SEQUENCE LISTING

<110> Tryggvason, Karl
Sergey, Rodin

<120> Cell Culture Medium

<130> LCTI-200006WO02

<160> 8

<170> PatentIn version 3.5

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<211> 3695
<212> PRT
<213> Homo sapiens

<400> 1

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        35                  40                  45

Tyr Phe Asn Leu Ala Glu Gly Ala Arg Ile Ala Ala Ser Ala Thr Cys
    50                  55                  60

Gly Glu Glu Ala Pro Ala Arg Gly Ser Pro Arg Pro Thr Glu Asp Leu
65                  70                  75                  80

Tyr Cys Lys Leu Val Gly Gly Pro Val Ala Gly Gly Asp Pro Asn Gln
                85                  90                  95

Thr Ile Arg Gly Gln Tyr Cys Asp Ile Cys Thr Ala Ala Asn Ser Asn
            100                 105                 110

Lys Ala His Pro Ala Ser Asn Ala Ile Asp Gly Thr Glu Arg Trp Trp
        115                 120                 125

Gln Ser Pro Pro Leu Ser Arg Gly Leu Glu Tyr Asn Glu Val Asn Val
    130                 135                 140

Thr Leu Asp Leu Gly Gln Val Phe His Val Ala Tyr Val Leu Ile Lys
145                 150                 155                 160

Phe Ala Asn Ser Pro Arg Pro Asp Leu Trp Val Leu Glu Arg Ser Met
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Asp Phe Gly Arg Thr Tyr Gln Pro Trp Gln Phe Phe Ala Ser Ser Lys
            180                 185                 190
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Arg Asp Cys Leu Glu Arg Phe Gly Pro Gln Thr Leu Glu Arg Ile Thr
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Arg Asp Asp Ala Ala Ile Cys Thr Thr Glu Tyr Ser Arg Ile Val Pro
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Leu Glu Asn Gly Glu Ile Val Val Ser Leu Val Asn Gly Arg Pro Gly
225                 230                 235                 240

Ala Met Asn Phe Ser Tyr Ser Pro Leu Leu Arg Glu Phe Thr Lys Ala
                245                 250                 255

Thr Asn Val Arg Leu Arg Phe Leu Arg Thr Asn Thr Leu Leu Gly His
            260                 265                 270

Leu Met Gly Lys Ala Leu Arg Asp Pro Thr Val Thr Arg Arg Tyr Tyr
        275                 280                 285

Tyr Ser Ile Lys Asp Ile Ser Ile Gly Gly Arg Cys Val Cys His Gly
    290                 295                 300

His Ala Asp Ala Cys Asp Ala Lys Asp Pro Thr Asp Pro Phe Arg Leu
305                 310                 315                 320

Gln Cys Thr Cys Gln His Asn Thr Cys Gly Gly Thr Cys Asp Arg Cys
                325                 330                 335

Cys Pro Gly Phe Asn Gln Gln Pro Trp Lys Pro Ala Thr Ala Asn Ser
            340                 345                 350

Ala Asn Glu Cys Gln Ser Cys Asn Cys Tyr Gly His Ala Thr Asp Cys
        355                 360                 365

Tyr Tyr Asp Pro Glu Val Asp Arg Arg Arg Ala Ser Gln Ser Leu Asp
    370                 375                 380

Gly Thr Tyr Gln Gly Gly Gly Val Cys Ile Asp Cys Gln His His Thr
385                 390                 395                 400

Thr Gly Val Asn Cys Glu Arg Cys Leu Pro Gly Phe Tyr Arg Ser Pro
                405                 410                 415

Asn His Pro Leu Asp Ser Pro His Val Cys Arg Arg Cys Asn Cys Glu
            420                 425                 430

Ser Asp Phe Thr Asp Gly Thr Cys Glu Asp Leu Thr Gly Arg Cys Tyr
        435                 440                 445

Cys Arg Pro Asn Phe Ser Gly Glu Arg Cys Asp Val Cys Ala Glu Gly
    450                 455                 460
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Phe Thr Gly Phe Pro Ser Cys Tyr Pro Thr Pro Ser Ser Ser Asn Asp
465                 470                 475                 480

Thr Arg Glu Gln Val Leu Pro Ala Gly Gln Ile Val Asn Cys Asp Cys
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Ser Ala Ala Gly Thr Gln Gly Asn Ala Cys Arg Lys Asp Pro Arg Val
            500                 505                 510

Gly Arg Cys Leu Cys Lys Pro Asn Phe Gln Gly Thr His Cys Glu Leu
        515                 520                 525

Cys Ala Pro Gly Phe Tyr Gly Pro Gly Cys Gln Pro Cys Gln Cys Ser
    530                 535                 540

