gttctcaatt 1860

gacaaagaga tggcagaaac acagcatggg acaacagtgg tgaaagtcaa gtatgaaggt 1920

gctggagctc cgtgtaaagt ccccatagag ataagagatg tgaacaagga aaaagtggtt 1980

gggcgtatca tctcatccac ccctttggct gagaatacca acagtgtaac caacatagag 2040

ttagaacccc cctttgggga cagctacata gtgataggtg ttggaaacag tgcattaaca 2100

ctccattggt tcaggaaagg gagttccatt ggcaagatgt ttgagtccac atacagaggt 2160

gcaaaacgaa tggccattct aggtgaaaca gcttgggatt ttggttccgt tggtggactg 2220

ttcacatcat tgggaaaggc tgtgcaccag gtttttggaa gtgtgtatac aaccctgttt 2280

ggaggagtct catggatgat tagaatccta attgggttcc tagtgttgtg gattggcacg 2340

aactcaagga acacttcaat ggctatgacg tgcatagctg ccggcattgt gacactgtat 2400

ttgggggtca tggtgcaggc cgatagtggt tgcgttgtga gctggaaaaa caaagaactg 2460

aaatgtggca gtgggatttt catcacagac aacgtgcaca catggacaga acaatacaag 2520

ttccaaccag aatccccttc aaaactagct tcagctatcc agaaagccca tgaagaggac 2580

atttgtggaa tccgctcagt aacaagactg gagaatctga tgtggaaaca aataacacca 2640

gaattgaatc acattctatc agaaaatgag gtgaagttaa ctattatgac aggagacatc 2700

aaaggaatca tgcaggcagg aaaacgatct ctgcggcctc agcccactga gctgaagtat 2760

tcatggaaaa catggggcaa agcaaaaatg ctctctacag agtctcataa ccagaccttt 2820

ctcattgatg gccccgaaac agcagaatgc cccaacacaa atagagcttg gaattcgttg 2880

gaagttgaag actatggctt tggagtattc accaccaata tatggctaaa attgaaagaa 2940

aaacaggatg tattctgcga ctcaaaactc atgtcagcgg ccataaaaga caacagagcc 3000

gtccatgccg atatgggtta ttggatagaa agtgcactca atgacacatg gaagatagag 3060

aaagcctctt tcattgaagt taaaaactgc cactggccaa aatcacacac cctctggagc 3120

aatggagtgc tagaaagtga gatgataatt ccaaagaatc tcgctggacc agtgtctcaa 3180

cacaactata gaccaggcta ccatacacaa ataacaggac catggcatct aggtaagctt 3240

gagatggact ttgatttctg tgatggaaca acagtggtag tgactgagga ctgcggaaat 3300

agaggaccct ctttgagaac aaccactgcc tctggaaaac tcataacaga atggtgctgc 3360

cgatcttgca cattaccacc gctaagatac agaggtgagg atgggtgctg gtacgggatg 3420

gaaatcagac cattgaagga gaaagaagag aatttggtca actccttggt cacagctgga 3480

catgggcagg tcgacaactt ttcactagga gtcttgggaa tggcattgtt cctggaggaa 3540

atgcttagga cccgagtagg aacgaaacat gcaatactac tagttgcagt ttcttttgtg 3600

acattgatca cagggaacat gtcctttaga gacctgggaa gagtgatggt tatggtaggc 3660

gccactatga cgggtgacat aggtatgggc gtgacttatc ttgccctact agcagccttc 3720

aaagtcagac caacttttgc agctggacta ctcttgagaa agctgacctc carggaattg 3780

atgatgacta ctataggaat tgtactcctc tcccagagca ccataccaga gaccattctt 3840

gagttgactg atgcgttagc cttaggcatg atggtcctca aaatggtgag aaatatggaa 3900

aagtatcaat tggcagtgac tatcatggct atcttgtgcg tcccaaacgc agtgatatta 3960

caaaacgcat ggaaagtgag ttgcacaata ttggcagtgg tgtccgtttc cccactgttc 4020

ttaacatcct cacagcaaaa aacagattgg ataccattag cattgacgat caaaggtctc 4080

aatccaacag ctatttttct aacaaccctc tcaagaacca gcaagaaaag gagctggcca 4140

ttaaatgagg ctatcatggc agtcgggatg gtgagcattt tagccagttc tctcctaaaa 4200

aatgatattc ccatgacagg accattagtg gctggagggc tcctcactgt gtgctacgtg 4260

ctcactggac gatcggccga tttggaactg gagagagcag ccgatgtcaa atgggaagac 4320

caggcagaga tatcaggaag cagtccaatc ctgtcaataa caatatcaga agatggtagc 4380

atgtcgataa aaaatgaaga ggaagaacaa acactgacca tactcattag aacaggattg 4440

ctggtgatct caggactttt tcctgtatca ataccaatca cggcagcagc atggtacctg 4500

tgggaagtga agaaacaacg ggccggagta ttgtgggatg ttccttcacc cccacccatg 4560

ggaaaggctg aactggaaga tggagcctat agaattaagc aaaaagggat tcttggatat 4620

tcccagatcg gagccggagt ttacaaagaa ggaacattcc atacaatgtg gcatgtcaca 4680

cgtggcgctg ttctaatgca taaaggaaag aggattgaac catcatgggc ggacgtcaag 4740

aaagacctaa tatcatatgg aggaggctgg aagttagaag gagaatggaa ggaaggagaa 4800

gaagtccagg tattggcact ggagcctgga aaaaatccaa gagccgtcca aacgaaacct 4860

ggtcttttca aaaccaacgc cggaacaata ggtgctgtat ctctggactt ttctcctgga 4920

acgtcaggat ctccaattat cgacaaaaaa ggaaaagttg tgggtcttta tggtaatggt 4980

gttgttacaa ggagtggagc atatgtgagt gctatagccc agactgaaaa aagcattgaa 5040

gacaacccag agatcgaaga tgacattttc cgaaagagaa gactgaccat catggacctc 5100

cacccaggag cgggaaagac gaagagatac cttccggcca tagtcagaga agctataaaa 5160

cggggtttga gaacattaat cttggccccc actagagttg tggcagctga aatggaggaa 5220

gcccttagag gacttccaat aagataccag accccagcca tcagagctgt gcacaccggg 5280

cgggagattg tggacctaat gtgtcatgcc acatttacca tgaggctgct atcaccagtt 5340

agagtgccaa actacaacct gattatcatg gacgaagccc atttcacaga tccagcaagt 5400

atagcagcta gaggatacat ctcaactcga gtggagatgg gtgaggcagc tgggattttt 5460

atgacagcca ctcccccggg aagcagagac ccatttcctc agagcaatgc accaatcata 5520

gatgaagaaa gagaaatccc tgaacgctcg tggaattccg gacatgaatg ggtcacggat 5580

tttaaaggga agactgtttg gttcgttcca agtataaaag caggaaatga tatagcagct 5640

tgcctgagga aaaatggaaa gaaagtgata caactcagta ggaagacctt tgattctgag 5700

tatgtcaaga ctagaaccaa tgattgggac ttcgtggtta caactgacat ttcagaaatg 5760

ggtgccaatt tcaaggctga gagggttata gaccccagac gctgcatgaa accagtcata 5820

ctaacagatg gtgaagagcg ggtgattctg gcaggaccta tgccagtgac ccactctagt 5880

gcagcacaaa gaagagggag aataggaaga aatccaaaaa atgagaatga ccagtacata 5940

tacatggggg aacctctgga aaatgatgaa gactgtgcac actggaaaga agctaaaatg 6000

ctcctagata acatcaacac gccagaagga atcattccta gcatgttcga accagagcgt 6060

gaaaaggtgg atgccattga tggcgaatac cgcttgagag gagaagcaag gaaaaccttt 6120

gtagacttaa tgagaagagg agacctacca gtctggttgg cctacagagt ggcagctgaa 6180

ggcatcaact acgcagacag aaggtggtgt tttgatggag tcaagaacaa ccaaatccta 6240

gaagaaaacg tggaagttga aatctggaca aaagaagggg aaaggaagaa attgaaaccc 6300

agatggttgg atgctaggat ctattctgac ccactggcgc taaaagaatt taaggaattt 6360

gcagccggaa gaaagtctct gaccctgaac ctaatcacag aaatgggtag gctcccaacc 6420

ttcatgactc agaaggtaag agacgcactg gacaacttag cagtgctgca cacggctgag 6480

gcaggtggaa gggcgtacaa ccatgctctc agtgaactgc cggagaccct ggagacattg 6540

cttttactga cacttctggc tacagtcacg ggagggatct ttttattctt gatgagcgca 6600

aggggcatag ggaagatgac cctgggaatg tgctgcataa tcacggctag catcctccta 6660

tggtacgcac aaatacagcc acactggata gcagcttcaa taatactgga gtttttttctc 6720

atagttttgc ttattccaga acctgaaaaa cagagaacac cccaagacaa ccaactgacc 6780

tacgttgtca tagccatcct cacagtggtg gccgcaacca tggcaaacga gatgggtttc 6840

ctagaaaaaa cgaagaaaga tctcggattg ggaagcattg caacccagca acccgagagc 6900

aacatcctgg acatagatct acgtcctgca tcagcatgga cgctgtatgc cgtggccaca 6960

acatttgtta caccaatgtt gagacatagc attgaaaatt cctcagtgaa tgtgtcccta 7020

acagccatag ccaaccaagc cacagtgtta atgggtctcg ggaaaggatg gccattgtca 7080

aagatggaca tcggagttcc ccttctcgcc attggatgct actcacaagt caaccccata 7140

actctcacag cagctctttt cttattggta gcacattatg ccatcatagg gccaggactc 7200

caagcaaaag caaccagaga agctcagaaa agagcagcgg cgggcatcat gaaaaaccca 7260

actgtcgatg gaataacagt gattgaccta gatccaatac cttatgatcc aaagtttgaa 7320

aagcagttgg gacaagtaat gctcctagtc ctctgcgtga ctcaagtatt gatgatgagg 7380

actacatggg ctctgtgtga ggctttaacc ttagctaccg ggcccatctc cacattgtgg 7440

gaaggaaatc cagggaggtt ttggaacact accattgcgg tgtcaatggc taacattttt 7500

agagggagtt acttggccgg agctggactt ctcttttcta ttatgaagaa cacaaccaac 7560

acaagaaggg gaactggcaa cataggagag acgcttggag agaaatggaa aagccgattg 7620

aacgcattgg gaaaaagtga attccagatc tacaagaaaa gtggaatcca ggaagtggat 7680

agaaccttag caaaagaagg cattaaaaga ggagaaacgg accatcacgc tgtgtcgcga 7740

ggctcagcaa aactgagatg gttcgttgag agaaacatgg tcacaccaga agggaaagta 7800

gtggacctcg gttgtggcag aggaggctgg tcatactatt gtggaggact aaagaatgta 7860

agagaagtca aaggcctaac aaaaggagga ccaggacacg aagaacccat ccccatgtca 7920

acatatgggt ggaatctagt gcgtcttcaa agtggagttg acgttttctt catcccgcca 7980

gaaaagtgtg acacattatt gtgtgacata ggggagtcat caccaaatcc cacagtggaa 8040

gcaggacgaa cactcagagt ccttaactta gtagaaaatt ggttgaacaa caacactcaa 8100

ttttgcataa aggttctcaa cccatatatg ccctcagtca tagaaaaaat ggaagcacta 8160

caaaggaaat atggaggagc cttagtgagg aatccactct cacgaaactc cacacatgag 8220

atgtactggg tatccaatgc ttccgggaac atagtgtcat cagtgaacat gatttcaagg 8280

atgttgatca acagatttac aatgagatac aagaaagcca cttacgagcc ggatgttgac 8340

ctcggaagcg gaacccgtaa catcgggatt gaaagtgaga taccaaacct agatataatt 8400

gggaaaagaa tagaaaaaat aaagcaagag catgaaacat catggcacta tgaccaagac 8460

cacccataca aaacgtgggc ataccatggt agctatgaaa caaaacagac tggatcagca 8520

tcatccatgg tcaacggagt ggtcaggctg ctgacaaaac cttgggacgt cgtccccatg 8580

gtgacacaga tggcaatgac agacacgact ccatttggac aacagcgcgt ttttaaagag 8640

aaagtggaca cgagaaccca agaaccgaaa gaaggcacga agaaactaat gaaaataaca 8700

gcagagtggc tttggaaaga attagggaag aaaaagacac ccaggatgtg caccagagaa 8760

gaattcacaa gaaaggtgag aagcaatgca gccttggggg ccatattcac tgatgagaac 8820

aagtggaagt cggcacgtga ggctgttgaa gatagtaggt tttgggagct ggttgacaag 8880

gaaaggaatc tccatcttga aggaaagtgt gaaacatgtg tgtacaacat gatgggaaaa 8940

agagagaaga agctagggga attcggcaag gcaaaaggca gcagagccat atggtacatg 9000

tggcttggag cacgcttctt agagtttgaa gccctaggat tcttaaatga agatcactgg 9060

ttctccagag agaactccct gagtggagtg gaaggagaag ggctgcacaa gctaggttac 9120

attctaagag acgtgagcaa gaaagaggga ggagcaatgt atgccgatga caccgcagga 9180

tgggatacaa gaatcacact agaagaccta aaaaatgaag aaatggtaac aaaccacatg 9240

gaaggagaac acaagaaact agccgaggcc attttcaaac taacgtacca aaacaaggtg 9300

gtgcgtgtgc aaagaccaac accaagaggc acagtaatgg acatcatatc gagaagagac 9360

caaagaggta gtggacaagt tggcacctat ggactcaata ctttcaccaa tatggaagcc 9420

caactaatca gacagatgga gggagaagga gtctttaaaa gcattcagca cctaacaatc 9480

acagaagaaa tcgctgtgca aaactggtta gcaagagtgg ggcgcgaaag gttatcaaga 9540

atggccatca gtggagatga ttgtgttgtg aaacctttag atgacaggtt cgcaagcgct 9600

ttaacagctc taaatgacat gggaaagatt aggaaagaca tacaacaatg ggaaccttca 9660

agaggatgga atgattggac acaagtgccc ttctgttcac accatttcca tgagttaatc 9720

atgaaagacg gtcgcgtact cgttgttccc tgtagaaacc aagatgaact gattggcaga 9780

gcccgaatct cccaaggagc agggtggtct ttgcgggaga cggcctgttt ggggaagtct 9840

tacgcccaaa tgtggagctt gatgtacttc cacagacgcg acctcaggct ggcggcaaat 9900

gctatttgct cggcagtacc atcacattgg gttccaacaa gtcgaacaac ctggtccata 9960

catgctaaac atgaatggat gacaacggaa gacatgctga cagtctggaa cagggtgtgg 10020

attcaagaaa acccatggat ggaagacaaa actccagtgg aatcatggga ggaaatccca 10080

tacttgggga aaagagaaga ccaatggtgc ggctcattga ttgggttaac aagcagggcc 10140

acctgggcaa agaacatcca agcagcaata aatcaagtta gatcccttat aggcaatgaa 10200

gaatacacag attacatgcc atccatgaaa agattcagaa gagaagagga agaagcagga 10260

gttctgtggt agaaagcaaa actaacatga aacaaggcta gaagtcaggt cggattaagc 10320

catagtacgg aaaaaactat gctacctgtg agccccgtcc aaggacgtta aaagaagtca 10380

ggccatcata aatgccatag cttgagtaaa ctatgcagcc tgtagctcca cctgagaagg 10440

tgtaaaaaat ccgggaggcc acaaaccatg gaagctgtac gcatggcgta gtggactagc 10500

ggttagagga gacccctccc ttacaaatcg cagcaacaat gggggcccaa ggcgagatga 10560

agctgtagtc tcgctggaag gactagaggt tagaggagac ccccccgaaa caaaaaacag 10620

catattgacg ctgggaaaga ccagagatcc tgctgtctcc tcagcatcat tccaggcaca 10680

gaacgccaga aaatggaatg gtgctgttga atcaacaggt tct 10723

<210> 8
<211> 3391
<212> PRT
<213> chimeric dengue serotype 2/4 (MVS)

<220>
<221> Xaa
<222> (1226)..(1226)
<223> Arg or Lys

<400> 8

```
Met Asn Asn Gln Arg Lys Lys Ala Lys Asn Thr Pro Phe Asn Met Leu
1               5                   10                  15

Lys Arg Glu Arg Asn Arg Val Ser Thr Val Gln Gln Leu Thr Lys Arg
            20                  25                  30

Phe Ser Leu Gly Met Leu Gln Gly Arg Gly Pro Leu Lys Leu Phe Met
        35                  40                  45

Ala Leu Val Ala Phe Leu Arg Phe Leu Thr Ile Pro Pro Thr Ala Gly
    50                  55                  60

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

Leu Arg Gly Phe Arg Lys Glu Ile Gly Arg Met Leu Asn Ile Leu Asn
                85                  90                  95

Arg Arg Arg Ser Ser Ala Gly Met Ile Ile Met Leu Ile Pro Thr Val
            100                 105                 110

Met Ala Phe His Leu Thr Thr Arg Asp Gly Glu Pro Leu Met Ile Val
        115                 120                 125

Ala Lys His Glu Arg Gly Arg Pro Leu Leu Phe Lys Thr Thr Glu Gly
    130                 135                 140

Ile Asn Lys Cys Thr Leu Ile Ala Met Asp Leu Gly Glu Met Cys Glu
145                 150                 155                 160

Asp Thr Val Thr Tyr Lys Cys Pro Leu Leu Val Asn Thr Glu Pro Glu
                165                 170                 175

Asp Ile Asp Cys Trp Cys Asn Leu Thr Ser Thr Trp Val Met Tyr Gly
            180                 185                 190

Thr Cys Thr Gln Ser Gly Glu Arg Arg Arg Glu Lys Arg Ser Val Ala
        195                 200                 205

Leu Thr Pro His Ser Gly Met Gly Leu Glu Thr Arg Ala Glu Thr Trp
    210                 215                 220
```

```
Met Ser Ser Glu Gly Ala Trp Lys His Ala Gln Arg Val Glu Ser Trp
225                 230                 235                 240

Ile Leu Arg Asn Pro Gly Phe Ala Leu Leu Ala Gly Phe Met Ala Tyr
                245                 250                 255

Met Ile Gly Gln Thr Gly Ile Gln Arg Thr Val Phe Phe Val Leu Met
            260                 265                 270

Met Leu Val Ala Pro Ser Tyr Gly Met Arg Cys Val Gly Val Gly Asn
        275                 280                 285

Arg Asp Phe Val Glu Gly Val Ser Gly Gly Ala Trp Val Asp Leu Val
    290                 295                 300

Leu Glu His Gly Gly Cys Val Thr Thr Met Ala Gln Gly Lys Pro Thr
305                 310                 315                 320

Leu Asp Phe Glu Leu Thr Lys Thr Thr Ala Lys Glu Val Ala Leu Leu
                325                 330                 335

Arg Thr Tyr Cys Ile Glu Ala Ser Ile Ser Asn Ile Thr Thr Ala Thr
            340                 345                 350

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

Gln Tyr Ile Cys Arg Arg Asp Val Val Asp Arg Gly Trp Gly Asn Gly
    370                 375                 380

Cys Gly Leu Phe Gly Lys Gly Gly Val Val Thr Cys Ala Lys Phe Ser
385                 390                 395                 400

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

Tyr Thr Val Val Val Thr Val His Asn Gly Asp Thr His Ala Val Gly
            420                 425                 430
```

```
Asn Asp Thr Ser Asn His Gly Val Thr Ala Thr Ile Thr Pro Arg Ser
        435                 440                 445

Pro Ser Val Glu Val Lys Leu Pro Asp Tyr Gly Glu Leu Thr Leu Asp
    450                 455                 460

Cys Glu Pro Arg Ser Gly Ile Asp Phe Asn Glu Met Ile Leu Met Lys
465                 470                 475                 480

Met Lys Lys Lys Thr Trp Leu Val His Lys Gln Trp Phe Leu Asp Leu
                485                 490                 495

Pro Leu Pro Trp Thr Ala Gly Ala Asp Thr Ser Glu Val His Trp Asn
            500                 505                 510

Tyr Lys Glu Arg Met Val Thr Phe Lys Val Pro His Ala Lys Arg Gln
        515                 520                 525

Asp Val Thr Val Leu Gly Ser Gln Glu Gly Ala Met His Ser Ala Leu
    530                 535                 540

Ala Gly Ala Thr Glu Val Asp Ser Gly Asp Gly Asn His Met Phe Ala
545                 550                 555                 560

Gly His Leu Lys Cys Lys Val Arg Met Glu Lys Leu Arg Ile Lys Gly
                565                 570                 575

Met Ser Tyr Thr Met Cys Ser Gly Lys Phe Ser Ile Asp Lys Glu Met
            580                 585                 590

Ala Glu Thr Gln His Gly Thr Thr Val Val Lys Val Lys Tyr Glu Gly
        595                 600                 605

Ala Gly Ala Pro Cys Lys Val Pro Ile Glu Ile Arg Asp Val Asn Lys
    610                 615                 620

Glu Lys Val Val Gly Arg Ile Ile Ser Ser Thr Pro Leu Ala Glu Asn
625                 630                 635                 640

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

```
Tyr Ile Val Ile Gly Val Gly Asn Ser Ala Leu Thr Leu His Trp Phe
            660                 665                 670

Arg Lys Gly Ser Ser Ile Gly Lys Met Phe Glu Ser Thr Tyr Arg Gly
        675                 680                 685

Ala Lys Arg Met Ala Ile Leu Gly Glu Thr Ala Trp Asp Phe Gly Ser
    690                 695                 700

Val Gly Gly Leu Phe Thr Ser Leu Gly Lys Ala Val His Gln Val Phe
705                 710                 715                 720

Gly Ser Val Tyr Thr Thr Leu Phe Gly Gly Val Ser Trp Met Ile Arg
                725                 730                 735

Ile Leu Ile Gly Phe Leu Val Leu Trp Ile Gly Thr Asn Ser Arg Asn
            740                 745                 750

Thr Ser Met Ala Met Thr Cys Ile Ala Ala Gly Ile Val Thr Leu Tyr
        755                 760                 765

Leu Gly Val Met Val Gln Ala Asp Ser Gly Cys Val Val Ser Trp Lys
    770                 775                 780

Asn Lys Glu Leu Lys Cys Gly Ser Gly Ile Phe Ile Thr Asp Asn Val
785                 790                 795                 800

His Thr Trp Thr Glu Gln Tyr Lys Phe Gln Pro Glu Ser Pro Ser Lys
                805                 810                 815

Leu Ala Ser Ala Ile Gln Lys Ala His Glu Glu Asp Ile Cys Gly Ile
            820                 825                 830

Arg Ser Val Thr Arg Leu Glu Asn Leu Met Trp Lys Gln Ile Thr Pro
        835                 840                 845

Glu Leu Asn His Ile Leu Ser Glu Asn Glu Val Lys Leu Thr Ile Met
    850                 855                 860
```

```
Thr Gly Asp Ile Lys Gly Ile Met Gln Ala Gly Lys Arg Ser Leu Arg
865                 870                 875                 880

Pro Gln Pro Thr Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala
                885                 890                 895

Lys Met Leu Ser Thr Glu Ser His Asn Gln Thr Phe Leu Ile Asp Gly
            900                 905                 910

Pro Glu Thr Ala Glu Cys Pro Asn Thr Asn Arg Ala Trp Asn Ser Leu
        915                 920                 925

Glu Val Glu Asp Tyr Gly Phe Gly Val Phe Thr Thr Asn Ile Trp Leu
    930                 935                 940

Lys Leu Lys Glu Lys Gln Asp Val Phe Cys Asp Ser Lys Leu Met Ser
945                 950                 955                 960

Ala Ala Ile Lys Asp Asn Arg Ala Val His Ala Asp Met Gly Tyr Trp
                965                 970                 975

Ile Glu Ser Ala Leu Asn Asp Thr Trp Lys Ile Glu Lys Ala Ser Phe
            980                 985                 990

Ile Glu Val Lys Asn Cys His Trp  Pro Lys Ser His Thr  Leu Trp Ser
        995                 1000                1005

Asn Gly  Val Leu Glu Ser Glu  Met Ile Ile Pro Lys  Asn Leu Ala
    1010                1015                1020

Gly Pro  Val Ser Gln His Asn  Tyr Arg Pro Gly Tyr  His Thr Gln
    1025                1030                1035

Ile Thr  Gly Pro Trp His Leu  Gly Lys Leu Glu Met  Asp Phe Asp
    1040                1045                1050

Phe Cys  Asp Gly Thr Thr Val  Val Val Thr Glu Asp  Cys Gly Asn
    1055                1060                1065

Arg Gly  Pro Ser Leu Arg Thr  Thr Thr Ala Ser Gly  Lys Leu Ile
    1070                1075                1080
```

```
Thr Glu  Trp Cys Cys Arg Ser  Cys Thr Leu Pro Pro  Leu Arg Tyr
    1085                1090                1095

Arg Gly  Glu Asp Gly Cys Trp  Tyr Gly Met Glu Ile  Arg Pro Leu
    1100                1105                1110

Lys Glu  Lys Glu Glu Asn Leu  Val Asn Ser Leu Val  Thr Ala Gly
    1115                1120                1125

His Gly  Gln Val Asp Asn Phe  Ser Leu Gly Val Leu  Gly Met Ala
    1130                1135                1140

Leu Phe  Leu Glu Glu Met Leu  Arg Thr Arg Val Gly  Thr Lys His
    1145                1150                1155

Ala Ile  Leu Leu Val Ala Val  Ser Phe Val Thr Leu  Ile Thr Gly
    1160                1165                1170

Asn Met  Ser Phe Arg Asp Leu  Gly Arg Val Met Val  Met Val Gly
    1175                1180                1185

Ala Thr  Met Thr Gly Asp Ile  Gly Met Gly Val Thr  Tyr Leu Ala
    1190                1195                1200

Leu Leu  Ala Ala Phe Lys Val  Arg Pro Thr Phe Ala  Ala Gly Leu
    1205                1210                1215

Leu Leu  Arg Lys Leu Thr Ser  Xaa Glu Leu Met Met  Thr Thr Ile
    1220                1225                1230

Gly Ile  Val Leu Leu Ser Gln  Ser Thr Ile Pro Glu  Thr Ile Leu
    1235                1240                1245

Glu Leu  Thr Asp Ala Leu Ala  Leu Gly Met Met Val  Leu Lys Met
    1250                1255                1260

Val Arg  Asn Met Glu Lys Tyr  Gln Leu Ala Val Thr  Ile Met Ala
    1265                1270                1275
```

```
Ile Leu  Cys Val Pro Asn Ala  Val Ile Leu Gln Asn  Ala Trp Lys
    1280                1285                1290

Val Ser  Cys Thr Ile Leu Ala  Val Val Ser Val Ser  Pro Leu Phe
    1295                1300                1305

Leu Thr  Ser Ser Gln Gln Lys  Thr Asp Trp Ile Pro  Leu Ala Leu
    1310                1315                1320

Thr Ile  Lys Gly Leu Asn Pro  Thr Ala Ile Phe Leu  Thr Thr Leu
    1325                1330                1335

Ser Arg  Thr Ser Lys Lys Arg  Ser Trp Pro Leu Asn  Glu Ala Ile
    1340                1345                1350

Met Ala  Val Gly Met Val Ser  Ile Leu Ala Ser Ser  Leu Leu Lys
    1355                1360                1365

Asn Asp  Ile Pro Met Thr Gly  Pro Leu Val Ala Gly  Gly Leu Leu
    1370                1375                1380

Thr Val  Cys Tyr Val Leu Thr  Gly Arg Ser Ala Asp  Leu Glu Leu
    1385                1390                1395

Glu Arg  Ala Ala Asp Val Lys  Trp Glu Asp Gln Ala  Glu Ile Ser
    1400                1405                1410

Gly Ser  Ser Pro Ile Leu Ser  Ile Thr Ile Ser Glu  Asp Gly Ser
    1415                1420                1425

Met Ser  Ile Lys Asn Glu Glu  Glu Glu Gln Thr Leu  Thr Ile Leu
    1430                1435                1440

Ile Arg  Thr Gly Leu Leu Val  Ile Ser Gly Leu Phe  Pro Val Ser
    1445                1450                1455

Ile Pro  Ile Thr Ala Ala Ala  Trp Tyr Leu Trp Glu  Val Lys Lys
    1460                1465                1470

Gln Arg  Ala Gly Val Leu Trp  Asp Val Pro Ser Pro  Pro Pro Met
    1475                1480                1485
```

```
Gly Lys  Ala Glu Leu Glu Asp  Gly Ala Tyr Arg Ile  Lys Gln Lys
    1490                 1495                 1500

Gly Ile  Leu Gly Tyr Ser Gln  Ile Gly Ala Gly Val  Tyr Lys Glu
    1505                 1510                 1515

Gly Thr  Phe His Thr Met Trp  His Val Thr Arg Gly  Ala Val Leu
    1520                 1525                 1530

Met His  Lys Gly Lys Arg Ile  Glu Pro Ser Trp Ala  Asp Val Lys
    1535                 1540                 1545

Lys Asp  Leu Ile Ser Tyr Gly  Gly Gly Trp Lys Leu  Glu Gly Glu
    1550                 1555                 1560

Trp Lys  Glu Gly Glu Glu Val  Gln Val Leu Ala Leu  Glu Pro Gly
    1565                 1570                 1575

Lys Asn  Pro Arg Ala Val Gln  Thr Lys Pro Gly Leu  Phe Lys Thr
    1580                 1585                 1590

Asn Ala  Gly Thr Ile Gly Ala  Val Ser Leu Asp Phe  Ser Pro Gly
    1595                 1600                 1605

Thr Ser  Gly Ser Pro Ile Ile  Asp Lys Lys Gly Lys  Val Val Gly
    1610                 1615                 1620

Leu Tyr  Gly Asn Gly Val Val  Thr Arg Ser Gly Ala  Tyr Val Ser
    1625                 1630                 1635

Ala Ile  Ala Gln Thr Glu Lys  Ser Ile Glu Asp Asn  Pro Glu Ile
    1640                 1645                 1650

Glu Asp  Asp Ile Phe Arg Lys  Arg Arg Leu Thr Ile  Met Asp Leu
    1655                 1660                 1665

His Pro  Gly Ala Gly Lys Thr  Lys Arg Tyr Leu Pro  Ala Ile Val
    1670                 1675                 1680
```

```
Arg Glu  Ala Ile Lys Arg Gly  Leu Arg Thr Leu Ile  Leu Ala Pro
    1685                 1690                 1695

Thr Arg  Val Val Ala Ala Glu  Met Glu Glu Ala Leu  Arg Gly Leu
    1700                 1705                 1710

Pro Ile  Arg Tyr Gln Thr Pro  Ala Ile Arg Ala Val  His Thr Gly
    1715                 1720                 1725

