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CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE
THEMIS BIOSCIENCE GMBH

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<141> 2013-09-26

<150> EP 12306176.4
<151> 2012-09-27

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ccg gag ggg tac tac aac tgg cac cac gga gca gta cag tac tca gga          96
Pro Glu Gly Tyr Tyr Asn Trp His His Gly Ala Val Gln Tyr Ser Gly
            20                  25                  30

ggc cgg ttc acc atc cct aca ggt gct ggc aaa cca ggg gac agc ggc         144
Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly Lys Pro Gly Asp Ser Gly
        35                  40                  45

aga ccg atc ttc gac aac aag gga cgc gtg gtg gcc ata gtc tta gga         192
Arg Pro Ile Phe Asp Asn Lys Gly Arg Val Val Ala Ile Val Leu Gly
    50                  55                  60

gga gct aat gaa gga gcc cgt aca gcc ctc tcg gtg gtg acc tgg aat         240
Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu Ser Val Val Thr Trp Asn
65                  70                  75                  80

aaa gac att gtc act aaa atc acc ccc gag ggg gcc gaa gag tgg agt         288
Lys Asp Ile Val Thr Lys Ile Thr Pro Glu Gly Ala Glu Glu Trp Ser
                85                  90                  95

ctt gcc atc cca gtt atg tgc ctg ttg gca aac acc acg ttc ccc tgc         336
Leu Ala Ile Pro Val Met Cys Leu Leu Ala Asn Thr Thr Phe Pro Cys
            100                 105                 110

tcc cag ccc cct tgc acg ccc tgc tgc tac gaa aag gaa ccg gag gaa         384
Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr Glu Lys Glu Pro Glu Glu
        115                 120                 125

acc cta cgc atg ctt gag gac aac gtc atg aga cct ggg tac tat cag         432
Thr Leu Arg Met Leu Glu Asp Asn Val Met Arg Pro Gly Tyr Tyr Gln
    130                 135                 140

ctg cta caa gca tcc tta aca tgt tct ccc cac cgc cag cga cgc agc         480
Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro His Arg Gln Arg Arg Ser
145                 150                 155                 160

acc aag gac aac ttc aat gtc tat aaa gcc aca aga cca tac tta gct         528
Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala
                165                 170                 175

cac tgt ccc gac tgt gga gaa ggg cac tcg tgc cat agt ccc gta gca         576
His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala
            180                 185                 190

cta gaa cgc atc aga aat gaa gcg aca gac ggg acg ctg aaa atc cag         624
Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln
        195                 200                 205

gtc tcc ttg caa atc gga ata aag acg gat gac agc cac gat tgg acc         672
Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr
    210                 215                 220

aag ctg cgt tat atg gac aac cac atg cca gca gac gca gag agg gcg         720
Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala
225                 230                 235                 240

ggg cta ttt gta aga aca tca gca ccg tgt acg att act gga aca atg         768
Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met
                245                 250                 255

gga cac ttc atc ctg gcc cga tgt cca aaa ggg gaa act ctg acg gtg         816
Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val
            260                 265                 270
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gga ttc act gac agt agg aag att agt cac tca tgt acg cac cca ttt        864
Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe
        275                 280                 285

cac cac gac cct cct gtg ata ggt cgg gaa aaa ttc cat tcc cga ccg        912
His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro
    290                 295                 300

cag cac ggt aaa gag ata cct tgc agc acg tac gtg cag agc acc gcc        960
Gln His Gly Lys Glu Ile Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala
305                 310                 315                 320

gca act acc gag gag ata gag gta cac atg ccc cca gac acc cct gat       1008
Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp
                325                 330                 335

cgc aca tta atg tca caa cag tcc ggc aac gta aag atc aca gtc aat       1056
Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn
            340                 345                 350

ggc cag acg gtg cgg tac aag tgt aat tgc ggt ggc tca aat gaa gga       1104
Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly
        355                 360                 365

cta aca act aca gac aaa gtg att aat aac tgc aag gtt gat caa tgt       1152
Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys
    370                 375                 380

cat gcc gcg gtc acc aat cac aaa aag tgg cag tat aac tcc cct ctg       1200
His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu
385                 390                 395                 400

gtc ccg cgt aat gct gaa ctt ggg gac cga aaa gga aaa att cac atc       1248
Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
                405                 410                 415

ccg ttt ccg ctg gca aat gta aca tgc agg gtg cct aaa gca agg aac       1296
Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn
            420                 425                 430

ccc acc gtg acg tac ggg aaa aac caa gtc atc atg cta ctg tat cct       1344
Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro
        435                 440                 445

gac cac cca aca ctc ctg tcc tac cgg aat atg gga gaa gaa cca aac       1392
Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn
    450                 455                 460

tat caa gaa gag tgg gtg atg cat aag aag gaa gtc gtg cta acc gtg       1440
Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val
465                 470                 475                 480

ccg act gaa ggg ctc gag gtc acg tgg ggc aac aac gag ccg tat aag       1488
Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
                485                 490                 495

tat tgg ccg cag tta tct aca aac ggt aca gcc cat ggc cac ccg cat       1536
Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His
            500                 505                 510

gag ata att ctg tat tat tat gag ctg tac ccc act atg act gta gta       1584
Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
        515                 520                 525

gtt gtg tca gtg gcc acg ttc ata ctc ctg tcg atg gtg ggt atg gca       1632
Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met Ala
    530                 535                 540
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gcg ggg atg tgc atg tgt gca cga cgc aga tgc atc aca ccg tat gaa       1680
Ala Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
545                 550                 555                 560

ctg aca cca gga gct acc gtc cct ttc ctg ctt agc cta ata tgc tgc       1728
Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys Cys
                565                 570                 575

atc aga aca gct aaa gcg gcc aca tac caa gag gct gcg ata tac ctg       1776
Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr Leu
            580                 585                 590

tgg aac gag cag caa cct tta                                           1797
Trp Asn Glu Gln Gln Pro Leu
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Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly Lys Pro Gly Asp Ser Gly
        35                  40                  45

Arg Pro Ile Phe Asp Asn Lys Gly Arg Val Val Ala Ile Val Leu Gly
    50                  55                  60

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

Lys Asp Ile Val Thr Lys Ile Thr Pro Glu Gly Ala Glu Glu Trp Ser
                85                  90                  95

Leu Ala Ile Pro Val Met Cys Leu Leu Ala Asn Thr Thr Phe Pro Cys
            100                 105                 110

Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr Glu Lys Glu Pro Glu Glu
        115                 120                 125

Thr Leu Arg Met Leu Glu Asp Asn Val Met Arg Pro Gly Tyr Tyr Gln
    130                 135                 140

Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro His Arg Gln Arg Arg Ser
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Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala
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His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala
            180                 185                 190

Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln
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Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr
    210                 215                 220

Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala
225                 230                 235                 240

Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met
                245                 250                 255

Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val
            260                 265                 270

Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe
        275                 280                 285

His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro
    290                 295                 300

Gln His Gly Lys Glu Ile Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala
305                 310                 315                 320

Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp
                325                 330                 335

Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn
            340                 345                 350

Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly
        355                 360                 365

Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys
    370                 375                 380

His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu
385                 390                 395                 400

Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
                405                 410                 415

Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn
            420                 425                 430

Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro
        435                 440                 445
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Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn
    450                 455                 460

Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val
465                 470                 475                 480

Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
                485                 490                 495

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

Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
        515                 520                 525

Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met Ala
    530                 535                 540

Ala Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
545                 550                 555                 560

Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys Cys
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Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr Leu
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Trp Asn Glu Gln Gln Pro Leu
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ccg gag ggg tac tac aac tgg cac cac gga gca gta cag tac tca gga          96
Pro Glu Gly Tyr Tyr Asn Trp His His Gly Ala Val Gln Tyr Ser Gly
            20                  25                  30

ggc cgg ttc acc atc cct aca ggt gct ggc aaa cca ggg gac agc ggc         144
Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly Lys Pro Gly Asp Ser Gly
        35                  40                  45

aga ccg atc ttc gac aac aag gga cgc gtg gtg gcc ata gtc tta gga         192
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Arg Pro Ile Phe Asp Asn Lys Gly Arg Val Val Ala Ile Val Leu Gly
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gga gct aat gaa gga gcc cgt aca gcc ctc tcg gtg gtg acc tgg aat        240
Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu Ser Val Val Thr Trp Asn
65                  70                  75                  80

aaa gac att gtc act aaa atc acc ccc gag ggg gcc gaa gag tgg agt        288
Lys Asp Ile Val Thr Lys Ile Thr Pro Glu Gly Ala Glu Glu Trp Ser
                85                  90                  95

ctt gcc atc cca gtt atg tgc ctg ttg gca aac acc acg ttc ccc tgc        336
Leu Ala Ile Pro Val Met Cys Leu Leu Ala Asn Thr Thr Phe Pro Cys
            100                 105                 110

tcc cag ccc cct tgc acg ccc tgc tgc tac gaa aag gaa ccg gag gaa        384
Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr Glu Lys Glu Pro Glu Glu
        115                 120                 125

acc cta cgc atg ctt gag gac aac gtc atg aga cct ggg tac tat cag        432
Thr Leu Arg Met Leu Glu Asp Asn Val Met Arg Pro Gly Tyr Tyr Gln
    130                 135                 140

ctg cta caa gca tcc tta aca tgt tct ccc cac cgc cag cga cgc agc        480
Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro His Arg Gln Arg Arg Ser
145                 150                 155                 160

acc aag gac aac ttc aat gtc tat aaa gcc aca aga cca tac tta gct        528
Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala
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cac tgt ccc gac tgt gga gaa ggg cac tcg tgc cat agt ccc gta gca        576
His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala
            180                 185                 190

cta gaa cgc atc aga aat gaa gcg aca gac ggg acg ctg aaa atc cag        624
Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln
        195                 200                 205

gtc tcc ttg caa atc gga ata aag acg gat gac agc cac gat tgg acc        672
Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr
    210                 215                 220

aag ctg cgt tat atg gac aac cac atg cca gca gac gca gag agg gcg        720
Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala
225                 230                 235                 240

ggg cta ttt gta aga aca tca gca ccg tgt acg att act gga aca atg        768
Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met
                245                 250                 255

gga cac ttc atc ctg gcc cga tgt cca aaa ggg gaa act ctg acg gtg        816
Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val
            260                 265                 270

gga ttc act gac agt agg aag att agt cac tca tgt acg cac cca ttt        864
Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe
        275                 280                 285

cac cac gac cct cct gtg ata ggt cgg gaa aaa ttc cat tcc cga ccg        912
His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro
    290                 295                 300

cag cac ggt aaa gag cta cct tgc agc acg tac gtg cag agc acc gcc        960
Gln His Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala
305                 310                 315                 320

gca act acc gag gag ata gag gta cac atg ccc cca gac acc cct gat       1008
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Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp
                325                 330                 335

cgc aca tta atg tca caa cag tcc ggc aac gta aag atc aca gtc aat       1056
Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn
            340                 345                 350

ggc cag acg gtg cgg tac aag tgt aat tgc ggt ggc tca aat gaa gga       1104
Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly
        355                 360                 365

cta aca act aca gac aaa gtg att aat aac tgc aag gtt gat caa tgt       1152
Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys
    370                 375                 380

cat gcc gcg gtc acc aat cac aaa aag tgg cag tat aac tcc cct ctg       1200
His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu
385                 390                 395                 400

gtc ccg cgt aat gct gaa ctt ggg gac cga aaa gga aaa att cac atc       1248
Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
                405                 410                 415

ccg ttt ccg ctg gca aat gta aca tgc agg gtg cct aaa gca agg aac       1296
Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn
            420                 425                 430

ccc acc gtg acg tac ggg aaa aac caa gtc atc atg cta ctg tat cct       1344
Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro
        435                 440                 445

gac cac cca aca ctc ctg tcc tac cgg aat atg gga gaa gaa cca aac       1392
Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn
    450                 455                 460

tat caa gaa gag tgg gtg atg cat aag aag gaa gtc gtg cta acc gtg       1440
Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val
465                 470                 475                 480

ccg act gaa ggg ctc gag gtc acg tgg ggc aac aac gag ccg tat aag       1488
Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
                485                 490                 495

tat tgg ccg cag tta tct aca aac ggt aca gcc cat ggc cac ccg cat       1536
Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His
            500                 505                 510

gag ata att ctg tat tat tat gag ctg tac ccc act atg act gta gta       1584
Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
        515                 520                 525

gtt gtg tca gtg gcc acg ttc ata ctc ctg tcg atg gtg ggt atg gca       1632
Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met Ala
    530                 535                 540

gcg ggg atg tgc atg cgt gca cga cgc aga tgc atc aca ccg tat gaa       1680
Ala Gly Met Cys Met Arg Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
545                 550                 555                 560

ctg aca cca gga gct acc gtc cct ttc ctg ctt agc cta ata tgc tgc       1728
Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys Cys
                565                 570                 575

atc aga aca gct aaa gcg gcc aca tac caa gag gct gcg ata tac ctg       1776
Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr Leu
            580                 585                 590

tgg aac gag cag caa cct tta                                          1797
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Trp Asn Glu Gln Gln Pro Leu
595

<210> 5
<211> 599
<212> PRT
<213> Chikungunya virus

<400> 5

Ile Pro Val His Met Lys Ser Asp Ala Ser Lys Phe Thr His Glu Lys
1 5 10 15

Pro Glu Gly Tyr Tyr Asn Trp His His Gly Ala Val Gln Tyr Ser Gly
20 25 30

Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly Lys Pro Gly Asp Ser Gly
35 40 45

Arg Pro Ile Phe Asp Asn Lys Gly Arg Val Val Ala Ile Val Leu Gly
50 55 60

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

Lys Asp Ile Val Thr Lys Ile Thr Pro Glu Gly Ala Glu Glu Trp Ser
85 90 95

Leu Ala Ile Pro Val Met Cys Leu Leu Ala Asn Thr Thr Phe Pro Cys
100 105 110

Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr Glu Lys Glu Pro Glu Glu
115 120 125

