SEQUENCE LISTING

<110> Inviragen, Inc.
THE GOVERNMENT OF THE UNITED STATES OF AMERICA AS REPRESENTED BY THE SECRETARY OF THE DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Huang, Claire Y.
Kinney, Richard M.
Livengood, Jill A.

<120> COMPOSITIONS AND METHODS FOR DENGUE VIRUS CHIMERIC CONSTRUCTS IN VACCINES

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<151> 2013-03-15

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Leu Ala Ser Ala Ile Gln Lys Ala His Glu Glu Asp Ile Cys Gly Ile
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Arg Ser Val Thr Arg Leu Glu Asn Leu Met Trp Lys Gln Ile Thr Pro
        835                 840                 845

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

Thr Gly Asp Ile Lys Gly Ile Met Gln Ala Gly Lys Arg Ser Leu Arg
865                 870                 875                 880
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Pro Gln Pro Thr Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala
               885                 890                 895

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Leu Phe  Leu Glu Glu Met Leu  Arg Thr Arg Val Gly  Thr Lys His
```

1145 1150 1155

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Glu Asp  Asp Ile Phe Arg Lys  Arg Arg Leu Thr Ile  Met Asp Leu
    1655                 1660                 1665
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His Pro  Gly Ala Gly Lys Thr  Lys Arg Tyr Leu Pro  Ala Ile Val
    1670                 1675                 1680

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Leu Thr  Asp Gly Glu Glu Arg  Val Ile Leu Ala Gly  Pro Met Pro
    1910                 1915                 1920
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Val Thr His Ser Ser Ala Ala Gln Arg Arg Gly Arg Ile Gly Arg
1925 1930 1935

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Cys Cys Ile Ile Thr Ala Ser Ile Leu Leu Trp Tyr Ala Gln Ile

2180 2185 2190

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Gln Arg  Lys Tyr Gly Gly Ala  Leu Val Arg Asn Pro  Leu Ser Arg
    2690                 2695                 2700
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Asn Ser  Thr His Glu Met Tyr  Trp Val Ser Asn Ala  Ser Gly Asn
    2705                 2710                 2715

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Asn Met  Met Gly Lys Arg Glu  Lys Lys Leu Gly Glu  Phe Gly Lys
    2945                 2950                 2955
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Ala Lys Gly Ser Arg Ala Ile Trp Tyr Met Trp Leu Gly Ala Arg
2960 2965 2970

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Val Leu Val Val Pro Cys Arg Asn Gln Asp Glu Leu Ile Gly Arg

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    3215                3220                3225

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

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

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

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

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

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

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

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

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

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

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

Lys Leu  Thr Asn Lys Ala Arg  Ser Gln Val Gly Leu  Ser His Ser
    3395                3400                3405

Thr Glu  Lys Thr Met Leu Pro  Val Ser Pro Val Gln  Gly Arg Lys
    3410                3415                3420

Lys Ser  Gly His His Lys Cys  His Ser Leu Ser Lys  Leu Cys Ser
    3425                3430                3435

Leu Leu  His Leu Arg Arg Cys  Lys Lys Ser Gly Arg  Pro Gln Thr
    3440                3445                3450

Met Glu  Ala Val Arg Met Ala  Trp Thr Ser Gly
    3455                3460
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<210> 3
<211> 3391

<212> PRT
<213> Artificial Sequence

<220>
<223> Dengue virus serotype 1, MVS

<400> 3

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ala Leu Arg His Pro Gly Phe Thr Val Ile Ala Leu Phe Leu Ala His

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                245                 250                 255

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Arg Gln Asp Leu Leu Val Thr Phe Lys Thr Ala His Ala Lys Lys Gln
        515                 520                 525
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Glu Val Val Val Leu Gly Ser Gln Glu Gly Ala Met His Thr Ala Leu
    530                 535                 540

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Asn Lys Glu Leu Lys Cys Gly Ser Gly Ile Phe Ile Thr Asp Asn Val
785                 790                 795                 800
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```
His Thr Trp Thr Glu Gln Tyr Lys Phe Gln Pro Glu Ser Pro Ser Lys
                805                 810                 815

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Phe Cys  Asp Gly Thr Thr Val  Val Val Thr Glu Asp  Cys Gly Asn
    1055                1060                1065
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Arg Gly  Pro Ser Leu Arg Thr  Thr Thr Ala Ser Gly  Lys Leu Ile
    1070                 1075                 1080

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

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

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

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

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

Ala Ile  Leu Leu Val Ala Val  Ser Phe Val Thr Leu  Ile Thr Gly
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Asn Met  Ser Phe Arg Asp Leu  Gly Arg Val Met Val  Met Val Gly
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Ala Thr  Met Thr Asp Asp Ile  Gly Met Gly Val Thr  Tyr Leu Ala
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Leu Leu  Ala Ala Phe Lys Val  Arg Pro Thr Phe Ala  Ala Gly Leu
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Leu Leu  Arg Lys Leu Thr Ser  Lys Glu Leu Met Met  Thr Thr Ile
    1220                 1225                 1230

Gly Ile  Val Leu Leu Ser Gln  Ser Thr Leu Pro Glu  Thr Ile Leu
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Glu Leu  Thr Asp Ala Leu Ala  Leu Gly Met Met Val  Leu Lys Met
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Val Arg  Asn Met Glu Lys Tyr  Gln Leu Ala Val Thr  Ile Met Ala
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Ile Leu  Cys Val Pro Asn Ala  Val Ile Leu Gln Asn  Ala Trp Lys
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Val Ser  Cys Thr Ile Leu Ala  Val Val Ser Val Ser  Pro Leu Phe
    1295                 1300                 1305

Leu Thr  Ser Ser Gln Gln Lys  Thr Asp Trp Ile Pro  Leu Ala Leu
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Thr Ile  Lys Gly Leu Asn Pro  Thr Ala Ile Phe Leu  Thr Thr Leu
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Ser Arg  Thr Ser Lys Lys Arg  Ser Trp Pro Leu Asn  Glu Ala Ile
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Met Ala  Val Gly Met Val Ser  Ile Leu Ala Ser Ser  Leu Leu Lys
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Asn Asp  Ile Pro Met Thr Gly  Pro Leu Val Ala Gly  Gly Leu Leu
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Thr Val  Cys Tyr Val Leu Thr  Gly Arg Ser Ala Asp  Leu Glu Leu
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Glu Arg  Ala Ala Asp Val Lys  Trp Glu Asp Gln Ala  Glu Ile Ser
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Gly Ser  Ser Pro Ile Leu Ser  Ile Thr Ile Ser Glu  Asp Gly Ser
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Met Ser  Ile Lys Asn Glu Glu  Glu Asp Gln Thr Leu  Thr Ile Leu
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Ile Arg  Thr Gly Leu Leu Val  Ile Ser Gly Leu Phe  Pro Val Ser
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Ile Pro  Ile Thr Ala Ala Ala  Trp Tyr Leu Trp Glu  Val Lys Lys
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Gln Arg  Ala Gly Val Leu Trp  Asp Val Pro Ser Pro  Pro Pro Met
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Gly Lys  Ala Glu Leu Glu Asp  Gly Ala Tyr Arg Ile  Lys Gln Lys
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Gly Ile  Leu Gly Tyr Ser Gln  Ile Gly Ala Gly Val  Tyr Lys Glu
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Gly Thr  Phe His Thr Met Trp  His Val Thr Arg Gly  Ala Val Leu
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Met His  Lys Gly Lys Arg Ile  Glu Pro Ser Trp Ala  Asp Val Lys
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Lys Asp  Leu Ile Ser Tyr Gly  Gly Gly Trp Lys Leu  Glu Gly Glu
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Trp Lys  Glu Gly Glu Glu Val  Gln Val Leu Ala Leu  Glu Pro Gly
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Lys Asn  Pro Arg Ala Val Gln  Thr Lys Pro Gly Leu  Phe Lys Thr
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Thr Ser  Gly Ser Pro Ile Ile  Asp Lys Lys Gly Lys  Val Val Gly
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Leu Tyr  Gly Asn Gly Val Val  Thr Arg Ser Gly Ala  Tyr Val Ser
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Ala Ile  Ala Gln Thr Glu Lys  Ser Ile Glu Asp Asn  Pro Glu Ile
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Glu Asp  Asp Ile Phe Arg Lys  Arg Arg Leu Thr Ile  Met Asp Leu
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His Pro  Gly Ala Gly Lys Thr  Lys Arg Tyr Leu Pro  Ala Ile Val
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Thr Arg  Val Val Ala Ala Glu  Met Glu Glu Ala Leu  Arg Gly Leu
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Pro Ile  Arg Tyr Gln Thr Pro  Ala Ile Arg Ala Val  His Thr Gly
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Arg Glu  Ile Val Asp Leu Met  Cys His Ala Thr Phe  Thr Met Arg
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Leu Leu  Ser Pro Val Arg Val  Pro Asn Tyr Asn Leu  Ile Ile Met
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Asp Glu  Ala His Phe Thr Asp  Pro Ala Ser Ile Ala  Ala Arg Gly
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Tyr Ile  Ser Thr Arg Val Glu  Met Gly Glu Ala Ala  Gly Ile Phe
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Met Thr  Ala Thr Pro Pro Gly  Ser Arg Asp Pro Phe  Pro Gln Ser
    1790                 1795                 1800

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

Trp Asn  Ser Gly His Glu Trp  Val Thr Asp Phe Lys  Gly Lys Thr
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Val Trp  Phe Val Pro Ser Ile  Lys Ala Gly Asn Asp  Ile Ala Ala
    1835                 1840                 1845
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Cys Leu Arg Lys Asn Gly Lys Lys Val Ile Gln Leu Ser Arg Lys
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Thr Phe Asp Ser Glu Tyr Val Lys Thr Arg Thr Asn Asp Trp Asp
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Phe Val Val Thr Thr Asp Ile Ser Glu Met Gly Ala Asn Phe Lys
1880                 1885                 1890

Ala Glu Arg Val Ile Asp Pro Arg Arg Cys Met Lys Pro Val Ile
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Leu Thr Asp Gly Glu Glu Arg Val Ile Leu Ala Gly Pro Met Pro
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Val Thr His Ser Ser Ala Ala Gln Arg Arg Gly Arg Ile Gly Arg
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Asn Pro Lys Asn Glu Asn Asp Gln Tyr Ile Tyr Met Gly Glu Pro
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Leu Glu Asn Asp Glu Asp Cys Ala His Trp Lys Glu Ala Lys Met
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Leu Leu Asp Asn Ile Asn Thr Pro Glu Gly Ile Ile Pro Ser Met
1970                 1975                 1980

Phe Glu Pro Glu Arg Glu Lys Val Asp Ala Ile Asp Gly Glu Tyr
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Arg Leu Arg Gly Glu Ala Arg Lys Thr Phe Val Asp Leu Met Arg
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Arg Gly Asp Leu Pro Val Trp Leu Ala Tyr Arg Val Ala Ala Glu
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Gly Ile Asn Tyr Ala Asp Arg Arg Trp Cys Phe Asp Gly Val Lys
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Asn Asn Gln Ile Leu Glu Glu Asn Val Glu Val Glu Ile Trp Thr
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Lys Glu Gly Glu Arg Lys Lys Leu Lys Pro Arg Trp Leu Asp Ala
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Val Glu  Asn Trp Leu Asn Asn  Asn Thr Gln Phe Cys  Ile Lys Val
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Leu Asn  Pro Tyr Met Pro Ser  Val Ile Glu Lys Met  Glu Ala Leu
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Gln Arg  Lys Tyr Gly Gly Ala  Leu Val Arg Asn Pro  Leu Ser Arg
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Asn Ser  Thr His Glu Met Tyr  Trp Val Ser Asn Ala  Ser Gly Asn
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Phe Thr  Met Arg Tyr Lys Lys  Ala Thr Tyr Glu Pro  Asp Val Asp
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Leu Gly  Ser Gly Thr Arg Asn  Ile Gly Ile Glu Ser  Glu Ile Pro
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His Glu  Thr Ser Trp His Tyr  Asp Gln Asp His Pro  Tyr Lys Thr
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Ala Lys  Gly Ser Arg Ala Ile  Trp Tyr Met Trp Leu  Gly Ala Arg
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Phe Ser  Arg Glu Asn Ser Leu  Ser Gly Val Glu Gly  Glu Gly Leu
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His Lys  Leu Gly Tyr Ile Leu  Arg Asp Val Ser Lys  Lys Glu Gly
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Gly Ala  Met Tyr Ala Asp Asp  Thr Ala Gly Trp Asp  Thr Arg Ile
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Thr Leu  Glu Asp Leu Lys Asn  Glu Glu Met Val Thr  Asn His Met
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Glu Gly  Glu His Lys Lys Leu  Ala Glu Ala Ile Phe  Lys Leu Thr
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Tyr Gln  Asn Lys Val Val Arg  Val Gln Arg Pro Thr  Pro Arg Gly
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Thr Val  Met Asp Ile Ile Ser  Arg Arg Asp Gln Arg  Gly Ser Gly
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Gln Val  Gly Thr Tyr Gly Leu  Asn Thr Phe Thr Asn  Met Glu Ala
    3095                 3100                 3105

Gln Leu  Ile Arg Gln Met Glu  Gly Glu Gly Val Phe  Lys Ser Ile
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Gln His  Leu Thr Ile Thr Glu  Glu Ile Ala Val Gln  Asn Trp Leu
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Ala Leu Val Ala Phe Leu Arg Phe Leu Thr Ile Pro Pro Thr Ala Gly
50 55 60

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

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

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

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

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

Val Asn Met Cys Thr Leu Met Ala Met Asp Leu Gly Glu Leu Cys Glu

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Asp Thr Ile Thr Tyr Glu Cys Pro Leu Leu Arg Gln Asn Glu Pro Glu
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Asp Ile Asp Cys Trp Cys Asn Ser Thr Ser Thr Trp Val Thr Tyr Gly
            180                 185                 190

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Tyr Thr Ile Val Ile Thr Pro His Ser Gly Glu Glu His Ala Val Gly
            420                 425                 430
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Asn Asp Thr Gly Lys His Gly Lys Glu Ile Lys Ile Thr Pro Gln Ser
        435                 440                 445

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ala Lys Arg Met Ala Ile Leu Gly Asp Thr Ala Trp Asp Phe Gly Ser
    690                 695                 700
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Leu Gly Gly Val Phe Thr Ser Ile Gly Lys Ala Leu His Gln Val Phe
705                 710                 715                 720

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ala Ala Ile Lys Asp Asn Arg Ala Val His Ala Asp Met Gly Tyr Trp
                965                 970                 975
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Ile Glu Ser Ala Leu Asn Asp Thr Trp Lys Ile Glu Lys Ala Ser Phe
            980                 985                 990

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Gly Ile  Val Leu Leu Ser Gln  Ser Thr Ile Pro Glu  Thr Ile Leu
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Glu Leu Thr Asp Ala Leu Ala Leu Gly Met Met Val Leu Lys Met
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Val Arg Asn Met Glu Lys Tyr Gln Leu Ala Val Thr Ile Met Ala
1265 1270 1275

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

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

Leu Thr Ser Ser Gln Gln Lys Thr Asp Trp Ile Pro Leu Ala Leu
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Thr Ile Lys Gly Leu Asn Pro Thr Ala Ile Phe Leu Thr Thr Leu
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Ser Arg Thr Ser Lys Lys Arg Ser Trp Pro Leu Asn Glu Ala Ile
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Met Ala Val Gly Met Val Ser Ile Leu Ala Ser Ser Leu Leu Lys
1355 1360 1365

Asn Asp Ile Pro Met Thr Gly Pro Leu Val Ala Gly Gly Leu Leu
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Thr Val Cys Tyr Val Leu Thr Gly Arg Ser Ala Asp Leu Glu Leu
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Glu Arg Ala Ala Asp Val Lys Trp Glu Asp Gln Ala Glu Ile Ser
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Gly Ser Ser Pro Ile Leu Ser Ile Thr Ile Ser Glu Asp Gly Ser
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Met Ser Ile Lys Asn Glu Glu Glu Glu Gln Thr Leu Thr Ile Leu
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Ile Arg Thr Gly Leu Leu Val Ile Ser Gly Leu Phe Pro Val Ser
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Ile Pro Ile Thr Ala Ala Ala Trp Tyr Leu Trp Glu Val Lys Lys
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Gln Arg Ala Gly Val Leu Trp Asp Val Pro Ser Pro Pro Pro Met
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Gly Lys Ala Glu Leu Glu Asp Gly Ala Tyr Arg Ile Lys Gln Lys
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Gly Ile  Leu Gly Tyr Ser Gln  Ile Gly Ala Gly Val  Tyr Lys Glu
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Gly Thr  Phe His Thr Met Trp  His Val Thr Arg Gly  Ala Val Leu
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Met His  Lys Gly Lys Arg Ile  Glu Pro Ser Trp Ala  Asp Val Lys
    1535                1540                1545

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

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

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

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

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

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

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

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

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

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

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

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

Arg Glu  Ile Val Asp Leu Met  Cys His Ala Thr Phe  Thr Met Arg
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Leu Leu  Ser Pro Val Arg Val  Pro Asn Tyr Asn Leu  Ile Ile Met
    1745                1750                1755
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Asp Glu Ala His Phe Thr Asp Pro Ala Ser Ile Ala Ala Arg Gly
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Tyr Ile Ser Thr Arg Val Glu Met Gly Glu Ala Ala Gly Ile Phe
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Met Thr Ala Thr Pro Pro Gly Ser Arg Asp Pro Phe Pro Gln Ser
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Asn Ala Pro Ile Ile Asp Glu Glu Arg Glu Ile Pro Glu Arg Ser
1805 1810 1815

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

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

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

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

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

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

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

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

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

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1955 1960 1965

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

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

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

Arg Gly Asp Leu Pro Val Trp Leu Ala Tyr Arg Val Ala Ala Glu
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Lys Met Asp Ile Gly Val Pro Leu Leu Ala Ile Gly Cys Tyr Ser
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Asp Pro Lys Phe Glu Lys Gln Leu Gly Gln Val Met Leu Leu Val
2405 2410 2415

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

His Glu  Thr Ser Trp His Tyr  Asp Gln Asp His Pro  Tyr Lys Thr
    2780                2785                2790
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Trp Ala  Tyr His Gly Ser Tyr  Glu Thr Lys Gln Thr  Gly Ser Ala
    2795                 2800                 2805

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Thr Leu  Glu Asp Leu Lys Asn  Glu Glu Met Val Thr  Asn His Met
    3035                 3040                 3045
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Glu Gly  Glu His Lys Lys Leu  Ala Glu Ala Ile Phe  Lys Leu Thr
    3050                 3055                 3060

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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<211> 3391
<212> PRT
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<220>
<223> Dengue virus serotype 2, MVS

<400> 6

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ala Lys Arg Met Ala Ile Leu Gly Asp Thr Ala Trp Asp Phe Gly Ser
    690                 695                 700
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Leu Gly Gly Val Phe Thr Ser Ile Gly Lys Ala Leu His Gln Val Phe
705                 710                 715                 720

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ala Ala Ile Lys Asp Asn Arg Ala Val His Ala Asp Met Gly Tyr Trp
                965                 970                 975
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Ile Glu Ser Ala Leu Asn Asp Thr Trp Lys Ile Glu Lys Ala Ser Phe
            980                 985                 990

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Leu Leu  Arg Lys Leu Thr Ser  Lys Glu Leu Met Met  Thr Thr Ile
    1220                1225                1230
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Gly Ile  Val Leu Leu Ser Gln  Ser Thr Ile Pro Glu  Thr Ile Leu
    1235                 1240                 1245

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Gly Lys  Ala Glu Leu Glu Asp  Gly Ala Tyr Arg Ile  Lys Gln Lys
```