Arg Glu  Ile Val Asp Leu Met  Cys His Ala Thr Phe  Thr Met Arg
    1730                 1735                 1740

Leu Leu  Ser Pro Val Arg Val  Pro Asn Tyr Asn Leu  Ile Ile Met
    1745                 1750                 1755

Asp Glu  Ala His Phe Thr Asp  Pro Ala Ser Ile Ala  Ala Arg Gly
    1760                 1765                 1770

Tyr Ile  Ser Thr Arg Val Glu  Met Gly Glu Ala Ala  Gly Ile Phe
    1775                 1780                 1785

Met Thr  Ala Thr Pro Pro Gly  Ser Arg Asp Pro Phe  Pro Gln Ser
    1790                 1795                 1800

Asn Ala  Pro Ile Ile Asp Glu  Glu Arg Glu Ile Pro  Glu Arg Ser
    1805                 1810                 1815

Trp Asn  Ser Gly His Glu Trp  Val Thr Asp Phe Lys  Gly Lys Thr
    1820                 1825                 1830

Val Trp  Phe Val Pro Ser Ile  Lys Ala Gly Asn Asp  Ile Ala Ala
    1835                 1840                 1845

Cys Leu  Arg Lys Asn Gly Lys  Lys Val Ile Gln Leu  Ser Arg Lys
    1850                 1855                 1860

Thr Phe  Asp Ser Glu Tyr Val  Lys Thr Arg Thr Asn  Asp Trp Asp
    1865                 1870                 1875

Phe Val  Val Thr Thr Asp Ile  Ser Glu Met Gly Ala  Asn Phe Lys
    1880                 1885                 1890
```

```
Ala Glu  Arg Val Ile Asp Pro  Arg Arg Cys Met Lys  Pro Val Ile
    1895                1900                1905

Leu Thr  Asp Gly Glu Glu Arg  Val Ile Leu Ala Gly  Pro Met Pro
    1910                1915                1920

Val Thr  His Ser Ser Ala Ala  Gln Arg Arg Gly Arg  Ile Gly Arg
    1925                1930                1935

Asn Pro  Lys Asn Glu Asn Asp  Gln Tyr Ile Tyr Met  Gly Glu Pro
    1940                1945                1950

Leu Glu  Asn Asp Glu Asp Cys  Ala His Trp Lys Glu  Ala Lys Met
    1955                1960                1965

Leu Leu  Asp Asn Ile Asn Thr  Pro Glu Gly Ile Ile  Pro Ser Met
    1970                1975                1980

Phe Glu  Pro Glu Arg Glu Lys  Val Asp Ala Ile Asp  Gly Glu Tyr
    1985                1990                1995

Arg Leu  Arg Gly Glu Ala Arg  Lys Thr Phe Val Asp  Leu Met Arg
    2000                2005                2010

Arg Gly  Asp Leu Pro Val Trp  Leu Ala Tyr Arg Val  Ala Ala Glu
    2015                2020                2025

Gly Ile  Asn Tyr Ala Asp Arg  Arg Trp Cys Phe Asp  Gly Val Lys
    2030                2035                2040

Asn Asn  Gln Ile Leu Glu Glu  Asn Val Glu Val Glu  Ile Trp Thr
    2045                2050                2055

Lys Glu  Gly Glu Arg Lys Lys  Leu Lys Pro Arg Trp  Leu Asp Ala
    2060                2065                2070

Arg Ile  Tyr Ser Asp Pro Leu  Ala Leu Lys Glu Phe  Lys Glu Phe
    2075                2080                2085
```

```
Ala Ala  Gly Arg Lys Ser Leu  Thr Leu Asn Leu Ile  Thr Glu Met
    2090                2095                2100

Gly Arg  Leu Pro Thr Phe Met  Thr Gln Lys Val Arg  Asp Ala Leu
    2105                2110                2115

Asp Asn  Leu Ala Val Leu His  Thr Ala Glu Ala Gly  Gly Arg Ala
    2120                2125                2130

Tyr Asn  His Ala Leu Ser Glu  Leu Pro Glu Thr Leu  Glu Thr Leu
    2135                2140                2145

Leu Leu  Leu Thr Leu Leu Ala  Thr Val Thr Gly Gly  Ile Phe Leu
    2150                2155                2160

Phe Leu  Met Ser Ala Arg Gly  Ile Gly Lys Met Thr  Leu Gly Met
    2165                2170                2175

Cys Cys  Ile Ile Thr Ala Ser  Ile Leu Leu Trp Tyr  Ala Gln Ile
    2180                2185                2190

Gln Pro  His Trp Ile Ala Ala  Ser Ile Ile Leu Glu  Phe Phe Leu
    2195                2200                2205

Ile Val  Leu Leu Ile Pro Glu  Pro Glu Lys Gln Arg  Thr Pro Gln
    2210                2215                2220

Asp Asn  Gln Leu Thr Tyr Val  Val Ile Ala Ile Leu  Thr Val Val
    2225                2230                2235

Ala Ala  Thr Met Ala Asn Glu  Met Gly Phe Leu Glu  Lys Thr Lys
    2240                2245                2250

Lys Asp  Leu Gly Leu Gly Ser  Ile Ala Thr Gln Gln  Pro Glu Ser
    2255                2260                2265

Asn Ile  Leu Asp Ile Asp Leu  Arg Pro Ala Ser Ala  Trp Thr Leu
    2270                2275                2280

Tyr Ala  Val Ala Thr Thr Phe  Val Thr Pro Met Leu  Arg His Ser
    2285                2290                2295
```

```
Ile Glu  Asn Ser Ser Val Asn  Val Ser Leu Thr Ala  Ile Ala Asn
    2300                2305                2310

Gln Ala  Thr Val Leu Met Gly  Leu Gly Lys Gly Trp  Pro Leu Ser
    2315                2320                2325

Lys Met  Asp Ile Gly Val Pro  Leu Leu Ala Ile Gly  Cys Tyr Ser
    2330                2335                2340

Gln Val  Asn Pro Ile Thr Leu  Thr Ala Ala Leu Phe  Leu Leu Val
    2345                2350                2355

Ala His  Tyr Ala Ile Ile Gly  Pro Gly Leu Gln Ala  Lys Ala Thr
    2360                2365                2370

Arg Glu  Ala Gln Lys Arg Ala  Ala Ala Gly Ile Met  Lys Asn Pro
    2375                2380                2385

Thr Val  Asp Gly Ile Thr Val  Ile Asp Leu Asp Pro  Ile Pro Tyr
    2390                2395                2400

Asp Pro  Lys Phe Glu Lys Gln  Leu Gly Gln Val Met  Leu Leu Val
    2405                2410                2415

Leu Cys  Val Thr Gln Val Leu  Met Met Arg Thr Thr  Trp Ala Leu
    2420                2425                2430

Cys Glu  Ala Leu Thr Leu Ala  Thr Gly Pro Ile Ser  Thr Leu Trp
    2435                2440                2445

Glu Gly  Asn Pro Gly Arg Phe  Trp Asn Thr Thr Ile  Ala Val Ser
    2450                2455                2460

Met Ala  Asn Ile Phe Arg Gly  Ser Tyr Leu Ala Gly  Ala Gly Leu
    2465                2470                2475

Leu Phe  Ser Ile Met Lys Asn  Thr Thr Asn Thr Arg  Arg Gly Thr
    2480                2485                2490
```

```
Gly Asn  Ile Gly Glu Thr Leu  Gly Glu Lys Trp Lys  Ser Arg Leu
    2495                 2500                 2505

Asn Ala  Leu Gly Lys Ser Glu  Phe Gln Ile Tyr Lys  Lys Ser Gly
    2510                 2515                 2520

Ile Gln  Glu Val Asp Arg Thr  Leu Ala Lys Glu Gly  Ile Lys Arg
    2525                 2530                 2535

Gly Glu  Thr Asp His His Ala  Val Ser Arg Gly Ser  Ala Lys Leu
    2540                 2545                 2550

Arg Trp  Phe Val Glu Arg Asn  Met Val Thr Pro Glu  Gly Lys Val
    2555                 2560                 2565

Val Asp  Leu Gly Cys Gly Arg  Gly Gly Trp Ser Tyr  Tyr Cys Gly
    2570                 2575                 2580

Gly Leu  Lys Asn Val Arg Glu  Val Lys Gly Leu Thr  Lys Gly Gly
    2585                 2590                 2595

Pro Gly  His Glu Glu Pro Ile  Pro Met Ser Thr Tyr  Gly Trp Asn
    2600                 2605                 2610

Leu Val  Arg Leu Gln Ser Gly  Val Asp Val Phe Phe  Ile Pro Pro
    2615                 2620                 2625

Glu Lys  Cys Asp Thr Leu Leu  Cys Asp Ile Gly Glu  Ser Ser Pro
    2630                 2635                 2640

Asn Pro  Thr Val Glu Ala Gly  Arg Thr Leu Arg Val  Leu Asn Leu
    2645                 2650                 2655

Val Glu  Asn Trp Leu Asn Asn  Asn Thr Gln Phe Cys  Ile Lys Val
    2660                 2665                 2670

Leu Asn  Pro Tyr Met Pro Ser  Val Ile Glu Lys Met  Glu Ala Leu
    2675                 2680                 2685

Gln Arg  Lys Tyr Gly Gly Ala  Leu Val Arg Asn Pro  Leu Ser Arg
    2690                 2695                 2700
```

```
Asn Ser  Thr His Glu Met Tyr  Trp Val Ser Asn Ala  Ser Gly Asn
    2705                2710                2715

Ile Val  Ser Ser Val Asn Met  Ile Ser Arg Met Leu  Ile Asn Arg
    2720                2725                2730

Phe Thr  Met Arg Tyr Lys Lys  Ala Thr Tyr Glu Pro  Asp Val Asp
    2735                2740                2745

Leu Gly  Ser Gly Thr Arg Asn  Ile Gly Ile Glu Ser  Glu Ile Pro
    2750                2755                2760

Asn Leu  Asp Ile Ile Gly Lys  Arg Ile Glu Lys Ile  Lys Gln Glu
    2765                2770                2775

His Glu  Thr Ser Trp His Tyr  Asp Gln Asp His Pro  Tyr Lys Thr
    2780                2785                2790

Trp Ala  Tyr His Gly Ser Tyr  Glu Thr Lys Gln Thr  Gly Ser Ala
    2795                2800                2805

Ser Ser  Met Val Asn Gly Val  Val Arg Leu Leu Thr  Lys Pro Trp
    2810                2815                2820

Asp Val  Val Pro Met Val Thr  Gln Met Ala Met Thr  Asp Thr Thr
    2825                2830                2835

Pro Phe  Gly Gln Gln Arg Val  Phe Lys Glu Lys Val  Asp Thr Arg
    2840                2845                2850

Thr Gln  Glu Pro Lys Glu Gly  Thr Lys Lys Leu Met  Lys Ile Thr
    2855                2860                2865

Ala Glu  Trp Leu Trp Lys Glu  Leu Gly Lys Lys Lys  Thr Pro Arg
    2870                2875                2880

Met Cys  Thr Arg Glu Glu Phe  Thr Arg Lys Val Arg  Ser Asn Ala
    2885                2890                2895
```

```
Ala Leu  Gly Ala Ile Phe Thr  Asp Glu Asn Lys Trp  Lys Ser Ala
    2900                 2905                 2910

Arg Glu  Ala Val Glu Asp Ser  Arg Phe Trp Glu Leu  Val Asp Lys
    2915                 2920                 2925

Glu Arg  Asn Leu His Leu Glu  Gly Lys Cys Glu Thr  Cys Val Tyr
    2930                 2935                 2940

Asn Met  Met Gly Lys Arg Glu  Lys Lys Leu Gly Glu  Phe Gly Lys
    2945                 2950                 2955

Ala Lys  Gly Ser Arg Ala Ile  Trp Tyr Met Trp Leu  Gly Ala Arg
    2960                 2965                 2970

Phe Leu  Glu Phe Glu Ala Leu  Gly Phe Leu Asn Glu  Asp His Trp
    2975                 2980                 2985

Phe Ser  Arg Glu Asn Ser Leu  Ser Gly Val Glu Gly  Glu Gly Leu
    2990                 2995                 3000

His Lys  Leu Gly Tyr Ile Leu  Arg Asp Val Ser Lys  Lys Glu Gly
    3005                 3010                 3015

Gly Ala  Met Tyr Ala Asp Asp  Thr Ala Gly Trp Asp  Thr Arg Ile
    3020                 3025                 3030

Thr Leu  Glu Asp Leu Lys Asn  Glu Glu Met Val Thr  Asn His Met
    3035                 3040                 3045

Glu Gly  Glu His Lys Lys Leu  Ala Glu Ala Ile Phe  Lys Leu Thr
    3050                 3055                 3060

Tyr Gln  Asn Lys Val Val Arg  Val Gln Arg Pro Thr  Pro Arg Gly
    3065                 3070                 3075

Thr Val  Met Asp Ile Ile Ser  Arg Arg Asp Gln Arg  Gly Ser Gly
    3080                 3085                 3090

Gln Val  Gly Thr Tyr Gly Leu  Asn Thr Phe Thr Asn  Met Glu Ala
    3095                 3100                 3105
```

```
Gln Leu  Ile Arg Gln Met Glu  Gly Glu Gly Val Phe  Lys Ser Ile
    3110                 3115                 3120

Gln His  Leu Thr Ile Thr Glu  Glu Ile Ala Val Gln  Asn Trp Leu
    3125                 3130                 3135

Ala Arg  Val Gly Arg Glu Arg  Leu Ser Arg Met Ala  Ile Ser Gly
    3140                 3145                 3150

Asp Asp  Cys Val Val Lys Pro  Leu Asp Asp Arg Phe  Ala Ser Ala
    3155                 3160                 3165

Leu Thr  Ala Leu Asn Asp Met  Gly Lys Ile Arg Lys  Asp Ile Gln
    3170                 3175                 3180

Gln Trp  Glu Pro Ser Arg Gly  Trp Asn Asp Trp Thr  Gln Val Pro
    3185                 3190                 3195

Phe Cys  Ser His His Phe His  Glu Leu Ile Met Lys  Asp Gly Arg
    3200                 3205                 3210

Val Leu  Val Val Pro Cys Arg  Asn Gln Asp Glu Leu  Ile Gly Arg
    3215                 3220                 3225

Ala Arg  Ile Ser Gln Gly Ala  Gly Trp Ser Leu Arg  Glu Thr Ala
    3230                 3235                 3240

Cys Leu  Gly Lys Ser Tyr Ala  Gln Met Trp Ser Leu  Met Tyr Phe
    3245                 3250                 3255

His Arg  Arg Asp Leu Arg Leu  Ala Ala Asn Ala Ile  Cys Ser Ala
    3260                 3265                 3270

Val Pro  Ser His Trp Val Pro  Thr Ser Arg Thr Thr  Trp Ser Ile
    3275                 3280                 3285

His Ala  Lys His Glu Trp Met  Thr Thr Glu Asp Met  Leu Thr Val
    3290                 3295                 3300
```

```
Trp Asn  Arg Val Trp Ile Gln  Glu Asn Pro Trp Met  Glu Asp Lys
    3305                 3310                 3315

Thr Pro  Val Glu Ser Trp Glu  Glu Ile Pro Tyr Leu  Gly Lys Arg
    3320                 3325                 3330

Glu Asp  Gln Trp Cys Gly Ser  Leu Ile Gly Leu Thr  Ser Arg Ala
    3335                 3340                 3345

Thr Trp  Ala Lys Asn Ile Gln  Ala Ala Ile Asn Gln  Val Arg Ser
    3350                 3355                 3360

Leu Ile  Gly Asn Glu Glu Tyr  Thr Asp Tyr Met Pro  Ser Met Lys
    3365                 3370                 3375

Arg Phe  Arg Arg Glu Glu Glu  Glu Ala Gly Val Leu  Trp
    3380                 3385                 3390
```

<210> 9
<211> 10735
<212> DNA
<213> dengue virus

<400> 9

```
agttgttagt ctacgtggac cgacaagaac agtttcgaat cggaagcttg cttaacgtag       60

ttctaacagt tttttattag agagcagatc tctgatgatc aaccaacgaa aaaagacggg      120

tcgaccgtct ttcaatatgc tgaaacgcgc gagaaaccgc gtgtcaactg tttcacagtt      180

ggcgaagaga ttctcaaaag gattgctctc aggccaagga cccatgaaat tggtgatggc      240

tttcatagca ttcttaagat ttctagccat acccccaaca gcaggaattt tggctagatg      300

gggctcattc aagaagaatg gagcgattaa agtgttacgg ggtttcaaga gagaaatctc      360

aaacatgcta aacataatga acaggaggaa aagatccgtg accatgctcc ttatgctgct      420

gcccacagcc ctggcgttcc atctgacgac acgaggggga gagccgcata tgatagttag      480

caagcaggaa agaggaaagt cacttttgtt caagacctct gcaggtgtca acatgtgcac      540

cctcattgcg atggatttgg gagagttgtg tgaggacacg atgacctaca aatgcccccg      600

gatcactgag gcggaaccag atgacgttga ctgttggtgc aatgccacgg acacatgggt      660

gacctatgga acgtgctctc aaactggcga acaccgacga gacaaacgtt ccgtcgcatt      720
```

ggccccacac gtggggcttg gcctagaaac aagagccgaa acgtggatgt cctctgaagg 780

tgcttggaaa cagatacaaa aagtagagac ttgggctctg agacatccag gattcacggt 840

gatagccctt tttctagcac atgccatagg aacatccatc acccagaaag ggatcatttt 900

cattttgctg atgctggtaa caccatctat ggccatgcga tgcgtgggaa taggcaacag 960

agacttcgtg gaaggactgt caggagcaac atgggtggat gtggtactgg agcatggaag 1020

ttgcgtcacc accatggcaa aaaacaaacc aacactggac attgaactct tgaagacgga 1080

ggtcacaaac cctgcagttc tgcgtaaatt gtgcattgaa gctaaaatat caaacaccac 1140

caccgattcg agatgtccaa cacaaggaga agccacactg gtggaagaac aagacgcgaa 1200

ctttgtgtgc cgacgaacgt tcgtggacag aggctggggc aatggctgtg ggctattcgg 1260

aaaaggtagt ctaataacgt gtgccaagtt taagtgtgtg acaaaactag aaggaaagat 1320

agttcaatat gaaaacctaa aatattcagt gatagtcacc gtccacactg gagatcagca 1380

ccaggtggga aatgagacta cagaacatgg aacaactgca accataacac ctcaagctcc 1440

tacgtcggaa atacagctga ccgactacgg aacccttaca ttagattgtt cacctaggac 1500

agggctagat tttaacgaga tggtgttgct gacaatgaaa gaaagatcat ggcttgtcca 1560

caaacaatgg tttctagact taccactgcc ttggacctct ggggcttcaa catcccaaga 1620

gacttggaac agacaagatt tactggtcac atttaagaca gctcatgcaa agaagcagga 1680

agtagtcgta ctaggatcac aagaaggagc aatgcacact gcgctgactg gagcgacaga 1740

aatccaaacg tcaggaacga caacaatttt cgcaggacac ctaaaatgca gactaaaaat 1800

ggacaaacta actttaaaag ggatgtcata tgtgatgtgc acaggctcat tcaagttaga 1860

gaaagaagtg gctgagaccc agcatggaac tgttctggtg caggttaaat atgaaggaac 1920

agacgcacca tgcaagattc ccttttcgac ccaagatgag aaaggagcaa cccagaatgg 1980

gagattaata acagccaacc ccatagtcac tgacaaagaa aaaccagtca atattgaggc 2040

agaaccaccc tttggtgaga gctacatcgt ggtaggagca ggtgaaaaag ctttgaaact 2100

aagctggttc aagaaaggaa gcagcatagg gaaaatgttt gaagcaactg cccgaggagc 2160

acgaaggatg gccattctgg gagacaccgc atgggacttc ggttctatag gaggagtgtt 2220

cacgtctatg ggaaaactgg tacaccaggt ttttggaact gcatatggag ttttgtttag 2280

cggagtttct tggaccatga aaataggaat agggattctg ctgacatggc taggattaaa 2340

ttcaaggaac acgtcccttt cgatgatgtg catcgcagtt ggcatggtca cactgtacct 2400

aggagtcatg gttcaggcag attcgggatg tgtaatcaac tggaaaggca gagaacttaa 2460

atgtggaagc ggcatttttg tcactaatga agttcacact tggacagagc aatacaaatt 2520

ccaggctgac tcccccaaga gactatcagc agccattggg aaggcatggg aggagggtgt 2580

gtgtggaatc cgatcagcca ctcgtctcga gaacatcatg tggaaacaaa tatcaaatga 2640

attgaaccac atcctacttg aaaatgacat gaaatttaca gtggtcgtgg gagatgttag 2700

tggaatcttg gcccaaggga aaaaaatgat taggccacaa cccatggaac acaaatactc 2760

gtggaaaagc tggggaaaag ccaaaatcat aggagcggat gtacagaaca ccaccttcat 2820

catcgacggc ccaaacaccc cagaatgccc tgacaatcaa agagcatgga atatttggga 2880

agtagaggac tatggatttg ggattttcac gacaaacata tggttgaaat tgcgtgactc 2940

ctacacccaa gtatgtgacc accggctgat gtcagctgcc attaaggaca gcaaggcagt 3000

ccatgctgac atggggtact ggatagaaag tgaaaagaac gagacatgga agttggcgag 3060

agcctccttt atagaagtta agacatgcat ctggccaaaa tcccacactc tatggagcaa 3120

tggagttctg gaaagtgaaa tgataattcc aaagatatat ggaggaccaa tatctcagca 3180

caactacaga ccaggatatt tcacacaaac agcagggccg tggcacctag gcaagttgga 3240

actagatttc gatttttgtg aaggtaccac agttgttgtg gatgaacatt gtggaaatcg 3300

aggaccatct ctcagaacca caacagtcac aggaaagata atccatgaat ggtgctgcag 3360

atcttgtacg ctacccccc tacgtttcaa aggggaagac gggtgttggt acggcatgga 3420

aatcagacca gtgaaggaca aggaagagaa cctggtcaag tcaatggtct ctgcagggtc 3480

aggagaagtg gacagctttt cactaggact gctatgcata tcaataatga ttgaagaagt 3540

gatgagatcc agatggagca aaaaaatgct gatgactgga acactggctg tgttcctcct 3600

tcttataatg ggacaattga catggagtga tctgatcagg ttatgtatta tggttggagc 3660

caacgcttca gacaagatgg ggatgggaac aacgtaccta gctttaatgg ccactttcaa 3720

aatgagacca atgttcgccg tcgggctatt atttcgcaga ctaacatcta gagaagttct 3780

tcttcttaca attggcttga gcctggtggc atccgtggag ctaccaagtt ccctagagga 3840

gctgggggat ggacttgcaa taggcatcat gatgttgaaa ttattgactg attttcagtc 3900

acaccagcta tgggctactc tgctatcctt gacatttatt aaaacaactt tttcattgca 3960

ctatgcatgg aagacaatgg ctatggtact gtcaattgta tctctcttcc ctttatgcct 4020

gtccacgacc tctcaaaaaa caacatggct tccggtgctg ttgggatctc ttggatgcaa 4080

accactaccc atgtttctta taacagaaaa caaaatctgg ggaaggaaga gttggcccct 4140

caatgaagga attatggctg ttggaatagt tagtattcta ctaagttcac ttttaaaaaa 4200

tgatgtgccg ctagccggcc cattaatagc tggaggcatg ctaatagcat gttatgtcat 4260

atccggaagc tcagctgatt tatcactgga gaaagcggct gaggtctcct gggaggaaga 4320

agcagaacac tcaggcgcct cacacaacat actagtagag gttcaagatg atggaaccat 4380

gaagataaaa gatgaagaga gagatgacac gctcaccatt ctccttaaag caactctgct 4440

ggcagtctca ggggtgtacc caatgtcaat accagcgacc ctttttgtgt ggtatttttg 4500

gcagaaaaag aaacagagat caggagtgct atgggacaca cccagccccc cagaagtgga 4560

aagagcagtt cttgatgatg gcatctatag aattttgcaa agaggactgt tgggcaggtc 4620

ccaagtagga gtaggagttt tccaagaagg cgtgttccac acaatgtggc acgtcactag 4680

gggagctgtc ctcatgtatc aaggaaaaag gctggaacca agctgggcca gtgtcaaaaa 4740

agacttgatc tcatatggag gaggttggag gtttcaagga tcctggaaca cgggagaaga 4800

agtacaggtg attgctgttg aaccgggaaa aaaccccaaa aatgtacaaa caacgccggg 4860

taccttcaag acccctgaag gcgaagttgg agccatagcc ttagacttta aacctggcac 4920

atctggatct cccatcgtaa acagagaggg aaaaatagta ggtctttatg gaaatggagt 4980

ggtgacaaca agcggaactt acgttagtgc catagctcaa gctaaggcat cacaagaagg 5040

gcctctacca gagattgagg acgaggtgtt taggaaaaga aacttaacaa taatggacct 5100

acatccagga tcgggaaaaa caagaagata ccttccagcc atagtccgtg aggccataaa 5160

aaggaagctg cgcacgctaa tcctagctcc cacaagagtt gtcgcttctg aaatggcaga 5220

ggcactcaag ggagtgccaa taaggtatca gacaacagca gtgaagagtg aacacacagg 5280

aaaggagata gttgacctta tgtgccacgc cactttcacc atgcgcctcc tgtctcccgt 5340

gagagttccc aattataaca tgattatcat ggatgaagca cacttcaccg atccagccag 5400

catagcagcc agagggtaca tctcaacccg agtgggtatg ggtgaagcag ctgcgatctt 5460

tatgacagcc actcccccag gatcggtgga ggcctttcca cagagcaatg caattatcca 5520

agatgaggaa agagacattc ctgagagatc atggaactca ggctatgact ggatcactga 5580

ttttccaggt aaaacagtct ggtttgttcc aagcatcaaa tcaggaaatg acattgccaa 5640

ctgtttaaga aaaaacggga aacgggtgat ccaattgagc agaaaaacct ttgacactga 5700

gtaccagaaa acaaaaaaca acgactggga ctatgtcgtc acaacagaca tttccgaaat 5760

gggagcaaat ttccgggccg acagggtaat agacccaagg cggtgtctga aaccggtaat 5820

actaaaagat ggtccagagc gcgtcattct agccggaccg atgccagtga ctgtggccag 5880

tgccgcccag aggagaggaa gaattggaag gaaccaaaac aaggaaggtg atcagtatat 5940

ttacatggga cagcctttaa acaatgatga ggaccacgct cattggacag aagcaaagat 6000

gctccttgac aatataaaca caccagaagg gattatccca gccctctatg agccggagag 6060

agaaaagagt gcagctatag acggggaata cagactgcgg ggtgaagcaa ggaaaacgtt 6120

cgtggagctc atgagaagag gggatctacc agtctggcta tcctacaaag ttgcctcaga 6180

aggcttccag tactccgaca gaaggtggtg cttcgatggg gaaaggaaca accaggtgtt 6240

ggaggagaac atggacgtgg agatctggac aaaagaagga gaaagaaaga aactacgacc 6300

tcgctggttg gacgccagaa catactctga cccactggct ctgcgcgagt ttaaagagtt 6360

tgcagcagga agaagaagcg tctcaggtga cctaatatta gaaataggga aacttccaca 6420

acatttgacg caaagggccc agaatgcttt ggacaacttg gtcatgttgc acaattccga 6480

acaaggagga aaagcctata gacatgctat ggaagaactg ccagacacaa tagaaacgtt 6540

gatgctccta gccttgatag ctgtgttgac tggtggagtg acgctgttct tcctatcagg 6600

aagaggtcta ggaaaaacat ctatcggctt actctgcgtg atggcctcaa gcgcactgtt 6660

atggatggcc agtgtggagc cccattggat agcggcctcc atcatactgg agttctttct 6720

gatggtactg cttattccag agccagacag acagcgcact ccacaggaca accagctagc 6780

atatgtggtg ataggtctgt tattcatgat attgacagtg gcagccaatg agatgggatt 6840

attggaaacc acaaagaaag acctggggat tggccatgta gctgctgaaa accaccacca 6900

tgctacaatg ctggacgtag acctacatcc agcttcagcc tggaccctct atgcagtggc 6960

cacaacaatc atcactccta tgatgagaca cacaattgaa aacacaacgg caaatatttc 7020

cctgacagcc atcgcaaacc aagcagctat attgatggga cttgacaagg gatggccaat 7080

atcgaagatg gacataggag ttccacttct cgccttgggg tgctattccc aagtgaatcc 7140

gctgacactg atagcggcag tattgatgct agtagctcat tacgccataa ttggacctgg 7200

actgcaagca aaagctacta gagaagctca aaaaagaaca gcggctggaa taatgaaaaa 7260

tccaactgtc gacgggattg ttgcaataga cttagatccc gtggtttacg atgcaaaatt 7320

tgaaaaacaa ctaggccaaa taatgttgtt gatactttgc acatcacaga ttcttttgat 7380

gcggactaca tgggccttgt gtgaatccat cacattggct actggacctc tgaccactct 7440

ttgggaggga tctccaggaa aattctggaa caccacaata gcggtatcca tggcaaacat 7500

tttcaggggg agttatctag caggagcagg tctggccttc tcattaatga aatctctagg 7560

aggaggtagg agaggcacgg gagcccaagg ggaaacactg ggagaaaaat ggaaaagaca 7620

actaaaccaa ctgagcaagt cagaattcaa tacttacaag aggagtggga ttatggaggt 7680

ggatagatcc gaagccaaag agggactgaa aagaggagaa acaaccaaac acgcagtatc 7740

gagaggaacg gccaaactga ggtggttcgt ggagaggaac cttgtgaaac cagaagggaa 7800

agtcatagac ctcggttgtg gaagaggtgg ctggtcatat tattgcgctg ggctgaagaa 7860

agtcacagaa gtgaaaggat acacaaaagg aggacctgga catgaggaac caatcccaat 7920

ggcgacctat ggatggaacc tagtaaagct gcactccgga aaagatgtat tttttatacc 7980

acctgagaaa tgtgacaccc ttttgtgtga tattggtgag tcctctccga acccaactat 8040

agaggaagga agaacgttac gtgttctgaa aatggtggaa ccatggctca gaggaaacca 8100

attttgcata aaaattctaa atccctatat gccgagcgtg gtagaaactc tggaacaaat 8160

gcaaagaaaa catggaggaa tgctagtgcg aaacccactc tcaagaaatt ccacccatga 8220

aatgtactgg gtttcatgtg gaacaggaaa cattgtgtca gcagtaaaca tgacatctag 8280

aatgttgcta aatcggttca caatggctca caggaagcca acatatgaaa gagacgtgga 8340

cttaggcgct ggaacaagac atgtggcagt agaaccagag gtagccaacc tagatatcat 8400

tggccagagg atagagaata taaaaaatga acataagtca acatggcatt atgatgagga 8460

caatccatac aaaacatggg cctatcatgg atcatatgag gttaagccat caggatcggc 8520

ctcatccatg gtcaatggcg tggtgagatt gctcaccaaa ccatgggatg ttatccccat 8580

ggtcacacaa atagccatga ctgataccac acccttgga caacagaggg tgtttaaaga 8640

gaaagttgac acgcgcacac caaaagcaaa acgtggcaca gcacaaatta tggaagtgac 8700

agccaggtgg ttatggggtt tcctttctag aaacaaaaaa cccagaattt gcacaagaga 8760

ggagtttaca agaaaagtta ggtcaaacgc agctattgga gcagtgttcg ttgatgaaaa 8820

tcaatggaac tcggcaaaag aagcagtgga agacgaacgg ttctgggaac ttgtccacag 8880

agagagggag cttcataaac aggggaaatg tgccacgtgt gtctacaata tgatggggaa 8940

gagagagaaa aaattaggag agttcggaaa ggcaaaagga agtcgtgcaa tatggtacat 9000

gtggttggga gcacgcttcc tagagtttga agcccttggt ttcatgaatg aagatcactg 9060

gttcagtaga gagaattcac tcagtggagt ggaaggagaa ggactccaca aacttggata 9120

catactcaga gacatatcaa ggattccagg ggggaacatg tatgcagatg acacagccgg 9180

atgggacaca agaataacag aggatgatct ccagaatgag gctaaaatca ctgacatcat 9240

ggagcccgaa catgccctgc tggctacgtc aatctttaag ctgacctacc aaaataaggt 9300

ggtaagggtg cagagaccag caaaaaatgg aaccgtgatg gatgttatat ccagacgtga 9360

ccagagaggc agtggacagg ttggaactta tggcttaaac actttcacca acatggaggc 9420

ccaactgata agacaaatgg agtccgaggg aatcttttta cccagcgaat tggaaacccc 9480

aaatctagcc ggaagagttc tcgactggtt ggaaaaatat ggtgtcgaaa ggctgaaaag 9540

aatggcaatc agcggagatg actgtgtggt gaaaccaatt gatgacaggt tcgcaacagc 9600

cttaacagct ttgaatgaca tgggaaaagt aagaaaagac ataccacaat gggaaccttc 9660

aaaaggatgg aatgattggc aacaagtgcc tttctgttca caccacttcc accagctaat 9720

tatgaaggat gggagggaga tagtggtgcc atgccgcaac caagatgaac ttgtggggag 9780

ggccagagta tcacaaggcg ccggatggag cctgagagaa accgcatgcc taggcaagtc 9840

atatgcacaa atgtggcagc tgatgtattt ccacaggaga gacctgagac tggcggctaa 9900

cgctatttgt tcagccgttc cagttgattg ggtcccaacc agccgcacca cctggtcgat 9960

ccatgcccat caccaatgga tgacaacaga agacatgtta tcagtatgga atagggtctg 10020

gatagaggaa aacccatgga tggaggataa gactcatgtg tccagttggg aagaagttcc 10080

atacctagga aagagggaag atcagtggtg tggatccctg ataggcttaa cagcaagggc 10140

cacctgggcc actaatatac aagtggccat aaaccaagtg agaaggctca ttgggaatga 10200

gaattatcta gattacatga catcaatgaa gagattcaag aatgagagtg atcccgaagg 10260

ggcactctgg taagtcaaca cattcacaaa ataaaggaaa ataaaaaatc aaatgaggca 10320

agaagtcagg ccagattaag ccatagtacg gtaagagcta tgctgcctgt gagccccgtc 10380

caaggacgta aaatgaagtc aggccgaaag ccacggtttg agcaagccgt gctgcctgtg 10440

gctccatcgt ggggatgtaa aaacccggga ggctgcaacc catggaagct gtacgcatgg 10500

ggtagcagac tagtggttag aggagacccc tcccaagaca caacgcagca gcggggccca 10560

acaccagggg aagctgtacc ctggtggtaa ggactagagg ttagaggaga ccccccgcgt 10620

aacaataaac agcatattga cgctgggaga gaccagagat cctgctgtct ctacagcatc 10680

attccaggca cagaacgcca gaaaatggaa tggtgctgtt gaatcaacag gttct 10735

<210> 10
<211> 3392
<212> PRT
<213> dengue virus

<400> 10

Met Ile Asn Gln Arg Lys Lys Thr Gly Arg Pro Ser Phe Asn Met Leu
1 5 10 15

Lys Arg Ala Arg Asn Arg Val Ser Thr Val Ser Gln Leu Ala Lys Arg
20 25 30

Phe Ser Lys Gly Leu Leu Ser Gly Gln Gly Pro Met Lys Leu Val Met
35 40 45

Ala Phe Ile Ala Phe Leu Arg Phe Leu Ala Ile Pro Pro Thr Ala Gly
50 55 60

Ile Leu Ala Arg Trp Gly Ser Phe Lys Lys Asn Gly Ala Ile Lys Val
65 70 75 80

Leu Arg Gly Phe Lys Arg Glu Ile Ser Asn Met Leu Asn Ile Met Asn
85 90 95

Arg Arg Lys Arg Ser Val Thr Met Leu Leu Met Leu Leu Pro Thr Ala
100 105 110

Leu Ala Phe His Leu Thr Thr Arg Gly Gly Glu Pro His Met Ile Val
115 120 125

Ser Lys Gln Glu Arg Gly Lys Ser Leu Leu Phe Lys Thr Ser Ala Gly
130 135 140