Thr Leu Arg Met Leu Glu Asp Asn Val Met Arg Pro Gly Tyr Tyr Gln
130 135 140

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

Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala
165 170 175

His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala
180 185 190

Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln
195 200 205

Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr
210 215 220

Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala

225 230 235 240

Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met
245 250 255

Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val
260 265 270

Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe
275 280 285

His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro
290 295 300

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

Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp
325 330 335

Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn
340 345 350

Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly
355 360 365

Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys
370 375 380

His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu
385 390 395 400

Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
405 410 415

Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn
420 425 430

Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro
435 440 445

Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn
450 455 460

Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val
465 470 475 480

Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
485 490 495

Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His

```
            500                 505                 510

Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
        515                 520                 525

Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met Ala
    530                 535                 540

Ala Gly Met Cys Met Arg Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
545                 550                 555                 560

Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys Cys
                565                 570                 575

Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr Leu
            580                 585                 590

Trp Asn Glu Gln Gln Pro Leu
        595


<210>  6
<211>  1797
<212>  DNA
<213>  Chikungunya virus


<220>
<221>  misc_feature
<223>  soluble glycoprotein E2 strain 06.27

<220>
<221>  CDS
<222>  (1)..(1797)

<400>  6
ata ccc gtg cac atg aag tcc gac gct tcg aag ttc acc cat gag aaa          48
Ile Pro Val His Met Lys Ser Asp Ala Ser Lys Phe Thr His Glu Lys
1               5                   10                  15

ccg gag ggg tac tac aac tgg cac cac gga gca gta cag tac tca gga          96
Pro Glu Gly Tyr Tyr Asn Trp His His Gly Ala Val Gln Tyr Ser Gly
            20                  25                  30

ggc cgg ttc acc atc cct aca ggt gct ggc aaa cca ggg gac agc ggc         144
Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly Lys Pro Gly Asp Ser Gly
        35                  40                  45

aga ccg atc ttc gac aac aag gga cgc gtg gtg gcc ata gtc tta gga         192
Arg Pro Ile Phe Asp Asn Lys Gly Arg Val Val Ala Ile Val Leu Gly
    50                  55                  60

gga gct aat gaa gga gcc cgt aca gcc ctc tcg gtg gtg acc tgg aat         240
Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu Ser Val Val Thr Trp Asn
65                  70                  75                  80

aaa gac att gtc act aaa atc acc ccc gag ggg gcc gaa gag tgg agt         288
Lys Asp Ile Val Thr Lys Ile Thr Pro Glu Gly Ala Glu Glu Trp Ser
                85                  90                  95

ctt gcc atc cca gtt atg tgc ctg ttg gca aac acc acg ttc ccc tgc         336
Leu Ala Ile Pro Val Met Cys Leu Leu Ala Asn Thr Thr Phe Pro Cys
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          100                 105                 110

tcc cag ccc cct tgc acg ccc tgc tgc tac gaa aag gaa ccg gag gaa        384
Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr Glu Lys Glu Pro Glu Glu
        115                 120                 125

acc cta cgc atg ctt gag gac aac gtc atg aga cct ggg tac tat cag        432
Thr Leu Arg Met Leu Glu Asp Asn Val Met Arg Pro Gly Tyr Tyr Gln
    130                 135                 140

ctg cta caa gca tcc tta aca tgt tct ccc cac cgc cag cga cgc agc        480
Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro His Arg Gln Arg Arg Ser
145                 150                 155                 160

acc aag gac aac ttc aat gtc tat aaa gcc aca aga cca tac tta gct        528
Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala
                165                 170                 175

cac tgt ccc gac tgt gga gaa ggg cac tcg tgc cat agt ccc gta gca        576
His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala
            180                 185                 190

cta gaa cgc atc aga aat gaa gcg aca gac ggg acg ctg aaa atc cag        624
Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln
        195                 200                 205

gtc tcc ttg caa atc gga ata aag acg gat gac agc cac gat tgg acc        672
Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr
    210                 215                 220

aag ctg cgt tat atg gac aac cac atg cca gca gac gca gag agg gcg        720
Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala
225                 230                 235                 240

ggg cta ttt gta aga aca tca gca ccg tgt acg att act gga aca atg        768
Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met
                245                 250                 255

gga cac ttc atc ctg gcc cga tgt cca aaa ggg gaa act ctg acg gtg        816
Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val
            260                 265                 270

gga ttc act gac agt agg aag att agt cac tca tgt acg cac cca ttt        864
Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe
        275                 280                 285

cac cac gac cct cct gtg ata ggt cgg gaa aaa ttc cat tcc cga ccg        912
His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro
    290                 295                 300

cag cac ggt aaa gag cta cct tgc agc acg tac gtg cag agc acc gcc        960
Gln His Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala
305                 310                 315                 320

gca act acc gag gag ata gag gta cac atg ccc cca gac acc cct gat       1008
Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp
                325                 330                 335

cgc aca tta atg tca caa cag tcc ggc aac gta aag atc aca gtc aat       1056
Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn
            340                 345                 350

ggc cag acg gtg cgg tac aag tgt aat tgc ggt ggc tca aat gaa gga       1104
Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly
        355                 360                 365

cta aca act aca gac aaa gtg att aat aac tgc aag gtt gat caa tgt       1152
Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys
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```
    370                 375                 380

cat gcc gcg gtc acc aat cac aaa aag tgg cag tat aac tcc cct ctg       1200
His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu
385                 390                 395                 400

gtc ccg cgt aat gct gaa ctt ggg gac cga aaa gga aaa att cac atc       1248
Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
                405                 410                 415

ccg ttt ccg ctg gca aat gta aca tgc agg gtg cct aaa gca agg aac       1296
Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn
            420                 425                 430

ccc acc gtg acg tac ggg aaa aac caa gtc atc atg cta ctg tat cct       1344
Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro
        435                 440                 445

gac cac cca aca ctc ctg tcc tac cgg aat atg gga gaa gaa cca aac       1392
Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn
    450                 455                 460

tat caa gaa gag tgg gtg atg cat aag aag gaa gtc gtg cta acc gtg       1440
Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val
465                 470                 475                 480

ccg act gaa ggg ctc gag gtc acg tgg ggc aac aac gag ccg tat aag       1488
Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
                485                 490                 495

tat tgg ccg cag tta tct aca aac ggt aca gcc cat ggc cac ccg cat       1536
Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His
            500                 505                 510

gag ata att ctg tat tat tat gag ctg tac ccc act atg act gta gta       1584
Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
        515                 520                 525

gtt gtg tca gtg gcc acg ttc ata ctc ctg tcg atg gtg ggt atg gca       1632
Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met Ala
    530                 535                 540

gcg ggg atg tgc atg tgt gca cga cgc aga tgc atc aca ccg tat gaa       1680
Ala Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
545                 550                 555                 560

ctg aca cca gga gct acc gtc cct ttc ctg ctt agc cta ata tgc tgc       1728
Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys Cys
                565                 570                 575

atc aga aca gct aaa gcg gcc aca tac caa gag gct gcg ata tac ctg       1776
Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr Leu
            580                 585                 590

tgg aac gag cag caa cct tta                                          1797
Trp Asn Glu Gln Gln Pro Leu
        595
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<210> 7
<211> 599
<212> PRT
<213> Chikungunya virus

<400> 7

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Ile Pro Val His Met Lys Ser Asp Ala Ser Lys Phe Thr His Glu Lys
1               5                   10                  15
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Pro Glu Gly Tyr Tyr Asn Trp His His Gly Ala Val Gln Tyr Ser Gly
            20                  25                  30

Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly Lys Pro Gly Asp Ser Gly
        35                  40                  45

Arg Pro Ile Phe Asp Asn Lys Gly Arg Val Val Ala Ile Val Leu Gly
    50                  55                  60

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

Lys Asp Ile Val Thr Lys Ile Thr Pro Glu Gly Ala Glu Glu Trp Ser
                85                  90                  95

Leu Ala Ile Pro Val Met Cys Leu Leu Ala Asn Thr Thr Phe Pro Cys
            100                 105                 110

Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr Glu Lys Glu Pro Glu Glu
        115                 120                 125

Thr Leu Arg Met Leu Glu Asp Asn Val Met Arg Pro Gly Tyr Tyr Gln
    130                 135                 140

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

Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala
                165                 170                 175

His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala
            180                 185                 190

Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln
        195                 200                 205

Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr
    210                 215                 220

Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala
225                 230                 235                 240

Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met
                245                 250                 255

Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val
            260                 265                 270

Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe
        275                 280                 285
```

```
His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro
    290                 295                 300

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

Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp
                325                 330                 335

Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn
            340                 345                 350

Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly
        355                 360                 365

Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys
    370                 375                 380

His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu
385                 390                 395                 400

Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
                405                 410                 415

Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn
            420                 425                 430

Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro
        435                 440                 445

Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn
    450                 455                 460

Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val
465                 470                 475                 480

Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
                485                 490                 495

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

Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
        515                 520                 525

Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met Ala
    530                 535                 540

Ala Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
545                 550                 555                 560
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```
Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys Cys
                565                 570                 575


Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr Leu
            580                 585                 590


Trp Asn Glu Gln Gln Pro Leu
        595


<210>  8
<211>  1797
<212>  DNA
<213>  Chikungunya virus


<220>
<221>  misc_feature
<223>  soluble glycoprotein E2 strain 06.49

<220>
<221>  CDS
<222>  (1)..(1797)

<400>  8
ata ccc gtg cac atg aag tcc gac gct tcg aag ttc acc cat gag aaa          48
Ile Pro Val His Met Lys Ser Asp Ala Ser Lys Phe Thr His Glu Lys
1               5                   10                  15

ccg gag ggg tac tac aac tgg cac cac gga gca gta cag tac tca gga          96
Pro Glu Gly Tyr Tyr Asn Trp His His Gly Ala Val Gln Tyr Ser Gly
            20                  25                  30

ggc cgg ttc acc atc cct aca ggt gct ggc aaa cca ggg gac agc ggc         144
Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly Lys Pro Gly Asp Ser Gly
        35                  40                  45

aga ccg atc ttc gac aac aag gga cgc gtg gtg gcc ata gtc tta gga         192
Arg Pro Ile Phe Asp Asn Lys Gly Arg Val Val Ala Ile Val Leu Gly
    50                  55                  60

gga gct aat gaa gga gcc cgt aca gcc ctc tcg gtg gtg acc tgg aat         240
Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu Ser Val Val Thr Trp Asn
65                  70                  75                  80

aaa gac att gtc act aaa atc acc ccc gag ggg gcc gaa gag tgg agt         288
Lys Asp Ile Val Thr Lys Ile Thr Pro Glu Gly Ala Glu Glu Trp Ser
                85                  90                  95

ctt gcc atc cca gtt atg tgc ctg ttg gca aac acc acg ttc ccc tgc         336
Leu Ala Ile Pro Val Met Cys Leu Leu Ala Asn Thr Thr Phe Pro Cys
            100                 105                 110

tcc cag ccc cct tgc acg ccc tgc tgc tac gaa aag gaa ccg gag gaa         384
Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr Glu Lys Glu Pro Glu Glu
        115                 120                 125

acc cta cgc atg ctt gag gac aac gtc atg aga cct ggg tac tat cag         432
Thr Leu Arg Met Leu Glu Asp Asn Val Met Arg Pro Gly Tyr Tyr Gln
    130                 135                 140

ctg cta caa gca tcc tta aca tgt tct ccc cac cgc cag cga cgc agc         480
Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro His Arg Gln Arg Arg Ser
145                 150                 155                 160
```

```
acc aag gac aac ttc aat gtc tat aaa gcc aca aga cca tac tta gct        528
Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala
                165                 170                 175

cac tgt ccc gac tgt gga gaa ggg cac tcg tgc cat agt ccc gta gca        576
His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala
            180                 185                 190

cta gaa cgc atc aga aat gaa gcg aca gac ggg acg ctg aaa atc cag        624
Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln
        195                 200                 205

gtc tcc ttg caa atc gga ata aag acg gat gac agc cac gat tgg acc        672
Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr
    210                 215                 220

aag ctg cgt tat atg gac aac cac atg cca gca gac gca gag agg gcg        720
Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala
225                 230                 235                 240

ggg cta ttt gta aga aca tca gca ccg tgt acg att act gga aca atg        768
Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met
                245                 250                 255

gga cac ttc atc ctg gcc cga tgt cca aaa ggg gaa act ctg acg gtg        816
Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val
            260                 265                 270

gga ttc act gac agt agg aag att agt cac tca tgt acg cac cca ttt        864
Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe
        275                 280                 285

cac cac gac cct cct gtg ata ggt cgg gaa aaa ttc cat tcc cga ccg        912
His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro
    290                 295                 300

cag cac ggt aaa gag cta cct tgc agc acg tac gtg cag agc acc gcc        960
Gln His Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala
305                 310                 315                 320

gca act acc gag gag ata gag gta cac atg ccc cca gac acc cct gat       1008
Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp
                325                 330                 335

cgc aca tta atg tca caa cag tcc ggc aac gta aag atc aca gtc aat       1056
Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn
            340                 345                 350

ggc cag acg gtg cgg tac aag tgt aat tgc ggt ggc tca aat gaa gga       1104
Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly
        355                 360                 365

cta aca act aca gac aaa gtg att aat aac tgc aag gtt gat caa tgt       1152
Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys
    370                 375                 380

cat gcc gcg gtc acc aat cac aaa aag tgg cag tat aac tcc cct ctg       1200
His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu
385                 390                 395                 400

gtc ccg cgt aat gct gaa ctt ggg gac cga aaa gga aaa att cac atc       1248
Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
                405                 410                 415

ccg ttt ccg ctg gca aat gta aca tgc agg gtg cct aaa gca agg aac       1296
Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn
            420                 425                 430
```

```
ccc acc gtg acg tac ggg aaa aac caa gtc atc atg cta ctg tat cct       1344
Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro
        435                 440                 445

gac cac cca aca ctc ctg tcc tac cgg aat atg gga gaa gaa cca aac       1392
Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn
    450                 455                 460

tat caa gaa gag tgg gtg atg cat aag aag gaa gtc gtg cta acc gtg       1440
Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val
465                 470                 475                 480

ccg act gaa ggg ctc gag gtc acg tgg ggc aac aac gag ccg tat aag       1488
Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
                485                 490                 495

tat tgg ccg cag tta tct aca aac ggt aca gcc cat ggc cac ccg cac       1536
Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His
            500                 505                 510

gag ata att ctg tat tat tat gag ctg tac ccc act atg act gta gta       1584
Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
        515                 520                 525

gtt gtg tca gtg gcc acg ttc ata ctc ctg tcg atg gtg ggt atg gca       1632
Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met Ala
    530                 535                 540

gcg ggg atg tgc atg tgt gca cga cgc aga tgc atc aca ccg tat gaa       1680
Ala Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
545                 550                 555                 560

ctg aca cca gga gct acc gtc cct ttc ctg ctt agc cta ata tgc tgc       1728
Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys Cys
                565                 570                 575

atc aga aca gct aaa gcg gcc aca tac caa gag gct gcg ata tac ctg       1776
Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr Leu
            580                 585                 590

tgg aac gag cag caa cct tta                                          1797
Trp Asn Glu Gln Gln Pro Leu
        595
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<210> 9
<211> 599
<212> PRT
<213> Chikungunya virus

<400> 9

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Ile Pro Val His Met Lys Ser Asp Ala Ser Lys Phe Thr His Glu Lys
1               5                   10                  15

Pro Glu Gly Tyr Tyr Asn Trp His His Gly Ala Val Gln Tyr Ser Gly
            20                  25                  30

Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly Lys Pro Gly Asp Ser Gly
        35                  40                  45

Arg Pro Ile Phe Asp Asn Lys Gly Arg Val Val Ala Ile Val Leu Gly
    50                  55                  60
```

```
Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu Ser Val Val Thr Trp Asn
65                  70                  75                  80

Lys Asp Ile Val Thr Lys Ile Thr Pro Glu Gly Ala Glu Glu Trp Ser
                85                  90                  95

Leu Ala Ile Pro Val Met Cys Leu Leu Ala Asn Thr Thr Phe Pro Cys
            100                 105                 110

Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr Glu Lys Glu Pro Glu Glu
        115                 120                 125

Thr Leu Arg Met Leu Glu Asp Asn Val Met Arg Pro Gly Tyr Tyr Gln
    130                 135                 140

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

Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala
                165                 170                 175

His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala
            180                 185                 190

Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln
        195                 200                 205

Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr
    210                 215                 220

Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala
225                 230                 235                 240

Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met
                245                 250                 255

Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val
            260                 265                 270

Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe
        275                 280                 285

His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro
    290                 295                 300

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

Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp
                325                 330                 335
```

```
Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn
            340                 345                 350

Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly
        355                 360                 365

Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys
    370                 375                 380

His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu
385                 390                 395                 400

Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
                405                 410                 415

Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn
            420                 425                 430

Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro
        435                 440                 445

Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn
    450                 455                 460

Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val
465                 470                 475                 480

Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
                485                 490                 495

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

Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
        515                 520                 525

Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met Ala
    530                 535                 540

Ala Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
545                 550                 555                 560

Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys Cys
                565                 570                 575

Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr Leu
            580                 585                 590

Trp Asn Glu Gln Gln Pro Leu
        595
```

<210> 10
<211> 1092
<212> DNA
<213> Chikungunya virus

<220>
<221> misc_feature
<223> ectodomain glycoprotein E2 strain 05.115

<220>
<221> CDS
<222> (1)..(1092)

<400> 10

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gac aac ttc aat gtc tat aaa gcc aca aga cca tac tta gct cac tgt          48
Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala His Cys
1               5                   10                  15

ccc gac tgt gga gaa ggg cac tcg tgc cat agt ccc gta gca cta gaa          96
Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala Leu Glu
            20                  25                  30

cgc atc aga aat gaa gcg aca gac ggg acg ctg aaa atc cag gtc tcc         144
Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln Val Ser
        35                  40                  45

ttg caa atc gga ata aag acg gat gac agc cac gat tgg acc aag ctg         192
Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr Lys Leu
    50                  55                  60

cgt tat atg gac aac cac atg cca gca gac gca gag agg gcg ggg cta         240
Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala Gly Leu
65                  70                  75                  80

ttt gta aga aca tca gca ccg tgt acg att act gga aca atg gga cac         288
Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met Gly His
                85                  90                  95

ttc atc ctg gcc cga tgt cca aaa ggg gaa act ctg acg gtg gga ttc         336
Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val Gly Phe
            100                 105                 110

act gac agt agg aag att agt cac tca tgt acg cac cca ttt cac cac         384
Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe His His
        115                 120                 125

gac cct cct gtg ata ggt cgg gaa aaa ttc cat tcc cga ccg cag cac         432
Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro Gln His
    130                 135                 140

ggt aaa gag ata cct tgc agc acg tac gtg cag agc acc gcc gca act         480
Gly Lys Glu Ile Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala Ala Thr
145                 150                 155                 160

acc gag gag ata gag gta cac atg ccc cca gac acc cct gat cgc aca         528
Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp Arg Thr
                165                 170                 175

tta atg tca caa cag tcc ggc aac gta aag atc aca gtc aat ggc cag         576
Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn Gly Gln
            180                 185                 190

acg gtg cgg tac aag tgt aat tgc ggt ggc tca aat gaa gga cta aca         624
Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly Leu Thr
        195                 200                 205
```