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    1490                1495                1500

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ile Gln Glu Val Asp Arg Thr Leu Ala Lys Glu Gly Ile Lys Arg

2525 2530 2535

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

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

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

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

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

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

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

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

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

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

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

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

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

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        115                 120                 125

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Thr Gln His Gly Thr Ile Leu Ile Lys Val Glu Tyr Lys Gly Glu Asp
        595                 600                 605
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Ala Pro Cys Lys Ile Pro Phe Ser Thr Glu Asp Gly Gln Gly Lys Ala
    610                 615                 620

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Asp Ile Lys Gly Ile Met Gln Ala Gly Lys Arg Ser Leu Arg Pro Gln
865                 870                 875                 880
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Pro Thr Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala Lys Met
                885                 890                 895

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Gln Val  Asp Asn Phe Ser Leu  Gly Val Leu Gly Met  Ala Leu Phe
    1130                1135                1140
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Leu Glu Glu Met Leu Arg Thr Arg Val Gly Thr Lys His Ala Ile
1145 1150 1155

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ala Ala Asp Val Lys Trp Glu Asp Gln Ala Glu Ile Ser Gly Ser

1400 1405 1410

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Asp Gly  Glu Glu Arg Val Ile  Leu Ala Gly Pro Met  Pro Val Thr
    1910                 1915                 1920
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His Ser  Ser Ala Ala Gln Arg  Arg Gly Arg Ile Gly  Arg Asn Pro
    1925                1930                1935

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Met Ser  Ala Arg Gly Ile Gly  Lys Met Thr Leu Gly  Met Cys Cys
    2165                2170                2175
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Ile Ile  Thr Ala Ser Ile Leu  Leu Trp Tyr Ala Gln  Ile Gln Pro
    2180                 2185                 2190

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ala Leu  Thr Leu Ala Thr Gly  Pro Ile Ser Thr Leu  Trp Glu Gly
```

2435 2440 2445

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Ser His  His Phe His Glu Leu  Ile Met Lys Asp Gly  Arg Val Leu
    3200                 3205                 3210
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Val Val  Pro Cys Arg Asn Gln  Asp Glu Leu Ile Gly  Arg Ala Arg
    3215                 3220                 3225

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

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

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

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

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

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

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

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

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

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

Arg Arg  Glu Glu Glu Glu Ala  Gly Val Leu Trp
    3380                 3385
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<210> 9
<211> 3389
<212> PRT
<213> Artificial Sequence

<220>
<223> Dengue virus serotype 3, MVS

<400> 9

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

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

Phe Ser Leu Gly Met Leu Gln Gly Arg Gly Pro Leu Lys Leu Phe Met
        35                  40                  45
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```
Ala Leu Val Ala Phe Leu Arg Phe Leu Thr Ile Pro Pro Thr Ala Gly
    50                  55                  60

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Tyr Ala Met Cys Leu Ser Ser Phe Val Leu Lys Lys Glu Val Ser Glu
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Thr Gln His Gly Thr Ile Leu Ile Lys Val Glu Tyr Lys Gly Glu Asp
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595 600 605

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Val Ser  Gln His Asn Tyr Arg  Pro Gly Tyr His Thr  Gln Ile Thr
    1025                1030                1035

Gly Pro  Trp His Leu Gly Lys  Leu Glu Met Asp Phe  Asp Phe Cys
    1040                1045                1050

Asp Gly  Thr Thr Val Val Val  Thr Glu Asp Cys Gly  Asn Arg Gly
    1055                1060                1065

Pro Ser  Leu Arg Thr Thr Thr  Ala Ser Gly Lys Leu  Ile Thr Glu
    1070                1075                1080

Trp Cys  Cys Arg Ser Cys Thr  Leu Pro Pro Leu Arg  Tyr Arg Gly
    1085                1090                1095

Glu Asp  Gly Cys Trp Tyr Gly  Met Glu Ile Arg Pro  Leu Lys Glu
    1100                1105                1110

Lys Glu  Glu Asn Leu Val Asn  Ser Leu Val Thr Ala  Gly His Gly
    1115                1120                1125

Gln Val  Asp Asn Phe Ser Leu  Gly Val Leu Gly Met  Ala Leu Phe
    1130                1135                1140
```

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Leu Glu  Glu Met Leu Arg Thr  Arg Val Gly Thr Lys  His Ala Ile
    1145                1150                1155

Leu Leu  Val Ala Val Ser Phe  Val Thr Leu Ile Thr  Gly Asn Met
    1160                1165                1170

Ser Phe  Arg Asp Leu Gly Arg  Val Met Val Met Val  Gly Ala Thr
    1175                1180                1185

Met Thr  Asp Asp Ile Gly Met  Gly Val Thr Tyr Leu  Ala Leu Leu
    1190                1195                1200

Ala Ala  Phe Lys Val Arg Pro  Thr Phe Ala Ala Gly  Leu Leu Leu
    1205                1210                1215

Arg Lys  Leu Thr Ser Lys Glu  Leu Met Met Thr Thr  Ile Gly Ile
    1220                1225                1230

Val Leu  Leu Ser Gln Ser Thr  Ile Pro Glu Thr Ile  Leu Glu Leu
    1235                1240                1245

Thr Asp  Ala Leu Ala Leu Gly  Met Met Val Leu Lys  Met Val Arg
    1250                1255                1260

Asn Met  Glu Lys Tyr Gln Leu  Ala Val Thr Ile Met  Ala Ile Leu
    1265                1270                1275

Cys Val  Pro Asn Ala Val Ile  Leu Gln Asn Ala Trp  Lys Val Ser
    1280                1285                1290

Cys Thr  Ile Leu Ala Val Val  Ser Val Ser Pro Leu  Phe Leu Thr
    1295                1300                1305

Ser Ser  Gln Gln Lys Thr Asp  Trp Ile Pro Leu Ala  Leu Thr Ile
    1310                1315                1320

Lys Gly  Leu Asn Pro Thr Ala  Ile Phe Leu Thr Thr  Leu Ser Arg
    1325                1330                1335