```
Val Asn Met Cys Thr Leu Ile Ala Met Asp Leu Gly Glu Leu Cys Glu
145                 150                 155                 160

Asp Thr Met Thr Tyr Lys Cys Pro Arg Ile Thr Glu Ala Glu Pro Asp
                165                 170                 175

Asp Val Asp Cys Trp Cys Asn Ala Thr Asp Thr Trp Val Thr Tyr Gly
            180                 185                 190

Thr Cys Ser Gln Thr Gly Glu His Arg Arg Asp Lys Arg Ser Val Ala
        195                 200                 205

Leu Ala Pro His Val Gly Leu Gly Leu Glu Thr Arg Ala Glu Thr Trp
    210                 215                 220

Met Ser Ser Glu Gly Ala Trp Lys Gln Ile Gln Lys Val Glu Thr Trp
225                 230                 235                 240

Ala Leu Arg His Pro Gly Phe Thr Val Ile Ala Leu Phe Leu Ala His
                245                 250                 255

Ala Ile Gly Thr Ser Ile Thr Gln Lys Gly Ile Ile Phe Ile Leu Leu
            260                 265                 270

Met Leu Val Thr Pro Ser Met Ala Met Arg Cys Val Gly Ile Gly Asn
        275                 280                 285

Arg Asp Phe Val Glu Gly Leu Ser Gly Ala Thr Trp Val Asp Val Val
    290                 295                 300

Leu Glu His Gly Ser Cys Val Thr Thr Met Ala Lys Asn Lys Pro Thr
305                 310                 315                 320

Leu Asp Ile Glu Leu Leu Lys Thr Glu Val Thr Asn Pro Ala Val Leu
                325                 330                 335

Arg Lys Leu Cys Ile Glu Ala Lys Ile Ser Asn Thr Thr Thr Asp Ser
            340                 345                 350

Arg Cys Pro Thr Gln Gly Glu Ala Thr Leu Val Glu Glu Gln Asp Ala
        355                 360                 365
```

```
Asn Phe Val Cys Arg Arg Thr Phe Val Asp Arg Gly Trp Gly Asn Gly
    370                 375                 380

Cys Gly Leu Phe Gly Lys Gly Ser Leu Ile Thr Cys Ala Lys Phe Lys
385                 390                 395                 400

Cys Val Thr Lys Leu Glu Gly Lys Ile Val Gln Tyr Glu Asn Leu Lys
                405                 410                 415

Tyr Ser Val Ile Val Thr Val His Thr Gly Asp Gln His Gln Val Gly
            420                 425                 430

Asn Glu Thr Thr Glu His Gly Thr Thr Ala Thr Ile Thr Pro Gln Ala
        435                 440                 445

Pro Thr Ser Glu Ile Gln Leu Thr Asp Tyr Gly Thr Leu Thr Leu Asp
    450                 455                 460

Cys Ser Pro Arg Thr Gly Leu Asp Phe Asn Glu Met Val Leu Leu Thr
465                 470                 475                 480

Met Lys Glu Arg Ser Trp Leu Val His Lys Gln Trp Phe Leu Asp Leu
                485                 490                 495

Pro Leu Pro Trp Thr Ser Gly Ala Ser Thr Ser Gln Glu Thr Trp Asn
            500                 505                 510

Arg Gln Asp Leu Leu Val Thr Phe Lys Thr Ala His Ala Lys Lys Gln
        515                 520                 525

Glu Val Val Val Leu Gly Ser Gln Glu Gly Ala Met His Thr Ala Leu
    530                 535                 540

Thr Gly Ala Thr Glu Ile Gln Thr Ser Gly Thr Thr Thr Ile Phe Ala
545                 550                 555                 560

Gly His Leu Lys Cys Arg Leu Lys Met Asp Lys Leu Thr Leu Lys Gly
                565                 570                 575
```

```
Met Ser Tyr Val Met Cys Thr Gly Ser Phe Lys Leu Glu Lys Glu Val
            580                 585                 590

Ala Glu Thr Gln His Gly Thr Val Leu Val Gln Val Lys Tyr Glu Gly
        595                 600                 605

Thr Asp Ala Pro Cys Lys Ile Pro Phe Ser Thr Gln Asp Glu Lys Gly
    610                 615                 620

Ala Thr Gln Asn Gly Arg Leu Ile Thr Ala Asn Pro Ile Val Thr Asp
625                 630                 635                 640

Lys Glu Lys Pro Val Asn Ile Glu Ala Glu Pro Pro Phe Gly Glu Ser
                645                 650                 655

Tyr Ile Val Val Gly Ala Gly Glu Lys Ala Leu Lys Leu Ser Trp Phe
            660                 665                 670

Lys Lys Gly Ser Ser Ile Gly Lys Met Phe Glu Ala Thr Ala Arg Gly
        675                 680                 685

Ala Arg Arg Met Ala Ile Leu Gly Asp Thr Ala Trp Asp Phe Gly Ser
    690                 695                 700

Ile Gly Gly Val Phe Thr Ser Met Gly Lys Leu Val His Gln Val Phe
705                 710                 715                 720

Gly Thr Ala Tyr Gly Val Leu Phe Ser Gly Val Ser Trp Thr Met Lys
                725                 730                 735

Ile Gly Ile Gly Ile Leu Leu Thr Trp Leu Gly Leu Asn Ser Arg Asn
            740                 745                 750

Thr Ser Leu Ser Met Met Cys Ile Ala Val Gly Met Val Thr Leu Tyr
        755                 760                 765

Leu Gly Val Met Val Gln Ala Asp Ser Gly Cys Val Ile Asn Trp Lys
    770                 775                 780

Gly Arg Glu Leu Lys Cys Gly Ser Gly Ile Phe Val Thr Asn Glu Val
785                 790                 795                 800
```

```
His Thr Trp Thr Glu Gln Tyr Lys Phe Gln Ala Asp Ser Pro Lys Arg
                805                 810                 815

Leu Ser Ala Ala Ile Gly Lys Ala Trp Glu Glu Gly Val Cys Gly Ile
            820                 825                 830

Arg Ser Ala Thr Arg Leu Glu Asn Ile Met Trp Lys Gln Ile Ser Asn
        835                 840                 845

Glu Leu Asn His Ile Leu Leu Glu Asn Asp Met Lys Phe Thr Val Val
    850                 855                 860

Val Gly Asp Val Ser Gly Ile Leu Ala Gln Gly Lys Lys Met Ile Arg
865                 870                 875                 880

Pro Gln Pro Met Glu His Lys Tyr Ser Trp Lys Ser Trp Gly Lys Ala
                885                 890                 895

Lys Ile Ile Gly Ala Asp Val Gln Asn Thr Thr Phe Ile Ile Asp Gly
            900                 905                 910

Pro Asn Thr Pro Glu Cys Pro Asp Asn Gln Arg Ala Trp Asn Ile Trp
        915                 920                 925

Glu Val Glu Asp Tyr Gly Phe Gly Ile Phe Thr Thr Asn Ile Trp Leu
    930                 935                 940

Lys Leu Arg Asp Ser Tyr Thr Gln Val Cys Asp His Arg Leu Met Ser
945                 950                 955                 960

Ala Ala Ile Lys Asp Ser Lys Ala Val His Ala Asp Met Gly Tyr Trp
                965                 970                 975

Ile Glu Ser Glu Lys Asn Glu Thr Trp Lys Leu Ala Arg Ala Ser Phe
            980                 985                 990

Ile Glu Val Lys Thr Cys Ile Trp  Pro Lys Ser His Thr  Leu Trp Ser
        995                 1000                1005
```

```
Asn Gly  Val Leu Glu Ser Glu  Met Ile Ile Pro Lys  Ile Tyr Gly
    1010                1015                1020

Gly Pro  Ile Ser Gln His Asn  Tyr Arg Pro Gly Tyr  Phe Thr Gln
    1025                1030                1035

Thr Ala  Gly Pro Trp His Leu  Gly Lys Leu Glu Leu  Asp Phe Asp
    1040                1045                1050

Phe Cys  Glu Gly Thr Thr Val  Val Val Asp Glu His  Cys Gly Asn
    1055                1060                1065

Arg Gly  Pro Ser Leu Arg Thr  Thr Thr Val Thr Gly  Lys Ile Ile
    1070                1075                1080

His Glu  Trp Cys Cys Arg Ser  Cys Thr Leu Pro Pro  Leu Arg Phe
    1085                1090                1095

Lys Gly  Glu Asp Gly Cys Trp  Tyr Gly Met Glu Ile  Arg Pro Val
    1100                1105                1110

Lys Asp  Lys Glu Glu Asn Leu  Val Lys Ser Met Val  Ser Ala Gly
    1115                1120                1125

Ser Gly  Glu Val Asp Ser Phe  Ser Leu Gly Leu Leu  Cys Ile Ser
    1130                1135                1140

Ile Met  Ile Glu Glu Val Met  Arg Ser Arg Trp Ser  Lys Lys Met
    1145                1150                1155

Leu Met  Thr Gly Thr Leu Ala  Val Phe Leu Leu Leu  Ile Met Gly
    1160                1165                1170

Gln Leu  Thr Trp Ser Asp Leu  Ile Arg Leu Cys Ile  Met Val Gly
    1175                1180                1185

Ala Asn  Ala Ser Asp Lys Met  Gly Met Gly Thr Thr  Tyr Leu Ala
    1190                1195                1200

Leu Met  Ala Thr Phe Lys Met  Arg Pro Met Phe Ala  Val Gly Leu
    1205                1210                1215
```

```
Leu Phe  Arg Arg Leu Thr Ser  Arg Glu Val Leu Leu  Leu Thr Ile
    1220                 1225                 1230

Gly Leu  Ser Leu Val Ala Ser  Val Glu Leu Pro Ser  Ser Leu Glu
    1235                 1240                 1245

Glu Leu  Gly Asp Gly Leu Ala  Ile Gly Ile Met Met  Leu Lys Leu
    1250                 1255                 1260

Leu Thr  Asp Phe Gln Ser His  Gln Leu Trp Ala Thr  Leu Leu Ser
    1265                 1270                 1275

Leu Thr  Phe Ile Lys Thr Thr  Phe Ser Leu His Tyr  Ala Trp Lys
    1280                 1285                 1290

Thr Met  Ala Met Val Leu Ser  Ile Val Ser Leu Phe  Pro Leu Cys
    1295                 1300                 1305

Leu Ser  Thr Thr Ser Gln Lys  Thr Thr Trp Leu Pro  Val Leu Leu
    1310                 1315                 1320

Gly Ser  Leu Gly Cys Lys Pro  Leu Pro Met Phe Leu  Ile Thr Glu
    1325                 1330                 1335

Asn Lys  Ile Trp Gly Arg Lys  Ser Trp Pro Leu Asn  Glu Gly Ile
    1340                 1345                 1350

Met Ala  Val Gly Ile Val Ser  Ile Leu Leu Ser Ser  Leu Leu Lys
    1355                 1360                 1365

Asn Asp  Val Pro Leu Ala Gly  Pro Leu Ile Ala Gly  Gly Met Leu
    1370                 1375                 1380

Ile Ala  Cys Tyr Val Ile Ser  Gly Ser Ser Ala Asp  Leu Ser Leu
    1385                 1390                 1395

Glu Lys  Ala Ala Glu Val Ser  Trp Glu Glu Glu Ala  Glu His Ser
    1400                 1405                 1410
```

```
Gly Ala  Ser His Asn Ile Leu  Val Glu Val Gln Asp  Asp Gly Thr
    1415                 1420                 1425

Met Lys  Ile Lys Asp Glu Glu  Arg Asp Asp Thr Leu  Thr Ile Leu
    1430                 1435                 1440

Leu Lys  Ala Thr Leu Leu Ala  Val Ser Gly Val Tyr  Pro Met Ser
    1445                 1450                 1455

Ile Pro  Ala Thr Leu Phe Val  Trp Tyr Phe Trp Gln  Lys Lys Lys
    1460                 1465                 1470

Gln Arg  Ser Gly Val Leu Trp  Asp Thr Pro Ser Pro  Pro Glu Val
    1475                 1480                 1485

Glu Arg  Ala Val Leu Asp Asp  Gly Ile Tyr Arg Ile  Leu Gln Arg
    1490                 1495                 1500

Gly Leu  Leu Gly Arg Ser Gln  Val Gly Val Gly Val  Phe Gln Glu
    1505                 1510                 1515

Gly Val  Phe His Thr Met Trp  His Val Thr Arg Gly  Ala Val Leu
    1520                 1525                 1530

Met Tyr  Gln Gly Lys Arg Leu  Glu Pro Ser Trp Ala  Ser Val Lys
    1535                 1540                 1545

Lys Asp  Leu Ile Ser Tyr Gly  Gly Gly Trp Arg Phe  Gln Gly Ser
    1550                 1555                 1560

Trp Asn  Thr Gly Glu Glu Val  Gln Val Ile Ala Val  Glu Pro Gly
    1565                 1570                 1575

Lys Asn  Pro Lys Asn Val Gln  Thr Thr Pro Gly Thr  Phe Lys Thr
    1580                 1585                 1590

Pro Glu  Gly Glu Val Gly Ala  Ile Ala Leu Asp Phe  Lys Pro Gly
    1595                 1600                 1605

Thr Ser  Gly Ser Pro Ile Val  Asn Arg Glu Gly Lys  Ile Val Gly
    1610                 1615                 1620
```

```
Leu Tyr  Gly Asn Gly Val Val  Thr Thr Ser Gly Thr  Tyr Val Ser
    1625                1630                1635

Ala Ile  Ala Gln Ala Lys Ala  Ser Gln Glu Gly Pro  Leu Pro Glu
    1640                1645                1650

Ile Glu  Asp Glu Val Phe Arg  Lys Arg Asn Leu Thr  Ile Met Asp
    1655                1660                1665

Leu His  Pro Gly Ser Gly Lys  Thr Arg Arg Tyr Leu  Pro Ala Ile
    1670                1675                1680

Val Arg  Glu Ala Ile Lys Arg  Lys Leu Arg Thr Leu  Ile Leu Ala
    1685                1690                1695

Pro Thr  Arg Val Val Ala Ser  Glu Met Ala Glu Ala  Leu Lys Gly
    1700                1705                1710

Val Pro  Ile Arg Tyr Gln Thr  Thr Ala Val Lys Ser  Glu His Thr
    1715                1720                1725

Gly Lys  Glu Ile Val Asp Leu  Met Cys His Ala Thr  Phe Thr Met
    1730                1735                1740

Arg Leu  Leu Ser Pro Val Arg  Val Pro Asn Tyr Asn  Met Ile Ile
    1745                1750                1755

Met Asp  Glu Ala His Phe Thr  Asp Pro Ala Ser Ile  Ala Ala Arg
    1760                1765                1770

Gly Tyr  Ile Ser Thr Arg Val  Gly Met Gly Glu Ala  Ala Ala Ile
    1775                1780                1785

Phe Met  Thr Ala Thr Pro Pro  Gly Ser Val Glu Ala  Phe Pro Gln
    1790                1795                1800

Ser Asn  Ala Ile Ile Gln Asp  Glu Glu Arg Asp Ile  Pro Glu Arg
    1805                1810                1815
```

```
Ser Trp  Asn Ser Gly Tyr Asp  Trp Ile Thr Asp Phe  Pro Gly Lys
    1820                 1825                 1830

Thr Val  Trp Phe Val Pro Ser  Ile Lys Ser Gly Asn  Asp Ile Ala
    1835                 1840                 1845

Asn Cys  Leu Arg Lys Asn Gly  Lys Arg Val Ile Gln  Leu Ser Arg
    1850                 1855                 1860

Lys Thr  Phe Asp Thr Glu Tyr  Gln Lys Thr Lys Asn  Asn Asp Trp
    1865                 1870                 1875

Asp Tyr  Val Val Thr Thr Asp  Ile Ser Glu Met Gly  Ala Asn Phe
    1880                 1885                 1890

Arg Ala  Asp Arg Val Ile Asp  Pro Arg Arg Cys Leu  Lys Pro Val
    1895                 1900                 1905

Ile Leu  Lys Asp Gly Pro Glu  Arg Val Ile Leu Ala  Gly Pro Met
    1910                 1915                 1920

Pro Val  Thr Val Ala Ser Ala  Ala Gln Arg Arg Gly  Arg Ile Gly
    1925                 1930                 1935

Arg Asn  Gln Asn Lys Glu Gly  Asp Gln Tyr Ile Tyr  Met Gly Gln
    1940                 1945                 1950

Pro Leu  Asn Asn Asp Glu Asp  His Ala His Trp Thr  Glu Ala Lys
    1955                 1960                 1965

Met Leu  Leu Asp Asn Ile Asn  Thr Pro Glu Gly Ile  Ile Pro Ala
    1970                 1975                 1980

Leu Tyr  Glu Pro Glu Arg Glu  Lys Ser Ala Ala Ile  Asp Gly Glu
    1985                 1990                 1995

Tyr Arg  Leu Arg Gly Glu Ala  Arg Lys Thr Phe Val  Glu Leu Met
    2000                 2005                 2010

Arg Arg  Gly Asp Leu Pro Val  Trp Leu Ser Tyr Lys  Val Ala Ser
    2015                 2020                 2025
```

```
Glu Gly  Phe Gln Tyr Ser Asp  Arg Arg Trp Cys Phe  Asp Gly Glu
    2030                2035                2040

Arg Asn  Asn Gln Val Leu Glu  Glu Asn Met Asp Val  Glu Ile Trp
    2045                2050                2055

Thr Lys  Glu Gly Glu Arg Lys  Lys Leu Arg Pro Arg  Trp Leu Asp
    2060                2065                2070

Ala Arg  Thr Tyr Ser Asp Pro  Leu Ala Leu Arg Glu  Phe Lys Glu
    2075                2080                2085

Phe Ala  Ala Gly Arg Arg Ser  Val Ser Gly Asp Leu  Ile Leu Glu
    2090                2095                2100

Ile Gly  Lys Leu Pro Gln His  Leu Thr Gln Arg Ala  Gln Asn Ala
    2105                2110                2115

Leu Asp  Asn Leu Val Met Leu  His Asn Ser Glu Gln  Gly Gly Lys
    2120                2125                2130

Ala Tyr  Arg His Ala Met Glu  Glu Leu Pro Asp Thr  Ile Glu Thr
    2135                2140                2145

Leu Met  Leu Leu Ala Leu Ile  Ala Val Leu Thr Gly  Gly Val Thr
    2150                2155                2160

Leu Phe  Phe Leu Ser Gly Arg  Gly Leu Gly Lys Thr  Ser Ile Gly
    2165                2170                2175

Leu Leu  Cys Val Met Ala Ser  Ser Ala Leu Leu Trp  Met Ala Ser
    2180                2185                2190

Val Glu  Pro His Trp Ile Ala  Ala Ser Ile Ile Leu  Glu Phe Phe
    2195                2200                2205

Leu Met  Val Leu Leu Ile Pro  Glu Pro Asp Arg Gln  Arg Thr Pro
    2210                2215                2220
```

```
Gln Asp  Asn Gln Leu Ala Tyr  Val Val Ile Gly Leu  Leu Phe Met
    2225                2230                2235

Ile Leu  Thr Val Ala Ala Asn  Glu Met Gly Leu Leu  Glu Thr Thr
    2240                2245                2250

Lys Lys  Asp Leu Gly Ile Gly  His Val Ala Ala Glu  Asn His His
    2255                2260                2265

His Ala  Thr Met Leu Asp Val  Asp Leu His Pro Ala  Ser Ala Trp
    2270                2275                2280

Thr Leu  Tyr Ala Val Ala Thr  Thr Ile Ile Thr Pro  Met Met Arg
    2285                2290                2295

His Thr  Ile Glu Asn Thr Thr  Ala Asn Ile Ser Leu  Thr Ala Ile
    2300                2305                2310

Ala Asn  Gln Ala Ala Ile Leu  Met Gly Leu Asp Lys  Gly Trp Pro
    2315                2320                2325

Ile Ser  Lys Met Asp Ile Gly  Val Pro Leu Leu Ala  Leu Gly Cys
    2330                2335                2340

Tyr Ser  Gln Val Asn Pro Leu  Thr Leu Ile Ala Ala  Val Leu Met
    2345                2350                2355

Leu Val  Ala His Tyr Ala Ile  Ile Gly Pro Gly Leu  Gln Ala Lys
    2360                2365                2370

Ala Thr  Arg Glu Ala Gln Lys  Arg Thr Ala Ala Gly  Ile Met Lys
    2375                2380                2385

Asn Pro  Thr Val Asp Gly Ile  Val Ala Ile Asp Leu  Asp Pro Val
    2390                2395                2400

Val Tyr  Asp Ala Lys Phe Glu  Lys Gln Leu Gly Gln  Ile Met Leu
    2405                2410                2415

Leu Ile  Leu Cys Thr Ser Gln  Ile Leu Leu Met Arg  Thr Thr Trp
    2420                2425                2430
```

```
Ala Leu  Cys Glu Ser Ile Thr  Leu Ala Thr Gly Pro  Leu Thr Thr
    2435                 2440                 2445

Leu Trp  Glu Gly Ser Pro Gly  Lys Phe Trp Asn Thr  Thr Ile Ala
    2450                 2455                 2460

Val Ser  Met Ala Asn Ile Phe  Arg Gly Ser Tyr Leu  Ala Gly Ala
    2465                 2470                 2475

Gly Leu  Ala Phe Ser Leu Met  Lys Ser Leu Gly Gly  Gly Arg Arg
    2480                 2485                 2490

Gly Thr  Gly Ala Gln Gly Glu  Thr Leu Gly Glu Lys  Trp Lys Arg
    2495                 2500                 2505

Gln Leu  Asn Gln Leu Ser Lys  Ser Glu Phe Asn Thr  Tyr Lys Arg
    2510                 2515                 2520

Ser Gly  Ile Met Glu Val Asp  Arg Ser Glu Ala Lys  Glu Gly Leu
    2525                 2530                 2535

Lys Arg  Gly Glu Thr Thr Lys  His Ala Val Ser Arg  Gly Thr Ala
    2540                 2545                 2550

Lys Leu  Arg Trp Phe Val Glu  Arg Asn Leu Val Lys  Pro Glu Gly
    2555                 2560                 2565

Lys Val  Ile Asp Leu Gly Cys  Gly Arg Gly Gly Trp  Ser Tyr Tyr
    2570                 2575                 2580

Cys Ala  Gly Leu Lys Lys Val  Thr Glu Val Lys Gly  Tyr Thr Lys
    2585                 2590                 2595

Gly Gly  Pro Gly His Glu Glu  Pro Ile Pro Met Ala  Thr Tyr Gly
    2600                 2605                 2610

Trp Asn  Leu Val Lys Leu His  Ser Gly Lys Asp Val  Phe Phe Ile
    2615                 2620                 2625
```

```
Pro Pro  Glu Lys Cys Asp Thr  Leu Leu Cys Asp Ile  Gly Glu Ser
    2630                 2635                 2640

Ser Pro  Asn Pro Thr Ile Glu  Glu Gly Arg Thr Leu  Arg Val Leu
    2645                 2650                 2655

Lys Met  Val Glu Pro Trp Leu  Arg Gly Asn Gln Phe  Cys Ile Lys
    2660                 2665                 2670

Ile Leu  Asn Pro Tyr Met Pro  Ser Val Val Glu Thr  Leu Glu Gln
    2675                 2680                 2685

Met Gln  Arg Lys His Gly Gly  Met Leu Val Arg Asn  Pro Leu Ser
    2690                 2695                 2700

Arg Asn  Ser Thr His Glu Met  Tyr Trp Val Ser Cys  Gly Thr Gly
    2705                 2710                 2715

Asn Ile  Val Ser Ala Val Asn  Met Thr Ser Arg Met  Leu Leu Asn
    2720                 2725                 2730

Arg Phe  Thr Met Ala His Arg  Lys Pro Thr Tyr Glu  Arg Asp Val
    2735                 2740                 2745

Asp Leu  Gly Ala Gly Thr Arg  His Val Ala Val Glu  Pro Glu Val
    2750                 2755                 2760

Ala Asn  Leu Asp Ile Ile Gly  Gln Arg Ile Glu Asn  Ile Lys Asn
    2765                 2770                 2775

Glu His  Lys Ser Thr Trp His  Tyr Asp Glu Asp Asn  Pro Tyr Lys
    2780                 2785                 2790

Thr Trp  Ala Tyr His Gly Ser  Tyr Glu Val Lys Pro  Ser Gly Ser
    2795                 2800                 2805

Ala Ser  Ser Met Val Asn Gly  Val Val Arg Leu Leu  Thr Lys Pro
    2810                 2815                 2820

Trp Asp  Val Ile Pro Met Val  Thr Gln Ile Ala Met  Thr Asp Thr
    2825                 2830                 2835
```

```
Thr Pro  Phe Gly Gln Gln Arg  Val Phe Lys Glu Lys  Val Asp Thr
    2840                2845                2850

Arg Thr  Pro Lys Ala Lys Arg  Gly Thr Ala Gln Ile  Met Glu Val
    2855                2860                2865

Thr Ala  Arg Trp Leu Trp Gly  Phe Leu Ser Arg Asn  Lys Lys Pro
    2870                2875                2880

Arg Ile  Cys Thr Arg Glu Glu  Phe Thr Arg Lys Val  Arg Ser Asn
    2885                2890                2895

Ala Ala  Ile Gly Ala Val Phe  Val Asp Glu Asn Gln  Trp Asn Ser
    2900                2905                2910