```
act aca gac aaa gtg att aat aac tgc aag gtt gat caa tgt cat gcc        672
Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys His Ala
    210                 215                 220

gcg gtc acc aat cac aaa aag tgg cag tat aac tcc cct ctg gtc ccg        720
Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu Val Pro
225                 230                 235                 240

cgt aat gct gaa ctt ggg gac cga aaa gga aaa att cac atc ccg ttt        768
Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile Pro Phe
                245                 250                 255

ccg ctg gca aat gta aca tgc agg gtg cct aaa gca agg aac ccc acc        816
Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn Pro Thr
            260                 265                 270

gtg acg tac ggg aaa aac caa gtc atc atg cta ctg tat cct gac cac        864
Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro Asp His
        275                 280                 285

cca aca ctc ctg tcc tac cgg aat atg gga gaa gaa cca aac tat caa        912
Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn Tyr Gln
    290                 295                 300

gaa gag tgg gtg atg cat aag aag gaa gtc gtg cta acc gtg ccg act        960
Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val Pro Thr
305                 310                 315                 320

gaa ggg ctc gag gtc acg tgg ggc aac aac gag ccg tat aag tat tgg       1008
Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys Tyr Trp
                325                 330                 335

ccg cag tta tct aca aac ggt aca gcc cat ggc cac ccg cat gag ata       1056
Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His Glu Ile
            340                 345                 350