Thr Ser  Lys Lys Arg Ser Trp  Pro Leu Asn Glu Ala  Ile Met Ala
    1340                1345                1350

Val Gly  Met Val Ser Ile Leu  Ala Ser Ser Leu Leu  Lys Asn Asp
    1355                1360                1365

Ile Pro  Met Thr Gly Pro Leu  Val Ala Gly Gly Leu  Leu Thr Val
    1370                1375                1380

Cys Tyr  Val Leu Thr Gly Arg  Ser Ala Asp Leu Glu  Leu Glu Arg
    1385                1390                1395
```

```
Ala Ala  Asp Val Lys Trp Glu  Asp Gln Ala Glu Ile  Ser Gly Ser
    1400                 1405                 1410

Ser Pro  Ile Leu Ser Ile Thr  Ile Ser Glu Asp Gly  Ser Met Ser
    1415                 1420                 1425

Ile Lys  Asn Glu Glu Glu Glu  Gln Thr Leu Thr Ile  Leu Ile Arg
    1430                 1435                 1440

Thr Gly  Leu Leu Val Ile Ser  Gly Leu Phe Pro Val  Ser Ile Pro
    1445                 1450                 1455

Ile Thr  Ala Ala Ala Trp Tyr  Leu Trp Glu Val Lys  Lys Gln Arg
    1460                 1465                 1470

Ala Gly  Val Leu Trp Asp Val  Pro Ser Pro Pro Pro  Met Gly Lys
    1475                 1480                 1485

Ala Glu  Leu Glu Asp Gly Ala  Tyr Arg Ile Lys Gln  Lys Gly Ile
    1490                 1495                 1500

Leu Gly  Tyr Ser Gln Ile Gly  Ala Gly Val Tyr Lys  Glu Gly Thr
    1505                 1510                 1515

Phe His  Thr Met Trp His Val  Thr Arg Gly Ala Val  Leu Met His
    1520                 1525                 1530

Lys Gly  Lys Arg Ile Glu Pro  Ser Trp Ala Asp Val  Lys Lys Asp
    1535                 1540                 1545

Leu Ile  Ser Tyr Gly Gly Gly  Trp Lys Leu Glu Gly  Glu Trp Lys
    1550                 1555                 1560

Glu Gly  Glu Glu Val Gln Val  Leu Ala Leu Glu Pro  Gly Lys Asn
    1565                 1570                 1575

Pro Arg  Ala Val Gln Thr Lys  Pro Gly Leu Phe Lys  Thr Asn Ala
    1580                 1585                 1590

Gly Thr  Ile Gly Ala Val Ser  Leu Asp Phe Ser Pro  Gly Thr Ser
    1595                 1600                 1605

Gly Ser  Pro Ile Ile Asp Lys  Lys Gly Lys Val Val  Gly Leu Tyr
    1610                 1615                 1620

Gly Asn  Gly Val Val Thr Arg  Ser Gly Ala Tyr Val  Ser Ala Ile
    1625                 1630                 1635

Ala Gln  Thr Glu Lys Ser Ile  Glu Asp Asn Pro Glu  Ile Glu Asp
    1640                 1645                 1650

Asp Ile  Phe Arg Lys Arg Arg  Leu Thr Ile Met Asp  Leu His Pro
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Gly Ala Gly Lys Thr Lys Arg Tyr Leu Pro Ala Ile Val Arg Glu
1670 1675 1680