Ala Lys  Glu Ala Val Glu Asp  Glu Arg Phe Trp Glu  Leu Val His
    2915                2920                2925

Arg Glu  Arg Glu Leu His Lys  Gln Gly Lys Cys Ala  Thr Cys Val
    2930                2935                2940

Tyr Asn  Met Met Gly Lys Arg  Glu Lys Lys Leu Gly  Glu Phe Gly
    2945                2950                2955

Lys Ala  Lys Gly Ser Arg Ala  Ile Trp Tyr Met Trp  Leu Gly Ala
    2960                2965                2970

Arg Phe  Leu Glu Phe Glu Ala  Leu Gly Phe Met Asn  Glu Asp His
    2975                2980                2985

Trp Phe  Ser Arg Glu Asn Ser  Leu Ser Gly Val Glu  Gly Glu Gly
    2990                2995                3000

Leu His  Lys Leu Gly Tyr Ile  Leu Arg Asp Ile Ser  Arg Ile Pro
    3005                3010                3015

Gly Gly  Asn Met Tyr Ala Asp  Asp Thr Ala Gly Trp  Asp Thr Arg
    3020                3025                3030
```

```
Ile Thr  Glu Asp Asp Leu Gln  Asn Glu Ala Lys Ile  Thr Asp Ile
    3035                 3040                 3045

Met Glu  Pro Glu His Ala Leu  Leu Ala Thr Ser Ile  Phe Lys Leu
    3050                 3055                 3060

Thr Tyr  Gln Asn Lys Val Val  Arg Val Gln Arg Pro  Ala Lys Asn
    3065                 3070                 3075

Gly Thr  Val Met Asp Val Ile  Ser Arg Arg Asp Gln  Arg Gly Ser
    3080                 3085                 3090

Gly Gln  Val Gly Thr Tyr Gly  Leu Asn Thr Phe Thr  Asn Met Glu
    3095                 3100                 3105

Ala Gln  Leu Ile Arg Gln Met  Glu Ser Glu Gly Ile  Phe Leu Pro
    3110                 3115                 3120

Ser Glu  Leu Glu Thr Pro Asn  Leu Ala Gly Arg Val  Leu Asp Trp
    3125                 3130                 3135

Leu Glu  Lys Tyr Gly Val Glu  Arg Leu Lys Arg Met  Ala Ile Ser
    3140                 3145                 3150

Gly Asp  Asp Cys Val Val Lys  Pro Ile Asp Asp Arg  Phe Ala Thr
    3155                 3160                 3165

Ala Leu  Thr Ala Leu Asn Asp  Met Gly Lys Val Arg  Lys Asp Ile
    3170                 3175                 3180

Pro Gln  Trp Glu Pro Ser Lys  Gly Trp Asn Asp Trp  Gln Gln Val
    3185                 3190                 3195

Pro Phe  Cys Ser His His Phe  His Gln Leu Ile Met  Lys Asp Gly
    3200                 3205                 3210

Arg Glu  Ile Val Val Pro Cys  Arg Asn Gln Asp Glu  Leu Val Gly
    3215                 3220                 3225

Arg Ala  Arg Val Ser Gln Gly  Ala Gly Trp Ser Leu  Arg Glu Thr
    3230                 3235                 3240
```

```
Ala Cys  Leu Gly Lys Ser Tyr  Ala Gln Met Trp Gln  Leu Met Tyr
    3245                 3250                 3255

Phe His  Arg Arg Asp Leu Arg  Leu Ala Ala Asn Ala  Ile Cys Ser
    3260                 3265                 3270

Ala Val  Pro Val Asp Trp Val  Pro Thr Ser Arg Thr  Thr Trp Ser
    3275                 3280                 3285

Ile His  Ala His His Gln Trp  Met Thr Thr Glu Asp  Met Leu Ser
    3290                 3295                 3300

Val Trp  Asn Arg Val Trp Ile  Glu Glu Asn Pro Trp  Met Glu Asp
    3305                 3310                 3315

Lys Thr  His Val Ser Ser Trp  Glu Glu Val Pro Tyr  Leu Gly Lys
    3320                 3325                 3330

Arg Glu  Asp Gln Trp Cys Gly  Ser Leu Ile Gly Leu  Thr Ala Arg
    3335                 3340                 3345

Ala Thr  Trp Ala Thr Asn Ile  Gln Val Ala Ile Asn  Gln Val Arg
    3350                 3355                 3360

Arg Leu  Ile Gly Asn Glu Asn  Tyr Leu Asp Tyr Met  Thr Ser Met
    3365                 3370                 3375

Lys Arg  Phe Lys Asn Glu Ser  Asp Pro Glu Gly Ala  Leu Trp
    3380                 3385                 3390
```

<210> 11
<211> 10723
<212> DNA
<213> dengue virus

<400> 11

```
agttgttagt ctacgtggac cgacaaagac agattctttg agggagctaa gctcaacgta       60

gttctaacag ttttttaatt agagagcaga tctctgatga ataaccaacg gaaaaaggcg      120

aaaaacacgc ctttcaatat gctgaaacgc gagagaaacc gcgtgtcgac tgtgcaacag      180
```

ctgacaaaga gattctcact tggaatgctg cagggacgag gaccattaaa actgttcatg 240

gccctggtgg cgttccttcg tttcctaaca atcccaccaa cagcagggat attgaagaga 300

tggggaacaa ttaaaaaatc aaaagctatt aatgttttga gagggttcag gaaagagatt 360

ggaaggatgc tgaacatctt gaataggaga cgcagatctg caggcatgat cattatgctg 420

attccaacag tgatggcgtt ccatttaacc acacgtaacg gagaaccaca catgatcgtc 480

agcagacaag agaaagggaa aagtcttctg tttaaaacag aggatggcgt gaacatgtgt 540

accctcatgg ccatggacct tggtgaattg tgtgaagaca caatcacgta caagtgtccc 600

cttctcaggc agaatgagcc agaagacata gactgttggt gcaactctac gtccacgtgg 660

gtaacttatg ggacgtgtac caccatggga gaacatagaa gagaaaaaag atcagtggca 720

ctcgttccac atgtgggaat gggactggag acacgaactg aaacatggat gtcatcagaa 780

ggggcctgga aacatgtcca gagaattgaa acttggatct tgagacatcc aggcttcacc 840

atgatggcag caatcctggc atacaccata ggaacgacac atttccaaag agccctgatt 900

ttcatcttac tgacagctgt cactccttca atgacaatgc gttgcatagg aatgtcaaat 960

agagactttg tggaaggggt ttcaggagga agctgggttg acatagtctt agaacatgga 1020

agctgtgtga cgacgatggc aaaaaacaaa ccaacattgg attttgaact gataaaaaca 1080

gaagccaaac agcctgccac cctaaggaag tactgtatag aggcaaagct aaccaacaca 1140

acaacagaat ctcgctgccc aacacaaggg gaacccagcc taaatgaaga gcaggacaaa 1200

aggttcgtct gcaaacactc catggtagac agaggatggg gaaatggatg tggactattt 1260

ggaaagggag gcattgtgac ctgtgctatg ttcagatgca aaaagaacat ggaaggaaaa 1320

gttgtgcaac cagaaaactt ggaatacacc attgtgataa cacctcactc aggggaagag 1380

catgcagtcg gaaatgacac aggaaaacat ggcaaggaaa tcaaaataac accacagagt 1440

tccatcacag aagcagaatt gacaggttat ggcactgtca caatggagtg ctctccaaga 1500

acgggcctcg acttcaatga gatggtgttg ctgcagatgg aaaataaagc ttggctggtg 1560

cacaggcaat ggttcctaga cctgccgtta ccatggttgc ccggagcgga cacacaaggg 1620

tcaaattgga tacagaaaga gacattggtc actttcaaaa atccccatgc gaagaaacag 1680

gatgttgttg ttttaggatc ccaagaaggg gccatgcaca cagcacttac aggggccaca 1740

gaaatccaaa tgtcatcagg aaacttactc ttcacaggac atctcaagtg caggctgaga 1800

atggacaagc tacagctcaa aggaatgtca tactctatgt gcacaggaaa gtttaaagtt 1860

gtgaaggaaa tagcagaaac acaacatgga acaatagtta tcagagtgca atatgaaggg 1920

gacggctctc catgcaagat ccctttgag ataatggatt tggaaaaaag acatgtctta 1980

ggtcgcctga ttacagtcaa cccaattgtg acagaaaaag atagcccagt caacatagaa 2040

gcagaacctc cattcggaga cagctacatc atcataggag tagagccggg acaactgaag 2100

ctcaactggt ttaagaaagg aagttctatc ggccaaatgt ttgagacaac aatgaggggg 2160

gcgaagagaa tggccatttt aggtgacaca gcctgggatt ttggatcctt gggaggagtg 2220

tttacatcta taggaaaggc tctccaccaa gtctttggag caatctatgg agctgccttc 2280

agtggggttt catggactat gaaaatcctc ataggagtca ttatcacatg gataggaatg 2340

aattcacgca gcacctcact gtctgtgaca ctagtattgg tgggaattgt gacactgtat 2400

ttgggagtca tggtgcaggc cgatagtggt tgcgttgtga gctggaaaaa caaagaactg 2460

aaatgtggca gtgggatttt catcacagac aacgtgcaca catggacaga acaatacaag 2520

ttccaaccag aatccccttc aaaactagct tcagctatcc agaaagccca tgaagagggc 2580

atttgtggaa tccgctcagt aacaagactg gagaatctga tgtggaaaca aataacacca 2640

gaattgaatc acattctatc agaaaatgag gtgaagttaa ctattatgac aggagacatc 2700

aaaggaatca tgcaggcagg aaaacgatct ctgcggcctc agcccactga gctgaagtat 2760

tcatggaaaa catggggcaa agcaaaaatg ctctctacag agtctcataa ccagaccttt 2820

ctcattgatg gccccgaaac agcagaatgc cccaacacaa atagagcttg gaattcgttg 2880

gaagttgaag actatggctt tggagtattc accaccaata tatggctaaa attgaaagaa 2940

aaacaggatg tattctgcga ctcaaaactc atgtcagcgg ccataaaaga caacagagcc 3000

gtccatgccg atatgggtta ttggatagaa agtgcactca atgacacatg gaagatagag 3060

aaagcctctt tcattgaagt taaaaactgc cactggccaa aatcacacac cctctggagc 3120

aatggagtgc tagaaagtga gatgataatt ccaaagaatc tcgctggacc agtgtctcaa 3180

cacaactata gaccaggcta ccatacacaa ataacaggac catggcatct aggtaagctt 3240

gagatggact ttgatttctg tgatggaaca acagtggtag tgactgagga ctgcggaaat 3300

agaggaccct ctttgagaac aaccactgcc tctggaaaac tcataacaga atggtgctgc 3360

cgatcttgca cattaccacc gctaagatac agaggtgagg atgggtgctg gtacgggatg 3420

gaaatcagac cattgaagga gaaagaagag aatttggtca actccttggt cacagctgga 3480

catgggcagg tcgacaactt ttcactagga gtcttgggaa tggcattgtt cctggaggaa 3540

atgcttagga cccgagtagg aacgaaacat gcaatactac tagttgcagt ttcttttgtg 3600

acattgatca cagggaacat gtcctttaga gacctgggaa gagtgatggt tatggtaggc 3660

gccactatga cggatgacat aggtatgggc gtgacttatc ttgccctact agcagccttc 3720

aaagtcagac caacttttgc agctggacta ctcttgagaa agctgacctc caaggaattg 3780

atgatgacta ctataggaat tgtactcctc tcccagagca ccataccaga gaccattctt 3840

gagttgactg atgcgttagc cttaggcatg atggtcctca aaatggtgag aaatatggaa 3900

aagtatcaat tggcagtgac tatcatggct atcttgtgcg tcccaaacgc agtgatatta 3960

caaaacgcat ggaaagtgag ttgcacaata ttggcagtgg tgtccgtttc cccactgctc 4020

ttaacatcct cacagcaaaa aacagattgg ataccattag cattgacgat caaaggtctc 4080

aatccaacag ctatttttct aacaaccctc tcaagaacca gcaagaaaag gagctggcca 4140

ttaaatgagg ctatcatggc agtcgggatg gtgagcattt tagccagttc tctcctaaaa 4200

aatgatattc ccatgacagg accattagtg gctggagggc tcctcactgt gtgctacgtg 4260

ctcactggac gatcggccga tttggaactg gagagagcag ccgatgtcaa atgggaagac 4320

caggcagaga tatcaggaag cagtccaatc ctgtcaataa caatatcaga agatggtagc 4380

atgtcgataa aaaatgaaga ggaagaacaa acactgacca tactcattag aacaggattg 4440

ctggtgatct caggactttt tcctgtatca ataccaatca cggcagcagc atggtacctg 4500

tgggaagtga agaaacaacg ggccggagta ttgtgggatg ttccttcacc cccacccatg 4560

ggaaaggctg aactggaaga tggagcctat agaattaagc aaaaagggat tcttggatat 4620

tcccagatcg gagccggagt ttacaaagaa ggaacattcc atacaatgtg gcatgtcaca 4680

cgtggcgctg ttctaatgca taaaggaaag aggattgaac catcatgggc ggacgtcaag 4740

aaagacctaa tatcatatgg aggaggctgg aagttagaag gagaatggaa ggaaggagaa 4800

gaagtccagg tattggcact ggagcctgga aaaaatccaa gagccgtcca aacgaaacct 4860

ggtcttttca aaaccaacgc cggaacaata ggtgctgtat ctctggactt ttctcctgga 4920

acgtcaggat ctccaattat cgacaaaaaa ggaaaagttg tgggtcttta tggtaatggt 4980

gttgttacaa ggagtggagc atatgtgagt gctatagccc agactgaaaa aagcattgaa 5040

gacaacccag agatcgaaga tgacattttc cgaaagagaa gactgaccat catggacctc 5100

cacccaggag cgggaaagac gaagagatac cttccggcca tagtcagaga agctataaaa 5160

cggggtttga gaacattaat cttggccccc actagagttg tggcagctga aatggaggaa 5220

gcccttagag gacttccaat aagataccag accccagcca tcagagctga gcacaccggg 5280

cgggagattg tggacctaat gtgtcatgcc acatttacca tgaggctgct atcaccagtt 5340

agagtgccaa actacaacct gattatcatg gacgaagccc atttcacaga cccagcaagt 5400

atagcagcta gaggatacat ctcaactcga gtggagatgg gtgaggcagc tgggattttt 5460

atgacagcca ctcccccggg aagcagagac ccatttcctc agagcaatgc accaatcata 5520

gatgaagaaa gagaaatccc tgaacgttcg tggaattccg gacatgaatg ggtcacggat 5580

tttaaaggga agactgtttg gttcgttcca agtataaaag caggaaatga tatagcagct 5640

tgcctgagga aaaatggaaa gaaagtgata caactcagta ggaagacctt tgattctgag 5700

tatgtcaaga ctagaaccaa tgattgggac ttcgtggtta caactgacat ttcagaaatg 5760

ggtgccaatt tcaaggctga gagggttata gaccccagac gctgcatgaa accagtcata 5820

ctaacagatg gtgaagagcg ggtgattctg gcaggaccta tgccagtgac ccactctagt 5880

gcagcacaaa gaagagggag aataggaaga aatccaaaaa atgagaatga ccagtacata 5940

tacatggggg aacctctgga aaatgatgaa gactgtgcac actggaaaga agctaaaatg 6000

ctcctagata acatcaacac gccagaagga atcattccta gcatgttcga accagagcgt 6060

gaaaaggtgg atgccattga tggcgaatac cgcttgagag gagaagcaag gaaaaccttt 6120

gtagacttaa tgagaagagg agacctacca gtctggttgg cctacagagt ggcagctgaa 6180

ggcatcaact acgcagacag aaggtggtgt tttgatggag tcaagaacaa ccaaatccta 6240

gaagaaaacg tggaagttga aatctggaca aaagaagggg aaaggaagaa attgaaaccc 6300

agatggttgg atgctaggat ctattctgac ccactggcgc taaaagaatt taaggaattt 6360

gcagccggaa gaaagtctct gaccctgaac ctaatcacag aaatgggtag gctcccaacc 6420

ttcatgactc agaaggcaag agacgcactg gacaacttag cagtgctgca cacggctgag 6480

gcaggtggaa gggcgtacaa ccatgctctc agtgaactgc cggagaccct ggagacattg 6540

cttttactga cacttctggc tacagtcacg ggagggatct ttttattctt gatgagcgga 6600

aggggcatag ggaagatgac cctgggaatg tgctgcataa tcacggctag catcctccta 6660

tggtacgcac aaatacagcc acactggata gcagcttcaa taatactgga gtttttttctc 6720

atagttttgc ttattccaga acctgaaaaa cagagaacac cccaagacaa ccaactgacc 6780

tacgttgtca tagccatcct cacagtggtg gccgcaacca tggcaaacga gatgggtttc 6840

ctagaaaaaa cgaagaaaga tctcggattg ggaagcattg caacccagca acccgagagc 6900

aacatcctgg acatagatct acgtcctgca tcagcatgga cgctgtatgc cgtggccaca 6960

acatttgtta caccaatgtt gagacatagc attgaaaatt cctcagtgaa tgtgtcccta 7020

acagctatag ccaaccaagc cacagtgtta atgggtctcg ggaaaggatg gccattgtca 7080

aagatggaca tcggagttcc ccttctcgcc attggatgct actcacaagt caaccccata 7140

actctcacag cagctctttt cttattggta gcacattatg ccatcatagg gccaggactc 7200

caagcaaaag caaccagaga agctcagaaa agagcagcgg cgggcatcat gaaaaaccca 7260

actgtcgatg gaataacagt gattgaccta gatccaatac cttatgatcc aaagtttgaa 7320

aagcagttgg gacaagtaat gctcctagtc ctctgcgtga ctcaagtatt gatgatgagg 7380

actacatggg ctctgtgtga ggctttaacc ttagctaccg ggcccatctc cacattgtgg 7440

gaaggaaatc cagggaggtt ttggaacact accattgcgg tgtcaatggc taacattttt 7500

agagggagtt acttggccgg agctggactt ctcttttcta ttatgaagaa cacaaccaac 7560

acaagaaggg gaactggcaa cataggagag acgcttggag agaaatggaa aagccgattg 7620

aacgcattgg gaaaaagtga attccagatc tacaagaaaa gtggaatcca ggaagtggat 7680

agaaccttag caaaagaagg cattaaaaga ggagaaacgg accatcacgc tgtgtcgcga 7740

ggctcagcaa aactgagatg gttcgttgag agaaacatgg tcacaccaga agggaaagta 7800

gtggacctcg gttgtggcag aggaggctgg tcatactatt gtggaggact aaagaatgta 7860

agagaagtca aaggcctaac aaaaggagga ccaggacacg aagaacccat ccccatgtca 7920

acatatgggt ggaatctagt gcgtcttcaa agtggagttg acgttttctt catcccgcca 7980

gaaaagtgtg acacattatt gtgtgacata ggggagtcat caccaaatcc cacagtggaa 8040

gcaggacgaa cactcagagt ccttaactta gtagaaaatt ggttgaacaa caacactcaa 8100

ttttgcataa aggttctcaa cccatatatg ccctcagtca tagaaaaaat ggaagcacta 8160

caaaggaaat atggaggagc cttagtgagg aatccactct cacgaaactc cacacatgag 8220

atgtactggg tatccaatgc ttccgggaac atagtgtcat cagtgaacat gatttcaagg 8280

atgttgatca acagatttac aatgagatac aagaaagcca cttacgagcc ggatgttgac 8340

ctcggaagcg gaacccgtaa catcgggatt gaaagtgaga taccaaacct agatataatt 8400

gggaaaagaa tagaaaaaat aaagcaagag catgaaacat catggcacta tgaccaagac 8460

cacccataca aaacgtgggc ataccatggt agctatgaaa caaaacagac tggatcagca 8520

tcatccatgg tcaacggagt ggtcaggctg ctgacaaaac cttgggacgt cgtccccatg 8580

gtgacacaga tggcaatgac agacacgact ccatttggac aacagcgcgt ttttaaagag 8640

aaagtggaca cgagaaccca agaaccgaaa gaaggcacga agaaactaat gaaaataaca 8700

gcagagtggc tttggaaaga attagggaag aaaaagacac ccaggatgtg caccagagaa 8760

gaattcacaa gaaaggtgag aagcaatgca gccttggggg ccatattcac tgatgagaac 8820

aagtggaagt cggcacgtga ggctgttgaa gatagtaggt tttgggagct ggttgacaag 8880

gaaaggaatc tccatcttga aggaaagtgt gaaacatgtg tgtacaacat gatgggaaaa 8940

agagagaaga agctagggga attcggcaag gcaaaaggca gcagagccat atggtacatg 9000

tggcttggag cacgcttctt agagtttgaa gccctaggat tcttaaatga agatcactgg 9060

ttctccagag agaactccct gagtggagtg gaaggagaag ggctgcacaa gctaggttac 9120

attctaagag acgtgagcaa gaaagaggga ggagcaatgt atgccgatga caccgcagga 9180

tgggatacaa gaatcacact agaagaccta aaaaatgaag aaatggtaac aaaccacatg 9240

gaaggagaac acaagaaact agccgaggcc attttcaaac taacgtacca aaacaaggtg 9300

gtgcgtgtgc aaagaccaac accaagaggc acagtaatgg acatcatatc gagaagagac 9360

caaagaggta gtggacaagt tggcacctat ggactcaata ctttcaccaa tatggaagcc 9420

caactaatca gacagatgga gggagaagga gtctttaaaa gcattcagca cctaacaatc 9480

acagaagaaa tcgctgtgca aaactggtta gcaagagtgg ggcgcgaaag gttatcaaga 9540

atggccatca gtggagatga ttgtgttgtg aaacctttag atgacaggtt cgcaagcgct 9600

ttaacagctc taaatgacat gggaaagatt aggaaagaca tacaacaatg ggaaccttca 9660

agaggatgga atgattggac acaagtgccc ttctgttcac accatttcca tgagttaatc 9720

atgaaagacg gtcgcgtact cgttgttcca tgtagaaacc aagatgaact gattggcaga 9780

gcccgaatct cccaaggagc agggtggtct ttgcgggaga cggcctgttt ggggaagtct 9840

tacgcccaaa tgtggagctt gatgtacttc cacagacgcg acctcaggct ggcggcaaat 9900

gctatttgct cggcagtacc atcacattgg gttccaacaa gtcgaacaac ctggtccata 9960

catgctaaac atgaatggat gacaacggaa gacatgctga cagtctggaa cagggtgtgg 10020

attcaagaaa acccatggat ggaagacaaa actccagtgg aatcatggga ggaaatccca 10080

tacttgggga aaagagaaga ccaatggtgc ggctcattga ttgggttaac aagcagggcc 10140

acctgggcaa agaacatcca agcagcaata aatcaagtta gatcccttat aggcaatgaa 10200

gaatacacag attacatgcc atccatgaaa agattcagaa gagaagagga agaagcagga 10260

gttctgtggt agaaagcaaa actaacatga aacaaggcta gaagtcaggt cggattaagc 10320

catagtacgg aaaaaactat gctacctgtg agccccgtcc aaggacgtta aaagaagtca 10380

ggccatcata aatgccatag ctggagtaaa ctatgcagcc tgtagctcca cctgagaagg 10440

tgtaaaaaat ccgggaggcc acaaaccatg gaagctgtac gcatggcgta gtggactagc 10500

ggttagagga gacccctccc ttacaaatcg cagcaacaat gggggcccaa ggcgagatga 10560

agctgtagtc tcgctggaag gactagaggt tagaggagac ccccccgaaa caaaaaacag 10620

catattgacg ctgggaaaga ccagagatcc tgctgtctcc tcagcatcat tccaggcaca 10680

gaacgccaga aaatggaatg gtgctgttga atcaacaggt tct 10723

<210> 12
<211> 3391
<212> PRT
<213> dengue virus

<400> 12

Met Asn Asn Gln Arg Lys Lys Ala Lys Asn Thr Pro Phe Asn Met Leu
1 5 10 15

Lys Arg Glu Arg Asn Arg Val Ser Thr Val Gln Gln Leu Thr Lys Arg
20 25 30

Phe Ser Leu Gly Met Leu Gln Gly Arg Gly Pro Leu Lys Leu Phe Met
35 40 45

Ala Leu Val Ala Phe Leu Arg Phe Leu Thr Ile Pro Pro Thr Ala Gly
50 55 60

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

```
Leu Arg Gly Phe Arg Lys Glu Ile Gly Arg Met Leu Asn Ile Leu Asn
                85                  90                  95

Arg Arg Arg Arg Ser Ala Gly Met Ile Ile Met Leu Ile Pro Thr Val
            100                 105                 110

Met Ala Phe His Leu Thr Thr Arg Asn Gly Glu Pro His Met Ile Val
        115                 120                 125

Ser Arg Gln Glu Lys Gly Lys Ser Leu Leu Phe Lys Thr Glu Asp Gly
    130                 135                 140

Val Asn Met Cys Thr Leu Met Ala Met Asp Leu Gly Glu Leu Cys Glu
145                 150                 155                 160

Asp Thr Ile Thr Tyr Lys Cys Pro Leu Leu Arg Gln Asn Glu Pro Glu
                165                 170                 175

Asp Ile Asp Cys Trp Cys Asn Ser Thr Ser Thr Trp Val Thr Tyr Gly
            180                 185                 190

Thr Cys Thr Thr Met Gly Glu His Arg Arg Glu Lys Arg Ser Val Ala
        195                 200                 205

Leu Val Pro His Val Gly Met Gly Leu Glu Thr Arg Thr Glu Thr Trp
    210                 215                 220

Met Ser Ser Glu Gly Ala Trp Lys His Val Gln Arg Ile Glu Thr Trp
225                 230                 235                 240

Ile Leu Arg His Pro Gly Phe Thr Met Met Ala Ala Ile Leu Ala Tyr
                245                 250                 255

Thr Ile Gly Thr Thr His Phe Gln Arg Ala Leu Ile Phe Ile Leu Leu
            260                 265                 270

Thr Ala Val Thr Pro Ser Met Thr Met Arg Cys Ile Gly Met Ser Asn
        275                 280                 285
```

```
Arg Asp Phe Val Glu Gly Val Ser Gly Gly Ser Trp Val Asp Ile Val
    290                 295                 300

Leu Glu His Gly Ser Cys Val Thr Thr Met Ala Lys Asn Lys Pro Thr
305                 310                 315                 320

Leu Asp Phe Glu Leu Ile Lys Thr Glu Ala Lys Gln Pro Ala Thr Leu
                325                 330                 335

Arg Lys Tyr Cys Ile Glu Ala Lys Leu Thr Asn Thr Thr Thr Glu Ser
            340                 345                 350

Arg Cys Pro Thr Gln Gly Glu Pro Ser Leu Asn Glu Glu Gln Asp Lys
        355                 360                 365

Arg Phe Val Cys Lys His Ser Met Val Asp Arg Gly Trp Gly Asn Gly
    370                 375                 380

Cys Gly Leu Phe Gly Lys Gly Gly Ile Val Thr Cys Ala Met Phe Arg
385                 390                 395                 400

Cys Lys Lys Asn Met Glu Gly Lys Val Val Gln Pro Glu Asn Leu Glu
                405                 410                 415

Tyr Thr Ile Val Ile Thr Pro His Ser Gly Glu Glu His Ala Val Gly
            420                 425                 430

Asn Asp Thr Gly Lys His Gly Lys Glu Ile Lys Ile Thr Pro Gln Ser
        435                 440                 445

Ser Ile Thr Glu Ala Glu Leu Thr Gly Tyr Gly Thr Val Thr Met Glu
    450                 455                 460

Cys Ser Pro Arg Thr Gly Leu Asp Phe Asn Glu Met Val Leu Leu Gln
465                 470                 475                 480

Met Glu Asn Lys Ala Trp Leu Val His Arg Gln Trp Phe Leu Asp Leu
                485                 490                 495

Pro Leu Pro Trp Leu Pro Gly Ala Asp Thr Gln Gly Ser Asn Trp Ile
            500                 505                 510
```

```
Gln Lys Glu Thr Leu Val Thr Phe Lys Asn Pro His Ala Lys Lys Gln
        515                 520                 525

Asp Val Val Val Leu Gly Ser Gln Glu Gly Ala Met His Thr Ala Leu
    530                 535                 540

Thr Gly Ala Thr Glu Ile Gln Met Ser Ser Gly Asn Leu Leu Phe Thr
545                 550                 555                 560

Gly His Leu Lys Cys Arg Leu Arg Met Asp Lys Leu Gln Leu Lys Gly
                565                 570                 575

Met Ser Tyr Ser Met Cys Thr Gly Lys Phe Lys Val Val Lys Glu Ile
            580                 585                 590

Ala Glu Thr Gln His Gly Thr Ile Val Ile Arg Val Gln Tyr Glu Gly
        595                 600                 605

Asp Gly Ser Pro Cys Lys Ile Pro Phe Glu Ile Met Asp Leu Glu Lys
    610                 615                 620

Arg His Val Leu Gly Arg Leu Ile Thr Val Asn Pro Ile Val Thr Glu
625                 630                 635                 640

Lys Asp Ser Pro Val Asn Ile Glu Ala Glu Pro Pro Phe Gly Asp Ser
                645                 650                 655

Tyr Ile Ile Ile Gly Val Glu Pro Gly Gln Leu Lys Leu Asn Trp Phe
            660                 665                 670

Lys Lys Gly Ser Ser Ile Gly Gln Met Phe Glu Thr Thr Met Arg Gly
        675                 680                 685

Ala Lys Arg Met Ala Ile Leu Gly Asp Thr Ala Trp Asp Phe Gly Ser
    690                 695                 700

Leu Gly Gly Val Phe Thr Ser Ile Gly Lys Ala Leu His Gln Val Phe
705                 710                 715                 720
```

```
Gly Ala Ile Tyr Gly Ala Ala Phe Ser Gly Val Ser Trp Thr Met Lys
                725                 730                 735

Ile Leu Ile Gly Val Ile Ile Thr Trp Ile Gly Met Asn Ser Arg Ser
            740                 745                 750

Thr Ser Leu Ser Val Thr Leu Val Leu Val Gly Ile Val Thr Leu Tyr
        755                 760                 765

Leu Gly Val Met Val Gln Ala Asp Ser Gly Cys Val Val Ser Trp Lys
    770                 775                 780

Asn Lys Glu Leu Lys Cys Gly Ser Gly Ile Phe Ile Thr Asp Asn Val
785                 790                 795                 800

His Thr Trp Thr Glu Gln Tyr Lys Phe Gln Pro Glu Ser Pro Ser Lys
                805                 810                 815

Leu Ala Ser Ala Ile Gln Lys Ala His Glu Glu Gly Ile Cys Gly Ile
            820                 825                 830