att ctg tat tat tat gag ctg tac ccc act atg act                       1092
Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr
        355                 360
```

<210> 11
<211> 364
<212> PRT
<213> Chikungunya virus

<400> 11

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Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala His Cys
1               5                   10                  15

Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala Leu Glu
            20                  25                  30

Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln Val Ser
        35                  40                  45

Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr Lys Leu
    50                  55                  60

Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala Gly Leu
65                  70                  75                  80
```

```
Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met Gly His
                85                  90                  95

Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val Gly Phe
            100                 105                 110

Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe His His
        115                 120                 125

Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro Gln His
    130                 135                 140

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

Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp Arg Thr
                165                 170                 175

Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn Gly Gln
            180                 185                 190

Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly Leu Thr
        195                 200                 205

Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys His Ala
    210                 215                 220

Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu Val Pro
225                 230                 235                 240

Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile Pro Phe
                245                 250                 255

Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn Pro Thr
            260                 265                 270

Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro Asp His
        275                 280                 285

Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn Tyr Gln
    290                 295                 300

Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val Pro Thr
305                 310                 315                 320

Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys Tyr Trp
                325                 330                 335

Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His Glu Ile
            340                 345                 350
```

```
Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr
        355                 360


<210>  12
<211>  1092
<212>  DNA
<213>  Chikungunya virus


<220>
<221>  misc_feature
<223>  ectodomain glycoprotein E2 strain 06.21

<220>
<221>  CDS
<222>  (1)..(1092)

<400>  12
gac aac ttc aat gtc tat aaa gcc aca aga cca tac tta gct cac tgt          48
Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala His Cys
1               5                  10                  15

ccc gac tgt gga gaa ggg cac tcg tgc cat agt ccc gta gca cta gaa          96
Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala Leu Glu
            20                  25                  30

cgc atc aga aat gaa gcg aca gac ggg acg ctg aaa atc cag gtc tcc         144
Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln Val Ser
        35                  40                  45

ttg caa atc gga ata aag acg gat gac agc cac gat tgg acc aag ctg         192
Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr Lys Leu
    50                  55                  60

cgt tat atg gac aac cac atg cca gca gac gca gag agg gcg ggg cta         240
Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala Gly Leu
65                  70                  75                  80

ttt gta aga aca tca gca ccg tgt acg att act gga aca atg gga cac         288
Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met Gly His
                85                  90                  95

ttc atc ctg gcc cga tgt cca aaa ggg gaa act ctg acg gtg gga ttc         336
Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val Gly Phe
            100                 105                 110

act gac agt agg aag att agt cac tca tgt acg cac cca ttt cac cac         384
Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe His His
        115                 120                 125

gac cct cct gtg ata ggt cgg gaa aaa ttc cat tcc cga ccg cag cac         432
Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro Gln His
    130                 135                 140

ggt aaa gag cta cct tgc agc acg tac gtg cag agc acc gcc gca act         480
Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala Ala Thr
145                 150                 155                 160

acc gag gag ata gag gta cac atg ccc cca gac acc cct gat cgc aca         528
Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp Arg Thr
                165                 170                 175

tta atg tca caa cag tcc ggc aac gta aag atc aca gtc aat ggc cag         576
Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn Gly Gln
            180                 185                 190

acg gtg cgg tac aag tgt aat tgc ggt ggc tca aat gaa gga cta aca         624
```

```
Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly Leu Thr
        195                 200                 205

act aca gac aaa gtg att aat aac tgc aag gtt gat caa tgt cat gcc        672
Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys His Ala
    210                 215                 220

gcg gtc acc aat cac aaa aag tgg cag tat aac tcc cct ctg gtc ccg        720
Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu Val Pro
225                 230                 235                 240

cgt aat gct gaa ctt ggg gac cga aaa gga aaa att cac atc ccg ttt        768
Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile Pro Phe
                245                 250                 255

ccg ctg gca aat gta aca tgc agg gtg cct aaa gca agg aac ccc acc        816
Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn Pro Thr
            260                 265                 270

gtg acg tac ggg aaa aac caa gtc atc atg cta ctg tat cct gac cac        864
Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro Asp His
        275                 280                 285

cca aca ctc ctg tcc tac cgg aat atg gga gaa gaa cca aac tat caa        912
Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn Tyr Gln
    290                 295                 300

gaa gag tgg gtg atg cat aag aag gaa gtc gtg cta acc gtg ccg act        960
Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val Pro Thr
305                 310                 315                 320

gaa ggg ctc gag gtc acg tgg ggc aac aac gag ccg tat aag tat tgg       1008
Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys Tyr Trp
                325                 330                 335

ccg cag tta tct aca aac ggt aca gcc cat ggc cac ccg cat gag ata       1056
Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His Glu Ile
            340                 345                 350

att ctg tat tat tat gag ctg tac ccc act atg act                       1092
Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr
        355                 360


<210>  13
<211>  364
<212>  PRT
<213>  Chikungunya virus

<400>  13

Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala His Cys
1               5                   10                  15


Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala Leu Glu
            20                  25                  30


Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln Val Ser
        35                  40                  45


Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr Lys Leu
    50                  55                  60


Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala Gly Leu
```

```
65                  70                  75                  80

Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met Gly His
                85                  90                  95

Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val Gly Phe
            100                 105                 110

Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe His His
        115                 120                 125

Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro Gln His
    130                 135                 140

Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala Ala Thr
145                 150                 155                 160

Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp Arg Thr
                165                 170                 175

Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn Gly Gln
            180                 185                 190

Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly Leu Thr
        195                 200                 205

Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys His Ala
    210                 215                 220

Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu Val Pro
225                 230                 235                 240

Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile Pro Phe
                245                 250                 255

Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn Pro Thr
            260                 265                 270

Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro Asp His
        275                 280                 285

Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn Tyr Gln
    290                 295                 300

Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val Pro Thr
305                 310                 315                 320

Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys Tyr Trp
                325                 330                 335

Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His Glu Ile
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```
            340                 345                 350


Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr
        355                 360


<210>  14
<211>  1092
<212>  DNA
<213>  Chikungunya virus


<220>
<221>  misc_feature
<223>  ectodomain glycoprotein E2 strain 06.27

<220>
<221>  CDS
<222>  (1)..(1092)

<400>  14
gac aac ttc aat gtc tat aaa gcc aca aga cca tac tta gct cac tgt          48
Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala His Cys
1               5                  10                  15

ccc gac tgt gga gaa ggg cac tcg tgc cat agt ccc gta gca cta gaa          96
Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala Leu Glu
            20                  25                  30

cgc atc aga aat gaa gcg aca gac ggg acg ctg aaa atc cag gtc tcc         144
Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln Val Ser
        35                  40                  45

ttg caa atc gga ata aag acg gat gac agc cac gat tgg acc aag ctg         192
Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr Lys Leu
    50                  55                  60

cgt tat atg gac aac cac atg cca gca gac gca gag agg gcg ggg cta         240
Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala Gly Leu
65                  70                  75                  80

ttt gta aga aca tca gca ccg tgt acg att act gga aca atg gga cac         288
Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met Gly His
                85                  90                  95

ttc atc ctg gcc cga tgt cca aaa ggg gaa act ctg acg gtg gga ttc         336
Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val Gly Phe
            100                 105                 110

act gac agt agg aag att agt cac tca tgt acg cac cca ttt cac cac         384
Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe His His
        115                 120                 125

gac cct cct gtg ata ggt cgg gaa aaa ttc cat tcc cga ccg cag cac         432
Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro Gln His
    130                 135                 140

ggt aaa gag cta cct tgc agc acg tac gtg cag agc acc gcc gca act         480
Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala Ala Thr
145                 150                 155                 160

acc gag gag ata gag gta cac atg ccc cca gac acc cct gat cgc aca         528
Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp Arg Thr
                165                 170                 175

tta atg tca caa cag tcc ggc aac gta aag atc aca gtc aat ggc cag         576
Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn Gly Gln
```

```
            180                 185                 190

acg gtg cgg tac aag tgt aat tgc ggt ggc tca aat gaa gga cta aca        624
Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly Leu Thr
        195                 200                 205

act aca gac aaa gtg att aat aac tgc aag gtt gat caa tgt cat gcc        672
Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys His Ala
    210                 215                 220

gcg gtc acc aat cac aaa aag tgg cag tat aac tcc cct ctg gtc ccg        720
Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu Val Pro
225                 230                 235                 240

cgt aat gct gaa ctt ggg gac cga aaa gga aaa att cac atc ccg ttt        768
Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile Pro Phe
                245                 250                 255

ccg ctg gca aat gta aca tgc agg gtg cct aaa gca agg aac ccc acc        816
Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn Pro Thr
            260                 265                 270

gtg acg tac ggg aaa aac caa gtc atc atg cta ctg tat cct gac cac        864
Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro Asp His
        275                 280                 285

cca aca ctc ctg tcc tac cgg aat atg gga gaa gaa cca aac tat caa        912
Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn Tyr Gln
    290                 295                 300

gaa gag tgg gtg atg cat aag aag gaa gtc gtg cta acc gtg ccg act        960
Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val Pro Thr
305                 310                 315                 320

gaa ggg ctc gag gtc acg tgg ggc aac aac gag ccg tat aag tat tgg       1008
Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys Tyr Trp
                325                 330                 335

ccg cag tta tct aca aac ggt aca gcc cat ggc cac ccg cat gag ata       1056
Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His Glu Ile
            340                 345                 350

att ctg tat tat tat gag ctg tac ccc act atg act                      1092
Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr
        355                 360


<210>  15
<211>  364
<212>  PRT
<213>  Chikungunya virus

<400>  15

Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu Ala His Cys
1               5                   10                  15


Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val Ala Leu Glu
            20                  25                  30


Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile Gln Val Ser
        35                  40                  45


Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp Thr Lys Leu
    50                  55                  60
```

```
Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg Ala Gly Leu
65                  70                  75                  80

Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr Met Gly His
                85                  90                  95

Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr Val Gly Phe
            100                 105                 110

Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro Phe His His
        115                 120                 125

Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg Pro Gln His
    130                 135                 140

Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val Gln Ser Thr Ala Ala Thr
145                 150                 155                 160

Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro Asp Arg Thr
                165                 170                 175

Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val Asn Gly Gln
            180                 185                 190

Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly Leu Thr
        195                 200                 205

Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln Cys His Ala
    210                 215                 220

Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro Leu Val Pro
225                 230                 235                 240

Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile Pro Phe
                245                 250                 255

Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn Pro Thr
            260                 265                 270

Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr Pro Asp His
        275                 280                 285

Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro Asn Tyr Gln
    290                 295                 300

Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr Val Pro Thr
305                 310                 315                 320

Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys Tyr Trp
                325                 330                 335
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Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro His Glu Ile
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Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr
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<210>  16
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       CCA61130.1)


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Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu
1               5                   10                  15

gct cac tgt ccc gac tgt gga gaa ggg cac tcg tgc cat agt ccc gta          96
Ala His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val
            20                  25                  30

gca cta gaa cgc atc aga aat gaa gcg aca gac ggg acg ctg aaa atc         144
Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile
        35                  40                  45

cag gtc tcc ttg caa atc gga ata aag acg gat gac agc cac gat tgg         192
Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp
    50                  55                  60

acc aag ctg cgt tat atg gac aac cac atg cca gca gac gca gag agg         240
Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg
65                  70                  75                  80

gcg ggg cta ttt gta aga aca tca gca ccg tgt acg att act gga aca         288
Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr
                85                  90                  95

atg gga cac ttc atc ctg gcc cga tgt cca aaa ggg gaa act ctg acg         336
Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr
            100                 105                 110

gtg gga ttc act gac agt agg aag att agt cat tca tgt acg cac cca         384
Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro
        115                 120                 125

ttt cac cac gac cct cct gtg ata ggt cgg gaa aaa ttc cat tcc cga         432
Phe His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg
    130                 135                 140

ccg cag cac ggt aaa gag cta cct tgc agc acg tac gtg cag agc acc         480
Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val Gln Ser Thr
145                 150                 155                 160

gcc gca act acc gag gag ata gag gta cac atg ccc cca gac acc cct         528
Ala Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro
                165                 170                 175
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```
gat cgc aca tta atg tca caa cag tcc ggc aac gta aag atc aca gtc        576
Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val
            180                 185                 190

aat ggc cag acg gtg cgg tat aag tgt aat tgc ggt ggc tca aat gaa        624
Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu
        195                 200                 205

gga cta aca act aca gac aaa gtg att aat aac tgc aag gtt gat caa        672
Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln
    210                 215                 220

tgt cat gcc gcg gtc acc aat cac aaa aag tgg cag tat aac tcc cct        720
Cys His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro
225                 230                 235                 240

ctg gtc ccg cgt aat gct gaa ctt ggg gac cga caa gga aaa att cac        768
Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Gln Gly Lys Ile His
                245                 250                 255

atc ccg ttt ccg ctg gca aat gta aca tgc agg gtg cct aaa gca agg        816
Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg
            260                 265                 270

aac ccc acc gtg acg tac ggg aaa aac caa gtc atc atg cta ctg tat        864
Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr
        275                 280                 285

cct gac cac cca aca ctc ctg tcc tac cgg aat atg gga gaa gaa cca        912
Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro
    290                 295                 300

aac tat caa gaa gag tgg gtg atg cat aag aag gaa gtc gtg cta acc        960
Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr
305                 310                 315                 320

gtg ccg act gaa ggg ctc gag gtc acg tgg ggc aac aac gag ccg tat       1008
Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr
                325                 330                 335

aag tat tgg ccg cag tta tct aca aac ggt aca gcc cat ggc cac ccg       1056
Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro
            340                 345                 350

cat gag ata att ctg tat tat tat gag ctg tac cct act atg act gta       1104
His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val
        355                 360                 365

gta gtt gta tca gtg gcc acg ttc ata ctc ctg tca atg gtg ggt atg       1152
Val Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met
    370                 375                 380

gca gcg ggg atg tgc atg tgt gca cga cgc aga tgc atc aca ccg tat       1200
Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr
385                 390                 395                 400

gaa ctg aca cca gga gct acc gtc cct ttc ctg ctt agc cta ata tgc       1248
Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys
                405                 410                 415

tgc atc aga aca gct aaa gcg gcc aca tac caa gag gct gcg ata tac       1296
Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr
            420                 425                 430

ctg tgg aac gag cag caa cct ttg ttt tgg cta caa gcc ctt att ccg       1344
Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu Gln Ala Leu Ile Pro
        435                 440                 445
```

```
ctg gca gcc ctg att gtt cta tgc aac tgt ctg aga ctc tta cca tgc       1392
Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu Arg Leu Leu Pro Cys
    450                 455                 460

tgc tgt aaa acg ttg gct ttt tta gcc gta atg agc gtc ggt gcc cac       1440
Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met Ser Val Gly Ala His
465                 470                 475                 480

act gtg agc gcg tac gaa cac gta aca gtg atc ccg aac acg gtg gga       1488
Thr Val Ser Ala Tyr Glu His Val Thr Val Ile Pro Asn Thr Val Gly
                485                 490                 495

gta ccg tat aag act cta gtc aat aga cct ggc tac agc ccc atg gta       1536
Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly Tyr Ser Pro Met Val
            500                 505                 510

ttg gag atg gaa cta ctg tca gtc act ttg gag cca aca cta tcg ctt       1584
Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu Pro Thr Leu Ser Leu
        515                 520                 525

gat tac atc acg tgc gag tac aaa acc gtc atc ccg tct ccg tac gtg       1632
Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile Pro Ser Pro Tyr Val
    530                 535                 540

aag tgc tgc ggt aca gca gag tgc aag gac aaa aac cta cct gac tac       1680
Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys Asn Leu Pro Asp Tyr
545                 550                 555                 560

agc tgt aag gtc ttc acc ggc gtc tac cca ttt atg tgg ggc ggc gcc       1728
Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala
                565                 570                 575

tac tgc ttc tgc gac gct gaa aat acg cag ttg agc gaa gca cat gtg       1776
Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu Ser Glu Ala His Val
            580                 585                 590

gag aag tcc gaa tca tgc aaa aca gaa ttt gca tca gcg tac agg gct       1824
Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala Ser Ala Tyr Arg Ala
        595                 600                 605

cat acc gca tct gca tca gct aag ctc cgc gtc ctt tac caa gga aat       1872
His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val Leu Tyr Gln Gly Asn
    610                 615                 620

aac atc act gta act gcc tat gca aac ggc gac cat gcc gtc aca gtt       1920
Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp His Ala Val Thr Val
625                 630                 635                 640

aag gac gcc aaa ttc att gtg ggg cca atg tct tca gcc tgg aca cct       1968
Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser Ser Ala Trp Thr Pro
                645                 650                 655

ttc gac aac aaa att gtg gtg tac aaa ggt gac gtc tat aac atg gac       2016
Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp Val Tyr Asn Met Asp
            660                 665                 670

tac ccg ccc ttt ggc gca gga aga cca gga caa ttt ggc gat atc caa       2064
Tyr Pro Pro Phe Gly Ala Gly Arg Pro Gly Gln Phe Gly Asp Ile Gln
        675                 680                 685

agt cgc aca cct gag agt aaa gac gtc tat gct aat aca caa ctg gta       2112
Ser Arg Thr Pro Glu Ser Lys Asp Val Tyr Ala Asn Thr Gln Leu Val
    690                 695                 700

ctg cag aga ccg gct gtg ggt acg gta cac gtg cca tac tct cag gca       2160
Leu Gln Arg Pro Ala Val Gly Thr Val His Val Pro Tyr Ser Gln Ala
705                 710                 715                 720
```

```
cca tct ggc ttt aag tat tgg cta aaa gaa cgc ggg gcg tca ctg cag       2208
Pro Ser Gly Phe Lys Tyr Trp Leu Lys Glu Arg Gly Ala Ser Leu Gln
                725                 730                 735

cac aca gca cca ttt ggc tgc caa ata gca aca aac ccg gta aga gcg       2256
His Thr Ala Pro Phe Gly Cys Gln Ile Ala Thr Asn Pro Val Arg Ala
            740                 745                 750

gtg aac tgc gcc gta ggg aac atg ccc atc tcc atc gac ata ccg gaa       2304
Val Asn Cys Ala Val Gly Asn Met Pro Ile Ser Ile Asp Ile Pro Glu
        755                 760                 765

gcg gcc ttc act agg gtc gtc gac gcg ccc tct tta acg gac atg tcg       2352
Ala Ala Phe Thr Arg Val Val Asp Ala Pro Ser Leu Thr Asp Met Ser
    770                 775                 780

tgc gag gta cca gcc tgc acc cat tcc tca gac ttt ggg ggc gtc gcc       2400
Cys Glu Val Pro Ala Cys Thr His Ser Ser Asp Phe Gly Gly Val Ala
785                 790                 795                 800

att att aaa tat gca gcc agc aag aaa ggc aag tgt gcg gtg cat tcg       2448
Ile Ile Lys Tyr Ala Ala Ser Lys Lys Gly Lys Cys Ala Val His Ser
                805                 810                 815

atg act aac gcc gtc act att cgg gaa gct gag ata gaa gtt gaa ggg       2496
Met Thr Asn Ala Val Thr Ile Arg Glu Ala Glu Ile Glu Val Glu Gly
            820                 825                 830

aat tct cag ctg caa atc tct ttc tcg acg gcc tta gcc agc gcc gaa       2544
Asn Ser Gln Leu Gln Ile Ser Phe Ser Thr Ala Leu Ala Ser Ala Glu
        835                 840                 845

ttc cgc gta caa gtc tgt tct aca caa gta cac tgt gca gct gag tgc       2592
Phe Arg Val Gln Val Cys Ser Thr Gln Val His Cys Ala Ala Glu Cys
    850                 855                 860

cac ccc ccg aag gac cac ata gtc aac tac ccg gcg tca cat acc acc       2640
His Pro Pro Lys Asp His Ile Val Asn Tyr Pro Ala Ser His Thr Thr
865                 870                 875                 880

ctc ggg gtc cag gac atc tcc gct acg gcg atg tca tgg gtg cag aag       2688
Leu Gly Val Gln Asp Ile Ser Ala Thr Ala Met Ser Trp Val Gln Lys
                885                 890                 895

atc acg gga ggt gtg gga ctg gtt gtt gct gtt gcc gca ctg att cta       2736
Ile Thr Gly Gly Val Gly Leu Val Val Ala Val Ala Ala Leu Ile Leu
            900                 905                 910

atc gtg gtg cta tgc gtg tcg ttc agc agg cac taa                      2772
Ile Val Val Leu Cys Val Ser Phe Ser Arg His
        915                 920
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Ala His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val
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Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile
        35                  40                  45

Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp
    50                  55                  60

Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg
65                  70                  75                  80

Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr
                85                  90                  95

Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr
            100                 105                 110

Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys Thr His Pro
        115                 120                 125

Phe His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg
    130                 135                 140

Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val Gln Ser Thr
145                 150                 155                 160

Ala Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro
                165                 170                 175

Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val
            180                 185                 190

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

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

Cys His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro
225                 230                 235                 240

Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Gln Gly Lys Ile His
                245                 250                 255

Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg
            260                 265                 270

Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr
        275                 280                 285
```

```
Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro
    290                 295                 300

Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val Val Leu Thr
305                 310                 315                 320

Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr
                325                 330                 335

Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro
            340                 345                 350

His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val
        355                 360                 365

Val Val Val Ser Val Ala Thr Phe Ile Leu Leu Ser Met Val Gly Met
    370                 375                 380

Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr
385                 390                 395                 400

Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys
                405                 410                 415

Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Ile Tyr
            420                 425                 430

Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu Gln Ala Leu Ile Pro
        435                 440                 445

Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu Arg Leu Leu Pro Cys
    450                 455                 460

Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met Ser Val Gly Ala His
465                 470                 475                 480

Thr Val Ser Ala Tyr Glu His Val Thr Val Ile Pro Asn Thr Val Gly
                485                 490                 495

Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly Tyr Ser Pro Met Val
            500                 505                 510

Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu Pro Thr Leu Ser Leu
        515                 520                 525

Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile Pro Ser Pro Tyr Val
    530                 535                 540

Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys Asn Leu Pro Asp Tyr
545                 550                 555                 560
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Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala
                565                 570                 575

Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu Ser Glu Ala His Val
            580                 585                 590

Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala Ser Ala Tyr Arg Ala
        595                 600                 605

His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val Leu Tyr Gln Gly Asn
    610                 615                 620

Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp His Ala Val Thr Val
625                 630                 635                 640

Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser Ser Ala Trp Thr Pro