Ala Ile Lys Arg Gly Leu Arg Thr Leu Ile Leu Ala Pro Thr Arg
1685 1690 1695

Val Val Ala Ala Glu Met Glu Glu Ala Leu Arg Gly Leu Pro Ile
1700 1705 1710

Arg Tyr Gln Thr Pro Ala Ile Arg Ala Val His Thr Gly Arg Glu
1715 1720 1725

Ile Val Asp Leu Met Cys His Ala Thr Phe Thr Met Arg Leu Leu
1730 1735 1740

Ser Pro Val Arg Val Pro Asn Tyr Asn Leu Ile Ile Met Asp Glu
1745 1750 1755

Ala His Phe Thr Asp Pro Ala Ser Ile Ala Ala Arg Gly Tyr Ile
1760 1765 1770

Ser Thr Arg Val Glu Met Gly Glu Ala Ala Gly Ile Phe Met Thr
1775 1780 1785

Ala Thr Pro Pro Gly Ser Arg Asp Pro Phe Pro Gln Ser Asn Ala
1790 1795 1800

Pro Ile Ile Asp Glu Glu Arg Glu Ile Pro Glu Arg Ser Trp Asn
1805 1810 1815

Ser Gly His Glu Trp Val Thr Asp Phe Lys Gly Lys Thr Val Trp
1820 1825 1830

Phe Val Pro Ser Ile Lys Ala Gly Asn Asp Ile Ala Ala Cys Leu
1835 1840 1845

Arg Lys Asn Gly Lys Lys Val Ile Gln Leu Ser Arg Lys Thr Phe
1850 1855 1860

Asp Ser Glu Tyr Val Lys Thr Arg Thr Asn Asp Trp Asp Phe Val
1865 1870 1875

Val Thr Thr Asp Ile Ser Glu Met Gly Ala Asn Phe Lys Ala Glu
1880 1885 1890

Arg Val Ile Asp Pro Arg Arg Cys Met Lys Pro Val Ile Leu Thr
1895 1900 1905

Asp Gly Glu Glu Arg Val Ile Leu Ala Gly Pro Met Pro Val Thr
1910 1915 1920

```
His Ser  Ser Ala Ala Gln Arg  Arg Gly Arg Ile Gly  Arg Asn Pro
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Lys Asn  Glu Asn Asp Gln Tyr  Ile Tyr Met Gly Glu  Pro Leu Glu
    1940                1945                1950

Asn Asp  Glu Asp Cys Ala His  Trp Lys Glu Ala Lys  Met Leu Leu
    1955                1960                1965

Asp Asn  Ile Asn Thr Pro Glu  Gly Ile Ile Pro Ser  Met Phe Glu
    1970                1975                1980

Pro Glu  Arg Glu Lys Val Asp  Ala Ile Asp Gly Glu  Tyr Arg Leu
    1985                1990                1995

Arg Gly  Glu Ala Arg Lys Thr  Phe Val Asp Leu Met  Arg Arg Gly
    2000                2005                2010

Asp Leu  Pro Val Trp Leu Ala  Tyr Arg Val Ala Ala  Glu Gly Ile
    2015                2020                2025

Asn Tyr  Ala Asp Arg Arg Trp  Cys Phe Asp Gly Val  Lys Asn Asn
    2030                2035                2040

Gln Ile  Leu Glu Glu Asn Val  Glu Val Glu Ile Trp  Thr Lys Glu
    2045                2050                2055

Gly Glu  Arg Lys Lys Leu Lys  Pro Arg Trp Leu Asp  Ala Arg Ile
    2060                2065                2070

Tyr Ser  Asp Pro Leu Ala Leu  Lys Glu Phe Lys Glu  Phe Ala Ala
    2075                2080                2085

Gly Arg  Lys Ser Leu Thr Leu  Asn Leu Ile Thr Glu  Met Gly Arg
    2090                2095                2100

Leu Pro  Thr Phe Met Thr Gln  Lys Ala Arg Asp Ala  Leu Asp Asn
    2105                2110                2115

Leu Ala  Val Leu His Thr Ala  Glu Ala Gly Gly Arg  Ala Tyr Asn
    2120                2125                2130

His Ala  Leu Ser Glu Leu Pro  Glu Thr Leu Glu Thr  Leu Leu Leu
    2135                2140                2145

Leu Thr  Leu Leu Ala Thr Val  Thr Gly Gly Ile Phe  Leu Phe Leu
    2150                2155                2160

Met Ser  Ala Arg Gly Ile Gly  Lys Met Thr Leu Gly  Met Cys Cys
    2165                2170                2175
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Ile Ile  Thr Ala Ser Ile Leu  Leu Trp Tyr Ala Gln  Ile Gln Pro
    2180                 2185                 2190

His Trp  Ile Ala Ala Ser Ile  Ile Leu Glu Phe Phe  Leu Ile Val
    2195                 2200                 2205

Leu Leu  Ile Pro Glu Pro Glu  Lys Gln Arg Thr Pro  Gln Asp Asn
    2210                 2215                 2220

Gln Leu  Thr Tyr Val Val Ile  Ala Ile Leu Thr Val  Val Ala Ala
    2225                 2230                 2235

Thr Met  Ala Asn Glu Met Gly  Phe Leu Glu Lys Thr  Lys Lys Asp
    2240                 2245                 2250

Leu Gly  Leu Gly Ser Ile Ala  Thr Gln Gln Pro Glu  Ser Asn Ile
    2255                 2260                 2265

Leu Asp  Ile Asp Leu Arg Pro  Ala Ser Ala Trp Thr  Leu Tyr Ala
    2270                 2275                 2280

Val Ala  Thr Thr Phe Val Thr  Pro Met Leu Arg His  Ser Ile Glu
    2285                 2290                 2295

Asn Ser  Ser Val Asn Val Ser  Leu Thr Ala Ile Ala  Asn Gln Ala
    2300                 2305                 2310

Thr Val  Leu Met Gly Leu Gly  Lys Gly Trp Pro Leu  Ser Lys Met
    2315                 2320                 2325

Asp Ile  Gly Val Pro Leu Leu  Ala Ile Gly Cys Tyr  Ser Gln Val
    2330                 2335                 2340

Asn Pro  Ile Thr Leu Thr Ala  Ala Leu Phe Leu Leu  Val Ala His
    2345                 2350                 2355

Tyr Ala  Ile Ile Gly Pro Gly  Leu Gln Ala Lys Ala  Thr Arg Glu
    2360                 2365                 2370

Ala Gln  Lys Arg Ala Ala Ala  Gly Ile Met Lys Asn  Pro Thr Val
    2375                 2380                 2385

Asp Gly  Ile Thr Val Ile Asp  Leu Asp Pro Ile Pro  Tyr Asp Pro
    2390                 2395                 2400

Lys Phe  Glu Lys Gln Leu Gly  Gln Val Met Leu Leu  Val Leu Cys
    2405                 2410                 2415

Val Thr  Gln Val Leu Met Met  Arg Thr Thr Trp Ala  Leu Cys Glu
    2420                 2425                 2430
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Ala Leu  Thr Leu Ala Thr Gly  Pro Ile Ser Thr Leu  Trp Glu Gly
    2435                 2440                 2445

Asn Pro  Gly Arg Phe Trp Asn  Thr Thr Ile Ala Val  Ser Met Ala
    2450                 2455                 2460

Asn Ile  Phe Arg Gly Ser Tyr  Leu Ala Gly Ala Gly  Leu Leu Phe
    2465                 2470                 2475

Ser Ile  Met Lys Asn Thr Thr  Asn Thr Arg Arg Gly  Thr Gly Asn
    2480                 2485                 2490

Ile Gly  Glu Thr Leu Gly Glu  Lys Trp Lys Ser Arg  Leu Asn Ala
    2495                 2500                 2505

Leu Gly  Lys Ser Glu Phe Gln  Ile Tyr Lys Lys Ser  Gly Ile Gln
    2510                 2515                 2520

Glu Val  Asp Arg Thr Leu Ala  Lys Glu Gly Ile Lys  Arg Gly Glu
    2525                 2530                 2535

Thr Asp  His His Ala Val Ser  Arg Gly Ser Ala Lys  Leu Arg Trp
    2540                 2545                 2550

Phe Val  Glu Arg Asn Met Val  Thr Pro Glu Gly Lys  Val Val Asp
    2555                 2560                 2565

Leu Gly  Cys Gly Arg Gly Gly  Trp Ser Tyr Tyr Cys  Gly Gly Leu
    2570                 2575                 2580

Lys Asn  Val Arg Glu Val Lys  Gly Leu Thr Lys Gly  Gly Pro Gly
    2585                 2590                 2595

His Glu  Glu Pro Ile Pro Met  Ser Thr Tyr Gly Trp  Asn Leu Val
    2600                 2605                 2610

Arg Leu  Gln Ser Gly Val Asp  Val Phe Phe Ile Pro  Pro Glu Lys
    2615                 2620                 2625

Cys Asp  Thr Leu Leu Cys Asp  Ile Gly Glu Ser Ser  Pro Asn Pro
    2630                 2635                 2640

Thr Val  Glu Ala Gly Arg Thr  Leu Arg Val Leu Asn  Leu Val Glu
    2645                 2650                 2655

Asn Trp  Leu Asn Asn Asn Thr  Gln Phe Cys Ile Lys  Val Leu Asn
    2660                 2665                 2670

Pro Tyr  Met Pro Ser Val Ile  Glu Lys Met Glu Ala  Leu Gln Arg
    2675                 2680                 2685

Lys Tyr  Gly Gly Ala Leu Val  Arg Asn Pro Leu Ser  Arg Asn Ser
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Thr His Glu Met Tyr Trp Val Ser Asn Ala Ser Gly Asn Ile Val
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Ser Ser Val Asn Met Ile Ser Arg Met Leu Ile Asn Arg Phe Thr
2720 2725 2730

Met Arg Tyr Lys Lys Ala Thr Tyr Glu Pro Asp Val Asp Leu Gly
2735 2740 2745

Ser Gly Thr Arg Asn Ile Gly Ile Glu Ser Glu Ile Pro Asn Leu
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Asp Ile Ile Gly Lys Arg Ile Glu Lys Ile Lys Gln Glu His Glu
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Thr Ser Trp His Tyr Asp Gln Asp His Pro Tyr Lys Thr Trp Ala
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Tyr His Gly Ser Tyr Glu Thr Lys Gln Thr Gly Ser Ala Ser Ser
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Met Val Asn Gly Val Val Arg Leu Leu Thr Lys Pro Trp Asp Val
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Val Pro Met Val Thr Gln Met Ala Met Thr Asp Thr Thr Pro Phe
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Gly Gln Gln Arg Val Phe Lys Glu Lys Val Asp Thr Arg Thr Gln
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Glu Pro Lys Glu Gly Thr Lys Lys Leu Met Lys Ile Thr Ala Glu
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Trp Leu Trp Lys Glu Leu Gly Lys Lys Lys Thr Pro Arg Met Cys
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Thr Arg Glu Glu Phe Thr Arg Lys Val Arg Ser Asn Ala Ala Leu
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Gly Ala Ile Phe Thr Asp Glu Asn Lys Trp Lys Ser Ala Arg Glu
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Ala Val Glu Asp Ser Arg Phe Trp Glu Leu Val Asp Lys Glu Arg
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Asn Leu His Leu Glu Gly Lys Cys Glu Thr Cys Val Tyr Asn Met
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Met Gly Lys Arg Glu Lys Lys Leu Gly Glu Phe Gly Lys Ala Lys
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Gly Ser Arg Ala Ile Trp Tyr Met Trp Leu Gly Ala Arg Phe Leu
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Glu Phe Glu Ala Leu Gly Phe Leu Asn Glu Asp His Trp Phe Ser
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Arg Glu Asn Ser Leu Ser Gly Val Glu Gly Glu Gly Leu His Lys
2990 2995 3000

Leu Gly Tyr Ile Leu Arg Asp Val Ser Lys Lys Glu Gly Gly Ala
3005 3010 3015

Met Tyr Ala Asp Asp Thr Ala Gly Trp Asp Thr Arg Ile Thr Leu
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Glu Asp Leu Lys Asn Glu Glu Met Val Thr Asn His Met Glu Gly
3035 3040 3045

Glu His Lys Lys Leu Ala Glu Ala Ile Phe Lys Leu Thr Tyr Gln
3050 3055 3060

Asn Lys Val Val Arg Val Gln Arg Pro Thr Pro Arg Gly Thr Val
3065 3070 3075

Met Asp Ile Ile Ser Arg Arg Asp Gln Arg Gly Ser Gly Gln Val
3080 3085 3090

Gly Thr Tyr Gly Leu Asn Thr Phe Thr Asn Met Glu Ala Gln Leu
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Ile Arg Gln Met Glu Gly Glu Gly Val Phe Lys Ser Ile Gln His
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Leu Thr Ile Thr Glu Glu Ile Ala Val Gln Asn Trp Leu Ala Arg
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Val Gly Arg Glu Arg Leu Ser Arg Met Ala Ile Ser Gly Asp Asp
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Cys Val Val Lys Pro Leu Asp Asp Arg Phe Ala Ser Ala Leu Thr
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Ala Leu Asn Asp Met Gly Lys Ile Arg Lys Asp Ile Gln Gln Trp
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Glu Pro Ser Arg Gly Trp Asn Asp Trp Thr Gln Val Pro Phe Cys
3185 3190 3195

Ser His His Phe His Glu Leu Ile Met Lys Asp Gly Arg Val Leu
3200 3205 3210

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Val Val  Pro Cys Arg Asn Gln  Asp Glu Leu Ile Gly  Arg Ala Arg
    3215                 3220                 3225

Ile Ser  Gln Gly Ala Gly Trp  Ser Leu Arg Glu Thr  Ala Cys Leu
    3230                 3235                 3240

Gly Lys  Ser Tyr Ala Gln Met  Trp Ser Leu Met Tyr  Phe His Arg
    3245                 3250                 3255

Arg Asp  Leu Arg Leu Ala Ala  Asn Ala Ile Cys Ser  Ala Val Pro
    3260                 3265                 3270

Ser His  Trp Val Pro Thr Ser  Arg Thr Thr Trp Ser  Ile His Ala
    3275                 3280                 3285

Lys His  Glu Trp Met Thr Thr  Glu Asp Met Leu Thr  Val Trp Asn
    3290                 3295                 3300

Arg Val  Trp Ile Gln Glu Asn  Pro Trp Met Glu Asp  Lys Thr Pro
    3305                 3310                 3315

Val Glu  Ser Trp Glu Glu Ile  Pro Tyr Leu Gly Lys  Arg Glu Asp
    3320                 3325                 3330

Gln Trp  Cys Gly Ser Leu Ile  Gly Leu Thr Ser Arg  Ala Thr Trp
    3335                 3340                 3345

Ala Lys  Asn Ile Gln Ala Ala  Ile Asn Gln Val Arg  Ser Leu Ile
    3350                 3355                 3360

Gly Asn  Glu Glu Tyr Thr Asp  Tyr Met Pro Ser Met  Lys Arg Phe
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Arg Arg  Glu Glu Glu Glu Ala  Gly Val Leu Trp
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Lys Arg Glu Arg Asn Arg Val Ser Thr Val Gln Gln Leu Thr Lys Arg
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Phe Ser Leu Gly Met Leu Gln Gly Arg Gly Pro Leu Lys Leu Phe Met
35 40 45

Ala Leu Val Ala Phe Leu Arg Phe Leu Thr Ile Pro Pro Thr Ala Gly
50 55 60

Ile Leu Lys Arg Trp Gly Thr Ile Lys Lys Ser Lys Ala Ile Asn Val
65 70 75 80

Leu Arg Gly Phe Arg Lys Glu Ile Gly Arg Met Leu Asn Ile Leu Asn
85 90 95

Arg Arg Arg Ser Ser Ala Gly Met Ile Ile Met Leu Ile Pro Thr Val
100 105 110

Met Ala Phe His Leu Thr Thr Arg Asp Gly Glu Pro Leu Met Ile Val
115 120 125

Ala Lys His Glu Arg Gly Arg Pro Leu Leu Phe Lys Thr Thr Glu Gly
130 135 140

Ile Asn Lys Cys Thr Leu Ile Ala Met Asp Leu Gly Glu Met Cys Glu
145 150 155 160

Asp Thr Val Thr Tyr Lys Cys Pro Leu Leu Val Asn Thr Glu Pro Glu
165 170 175

Asp Ile Asp Cys Trp Cys Asn Leu Thr Ser Thr Trp Val Met Tyr Gly
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Thr Cys Thr Gln Ser Gly Glu Arg Arg Arg Glu Lys Arg Ser Val Ala
195 200 205

Leu Thr Pro His Ser Gly Met Gly Leu Glu Thr Arg Ala Glu Thr Trp
210 215 220

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Met Ser Ser Glu Gly Ala Trp Lys His Ala Gln Arg Val Glu Ser Trp
225                 230                 235                 240

Ile Leu Arg Asn Pro Gly Phe Ala Leu Leu Ala Gly Phe Met Ala Tyr
                245                 250                 255

Met Ile Gly Gln Thr Gly Ile Gln Arg Thr Val Phe Phe Val Leu Met
            260                 265                 270

Met Leu Val Ala Pro Ser Tyr Gly Met Arg Cys Val Gly Val Gly Asn
        275                 280                 285

Arg Asp Phe Val Glu Gly Val Ser Gly Gly Ala Trp Val Asp Leu Val
    290                 295                 300

Leu Glu His Gly Gly Cys Val Thr Thr Met Ala Gln Gly Lys Pro Thr
305                 310                 315                 320

Leu Asp Phe Glu Leu Thr Lys Thr Thr Ala Lys Glu Val Ala Leu Leu
                325                 330                 335

Arg Thr Tyr Cys Ile Glu Ala Ser Ile Ser Asn Ile Thr Thr Ala Thr
            340                 345                 350

Arg Cys Pro Thr Gln Gly Glu Pro Tyr Leu Lys Glu Glu Gln Asp Gln
        355                 360                 365

Gln Tyr Ile Cys Arg Arg Asp Val Val Asp Arg Gly Trp Gly Asn Gly
    370                 375                 380

Cys Gly Leu Phe Gly Lys Gly Gly Val Val Thr Cys Ala Lys Phe Ser
385                 390                 395                 400

Cys Ser Gly Lys Ile Thr Gly Asn Leu Val Gln Ile Glu Asn Leu Glu
                405                 410                 415

Tyr Thr Val Val Val Thr Val His Asn Gly Asp Thr His Ala Val Gly
            420                 425                 430

Asn Asp Thr Ser Asn His Gly Val Thr Ala Thr Ile Thr Pro Arg Ser
        435                 440                 445

Pro Ser Val Glu Val Lys Leu Pro Asp Tyr Gly Glu Leu Thr Leu Asp
    450                 455                 460