Arg Ser Val Thr Arg Leu Glu Asn Leu Met Trp Lys Gln Ile Thr Pro
        835                 840                 845

Glu Leu Asn His Ile Leu Ser Glu Asn Glu Val Lys Leu Thr Ile Met
    850                 855                 860

Thr Gly Asp Ile Lys Gly Ile Met Gln Ala Gly Lys Arg Ser Leu Arg
865                 870                 875                 880

Pro Gln Pro Thr Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala
                885                 890                 895

Lys Met Leu Ser Thr Glu Ser His Asn Gln Thr Phe Leu Ile Asp Gly
            900                 905                 910

Pro Glu Thr Ala Glu Cys Pro Asn Thr Asn Arg Ala Trp Asn Ser Leu
        915                 920                 925

Glu Val Glu Asp Tyr Gly Phe Gly Val Phe Thr Thr Asn Ile Trp Leu
    930                 935                 940
```

```
Lys Leu Lys Glu Lys Gln Asp Val Phe Cys Asp Ser Lys Leu Met Ser
945                 950                 955                 960

Ala Ala Ile Lys Asp Asn Arg Ala Val His Ala Asp Met Gly Tyr Trp
                965                 970                 975

Ile Glu Ser Ala Leu Asn Asp Thr Trp Lys Ile Glu Lys Ala Ser Phe
            980                 985                 990

Ile Glu Val Lys Asn Cys His Trp  Pro Lys Ser His Thr  Leu Trp Ser
        995                 1000                1005

Asn Gly  Val Leu Glu Ser Glu  Met Ile Ile Pro Lys  Asn Leu Ala
    1010                1015                1020

Gly Pro  Val Ser Gln His Asn  Tyr Arg Pro Gly Tyr  His Thr Gln
    1025                1030                1035

Ile Thr  Gly Pro Trp His Leu  Gly Lys Leu Glu Met  Asp Phe Asp
    1040                1045                1050

Phe Cys  Asp Gly Thr Thr Val  Val Val Thr Glu Asp  Cys Gly Asn
    1055                1060                1065

Arg Gly  Pro Ser Leu Arg Thr  Thr Thr Ala Ser Gly  Lys Leu Ile
    1070                1075                1080

Thr Glu  Trp Cys Cys Arg Ser  Cys Thr Leu Pro Pro  Leu Arg Tyr
    1085                1090                1095

Arg Gly  Glu Asp Gly Cys Trp  Tyr Gly Met Glu Ile  Arg Pro Leu
    1100                1105                1110

Lys Glu  Lys Glu Glu Asn Leu  Val Asn Ser Leu Val  Thr Ala Gly
    1115                1120                1125

His Gly  Gln Val Asp Asn Phe  Ser Leu Gly Val Leu  Gly Met Ala
    1130                1135                1140
```

```
Leu Phe  Leu Glu Glu Met Leu  Arg Thr Arg Val Gly  Thr Lys His
    1145                1150                1155

Ala Ile  Leu Leu Val Ala Val  Ser Phe Val Thr Leu  Ile Thr Gly
    1160                1165                1170

Asn Met  Ser Phe Arg Asp Leu  Gly Arg Val Met Val  Met Val Gly
    1175                1180                1185

Ala Thr  Met Thr Asp Asp Ile  Gly Met Gly Val Thr  Tyr Leu Ala
    1190                1195                1200

Leu Leu  Ala Ala Phe Lys Val  Arg Pro Thr Phe Ala  Ala Gly Leu
    1205                1210                1215

Leu Leu  Arg Lys Leu Thr Ser  Lys Glu Leu Met Met  Thr Thr Ile
    1220                1225                1230

Gly Ile  Val Leu Leu Ser Gln  Ser Thr Ile Pro Glu  Thr Ile Leu
    1235                1240                1245

Glu Leu  Thr Asp Ala Leu Ala  Leu Gly Met Met Val  Leu Lys Met
    1250                1255                1260

Val Arg  Asn Met Glu Lys Tyr  Gln Leu Ala Val Thr  Ile Met Ala
    1265                1270                1275

Ile Leu  Cys Val Pro Asn Ala  Val Ile Leu Gln Asn  Ala Trp Lys
    1280                1285                1290

Val Ser  Cys Thr Ile Leu Ala  Val Val Ser Val Ser  Pro Leu Leu
    1295                1300                1305

Leu Thr  Ser Ser Gln Gln Lys  Thr Asp Trp Ile Pro  Leu Ala Leu
    1310                1315                1320

Thr Ile  Lys Gly Leu Asn Pro  Thr Ala Ile Phe Leu  Thr Thr Leu
    1325                1330                1335

Ser Arg  Thr Ser Lys Lys Arg  Ser Trp Pro Leu Asn  Glu Ala Ile
    1340                1345                1350
```

```
Met Ala  Val Gly Met Val Ser  Ile Leu Ala Ser Ser  Leu Leu Lys
    1355                1360                1365

Asn Asp  Ile Pro Met Thr Gly  Pro Leu Val Ala Gly  Gly Leu Leu
    1370                1375                1380

Thr Val  Cys Tyr Val Leu Thr  Gly Arg Ser Ala Asp  Leu Glu Leu
    1385                1390                1395

Glu Arg  Ala Ala Asp Val Lys  Trp Glu Asp Gln Ala  Glu Ile Ser
    1400                1405                1410

Gly Ser  Ser Pro Ile Leu Ser  Ile Thr Ile Ser Glu  Asp Gly Ser
    1415                1420                1425

Met Ser  Ile Lys Asn Glu Glu  Glu Glu Gln Thr Leu  Thr Ile Leu
    1430                1435                1440

Ile Arg  Thr Gly Leu Leu Val  Ile Ser Gly Leu Phe  Pro Val Ser
    1445                1450                1455

Ile Pro  Ile Thr Ala Ala Ala  Trp Tyr Leu Trp Glu  Val Lys Lys
    1460                1465                1470

Gln Arg  Ala Gly Val Leu Trp  Asp Val Pro Ser Pro  Pro Pro Met
    1475                1480                1485

Gly Lys  Ala Glu Leu Glu Asp  Gly Ala Tyr Arg Ile  Lys Gln Lys
    1490                1495                1500

Gly Ile  Leu Gly Tyr Ser Gln  Ile Gly Ala Gly Val  Tyr Lys Glu
    1505                1510                1515

Gly Thr  Phe His Thr Met Trp  His Val Thr Arg Gly  Ala Val Leu
    1520                1525                1530

Met His  Lys Gly Lys Arg Ile  Glu Pro Ser Trp Ala  Asp Val Lys
    1535                1540                1545
```

```
Lys Asp  Leu Ile Ser Tyr Gly  Gly Gly Trp Lys Leu  Glu Gly Glu
    1550                1555                1560

Trp Lys  Glu Gly Glu Glu Val  Gln Val Leu Ala Leu  Glu Pro Gly
    1565                1570                1575

Lys Asn  Pro Arg Ala Val Gln  Thr Lys Pro Gly Leu  Phe Lys Thr
    1580                1585                1590

Asn Ala  Gly Thr Ile Gly Ala  Val Ser Leu Asp Phe  Ser Pro Gly
    1595                1600                1605

Thr Ser  Gly Ser Pro Ile Ile  Asp Lys Lys Gly Lys  Val Val Gly
    1610                1615                1620

Leu Tyr  Gly Asn Gly Val Val  Thr Arg Ser Gly Ala  Tyr Val Ser
    1625                1630                1635

Ala Ile  Ala Gln Thr Glu Lys  Ser Ile Glu Asp Asn  Pro Glu Ile
    1640                1645                1650

Glu Asp  Asp Ile Phe Arg Lys  Arg Arg Leu Thr Ile  Met Asp Leu
    1655                1660                1665

His Pro  Gly Ala Gly Lys Thr  Lys Arg Tyr Leu Pro  Ala Ile Val
    1670                1675                1680

Arg Glu  Ala Ile Lys Arg Gly  Leu Arg Thr Leu Ile  Leu Ala Pro
    1685                1690                1695

Thr Arg  Val Val Ala Ala Glu  Met Glu Glu Ala Leu  Arg Gly Leu
    1700                1705                1710

Pro Ile  Arg Tyr Gln Thr Pro  Ala Ile Arg Ala Glu  His Thr Gly
    1715                1720                1725

Arg Glu  Ile Val Asp Leu Met  Cys His Ala Thr Phe  Thr Met Arg
    1730                1735                1740

Leu Leu  Ser Pro Val Arg Val  Pro Asn Tyr Asn Leu  Ile Ile Met
    1745                1750                1755
```

```
Asp Glu  Ala His Phe Thr Asp  Pro Ala Ser Ile Ala  Ala Arg Gly
    1760                1765                1770

Tyr Ile  Ser Thr Arg Val Glu  Met Gly Glu Ala Ala  Gly Ile Phe
    1775                1780                1785

Met Thr  Ala Thr Pro Pro Gly  Ser Arg Asp Pro Phe  Pro Gln Ser
    1790                1795                1800

Asn Ala  Pro Ile Ile Asp Glu  Glu Arg Glu Ile Pro  Glu Arg Ser
    1805                1810                1815

Trp Asn  Ser Gly His Glu Trp  Val Thr Asp Phe Lys  Gly Lys Thr
    1820                1825                1830

Val Trp  Phe Val Pro Ser Ile  Lys Ala Gly Asn Asp  Ile Ala Ala
    1835                1840                1845

Cys Leu  Arg Lys Asn Gly Lys  Lys Val Ile Gln Leu  Ser Arg Lys
    1850                1855                1860

Thr Phe  Asp Ser Glu Tyr Val  Lys Thr Arg Thr Asn  Asp Trp Asp
    1865                1870                1875

Phe Val  Val Thr Thr Asp Ile  Ser Glu Met Gly Ala  Asn Phe Lys
    1880                1885                1890

Ala Glu  Arg Val Ile Asp Pro  Arg Arg Cys Met Lys  Pro Val Ile
    1895                1900                1905

Leu Thr  Asp Gly Glu Glu Arg  Val Ile Leu Ala Gly  Pro Met Pro
    1910                1915                1920

Val Thr  His Ser Ser Ala Ala  Gln Arg Arg Gly Arg  Ile Gly Arg
    1925                1930                1935

Asn Pro  Lys Asn Glu Asn Asp  Gln Tyr Ile Tyr Met  Gly Glu Pro
    1940                1945                1950
```

```
Leu Glu  Asn Asp Glu Asp Cys  Ala His Trp Lys Glu  Ala Lys Met
    1955                1960                1965

Leu Leu  Asp Asn Ile Asn Thr  Pro Glu Gly Ile Ile  Pro Ser Met
    1970                1975                1980

Phe Glu  Pro Glu Arg Glu Lys  Val Asp Ala Ile Asp  Gly Glu Tyr
    1985                1990                1995

Arg Leu  Arg Gly Glu Ala Arg  Lys Thr Phe Val Asp  Leu Met Arg
    2000                2005                2010

Arg Gly  Asp Leu Pro Val Trp  Leu Ala Tyr Arg Val  Ala Ala Glu
    2015                2020                2025

Gly Ile  Asn Tyr Ala Asp Arg  Arg Trp Cys Phe Asp  Gly Val Lys
    2030                2035                2040

Asn Asn  Gln Ile Leu Glu Glu  Asn Val Glu Val Glu  Ile Trp Thr
    2045                2050                2055

Lys Glu  Gly Glu Arg Lys Lys  Leu Lys Pro Arg Trp  Leu Asp Ala
    2060                2065                2070

Arg Ile  Tyr Ser Asp Pro Leu  Ala Leu Lys Glu Phe  Lys Glu Phe
    2075                2080                2085

Ala Ala  Gly Arg Lys Ser Leu  Thr Leu Asn Leu Ile  Thr Glu Met
    2090                2095                2100

Gly Arg  Leu Pro Thr Phe Met  Thr Gln Lys Ala Arg  Asp Ala Leu
    2105                2110                2115

Asp Asn  Leu Ala Val Leu His  Thr Ala Glu Ala Gly  Gly Arg Ala
    2120                2125                2130

Tyr Asn  His Ala Leu Ser Glu  Leu Pro Glu Thr Leu  Glu Thr Leu
    2135                2140                2145

Leu Leu  Leu Thr Leu Leu Ala  Thr Val Thr Gly Gly  Ile Phe Leu
    2150                2155                2160
```

```
Phe Leu  Met Ser Gly Arg Gly  Ile Gly Lys Met Thr  Leu Gly Met
    2165                2170                2175

Cys Cys  Ile Ile Thr Ala Ser  Ile Leu Leu Trp Tyr  Ala Gln Ile
    2180                2185                2190

Gln Pro  His Trp Ile Ala Ala  Ser Ile Ile Leu Glu  Phe Phe Leu
    2195                2200                2205

Ile Val  Leu Leu Ile Pro Glu  Pro Glu Lys Gln Arg  Thr Pro Gln
    2210                2215                2220

Asp Asn  Gln Leu Thr Tyr Val  Val Ile Ala Ile Leu  Thr Val Val
    2225                2230                2235

Ala Ala  Thr Met Ala Asn Glu  Met Gly Phe Leu Glu  Lys Thr Lys
    2240                2245                2250

Lys Asp  Leu Gly Leu Gly Ser  Ile Ala Thr Gln Gln  Pro Glu Ser
    2255                2260                2265

Asn Ile  Leu Asp Ile Asp Leu  Arg Pro Ala Ser Ala  Trp Thr Leu
    2270                2275                2280

Tyr Ala  Val Ala Thr Thr Phe  Val Thr Pro Met Leu  Arg His Ser
    2285                2290                2295

Ile Glu  Asn Ser Ser Val Asn  Val Ser Leu Thr Ala  Ile Ala Asn
    2300                2305                2310

Gln Ala  Thr Val Leu Met Gly  Leu Gly Lys Gly Trp  Pro Leu Ser
    2315                2320                2325

Lys Met  Asp Ile Gly Val Pro  Leu Leu Ala Ile Gly  Cys Tyr Ser
    2330                2335                2340

Gln Val  Asn Pro Ile Thr Leu  Thr Ala Ala Leu Phe  Leu Leu Val
    2345                2350                2355
```

```
Ala His  Tyr Ala Ile Ile Gly  Pro Gly Leu Gln Ala  Lys Ala Thr
    2360                2365                2370

Arg Glu  Ala Gln Lys Arg Ala  Ala Ala Gly Ile Met  Lys Asn Pro
    2375                2380                2385

Thr Val  Asp Gly Ile Thr Val  Ile Asp Leu Asp Pro  Ile Pro Tyr
    2390                2395                2400

Asp Pro  Lys Phe Glu Lys Gln  Leu Gly Gln Val Met  Leu Leu Val
    2405                2410                2415

Leu Cys  Val Thr Gln Val Leu  Met Met Arg Thr Thr  Trp Ala Leu
    2420                2425                2430

Cys Glu  Ala Leu Thr Leu Ala  Thr Gly Pro Ile Ser  Thr Leu Trp
    2435                2440                2445

Glu Gly  Asn Pro Gly Arg Phe  Trp Asn Thr Thr Ile  Ala Val Ser
    2450                2455                2460

Met Ala  Asn Ile Phe Arg Gly  Ser Tyr Leu Ala Gly  Ala Gly Leu
    2465                2470                2475

Leu Phe  Ser Ile Met Lys Asn  Thr Thr Asn Thr Arg  Arg Gly Thr
    2480                2485                2490

Gly Asn  Ile Gly Glu Thr Leu  Gly Glu Lys Trp Lys  Ser Arg Leu
    2495                2500                2505

Asn Ala  Leu Gly Lys Ser Glu  Phe Gln Ile Tyr Lys  Lys Ser Gly
    2510                2515                2520

Ile Gln  Glu Val Asp Arg Thr  Leu Ala Lys Glu Gly  Ile Lys Arg
    2525                2530                2535

Gly Glu  Thr Asp His His Ala  Val Ser Arg Gly Ser  Ala Lys Leu
    2540                2545                2550

Arg Trp  Phe Val Glu Arg Asn  Met Val Thr Pro Glu  Gly Lys Val
    2555                2560                2565
```

```
Val Asp  Leu Gly Cys Gly Arg  Gly Gly Trp Ser Tyr  Tyr Cys Gly
    2570                 2575                 2580

Gly Leu  Lys Asn Val Arg Glu  Val Lys Gly Leu Thr  Lys Gly Gly
    2585                 2590                 2595

Pro Gly  His Glu Glu Pro Ile  Pro Met Ser Thr Tyr  Gly Trp Asn
    2600                 2605                 2610

Leu Val  Arg Leu Gln Ser Gly  Val Asp Val Phe Phe  Ile Pro Pro
    2615                 2620                 2625

Glu Lys  Cys Asp Thr Leu Leu  Cys Asp Ile Gly Glu  Ser Ser Pro
    2630                 2635                 2640

Asn Pro  Thr Val Glu Ala Gly  Arg Thr Leu Arg Val  Leu Asn Leu
    2645                 2650                 2655

Val Glu  Asn Trp Leu Asn Asn  Asn Thr Gln Phe Cys  Ile Lys Val
    2660                 2665                 2670

Leu Asn  Pro Tyr Met Pro Ser  Val Ile Glu Lys Met  Glu Ala Leu
    2675                 2680                 2685

Gln Arg  Lys Tyr Gly Gly Ala  Leu Val Arg Asn Pro  Leu Ser Arg
    2690                 2695                 2700

Asn Ser  Thr His Glu Met Tyr  Trp Val Ser Asn Ala  Ser Gly Asn
    2705                 2710                 2715

Ile Val  Ser Ser Val Asn Met  Ile Ser Arg Met Leu  Ile Asn Arg
    2720                 2725                 2730

Phe Thr  Met Arg Tyr Lys Lys  Ala Thr Tyr Glu Pro  Asp Val Asp
    2735                 2740                 2745

Leu Gly  Ser Gly Thr Arg Asn  Ile Gly Ile Glu Ser  Glu Ile Pro
    2750                 2755                 2760
```

```
Asn Leu  Asp Ile Ile Gly Lys  Arg Ile Glu Lys Ile  Lys Gln Glu
    2765                 2770                 2775

His Glu  Thr Ser Trp His Tyr  Asp Gln Asp His Pro  Tyr Lys Thr
    2780                 2785                 2790

Trp Ala  Tyr His Gly Ser Tyr  Glu Thr Lys Gln Thr  Gly Ser Ala
    2795                 2800                 2805

Ser Ser  Met Val Asn Gly Val  Val Arg Leu Leu Thr  Lys Pro Trp
    2810                 2815                 2820

Asp Val  Val Pro Met Val Thr  Gln Met Ala Met Thr  Asp Thr Thr
    2825                 2830                 2835

Pro Phe  Gly Gln Gln Arg Val  Phe Lys Glu Lys Val  Asp Thr Arg
    2840                 2845                 2850

Thr Gln  Glu Pro Lys Glu Gly  Thr Lys Lys Leu Met  Lys Ile Thr
    2855                 2860                 2865

Ala Glu  Trp Leu Trp Lys Glu  Leu Gly Lys Lys Lys  Thr Pro Arg
    2870                 2875                 2880

Met Cys  Thr Arg Glu Glu Phe  Thr Arg Lys Val Arg  Ser Asn Ala
    2885                 2890                 2895

Ala Leu  Gly Ala Ile Phe Thr  Asp Glu Asn Lys Trp  Lys Ser Ala
    2900                 2905                 2910

Arg Glu  Ala Val Glu Asp Ser  Arg Phe Trp Glu Leu  Val Asp Lys
    2915                 2920                 2925

Glu Arg  Asn Leu His Leu Glu  Gly Lys Cys Glu Thr  Cys Val Tyr
    2930                 2935                 2940

Asn Met  Met Gly Lys Arg Glu  Lys Lys Leu Gly Glu  Phe Gly Lys
    2945                 2950                 2955

Ala Lys  Gly Ser Arg Ala Ile  Trp Tyr Met Trp Leu  Gly Ala Arg
    2960                 2965                 2970
```

```
Phe Leu  Glu Phe Glu Ala Leu  Gly Phe Leu Asn Glu  Asp His Trp
    2975                 2980                 2985

Phe Ser  Arg Glu Asn Ser Leu  Ser Gly Val Glu Gly  Glu Gly Leu
    2990                 2995                 3000

His Lys  Leu Gly Tyr Ile Leu  Arg Asp Val Ser Lys  Lys Glu Gly
    3005                 3010                 3015

Gly Ala  Met Tyr Ala Asp Asp  Thr Ala Gly Trp Asp  Thr Arg Ile
    3020                 3025                 3030

Thr Leu  Glu Asp Leu Lys Asn  Glu Glu Met Val Thr  Asn His Met
    3035                 3040                 3045

Glu Gly  Glu His Lys Lys Leu  Ala Glu Ala Ile Phe  Lys Leu Thr
    3050                 3055                 3060

Tyr Gln  Asn Lys Val Val Arg  Val Gln Arg Pro Thr  Pro Arg Gly
    3065                 3070                 3075

Thr Val  Met Asp Ile Ile Ser  Arg Arg Asp Gln Arg  Gly Ser Gly
    3080                 3085                 3090

Gln Val  Gly Thr Tyr Gly Leu  Asn Thr Phe Thr Asn  Met Glu Ala
    3095                 3100                 3105

Gln Leu  Ile Arg Gln Met Glu  Gly Glu Gly Val Phe  Lys Ser Ile
    3110                 3115                 3120

Gln His  Leu Thr Ile Thr Glu  Glu Ile Ala Val Gln  Asn Trp Leu
    3125                 3130                 3135

Ala Arg  Val Gly Arg Glu Arg  Leu Ser Arg Met Ala  Ile Ser Gly
    3140                 3145                 3150

Asp Asp  Cys Val Val Lys Pro  Leu Asp Asp Arg Phe  Ala Ser Ala
    3155                 3160                 3165
```

```
Leu Thr  Ala Leu Asn Asp Met  Gly Lys Ile Arg Lys  Asp Ile Gln
    3170                3175                3180

Gln Trp  Glu Pro Ser Arg Gly  Trp Asn Asp Trp Thr  Gln Val Pro
    3185                3190                3195

Phe Cys  Ser His His Phe His  Glu Leu Ile Met Lys  Asp Gly Arg
    3200                3205                3210

Val Leu  Val Val Pro Cys Arg  Asn Gln Asp Glu Leu  Ile Gly Arg
    3215                3220                3225

Ala Arg  Ile Ser Gln Gly Ala  Gly Trp Ser Leu Arg  Glu Thr Ala
    3230                3235                3240

Cys Leu  Gly Lys Ser Tyr Ala  Gln Met Trp Ser Leu  Met Tyr Phe
    3245                3250                3255

His Arg  Arg Asp Leu Arg Leu  Ala Ala Asn Ala Ile  Cys Ser Ala
    3260                3265                3270

Val Pro  Ser His Trp Val Pro  Thr Ser Arg Thr Thr  Trp Ser Ile
    3275                3280                3285

His Ala  Lys His Glu Trp Met  Thr Thr Glu Asp Met  Leu Thr Val
    3290                3295                3300

Trp Asn  Arg Val Trp Ile Gln  Glu Asn Pro Trp Met  Glu Asp Lys
    3305                3310                3315

Thr Pro  Val Glu Ser Trp Glu  Glu Ile Pro Tyr Leu  Gly Lys Arg
    3320                3325                3330

Glu Asp  Gln Trp Cys Gly Ser  Leu Ile Gly Leu Thr  Ser Arg Ala
    3335                3340                3345

Thr Trp  Ala Lys Asn Ile Gln  Ala Ala Ile Asn Gln  Val Arg Ser
    3350                3355                3360