                645                 650                 655

Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp Val Tyr Asn Met Asp
            660                 665                 670

Tyr Pro Pro Phe Gly Ala Gly Arg Pro Gly Gln Phe Gly Asp Ile Gln
        675                 680                 685

Ser Arg Thr Pro Glu Ser Lys Asp Val Tyr Ala Asn Thr Gln Leu Val
    690                 695                 700

Leu Gln Arg Pro Ala Val Gly Thr Val His Val Pro Tyr Ser Gln Ala
705                 710                 715                 720

Pro Ser Gly Phe Lys Tyr Trp Leu Lys Glu Arg Gly Ala Ser Leu Gln
                725                 730                 735

His Thr Ala Pro Phe Gly Cys Gln Ile Ala Thr Asn Pro Val Arg Ala
            740                 745                 750

Val Asn Cys Ala Val Gly Asn Met Pro Ile Ser Ile Asp Ile Pro Glu
        755                 760                 765

Ala Ala Phe Thr Arg Val Val Asp Ala Pro Ser Leu Thr Asp Met Ser
    770                 775                 780

Cys Glu Val Pro Ala Cys Thr His Ser Ser Asp Phe Gly Gly Val Ala
785                 790                 795                 800

Ile Ile Lys Tyr Ala Ala Ser Lys Lys Gly Lys Cys Ala Val His Ser
                805                 810                 815

Met Thr Asn Ala Val Thr Ile Arg Glu Ala Glu Ile Glu Val Glu Gly
            820                 825                 830
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Asn Ser Gln Leu Gln Ile Ser Phe Ser Thr Ala Leu Ala Ser Ala Glu
835 840 845

Phe Arg Val Gln Val Cys Ser Thr Gln Val His Cys Ala Ala Glu Cys
850 855 860

His Pro Pro Lys Asp His Ile Val Asn Tyr Pro Ala Ser His Thr Thr
865 870 875 880

Leu Gly Val Gln Asp Ile Ser Ala Thr Ala Met Ser Trp Val Gln Lys
885 890 895

Ile Thr Gly Gly Val Gly Leu Val Val Ala Val Ala Ala Leu Ile Leu
900 905 910

Ile Val Val Leu Cys Val Ser Phe Ser Arg His
915 920

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<220>
<223> polyprotein E2-6K-E1 France/2010 CHIKV strains (GenBank: CCA61131.1)

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1 5 10 15

gct cac tgt ccc gac tgt gga gaa ggg cac tcg tgc cat agt ccc gta 96
Ala His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val
20 25 30

gcg cta gaa cgc atc aga aac gaa gcg aca gac ggg acg ttg aaa atc 144
Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile
35 40 45

cag gtt tcc ttg caa atc gga ata aag acg gat gat agc cat gat tgg 192
Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp
50 55 60

acc aag ctg cgt tat atg gac aat cac atg cca gca gac gca gag cgg 240
Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg
65 70 75 80

gcc ggg cta ttt gta aga acg tca gca ccg tgc acg att act gga aca 288
Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr
85 90 95

atg gga cac ttc att ctg gcc cga tgt ccg aaa gga gaa act ctg aca 336
Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr
100 105 110

gtg ggg ttc act gac ggt agg aag atc agt cac tca tgt acg cac cca 384

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Val Gly Phe Thr Asp Gly Arg Lys Ile Ser His Ser Cys Thr His Pro
        115                 120                 125

ttt cac cat gac cct cct gtg ata ggc cgg gaa aaa ttc cat tcc cga        432
Phe His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg
    130                 135                 140

ccg cag cac ggt agg gaa cta cct tgc agc acg tac gcg cag agc acc        480
Pro Gln His Gly Arg Glu Leu Pro Cys Ser Thr Tyr Ala Gln Ser Thr
145                 150                 155                 160

gct gca act gcc gag gag ata gag gta cat atg ccc cca gac act cca        528
Ala Ala Thr Ala Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro
                165                 170                 175

gat cgc aca tta atg tca caa cag tcc ggc aat gta aag atc aca gtc        576
Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val
            180                 185                 190

aat agt cag acg gtg cgg tac aag tgc aat tgt ggt gac tca agt gaa        624
Asn Ser Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Asp Ser Ser Glu
        195                 200                 205

gga tta acc act aca gat aaa gtg att aat aac tgc aag gtt gat caa        672
Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Val Asp Gln
    210                 215                 220

tgc cat gcc gcg gtc acc aat cac aaa aaa tgg cag tat aat tcc cct        720
Cys His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro
225                 230                 235                 240

ctg gtc ccg cgc aat gct gaa ttc ggg gac cgg aaa gga aaa gtt cac        768
Leu Val Pro Arg Asn Ala Glu Phe Gly Asp Arg Lys Gly Lys Val His
                245                 250                 255

att cca ttt cct ctg gca aat gtg aca tgc agg gtg cct aaa gca aga        816
Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg
            260                 265                 270

aac ccc acc gtg acg tac gga aaa aac caa gtc atc atg ttg ctg tat        864
Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr
        275                 280                 285

ccg gac cac cca acg ctc ctg tcc tac agg aat atg gga gaa gaa cca        912
Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro
    290                 295                 300

aac tat caa gaa gag tgg gtg acg cat aag aag gag atc agg tta acc        960
Asn Tyr Gln Glu Glu Trp Val Thr His Lys Lys Glu Ile Arg Leu Thr
305                 310                 315                 320

gta ccg act gaa ggg ctc gag gtc acg tgg ggt aac aat gag ccg tac       1008
Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr
                325                 330                 335

aag tat tgg ccg cag tta tcc aca aac ggt aca gcc cac ggc cac ccg       1056
Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro
            340                 345                 350

cat gag ata att ttg tat tat tat gag ctg tac cca act atg act gtg       1104
His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val
        355                 360                 365

gta gtt ttg tca gtg gcc tcg ttc ata ctc ctg tcg atg gtg ggt gtg       1152
Val Val Leu Ser Val Ala Ser Phe Ile Leu Leu Ser Met Val Gly Val
    370                 375                 380

gca gtg ggg atg tgc atg tgt gca cga cgc aga tgc att aca ccg tac       1200
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Ala Val Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr
385                 390                 395                 400

gaa ctg aca cca gga gct acc gtc cct ttc ctg ctt agc cta ata tgc       1248
Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys
                405                 410                 415

tgc att aga aca gct aaa gcg gcc aca tac cag gag gcc gcg gta tac       1296
Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Val Tyr
            420                 425                 430

ctg tgg aac gag cag cag cct tta ttt tgg ctg caa gcc ctt att ccg       1344
Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu Gln Ala Leu Ile Pro
        435                 440                 445

ctg gca gcc ctg att gtc cta tgt aac tgt ctg aga ctc tta cca tgc       1392
Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu Arg Leu Leu Pro Cys
    450                 455                 460

tgt tgt aaa atg ttg act ttt tta gcc gta ctg agc gtc ggt gcc cac       1440
Cys Cys Lys Met Leu Thr Phe Leu Ala Val Leu Ser Val Gly Ala His
465                 470                 475                 480

act gtg agc gcg tac gaa cac gta aca gtg atc ccg aac acg gtg gga       1488
Thr Val Ser Ala Tyr Glu His Val Thr Val Ile Pro Asn Thr Val Gly
                485                 490                 495

gta ccg tat aag act cta gtc aac aga ccg ggc tac agc ccc atg gta       1536
Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly Tyr Ser Pro Met Val
            500                 505                 510

ctg gag atg gag ctt ctg tct gtc acc ttg gaa cca acg cta tcg ctt       1584
Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu Pro Thr Leu Ser Leu
        515                 520                 525

gat tac atc acg tgc gag tat aaa acc gtt atc ccg tct ccg tac gtg       1632
Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile Pro Ser Pro Tyr Val
    530                 535                 540

aaa tgc tgc ggt aca gca gag tgt aag gac aag agc cta cct gat tac       1680
Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys Ser Leu Pro Asp Tyr
545                 550                 555                 560

agc tgt aag gtc ttc acc ggc gtc tac cca ttc atg tgg ggc ggc gcc       1728
Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala
                565                 570                 575

tac tgc ttc tgc gac acc gaa aat acg caa ttg agc gaa gca cat gtg       1776
Tyr Cys Phe Cys Asp Thr Glu Asn Thr Gln Leu Ser Glu Ala His Val
            580                 585                 590

gag aag tcc gaa tca tgc aaa aca gaa ttt gca tca gca tac agg gct       1824
Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala Ser Ala Tyr Arg Ala
        595                 600                 605

cat acc gca tcc gca tca gct aag ctc cgc gtc ctt tac caa gga aat       1872
His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val Leu Tyr Gln Gly Asn
    610                 615                 620

aat atc act gta gct gct tat gca aac ggc gac cat gcc gtc aca gtt       1920
Asn Ile Thr Val Ala Ala Tyr Ala Asn Gly Asp His Ala Val Thr Val
625                 630                 635                 640

aag gac gct aaa ttc ata gtg ggg cca atg tct tca gcc tgg aca cct       1968
Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser Ser Ala Trp Thr Pro
                645                 650                 655

ttc gac aat aaa atc gtg gtg tac aaa ggc gac gtc tac aac atg gac       2016
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Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp Val Tyr Asn Met Asp
            660                 665                 670

tac ccg ccc ttc ggc gca gga aga cca gga caa ttt ggc gac atc caa       2064
Tyr Pro Pro Phe Gly Ala Gly Arg Pro Gly Gln Phe Gly Asp Ile Gln
        675                 680                 685

agt cgc acg cct gag agc gaa gac gtc tat gct aac aca caa ctg gta       2112
Ser Arg Thr Pro Glu Ser Glu Asp Val Tyr Ala Asn Thr Gln Leu Val
    690                 695                 700

ctg cag aga ccg tcc gcg ggt acg gtg cac gtg ccg tac tct cag gca       2160
Leu Gln Arg Pro Ser Ala Gly Thr Val His Val Pro Tyr Ser Gln Ala
705                 710                 715                 720

cca tct ggc ttc aag tat tgg cta aaa gaa cga ggg gcg tcg ctg cag       2208
Pro Ser Gly Phe Lys Tyr Trp Leu Lys Glu Arg Gly Ala Ser Leu Gln
                725                 730                 735

cac aca gca cca ttt ggc tgt caa ata gca aca aac ccg gta aga gcg       2256
His Thr Ala Pro Phe Gly Cys Gln Ile Ala Thr Asn Pro Val Arg Ala
            740                 745                 750

atg aac tgc gcc gta ggg aac atg cct atc tcc atc gac ata ccg gac       2304
Met Asn Cys Ala Val Gly Asn Met Pro Ile Ser Ile Asp Ile Pro Asp
        755                 760                 765

gcg gcc ttt acc agg gtc gtc gac gcg cca tct tta acg gac atg tcg       2352
Ala Ala Phe Thr Arg Val Val Asp Ala Pro Ser Leu Thr Asp Met Ser
    770                 775                 780

tgt gag gta tca gcc tgc acc cat tcc tca gac ttt ggg ggc gtt gcc       2400
Cys Glu Val Ser Ala Cys Thr His Ser Ser Asp Phe Gly Gly Val Ala
785                 790                 795                 800

atc att aaa tat gca gcc agt aag aaa ggc aag tgt gca gtg cac tcg       2448
Ile Ile Lys Tyr Ala Ala Ser Lys Lys Gly Lys Cys Ala Val His Ser
                805                 810                 815

atg act aac gcc gtc act att cgg gaa gct gaa ata gaa gta gaa ggg       2496
Met Thr Asn Ala Val Thr Ile Arg Glu Ala Glu Ile Glu Val Glu Gly
            820                 825                 830

aac tct cag ttg caa atc tct ttt tcg acg gcc cta gcc agc gcc gaa       2544
Asn Ser Gln Leu Gln Ile Ser Phe Ser Thr Ala Leu Ala Ser Ala Glu
        835                 840                 845

ttc cgc gta caa gtc tgt tct aca caa gta cac tgt gca gcc gag tgc       2592
Phe Arg Val Gln Val Cys Ser Thr Gln Val His Cys Ala Ala Glu Cys
    850                 855                 860

cat cca ccg aaa gac cat ata gtc aat tac ccg gcg tca cac acc acc       2640
His Pro Pro Lys Asp His Ile Val Asn Tyr Pro Ala Ser His Thr Thr
865                 870                 875                 880

ccc ggg gtc caa gac att tcc gct acg gcg atg tca tgg gtg cag aag       2688
Pro Gly Val Gln Asp Ile Ser Ala Thr Ala Met Ser Trp Val Gln Lys
                885                 890                 895

atc acg gga ggt gtg gga ctg gtt gtc gct gtt gca gca ctg atc cta       2736
Ile Thr Gly Gly Val Gly Leu Val Val Ala Val Ala Ala Leu Ile Leu
            900                 905                 910

atc gtg gtg cta tgc gtg tcg ttt agc agg cac taa                      2772
Ile Val Val Leu Cys Val Ser Phe Ser Arg His
        915                 920
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Ala His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His Ser Pro Val
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Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr Leu Lys Ile
35 40 45

Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser His Asp Trp
50 55 60

Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp Ala Glu Arg
65 70 75 80

Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile Thr Gly Thr
85 90 95

Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu Thr Leu Thr
100 105 110

Val Gly Phe Thr Asp Gly Arg Lys Ile Ser His Ser Cys Thr His Pro
115 120 125

Phe His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe His Ser Arg
130 135 140

Pro Gln His Gly Arg Glu Leu Pro Cys Ser Thr Tyr Ala Gln Ser Thr
145 150 155 160

Ala Ala Thr Ala Glu Glu Ile Glu Val His Met Pro Pro Asp Thr Pro
165 170 175

Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys Ile Thr Val
180 185 190

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

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

Cys His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr Asn Ser Pro
225 230 235 240

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Leu Val Pro Arg Asn Ala Glu Phe Gly Asp Arg Lys Gly Lys Val His
                245                 250                 255

Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg
            260                 265                 270

Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met Leu Leu Tyr
        275                 280                 285

Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Glu Glu Pro
    290                 295                 300

Asn Tyr Gln Glu Glu Trp Val Thr His Lys Lys Glu Ile Arg Leu Thr
305                 310                 315                 320

Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr
                325                 330                 335

Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His Gly His Pro
            340                 345                 350

His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val
        355                 360                 365

Val Val Leu Ser Val Ala Ser Phe Ile Leu Leu Ser Met Val Gly Val
    370                 375                 380

Ala Val Gly Met Cys Met Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr
385                 390                 395                 400

Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Ile Cys
                405                 410                 415

Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln Glu Ala Ala Val Tyr
            420                 425                 430

Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu Gln Ala Leu Ile Pro
        435                 440                 445

Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu Arg Leu Leu Pro Cys
    450                 455                 460

Cys Cys Lys Met Leu Thr Phe Leu Ala Val Leu Ser Val Gly Ala His
465                 470                 475                 480

Thr Val Ser Ala Tyr Glu His Val Thr Val Ile Pro Asn Thr Val Gly
                485                 490                 495

Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly Tyr Ser Pro Met Val
            500                 505                 510
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Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu Pro Thr Leu Ser Leu
        515                 520                 525

Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile Pro Ser Pro Tyr Val
    530                 535                 540

Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys Ser Leu Pro Asp Tyr
545                 550                 555                 560

Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala
                565                 570                 575

Tyr Cys Phe Cys Asp Thr Glu Asn Thr Gln Leu Ser Glu Ala His Val
            580                 585                 590

Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala Ser Ala Tyr Arg Ala
        595                 600                 605

His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val Leu Tyr Gln Gly Asn
    610                 615                 620

Asn Ile Thr Val Ala Ala Tyr Ala Asn Gly Asp His Ala Val Thr Val
625                 630                 635                 640

Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser Ser Ala Trp Thr Pro
                645                 650                 655

Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp Val Tyr Asn Met Asp
            660                 665                 670

Tyr Pro Pro Phe Gly Ala Gly Arg Pro Gly Gln Phe Gly Asp Ile Gln
        675                 680                 685

Ser Arg Thr Pro Glu Ser Glu Asp Val Tyr Ala Asn Thr Gln Leu Val
    690                 695                 700

Leu Gln Arg Pro Ser Ala Gly Thr Val His Val Pro Tyr Ser Gln Ala
705                 710                 715                 720

Pro Ser Gly Phe Lys Tyr Trp Leu Lys Glu Arg Gly Ala Ser Leu Gln
                725                 730                 735

His Thr Ala Pro Phe Gly Cys Gln Ile Ala Thr Asn Pro Val Arg Ala
            740                 745                 750

Met Asn Cys Ala Val Gly Asn Met Pro Ile Ser Ile Asp Ile Pro Asp
        755                 760                 765

Ala Ala Phe Thr Arg Val Val Asp Ala Pro Ser Leu Thr Asp Met Ser
    770                 775                 780
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Cys Glu Val Ser Ala Cys Thr His Ser Ser Asp Phe Gly Gly Val Ala
785                 790                 795                 800

Ile Ile Lys Tyr Ala Ala Ser Lys Lys Gly Lys Cys Ala Val His Ser
                805                 810                 815

Met Thr Asn Ala Val Thr Ile Arg Glu Ala Glu Ile Glu Val Glu Gly
            820                 825                 830

Asn Ser Gln Leu Gln Ile Ser Phe Ser Thr Ala Leu Ala Ser Ala Glu
        835                 840                 845

Phe Arg Val Gln Val Cys Ser Thr Gln Val His Cys Ala Ala Glu Cys
    850                 855                 860

His Pro Pro Lys Asp His Ile Val Asn Tyr Pro Ala Ser His Thr Thr
865                 870                 875                 880

Pro Gly Val Gln Asp Ile Ser Ala Thr Ala Met Ser Trp Val Gln Lys
                885                 890                 895

Ile Thr Gly Gly Val Gly Leu Val Val Ala Val Ala Ala Leu Ile Leu
            900                 905                 910

Ile Val Val Leu Cys Val Ser Phe Ser Arg His
        915                 920


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1               5                   10                  15

cga ccc tgg act ccg cgc cct act atc caa gtc atc agg ccc aga ccg         96
Arg Pro Trp Thr Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
            20                  25                  30

cgc ccg cag agg caa gct ggg caa ctt gcc cag ctg atc tca gca gtt        144
Arg Pro Gln Arg Gln Ala Gly Gln Leu Ala Gln Leu Ile Ser Ala Val
        35                  40                  45

aat aaa ctg aca atg cgc gcg gta ccc caa cag aag cca cgc agg aat        192
Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60
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cgg aag aat aag aag caa aag caa aag caa cag gcg cca caa aac aac        240
Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
65                  70                  75                  80

aca aac caa aag aag cag cca cct aaa aag aaa cca gct caa aag aaa        288
Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

aag aag ccg ggc cgc aga gag agg atg tgc atg aaa atc gaa aat gac        336
Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

tgt att ttc gaa gtc aag cac gaa ggt aag gta aca ggt tac gcg tgc        384
Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
        115                 120                 125

ttg gtg ggg gac aaa gta atg aaa cca gca cac gta aag ggg acc atc        432
Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

gat aac gcg gac ctg gcc aaa ttg gcc ttt aag cgg tca tct aag tac        480
Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

gac ctt gaa tgc gcg cag ata ccc gtg cac atg aag tcc gac gct tcg        528
Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

aag ttc acc cat gag aaa ccg gag ggg tac tac aac tgg cac cac gga        576
Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

gca gta cag tac tca gga ggc cgg ttc acc atc cct aca ggt gcg ggc        624
Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

aaa cca ggg gac agc ggt aga ccg atc ttc gac aac aag gga cgc gtg        672
Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

gtg gcc ata gtc tta gga gga gct aat gaa gga gcc cgt aca gcc ctc        720
Val Ala Ile Val Leu Gly Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu
225                 230                 235                 240

tca gtg gtg acc tgg aat aaa gac att gtc act aaa atc acc cct gag        768
Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
                245                 250                 255

gga gcc gaa gag tgg agt ctt gcc atc cca gtt atg tgc ctg ttg gca        816
Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
            260                 265                 270

aat acc acg ttc ccc tgc tcc cag ccc cct tgc ata ccc tgc tgc tac        864
Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Ile Pro Cys Cys Tyr
        275                 280                 285

gaa aag gaa ccg gag gaa acc cta cgc atg ctt gag gac aac gtc atg        912
Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

aga cct ggg tac tat cag ctg cta caa gca tca tta aca tgt tct ccc        960
Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

cac cgc cag cga cgc agc acc aag gac aac ttc aat gtc tat aaa gcc       1008
His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335
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aca aga cca tac tta gct cac tgt ccc gac tgt gga gaa ggg cac tcg       1056
Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

tgc cat agt ccc gta gca cta gaa cgc atc aga aat gaa gcg aca gac       1104
Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

ggg acg ctg aaa atc cag gtc tcc ttg caa att gga ata ggg acg gat       1152
Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Gly Thr Asp
    370                 375                 380

gat agc cat gat tgg acc aag ctg cgt tac atg gac aat cac ata cca       1200
Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Ile Pro
385                 390                 395                 400

gca gac gca ggg agg gcc ggg cta ttt gta aga aca tca gca cca tgc       1248
Ala Asp Ala Gly Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

acg att act gga aca atg gga cac ttc atc ctg gcc cga tgt ccg aaa       1296
Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

gga gaa act ctg acg gtg gga ttc act gac agt agg aag att agt cac       1344
Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
        435                 440                 445

tca tgt acg cac cca ttt cac cac gac cct cct gtg ata ggc cgg gaa       1392
Ser Cys Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

aaa ttc cat tcc cga ccg cag cac ggt aaa gag cta cct tgc agc acg       1440
Lys Phe His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr
465                 470                 475                 480

tac gtg cag agc aac gcc gca act gcc gag gag ata gag gta cac atg       1488
Tyr Val Gln Ser Asn Ala Ala Thr Ala Glu Glu Ile Glu Val His Met
                485                 490                 495

ccc cca gac acc cct gat cgc aca ttg ctg tca caa cag tcc ggc aac       1536
Pro Pro Asp Thr Pro Asp Arg Thr Leu Leu Ser Gln Gln Ser Gly Asn
            500                 505                 510

gta aag atc aca gtc aac ggc cgg acg gtg cgg tat aag tgt aat tgc       1584
Val Lys Ile Thr Val Asn Gly Arg Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

ggt ggc tca aat gaa gga cta ata act aca gat aaa gtg att aat aac       1632
Gly Gly Ser Asn Glu Gly Leu Ile Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

tgc aag gtt gat caa tgt cat gcc gcg gtc acc aat cac aaa aag tgg       1680
Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560

cag tat aac tcc cct ctg gtc ccg cgt aac gct gaa ctc ggg gac cga       1728
Gln Tyr Asn Ser Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg
                565                 570                 575

aaa gga aaa att cac atc ccg ttt ccg ctg gca aat gta aca tgc atg       1776
Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Met
            580                 585                 590

gtg cct aaa gca agg aac ccc acc gtg acg tac ggg aaa aac caa gtc       1824
Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605
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atc atg cta ctg tat cct gac cac cca aca ctc ctg tcc tac cgg agt       1872
Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Ser
    610                 615                 620

atg gga gaa gaa cca aac tat caa gaa gag tgg gtg acg cac aag aag       1920
Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Thr His Lys Lys
625                 630                 635                 640

gag gtc gtg cta acc gtg ccg act gaa ggg ctc gag gtt acg tgg ggc       1968
Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
                645                 650                 655

aac aac gag ccg tat aag tat tgg ccg cag tta tct gca aac ggt aca       2016
Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Ala Asn Gly Thr
            660                 665                 670

gcc cac ggc cac ccg cat gag ata atc ttg tac tat tat gag ctg tac       2064
Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
        675                 680                 685

cct act atg act gta gta gtt gtg tca gtg gcc tcg ttc ata ctc ctg       2112
Pro Thr Met Thr Val Val Val Val Ser Val Ala Ser Phe Ile Leu Leu
    690                 695                 700

tcg atg gtg ggt atg gca gtg ggg atg tgc atg tgt gca cga cgc aga       2160
Ser Met Val Gly Met Ala Val Gly Met Cys Met Cys Ala Arg Arg Arg
705                 710                 715                 720

tgc atc aca cca tac gaa ctg aca cca gga gct acc gtc cct ttc ctg       2208
Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
                725                 730                 735

ctt agc cta ata tgc tgc atc aga aca gct aaa gcg gcc aca tac caa       2256
Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
            740                 745                 750

gag gct gcg gta tac ctg tgg aac gag cag caa cct ttg ttt tgg cta       2304
Glu Ala Ala Val Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
        755                 760                 765

caa gcc ctt att ccg ctg gca gcc ctg att gtc cta tgc aac tgt ctg       2352
Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
    770                 775                 780

aga ctc tta cca tgc tgt tgt aaa acg ttg gct ttt tta gcc gta atg       2400
Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785                 790                 795                 800

agc atc ggt gcc cac act gtg agc gcg tac gaa cac gta aca gtg atc       2448
Ser Ile Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
                805                 810                 815

ccg aac acg gtg gga gta ccg tat aag act cta gtc aac aga ccg ggc       2496
Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
            820                 825                 830

tac agc ccc atg gta ctg gag atg gag cta ctg tca gtc act ttg gag       2544
Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
        835                 840                 845

cca acg cta tcg ctt gat tac atc acg tgc gaa tac aaa acc gtc atc       2592
Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
    850                 855                 860

ccg tct ccg tac gtg aaa tgc tgc ggt aca gca gag tgc aag gac aaa       2640
Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865                 870                 875                 880
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aac cta cct gac tac agc tgt aag gtc ttc acc ggc gtc tac cca ttt       2688
Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe
                885                 890                 895

atg tgg ggc ggc gcc tac tgc ttc tgc gac gct gaa aac acg caa ttg       2736
Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
            900                 905                 910

agc gaa gca cat gtg gag aag tcc gaa tca tgc aaa aca gaa ttt gca       2784
Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
        915                 920                 925

tca gca tac agg gct cat acc gca tcc gca tca gct aag ctc cgc gtc       2832
Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
    930                 935                 940

ctt tac caa gga aat aac atc act gta act gcc tat gca aac ggc gac       2880
Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945                 950                 955                 960

cat gcc gtc aca gtt aag gac gcc aaa ttc att gtg ggg cca atg tct       2928
His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
                965                 970                 975

tca gcc tgg aca cct ttc gac aac aaa atc gtg gtg tac aaa ggt gac       2976
Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
            980                 985                 990

gtt tac aac atg gac tac ccg ccc  ttt ggc gca gga aga  cca gga caa     3024
Val Tyr Asn Met Asp Tyr Pro Pro  Phe Gly Ala Gly Arg  Pro Gly Gln
        995                 1000                1005

ttt ggc  gat atc caa agt cgc  acg cct gag agc aaa  gac gtc tat        3069
Phe Gly  Asp Ile Gln Ser Arg  Thr Pro Glu Ser Lys  Asp Val Tyr
    1010                1015                1020

gct aac  aca caa ctg gta ctg  cag aga ccg gct gcg  ggt acg gta        3114
Ala Asn  Thr Gln Leu Val Leu  Gln Arg Pro Ala Ala  Gly Thr Val
    1025                1030                1035

cac gtg  cca tac tct cag gca  cca tct ggc ttt aag  tat tgg tta        3159
His Val  Pro Tyr Ser Gln Ala  Pro Ser Gly Phe Lys  Tyr Trp Leu
    1040                1045                1050

aaa gaa  cga ggg gcg tcg cta  cag cac aca gca cca  ttt ggc tgc        3204
Lys Glu  Arg Gly Ala Ser Leu  Gln His Thr Ala Pro  Phe Gly Cys
    1055                1060                1065

caa ata  gca aca aac ccg gta  aga gcg atg aac tgc  gcc gta ggg        3249
Gln Ile  Ala Thr Asn Pro Val  Arg Ala Met Asn Cys  Ala Val Gly
    1070                1075                1080

aac atg  ccc atc tcc atc gac  ata ccg gat gcg gcc  ttc act agg        3294
Asn Met  Pro Ile Ser Ile Asp  Ile Pro Asp Ala Ala  Phe Thr Arg
    1085                1090                1095

gtc gtc  gac gcg ccc tct tta  acg gac atg tca tgc  gag gta cca        3339
Val Val  Asp Ala Pro Ser Leu  Thr Asp Met Ser Cys  Glu Val Pro
    1100                1105                1110

gcc tgc  acc cat tcc tca gac  ttt ggg ggc gtc gcc  att att aaa        3384
Ala Cys  Thr His Ser Ser Asp  Phe Gly Gly Val Ala  Ile Ile Lys
    1115                1120                1125

tat gca  gtc agc aag aaa ggc  aag tgt gcg gtg cat  tcg atg acc        3429
Tyr Ala  Val Ser Lys Lys Gly  Lys Cys Ala Val His  Ser Met Thr
    1130                1135                1140
```

```
aac gcc  gtc act atc cgg gaa  gct gag ata gaa gtt  gaa ggg aat        3474
Asn Ala  Val Thr Ile Arg Glu  Ala Glu Ile Glu Val  Glu Gly Asn
    1145                1150                1155

tct cag  ctg caa atc tct ttc  tcg acg gcc ttg gcc  agc gcc gaa        3519
Ser Gln  Leu Gln Ile Ser Phe  Ser Thr Ala Leu Ala  Ser Ala Glu
    1160                1165                1170

ttc cgc  gta caa gtc tgt tct  aca caa gta cac tgt  gca gcc gag        3564
Phe Arg  Val Gln Val Cys Ser  Thr Gln Val His Cys  Ala Ala Glu
    1175                1180                1185

tgc cac  cct ccg aag gac cac  ata gtc aac tac ccg  gcg tca cat        3609
Cys His  Pro Pro Lys Asp His  Ile Val Asn Tyr Pro  Ala Ser His
    1190                1195                1200

acc acc  ctc ggg gtc cag gac  att tcc gct acg gcg  atg tca tgg        3654
Thr Thr  Leu Gly Val Gln Asp  Ile Ser Ala Thr Ala  Met Ser Trp
    1205                1210                1215

gtg cag  aag atc acg gga ggt  gtg gga ctg gtt gtc  gct gtt gca        3699
Val Gln  Lys Ile Thr Gly Gly  Val Gly Leu Val Val  Ala Val Ala
    1220                1225                1230

gca ctg  att cta atc gtg gtg  cta tgc gtg tcg ttc  agc agg cac        3744
Ala Leu  Ile Leu Ile Val Val  Leu Cys Val Ser Phe  Ser Arg His
    1235                1240                1245
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<210> 21
<211> 1248
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Construct

<400> 21

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Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
1               5                   10                  15

Arg Pro Trp Thr Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
            20                  25                  30

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

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60

Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
65                  70                  75                  80

Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
```