Cys Glu Pro Arg Ser Gly Ile Asp Phe Asn Glu Met Ile Leu Met Lys
465                 470                 475                 480

Met Lys Lys Lys Thr Trp Leu Val His Lys Gln Trp Phe Leu Asp Leu
                485                 490                 495

Pro Leu Pro Trp Thr Ala Gly Ala Asp Thr Ser Glu Val His Trp Asn
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Tyr Lys Glu Arg Met Val Thr Phe Lys Val Pro His Ala Lys Arg Gln
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Asp Val Thr Val Leu Gly Ser Gln Glu Gly Ala Met His Ser Ala Leu
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Ala Gly Ala Thr Glu Val Asp Ser Gly Asp Gly Asn His Met Phe Ala
545                 550                 555                 560

Gly His Leu Lys Cys Lys Val Arg Met Glu Lys Leu Arg Ile Lys Gly
                565                 570                 575

Met Ser Tyr Thr Met Cys Ser Gly Lys Phe Ser Ile Asp Lys Glu Met
            580                 585                 590

Ala Glu Thr Gln His Gly Thr Thr Val Val Lys Val Lys Tyr Glu Gly
        595                 600                 605

Ala Gly Ala Pro Cys Lys Val Pro Ile Glu Ile Arg Asp Val Asn Lys
    610                 615                 620

Glu Lys Val Val Gly Arg Ile Ile Ser Ser Thr Pro Leu Ala Glu Asn
625                 630                 635                 640

Thr Asn Ser Val Thr Asn Ile Glu Leu Glu Pro Pro Phe Gly Asp Ser
                645                 650                 655

Tyr Ile Val Ile Gly Val Gly Asn Ser Ala Leu Thr Leu His Trp Phe
            660                 665                 670

Arg Lys Gly Ser Ser Ile Gly Lys Met Phe Glu Ser Thr Tyr Arg Gly
        675                 680                 685

Ala Lys Arg Met Ala Ile Leu Gly Glu Thr Ala Trp Asp Phe Gly Ser
    690                 695                 700

Val Gly Gly Leu Phe Thr Ser Leu Gly Lys Ala Val His Gln Val Phe
705                 710                 715                 720

Gly Ser Val Tyr Thr Thr Leu Phe Gly Gly Val Ser Trp Met Ile Arg
                725                 730                 735

Ile Leu Ile Gly Phe Leu Val Leu Trp Ile Gly Thr Asn Ser Arg Asn
            740                 745                 750

Thr Ser Met Ala Met Thr Cys Ile Ala Ala Gly Ile Val Thr Leu Tyr
        755                 760                 765

Leu Gly Val Met Val Gln Ala Asp Ser Gly Cys Val Val Ser Trp Lys
    770                 775                 780
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Asn Lys Glu Leu Lys Cys Gly Ser Gly Ile Phe Ile Thr Asp Asn Val
785                 790                 795                 800

His Thr Trp Thr Glu Gln Tyr Lys Phe Gln Pro Glu Ser Pro Ser Lys
                805                 810                 815

Leu Ala Ser Ala Ile Gln Lys Ala His Glu Glu Asp Ile Cys Gly Ile
            820                 825                 830

Arg Ser Val Thr Arg Leu Glu Asn Leu Met Trp Lys Gln Ile Thr Pro
        835                 840                 845

Glu Leu Asn His Ile Leu Ser Glu Asn Glu Val Lys Leu Thr Ile Met
    850                 855                 860

Thr Gly Asp Ile Lys Gly Ile Met Gln Ala Gly Lys Arg Ser Leu Arg
865                 870                 875                 880

Pro Gln Pro Thr Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala
                885                 890                 895

Lys Met Leu Ser Thr Glu Ser His Asn Gln Thr Phe Leu Ile Asp Gly
            900                 905                 910

Pro Glu Thr Ala Glu Cys Pro Asn Thr Asn Arg Ala Trp Asn Ser Leu
        915                 920                 925

Glu Val Glu Asp Tyr Gly Phe Gly Val Phe Thr Thr Asn Ile Trp Leu
    930                 935                 940

Lys Leu Lys Glu Lys Gln Asp Val Phe Cys Asp Ser Lys Leu Met Ser
945                 950                 955                 960

Ala Ala Ile Lys Asp Asn Arg Ala Val His Ala Asp Met Gly Tyr Trp
                965                 970                 975

Ile Glu Ser Ala Leu Asn Asp Thr Trp Lys Ile Glu Lys Ala Ser Phe
            980                 985                 990

Ile Glu Val Lys Asn Cys His Trp  Pro Lys Ser His Thr  Leu Trp Ser
        995                 1000                1005

Asn Gly  Val Leu Glu Ser Glu  Met Ile Ile Pro Lys  Asn Leu Ala
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Gly Pro  Val Ser Gln His Asn  Tyr Arg Pro Gly Tyr  His Thr Gln
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Ile Thr  Gly Pro Trp His Leu  Gly Lys Leu Glu Met  Asp Phe Asp
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Phe Cys  Asp Gly Thr Thr Val  Val Val Thr Glu Asp  Cys Gly Asn
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Arg Gly  Pro Ser Leu Arg Thr  Thr Thr Ala Ser Gly  Lys Leu Ile
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Thr Glu  Trp Cys Cys Arg Ser  Cys Thr Leu Pro Pro  Leu Arg Tyr
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Arg Gly  Glu Asp Gly Cys Trp  Tyr Gly Met Glu Ile  Arg Pro Leu
    1100                 1105                 1110

Lys Glu  Lys Glu Glu Asn Leu  Val Asn Ser Leu Val  Thr Ala Gly
    1115                 1120                 1125

His Gly  Gln Val Asp Asn Phe  Ser Leu Gly Val Leu  Gly Met Ala
    1130                 1135                 1140

Leu Phe  Leu Glu Glu Met Leu  Arg Thr Arg Val Gly  Thr Lys His
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Ala Ile  Leu Leu Val Ala Val  Ser Phe Val Thr Leu  Ile Thr Gly
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Asn Met  Ser Phe Arg Asp Leu  Gly Arg Val Met Val  Met Val Gly
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Ala Thr  Met Thr Gly Asp Ile  Gly Met Gly Val Thr  Tyr Leu Ala
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Leu Leu  Ala Ala Phe Lys Val  Arg Pro Thr Phe Ala  Ala Gly Leu
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Leu Leu  Arg Lys Leu Thr Ser  Arg Glu Leu Met Met  Thr Thr Ile
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Gly Ile  Val Leu Leu Ser Gln  Ser Thr Ile Pro Glu  Thr Ile Leu
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Glu Leu  Thr Asp Ala Leu Ala  Leu Gly Met Met Val  Leu Lys Met
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Val Arg  Asn Met Glu Lys Tyr  Gln Leu Ala Val Thr  Ile Met Ala
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Ile Leu  Cys Val Pro Asn Ala  Val Ile Leu Gln Asn  Ala Trp Lys
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Val Ser  Cys Thr Ile Leu Ala  Val Val Ser Val Ser  Pro Leu Phe
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Leu Thr  Ser Ser Gln Gln Lys  Thr Asp Trp Ile Pro  Leu Ala Leu
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Thr Ile  Lys Gly Leu Asn Pro  Thr Ala Ile Phe Leu  Thr Thr Leu
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Ser Arg  Thr Ser Lys Lys Arg  Ser Trp Pro Leu Asn  Glu Ala Ile
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Met Ala  Val Gly Met Val Ser  Ile Leu Ala Ser Ser  Leu Leu Lys
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Asn Asp  Ile Pro Met Thr Gly  Pro Leu Val Ala Gly  Gly Leu Leu
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Thr Val  Cys Tyr Val Leu Thr  Gly Arg Ser Ala Asp  Leu Glu Leu
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Glu Arg  Ala Ala Asp Val Lys  Trp Glu Asp Gln Ala  Glu Ile Ser
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Gly Ser  Ser Pro Ile Leu Ser  Ile Thr Ile Ser Glu  Asp Gly Ser
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Met Ser  Ile Lys Asn Glu Glu  Glu Glu Gln Thr Leu  Thr Ile Leu
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Ile Arg  Thr Gly Leu Leu Val  Ile Ser Gly Leu Phe  Pro Val Ser
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Ile Pro  Ile Thr Ala Ala Ala  Trp Tyr Leu Trp Glu  Val Lys Lys
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Gln Arg  Ala Gly Val Leu Trp  Asp Val Pro Ser Pro  Pro Pro Met
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Gly Lys  Ala Glu Leu Glu Asp  Gly Ala Tyr Arg Ile  Lys Gln Lys
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Gly Ile  Leu Gly Tyr Ser Gln  Ile Gly Ala Gly Val  Tyr Lys Glu
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Gly Thr  Phe His Thr Met Trp  His Val Thr Arg Gly  Ala Val Leu
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Met His  Lys Gly Lys Arg Ile  Glu Pro Ser Trp Ala  Asp Val Lys
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Lys Asp  Leu Ile Ser Tyr Gly  Gly Gly Trp Lys Leu  Glu Gly Glu
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Trp Lys  Glu Gly Glu Glu Val  Gln Val Leu Ala Leu  Glu Pro Gly
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His Pro Gly Ala Gly Lys Thr Lys Arg Tyr Leu Pro Ala Ile Val
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Asp Glu Ala His Phe Thr Asp Pro Ala Ser Ile Ala Ala Arg Gly
1760 1765 1770

Tyr Ile Ser Thr Arg Val Glu Met Gly Glu Ala Ala Gly Ile Phe
1775 1780 1785

Met Thr Ala Thr Pro Pro Gly Ser Arg Asp Pro Phe Pro Gln Ser
1790 1795 1800

Asn Ala Pro Ile Ile Asp Glu Glu Arg Glu Ile Pro Glu Arg Ser
1805 1810 1815

Trp Asn Ser Gly His Glu Trp Val Thr Asp Phe Lys Gly Lys Thr
1820 1825 1830

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Val Trp  Phe Val Pro Ser Ile  Lys Ala Gly Asn Asp  Ile Ala Ala
    1835                 1840                 1845

Cys Leu  Arg Lys Asn Gly Lys  Lys Val Ile Gln Leu  Ser Arg Lys
    1850                 1855                 1860

Thr Phe  Asp Ser Glu Tyr Val  Lys Thr Arg Thr Asn  Asp Trp Asp
    1865                 1870                 1875

Phe Val  Val Thr Thr Asp Ile  Ser Glu Met Gly Ala  Asn Phe Lys
    1880                 1885                 1890

Ala Glu  Arg Val Ile Asp Pro  Arg Arg Cys Met Lys  Pro Val Ile
    1895                 1900                 1905

Leu Thr  Asp Gly Glu Glu Arg  Val Ile Leu Ala Gly  Pro Met Pro
    1910                 1915                 1920

Val Thr  His Ser Ser Ala Ala  Gln Arg Arg Gly Arg  Ile Gly Arg
    1925                 1930                 1935

Asn Pro  Lys Asn Glu Asn Asp  Gln Tyr Ile Tyr Met  Gly Glu Pro
    1940                 1945                 1950

Leu Glu  Asn Asp Glu Asp Cys  Ala His Trp Lys Glu  Ala Lys Met
    1955                 1960                 1965

Leu Leu  Asp Asn Ile Asn Thr  Pro Glu Gly Ile Ile  Pro Ser Met
    1970                 1975                 1980

Phe Glu  Pro Glu Arg Glu Lys  Val Asp Ala Ile Asp  Gly Glu Tyr
    1985                 1990                 1995

Arg Leu  Arg Gly Glu Ala Arg  Lys Thr Phe Val Asp  Leu Met Arg
    2000                 2005                 2010

Arg Gly  Asp Leu Pro Val Trp  Leu Ala Tyr Arg Val  Ala Ala Glu
    2015                 2020                 2025

Gly Ile  Asn Tyr Ala Asp Arg  Arg Trp Cys Phe Asp  Gly Val Lys
    2030                 2035                 2040

Asn Asn  Gln Ile Leu Glu Glu  Asn Val Glu Val Glu  Ile Trp Thr
    2045                 2050                 2055

Lys Glu  Gly Glu Arg Lys Lys  Leu Lys Pro Arg Trp  Leu Asp Ala
    2060                 2065                 2070

Arg Ile  Tyr Ser Asp Pro Leu  Ala Leu Lys Glu Phe  Lys Glu Phe
    2075                 2080                 2085
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Ala Ala  Gly Arg Lys Ser Leu  Thr Leu Asn Leu Ile  Thr Glu Met
    2090                 2095                 2100

Gly Arg  Leu Pro Thr Phe Met  Thr Gln Lys Val Arg  Asp Ala Leu
    2105                 2110                 2115

Asp Asn  Leu Ala Val Leu His  Thr Ala Glu Ala Gly  Gly Arg Ala
    2120                 2125                 2130

Tyr Asn  His Ala Leu Ser Glu  Leu Pro Glu Thr Leu  Glu Thr Leu
    2135                 2140                 2145

Leu Leu  Leu Thr Leu Leu Ala  Thr Val Thr Gly Gly  Ile Phe Leu
    2150                 2155                 2160

Phe Leu  Met Ser Ala Arg Gly  Ile Gly Lys Met Thr  Leu Gly Met
    2165                 2170                 2175

Cys Cys  Ile Ile Thr Ala Ser  Ile Leu Leu Trp Tyr  Ala Gln Ile
    2180                 2185                 2190

Gln Pro  His Trp Ile Ala Ala  Ser Ile Ile Leu Glu  Phe Phe Leu
    2195                 2200                 2205

Ile Val  Leu Leu Ile Pro Glu  Pro Glu Lys Gln Arg  Thr Pro Gln
    2210                 2215                 2220

Asp Asn  Gln Leu Thr Tyr Val  Val Ile Ala Ile Leu  Thr Val Val
    2225                 2230                 2235

Ala Ala  Thr Met Ala Asn Glu  Met Gly Phe Leu Glu  Lys Thr Lys
    2240                 2245                 2250

Lys Asp  Leu Gly Leu Gly Ser  Ile Ala Thr Gln Gln  Pro Glu Ser
    2255                 2260                 2265

Asn Ile  Leu Asp Ile Asp Leu  Arg Pro Ala Ser Ala  Trp Thr Leu
    2270                 2275                 2280

Tyr Ala  Val Ala Thr Thr Phe  Val Thr Pro Met Leu  Arg His Ser
    2285                 2290                 2295

Ile Glu  Asn Ser Ser Val Asn  Val Ser Leu Thr Ala  Ile Ala Asn
    2300                 2305                 2310

Gln Ala  Thr Val Leu Met Gly  Leu Gly Lys Gly Trp  Pro Leu Ser
    2315                 2320                 2325

Lys Met  Asp Ile Gly Val Pro  Leu Leu Ala Ile Gly  Cys Tyr Ser
    2330                 2335                 2340
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Gln Val  Asn Pro Ile Thr Leu  Thr Ala Ala Leu Phe  Leu Leu Val
    2345                2350                2355

Ala His  Tyr Ala Ile Ile Gly  Pro Gly Leu Gln Ala  Lys Ala Thr
    2360                2365                2370

Arg Glu  Ala Gln Lys Arg Ala  Ala Ala Gly Ile Met  Lys Asn Pro
    2375                2380                2385

Thr Val  Asp Gly Ile Thr Val  Ile Asp Leu Asp Pro  Ile Pro Tyr
    2390                2395                2400

Asp Pro  Lys Phe Glu Lys Gln  Leu Gly Gln Val Met  Leu Leu Val
    2405                2410                2415

Leu Cys  Val Thr Gln Val Leu  Met Met Arg Thr Thr  Trp Ala Leu
    2420                2425                2430

Cys Glu  Ala Leu Thr Leu Ala  Thr Gly Pro Ile Ser  Thr Leu Trp
    2435                2440                2445

Glu Gly  Asn Pro Gly Arg Phe  Trp Asn Thr Thr Ile  Ala Val Ser
    2450                2455                2460

Met Ala  Asn Ile Phe Arg Gly  Ser Tyr Leu Ala Gly  Ala Gly Leu
    2465                2470                2475

Leu Phe  Phe Ile Met Lys Asn  Thr Thr Asn Thr Arg  Arg Gly Thr
    2480                2485                2490

Gly Asn  Ile Gly Glu Thr Leu  Gly Glu Lys Trp Lys  Ser Arg Leu
    2495                2500                2505

Asn Ala  Leu Gly Lys Ser Glu  Phe Gln Ile Tyr Lys  Lys Ser Gly
    2510                2515                2520

Ile Gln  Glu Val Asp Arg Thr  Leu Ala Lys Glu Gly  Ile Lys Arg
    2525                2530                2535

Gly Glu  Thr Asp His His Ala  Val Ser Arg Gly Ser  Ala Lys Leu
    2540                2545                2550

Arg Trp  Phe Val Glu Arg Asn  Met Val Thr Pro Glu  Gly Lys Val
    2555                2560                2565

Val Asp  Leu Gly Cys Gly Arg  Gly Gly Trp Ser Tyr  Tyr Cys Gly
    2570                2575                2580

Gly Leu  Lys Asn Val Arg Glu  Val Lys Gly Leu Thr  Lys Gly Gly
    2585                2590                2595

Pro Gly  His Glu Glu Pro Ile  Pro Met Ser Thr Tyr  Gly Trp Asn
```