Leu Ile  Gly Asn Glu Glu Tyr  Thr Asp Tyr Met Pro  Ser Met Lys
    3365                3370                3375
```

Arg Phe Arg Arg Glu Glu Glu Glu Ala Gly Val Leu Trp
    3380   3385   3390

<210> 13
<211> 10696
<212> DNA
<213> dengue virus

<400> 13
agttgttagt ctacgtggac cgacaagaac agtttcgact cggaagcttg cttaacgtag 60

tgctgacagt tttttattag agagcagatc tctgatgaac aaccaacgga aaaagacggg 120

aaaaccgtct atcaatatgc tgaaacgcgt gagaaaccgt gtgtcaactg gatcacagtt 180

ggcgaagaga ttctcaagag gattgctgaa cggccaagga ccaatgaaat tggttatggc 240

atttatagct ttcctcagat ttctagccat tccaccgaca gcaggagtct tggctagatg 300

gggtaccttt aagaagtcgg gggctattaa ggtcttaaaa ggcttcaaga aggagatctc 360

aaacatgctg agcattatca acaaacggaa aaagacatcg ctctgtctca tgatgatgtt 420

accagcaaca cttgctttcc acttaacttc acgagatgga gagccgcgca tgattgtggg 480

gaagaatgaa agaggaaaat ccctactttt caagacagcc tctggaatca acatgtgcac 540

actcatagcc atggatctgg gagagatgtg tgatgacacg gtcacttaca aatgccccca 600

cattaccgaa gtggagcctg aagacattga ctgctggtgc aaccttacat cgacatgggt 660

gacttatgga acatgcaatc aagctggaga gcatagacgc gataagagat cagtggcgtt 720

agctccccat gttggcatgg gactggacac acgcactcaa acctggatgt cggctgaagg 780

agcttggaga caagtcgaga aggtagagac atgggccctt aggcacccag ggtttaccat 840

actagcccta tttcttgccc attacatagg cacttccttg acccagaaag tggttatttt 900

tatactatta atgctggtta ccccatccat gacaatgaga tgtgtaggag taggaaacag 960

agattttgtg gaaggcctat cgggagctac gtgggttgac gtggtgctcg agcacggtgg 1020

gtgtgtgact accatggcta agaacaagcc cacgctggac atagagcttc agaagaccga 1080

ggccacccaa ctggcgaccc taaggaagct atgcattgag ggaaaaatta ccaacataac 1140

aaccgactca agatgtccca cccaagggga agcgatttta cctgaggagc aggaccagaa 1200

ctacgtgtgt aagcatacat acgtggacag aggctgggga aacggttgtg gtttgtttgg 1260

caagggaagc ttggtgacat gcgcgaaatt tcaatgttta gaatcaatag agggaaaagt 1320

ggtgcaacat gagaacctca aatacaccgt catcatcaca gtgcacacag gagaccaaca 1380

ccaggtggga aatgaaacgc agggagtcac ggctgagata acaccccagg catcaaccgc 1440

tgaagtcatt ttacctgaat atggaaccct cgggctagaa tgctcaccac ggacaggttt 1500

ggatttcaat gaaatgatct cattgacaat gaagaacaaa gcatggatgg tacatagaca 1560

atggttcttt gacttacccc taccatggac atcaggagct acagcagaaa caccaacttg 1620

gaacaggaaa gagcttcttg tgacatttaa aaatgcacat gcaaaaaagc aagaagtagt 1680

tgttcttgga tcacaagagg gagcaatgca tacagcactg acaggagcta cagagatcca 1740

aacctcagga ggcacaagta tctttgcggg gcacttaaaa tgtagactca agatggacaa 1800

attggaactc aaggggatga gctatgcaat gtgcttgagt agctttgtgt tgaagaaaga 1860

agtctccgaa acgcagcatg ggacaatact cattaaggtt gagtacaaag gggaagatgc 1920

accctgcaag attcctttct ccacggagga tggacaagga aaagctcaca atggcagact 1980

gatcacagcc aatccagtgg tgaccaagaa ggaggagcct gtcaacattg aggctgaacc 2040

tccttttgga gaaagtaaca tagtaattgg aattggagac aaagccctga aaatcaactg 2100

gtacaagaag ggaagctcga ttgggaagat gttcgaggcc actgccagag gtgcaaggcg 2160

catggccatc ttgggagaca cagcctggga ctttggatca gtgggtggtg ttttgaattc 2220

attagggaaa atggtccacc aaatatttgg gagtgcttac acagccctat ttggtggagt 2280

ctcctggatg atgaaaattg gaataggtgt cctcttaacc tggatagggt tgaactcaaa 2340

aaatacttct atgtcatttt catgcatcgc gataggaatc attacactct atctgggagc 2400

cgtggtgcaa gctgacatgg ggtgtgtcat aaactggaaa ggcaaagaac tcaaatgtgg 2460

aagtggaatt ttcgtcacta atgaggtcca cacctggaca gagcaataca aatttcaagc 2520

agactccccc aagagactgg caacagccat tgcaggcgct tgggaaaatg gagtgtgcgg 2580

aattaggtca acaaccagaa tggagaacct cttgtggaag caaatagcca atgaactgaa 2640

ttacatatta tgggaaaaca acattaaatt aacggtagtt gtaggcgaca taactggggt 2700

cttagagcaa gggaaaagaa cactaacacc acaacccatg gagctaaaat attcttggaa 2760

aacatgggga aaggcaaaaa tagtgacagc tgaaacacaa aattcctctt tcataataga 2820

tgggccaagc acaccggagt gtccaagtgc ctcaagagca tggaatgtgt gggaggtgga 2880

ggattacggg ttcggagttt tcacaaccaa catatggctg aaactccgag aggtgtacac 2940

ccaactatgt gaccataggc taatgtcggc agccgtcaag gatgagaggg ctgtacatgc 3000

cgacatgggc tattggatag aaagccaaaa gaatgggagt tggaagctag aaaaagcatc 3060

cttcatagag gtgaaaacct gcacatggcc aaaatcacac actctctgga gcaatggtgt 3120

gctagagagt gacatgatta tcccaaagag tctagctggt cccatttcgc aacacaacca 3180

caggcccggg taccacaccc aaacggcagg accctggcac ttaggaaaat tggagctgga 3240

cttcaactat tgtgaaggaa caacagttgt catctcagaa aactgtggga caagaggccc 3300

atcattgaga acaacaacgg tgtcagggaa gttgatacac gaatggtgct gccgctcgtg 3360

cacacttcct cccctacgat acatgggaga agacggctgc tggtatggca tggaaatcag 3420

acccattaat gagaaagaag agaatatggt aaagtctcta gcctcagcag ggagtggaaa 3480

ggtggacaac ttcacaatgg gtgtcttgtg tttggcaatc ctctttgaag aggtgatgag 3540

aggaaaattt gggaaaaaac acatgattgc aggggttctc ttcacgtttg tgctcctcct 3600

ctcagggcaa ataacatgga gagacatggc gcacacactc ataatgattg ggtccaacgc 3660

ctctgacaga atggggatgg gcgtcactta cctagctcta attgcaacat ttaaaattca 3720

gccattcctg gctttgggat tcttcctgag gaaactgaca tctagagaaa atttattgct 3780

gggagttggg ttggccatgg cagcaacgtt acgactgcca gaggacattg aacagatggc 3840

gaatggaatt gctttggggc tcatggctct taaactgata acacaatttg aaacatacca 3900

actatggacg gcattagttt ccctaacgtg ttcaaataca attttcacgt tgactgttgc 3960

ctggagaaca gccactctga ttttagccgg aatttcgctt ttgccagtgt gccagtcttc 4020

gagcatgagg aaaacagatt ggctcccaat gactgtggca gctatgggag ctcaacccct 4080

accacttttt attttcagtc tgaaagatac actcaaaagg agaagctggc cactgaatga 4140

gggggtgatg gcagttggac ttgtgagcat tctagctagt tctctcctta ggaatgatgt 4200

gcctatggct ggaccattag tggctggggg cttgctgata gcgtgctacg tcataactgg 4260

cacgtcagca gacctcactg tagaaaaagc agcagatgta acatgggagg aagaggccga 4320

gcaaacagga gtgtcccaca atttaatggt cacagttgat gatgatggaa caatgagaat 4380

aaaagatgac gagactgaga acatcttaac agtgctttta aaaacagcac tactaatagt 4440

atcaggcatc tttccatact ccatacccgc aacactgttg gtctggcata cttggcaaaa 4500

gcaaacccaa agatccggcg tcctatggga cgtacccagc cccccagaga cacagaaagc 4560

ggaactggaa gaaggggtct ataggatcaa acagcaagga atttttggga aaacccaagt 4620

gggggttgga gtacagaaag aaggagtttt ccacaccatg tggcatgtca caagaggggc 4680

agtgttgaca cacaatggga aaagactgga accaaactgg gctagcgtga aaaaagatct 4740

gatttcatac ggaggaggat ggagattgag tgcacaatgg caaaaggggg aggaggtgca 4800

ggttattgcc gtagagcctg ggaagaaccc aaagaacttt caaaccatgc caggcatttt 4860

tcagacaaca acaggggaaa taggagcaat tgcactggat ttcaagcctg gaacttcagg 4920

atctcccatc ataaacagag agggaaaggt agtgggactg tatggcaatg gagtggttac 4980

aaagaatgga ggctatgtca gtggaatagc gcaaacaaat gcagaaccag atggaccgac 5040

accagagttg gaagaagaga tgttcaaaaa gcgaaatcta accataatgg atctccatcc 5100

tgggtcagga aagacgcgga aatatcttcc agctattgtt agagaggcaa tcaagagacg 5160

cttaaggact ctaattttgg caccaacaag ggtagttgca gctgagatgg aagaagcatt 5220

gaaagggctc ccaataaggt atcaaacaac tgcaacaaaa tctgaacaca caggaagaga 5280

gattgttgat ctaatgtgtc acgcaacgtt cacaatgcgc ttgctgtcac cagtcagggt 5340

tccaaactac aacttgataa taatggatga ggcccatttc acagacccag ccagtatagc 5400

ggctagaggg tacatatcaa ctcgtgtagg aatgggagag gcagccgcaa ttttcatgac 5460

agcaacaccc cctggaacag ctgatgcctt tcctcagagc aacgctccaa ttcaagatga 5520

agagagagac ataccggaac gctcatggaa ttcaggcaat gaatggatta ctgactttgt 5580

tgggaagaca gtgtggtttg tccctagcat caaagccgga aatgacatag caaactgctt 5640

gcggaaaaat ggaaaaaagg ttattcaact cagcaggaag acctttgaca cagaatatca 5700

aaagaccaaa ctgaatgatt gggactttgt ggtgacaaca gacatttcag aaatgggagc 5760

caatttcaaa gcagatagag tgatcgaccc aagaagatgt ctcaagccgg tgattttgac 5820

agatggaccc gagcgggtga tcctggctgg accaatgcca gtcaccgtag cgagcgctgc 5880

gcaaaggaga gggagagttg gcaggaaccc acaaaaagaa aatgaccagt acatattcat 5940

gggccagcct ctcaacaatg atgaagacca tgctcactgg acagaagcaa aaatgctgct 6000

ggacaacatc aacacaccag aagggattat accagctctc tttgaaccag aaagggagaa 6060

gtcagccgcc atagacggcg aataccgcct gaagggtgag tccaggaaga ctttcgtgga 6120

actcatgagg aggggtgacc tcccagtttg gctagcccat aaagtagcat cagaagggat 6180

caaatataca gatagaaaat ggtgctttga tggagaacgt aataatcaaa ttttagagga 6240

gaatatggat gtggaaatct ggacaaagga aggagaaaag aaaaaactga gacctaggtg 6300

gcttgatgcc cgcacttatt cagatccttt agcactcaaa gaattcaagg attttgcagc 6360

tggcagaaag tcaatcgccc ttgatcttgt gacagaaata ggaagagtgc cttcacactt 6420

agcccacaga acgagaaacg ccctggataa tttggtgatg ctgcacacgt cagaacatgg 6480

cggtagggcc tacaggcatg cagtggagga actaccagaa acgatggaaa cactcttact 6540

cctgggactg atgatcttgt taacaggtgg agcaatgctc ttcttgatat caggtaaagg 6600

gattggaaag acttcaatag gactcatttg tgtaattgct tccagcggca tgttatggat 6660

ggctgatgtc ccactccaat ggatcgcatc ggctatagtc ctggagtttt ttatgatggt 6720

gttgctcata ccagaaccag aaaagcagag aactccccaa gacaaccaac tcgcatatgt 6780

cgtgataggc atacttacat tggctgcaat agtagcggcc aatgaaatgg gactgttgga 6840

aactacaaag agagatttag gaatgtctaa agaaccaggt gttgtttctc caaccagcta 6900

tttggatgtg gacttgcacc cagcatcagc ctggacattg tacgccgtgg ccacaacagt 6960

aataacacca atgttgagac acaccataga gaattccaca gcaaatgtgt ctctggcagc 7020

catagctaac caggcagtgg tcctgatggg tttagacaaa ggatggccga tatcgaaaat 7080

ggacttgggc gtaccactat tggcactggg ttgctattca caagtgaacc cactaactct 7140

tgcagcggca gtacttttgc tagtcacaca ttatgcaatt ataggtccag gattgcaggc 7200

aaaagccacc cgtgaagctc agaaaaggac agctgctgga ataatgaaga atccaacggt 7260

ggatggaata atgacaatag acctagatcc tgtaatatat gattcaaaat ttgaaaagca 7320

actaggacag gtcatgctcc tggttctgtg tgcagtccaa cttttattga tgagaacatc 7380

atgggccttg tgtgaagttc taaccctagc cacaggacca ataacaacac tctgggaagg 7440

atcacctggg aagttctgga acaccacgat agctgtttcc atggcgaaca tctttagagg 7500

gagctattta gcaggagctg ggcttgcttt ttctatcatg aaatcagttg gaacaggaaa 7560

gagaggaaca gggtcacaag gtgaaacctt aggagaaaag tggaaaaaga aattaaatca 7620

gttatcccgg aaagagtttg acctttacaa gaaatccgga atcaccgaag tggatagaac 7680

agaagccaaa gaagggttaa aaagaggaga aataacacac catgccgtgt ccagaggcag 7740

cgcaaaactt caatggttcg tggagagaaa catggtcatt cctgaaggaa gagtcataga 7800

cctaggctgt ggaagaggag gctggtcata ttactgtgca ggactgaaaa aagttacaga 7860

agtgcgagga tacacaaaag gcggcccagg acacgaagaa ccagtaccta tgtctacata 7920

cggatggaac atagtcaagt taatgagtgg aaaggatgtt ttttatctgc cacctgaaaa 7980

gtgtgatacc ctattgtgtg acattggaga atcttcacca agcccaacag tggaagaaag 8040

cagaaccata agagttttga agatggttga accatggcta aagaacaacc agttttgcat 8100

taaagtattg aacccataca tgccaactgt gattgagcac ttagaaagac tacaaaggaa 8160

acatggagga atgcttgtga gaaatccact ctcacgaaac tccacgcacg aaatgtattg 8220

gatatccaat ggtacaggca atatcgtctc ttcagtcaac atggtatcca gattgctact 8280

gaacagattc acaatgacac acaggagacc caccatagag aaagatgtgg atctaggagc 8340

aggaacccga catgtcaatg cggaaccaga aacacccaac atggatgtca ttggggaaag 8400

aataaaaagg atcaaagagg agcatagttc aacatggcac tatgatgatg aaaatcctta 8460

caaaacgtgg gcttaccatg gatcctatga agtaaaagcc acaggctcag cctcctccat 8520

gataaatgga gtcgtgaaac tcctcacaaa accatgggat gtggtgccca tggtgacaca 8580

gatggcaatg acagatacaa ctccattcgg ccagcaaaga gtttttaaag agaaagtgga 8640

caccaggaca cctaggccca tgccaggaac aagaaaggtt atggagatca cagcggagtg 8700

gctttggagg accctgggaa ggaacaaaag acccagatta tgcacaaggg aggaattcac 8760

aaagaaggtc agaaccaacg cagctatggg cgctgtcttc acagaagaga accaatggga 8820

cagtgcgaga gctgctgttg aggacgaaga attttggaaa cttgtggaca gagaacgtga 8880

actccacaaa ctgggcaagt gtggaagctg cgtttacaac atgatgggca agagagagaa 8940

aaaacttgga gagtttggta aagcaaaagg cagtagggct atatggtaca tgtggttggg 9000

agccaggtac cttgagttcg aggcgctcgg attcctcaat gaagaccact ggttctcgcg 9060

tgaaaactct tacagtggag tagaaggaga aggactgcac aagctgggat acatcttgag 9120

agatatttcc aagatacccg gaggagccat gtatgctgat gacacagccg gttgggacac 9180

aagaataaca gaagatgacc tgcacaatga ggaaaaaatc acacagcaga tggaccctga 9240

acacaggcag ctagcgaacg ctatattcaa gctcacatac caaaacaaag tggtcaaagt 9300

ccaacgacca actccaaagg gcacggtaat ggacatcata tctaggaaag accaaagagg 9360

cagtggacag gtgggaactt atggtctgaa cacattcacc aacatggaag cccagctaat 9420

cagacaaatg gaaggagaag gcgtgttgtc aaaggcagac ctcgagaacc cccatccgct 9480

agagaagaaa attacacaat ggttggaaac taaaggagtg gaaaggttaa aaagaatggc 9540

catcagcggg gatgattgcg ttgtgaaacc aatcgacgac agattcgcca atgccctgct 9600

tgccctgaac gatatgggaa aggttagaaa ggacatacct caatggcagc catcaaaggg 9660

atggcatgat tggcaacagg tccccttctg ctcccaccac tttcatgaat tgatcatgaa 9720

agatggaaga aagttggtag ttccctgcag accccaggac gaactaatag gaagagcgag 9780

aatctcccaa ggagcaggat ggagccttag agaaactgca tgtctaggga aagcctacgc 9840

tcaaatgtgg gctctcatgt attttcacag aagagatctt agactagcat ccaacgccat 9900

atgttcagca gtaccagtcc actgggtccc cacgagcaga acgacatggt ctattcatgc 9960

tcaccatcag tggatgacta cagaagacat gcttactgtc tggaacaggg tgtggataga 10020

ggacaatcca tggatggaag acaaaactcc agtcacaacg tgggaagatg ttccatatct 10080

agggaagaga gaagaccaat ggtgcggatc actcataggt ctcacttcca gagcaacctg 10140

ggcccagaac atactcacag caatccaaca ggtgagaagc ctcataggca atgaagagtt 10200

tctggactac atgccttcga tgaagagatt caggaaggag gaggagtcag agggagccat 10260

ttggtaaaag caggaggtaa actgtcaggc cacattaagc cacagtacgg aagaagctgt 10320

gcagcctgtg agccccgtcc aaggacgtta aaagaagaag tcaggcccaa aagccacggt 10380

ttgagcaaac cgtgctgcct gtagctccgt cgtggggacg taaagcctgg gaggctgcaa 10440

accgtggaag ctgtacgcac ggtgtagcag actagtggtt agaggagacc cctcccatga 10500

cacaacgcag cagcggggcc cgagcactga gggaagctgt acctccttgc aaaggactag 10560

aggttagagg agacccccg caaacaaaaa cagcatattg acgctgggag agaccagaga 10620

tcctgctgtc tcctcagcat cattccaggc acagaacgcc agaaaatgga atggtgctgt 10680

tgaatcaaca ggttct 10696

<210> 14
<211> 3390
<212> PRT
<213> dengue virus

<400> 14

```
Met Asn Asn Gln Arg Lys Lys Thr Gly Lys Pro Ser Ile Asn Met Leu
1               5                  10                  15

Lys Arg Val Arg Asn Arg Val Ser Thr Gly Ser Gln Leu Ala Lys Arg
            20                  25                  30

Phe Ser Arg Gly Leu Leu Asn Gly Gln Gly Pro Met Lys Leu Val Met
        35                  40                  45

Ala Phe Ile Ala Phe Leu Arg Phe Leu Ala Ile Pro Pro Thr Ala Gly
    50                  55                  60

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

Leu Lys Gly Phe Lys Lys Glu Ile Ser Asn Met Leu Ser Ile Ile Asn
                85                  90                  95

Lys Arg Lys Lys Thr Ser Leu Cys Leu Met Met Met Leu Pro Ala Thr
            100                 105                 110

Leu Ala Phe His Leu Thr Ser Arg Asp Gly Glu Pro Arg Met Ile Val
        115                 120                 125

Gly Lys Asn Glu Arg Gly Lys Ser Leu Leu Phe Lys Thr Ala Ser Gly
    130                 135                 140

Ile Asn Met Cys Thr Leu Ile Ala Met Asp Leu Gly Glu Met Cys Asp
145                 150                 155                 160

Asp Thr Val Thr Tyr Lys Cys Pro His Ile Thr Glu Val Glu Pro Glu
                165                 170                 175

Asp Ile Asp Cys Trp Cys Asn Leu Thr Ser Thr Trp Val Thr Tyr Gly
            180                 185                 190

Thr Cys Asn Gln Ala Gly Glu His Arg Arg Asp Lys Arg Ser Val Ala
        195                 200                 205

Leu Ala Pro His Val Gly Met Gly Leu Asp Thr Arg Thr Gln Thr Trp
    210                 215                 220
```

```
Met Ser Ala Glu Gly Ala Trp Arg Gln Val Glu Lys Val Glu Thr Trp
225                 230                 235                 240

Ala Leu Arg His Pro Gly Phe Thr Ile Leu Ala Leu Phe Leu Ala His
                245                 250                 255

Tyr Ile Gly Thr Ser Leu Thr Gln Lys Val Val Ile Phe Ile Leu Leu
            260                 265                 270

Met Leu Val Thr Pro Ser Met Thr Met Arg Cys Val Gly Val Gly Asn
        275                 280                 285

Arg Asp Phe Val Glu Gly Leu Ser Gly Ala Thr Trp Val Asp Val Val
    290                 295                 300

Leu Glu His Gly Gly Cys Val Thr Thr Met Ala Lys Asn Lys Pro Thr
305                 310                 315                 320

Leu Asp Ile Glu Leu Gln Lys Thr Glu Ala Thr Gln Leu Ala Thr Leu
                325                 330                 335

Arg Lys Leu Cys Ile Glu Gly Lys Ile Thr Asn Ile Thr Thr Asp Ser
            340                 345                 350

Arg Cys Pro Thr Gln Gly Glu Ala Ile Leu Pro Glu Glu Gln Asp Gln
        355                 360                 365

Asn Tyr Val Cys Lys His Thr Tyr Val Asp Arg Gly Trp Gly Asn Gly
    370                 375                 380

Cys Gly Leu Phe Gly Lys Gly Ser Leu Val Thr Cys Ala Lys Phe Gln
385                 390                 395                 400

Cys Leu Glu Ser Ile Glu Gly Lys Val Val Gln His Glu Asn Leu Lys
                405                 410                 415

Tyr Thr Val Ile Ile Thr Val His Thr Gly Asp Gln His Gln Val Gly
            420                 425                 430
```

```
Asn Glu Thr Gln Gly Val Thr Ala Glu Ile Thr Pro Gln Ala Ser Thr
        435                 440                 445

Ala Glu Val Ile Leu Pro Glu Tyr Gly Thr Leu Gly Leu Glu Cys Ser
    450                 455                 460

Pro Arg Thr Gly Leu Asp Phe Asn Glu Met Ile Ser Leu Thr Met Lys
465                 470                 475                 480

Asn Lys Ala Trp Met Val His Arg Gln Trp Phe Phe Asp Leu Pro Leu
                485                 490                 495

Pro Trp Thr Ser Gly Ala Thr Ala Glu Thr Pro Thr Trp Asn Arg Lys
            500                 505                 510

Glu Leu Leu Val Thr Phe Lys Asn Ala His Ala Lys Lys Gln Glu Val
        515                 520                 525

Val Val Leu Gly Ser Gln Glu Gly Ala Met His Thr Ala Leu Thr Gly
    530                 535                 540

Ala Thr Glu Ile Gln Thr Ser Gly Gly Thr Ser Ile Phe Ala Gly His
545                 550                 555                 560

Leu Lys Cys Arg Leu Lys Met Asp Lys Leu Glu Leu Lys Gly Met Ser
                565                 570                 575

Tyr Ala Met Cys Leu Ser Ser Phe Val Leu Lys Lys Glu Val Ser Glu
            580                 585                 590

Thr Gln His Gly Thr Ile Leu Ile Lys Val Glu Tyr Lys Gly Glu Asp
        595                 600                 605

Ala Pro Cys Lys Ile Pro Phe Ser Thr Glu Asp Gly Gln Gly Lys Ala
    610                 615                 620

His Asn Gly Arg Leu Ile Thr Ala Asn Pro Val Val Thr Lys Lys Glu
625                 630                 635                 640

Glu Pro Val Asn Ile Glu Ala Glu Pro Pro Phe Gly Glu Ser Asn Ile
                645                 650                 655
```

```
Val Ile Gly Ile Gly Asp Lys Ala Leu Lys Ile Asn Trp Tyr Lys Lys
            660                 665                 670

Gly Ser Ser Ile Gly Lys Met Phe Glu Ala Thr Ala Arg Gly Ala Arg
        675                 680                 685

Arg Met Ala Ile Leu Gly Asp Thr Ala Trp Asp Phe Gly Ser Val Gly
    690                 695                 700

Gly Val Leu Asn Ser Leu Gly Lys Met Val His Gln Ile Phe Gly Ser
705                 710                 715                 720

Ala Tyr Thr Ala Leu Phe Gly Gly Val Ser Trp Met Met Lys Ile Gly
                725                 730                 735

Ile Gly Val Leu Leu Thr Trp Ile Gly Leu Asn Ser Lys Asn Thr Ser
            740                 745                 750

Met Ser Phe Ser Cys Ile Ala Ile Gly Ile Ile Thr Leu Tyr Leu Gly
        755                 760                 765

Ala Val Val Gln Ala Asp Met Gly Cys Val Ile Asn Trp Lys Gly Lys
    770                 775                 780

Glu Leu Lys Cys Gly Ser Gly Ile Phe Val Thr Asn Glu Val His Thr
785                 790                 795                 800

Trp Thr Glu Gln Tyr Lys Phe Gln Ala Asp Ser Pro Lys Arg Leu Ala
                805                 810                 815

Thr Ala Ile Ala Gly Ala Trp Glu Asn Gly Val Cys Gly Ile Arg Ser
            820                 825                 830

Thr Thr Arg Met Glu Asn Leu Leu Trp Lys Gln Ile Ala Asn Glu Leu
        835                 840                 845

Asn Tyr Ile Leu Trp Glu Asn Asn Ile Lys Leu Thr Val Val Val Gly
    850                 855                 860
```

```
Asp Ile Thr Gly Val Leu Glu Gln Gly Lys Arg Thr Leu Thr Pro Gln
865                 870                 875                 880


Pro Met Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala Lys Ile
                885                 890                 895


Val Thr Ala Glu Thr Gln Asn Ser Ser Phe Ile Ile Asp Gly Pro Ser
            900                 905                 910


Thr Pro Glu Cys Pro Ser Ala Ser Arg Ala Trp Asn Val Trp Glu Val
        915                 920                 925


Glu Asp Tyr Gly Phe Gly Val Phe Thr Thr Asn Ile Trp Leu Lys Leu
    930                 935                 940


Arg Glu Val Tyr Thr Gln Leu Cys Asp His Arg Leu Met Ser Ala Ala
945                 950                 955                 960


Val Lys Asp Glu Arg Ala Val His Ala Asp Met Gly Tyr Trp Ile Glu
                965                 970                 975


Ser Gln Lys Asn Gly Ser Trp Lys Leu Glu Lys Ala Ser Phe Ile Glu
            980                 985                 990


Val Lys Thr Cys Thr Trp Pro Lys  Ser His Thr Leu Trp  Ser Asn Gly
        995                 1000                1005


Val Leu  Glu Ser Asp Met Ile  Ile Pro Lys Ser Leu  Ala Gly Pro
    1010                1015                1020


Ile Ser  Gln His Asn His Arg  Pro Gly Tyr His Thr  Gln Thr Ala
    1025                1030                1035


Gly Pro  Trp His Leu Gly Lys  Leu Glu Leu Asp Phe  Asn Tyr Cys
    1040                1045                1050


Glu Gly  Thr Thr Val Val Ile  Ser Glu Asn Cys Gly  Thr Arg Gly
    1055                1060                1065


Pro Ser  Leu Arg Thr Thr Thr  Val Ser Gly Lys Leu  Ile His Glu
    1070                1075                1080
```

```
Trp Cys  Cys Arg Ser Cys Thr  Leu Pro Pro Leu Arg  Tyr Met Gly
    1085                1090                1095

Glu Asp  Gly Cys Trp Tyr Gly  Met Glu Ile Arg Pro  Ile Asn Glu
    1100                1105                1110

Lys Glu  Glu Asn Met Val Lys  Ser Leu Ala Ser Ala  Gly Ser Gly
    1115                1120                1125

Lys Val  Asp Asn Phe Thr Met  Gly Val Leu Cys Leu  Ala Ile Leu
    1130                1135                1140

Phe Glu  Glu Val Met Arg Gly  Lys Phe Gly Lys Lys  His Met Ile
    1145                1150                1155

Ala Gly  Val Leu Phe Thr Phe  Val Leu Leu Leu Ser  Gly Gln Ile
    1160                1165                1170

Thr Trp  Arg Asp Met Ala His  Thr Leu Ile Met Ile  Gly Ser Asn
    1175                1180                1185

Ala Ser  Asp Arg Met Gly Met  Gly Val Thr Tyr Leu  Ala Leu Ile
    1190                1195                1200

Ala Thr  Phe Lys Ile Gln Pro  Phe Leu Ala Leu Gly  Phe Phe Leu
    1205                1210                1215

Arg Lys  Leu Thr Ser Arg Glu  Asn Leu Leu Leu Gly  Val Gly Leu
    1220                1225                1230

Ala Met  Ala Ala Thr Leu Arg  Leu Pro Glu Asp Ile  Glu Gln Met
    1235                1240                1245

Ala Asn  Gly Ile Ala Leu Gly  Leu Met Ala Leu Lys  Leu Ile Thr
    1250                1255                1260

Gln Phe  Glu Thr Tyr Gln Leu  Trp Thr Ala Leu Val  Ser Leu Thr
    1265                1270                1275
```

```
Cys Ser  Asn Thr Ile Phe Thr  Leu Thr Val Ala Trp  Arg Thr Ala
    1280                 1285                 1290

Thr Leu  Ile Leu Ala Gly Ile  Ser Leu Leu Pro Val  Cys Gln Ser
    1295                 1300                 1305

Ser Ser  Met Arg Lys Thr Asp  Trp Leu Pro Met Thr  Val Ala Ala
    1310                 1315                 1320

Met Gly  Ala Gln Pro Leu Pro  Leu Phe Ile Phe Ser  Leu Lys Asp
    1325                 1330                 1335

Thr Leu  Lys Arg Arg Ser Trp  Pro Leu Asn Glu Gly  Val Met Ala
    1340                 1345                 1350

Val Gly  Leu Val Ser Ile Leu  Ala Ser Ser Leu Leu  Arg Asn Asp
    1355                 1360                 1365

Val Pro  Met Ala Gly Pro Leu  Val Ala Gly Gly Leu  Leu Ile Ala
    1370                 1375                 1380

Cys Tyr  Val Ile Thr Gly Thr  Ser Ala Asp Leu Thr  Val Glu Lys
    1385                 1390                 1395

Ala Ala  Asp Val Thr Trp Glu  Glu Glu Ala Glu Gln  Thr Gly Val
    1400                 1405                 1410

Ser His  Asn Leu Met Val Thr  Val Asp Asp Asp Gly  Thr Met Arg
    1415                 1420                 1425

Ile Lys  Asp Asp Glu Thr Glu  Asn Ile Leu Thr Val  Leu Leu Lys
    1430                 1435                 1440

Thr Ala  Leu Leu Ile Val Ser  Gly Ile Phe Pro Tyr  Ser Ile Pro
    1445                 1450                 1455

Ala Thr  Leu Leu Val Trp His  Thr Trp Gln Lys Gln  Thr Gln Arg
    1460                 1465                 1470

Ser Gly  Val Leu Trp Asp Val  Pro Ser Pro Pro Glu  Thr Gln Lys
    1475                 1480                 1485
```

```
Ala Glu  Leu Glu Glu Gly Val  Tyr Arg Ile Lys Gln  Gln Gly Ile
    1490                1495                1500

Phe Gly  Lys Thr Gln Val Gly  Val Gly Val Gln Lys  Glu Gly Val
    1505                1510                1515

Phe His  Thr Met Trp His Val  Thr Arg Gly Ala Val  Leu Thr His
    1520                1525                1530

Asn Gly  Lys Arg Leu Glu Pro  Asn Trp Ala Ser Val  Lys Lys Asp
    1535                1540                1545

Leu Ile  Ser Tyr Gly Gly Gly  Trp Arg Leu Ser Ala  Gln Trp Gln
    1550                1555                1560

Lys Gly  Glu Glu Val Gln Val  Ile Ala Val Glu Pro  Gly Lys Asn
    1565                1570                1575

Pro Lys  Asn Phe Gln Thr Met  Pro Gly Ile Phe Gln  Thr Thr Thr
    1580                1585                1590

Gly Glu  Ile Gly Ala Ile Ala  Leu Asp Phe Lys Pro  Gly Thr Ser
    1595                1600                1605

Gly Ser  Pro Ile Ile Asn Arg  Glu Gly Lys Val Val  Gly Leu Tyr
    1610                1615                1620

Gly Asn  Gly Val Val Thr Lys  Asn Gly Gly Tyr Val  Ser Gly Ile
    1625                1630                1635

Ala Gln  Thr Asn Ala Glu Pro  Asp Gly Pro Thr Pro  Glu Leu Glu
    1640                1645                1650

Glu Glu  Met Phe Lys Lys Arg  Asn Leu Thr Ile Met  Asp Leu His
    1655                1660                1665

Pro Gly  Ser Gly Lys Thr Arg  Lys Tyr Leu Pro Ala  Ile Val Arg
    1670                1675                1680
```

```
Glu Ala  Ile Lys Arg Arg Leu  Arg Thr Leu Ile Leu  Ala Pro Thr
    1685                1690                1695

Arg Val  Val Ala Ala Glu Met  Glu Glu Ala Leu Lys  Gly Leu Pro
    1700                1705                1710

Ile Arg  Tyr Gln Thr Thr Ala  Thr Lys Ser Glu His  Thr Gly Arg
    1715                1720                1725

Glu Ile  Val Asp Leu Met Cys  His Ala Thr Phe Thr  Met Arg Leu
    1730                1735                1740

Leu Ser  Pro Val Arg Val Pro  Asn Tyr Asn Leu Ile  Ile Met Asp
    1745                1750                1755

Glu Ala  His Phe Thr Asp Pro  Ala Ser Ile Ala Ala  Arg Gly Tyr
    1760                1765                1770

Ile Ser  Thr Arg Val Gly Met  Gly Glu Ala Ala Ala  Ile Phe Met
    1775                1780                1785

Thr Ala  Thr Pro Pro Gly Thr  Ala Asp Ala Phe Pro  Gln Ser Asn
    1790                1795                1800

Ala Pro  Ile Gln Asp Glu Glu  Arg Asp Ile Pro Glu  Arg Ser Trp
    1805                1810                1815

Asn Ser  Gly Asn Glu Trp Ile  Thr Asp Phe Val Gly  Lys Thr Val
    1820                1825                1830

Trp Phe  Val Pro Ser Ile Lys  Ala Gly Asn Asp Ile  Ala Asn Cys
    1835                1840                1845

Leu Arg  Lys Asn Gly Lys Lys  Val Ile Gln Leu Ser  Arg Lys Thr
    1850                1855                1860

Phe Asp  Thr Glu Tyr Gln Lys  Thr Lys Leu Asn Asp  Trp Asp Phe
    1865                1870                1875

Val Val  Thr Thr Asp Ile Ser  Glu Met Gly Ala Asn  Phe Lys Ala
    1880                1885                1890
```

```
Asp Arg  Val Ile Asp Pro Arg  Arg Cys Leu Lys Pro  Val Ile Leu
    1895                1900                1905

Thr Asp  Gly Pro Glu Arg Val  Ile Leu Ala Gly Pro  Met Pro Val
    1910                1915                1920

Thr Val  Ala Ser Ala Ala Gln  Arg Arg Gly Arg Val  Gly Arg Asn
    1925                1930                1935

Pro Gln  Lys Glu Asn Asp Gln  Tyr Ile Phe Met Gly  Gln Pro Leu
    1940                1945                1950

Asn Asn  Asp Glu Asp His Ala  His Trp Thr Glu Ala  Lys Met Leu
    1955                1960                1965

Leu Asp  Asn Ile Asn Thr Pro  Glu Gly Ile Ile Pro  Ala Leu Phe
    1970                1975                1980

Glu Pro  Glu Arg Glu Lys Ser  Ala Ala Ile Asp Gly  Glu Tyr Arg
    1985                1990                1995

Leu Lys  Gly Glu Ser Arg Lys  Thr Phe Val Glu Leu  Met Arg Arg
    2000                2005                2010

Gly Asp  Leu Pro Val Trp Leu  Ala His Lys Val Ala  Ser Glu Gly
    2015                2020                2025

Ile Lys  Tyr Thr Asp Arg Lys  Trp Cys Phe Asp Gly  Glu Arg Asn
    2030                2035                2040

Asn Gln  Ile Leu Glu Glu Asn  Met Asp Val Glu Ile  Trp Thr Lys
    2045                2050                2055

Glu Gly  Glu Lys Lys Lys Leu  Arg Pro Arg Trp Leu  Asp Ala Arg
    2060                2065                2070

Thr Tyr  Ser Asp Pro Leu Ala  Leu Lys Glu Phe Lys  Asp Phe Ala
    2075                2080                2085
```

```
Ala Gly  Arg Lys Ser Ile Ala  Leu Asp Leu Val Thr  Glu Ile Gly
    2090                2095                2100