115 120 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
130 135 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145 150 155 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
165 170 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
180 185 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
195 200 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
210 215 220

Val Ala Ile Val Leu Gly Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu
225 230 235 240

Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
245 250 255

Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
260 265 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Ile Pro Cys Cys Tyr
275 280 285

Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
290 295 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305 310 315 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
325 330 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
340 345 350

Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
355 360 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Gly Thr Asp
370 375 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Ile Pro

```
385                 390                 395                 400

Ala Asp Ala Gly Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

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

Ser Cys Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

Lys Phe His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr
465                 470                 475                 480

Tyr Val Gln Ser Asn Ala Ala Thr Ala Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Leu Ser Gln Gln Ser Gly Asn
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Arg Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Asn Glu Gly Leu Ile Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560

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

Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Met
            580                 585                 590

Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605

Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Ser
    610                 615                 620

Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Thr His Lys Lys
625                 630                 635                 640

Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
                645                 650                 655

Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Ala Asn Gly Thr
```

660 665 670

Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
675 680 685

Pro Thr Met Thr Val Val Val Val Ser Val Ala Ser Phe Ile Leu Leu
690 695 700

Ser Met Val Gly Met Ala Val Gly Met Cys Met Cys Ala Arg Arg Arg
705 710 715 720

Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
725 730 735

Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
740 745 750

Glu Ala Ala Val Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
755 760 765

Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
770 775 780

Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785 790 795 800

Ser Ile Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
805 810 815

Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
820 825 830

Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
835 840 845

Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
850 855 860

Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865 870 875 880

Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe
885 890 895

Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
900 905 910

Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
915 920 925

Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val

```
930                 935                 940

Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945                 950                 955                 960

His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
                965                 970                 975

Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
            980                 985                 990

Val Tyr Asn Met Asp Tyr Pro Pro  Phe Gly Ala Gly Arg  Pro Gly Gln
        995                 1000                1005

Phe Gly  Asp Ile Gln Ser Arg  Thr Pro Glu Ser Lys  Asp Val Tyr
    1010                1015                1020

Ala Asn  Thr Gln Leu Val Leu  Gln Arg Pro Ala Ala  Gly Thr Val
    1025                1030                1035

His Val  Pro Tyr Ser Gln Ala  Pro Ser Gly Phe Lys  Tyr Trp Leu
    1040                1045                1050

Lys Glu  Arg Gly Ala Ser Leu  Gln His Thr Ala Pro  Phe Gly Cys
    1055                1060                1065

Gln Ile  Ala Thr Asn Pro Val  Arg Ala Met Asn Cys  Ala Val Gly
    1070                1075                1080

Asn Met  Pro Ile Ser Ile Asp  Ile Pro Asp Ala Ala  Phe Thr Arg
    1085                1090                1095

Val Val  Asp Ala Pro Ser Leu  Thr Asp Met Ser Cys  Glu Val Pro
    1100                1105                1110

Ala Cys  Thr His Ser Ser Asp  Phe Gly Gly Val Ala  Ile Ile Lys
    1115                1120                1125

Tyr Ala  Val Ser Lys Lys Gly  Lys Cys Ala Val His  Ser Met Thr
    1130                1135                1140

Asn Ala  Val Thr Ile Arg Glu  Ala Glu Ile Glu Val  Glu Gly Asn
    1145                1150                1155

Ser Gln  Leu Gln Ile Ser Phe  Ser Thr Ala Leu Ala  Ser Ala Glu
    1160                1165                1170

Phe Arg  Val Gln Val Cys Ser  Thr Gln Val His Cys  Ala Ala Glu
    1175                1180                1185

Cys His  Pro Pro Lys Asp His  Ile Val Asn Tyr Pro  Ala Ser His
```

1190 1195 1200

Thr Thr Leu Gly Val Gln Asp Ile Ser Ala Thr Ala Met Ser Trp
1205 1210 1215

Val Gln Lys Ile Thr Gly Gly Val Gly Leu Val Val Ala Val Ala
1220 1225 1230

Ala Leu Ile Leu Ile Val Val Leu Cys Val Ser Phe Ser Arg His
1235 1240 1245

<210> 22
<211> 1248
<212> PRT
<213> Artificial Sequence

<220>
<223> proteins C-E3-E2-6K-E1 strain 05.61

<400> 22

Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
1 5 10 15

Arg Pro Trp Thr Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
20 25 30

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

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
50 55 60

Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
65 70 75 80

Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
85 90 95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
100 105 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
115 120 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
130 135 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145 150 155 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
165 170 175

```
Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

Val Ala Ile Val Leu Gly Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu
225                 230                 235                 240

Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
                245                 250                 255

Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro
385                 390                 395                 400

Ala Asp Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
        435                 440                 445
```

```
Ser Cys Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

Lys Phe His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr
465                 470                 475                 480

Tyr Val Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560

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

Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg
            580                 585                 590

Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605

Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn
    610                 615                 620

Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys
625                 630                 635                 640

Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
                645                 650                 655

Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr
            660                 665                 670

Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
        675                 680                 685

Pro Thr Met Thr Val Val Val Val Ser Val Ala Thr Phe Ile Leu Leu
    690                 695                 700

Ser Met Val Gly Met Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg
705                 710                 715                 720
```

```
Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
                725                 730                 735

Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
            740                 745                 750

Glu Ala Ala Ile Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
        755                 760                 765

Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
    770                 775                 780

Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785                 790                 795                 800

Ser Val Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
                805                 810                 815

Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
            820                 825                 830

Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
        835                 840                 845

Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
    850                 855                 860

Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865                 870                 875                 880

Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe
                885                 890                 895

Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
            900                 905                 910

Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
        915                 920                 925

Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
    930                 935                 940

Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945                 950                 955                 960

His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
                965                 970                 975

Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
            980                 985                 990
```

```
Val Tyr Asn Met Asp Tyr Pro Pro  Phe Gly Ala Gly Arg  Pro Gly Gln
        995                 1000                1005


Phe Gly  Asp Ile Gln Ser Arg  Thr Pro Glu Ser Lys  Asp Val Tyr
    1010                1015                1020


Ala Asn  Thr Gln Leu Val Leu  Gln Arg Pro Ala Ala  Gly Thr Val
    1025                1030                1035


His Val  Pro Tyr Ser Gln Ala  Pro Ser Gly Phe Lys  Tyr Trp Leu
    1040                1045                1050


Lys Glu  Arg Gly Ala Ser Leu  Gln His Thr Ala Pro  Phe Gly Cys
    1055                1060                1065


Gln Ile  Ala Thr Asn Pro Val  Arg Ala Val Asn Cys  Ala Val Gly
    1070                1075                1080


Asn Met  Pro Ile Ser Ile Asp  Ile Pro Glu Ala Ala  Phe Thr Arg
    1085                1090                1095


Val Val  Asp Ala Pro Ser Leu  Thr Asp Met Ser Cys  Glu Val Pro
    1100                1105                1110


Ala Cys  Thr His Ser Ser Asp  Phe Gly Gly Val Ala  Ile Ile Lys
    1115                1120                1125


Tyr Ala  Ala Ser Lys Lys Gly  Lys Cys Ala Val His  Ser Met Thr
    1130                1135                1140


Asn Ala  Val Thr Ile Arg Glu  Ala Glu Ile Glu Val  Glu Gly Asn
    1145                1150                1155


Ser Gln  Leu Gln Ile Ser Phe  Ser Thr Ala Leu Ala  Ser Ala Glu
    1160                1165                1170


Phe Arg  Val Gln Val Cys Ser  Thr Gln Val His Cys  Ala Ala Glu
    1175                1180                1185


Cys His  Pro Pro Lys Asp His  Ile Val Asn Tyr Pro  Ala Ser His
    1190                1195                1200


Thr Thr  Leu Gly Val Gln Asp  Ile Ser Ala Thr Ala  Met Ser Trp
    1205                1210                1215


Val Gln  Lys Ile Thr Gly Gly  Val Gly Leu Val Val  Ala Val Ala
    1220                1225                1230


Ala Leu  Ile Leu Ile Val Val  Leu Cys Val Ser Phe  Ser Arg His
    1235                1240                1245
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<210> 23
<211> 1248
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<213> Artificial Sequence

<220>
<223> proteins C-E3-E2-6K-E1 strain 05.209

<400> 23

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Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
1               5                   10                  15

Arg Pro Trp Thr Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
            20                  25                  30

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

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60

Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
65                  70                  75                  80

Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
        115                 120                 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

Val Ala Ile Val Leu Gly Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu
```

```
225                 230                 235                 240

Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
                245                 250                 255

Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro
385                 390                 395                 400

Ala Asp Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

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

Ser Cys Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

Lys Phe His Ser Arg Pro Arg His Gly Lys Glu Leu Pro Cys Ser Thr
465                 470                 475                 480

Tyr Val Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn
```

```
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560

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

Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg
            580                 585                 590

Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605

Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn
    610                 615                 620

Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys
625                 630                 635                 640

Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
                645                 650                 655

Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr
            660                 665                 670

Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
        675                 680                 685

Pro Thr Met Thr Val Val Val Val Ser Val Ala Thr Phe Ile Leu Leu
    690                 695                 700

Ser Met Val Gly Met Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg
705                 710                 715                 720

Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
                725                 730                 735

Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
            740                 745                 750

Glu Ala Ala Ile Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
        755                 760                 765

Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
```

```
    770                 775                 780

Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785                 790                 795                 800

Ser Val Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
                805                 810                 815

Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
            820                 825                 830

Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
        835                 840                 845

Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
    850                 855                 860

Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865                 870                 875                 880

Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe
                885                 890                 895

Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
            900                 905                 910

Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
        915                 920                 925

Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
    930                 935                 940

Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945                 950                 955                 960

His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
                965                 970                 975

Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
            980                 985                 990

Val Tyr Asn Met Asp Tyr Pro Pro  Phe Gly Ala Gly Arg  Pro Gly Gln
        995                 1000                1005

Phe Gly  Asp Ile Gln Ser Arg  Thr Pro Glu Ser Lys  Asp Val Tyr
    1010                1015                1020

Ala Asn  Thr Gln Leu Val Leu  Gln Arg Pro Ala Ala  Gly Thr Val
    1025                1030                1035

His Val  Pro Tyr Ser Gln Ala  Pro Ser Gly Phe Lys  Tyr Trp Leu
```

1040 1045 1050

Lys Glu Arg Gly Ala Ser Leu Gln His Thr Ala Pro Phe Gly Cys
1055 1060 1065

Gln Ile Ala Thr Asn Pro Val Arg Ala Val Asn Cys Ala Val Gly
1070 1075 1080

Asn Met Pro Ile Ser Ile Asp Ile Pro Glu Ala Ala Phe Thr Arg
1085 1090 1095

Val Val Asp Ala Pro Ser Leu Thr Asp Met Ser Cys Glu Val Pro
1100 1105 1110

Ala Cys Thr His Ser Ser Asp Phe Gly Gly Val Ala Ile Ile Lys
1115 1120 1125

Tyr Ala Ala Ser Lys Lys Gly Lys Cys Ala Val His Ser Met Thr
1130 1135 1140

Asn Ala Val Thr Ile Arg Glu Ala Glu Ile Glu Val Glu Gly Asn
1145 1150 1155

Ser Gln Leu Gln Ile Ser Phe Ser Thr Ala Leu Ala Ser Ala Glu
1160 1165 1170

Phe Arg Val Gln Val Cys Ser Thr Gln Val His Cys Ala Ala Glu
1175 1180 1185

Cys His Pro Pro Lys Asp His Ile Val Asn Tyr Pro Ala Ser His
1190 1195 1200

Thr Thr Leu Gly Val Gln Asp Ile Ser Ala Thr Ala Met Ser Trp
1205 1210 1215

Val Gln Lys Ile Thr Gly Gly Val Gly Leu Val Val Ala Val Ala
1220 1225 1230

Ala Leu Ile Leu Ile Val Val Leu Cys Val Ser Phe Ser Arg His
1235 1240 1245

<210> 24
<211> 1248
<212> PRT
<213> Artificial Sequence

<220>
<223> proteins C-E3-E2-6K-E1 strain 05.115

<400> 24

Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
1 5 10 15

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Arg Pro Trp Thr Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
            20                  25                  30