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    2600                 2605                 2610

Leu Val  Arg Leu Gln Ser Gly  Val Asp Val Phe Phe  Ile Pro Pro
    2615                 2620                 2625

Glu Lys  Cys Asp Thr Leu Leu  Cys Asp Ile Gly Glu  Ser Ser Pro
    2630                 2635                 2640

Asn Pro  Thr Val Glu Ala Gly  Arg Thr Leu Arg Val  Leu Asn Leu
    2645                 2650                 2655

Val Glu  Asn Trp Leu Asn Asn  Asn Thr Gln Phe Cys  Ile Lys Val
    2660                 2665                 2670

Leu Asn  Pro Tyr Met Pro Ser  Val Ile Glu Lys Met  Glu Ala Leu
    2675                 2680                 2685

Gln Arg  Lys Tyr Gly Gly Ala  Leu Val Arg Asn Pro  Leu Ser Arg
    2690                 2695                 2700

Asn Ser  Thr His Glu Met Tyr  Trp Val Ser Asn Ala  Ser Gly Asn
    2705                 2710                 2715

Ile Val  Ser Ser Val Asn Met  Ile Ser Arg Met Leu  Ile Asn Arg
    2720                 2725                 2730

Phe Thr  Met Arg Tyr Lys Lys  Ala Thr Tyr Glu Pro  Asp Val Asp
    2735                 2740                 2745

Leu Gly  Ser Gly Thr Arg Asn  Ile Gly Ile Glu Ser  Glu Ile Pro
    2750                 2755                 2760

Asn Leu  Asp Ile Ile Gly Lys  Arg Ile Glu Lys Ile  Lys Gln Glu
    2765                 2770                 2775

His Glu  Thr Ser Trp His Tyr  Asp Gln Asp His Pro  Tyr Lys Thr
    2780                 2785                 2790

Trp Ala  Tyr His Gly Ser Tyr  Glu Thr Lys Gln Thr  Gly Ser Ala
    2795                 2800                 2805

Ser Ser  Met Val Asn Gly Val  Val Arg Leu Leu Thr  Lys Pro Trp
    2810                 2815                 2820

Asp Val  Val Pro Met Val Thr  Gln Met Ala Met Thr  Asp Thr Thr
    2825                 2830                 2835

Pro Phe  Gly Gln Gln Arg Val  Phe Lys Glu Lys Val  Asp Thr Arg
    2840                 2845                 2850

Thr Gln  Glu Pro Lys Glu Gly  Thr Lys Lys Leu Met  Lys Ile Thr
    2855                 2860                 2865
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Ala Glu Trp Leu Trp Lys Glu Leu Gly Lys Lys Lys Thr Pro Arg
2870 2875 2880

Met Cys Thr Arg Glu Glu Phe Thr Arg Lys Val Arg Ser Asn Ala
2885 2890 2895

Ala Leu Gly Ala Ile Phe Thr Asp Glu Asn Lys Trp Lys Ser Ala
2900 2905 2910

Arg Glu Ala Val Glu Asp Ser Arg Phe Trp Glu Leu Val Asp Lys
2915 2920 2925

Glu Arg Asn Leu His Leu Glu Gly Lys Cys Glu Thr Cys Val Tyr
2930 2935 2940

Asn Met Met Gly Lys Arg Glu Lys Lys Leu Gly Glu Phe Gly Lys
2945 2950 2955

Ala Lys Gly Ser Arg Ala Ile Trp Tyr Met Trp Leu Gly Ala Arg
2960 2965 2970

Phe Leu Glu Phe Glu Ala Leu Gly Phe Leu Asn Glu Asp His Trp
2975 2980 2985

Phe Ser Arg Glu Asn Ser Leu Ser Gly Val Glu Gly Glu Gly Leu
2990 2995 3000

His Lys Leu Gly Tyr Ile Leu Arg Asp Val Ser Lys Lys Glu Gly
3005 3010 3015

Gly Ala Met Tyr Ala Asp Asp Thr Ala Gly Trp Asp Thr Arg Ile
3020 3025 3030

Thr Leu Glu Asp Leu Lys Asn Glu Glu Met Val Thr Asn His Met
3035 3040 3045

Glu Gly Glu His Lys Lys Leu Ala Glu Ala Ile Phe Lys Leu Thr
3050 3055 3060

Tyr Gln Asn Lys Val Val Arg Val Gln Arg Pro Thr Pro Arg Gly
3065 3070 3075

Thr Val Met Asp Ile Ile Ser Arg Arg Asp Gln Arg Gly Ser Gly
3080 3085 3090

Gln Val Gly Thr Tyr Gly Leu Asn Thr Phe Thr Asn Met Glu Ala
3095 3100 3105

Gln Leu Ile Arg Gln Met Glu Gly Glu Gly Val Phe Lys Ser Ile
3110 3115 3120

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Gln His  Leu Thr Ile Thr Glu  Glu Ile Ala Val Gln  Asn Trp Leu
    3125                3130                3135

Ala Arg  Val Gly Arg Glu Arg  Leu Ser Arg Met Ala  Ile Ser Gly
    3140                3145                3150

Asp Asp  Cys Val Val Lys Pro  Leu Asp Asp Arg Phe  Ala Ser Ala
    3155                3160                3165

Leu Thr  Ala Leu Asn Asp Met  Gly Lys Ile Arg Lys  Asp Ile Gln
    3170                3175                3180

Gln Trp  Glu Pro Ser Arg Gly  Trp Asn Asp Trp Thr  Gln Val Pro
    3185                3190                3195

Phe Cys  Ser His His Phe His  Glu Leu Ile Met Lys  Asp Gly Arg
    3200                3205                3210

Val Leu  Val Val Pro Cys Arg  Asn Gln Asp Glu Leu  Ile Gly Arg
    3215                3220                3225

Ala Arg  Ile Ser Gln Gly Ala  Gly Trp Ser Leu Arg  Glu Thr Ala
    3230                3235                3240

Cys Leu  Gly Lys Ser Tyr Ala  Gln Met Trp Ser Leu  Met Tyr Phe
    3245                3250                3255

His Arg  Arg Asp Leu Arg Leu  Ala Ala Asn Ala Ile  Cys Ser Ala
    3260                3265                3270

Val Pro  Ser His Trp Val Pro  Thr Ser Arg Thr Thr  Trp Ser Ile
    3275                3280                3285

His Ala  Lys His Glu Trp Met  Thr Thr Glu Asp Met  Leu Thr Val
    3290                3295                3300

Trp Asn  Arg Val Trp Ile Gln  Glu Asn Pro Trp Met  Glu Asp Lys
    3305                3310                3315

Thr Pro  Val Glu Ser Trp Glu  Glu Ile Pro Tyr Leu  Gly Lys Arg
    3320                3325                3330

Glu Asp  Gln Trp Cys Gly Ser  Leu Ile Gly Leu Thr  Ser Arg Ala
    3335                3340                3345

Thr Trp  Ala Lys Asn Ile Gln  Ala Ala Ile Asn Gln  Val Arg Ser
    3350                3355                3360

Leu Ile  Gly Asn Glu Glu Tyr  Thr Asp Tyr Met Pro  Ser Met Lys
    3365                3370                3375
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Arg Phe  Arg Arg Glu Glu Glu  Glu Ala Gly Val Leu  Trp
    3380                3385                3390


<210>  12
<211>  3391
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Dengue virus serotype 4, MVS

<400>  12

Met Asn Asn Gln Arg Lys Lys Ala Lys Asn Thr Pro Phe Asn Met Leu
1               5                  10                  15


Lys Arg Glu Arg Asn Arg Val Ser Thr Val Gln Gln Leu Thr Lys Arg
            20                  25                  30


Phe Ser Leu Gly Met Leu Gln Gly Arg Gly Pro Leu Lys Leu Phe Met
        35                  40                  45


Ala Leu Val Ala Phe Leu Arg Phe Leu Thr Ile Pro Pro Thr Ala Gly
    50                  55                  60


Ile Leu Lys Arg Trp Gly Thr Ile Lys Lys Ser Lys Ala Ile Asn Val
65                  70                  75                  80


Leu Arg Gly Phe Arg Lys Glu Ile Gly Arg Met Leu Asn Ile Leu Asn
                85                  90                  95


Arg Arg Arg Ser Ser Ala Gly Met Ile Ile Met Leu Ile Pro Thr Val
            100                 105                 110


Met Ala Phe His Leu Thr Thr Arg Asp Gly Glu Pro Leu Met Ile Val
        115                 120                 125


Ala Lys His Glu Arg Gly Arg Pro Leu Leu Phe Lys Thr Thr Glu Gly
    130                 135                 140


Ile Asn Lys Cys Thr Leu Ile Ala Met Asp Leu Gly Glu Met Cys Glu
145                 150                 155                 160


Asp Thr Val Thr Tyr Lys Cys Pro Leu Leu Val Asn Thr Glu Pro Glu
                165                 170                 175


Asp Ile Asp Cys Trp Cys Asn Leu Thr Ser Thr Trp Val Met Tyr Gly
            180                 185                 190


Thr Cys Thr Gln Ser Gly Glu Arg Arg Arg Glu Lys Arg Ser Val Ala
        195                 200                 205


Leu Thr Pro His Ser Gly Met Gly Leu Glu Thr Arg Ala Glu Thr Trp
    210                 215                 220
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Met Ser Ser Glu Gly Ala Trp Lys His Ala Gln Arg Val Glu Ser Trp
225                 230                 235                 240

Ile Leu Arg Asn Pro Gly Phe Ala Leu Leu Ala Gly Phe Met Ala Tyr
                245                 250                 255

Met Ile Gly Gln Thr Gly Ile Gln Arg Thr Val Phe Phe Val Leu Met
            260                 265                 270

Met Leu Val Ala Pro Ser Tyr Gly Met Arg Cys Val Gly Val Gly Asn
        275                 280                 285

Arg Asp Phe Val Glu Gly Val Ser Gly Gly Ala Trp Val Asp Leu Val
    290                 295                 300

Leu Glu His Gly Gly Cys Val Thr Thr Met Ala Gln Gly Lys Pro Thr
305                 310                 315                 320

Leu Asp Phe Glu Leu Thr Lys Thr Thr Ala Lys Glu Val Ala Leu Leu
                325                 330                 335

Arg Thr Tyr Cys Ile Glu Ala Ser Ile Ser Asn Ile Thr Thr Ala Thr
            340                 345                 350

Arg Cys Pro Thr Gln Gly Glu Pro Tyr Leu Lys Glu Glu Gln Asp Gln
        355                 360                 365

Gln Tyr Ile Cys Arg Arg Asp Val Val Asp Arg Gly Trp Gly Asn Gly
    370                 375                 380

Cys Gly Leu Phe Gly Lys Gly Gly Val Val Thr Cys Ala Lys Phe Ser
385                 390                 395                 400

Cys Ser Gly Lys Ile Thr Gly Asn Leu Val Gln Ile Glu Asn Leu Glu
                405                 410                 415

Tyr Thr Val Val Val Thr Val His Asn Gly Asp Thr His Ala Val Gly
            420                 425                 430

Asn Asp Thr Ser Asn His Gly Val Thr Ala Thr Ile Thr Pro Arg Ser
        435                 440                 445

Pro Ser Val Glu Val Lys Leu Pro Asp Tyr Gly Glu Leu Thr Leu Asp
    450                 455                 460

Cys Glu Pro Arg Ser Gly Ile Asp Phe Asn Glu Met Ile Leu Met Lys
465                 470                 475                 480

Met Lys Lys Lys Thr Trp Leu Val His Lys Gln Trp Phe Leu Asp Leu
                485                 490                 495
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Pro Leu Pro Trp Thr Ala Gly Ala Asp Thr Ser Glu Val His Trp Asn
            500                 505                 510

Tyr Lys Glu Arg Met Val Thr Phe Lys Val Pro His Ala Lys Arg Gln
        515                 520                 525