Arg Val  Pro Ser His Leu Ala  His Arg Thr Arg Asn  Ala Leu Asp
    2105                2110                2115

Asn Leu  Val Met Leu His Thr  Ser Glu His Gly Gly  Arg Ala Tyr
    2120                2125                2130

Arg His  Ala Val Glu Glu Leu  Pro Glu Thr Met Glu  Thr Leu Leu
    2135                2140                2145

Leu Leu  Gly Leu Met Ile Leu  Leu Thr Gly Gly Ala  Met Leu Phe
    2150                2155                2160

Leu Ile  Ser Gly Lys Gly Ile  Gly Lys Thr Ser Ile  Gly Leu Ile
    2165                2170                2175

Cys Val  Ile Ala Ser Ser Gly  Met Leu Trp Met Ala  Asp Val Pro
    2180                2185                2190

Leu Gln  Trp Ile Ala Ser Ala  Ile Val Leu Glu Phe  Phe Met Met
    2195                2200                2205

Val Leu  Leu Ile Pro Glu Pro  Glu Lys Gln Arg Thr  Pro Gln Asp
    2210                2215                2220

Asn Gln  Leu Ala Tyr Val Val  Ile Gly Ile Leu Thr  Leu Ala Ala
    2225                2230                2235

Ile Val  Ala Ala Asn Glu Met  Gly Leu Leu Glu Thr  Thr Lys Arg
    2240                2245                2250

Asp Leu  Gly Met Ser Lys Glu  Pro Gly Val Val Ser  Pro Thr Ser
    2255                2260                2265

Tyr Leu  Asp Val Asp Leu His  Pro Ala Ser Ala Trp  Thr Leu Tyr
    2270                2275                2280

Ala Val  Ala Thr Thr Val Ile  Thr Pro Met Leu Arg  His Thr Ile
    2285                2290                2295
```

```
Glu Asn  Ser Thr Ala Asn Val  Ser Leu Ala Ala Ile  Ala Asn Gln
    2300                2305                2310

Ala Val  Val Leu Met Gly Leu  Asp Lys Gly Trp Pro  Ile Ser Lys
    2315                2320                2325

Met Asp  Leu Gly Val Pro Leu  Leu Ala Leu Gly Cys  Tyr Ser Gln
    2330                2335                2340

Val Asn  Pro Leu Thr Leu Ala  Ala Ala Val Leu Leu  Leu Val Thr
    2345                2350                2355

His Tyr  Ala Ile Ile Gly Pro  Gly Leu Gln Ala Lys  Ala Thr Arg
    2360                2365                2370

Glu Ala  Gln Lys Arg Thr Ala  Ala Gly Ile Met Lys  Asn Pro Thr
    2375                2380                2385

Val Asp  Gly Ile Met Thr Ile  Asp Leu Asp Pro Val  Ile Tyr Asp
    2390                2395                2400

Ser Lys  Phe Glu Lys Gln Leu  Gly Gln Val Met Leu  Leu Val Leu
    2405                2410                2415

Cys Ala  Val Gln Leu Leu Leu  Met Arg Thr Ser Trp  Ala Leu Cys
    2420                2425                2430

Glu Val  Leu Thr Leu Ala Thr  Gly Pro Ile Thr Thr  Leu Trp Glu
    2435                2440                2445

Gly Ser  Pro Gly Lys Phe Trp  Asn Thr Thr Ile Ala  Val Ser Met
    2450                2455                2460

Ala Asn  Ile Phe Arg Gly Ser  Tyr Leu Ala Gly Ala  Gly Leu Ala
    2465                2470                2475

Phe Ser  Ile Met Lys Ser Val  Gly Thr Gly Lys Arg  Gly Thr Gly
    2480                2485                2490
```

```
Ser Gln  Gly Glu Thr Leu Gly  Glu Lys Trp Lys Lys  Lys Leu Asn
    2495                 2500                 2505

Gln Leu  Ser Arg Lys Glu Phe  Asp Leu Tyr Lys Lys  Ser Gly Ile
    2510                 2515                 2520

Thr Glu  Val Asp Arg Thr Glu  Ala Lys Glu Gly Leu  Lys Arg Gly
    2525                 2530                 2535

Glu Ile  Thr His His Ala Val  Ser Arg Gly Ser Ala  Lys Leu Gln
    2540                 2545                 2550

Trp Phe  Val Glu Arg Asn Met  Val Ile Pro Glu Gly  Arg Val Ile
    2555                 2560                 2565

Asp Leu  Gly Cys Gly Arg Gly  Gly Trp Ser Tyr Tyr  Cys Ala Gly
    2570                 2575                 2580

Leu Lys  Lys Val Thr Glu Val  Arg Gly Tyr Thr Lys  Gly Gly Pro
    2585                 2590                 2595

Gly His  Glu Glu Pro Val Pro  Met Ser Thr Tyr Gly  Trp Asn Ile
    2600                 2605                 2610

Val Lys  Leu Met Ser Gly Lys  Asp Val Phe Tyr Leu  Pro Pro Glu
    2615                 2620                 2625

Lys Cys  Asp Thr Leu Leu Cys  Asp Ile Gly Glu Ser  Ser Pro Ser
    2630                 2635                 2640

Pro Thr  Val Glu Glu Ser Arg  Thr Ile Arg Val Leu  Lys Met Val
    2645                 2650                 2655

Glu Pro  Trp Leu Lys Asn Asn  Gln Phe Cys Ile Lys  Val Leu Asn
    2660                 2665                 2670

Pro Tyr  Met Pro Thr Val Ile  Glu His Leu Glu Arg  Leu Gln Arg
    2675                 2680                 2685

Lys His  Gly Gly Met Leu Val  Arg Asn Pro Leu Ser  Arg Asn Ser
    2690                 2695                 2700
```

```
Thr His  Glu Met Tyr Trp Ile  Ser Asn Gly Thr Gly  Asn Ile Val
    2705                2710                2715

Ser Ser  Val Asn Met Val Ser  Arg Leu Leu Leu Asn  Arg Phe Thr
    2720                2725                2730

Met Thr  His Arg Arg Pro Thr  Ile Glu Lys Asp Val  Asp Leu Gly
    2735                2740                2745

Ala Gly  Thr Arg His Val Asn  Ala Glu Pro Glu Thr  Pro Asn Met
    2750                2755                2760

Asp Val  Ile Gly Glu Arg Ile  Lys Arg Ile Lys Glu  Glu His Ser
    2765                2770                2775

Ser Thr  Trp His Tyr Asp Asp  Glu Asn Pro Tyr Lys  Thr Trp Ala
    2780                2785                2790

Tyr His  Gly Ser Tyr Glu Val  Lys Ala Thr Gly Ser  Ala Ser Ser
    2795                2800                2805

Met Ile  Asn Gly Val Val Lys  Leu Leu Thr Lys Pro  Trp Asp Val
    2810                2815                2820

Val Pro  Met Val Thr Gln Met  Ala Met Thr Asp Thr  Thr Pro Phe
    2825                2830                2835

Gly Gln  Gln Arg Val Phe Lys  Glu Lys Val Asp Thr  Arg Thr Pro
    2840                2845                2850

Arg Pro  Met Pro Gly Thr Arg  Lys Val Met Glu Ile  Thr Ala Glu
    2855                2860                2865

Trp Leu  Trp Arg Thr Leu Gly  Arg Asn Lys Arg Pro  Arg Leu Cys
    2870                2875                2880

Thr Arg  Glu Glu Phe Thr Lys  Lys Val Arg Thr Asn  Ala Ala Met
    2885                2890                2895
```

```
Gly Ala  Val Phe Thr Glu Glu  Asn Gln Trp Asp Ser  Ala Arg Ala
    2900                2905                2910

Ala Val  Glu Asp Glu Glu Phe  Trp Lys Leu Val Asp  Arg Glu Arg
    2915                2920                2925

Glu Leu  His Lys Leu Gly Lys  Cys Gly Ser Cys Val  Tyr Asn Met
    2930                2935                2940

Met Gly  Lys Arg Glu Lys Lys  Leu Gly Glu Phe Gly  Lys Ala Lys
    2945                2950                2955

Gly Ser  Arg Ala Ile Trp Tyr  Met Trp Leu Gly Ala  Arg Tyr Leu
    2960                2965                2970

Glu Phe  Glu Ala Leu Gly Phe  Leu Asn Glu Asp His  Trp Phe Ser
    2975                2980                2985

Arg Glu  Asn Ser Tyr Ser Gly  Val Glu Gly Glu Gly  Leu His Lys
    2990                2995                3000

Leu Gly  Tyr Ile Leu Arg Asp  Ile Ser Lys Ile Pro  Gly Gly Ala
    3005                3010                3015

Met Tyr  Ala Asp Asp Thr Ala  Gly Trp Asp Thr Arg  Ile Thr Glu
    3020                3025                3030

Asp Asp  Leu His Asn Glu Glu  Lys Ile Thr Gln Gln  Met Asp Pro
    3035                3040                3045

Glu His  Arg Gln Leu Ala Asn  Ala Ile Phe Lys Leu  Thr Tyr Gln
    3050                3055                3060

Asn Lys  Val Val Lys Val Gln  Arg Pro Thr Pro Lys  Gly Thr Val
    3065                3070                3075

Met Asp  Ile Ile Ser Arg Lys  Asp Gln Arg Gly Ser  Gly Gln Val
    3080                3085                3090

Gly Thr  Tyr Gly Leu Asn Thr  Phe Thr Asn Met Glu  Ala Gln Leu
    3095                3100                3105
```

```
Ile Arg  Gln Met Glu Gly Glu  Gly Val Leu Ser Lys  Ala Asp Leu
    3110                3115                3120

Glu Asn  Pro His Pro Leu Glu  Lys Lys Ile Thr Gln  Trp Leu Glu
    3125                3130                3135

Thr Lys  Gly Val Glu Arg Leu  Lys Arg Met Ala Ile  Ser Gly Asp
    3140                3145                3150

Asp Cys  Val Val Lys Pro Ile  Asp Asp Arg Phe Ala  Asn Ala Leu
    3155                3160                3165

Leu Ala  Leu Asn Asp Met Gly  Lys Val Arg Lys Asp  Ile Pro Gln
    3170                3175                3180

Trp Gln  Pro Ser Lys Gly Trp  His Asp Trp Gln Gln  Val Pro Phe
    3185                3190                3195

Cys Ser  His His Phe His Glu  Leu Ile Met Lys Asp  Gly Arg Lys
    3200                3205                3210

Leu Val  Val Pro Cys Arg Pro  Gln Asp Glu Leu Ile  Gly Arg Ala
    3215                3220                3225

Arg Ile  Ser Gln Gly Ala Gly  Trp Ser Leu Arg Glu  Thr Ala Cys
    3230                3235                3240

Leu Gly  Lys Ala Tyr Ala Gln  Met Trp Ala Leu Met  Tyr Phe His
    3245                3250                3255

Arg Arg  Asp Leu Arg Leu Ala  Ser Asn Ala Ile Cys  Ser Ala Val
    3260                3265                3270

Pro Val  His Trp Val Pro Thr  Ser Arg Thr Thr Trp  Ser Ile His
    3275                3280                3285

Ala His  His Gln Trp Met Thr  Thr Glu Asp Met Leu  Thr Val Trp
    3290                3295                3300
```

```
Asn Arg  Val Trp Ile Glu Asp  Asn Pro Trp Met Glu  Asp Lys Thr
    3305                 3310                 3315

Pro Val  Thr Thr Trp Glu Asp  Val Pro Tyr Leu Gly  Lys Arg Glu
    3320                 3325                 3330

Asp Gln  Trp Cys Gly Ser Leu  Ile Gly Leu Thr Ser  Arg Ala Thr
    3335                 3340                 3345

Trp Ala  Gln Asn Ile Leu Thr  Ala Ile Gln Gln Val  Arg Ser Leu
    3350                 3355                 3360

Ile Gly  Asn Glu Glu Phe Leu  Asp Tyr Met Pro Ser  Met Lys Arg
    3365                 3370                 3375

Phe Arg  Lys Glu Glu Glu Ser  Glu Gly Ala Ile Trp
    3380                 3385                 3390
```

<210> 15
<211> 10648
<212> DNA
<213> dengue virus

<400> 15

```
agttgttagt ctgtgtggac cgacaaggac agttccaaat cggaagcttg cttaacacag       60

ttctaacagt ttgtttgaat agagagcaga tctctggaaa aatgaaccaa cgaaaaaagg      120

tggttagacc acctttcaat atgctgaaac gcgagagaaa ccgcgtatca acccctcaag      180

ggttggtgaa gagattctca accggacttt tttctgggaa aggaccctta cggatggtgc      240

tagcattcat cacgtttttg cgagtccttt ccatcccacc aacagcaggg attctgaaaa      300

gatggggaca gttgaagaaa aataaggcca tcaggatact gattggattc aggaaggaga      360

taggccgcat gctgaacatc ttgaacggga gaaaaaggtc aacgataaca ttgctgtgct      420

tgattcccac cgtaatggcg tttcacttgt caacaagaga tggcgaaccc ctcatgatag      480

tggcaaaaca tgaaaggggg agacctctct tgtttaagac aacagagggg atcaacaaat      540

gcactctcat tgccatggac ttgggtgaaa tgtgtgagga cactgtcacg tataaatgcc      600

ccttactggt caataccgaa cctgaagaca ttgattgctg gtgcaatctc acgtctacct      660

gggtcatgta tgggacatgc acccagagcg gagaacggag acgagagaag cgctcagtag      720
```

ctttaacacc acattcagga atgggattgg aaacaagagc tgagacatgg atgtcatcgg 780

aaggggcttg gaagcatgct cagagagtag agagctggat actcagaaac ccaggattcg 840

cgctcttggc aggatttatg gcttatatga ttgggcaaac aggaatccag cgaactgtct 900

tctttgtcct aatgatgctg gtcgccccat cctacggaat gcgatgcgta ggagtaggaa 960

acagagactt tgtggaagga gtctcaggtg gagcatgggt cgatctggtg ctagaacatg 1020

gaggatgcgt cacaaccatg gcccagggaa aaccaacctt ggattttgaa ctgactaaga 1080

caacagccaa ggaagtggct ctgttaagaa cctattgcat tgaagcctca atatcaaaca 1140

taaccacggc aacaagatgt ccaacgcaag gagagcctta tctaaaagag gaacaagacc 1200

aacagtacat ttgccggaga gatgtggtag acagagggtg gggcaatggc tgtggcttgt 1260

ttggaaaagg aggagttgtg acatgtgcga agttttcatg ttcggggaag ataacaggca 1320

atttggtcca aattgagaac cttgaataca cagtggttgt aacagtccac aatggagaca 1380

cccatgcagt aggaaatgac acatccaatc atggagttac agccacgata actcccaggt 1440

caccatcggt ggaagtcaaa ttgccggact atggagaact aacactcgat tgtgaaccca 1500

ggtctggaat tgactttaat gagatgattc tgatgaaaat gaaaaagaaa acatggcttg 1560

tgcataagca atggtttttg gatctacctc taccatggac agcaggagca gacacatcag 1620

aggttcactg gaattacaaa gagagaatgg tgacatttaa ggttcctcat gccaagagac 1680

aggatgtgac agtgctggga tctcaggaag gagccatgca ttctgccctc gctggagcca 1740

cagaagtgga ctccggtgat ggaaatcaca tgtttgcagg acatctcaag tgcaaagtcc 1800

gtatggagaa attgagaatc aagggaatgt catacacgat gtgttcagga aagttctcaa 1860

ttgacaaaga gatggcagaa acacagcatg ggacaacagt ggtgaaagtc aagtatgaag 1920

gtgctggagc tccgtgtaaa gtccccatag agataagaga tgtgaacaag gaaaaagtgg 1980

ttgggcgtat catctcatcc acccctttgg ctgagaatac caacagtgca accaacatag 2040

agttagaacc ccccttgggg gacagctaca tagtgatagg tgttggaaac agtgcattaa 2100

cactccattg gttcaggaaa gggagttcca ttggcaagat gtttgagtcc acatacagag 2160

gtgcaaaacg aatggccatt ctaggtgaaa cagcttggga ttttggttcc gttggtggac 2220

tgttcacatc attgggaaag gctgtgcacc aggtttttgg aagtgtgtat acaaccatgt 2280

ttggaggagt ctcatggatg attagaatcc taattgggtt cctagtgttg tggattggca 2340

cgaactcaag gaacacttca atggctatga cgtgcatagc tgttggagga atcactctgt 2400

ttctgggctt cacagttcaa gcagacatgg gttgtgtggt gtcatggagt gggaaagaat 2460

tgaagtgtgg aagcggaatt tttgtggttg acaacgtgca cacttggaca gaacagtaca 2520

aatttcaacc ggagtcccca gcgagactag cgtctgcaat attgaatgcc cacaaagatg 2580

gggtctgtgg aattagatca accacgaggc tggaaaatgt catgtggaag caaataacca 2640

acgagctaaa ttatgttctc tgggaaggag gacatgacct cactgtagtg gctggggatg 2700

tgaaggggt gttgaccaaa ggcaagagag cactcacacc cccagtgaat gatctgaaat 2760

attcatggaa gacatgggga aaagcaaaaa tcttcacccc agaagcaaga aatagcacat 2820

ttttaataga cggaccagac acctccgaat gccccaatga acgaagagca tggaactttc 2880

ttgaggtgga agactatgga tttggcatgt tcacgaccaa catatggatg aaattccgag 2940

aaggaagttc agaagtgtgt gaccacaggt taatgtcagc ggcaattaaa gatcagaaag 3000

ctgtgcatgc tgacatgggt tattggatag agagctcaaa aaaccagacc tggcagatag 3060

agaaagcatc tcttattgaa gtgaaaacat gtctgtggcc caagacccac acattgtgga 3120

gcaatggagt gctggaaagc cagatgctca ttccaaaatc atatgcgggc ccttttcac 3180

agcacaatta ccgccagggc tatgccacgc aaaccgtggg cccatggcac ttaggcaaat 3240

tagagataga ctttggagaa tgccccggaa caacagtcgc aattcaggag gattgtgacc 3300

atagaggccc atctttgagg accaccactg catctggaaa actagtcacg caatggtgct 3360

gccgctcctg cacgatgcct cccttaaggt tcttgggaga agatgggtgc tggtatggga 3420

tggagattag gcccttgagt gaaaaagaag agaacatggt caaatcacag gtaacggccg 3480

gacagggcac atcagaaact ttttctatgg gtctgttgtg cctgaccttg tttgtggaag 3540

aatgcttgag gagaagagtc actaggaaac acatgatatt ggttgtggtg atcactcttt 3600

gtgccatcat cctaggaggc ctcacatgga tggacttact acgagccctc atcatgttgg 3660

gggacactat gtctggtaga ataggaggac agatccacct agccatcatg gcagtgttca 3720

agatgtcacc aggatacgtg ctgggtgtgt ttttaaggaa actcacttca agagagacag 3780

cactaatggt aataggaatg gccatgacaa cggtgctttc aattccacat gaccttatgg 3840

aactcattga tggaatatca ctggggctaa ttttgctaaa aatagtgaca cattttgaca 3900

acacccaagt gggaacctta gccctttcct tgaccttcat aagatcaaca atgccattgg 3960

tcatggcttg gaggaccatt atggctgtgt tgtttgtggt cacactcatt cctttgtgca 4020

ggacaagctg tcttcaaaaa cagtctcatt gggtagaaat aacagcactc atcctaggag 4080

cccaagctct gccagtgtac ctaatgactc ttatgaaagg agcctcaaga agatcttggc 4140

ctcttaacga gggcataatg gctgtgggtt tggttagtct cttaggaagc gctcttttaa 4200

agaatgatgt ccctttagct ggcccaatgg tggcaggagg cttacttctg gcggcttacg 4260

tgatgagtgg tagctcagca gatctgtcac tagagaaggc cgccaatgtg cagtgggatg 4320

aaatggcaga cataacaggc tcaagcccaa tcatagaagt gaagcaggat gaagatggct 4380

ctttctccat acgggacgtc gaggaaacca atatgataac ccttttggtg aaactggcac 4440

tgataacagt gtcaggtctc taccccttgg caattccagt cacaatgacc ttatggtaca 4500

tgtggcaagt gaaaacacaa agatcaggag ccctgtggga cgtcccctca cccgctgcca 4560

ctcaaaaagc cgcactgtct gaaggagtgt acaggatcat gcaaagaggg ttatttggga 4620

aaactcaggt tggagtaggg atacacatgg aaggtgtatt tcacacaatg tggcatgtaa 4680

caagaggatc agtgatctgc catgagactg ggagattgga gccatcttgg gctgacgtca 4740

ggaatgacat gatatcatac ggtgggggat ggagacttgg agacaaatgg gacaaagaag 4800

aagatgttca ggtcctcgcc atagaaccag gaaaaaatcc taaacatgtc caaacgaaac 4860

ccggcctttt caagacccta actggagaaa ttggagcagt aacattagat ttcaaacccg 4920

gaacgtctgg ttctcccatc atcaacagga aaggaaaagt catcggactc tatggaaatg 4980

gagtagttac caaatcaggt gattacgtca gtgccataac gcaagccgaa agaattggag 5040

agccagatta tgaagtggat gaggacattt ttcgaaagaa aagattaact ataatggact 5100

tacaccccgg agctggaaag acaaaaagaa ttcttccatc aatagtgaga gaagccttaa 5160

aaaggaggct gcgaaccttg attttggctc ccacgagagt ggtggcggcc gagatggaag 5220

aggccctacg tggactgcca atccgttatc agaccccagc tgtgaaatca gaacacacag 5280

gaagagagat tgtagacctc atgtgtcatg caaccttcac aacaagactt ttgtcatcaa 5340

ccagagttcc aaattacaac ctcatagtga tggatgaagc acatttcacc gatccttcta 5400

gtgtcgcggc tagaggatac atctcgacca gggtggaaat gggagaggca gcagccatct 5460

tcatgaccgc aacccctccc ggagcgacag atccctttcc ccagagcaac agcccaatag 5520

aagacatcga gagggaaatt ccggaaaggt catggaacac agggttcgac tggataacag 5580

actaccaagg gaaaactgtg tggtttgttc ccagcataaa agctggaaat gacattgcaa 5640

attgtttgag aaagtcggga aagaaagtta tccagttgag taggaaaacc tttgatacag 5700

agtatccaaa aacgaaactc acggactggg attttgtggt cactacagac atatctgaaa 5760

tgggggccaa ttttagagct gggagagtga tagaccctag gagatgcctc aagccagtta 5820

tcctaacaga tgggccagag agagtcattt tagcaggtcc tattccagtg actccagcaa 5880

gcgctgctca gagaagaggg cgaataggaa ggaacccagc acaagaagac gaccaatacg 5940

ttttctccgg agacccacta aaaaatgatg aagatcatgc ccactggaca gaagcaaaga 6000

tgctgcttga caatatctac accccagaag ggatcattcc aacattgttt ggtccggaaa 6060

gggaaaaaac ccaagccatt gatggagagt ttcgcctcag aggggaacaa aggaagactt 6120

ttgtggaatt aatgaggaga ggagaccttc cggtgtggct gagctataag gtagcttctg 6180

ctggcatttc ttacaaagat cgggaatggt gcttcacagg ggaaaggaat aaccaaattt 6240

tagaagaaaa catggaggtt gaaatttgga ctagagaggg agaaaagaaa aagctaaggc 6300

caagatggtt agatgcacgt gtatacgctg accccatggc tttgaaggat tttaaggagt 6360

ttgctagtgg aaggaagagc ataactctcg acatcctaac agagattgcc agtttgccaa 6420

cttacctttc ctctagggcc aagctcgccc ttgataacat agtcatgctc cacacaacag 6480

aaagaggagg gagggcctac caacacgccc tgaacgaact cccggagtca ctggaaacac 6540

ttatgcttgt agctttacta ggtgctatga cagcaggtat cttcctgttt ttcatgcaag 6600

ggaaaggaat agggaaattg tcaatgggtt tgataaccat tgcggtggct agtggcttgc 6660

tctgggtagc agaaattcaa ccccagtgga tagcggcctc aatcatacta gagtttttc 6720

tcatggtact gttgataccg gaaccagaaa aacaaaggac cccacaagac aatcaattga 6780

tctacgtcat attgaccatt ctcaccatta ttggtctcat agcagccaac gagatggggc 6840

tgattgaaaa aacaaaaacg gattttgggt tttaccaggt aaaaacagaa accaccatcc 6900

tcgatgtgga cttgagacca gcttcagcat ggacgctcta tgcagtagcc accacaattc 6960

tgactcccat gctgagacac accatagaaa acacgtcggc caacctatct ctagcagcca 7020

ttgccaacca ggcggccgtc ctaatggggc ttggaaaagg atggccgctc cacagaatgg 7080

acctcggtgt gccgctgtta gcaatgggat gctattctca agtgaaccca acaactttga 7140

cagcatcctt agtcatgctt ttagtccatt atgcaataat aggtccagga ttgcaggcaa 7200

aagccacaag agaggcccag aaaaggacag ctgctgggat catgaaaaac cccacggtgg 7260

acgggataac agtaatagat ctagaaccaa tatcctatga cccaaaattt gaaaagcaat 7320

tagggcaggt catgctactc gtcttgtgtg ctggacaact actcttgatg agaacaacat 7380

gggctttctg tgaagtcttg actttggcca caggaccaat cttgaccttg tgggagggca 7440

acccgggaag gttttggaac acgaccatag ccgtatccac cgccaacatt ttcaggggaa 7500

gttacctggc gggagctgga ctggcttttt cactcataaa gaatgtacaa acccctagga 7560

ggggaactgg gaccacagga gagacactgg gagagaagtg gaagagacag ctaaactcat 7620

tagacagaaa agagtttgaa gagtataaaa gaagtggaat actagaagtg gacaggactg 7680

aagccaagtc tgccctgaaa gatgggtcta aaatcaagca tgcagtatct agagggtcca 7740

gtaagattag atggattgtt gagagaggga tggtaaagcc aaaagggaaa gttgtagatc 7800

ttggctgtgg gagaggagga tggtcttatt acatggcgac gctcaagaac gtgactgaag 7860

tgaaagggta tacaaaagga ggtccaggac atgaagaacc gattcccatg gctacttatg 7920

gctggaattt ggtcaaactc cattcagggg ttgacgtgtt ctacaaaccc acagagcaag 7980

tggacaccct gctctgtgat attggggagt catcttctaa tccaacaata gaggaaggaa 8040

gaacattaag agttttgaag atggtggagc catggctctc ttcaaaacct gaattctgca 8100

tcaaagtcct taacccctac atgccaacag tcatagaaga gctggagaaa ctgcagagaa 8160

aacatggtgg gaaccttgtc agatgcccgc tgtccaggaa ctccacccat gagatgtatt 8220

gggtgtcagg agcgtcggga aacattgtga gctctgtgaa cacaacatca aagatgttgt 8280

tgaacaggtt cacaacaagg cataggaaac ccacttatga gaaggacgta gatcttgggg 8340

caggaacgag aagtgtctcc actgaaacag aaaaaccaga catgacaatt attgggagaa 8400

ggcttcagcg attgcaagag gagcacaaag aaacctggca ttatgatcag gaaaacccat 8460

acagaacctg ggcgtatcat ggaagctatg aagctccttc gacaggctct gcatcctcca 8520

tggtgaacgg ggtagtaaaa ctgctaacaa aaccttggga tgtggttcca atggtgaccc 8580

agttagccat gacagacaca acccctttg ggcaacaaag agtgttcaaa gagaaggtgg 8640

ataccagaac accacaacca aaacccggta cacgaatggt tatgaccacg acagccaatt 8700

ggctgtgggc cctccttggg aagaagaaaa atcccagact gtgcacaagg gaagagttca 8760

tctcaaaagt tagatcaaac gcagccatag gcgcagtctt tcaggaagaa cagggatgga 8820

catcagccag tgaagctgtg aatgacagcc ggttttggga actggttgac aaagaaaggg 8880

ccctacacca ggaagggaaa tgtgaatcgt gtgtctacaa catgatggga aaacgtgaga 8940

aaaagttagg agagtttggc agagccaagg gaagccgagc aatctggtac atgtggctgg 9000

gagcgcggtt tctggaattt gaagccctgg gttttttgaa tgaagatcac tggtttggca 9060

gagaaaattc atggagtgga gtggaagggg aaggtctgca cagattggga tatatcctgg 9120

aggagataga caagaaggat ggagacctaa tgtatgctga tgacacagca ggctgggaca 9180

caagaatcac tgaggatgac cttcaaaatg aagaactgat cacggaacag atggcccccc 9240

accacaagat cctagccaaa gccattttca aactaaccta tcaaaacaaa gtggtgaaag 9300

tcctcagacc cacaccgaga ggagcggtga tggatatcat atccaggaaa gaccaaagag 9360

gtagtggaca agttggaaca tatggtttga acacattcac caacatggaa gttcaactca 9420

tccgccaaat ggaagctgaa ggagtcatca cacaagatga catgcagaac ccaaaagggt 9480

tgaaagaaag agttgagaaa tggctgaaag agtgtggtgt cgacaggtta aagaggatgg 9540

caatcagtgg agacgattgc gtggtgaagc ccctggatga gaggtttggc acttccctcc 9600

tcttcttgaa cgacatggga aaggtgagga aagacattcc gcagtgggaa ccatctaagg 9660

gatggaaaaa ctggcaagag gttccttttt gctcccacca ctttcacaag atcttcatga 9720

aggatggccg ctcactagtt gttccatgta gaaaccagga tgaactgata gggagagcca 9780

gaatctcgca gggggctgga tggagcttaa gagaaacagc ctgcctgggc aaagcttacg 9840

cccagatgtg gtcgctcatg tacttccaca gaagggatct gcgtttagcc tccatggcca 9900

tatgctcagc agttccaacg gaatggtttc caacaagcag aacaacatgg tcaatccacg 9960

ctcatcatca gtggatgacc actgaagata tgctcaaagt gtggaacaga gtgtggatag 10020

aagacaaccc taatatgact gacaagactc cagtccattc gtgggaagat ataccttacc 10080

tagggaaaag agaggatttg tggtgtggat ccctgattgg actttcttcc agagccacct 10140

gggcgaagaa cattcacacg gccataaccc aggtcagaaa cctgatcgga aaagaggaat 10200

acgtggatta catgccagta atgaaaagat acagcgctcc ttcagagagt gaaggagttc 10260

tgtaattacc aacaacaaac accaaaggct attgaagtca ggccacttgt gccacggctt 10320

gagcaaaccg tgctgcctgt agctccgcca ataatgggag gcgtgaaatc cctagggagg 10380

ccatgcgcca cggaagctgt acgcgtggca tattggacta gcggttagag gagacccctc 10440

ccatcactga caaaacgcag caaaaggggg cccgaagcca ggaggaagct gtactcctgg 10500

tggaaggact agaggttaga ggagaccccc ccaacacaaa aacagcatat tgacgctggg 10560

aaagaccaga gatcctgctg tctctgcaac atcaatccag gcacagagcg ccgcaagatg 10620

gattggtgtt gttgatccaa caggttct 10648

<210> 16
<211> 3387
<212> PRT
<213> dengue virus

<400> 16

Met Asn Gln Arg Lys Lys Val Val Arg Pro Pro Phe Asn Met Leu Lys
1 5 10 15

Arg Glu Arg Asn Arg Val Ser Thr Pro Gln Gly Leu Val Lys Arg Phe
20 25 30

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

Phe Ile Thr Phe Leu Arg Val Leu Ser Ile Pro Pro Thr Ala Gly Ile
50 55 60

Leu Lys Arg Trp Gly Gln Leu Lys Lys Asn Lys Ala Ile Arg Ile Leu
65 70 75 80

Ile Gly Phe Arg Lys Glu Ile Gly Arg Met Leu Asn Ile Leu Asn Gly
85 90 95

Arg Lys Arg Ser Thr Ile Thr Leu Leu Cys Leu Ile Pro Thr Val Met
100 105 110

Ala Phe His Leu Ser Thr Arg Asp Gly Glu Pro Leu Met Ile Val Ala
115 120 125

Lys His Glu Arg Gly Arg Pro Leu Leu Phe Lys Thr Thr Glu Gly Ile
130 135 140

Asn Lys Cys Thr Leu Ile Ala Met Asp Leu Gly Glu Met Cys Glu Asp
145 150 155 160