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

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60

Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
65                  70                  75                  80

Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
        115                 120                 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

Val Ala Ile Val Leu Gly Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu
225                 230                 235                 240

Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
                245                 250                 255

Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285
```

```
Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro
385                 390                 395                 400

Ala Asp Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

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

Ser Cys Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

Lys Phe His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr
465                 470                 475                 480

Tyr Val Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560
```

```
Gln Tyr Asn Ser Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg
                565                 570                 575

Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg
            580                 585                 590

Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605

Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn
    610                 615                 620

Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys
625                 630                 635                 640

Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
                645                 650                 655

Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr
            660                 665                 670

Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
        675                 680                 685

Pro Thr Met Thr Val Val Val Val Ser Val Ala Thr Phe Ile Leu Leu
    690                 695                 700

Ser Met Val Gly Met Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg
705                 710                 715                 720

Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
                725                 730                 735

Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
            740                 745                 750

Glu Ala Ala Ile Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
        755                 760                 765

Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
    770                 775                 780

Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785                 790                 795                 800

Ser Val Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
                805                 810                 815

Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
            820                 825                 830
```

```
Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
        835                 840                 845

Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
    850                 855                 860

Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865                 870                 875                 880

Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe
                885                 890                 895

Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
            900                 905                 910

Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
        915                 920                 925

Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
    930                 935                 940

Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945                 950                 955                 960

His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
                965                 970                 975

Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
            980                 985                 990

Val Tyr Asn Met Asp Tyr Pro Pro  Phe Gly Ala Gly Arg  Pro Gly Gln
        995                 1000                1005

Phe Gly  Asp Ile Gln Ser Arg  Thr Pro Glu Ser Lys  Asp Val Tyr
    1010                1015                1020

Ala Asn  Thr Gln Leu Val Leu  Gln Arg Pro Ala Ala  Gly Thr Val
    1025                1030                1035

His Val  Pro Tyr Ser Gln Ala  Pro Ser Gly Phe Lys  Tyr Trp Leu
    1040                1045                1050

Lys Glu  Arg Gly Ala Ser Leu  Gln His Thr Ala Pro  Phe Gly Cys
    1055                1060                1065

Gln Ile  Ala Thr Asn Pro Val  Arg Ala Val Asn Cys  Ala Val Gly
    1070                1075                1080

Asn Met  Pro Ile Ser Ile Asp  Ile Pro Glu Ala Ala  Phe Thr Arg
    1085                1090                1095
```

```
Val Val  Asp Ala Pro Ser Leu  Thr Asp Met Ser Cys  Glu Val Pro
    1100                1105                1110


Ala Cys  Thr His Ser Ser Asp  Phe Gly Gly Val Ala  Ile Ile Lys
    1115                1120                1125


Tyr Ala  Ala Ser Lys Lys Gly  Lys Cys Ala Val His  Ser Met Thr
    1130                1135                1140


Asn Ala  Val Thr Ile Arg Glu  Ala Glu Ile Glu Val  Glu Gly Asn
    1145                1150                1155


Ser Gln  Leu Gln Ile Ser Phe  Ser Thr Ala Leu Ala  Ser Ala Glu
    1160                1165                1170


Phe Arg  Val Gln Val Cys Ser  Thr Gln Val His Cys  Ala Ala Glu
    1175                1180                1185


Cys His  Pro Pro Lys Asp His  Ile Val Asn Tyr Pro  Ala Ser His
    1190                1195                1200


Thr Thr  Leu Gly Val Gln Asp  Ile Ser Ala Thr Ala  Met Ser Trp
    1205                1210                1215


Val Gln  Lys Ile Thr Gly Gly  Val Gly Leu Val Val  Ala Val Ala
    1220                1225                1230


Ala Leu  Ile Leu Ile Val Val  Leu Cys Val Ser Phe  Ser Arg His
    1235                1240                1245


<210>  25
<211>  1248
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  proteins C-E3-E2-6K-E1 strain 06.27

<400>  25

Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
1               5                   10                  15


Arg Pro Trp Thr Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
            20                  25                  30


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


Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60


Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
```

```
65                  70                  75                  80

Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
        115                 120                 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

Val Ala Ile Val Leu Gly Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu
225                 230                 235                 240

Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
                245                 250                 255

Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
```

```
            340                 345                 350

Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro
385                 390                 395                 400

Ala Asp Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

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

Ser Cys Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

Lys Phe His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr
465                 470                 475                 480

Tyr Val Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560

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

Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg
            580                 585                 590

Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605

Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn
```

610 615 620

Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys
625 630 635 640

Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
645 650 655

Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr
660 665 670

Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
675 680 685

Pro Thr Met Thr Val Val Val Val Ser Val Ala Thr Phe Ile Leu Leu
690 695 700

Ser Met Val Gly Met Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg
705 710 715 720

Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
725 730 735

Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
740 745 750

Glu Ala Ala Ile Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
755 760 765

Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
770 775 780

Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785 790 795 800

Ser Val Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
805 810 815

Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
820 825 830

Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
835 840 845

Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
850 855 860

Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865 870 875 880

Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe

885 890 895

Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
900 905 910

Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
915 920 925

Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
930 935 940

Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945 950 955 960

His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
965 970 975

Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
980 985 990

Val Tyr Asn Met Asp Tyr Pro Pro Phe Gly Ala Gly Arg Pro Gly Gln
995 1000 1005

Phe Gly Asp Ile Gln Ser Arg Thr Pro Glu Ser Lys Asp Val Tyr
1010 1015 1020

Ala Asn Thr Gln Leu Val Leu Gln Arg Pro Ala Val Gly Thr Val
1025 1030 1035

His Val Pro Tyr Ser Gln Ala Pro Ser Gly Phe Lys Tyr Trp Leu
1040 1045 1050

Lys Glu Arg Gly Ala Ser Leu Gln His Thr Ala Pro Phe Gly Cys
1055 1060 1065

Gln Ile Ala Thr Asn Pro Val Arg Ala Val Asn Cys Ala Val Gly
1070 1075 1080

Asn Met Pro Ile Ser Ile Asp Ile Pro Glu Ala Ala Phe Thr Arg
1085 1090 1095

Val Val Asp Ala Pro Ser Leu Thr Asp Met Ser Cys Glu Val Pro
1100 1105 1110

Ala Cys Thr His Ser Ser Asp Phe Gly Gly Val Ala Ile Ile Lys
1115 1120 1125

Tyr Ala Ala Ser Lys Lys Gly Lys Cys Ala Val His Ser Met Thr
1130 1135 1140

Asn Ala Val Thr Ile Arg Glu Ala Glu Ile Glu Val Glu Gly Asn

1145 1150 1155

Ser Gln Leu Gln Ile Ser Phe Ser Thr Ala Leu Ala Ser Ala Glu
1160 1165 1170

Phe Arg Val Gln Val Cys Ser Thr Gln Val His Cys Ala Ala Glu
1175 1180 1185

Cys His Pro Pro Lys Asp His Ile Val Asn Tyr Pro Ala Ser His
1190 1195 1200

Thr Thr Leu Gly Val Gln Asp Ile Ser Ala Thr Ala Met Ser Trp
1205 1210 1215

Val Gln Lys Ile Thr Gly Gly Val Gly Leu Val Val Ala Val Ala
1220 1225 1230

Ala Leu Ile Leu Ile Val Val Leu Cys Val Ser Phe Ser Arg His
1235 1240 1245

<210> 26
<211> 1248
<212> PRT
<213> Artificial Sequence

<220>
<223> proteins C-E3-E2-6K-E1 strain 06.21

<400> 26

Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
1 5 10 15

Arg Pro Trp Thr Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
20 25 30

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

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
50 55 60

Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
65 70 75 80

Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
85 90 95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
100 105 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
115 120 125

```
Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

Val Ala Ile Val Leu Gly Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu
225                 230                 235                 240

Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
                245                 250                 255

Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro
385                 390                 395                 400
```

```
Ala Asp Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

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

Ser Cys Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

Lys Phe His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr
465                 470                 475                 480

Tyr Val Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560

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

Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg
            580                 585                 590

Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605

Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn
    610                 615                 620

Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys
625                 630                 635                 640

Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
                645                 650                 655

Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr
            660                 665                 670
```

```
Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
        675                 680                 685

Pro Thr Met Thr Val Val Val Val Ser Val Ala Thr Phe Ile Leu Leu
    690                 695                 700

Ser Met Val Gly Met Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg
705                 710                 715                 720

Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
                725                 730                 735

Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
            740                 745                 750

Glu Ala Ala Ile Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
        755                 760                 765

Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
    770                 775                 780

Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785                 790                 795                 800

Ser Val Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
                805                 810                 815

Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
            820                 825                 830

Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
        835                 840                 845

Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
    850                 855                 860

Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865                 870                 875                 880

Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe
                885                 890                 895

Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
            900                 905                 910

Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
        915                 920                 925

Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
    930                 935                 940
```

```
Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945                 950                 955                 960

His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
                965                 970                 975

Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
            980                 985                 990

Val Tyr Asn Met Asp Tyr Pro Pro  Phe Gly Ala Gly Arg  Pro Gly Gln
        995                 1000                1005

Phe Gly  Asp Ile Gln Ser Arg  Thr Pro Glu Ser Lys  Asp Val Tyr
    1010                1015                1020

Ala Asn  Thr Gln Leu Val Leu  Gln Arg Pro Ala Val  Gly Thr Val
    1025                1030                1035

His Val  Pro Tyr Ser Gln Ala  Pro Ser Gly Phe Lys  Tyr Trp Leu
    1040                1045                1050

Lys Glu  Arg Gly Ala Ser Leu  Gln His Thr Ala Pro  Phe Gly Cys
    1055                1060                1065

Gln Ile  Ala Thr Asn Pro Val  Arg Ala Val Asn Cys  Ala Val Gly
    1070                1075                1080

Asn Met  Pro Ile Ser Ile Asp  Ile Pro Glu Ala Ala  Phe Thr Arg
    1085                1090                1095

Val Val  Asp Ala Pro Ser Leu  Thr Asp Met Ser Cys  Glu Val Pro
    1100                1105                1110

Ala Cys  Thr His Ser Ser Asp  Phe Gly Gly Val Ala  Ile Ile Lys
    1115                1120                1125

Tyr Ala  Ala Ser Lys Lys Gly  Lys Cys Ala Val His  Ser Met Thr
    1130                1135                1140

Asn Ala  Val Thr Ile Arg Glu  Ala Glu Ile Glu Val  Glu Gly Asn
    1145                1150                1155

Ser Gln  Leu Gln Ile Ser Phe  Ser Thr Ala Leu Ala  Ser Ala Glu
    1160                1165                1170

Phe Arg  Val Gln Val Cys Ser  Thr Gln Val His Cys  Ala Ala Glu
    1175                1180                1185

Cys His  Pro Pro Lys Asp His  Ile Val Asn Tyr Pro  Ala Ser His
    1190                1195                1200
```

```
Thr Thr  Leu Gly Val Gln Asp  Ile Ser Ala Thr Ala  Met Ser Trp
    1205                1210                1215


Val Gln  Lys Ile Thr Gly Gly  Val Gly Leu Val Val  Ala Val Ala
    1220                1225                1230


Ala Leu  Ile Leu Ile Val Val  Leu Cys Val Ser Phe  Ser Arg His
    1235                1240                1245


<210>  27
<211>  3747
<212>  DNA
<213>  Artificial Sequence

<220>
<223>  proteins C-E3-E2-6K-E1 strain 06.49 (GenBank: AM258994.1)


<220>
<221>  CDS
<222>  (1)..(3747)

<400>  27
atg gag ttc atc cca acc caa act ttt tac aat agg agg tac cag cct         48
Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
1               5                   10                  15

cga ccc tgg act ccg cgc cct act atc caa gtc atc agg ccc aga ccg         96
Arg Pro Trp Thr Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
            20                  25                  30

cgc cct cag agg caa gct ggg caa ctt gcc cag ctg atc tca gca gtt        144
Arg Pro Gln Arg Gln Ala Gly Gln Leu Ala Gln Leu Ile Ser Ala Val
        35                  40                  45

aat aaa ctg aca atg cgc gcg gta ccc caa cag aag cca cgc agg aat        192
Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60

cgg aag aat aag aag caa aag caa aaa caa cag gcg cca caa aac aac        240
Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
65                  70                  75                  80

aca aat caa aag aag cag cca cct aaa aag aaa ccg gct caa aag aaa        288
Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

aag aag ccg ggc cgc aga gag agg atg tgc atg aaa atc gaa aat gat        336
Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

tgt att ttc gaa gtc aag cac gaa ggt aag gta aca ggt tac gcg tgc        384
Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
        115                 120                 125

ctg gtg ggg gac aaa gta atg aaa cca gca cac gta aag ggg acc atc        432
Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

gat aac gcg gac ctg gcc aaa ctg gcc ttt aag cgg tca tct aag tat        480
Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

gac ctt gaa tgc gcg cag ata ccc gtg cac atg aag tcc gac gct tcg        528
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Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

aag ttc acc cat gag aaa ccg gag ggg tac tac aac tgg cac cac gga        576
Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

gca gta cag tac tca gga ggc cgg ttc acc atc cct aca ggt gct ggc        624
Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

aaa cca ggg gac agc ggc aga ccg atc ttc gac aac aag gga cgc gtg        672
Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

gtg gcc ata gtc tta gga gga gct aat gaa gga gcc cgt aca gcc ctc        720
Val Ala Ile Val Leu Gly Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu
225                 230                 235                 240

tcg gtg gtg acc tgg aat aaa gac att gtc act aaa atc acc ccc gag        768
Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
                245                 250                 255

ggg gcc gaa gag tgg agt ctt gcc atc cca gtt atg tgc ctg ttg gca        816
Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
            260                 265                 270

aac acc acg ttc ccc tgc tcc cag ccc cct tgc acg ccc tgc tgc tac        864
Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

gaa aag gaa ccg gag gaa acc cta cgc atg ctt gag gac aac gtc atg        912
Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

aga cct ggg tac tat cag ctg cta caa gca tcc tta aca tgt tct ccc        960
Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

cac cgc cag cga cgc agc acc aag gac aac ttc aat gtc tat aaa gcc       1008
His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

aca aga cca tac tta gct cac tgt ccc gac tgt gga gaa ggg cac tcg       1056
Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

tgc cat agt ccc gta gca cta gaa cgc atc aga aat gaa gcg aca gac       1104
Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

ggg acg ctg aaa atc cag gtc tcc ttg caa atc gga ata aag acg gat       1152
Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

gac agc cac gat tgg acc aag ctg cgt tat atg gac aac cac atg cca       1200
Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro
385                 390                 395                 400

gca gac gca gag agg gcg ggg cta ttt gta aga aca tca gca ccg tgt       1248
Ala Asp Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

acg att act gga aca atg gga cac ttc atc ctg gcc cga tgt cca aaa       1296
Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

ggg gaa act ctg acg gtg gga ttc act gac agt agg aag att agt cac       1344
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Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
        435                 440                 445

tca tgt acg cac cca ttt cac cac gac cct cct gtg ata ggt cgg gaa       1392
Ser Cys Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

aaa ttc cat tcc cga ccg cag cac ggt aaa gag cta cct tgc agc acg       1440
Lys Phe His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr
465                 470                 475                 480

tac gtg cag agc acc gcc gca act acc gag gag ata gag gta cac atg       1488
Tyr Val Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met
                485                 490                 495

ccc cca gac acc cct gat cgc aca tta atg tca caa cag tcc ggc aac       1536
Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn
            500                 505                 510

gta aag atc aca gtc aat ggc cag acg gtg cgg tac aag tgt aat tgc       1584
Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

ggt ggc tca aat gaa gga cta aca act aca gac aaa gtg att aat aac       1632
Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

tgc aag gtt gat caa tgt cat gcc gcg gtc acc aat cac aaa aag tgg       1680
Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560

cag tat aac tcc cct ctg gtc ccg cgt aat gct gaa ctt ggg gac cga       1728
Gln Tyr Asn Ser Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg
                565                 570                 575

aaa gga aaa att cac atc ccg ttt ccg ctg gca aat gta aca tgc agg       1776
Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg
            580                 585                 590