Asp Val Thr Val Leu Gly Ser Gln Glu Gly Ala Met His Ser Ala Leu
    530                 535                 540

Ala Gly Ala Thr Glu Val Asp Ser Gly Asp Gly Asn His Met Phe Ala
545                 550                 555                 560

Gly His Leu Lys Cys Lys Val Arg Met Glu Lys Leu Arg Ile Lys Gly
                565                 570                 575

Met Ser Tyr Thr Met Cys Ser Gly Lys Phe Ser Ile Asp Lys Glu Met
            580                 585                 590

Ala Glu Thr Gln His Gly Thr Thr Val Val Lys Val Lys Tyr Glu Gly
        595                 600                 605

Ala Gly Ala Pro Cys Lys Val Pro Ile Glu Ile Arg Asp Val Asn Lys
    610                 615                 620

Glu Lys Val Val Gly Arg Ile Ile Ser Ser Thr Pro Leu Ala Glu Asn
625                 630                 635                 640

Thr Asn Ser Val Thr Asn Ile Glu Leu Glu Pro Pro Phe Gly Asp Ser
                645                 650                 655

Tyr Ile Val Ile Gly Val Gly Asn Ser Ala Leu Thr Leu His Trp Phe
            660                 665                 670

Arg Lys Gly Ser Ser Ile Gly Lys Met Phe Glu Ser Thr Tyr Arg Gly
        675                 680                 685

Ala Lys Arg Met Ala Ile Leu Gly Glu Thr Ala Trp Asp Phe Gly Ser
    690                 695                 700

Val Gly Gly Leu Phe Thr Ser Leu Gly Lys Ala Val His Gln Val Phe
705                 710                 715                 720

Gly Ser Val Tyr Thr Thr Leu Phe Gly Gly Val Ser Trp Met Ile Arg
                725                 730                 735

Ile Leu Ile Gly Phe Leu Val Leu Trp Ile Gly Thr Asn Ser Arg Asn
            740                 745                 750

Thr Ser Met Ala Met Thr Cys Ile Ala Ala Gly Ile Val Thr Leu Tyr
        755                 760                 765

Leu Gly Val Met Val Gln Ala Asp Ser Gly Cys Val Val Ser Trp Lys
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770 775 780

Asn Lys Glu Leu Lys Cys Gly Ser Gly Ile Phe Ile Thr Asp Asn Val
785 790 795 800

His Thr Trp Thr Glu Gln Tyr Lys Phe Gln Pro Glu Ser Pro Ser Lys
805 810 815

Leu Ala Ser Ala Ile Gln Lys Ala His Glu Glu Asp Ile Cys Gly Ile
820 825 830

Arg Ser Val Thr Arg Leu Glu Asn Leu Met Trp Lys Gln Ile Thr Pro
835 840 845

Glu Leu Asn His Ile Leu Ser Glu Asn Glu Val Lys Leu Thr Ile Met
850 855 860

Thr Gly Asp Ile Lys Gly Ile Met Gln Ala Gly Lys Arg Ser Leu Arg
865 870 875 880

Pro Gln Pro Thr Glu Leu Lys Tyr Ser Trp Lys Thr Trp Gly Lys Ala
885 890 895

Lys Met Leu Ser Thr Glu Ser His Asn Gln Thr Phe Leu Ile Asp Gly
900 905 910

Pro Glu Thr Ala Glu Cys Pro Asn Thr Asn Arg Ala Trp Asn Ser Leu
915 920 925

Glu Val Glu Asp Tyr Gly Phe Gly Val Phe Thr Thr Asn Ile Trp Leu
930 935 940

Lys Leu Lys Glu Lys Gln Asp Val Phe Cys Asp Ser Lys Leu Met Ser
945 950 955 960

Ala Ala Ile Lys Asp Asn Arg Ala Val His Ala Asp Met Gly Tyr Trp
965 970 975

Ile Glu Ser Ala Leu Asn Asp Thr Trp Lys Ile Glu Lys Ala Ser Phe
980 985 990

Ile Glu Val Lys Asn Cys His Trp Pro Lys Ser His Thr Leu Trp Ser
995 1000 1005

Asn Gly Val Leu Glu Ser Glu Met Ile Ile Pro Lys Asn Leu Ala
1010 1015 1020

Gly Pro Val Ser Gln His Asn Tyr Arg Pro Gly Tyr His Thr Gln
1025 1030 1035

Ile Thr Gly Pro Trp His Leu Gly Lys Leu Glu Met Asp Phe Asp
1040 1045 1050

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Phe Cys  Asp Gly Thr Thr Val  Val Val Thr Glu Asp  Cys Gly Asn
    1055                 1060                 1065

Arg Gly  Pro Ser Leu Arg Thr  Thr Thr Ala Ser Gly  Lys Leu Ile
    1070                 1075                 1080

Thr Glu  Trp Cys Cys Arg Ser  Cys Thr Leu Pro Pro  Leu Arg Tyr
    1085                 1090                 1095

Arg Gly  Glu Asp Gly Cys Trp  Tyr Gly Met Glu Ile  Arg Pro Leu
    1100                 1105                 1110

Lys Glu  Lys Glu Glu Asn Leu  Val Asn Ser Leu Val  Thr Ala Gly
    1115                 1120                 1125

His Gly  Gln Val Asp Asn Phe  Ser Leu Gly Val Leu  Gly Met Ala
    1130                 1135                 1140

Leu Phe  Leu Glu Glu Met Leu  Arg Thr Arg Val Gly  Thr Lys His
    1145                 1150                 1155

Ala Ile  Leu Leu Val Ala Val  Ser Phe Val Thr Leu  Ile Thr Gly
    1160                 1165                 1170

Asn Met  Ser Phe Arg Asp Leu  Gly Arg Val Met Val  Met Val Gly
    1175                 1180                 1185

Ala Thr  Met Thr Gly Asp Ile  Gly Met Gly Val Thr  Tyr Leu Ala
    1190                 1195                 1200

Leu Leu  Ala Ala Phe Lys Val  Arg Pro Thr Phe Ala  Ala Gly Leu
    1205                 1210                 1215

Leu Leu  Arg Lys Leu Thr Ser  Arg Glu Leu Met Met  Thr Thr Ile
    1220                 1225                 1230

Gly Ile  Val Leu Leu Ser Gln  Ser Thr Ile Pro Glu  Thr Ile Leu
    1235                 1240                 1245

Glu Leu  Thr Asp Ala Leu Ala  Leu Gly Met Met Val  Leu Lys Met
    1250                 1255                 1260

Val Arg  Asn Met Glu Lys Tyr  Gln Leu Ala Val Thr  Ile Met Ala
    1265                 1270                 1275

Ile Leu  Cys Val Pro Asn Ala  Val Ile Leu Gln Asn  Ala Trp Lys
    1280                 1285                 1290

Val Ser  Cys Thr Ile Leu Ala  Val Val Ser Val Ser  Pro Leu Phe
    1295                 1300                 1305
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Leu Thr  Ser Ser Gln Gln Lys  Thr Asp Trp Ile Pro  Leu Ala Leu
    1310                 1315                 1320

Thr Ile  Lys Gly Leu Asn Pro  Thr Ala Ile Phe Leu  Thr Thr Leu
    1325                 1330                 1335

Ser Arg  Thr Ser Lys Lys Arg  Ser Trp Pro Leu Asn  Glu Ala Ile
    1340                 1345                 1350

Met Ala  Val Gly Met Val Ser  Ile Leu Ala Ser Ser  Leu Leu Lys
    1355                 1360                 1365

Asn Asp  Ile Pro Met Thr Gly  Pro Leu Val Ala Gly  Gly Leu Leu
    1370                 1375                 1380

Thr Val  Cys Tyr Val Leu Thr  Gly Arg Ser Ala Asp  Leu Glu Leu
    1385                 1390                 1395

Glu Arg  Ala Ala Asp Val Lys  Trp Glu Asp Gln Ala  Glu Ile Ser
    1400                 1405                 1410

Gly Ser  Ser Pro Ile Leu Ser  Ile Thr Ile Ser Glu  Asp Gly Ser
    1415                 1420                 1425

Met Ser  Ile Lys Asn Glu Glu  Glu Glu Gln Thr Leu  Thr Ile Leu
    1430                 1435                 1440

Ile Arg  Thr Gly Leu Leu Val  Ile Ser Gly Leu Phe  Pro Val Ser
    1445                 1450                 1455

Ile Pro  Ile Thr Ala Ala Ala  Trp Tyr Leu Trp Glu  Val Lys Lys
    1460                 1465                 1470

Gln Arg  Ala Gly Val Leu Trp  Asp Val Pro Ser Pro  Pro Pro Met
    1475                 1480                 1485

Gly Lys  Ala Glu Leu Glu Asp  Gly Ala Tyr Arg Ile  Lys Gln Lys
    1490                 1495                 1500

Gly Ile  Leu Gly Tyr Ser Gln  Ile Gly Ala Gly Val  Tyr Lys Glu
    1505                 1510                 1515

Gly Thr  Phe His Thr Met Trp  His Val Thr Arg Gly  Ala Val Leu
    1520                 1525                 1530

Met His  Lys Gly Lys Arg Ile  Glu Pro Ser Trp Ala  Asp Val Lys
    1535                 1540                 1545