```
Thr Val Thr Tyr Lys Cys Pro Leu Leu Val Asn Thr Glu Pro Glu Asp
                165                 170                 175

Ile Asp Cys Trp Cys Asn Leu Thr Ser Thr Trp Val Met Tyr Gly Thr
            180                 185                 190

Cys Thr Gln Ser Gly Glu Arg Arg Arg Glu Lys Arg Ser Val Ala Leu
        195                 200                 205

Thr Pro His Ser Gly Met Gly Leu Glu Thr Arg Ala Glu Thr Trp Met
    210                 215                 220

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

Leu Arg Asn Pro Gly Phe Ala Leu Leu Ala Gly Phe Met Ala Tyr Met
                245                 250                 255

Ile Gly Gln Thr Gly Ile Gln Arg Thr Val Phe Phe Val Leu Met Met
            260                 265                 270

Leu Val Ala Pro Ser Tyr Gly Met Arg Cys Val Gly Val Gly Asn Arg
        275                 280                 285

Asp Phe Val Glu Gly Val Ser Gly Gly Ala Trp Val Asp Leu Val Leu
    290                 295                 300

Glu His Gly Gly Cys Val Thr Thr Met Ala Gln Gly Lys Pro Thr Leu
305                 310                 315                 320

Asp Phe Glu Leu Thr Lys Thr Thr Ala Lys Glu Val Ala Leu Leu Arg
                325                 330                 335

Thr Tyr Cys Ile Glu Ala Ser Ile Ser Asn Ile Thr Thr Ala Thr Arg
            340                 345                 350

Cys Pro Thr Gln Gly Glu Pro Tyr Leu Lys Glu Glu Gln Asp Gln Gln
        355                 360                 365
```

```
Tyr Ile Cys Arg Arg Asp Val Val Asp Arg Gly Trp Gly Asn Gly Cys
    370                 375                 380

Gly Leu Phe Gly Lys Gly Gly Val Val Thr Cys Ala Lys Phe Ser Cys
385                 390                 395                 400

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

Thr Val Val Val Thr Val His Asn Gly Asp Thr His Ala Val Gly Asn
            420                 425                 430

Asp Thr Ser Asn His Gly Val Thr Ala Thr Ile Thr Pro Arg Ser Pro
        435                 440                 445

Ser Val Glu Val Lys Leu Pro Asp Tyr Gly Glu Leu Thr Leu Asp Cys
    450                 455                 460

Glu Pro Arg Ser Gly Ile Asp Phe Asn Glu Met Ile Leu Met Lys Met
465                 470                 475                 480

Lys Lys Lys Thr Trp Leu Val His Lys Gln Trp Phe Leu Asp Leu Pro
                485                 490                 495

Leu Pro Trp Thr Ala Gly Ala Asp Thr Ser Glu Val His Trp Asn Tyr
            500                 505                 510

Lys Glu Arg Met Val Thr Phe Lys Val Pro His Ala Lys Arg Gln Asp
        515                 520                 525

Val Thr Val Leu Gly Ser Gln Glu Gly Ala Met His Ser Ala Leu Ala
    530                 535                 540

Gly Ala Thr Glu Val Asp Ser Gly Asp Gly Asn His Met Phe Ala Gly
545                 550                 555                 560

His Leu Lys Cys Lys Val Arg Met Glu Lys Leu Arg Ile Lys Gly Met
                565                 570                 575

Ser Tyr Thr Met Cys Ser Gly Lys Phe Ser Ile Asp Lys Glu Met Ala
            580                 585                 590
```

```
Glu Thr Gln His Gly Thr Thr Val Val Lys Val Lys Tyr Glu Gly Ala
        595                 600                 605

Gly Ala Pro Cys Lys Val Pro Ile Glu Ile Arg Asp Val Asn Lys Glu
    610                 615                 620

Lys Val Val Gly Arg Ile Ile Ser Ser Thr Pro Leu Ala Glu Asn Thr
625                 630                 635                 640

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

Ile Val Ile Gly Val Gly Asn Ser Ala Leu Thr Leu His Trp Phe Arg
            660                 665                 670

Lys Gly Ser Ser Ile Gly Lys Met Phe Glu Ser Thr Tyr Arg Gly Ala
        675                 680                 685

Lys Arg Met Ala Ile Leu Gly Glu Thr Ala Trp Asp Phe Gly Ser Val
    690                 695                 700

Gly Gly Leu Phe Thr Ser Leu Gly Lys Ala Val His Gln Val Phe Gly
705                 710                 715                 720

Ser Val Tyr Thr Thr Met Phe Gly Gly Val Ser Trp Met Ile Arg Ile
                725                 730                 735

Leu Ile Gly Phe Leu Val Leu Trp Ile Gly Thr Asn Ser Arg Asn Thr
            740                 745                 750

Ser Met Ala Met Thr Cys Ile Ala Val Gly Gly Ile Thr Leu Phe Leu
        755                 760                 765

Gly Phe Thr Val Gln Ala Asp Met Gly Cys Val Val Ser Trp Ser Gly
    770                 775                 780

Lys Glu Leu Lys Cys Gly Ser Gly Ile Phe Val Val Asp Asn Val His
785                 790                 795                 800
```

```
Thr Trp Thr Glu Gln Tyr Lys Phe Gln Pro Glu Ser Pro Ala Arg Leu
                805                 810                 815

Ala Ser Ala Ile Leu Asn Ala His Lys Asp Gly Val Cys Gly Ile Arg
            820                 825                 830

Ser Thr Thr Arg Leu Glu Asn Val Met Trp Lys Gln Ile Thr Asn Glu
        835                 840                 845

Leu Asn Tyr Val Leu Trp Glu Gly Gly His Asp Leu Thr Val Val Ala
    850                 855                 860

Gly Asp Val Lys Gly Val Leu Thr Lys Gly Lys Arg Ala Leu Thr Pro
865                 870                 875                 880

Pro Val Asn Asp Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala Lys
                885                 890                 895

Ile Phe Thr Pro Glu Ala Arg Asn Ser Thr Phe Leu Ile Asp Gly Pro
            900                 905                 910

Asp Thr Ser Glu Cys Pro Asn Glu Arg Arg Ala Trp Asn Phe Leu Glu
        915                 920                 925

Val Glu Asp Tyr Gly Phe Gly Met Phe Thr Thr Asn Ile Trp Met Lys
    930                 935                 940

Phe Arg Glu Gly Ser Ser Glu Val Cys Asp His Arg Leu Met Ser Ala
945                 950                 955                 960

Ala Ile Lys Asp Gln Lys Ala Val His Ala Asp Met Gly Tyr Trp Ile
                965                 970                 975

Glu Ser Ser Lys Asn Gln Thr Trp Gln Ile Glu Lys Ala Ser Leu Ile
            980                 985                 990

Glu Val Lys Thr Cys Leu Trp Pro  Lys Thr His Thr Leu  Trp Ser Asn
        995                 1000                1005

Gly Val  Leu Glu Ser Gln Met  Leu Ile Pro Lys Ser  Tyr Ala Gly
    1010                1015                1020
```

```
Pro Phe  Ser Gln His Asn Tyr  Arg Gln Gly Tyr Ala  Thr Gln Thr
    1025                1030                1035

Val Gly  Pro Trp His Leu Gly  Lys Leu Glu Ile Asp  Phe Gly Glu
    1040                1045                1050

Cys Pro  Gly Thr Thr Val Ala  Ile Gln Glu Asp Cys  Asp His Arg
    1055                1060                1065

Gly Pro  Ser Leu Arg Thr Thr  Thr Ala Ser Gly Lys  Leu Val Thr
    1070                1075                1080

Gln Trp  Cys Cys Arg Ser Cys  Thr Met Pro Pro Leu  Arg Phe Leu
    1085                1090                1095

Gly Glu  Asp Gly Cys Trp Tyr  Gly Met Glu Ile Arg  Pro Leu Ser
    1100                1105                1110

Glu Lys  Glu Glu Asn Met Val  Lys Ser Gln Val Thr  Ala Gly Gln
    1115                1120                1125

Gly Thr  Ser Glu Thr Phe Ser  Met Gly Leu Leu Cys  Leu Thr Leu
    1130                1135                1140

Phe Val  Glu Glu Cys Leu Arg  Arg Arg Val Thr Arg  Lys His Met
    1145                1150                1155

Ile Leu  Val Val Val Ile Thr  Leu Cys Ala Ile Ile  Leu Gly Gly
    1160                1165                1170

Leu Thr  Trp Met Asp Leu Leu  Arg Ala Leu Ile Met  Leu Gly Asp
    1175                1180                1185

Thr Met  Ser Gly Arg Ile Gly  Gly Gln Ile His Leu  Ala Ile Met
    1190                1195                1200

Ala Val  Phe Lys Met Ser Pro  Gly Tyr Val Leu Gly  Val Phe Leu
    1205                1210                1215
```

```
Arg Lys  Leu Thr Ser Arg Glu  Thr Ala Leu Met Val  Ile Gly Met
    1220                 1225                 1230

Ala Met  Thr Thr Val Leu Ser  Ile Pro His Asp Leu  Met Glu Leu
    1235                 1240                 1245

Ile Asp  Gly Ile Ser Leu Gly  Leu Ile Leu Leu Lys  Ile Val Thr
    1250                 1255                 1260

His Phe  Asp Asn Thr Gln Val  Gly Thr Leu Ala Leu  Ser Leu Thr
    1265                 1270                 1275

Phe Ile  Arg Ser Thr Met Pro  Leu Val Met Ala Trp  Arg Thr Ile
    1280                 1285                 1290

Met Ala  Val Leu Phe Val Val  Thr Leu Ile Pro Leu  Cys Arg Thr
    1295                 1300                 1305

Ser Cys  Leu Gln Lys Gln Ser  His Trp Val Glu Ile  Thr Ala Leu
    1310                 1315                 1320

Ile Leu  Gly Ala Gln Ala Leu  Pro Val Tyr Leu Met  Thr Leu Met
    1325                 1330                 1335

Lys Gly  Ala Ser Arg Arg Ser  Trp Pro Leu Asn Glu  Gly Ile Met
    1340                 1345                 1350

Ala Val  Gly Leu Val Ser Leu  Leu Gly Ser Ala Leu  Leu Lys Asn
    1355                 1360                 1365

Asp Val  Pro Leu Ala Gly Pro  Met Val Ala Gly Gly  Leu Leu Leu
    1370                 1375                 1380

Ala Ala  Tyr Val Met Ser Gly  Ser Ser Ala Asp Leu  Ser Leu Glu
    1385                 1390                 1395

Lys Ala  Ala Asn Val Gln Trp  Asp Glu Met Ala Asp  Ile Thr Gly
    1400                 1405                 1410

Ser Ser  Pro Ile Ile Glu Val  Lys Gln Asp Glu Asp  Gly Ser Phe
    1415                 1420                 1425
```

```
Ser Ile  Arg Asp Val Glu Glu  Thr Asn Met Ile Thr  Leu Leu Val
    1430                1435                1440

Lys Leu  Ala Leu Ile Thr Val  Ser Gly Leu Tyr Pro  Leu Ala Ile
    1445                1450                1455

Pro Val  Thr Met Thr Leu Trp  Tyr Met Trp Gln Val  Lys Thr Gln
    1460                1465                1470

Arg Ser  Gly Ala Leu Trp Asp  Val Pro Ser Pro Ala  Ala Thr Gln
    1475                1480                1485

Lys Ala  Ala Leu Ser Glu Gly  Val Tyr Arg Ile Met  Gln Arg Gly
    1490                1495                1500

Leu Phe  Gly Lys Thr Gln Val  Gly Val Gly Ile His  Met Glu Gly
    1505                1510                1515

Val Phe  His Thr Met Trp His  Val Thr Arg Gly Ser  Val Ile Cys
    1520                1525                1530

His Glu  Thr Gly Arg Leu Glu  Pro Ser Trp Ala Asp  Val Arg Asn
    1535                1540                1545

Asp Met  Ile Ser Tyr Gly Gly  Gly Trp Arg Leu Gly  Asp Lys Trp
    1550                1555                1560

Asp Lys  Glu Glu Asp Val Gln  Val Leu Ala Ile Glu  Pro Gly Lys
    1565                1570                1575

Asn Pro  Lys His Val Gln Thr  Lys Pro Gly Leu Phe  Lys Thr Leu
    1580                1585                1590

Thr Gly  Glu Ile Gly Ala Val  Thr Leu Asp Phe Lys  Pro Gly Thr
    1595                1600                1605

Ser Gly  Ser Pro Ile Ile Asn  Arg Lys Gly Lys Val  Ile Gly Leu
    1610                1615                1620
```

```
Tyr Gly  Asn Gly Val Val Thr  Lys Ser Gly Asp Tyr  Val Ser Ala
    1625                1630                1635

Ile Thr  Gln Ala Glu Arg Ile  Gly Glu Pro Asp Tyr  Glu Val Asp
    1640                1645                1650

Glu Asp  Ile Phe Arg Lys Lys  Arg Leu Thr Ile Met  Asp Leu His
    1655                1660                1665

Pro Gly  Ala Gly Lys Thr Lys  Arg Ile Leu Pro Ser  Ile Val Arg
    1670                1675                1680

Glu Ala  Leu Lys Arg Arg Leu  Arg Thr Leu Ile Leu  Ala Pro Thr
    1685                1690                1695

Arg Val  Val Ala Ala Glu Met  Glu Glu Ala Leu Arg  Gly Leu Pro
    1700                1705                1710

Ile Arg  Tyr Gln Thr Pro Ala  Val Lys Ser Glu His  Thr Gly Arg
    1715                1720                1725

Glu Ile  Val Asp Leu Met Cys  His Ala Thr Phe Thr  Thr Arg Leu
    1730                1735                1740

Leu Ser  Ser Thr Arg Val Pro  Asn Tyr Asn Leu Ile  Val Met Asp
    1745                1750                1755

Glu Ala  His Phe Thr Asp Pro  Ser Ser Val Ala Ala  Arg Gly Tyr
    1760                1765                1770

Ile Ser  Thr Arg Val Glu Met  Gly Glu Ala Ala Ala  Ile Phe Met
    1775                1780                1785

Thr Ala  Thr Pro Pro Gly Ala  Thr Asp Pro Phe Pro  Gln Ser Asn
    1790                1795                1800

Ser Pro  Ile Glu Asp Ile Glu  Arg Glu Ile Pro Glu  Arg Ser Trp
    1805                1810                1815

Asn Thr  Gly Phe Asp Trp Ile  Thr Asp Tyr Gln Gly  Lys Thr Val
    1820                1825                1830
```

```
Trp Phe  Val Pro Ser Ile Lys  Ala Gly Asn Asp Ile  Ala Asn Cys
    1835                 1840                 1845

Leu Arg  Lys Ser Gly Lys Lys  Val Ile Gln Leu Ser  Arg Lys Thr
    1850                 1855                 1860

Phe Asp  Thr Glu Tyr Pro Lys  Thr Lys Leu Thr Asp  Trp Asp Phe
    1865                 1870                 1875

Val Val  Thr Thr Asp Ile Ser  Glu Met Gly Ala Asn  Phe Arg Ala
    1880                 1885                 1890

Gly Arg  Val Ile Asp Pro Arg  Arg Cys Leu Lys Pro  Val Ile Leu
    1895                 1900                 1905

Thr Asp  Gly Pro Glu Arg Val  Ile Leu Ala Gly Pro  Ile Pro Val
    1910                 1915                 1920

Thr Pro  Ala Ser Ala Ala Gln  Arg Arg Gly Arg Ile  Gly Arg Asn
    1925                 1930                 1935

Pro Ala  Gln Glu Asp Asp Gln  Tyr Val Phe Ser Gly  Asp Pro Leu
    1940                 1945                 1950

Lys Asn  Asp Glu Asp His Ala  His Trp Thr Glu Ala  Lys Met Leu
    1955                 1960                 1965

Leu Asp  Asn Ile Tyr Thr Pro  Glu Gly Ile Ile Pro  Thr Leu Phe
    1970                 1975                 1980

Gly Pro  Glu Arg Glu Lys Thr  Gln Ala Ile Asp Gly  Glu Phe Arg
    1985                 1990                 1995

Leu Arg  Gly Glu Gln Arg Lys  Thr Phe Val Glu Leu  Met Arg Arg
    2000                 2005                 2010

Gly Asp  Leu Pro Val Trp Leu  Ser Tyr Lys Val Ala  Ser Ala Gly
    2015                 2020                 2025
```

```
Ile Ser  Tyr Lys Asp Arg Glu  Trp Cys Phe Thr Gly  Glu Arg Asn
    2030                2035                2040

Asn Gln  Ile Leu Glu Glu Asn  Met Glu Val Glu Ile  Trp Thr Arg
    2045                2050                2055

Glu Gly  Glu Lys Lys Lys Leu  Arg Pro Arg Trp Leu  Asp Ala Arg
    2060                2065                2070

Val Tyr  Ala Asp Pro Met Ala  Leu Lys Asp Phe Lys  Glu Phe Ala
    2075                2080                2085

Ser Gly  Arg Lys Ser Ile Thr  Leu Asp Ile Leu Thr  Glu Ile Ala
    2090                2095                2100

Ser Leu  Pro Thr Tyr Leu Ser  Ser Arg Ala Lys Leu  Ala Leu Asp
    2105                2110                2115

Asn Ile  Val Met Leu His Thr  Thr Glu Arg Gly Gly  Arg Ala Tyr
    2120                2125                2130

Gln His  Ala Leu Asn Glu Leu  Pro Glu Ser Leu Glu  Thr Leu Met
    2135                2140                2145

Leu Val  Ala Leu Leu Gly Ala  Met Thr Ala Gly Ile  Phe Leu Phe
    2150                2155                2160

Phe Met  Gln Gly Lys Gly Ile  Gly Lys Leu Ser Met  Gly Leu Ile
    2165                2170                2175

Thr Ile  Ala Val Ala Ser Gly  Leu Leu Trp Val Ala  Glu Ile Gln
    2180                2185                2190

Pro Gln  Trp Ile Ala Ala Ser  Ile Ile Leu Glu Phe  Phe Leu Met
    2195                2200                2205

Val Leu  Leu Ile Pro Glu Pro  Glu Lys Gln Arg Thr  Pro Gln Asp
    2210                2215                2220

Asn Gln  Leu Ile Tyr Val Ile  Leu Thr Ile Leu Thr  Ile Ile Gly
    2225                2230                2235
```

```
Leu Ile  Ala Ala Asn Glu Met  Gly Leu Ile Glu Lys  Thr Lys Thr
    2240                2245                2250

Asp Phe  Gly Phe Tyr Gln Val  Lys Thr Glu Thr Thr  Ile Leu Asp
    2255                2260                2265

Val Asp  Leu Arg Pro Ala Ser  Ala Trp Thr Leu Tyr  Ala Val Ala
    2270                2275                2280

Thr Thr  Ile Leu Thr Pro Met  Leu Arg His Thr Ile  Glu Asn Thr
    2285                2290                2295

Ser Ala  Asn Leu Ser Leu Ala  Ala Ile Ala Asn Gln  Ala Ala Val
    2300                2305                2310

Leu Met  Gly Leu Gly Lys Gly  Trp Pro Leu His Arg  Met Asp Leu
    2315                2320                2325

Gly Val  Pro Leu Leu Ala Met  Gly Cys Tyr Ser Gln  Val Asn Pro
    2330                2335                2340

Thr Thr  Leu Thr Ala Ser Leu  Val Met Leu Leu Val  His Tyr Ala
    2345                2350                2355

Ile Ile  Gly Pro Gly Leu Gln  Ala Lys Ala Thr Arg  Glu Ala Gln
    2360                2365                2370

Lys Arg  Thr Ala Ala Gly Ile  Met Lys Asn Pro Thr  Val Asp Gly
    2375                2380                2385

Ile Thr  Val Ile Asp Leu Glu  Pro Ile Ser Tyr Asp  Pro Lys Phe
    2390                2395                2400

Glu Lys  Gln Leu Gly Gln Val  Met Leu Leu Val Leu  Cys Ala Gly
    2405                2410                2415

Gln Leu  Leu Leu Met Arg Thr  Thr Trp Ala Phe Cys  Glu Val Leu
    2420                2425                2430
```

```
Thr Leu  Ala Thr Gly Pro Ile  Leu Thr Leu Trp Glu  Gly Asn Pro
    2435                 2440                 2445

Gly Arg  Phe Trp Asn Thr Thr  Ile Ala Val Ser Thr  Ala Asn Ile
    2450                 2455                 2460

Phe Arg  Gly Ser Tyr Leu Ala  Gly Ala Gly Leu Ala  Phe Ser Leu
    2465                 2470                 2475

Ile Lys  Asn Val Gln Thr Pro  Arg Arg Gly Thr Gly  Thr Thr Gly
    2480                 2485                 2490

Glu Thr  Leu Gly Glu Lys Trp  Lys Arg Gln Leu Asn  Ser Leu Asp
    2495                 2500                 2505

Arg Lys  Glu Phe Glu Glu Tyr  Lys Arg Ser Gly Ile  Leu Glu Val
    2510                 2515                 2520

Asp Arg  Thr Glu Ala Lys Ser  Ala Leu Lys Asp Gly  Ser Lys Ile
    2525                 2530                 2535

Lys His  Ala Val Ser Arg Gly  Ser Ser Lys Ile Arg  Trp Ile Val
    2540                 2545                 2550

Glu Arg  Gly Met Val Lys Pro  Lys Gly Lys Val Val  Asp Leu Gly
    2555                 2560                 2565

Cys Gly  Arg Gly Gly Trp Ser  Tyr Tyr Met Ala Thr  Leu Lys Asn
    2570                 2575                 2580

Val Thr  Glu Val Lys Gly Tyr  Thr Lys Gly Gly Pro  Gly His Glu
    2585                 2590                 2595

Glu Pro  Ile Pro Met Ala Thr  Tyr Gly Trp Asn Leu  Val Lys Leu
    2600                 2605                 2610

His Ser  Gly Val Asp Val Phe  Tyr Lys Pro Thr Glu  Gln Val Asp
    2615                 2620                 2625

Thr Leu  Leu Cys Asp Ile Gly  Glu Ser Ser Ser Asn  Pro Thr Ile
    2630                 2635                 2640
```

```
Glu Glu  Gly Arg Thr Leu Arg  Val Leu Lys Met Val  Glu Pro Trp
    2645                 2650                 2655

Leu Ser  Ser Lys Pro Glu Phe  Cys Ile Lys Val Leu  Asn Pro Tyr
    2660                 2665                 2670

Met Pro  Thr Val Ile Glu Glu  Leu Glu Lys Leu Gln  Arg Lys His
    2675                 2680                 2685

Gly Gly  Asn Leu Val Arg Cys  Pro Leu Ser Arg Asn  Ser Thr His
    2690                 2695                 2700

Glu Met  Tyr Trp Val Ser Gly  Ala Ser Gly Asn Ile  Val Ser Ser
    2705                 2710                 2715

Val Asn  Thr Thr Ser Lys Met  Leu Leu Asn Arg Phe  Thr Thr Arg
    2720                 2725                 2730

His Arg  Lys Pro Thr Tyr Glu  Lys Asp Val Asp Leu  Gly Ala Gly
    2735                 2740                 2745

Thr Arg  Ser Val Ser Thr Glu  Thr Glu Lys Pro Asp  Met Thr Ile
    2750                 2755                 2760

Ile Gly  Arg Arg Leu Gln Arg  Leu Gln Glu Glu His  Lys Glu Thr
    2765                 2770                 2775

Trp His  Tyr Asp Gln Glu Asn  Pro Tyr Arg Thr Trp  Ala Tyr His
    2780                 2785                 2790

Gly Ser  Tyr Glu Ala Pro Ser  Thr Gly Ser Ala Ser  Ser Met Val
    2795                 2800                 2805

Asn Gly  Val Val Lys Leu Leu  Thr Lys Pro Trp Asp  Val Val Pro
    2810                 2815                 2820

Met Val  Thr Gln Leu Ala Met  Thr Asp Thr Thr Pro  Phe Gly Gln
    2825                 2830                 2835
```

```
Gln Arg  Val Phe Lys Glu Lys  Val Asp Thr Arg Thr  Pro Gln Pro
    2840                 2845                 2850

Lys Pro  Gly Thr Arg Met Val  Met Thr Thr Thr Ala  Asn Trp Leu
    2855                 2860                 2865

Trp Ala  Leu Leu Gly Lys Lys  Lys Asn Pro Arg Leu  Cys Thr Arg
    2870                 2875                 2880

Glu Glu  Phe Ile Ser Lys Val  Arg Ser Asn Ala Ala  Ile Gly Ala
    2885                 2890                 2895

Val Phe  Gln Glu Glu Gln Gly  Trp Thr Ser Ala Ser  Glu Ala Val
    2900                 2905                 2910

Asn Asp  Ser Arg Phe Trp Glu  Leu Val Asp Lys Glu  Arg Ala Leu
    2915                 2920                 2925

His Gln  Glu Gly Lys Cys Glu  Ser Cys Val Tyr Asn  Met Met Gly
    2930                 2935                 2940

Lys Arg  Glu Lys Lys Leu Gly  Glu Phe Gly Arg Ala  Lys Gly Ser
    2945                 2950                 2955

Arg Ala  Ile Trp Tyr Met Trp  Leu Gly Ala Arg Phe  Leu Glu Phe
    2960                 2965                 2970

Glu Ala  Leu Gly Phe Leu Asn  Glu Asp His Trp Phe  Gly Arg Glu
    2975                 2980                 2985

Asn Ser  Trp Ser Gly Val Glu  Gly Glu Gly Leu His  Arg Leu Gly
    2990                 2995                 3000

Tyr Ile  Leu Glu Glu Ile Asp  Lys Lys Asp Gly Asp  Leu Met Tyr
    3005                 3010                 3015

Ala Asp  Asp Thr Ala Gly Trp  Asp Thr Arg Ile Thr  Glu Asp Asp
    3020                 3025                 3030

Leu Gln  Asn Glu Glu Leu Ile  Thr Glu Gln Met Ala  Pro His His
    3035                 3040                 3045
```

```
Lys Ile  Leu Ala Lys Ala Ile  Phe Lys Leu Thr Tyr  Gln Asn Lys
    3050                 3055                 3060

Val Val  Lys Val Leu Arg Pro  Thr Pro Arg Gly Ala  Val Met Asp
    3065                 3070                 3075

Ile Ile  Ser Arg Lys Asp Gln  Arg Gly Ser Gly Gln  Val Gly Thr
    3080                 3085                 3090

Tyr Gly  Leu Asn Thr Phe Thr  Asn Met Glu Val Gln  Leu Ile Arg
    3095                 3100                 3105

Gln Met  Glu Ala Glu Gly Val  Ile Thr Gln Asp Asp  Met Gln Asn
    3110                 3115                 3120

Pro Lys  Gly Leu Lys Glu Arg  Val Glu Lys Trp Leu  Lys Glu Cys
    3125                 3130                 3135

Gly Val  Asp Arg Leu Lys Arg  Met Ala Ile Ser Gly  Asp Asp Cys
    3140                 3145                 3150

Val Val  Lys Pro Leu Asp Glu  Arg Phe Gly Thr Ser  Leu Leu Phe
    3155                 3160                 3165

Leu Asn  Asp Met Gly Lys Val  Arg Lys Asp Ile Pro  Gln Trp Glu
    3170                 3175                 3180

Pro Ser  Lys Gly Trp Lys Asn  Trp Gln Glu Val Pro  Phe Cys Ser
    3185                 3190                 3195

His His  Phe His Lys Ile Phe  Met Lys Asp Gly Arg  Ser Leu Val
    3200                 3205                 3210

Val Pro  Cys Arg Asn Gln Asp  Glu Leu Ile Gly Arg  Ala Arg Ile
    3215                 3220                 3225

Ser Gln  Gly Ala Gly Trp Ser  Leu Arg Glu Thr Ala  Cys Leu Gly
    3230                 3235                 3240
```

```
Lys Ala  Tyr Ala Gln Met Trp  Ser Leu Met Tyr Phe  His Arg Arg
    3245                 3250                 3255

Asp Leu  Arg Leu Ala Ser Met  Ala Ile Cys Ser Ala  Val Pro Thr
    3260                 3265                 3270

Glu Trp  Phe Pro Thr Ser Arg  Thr Thr Trp Ser Ile  His Ala His
    3275                 3280                 3285

His Gln  Trp Met Thr Thr Glu  Asp Met Leu Lys Val  Trp Asn Arg
    3290                 3295                 3300

Val Trp  Ile Glu Asp Asn Pro  Asn Met Thr Asp Lys  Thr Pro Val
    3305                 3310                 3315

His Ser  Trp Glu Asp Ile Pro  Tyr Leu Gly Lys Arg  Glu Asp Leu
    3320                 3325                 3330

Trp Cys  Gly Ser Leu Ile Gly  Leu Ser Ser Arg Ala  Thr Trp Ala
    3335                 3340                 3345

Lys Asn  Ile His Thr Ala Ile  Thr Gln Val Arg Asn  Leu Ile Gly
    3350                 3355                 3360

Lys Glu  Glu Tyr Val Asp Tyr  Met Pro Val Met Lys  Arg Tyr Ser
    3365                 3370                 3375

Ala Pro  Ser Glu Ser Glu Gly  Val Leu
    3380                 3385
```