gtg cct aaa gca agg aac ccc acc gtg acg tac ggg aaa aac caa gtc       1824
Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605

atc atg cta ctg tat cct gac cac cca aca ctc ctg tcc tac cgg aat       1872
Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn
    610                 615                 620

atg gga gaa gaa cca aac tat caa gaa gag tgg gtg atg cat aag aag       1920
Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys
625                 630                 635                 640

gaa gtc gtg cta acc gtg ccg act gaa ggg ctc gag gtc acg tgg ggc       1968
Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
                645                 650                 655

aac aac gag ccg tat aag tat tgg ccg cag tta tct aca aac ggt aca       2016
Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr
            660                 665                 670

gcc cat ggc cac ccg cac gag ata att ctg tat tat tat gag ctg tac       2064
Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
        675                 680                 685

ccc act atg act gta gta gtt gtg tca gtg gcc acg ttc ata ctc ctg       2112
Pro Thr Met Thr Val Val Val Val Ser Val Ala Thr Phe Ile Leu Leu
    690                 695                 700

tcg atg gtg ggt atg gca gcg ggg atg tgc atg tgt gca cga cgc aga       2160
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Ser Met Val Gly Met Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg
705                 710                 715                 720

tgc atc aca ccg tat gaa ctg aca cca gga gct acc gtc cct ttc ctg       2208
Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
                725                 730                 735

ctt agc cta ata tgc tgc atc aga aca gct aaa gcg gcc aca tac caa       2256
Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
            740                 745                 750

gag gct gcg ata tac ctg tgg aac gag cag caa cct ttg ttt tgg cta       2304
Glu Ala Ala Ile Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
        755                 760                 765

caa gcc ctt att ccg ctg gca gcc ctg att gtt cta tgc aac tgt ctg       2352
Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
    770                 775                 780

aga ctc tta cca tgc tgc tgt aaa acg ttg gct ttt tta gcc gta atg       2400
Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785                 790                 795                 800

agc gtc ggt gcc cac act gtg agc gcg tac gaa cac gta aca gtg atc       2448
Ser Val Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
                805                 810                 815

ccg aac acg gtg gga gta ccg tat aag act cta gtc aat aga cct ggc       2496
Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
            820                 825                 830

tac agc ccc atg gta ttg gag atg gaa cta ctg tca gtc act ttg gag       2544
Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
        835                 840                 845

cca aca cta tcg ctt gat tac atc acg tgc gag tac aaa acc gtc atc       2592
Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
    850                 855                 860

ccg tct ccg tac gtg aag tgc tgc ggt aca gca gag tgc aag gac aaa       2640
Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865                 870                 875                 880

aac cta cct gac tac agc tgt aag gtc ttc acc ggc gtc tac cca ttt       2688
Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe
                885                 890                 895

atg tgg ggc ggc gcc tac tgc ttc tgc gac gct gaa aac acg cag ttg       2736
Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
            900                 905                 910

agc gaa gca cac gtg gag aag tcc gaa tca tgc aaa aca gaa ttt gca       2784
Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
        915                 920                 925

tca gca tac agg gct cat acc gca tct gca tca gct aag ctc cgc gtc       2832
Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
    930                 935                 940

ctt tac caa gga aat aac atc act gta act gcc tat gca aac ggc gac       2880
Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945                 950                 955                 960

cat gcc gtc aca gtt aag gac gcc aaa ttc att gtg ggg cca atg tct       2928
His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
                965                 970                 975

tca gcc tgg aca cct ttc gac aac aaa att gtg gtg tac aaa ggt gac       2976
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Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
            980                 985                 990

gtc tat aac atg gac tac ccg ccc  ttt ggc gca gga aga  cca gga caa     3024
Val Tyr Asn Met Asp Tyr Pro Pro  Phe Gly Ala Gly Arg  Pro Gly Gln
        995                1000                1005

ttt ggc  gat atc caa agt cgc  aca cct gag agt aaa  gac gtc tat        3069
Phe Gly  Asp Ile Gln Ser Arg  Thr Pro Glu Ser Lys  Asp Val Tyr
    1010                1015                1020

gct aat  aca caa ctg gta ctg  cag aga ccg gct gtg  ggt acg gta        3114
Ala Asn  Thr Gln Leu Val Leu  Gln Arg Pro Ala Val  Gly Thr Val
    1025                1030                1035

cac gtg  cca tac tct cag gca  cca tct ggc ttt aag  tat tgg cta        3159
His Val  Pro Tyr Ser Gln Ala  Pro Ser Gly Phe Lys  Tyr Trp Leu
    1040                1045                1050

aaa gaa  cgc ggg gcg tcg ctg  cag cac aca gca cca  ttt ggc tgc        3204
Lys Glu  Arg Gly Ala Ser Leu  Gln His Thr Ala Pro  Phe Gly Cys
    1055                1060                1065

caa ata  gca aca aac ccg gta  aga gcg gtg aac tgc  gcc gta ggg        3249
Gln Ile  Ala Thr Asn Pro Val  Arg Ala Val Asn Cys  Ala Val Gly
    1070                1075                1080

aac atg  ccc atc tcc atc gac  ata ccg gaa gcg gcc  ttc act agg        3294
Asn Met  Pro Ile Ser Ile Asp  Ile Pro Glu Ala Ala  Phe Thr Arg
    1085                1090                1095

gtc gtc  gac gcg ccc tct tta  acg gac atg tcg tgc  gag gta cca        3339
Val Val  Asp Ala Pro Ser Leu  Thr Asp Met Ser Cys  Glu Val Pro
    1100                1105                1110

gcc tgc  acc cat tcc tca gac  ttt ggg ggc gtc gcc  att att aaa        3384
Ala Cys  Thr His Ser Ser Asp  Phe Gly Gly Val Ala  Ile Ile Lys
    1115                1120                1125

tat gca  gcc agc aag aaa ggc  aag tgt gcg gtg cat  tcg atg act        3429
Tyr Ala  Ala Ser Lys Lys Gly  Lys Cys Ala Val His  Ser Met Thr
    1130                1135                1140

aac gcc  gtc act att cgg gaa  gct gag ata gaa gtt  gaa ggg aat        3474
Asn Ala  Val Thr Ile Arg Glu  Ala Glu Ile Glu Val  Glu Gly Asn
    1145                1150                1155

tct cag  ctg caa atc tct ttc  tcg acg gcc tta gcc  agc gcc gaa        3519
Ser Gln  Leu Gln Ile Ser Phe  Ser Thr Ala Leu Ala  Ser Ala Glu
    1160                1165                1170

ttc cgc  gta caa gtc tgt tct  aca caa gta cac tgt  gca gcc gag        3564
Phe Arg  Val Gln Val Cys Ser  Thr Gln Val His Cys  Ala Ala Glu
    1175                1180                1185

tgc cac  ccc ccg aag gac cac  ata gtc aac tac ccg  gcg tca cat        3609
Cys His  Pro Pro Lys Asp His  Ile Val Asn Tyr Pro  Ala Ser His
    1190                1195                1200

acc acc  ctc ggg gtc cag gac  atc tcc gct acg gcg  atg tca tgg        3654
Thr Thr  Leu Gly Val Gln Asp  Ile Ser Ala Thr Ala  Met Ser Trp
    1205                1210                1215

gtg cag  aag atc acg gga ggt  gtg gga ctg gtt gtt  gct gtt gcc        3699
Val Gln  Lys Ile Thr Gly Gly  Val Gly Leu Val Val  Ala Val Ala
    1220                1225                1230

gca ctg  att cta atc gtg gtg  cta tgc gtg tcg ttc  agc agg cac        3744
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Ala Leu  Ile Leu Ile Val Val  Leu Cys Val Ser Phe  Ser Arg His
    1235                1240                1245

taa                                                          3747


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Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
1               5                   10                  15


Arg Pro Trp Thr Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
            20                  25                  30


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


Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60


Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
65                  70                  75                  80


Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95


Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110


Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
        115                 120                 125


Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140


Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160


Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175


Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190


Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205
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Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

Val Ala Ile Val Leu Gly Gly Ala Asn Glu Gly Ala Arg Thr Ala Leu
225                 230                 235                 240

Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
                245                 250                 255

Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro
385                 390                 395                 400

Ala Asp Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

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

Ser Cys Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

Lys Phe His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr
465                 470                 475                 480
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Tyr Val Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560

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

Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg
            580                 585                 590

Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605

Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn
    610                 615                 620

Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys
625                 630                 635                 640

Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
                645                 650                 655

Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr
            660                 665                 670

Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
        675                 680                 685

Pro Thr Met Thr Val Val Val Val Ser Val Ala Thr Phe Ile Leu Leu
    690                 695                 700

Ser Met Val Gly Met Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg
705                 710                 715                 720

Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
                725                 730                 735

Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
            740                 745                 750
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Glu Ala Ala Ile Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
        755                 760                 765

Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
    770                 775                 780

Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785                 790                 795                 800

Ser Val Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
                805                 810                 815

Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
            820                 825                 830

Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
        835                 840                 845

Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
    850                 855                 860

Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865                 870                 875                 880

Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe
                885                 890                 895

Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
            900                 905                 910

Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
        915                 920                 925

Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
    930                 935                 940

Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945                 950                 955                 960

His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
                965                 970                 975

Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
            980                 985                 990

Val Tyr Asn Met Asp Tyr Pro Pro  Phe Gly Ala Gly Arg  Pro Gly Gln
        995                 1000                1005

Phe Gly  Asp Ile Gln Ser Arg  Thr Pro Glu Ser Lys  Asp Val Tyr
    1010                1015                1020
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Ala Asn  Thr Gln Leu Val Leu  Gln Arg Pro Ala Val  Gly Thr Val
    1025                1030                1035

His Val  Pro Tyr Ser Gln Ala  Pro Ser Gly Phe Lys  Tyr Trp Leu
    1040                1045                1050

Lys Glu  Arg Gly Ala Ser Leu  Gln His Thr Ala Pro  Phe Gly Cys
    1055                1060                1065

Gln Ile  Ala Thr Asn Pro Val  Arg Ala Val Asn Cys  Ala Val Gly
    1070                1075                1080

Asn Met  Pro Ile Ser Ile Asp  Ile Pro Glu Ala Ala  Phe Thr Arg
    1085                1090                1095

Val Val  Asp Ala Pro Ser Leu  Thr Asp Met Ser Cys  Glu Val Pro
    1100                1105                1110

Ala Cys  Thr His Ser Ser Asp  Phe Gly Gly Val Ala  Ile Ile Lys
    1115                1120                1125

Tyr Ala  Ala Ser Lys Lys Gly  Lys Cys Ala Val His  Ser Met Thr
    1130                1135                1140

Asn Ala  Val Thr Ile Arg Glu  Ala Glu Ile Glu Val  Glu Gly Asn
    1145                1150                1155

Ser Gln  Leu Gln Ile Ser Phe  Ser Thr Ala Leu Ala  Ser Ala Glu
    1160                1165                1170

Phe Arg  Val Gln Val Cys Ser  Thr Gln Val His Cys  Ala Ala Glu
    1175                1180                1185

Cys His  Pro Pro Lys Asp His  Ile Val Asn Tyr Pro  Ala Ser His
    1190                1195                1200

Thr Thr  Leu Gly Val Gln Asp  Ile Ser Ala Thr Ala  Met Ser Trp
    1205                1210                1215

Val Gln  Lys Ile Thr Gly Gly  Val Gly Leu Val Val  Ala Val Ala
    1220                1225                1230

Ala Leu  Ile Leu Ile Val Val  Leu Cys Val Ser Phe  Ser Arg His
    1235                1240                1245
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Arg Thr Met Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala Asn Thr
1               5                  10                  15

acg ttt cct tgc tcc cag gac aac ttc aat gtc tat aaa gcc aca aga          96
Thr Phe Pro Cys Ser Gln Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg
            20                  25                  30

cca tac tta gct cac tgt ccc gac tgt gga gaa ggg cac tcg tgc cat         144
Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His
        35                  40                  45

agt ccc gta gca cta gaa cgc atc aga aat gaa gcg aca gac ggg acg         192
Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp Gly Thr
    50                  55                  60

ctg aaa atc cag gtc tcc ttg caa atc gga ata aag acg gat gac agc         240
Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser
65                  70                  75                  80

cac gat tgg acc aag ctg cgt tat atg gac aac cac atg cca gca gac         288
His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp
                85                  90                  95

gca gag agg gcg ggg cta ttt gta aga aca tca gca ccg tgt acg att         336
Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile
            100                 105                 110

act gga aca atg gga cac ttc atc ctg gcc cga tgt ccc aaa ggc gaa         384
Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys Gly Glu
        115                 120                 125

act ctg acg gtg gga ttc act gac agt agg aag att agt cac tca tgt         432
Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys
    130                 135                 140

acg cac cca ttt cac cac gac cct cct gtg ata ggt cgg gag aaa ttc         480
Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe
145                 150                 155                 160

cat tcc cga ccg cag cac ggt aaa gag cta cct tgc agc acc tac gtg         528
His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val
                165                 170                 175

cag agc acc gcc gca act acc gag gag ata gag gta cac atg ccc cca         576
Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro
            180                 185                 190

gac acc cct gat cgc aca tta atg tca caa cag tcc ggc aac gta aag         624
Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys
        195                 200                 205

atc aca gtc aat ggc cag acg gtg cgg tac aag tgt aat tgc ggt ggc         672
Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly
    210                 215                 220

tca aat gaa gga cta aca act aca gac aaa gtg att aat aac tgc aag         720
Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys
225                 230                 235                 240

gtt gat caa tgt cat gcc gcg gtc acc aat cac aaa aag tgg cag tat         768
Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr
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                245                 250                 255

aac tcc cct ctg gtc ccg cgt aat gct gaa ctt ggg gac agg aaa gga        816
Asn Ser Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly
            260                 265                 270

aaa att cac atc ccg ttt ccg ctg gca aat gta aca tgc agg gtg cct        864
Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro
        275                 280                 285

aaa gca agg aac ccc acc gtg acg tat ggc aaa aac caa gtc atc atg        912
Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met
    290                 295                 300

cta ctg tat cct gac cac cca aca ctc ctg tcc tac cgg aat atg gga        960
Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly
305                 310                 315                 320

gaa gaa cca aac tat caa gaa gag tgg gtg atg cat aag aag gaa gtc       1008
Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val
                325                 330                 335

gtg cta acc gtg ccg act gaa ggg ctc gag gtc acg tgg ggc aac aac       1056
Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn
            340                 345                 350

gag ccg tat aag tat tgg ccg cag tta tct aca aac ggt aca gcc cat       1104
Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His
        355                 360                 365

ggc cac ccg cac gag ata att ctg tat tat tat gag ctg tac ccc act       1152
Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr
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atg act taa tag gcg cgc                                              1170
Met Thr         Ala Arg
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<400> 30

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Thr Phe Pro Cys Ser Gln Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg
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Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser Cys His
        35                  40                  45

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

Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp Asp Ser
65                  70                  75                  80
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```
His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro Ala Asp
                85                  90                  95

Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys Thr Ile
            100                 105                 110

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

Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His Ser Cys
    130                 135                 140

Thr His Pro Phe His His Asp Pro Pro Val Ile Gly Arg Glu Lys Phe
145                 150                 155                 160

His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr Tyr Val
                165                 170                 175

Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met Pro Pro
            180                 185                 190

Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn Val Lys
        195                 200                 205

Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly
    210                 215                 220

Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys
225                 230                 235                 240

Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp Gln Tyr
                245                 250                 255

Asn Ser Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly
            260                 265                 270

Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro
        275                 280                 285

Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Ile Met
    290                 295                 300

Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly
305                 310                 315                 320

Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys Glu Val
                325                 330                 335

Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn
            340                 345                 350
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Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr Ala His
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Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr
370 375 380

Met Thr
385

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gggcaacttg cccagctgat ctcagcagtt aataaactga caatgagagc ggtaccccaa 180

cagaagccac gcaggaatcg gaagaataag aagcaaaagc aaaaacaaca ggcgccacaa 240

aacaacacaa atcaaaagaa gcagccacct aaaaagaaac cggctcaaaa gaaaaagaag 300

ccgggccgca gagagaggat gtgcatgaaa atcgaaaatg attgtatttt cgaagtcaag 360

cacgaaggta aggtaacagg ttacgcgtgc ctggtggggg acaaagtaat gaaaccagca 420

cacgtcaagg gcaccatcga taacgcggac ctggccaaac tggcctttaa gcggtcatct 480

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ggccggttca ccatccctac aggtgctggc aaaccagggg acagcggcag accgatcttc 660

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gct cac 54
Ala His

<210> 33
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<212> PRT
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Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala Thr Arg Pro Tyr Leu
1 5 10 15

Ala His