Lys Asp  Leu Ile Ser Tyr Gly  Gly Gly Trp Lys Leu  Glu Gly Glu
    1550                 1555                 1560
```

Trp Lys Glu Gly Glu Glu Val Gln Val Leu Ala Leu Glu Pro Gly
1565 1570 1575

Lys Asn Pro Arg Ala Val Gln Thr Lys Pro Gly Leu Phe Lys Thr
1580 1585 1590

Asn Ala Gly Thr Ile Gly Ala Val Ser Leu Asp Phe Ser Pro Gly
1595 1600 1605

Thr Ser Gly Ser Pro Ile Ile Asp Lys Lys Gly Lys Val Val Gly
1610 1615 1620

Leu Tyr Gly Asn Gly Val Val Thr Arg Ser Gly Ala Tyr Val Ser
1625 1630 1635

Ala Ile Ala Gln Thr Glu Lys Ser Ile Glu Asp Asn Pro Glu Ile
1640 1645 1650

Glu Asp Asp Ile Phe Arg Lys Arg Arg Leu Thr Ile Met Asp Leu
1655 1660 1665

His Pro Gly Ala Gly Lys Thr Lys Arg Tyr Leu Pro Ala Ile Val
1670 1675 1680

Arg Glu Ala Ile Lys Arg Gly Leu Arg Thr Leu Ile Leu Ala Pro
1685 1690 1695

Thr Arg Val Val Ala Ala Glu Met Glu Glu Ala Leu Arg Gly Leu
1700 1705 1710

Pro Ile Arg Tyr Gln Thr Pro Ala Ile Arg Ala Val His Thr Gly
1715 1720 1725

Arg Glu Ile Val Asp Leu Met Cys His Ala Thr Phe Thr Met Arg
1730 1735 1740

Leu Leu Ser Pro Val Arg Val Pro Asn Tyr Asn Leu Ile Ile Met
1745 1750 1755

Asp Glu Ala His Phe Thr Asp Pro Ala Ser Ile Ala Ala Arg Gly
1760 1765 1770

Tyr Ile Ser Thr Arg Val Glu Met Gly Glu Ala Ala Gly Ile Phe
1775 1780 1785

Met Thr Ala Thr Pro Pro Gly Ser Arg Asp Pro Phe Pro Gln Ser
1790 1795 1800

Asn Ala Pro Ile Ile Asp Glu Glu Arg Glu Ile Pro Glu Arg Ser
1805 1810 1815

Trp Asn Ser Gly His Glu Trp Val Thr Asp Phe Lys Gly Lys Thr

1820 1825 1830

Val Trp Phe Val Pro Ser Ile Lys Ala Gly Asn Asp Ile Ala Ala
1835 1840 1845

Cys Leu Arg Lys Asn Gly Lys Lys Val Ile Gln Leu Ser Arg Lys
1850 1855 1860

Thr Phe Asp Ser Glu Tyr Val Lys Thr Arg Thr Asn Asp Trp Asp
1865 1870 1875

Phe Val Val Thr Thr Asp Ile Ser Glu Met Gly Ala Asn Phe Lys
1880 1885 1890

Ala Glu Arg Val Ile Asp Pro Arg Arg Cys Met Lys Pro Val Ile
1895 1900 1905

Leu Thr Asp Gly Glu Glu Arg Val Ile Leu Ala Gly Pro Met Pro
1910 1915 1920

Val Thr His Ser Ser Ala Ala Gln Arg Arg Gly Arg Ile Gly Arg
1925 1930 1935

Asn Pro Lys Asn Glu Asn Asp Gln Tyr Ile Tyr Met Gly Glu Pro
1940 1945 1950

Leu Glu Asn Asp Glu Asp Cys Ala His Trp Lys Glu Ala Lys Met
1955 1960 1965

Leu Leu Asp Asn Ile Asn Thr Pro Glu Gly Ile Ile Pro Ser Met
1970 1975 1980

Phe Glu Pro Glu Arg Glu Lys Val Asp Ala Ile Asp Gly Glu Tyr
1985 1990 1995

Arg Leu Arg Gly Glu Ala Arg Lys Thr Phe Val Asp Leu Met Arg
2000 2005 2010

Arg Gly Asp Leu Pro Val Trp Leu Ala Tyr Arg Val Ala Ala Glu
2015 2020 2025

Gly Ile Asn Tyr Ala Asp Arg Arg Trp Cys Phe Asp Gly Val Lys
2030 2035 2040

Asn Asn Gln Ile Leu Glu Glu Asn Val Glu Val Glu Ile Trp Thr
2045 2050 2055

Lys Glu Gly Glu Arg Lys Lys Leu Lys Pro Arg Trp Leu Asp Ala
2060 2065 2070

Arg Ile Tyr Ser Asp Pro Leu Ala Leu Lys Glu Phe Lys Glu Phe
2075 2080 2085

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Ala Ala  Gly Arg Lys Ser Leu  Thr Leu Asn Leu Ile  Thr Glu Met
    2090                 2095                 2100

Gly Arg  Leu Pro Thr Phe Met  Thr Gln Lys Val Arg  Asp Ala Leu
    2105                 2110                 2115

Asp Asn  Leu Ala Val Leu His  Thr Ala Glu Ala Gly  Gly Arg Ala
    2120                 2125                 2130

Tyr Asn  His Ala Leu Ser Glu  Leu Pro Glu Thr Leu  Glu Thr Leu
    2135                 2140                 2145

Leu Leu  Leu Thr Leu Leu Ala  Thr Val Thr Gly Gly  Ile Phe Leu
    2150                 2155                 2160

Phe Leu  Met Ser Ala Arg Gly  Ile Gly Lys Met Thr  Leu Gly Met
    2165                 2170                 2175

Cys Cys  Ile Ile Thr Ala Ser  Ile Leu Leu Trp Tyr  Ala Gln Ile
    2180                 2185                 2190

Gln Pro  His Trp Ile Ala Ala  Ser Ile Ile Leu Glu  Phe Phe Leu
    2195                 2200                 2205

Ile Val  Leu Leu Ile Pro Glu  Pro Glu Lys Gln Arg  Thr Pro Gln
    2210                 2215                 2220

Asp Asn  Gln Leu Thr Tyr Val  Val Ile Ala Ile Leu  Thr Val Val
    2225                 2230                 2235

Ala Ala  Thr Met Ala Asn Glu  Met Gly Phe Leu Glu  Lys Thr Lys
    2240                 2245                 2250

Lys Asp  Leu Gly Leu Gly Ser  Ile Ala Thr Gln Gln  Pro Glu Ser
    2255                 2260                 2265

Asn Ile  Leu Asp Ile Asp Leu  Arg Pro Ala Ser Ala  Trp Thr Leu
    2270                 2275                 2280

Tyr Ala  Val Ala Thr Thr Phe  Val Thr Pro Met Leu  Arg His Ser
    2285                 2290                 2295

Ile Glu  Asn Ser Ser Val Asn  Val Ser Leu Thr Ala  Ile Ala Asn
    2300                 2305                 2310

Gln Ala  Thr Val Leu Met Gly  Leu Gly Lys Gly Trp  Pro Leu Ser
    2315                 2320                 2325

Lys Met  Asp Ile Gly Val Pro  Leu Leu Ala Ile Gly  Cys Tyr Ser
    2330                 2335                 2340
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Gln Val  Asn Pro Ile Thr Leu  Thr Ala Ala Leu Phe  Leu Leu Val
    2345                2350                2355

Ala His  Tyr Ala Ile Ile Gly  Pro Gly Leu Gln Ala  Lys Ala Thr
    2360                2365                2370

Arg Glu  Ala Gln Lys Arg Ala  Ala Ala Gly Ile Met  Lys Asn Pro
    2375                2380                2385

Thr Val  Asp Gly Ile Thr Val  Ile Asp Leu Asp Pro  Ile Pro Tyr
    2390                2395                2400

Asp Pro  Lys Phe Glu Lys Gln  Leu Gly Gln Val Met  Leu Leu Val
    2405                2410                2415

Leu Cys  Val Thr Gln Val Leu  Met Met Arg Thr Thr  Trp Ala Leu
    2420                2425                2430

Cys Glu  Ala Leu Thr Leu Ala  Thr Gly Pro Ile Ser  Thr Leu Trp
    2435                2440                2445

Glu Gly  Asn Pro Gly Arg Phe  Trp Asn Thr Thr Ile  Ala Val Ser
    2450                2455                2460

Met Ala  Asn Ile Phe Arg Gly  Ser Tyr Leu Ala Gly  Ala Gly Leu
    2465                2470                2475

Leu Phe  Ser Ile Met Lys Asn  Thr Thr Asn Thr Arg  Arg Gly Thr
    2480                2485                2490

Gly Asn  Ile Gly Glu Thr Leu  Gly Glu Lys Trp Lys  Ser Arg Leu
    2495                2500                2505

Asn Ala  Leu Gly Lys Ser Glu  Phe Gln Ile Tyr Lys  Lys Ser Gly
    2510                2515                2520

Ile Gln  Glu Val Asp Arg Thr  Leu Ala Lys Glu Gly  Ile Lys Arg
    2525                2530                2535

Gly Glu  Thr Asp His His Ala  Val Ser Arg Gly Ser  Ala Lys Leu
    2540                2545                2550

Arg Trp  Phe Val Glu Arg Asn  Met Val Thr Pro Glu  Gly Lys Val
    2555                2560                2565

Val Asp  Leu Gly Cys Gly Arg  Gly Gly Trp Ser Tyr  Tyr Cys Gly
    2570                2575                2580

Gly Leu  Lys Asn Val Arg Glu  Val Lys Gly Leu Thr  Lys Gly Gly
    2585                2590                2595
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Pro Gly His Glu Glu Pro Ile Pro Met Ser Thr Tyr Gly Trp Asn
2600 2605 2610

Leu Val Arg Leu Gln Ser Gly Val Asp Val Phe Phe Ile Pro Pro
2615 2620 2625

Glu Lys Cys Asp Thr Leu Leu Cys Asp Ile Gly Glu Ser Ser Pro
2630 2635 2640

Asn Pro Thr Val Glu Ala Gly Arg Thr Leu Arg Val Leu Asn Leu
2645 2650 2655

Val Glu Asn Trp Leu Asn Asn Asn Thr Gln Phe Cys Ile Lys Val
2660 2665 2670

Leu Asn Pro Tyr Met Pro Ser Val Ile Glu Lys Met Glu Ala Leu
2675 2680 2685

Gln Arg Lys Tyr Gly Gly Ala Leu Val Arg Asn Pro Leu Ser Arg
2690 2695 2700

Asn Ser Thr His Glu Met Tyr Trp Val Ser Asn Ala Ser Gly Asn
2705 2710 2715

Ile Val Ser Ser Val Asn Met Ile Ser Arg Met Leu Ile Asn Arg
2720 2725 2730

Phe Thr Met Arg Tyr Lys Lys Ala Thr Tyr Glu Pro Asp Val Asp
2735 2740 2745

Leu Gly Ser Gly Thr Arg Asn Ile Gly Ile Glu Ser Glu Ile Pro
2750 2755 2760

Asn Leu Asp Ile Ile Gly Lys Arg Ile Glu Lys Ile Lys Gln Glu
2765 2770 2775

His Glu Thr Ser Trp His Tyr Asp Gln Asp His Pro Tyr Lys Thr
2780 2785 2790

Trp Ala Tyr His Gly Ser Tyr Glu Thr Lys Gln Thr Gly Ser Ala
2795 2800 2805

Ser Ser Met Val Asn Gly Val Val Arg Leu Leu Thr Lys Pro Trp
2810 2815 2820

Asp Val Val Pro Met Val Thr Gln Met Ala Met Thr Asp Thr Thr
2825 2830 2835

Pro Phe Gly Gln Gln Arg Val Phe Lys Glu Lys Val Asp Thr Arg
2840 2845 2850

Thr Gln Glu Pro Lys Glu Gly Thr Lys Lys Leu Met Lys Ile Thr

2855 2860 2865

Ala Glu Trp Leu Trp Lys Glu Leu Gly Lys Lys Lys Thr Pro Arg
2870 2875 2880

Met Cys Thr Arg Glu Glu Phe Thr Arg Lys Val Arg Ser Asn Ala
2885 2890 2895

Ala Leu Gly Ala Ile Phe Thr Asp Glu Asn Lys Trp Lys Ser Ala
2900 2905 2910

Arg Glu Ala Val Glu Asp Ser Arg Phe Trp Glu Leu Val Asp Lys
2915 2920 2925

Glu Arg Asn Leu His Leu Glu Gly Lys Cys Glu Thr Cys Val Tyr
2930 2935 2940

Asn Met Met Gly Lys Arg Glu Lys Lys Leu Gly Glu Phe Gly Lys
2945 2950 2955

Ala Lys Gly Ser Arg Ala Ile Trp Tyr Met Trp Leu Gly Ala Arg
2960 2965 2970

Phe Leu Glu Phe Glu Ala Leu Gly Phe Leu Asn Glu Asp His Trp
2975 2980 2985

Phe Ser Arg Glu Asn Ser Leu Ser Gly Val Glu Gly Glu Gly Leu
2990 2995 3000

His Lys Leu Gly Tyr Ile Leu Arg Asp Val Ser Lys Lys Glu Gly
3005 3010 3015

Gly Ala Met Tyr Ala Asp Asp Thr Ala Gly Trp Asp Thr Arg Ile
3020 3025 3030

Thr Leu Glu Asp Leu Lys Asn Glu Glu Met Val Thr Asn His Met
3035 3040 3045

Glu Gly Glu His Lys Lys Leu Ala Glu Ala Ile Phe Lys Leu Thr
3050 3055 3060

Tyr Gln Asn Lys Val Val Arg Val Gln Arg Pro Thr Pro Arg Gly
3065 3070 3075

Thr Val Met Asp Ile Ile Ser Arg Arg Asp Gln Arg Gly Ser Gly
3080 3085 3090

Gln Val Gly Thr Tyr Gly Leu Asn Thr Phe Thr Asn Met Glu Ala
3095 3100 3105

Gln Leu Ile Arg Gln Met Glu Gly Glu Gly Val Phe Lys Ser Ile
3110 3115 3120

Gln His Leu Thr Ile Thr Glu Glu Ile Ala Val Gln Asn Trp Leu
3125 3130 3135

Ala Arg Val Gly Arg Glu Arg Leu Ser Arg Met Ala Ile Ser Gly
3140 3145 3150

Asp Asp Cys Val Val Lys Pro Leu Asp Asp Arg Phe Ala Ser Ala
3155 3160 3165

Leu Thr Ala Leu Asn Asp Met Gly Lys Ile Arg Lys Asp Ile Gln
3170 3175 3180

Gln Trp Glu Pro Ser Arg Gly Trp Asn Asp Trp Thr Gln Val Pro
3185 3190 3195

Phe Cys Ser His His Phe His Glu Leu Ile Met Lys Asp Gly Arg
3200 3205 3210

Val Leu Val Val Pro Cys Arg Asn Gln Asp Glu Leu Ile Gly Arg
3215 3220 3225

Ala Arg Ile Ser Gln Gly Ala Gly Trp Ser Leu Arg Glu Thr Ala
3230 3235 3240

Cys Leu Gly Lys Ser Tyr Ala Gln Met Trp Ser Leu Met Tyr Phe
3245 3250 3255

His Arg Arg Asp Leu Arg Leu Ala Ala Asn Ala Ile Cys Ser Ala
3260 3265 3270

Val Pro Ser His Trp Val Pro Thr Ser Arg Thr Thr Trp Ser Ile
3275 3280 3285

His Ala Lys His Glu Trp Met Thr Thr Glu Asp Met Leu Thr Val
3290 3295 3300

Trp Asn Arg Val Trp Ile Gln Glu Asn Pro Trp Met Glu Asp Lys
3305 3310 3315

Thr Pro Val Glu Ser Trp Glu Glu Ile Pro Tyr Leu Gly Lys Arg
3320 3325 3330

Glu Asp Gln Trp Cys Gly Ser Leu Ile Gly Leu Thr Ser Arg Ala
3335 3340 3345

Thr Trp Ala Lys Asn Ile Gln Ala Ala Ile Asn Gln Val Arg Ser
3350 3355 3360

Leu Ile Gly Asn Glu Glu Tyr Thr Asp Tyr Met Pro Ser Met Lys
3365 3370 3375

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Arg Phe  Arg Arg Glu Glu Glu  Glu Ala Gly Val Leu  Trp
    3380                3385                3390
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