Ser Pro Gly Val Ala Asp Asp Arg Cys Asp Pro Asp Thr Gly Gln Cys
545                 550                 555                 560

Arg Cys Arg Val Gly Phe Glu Gly Ala Thr Cys Asp Arg Cys Ala Pro
                565                 570                 575

Gly Tyr Phe His Phe Pro Leu Cys Gln Leu Cys Gly Cys Ser Pro Ala
            580                 585                 590

Gly Thr Leu Pro Glu Gly Cys Asp Glu Ala Gly Arg Cys Leu Cys Gln
        595                 600                 605

Pro Glu Phe Ala Gly Pro His Cys Asp Arg Cys Arg Pro Gly Tyr His
    610                 615                 620

Gly Phe Pro Asn Cys Gln Ala Cys Thr Cys Asp Pro Arg Gly Ala Leu
625                 630                 635                 640

Asp Gln Leu Cys Gly Ala Gly Gly Leu Cys Arg Cys Arg Pro Gly Tyr
                645                 650                 655

Thr Gly Thr Ala Cys Gln Glu Cys Ser Pro Gly Phe His Gly Phe Pro
            660                 665                 670

Ser Cys Val Pro Cys His Cys Ser Ala Glu Gly Ser Leu His Ala Ala
        675                 680                 685

Cys Asp Pro Arg Ser Gly Gln Cys Ser Cys Arg Pro Arg Val Thr Gly
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Leu Arg Cys Asp Thr Cys Val Pro Gly Ala Tyr Asn Phe Pro Tyr Cys
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Glu Ala Gly Ser Cys His Pro Ala Gly Leu Ala Pro Val Asp Pro Ala
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Leu Pro Glu Ala Gln Val Pro Cys Met Cys Arg Ala His Val Glu Gly
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Pro Ser Cys Asp Arg Cys Lys Pro Gly Phe Trp Gly Leu Ser Pro Ser
        755                 760                 765

Asn Pro Glu Gly Cys Thr Arg Cys Ser Cys Asp Leu Arg Gly Thr Leu
    770                 775                 780

Gly Gly Val Ala Glu Cys Gln Pro Gly Thr Gly Gln Cys Phe Cys Lys
785                 790                 795                 800

Pro His Val Cys Gly Gln Ala Cys Ala Ser Cys Lys Asp Gly Phe Phe
                805                 810                 815

Gly Leu Asp Gln Ala Asp Tyr Phe Gly Cys Arg Ser Cys Arg Cys Asp
            820                 825                 830

Ile Gly Gly Ala Leu Gly Gln Ser Cys Glu Pro Arg Thr Gly Val Cys
        835                 840                 845

Arg Cys Arg Pro Asn Thr Gln Gly Pro Thr Cys Ser Glu Pro Ala Arg
    850                 855                 860

Asp His Tyr Leu Pro Asp Leu His His Leu Arg Leu Glu Leu Glu Glu
865                 870                 875                 880

Ala Ala Thr Pro Glu Gly His Ala Val Arg Phe Gly Phe Asn Pro Leu
                885                 890                 895

Glu Phe Glu Asn Phe Ser Trp Arg Gly Tyr Ala Gln Met Ala Pro Val
            900                 905                 910

Gln Pro Arg Ile Val Ala Arg Leu Asn Leu Thr Ser Pro Asp Leu Phe
        915                 920                 925

Trp Leu Val Phe Arg Tyr Val Asn Arg Gly Ala Met Ser Val Ser Gly
    930                 935                 940

Arg Val Ser Val Arg Glu Glu Gly Arg Ser Ala Thr Cys Ala Asn Cys
945                 950                 955                 960

Thr Ala Gln Ser Gln Pro Val Ala Phe Pro Pro Ser Thr Glu Pro Ala
                965                 970                 975

Phe Ile Thr Val Pro Gln Arg Gly Phe Gly Glu Pro Phe Val Leu Asn
            980                 985                 990

Pro Gly Thr Trp Ala Leu Arg Val  Glu Ala Glu Gly Val  Leu Leu Asp
        995                 1000                1005
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Tyr Val Val Leu Leu Pro Ser Ala Tyr Tyr Glu Ala Ala Leu Leu
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Gln Leu Arg Val Thr Glu Ala Cys Thr Tyr Arg Pro Ser Ala Gln
1025 1030 1035

Gln Ser Gly Asp Asn Cys Leu Leu Tyr Thr His Leu Pro Leu Asp
1040 1045 1050

Gly Phe Pro Ser Ala Ala Gly Leu Glu Ala Leu Cys Arg Gln Asp
1055 1060 1065

Asn Ser Leu Pro Arg Pro Cys Pro Thr Glu Gln Leu Ser Pro Ser
1070 1075 1080

His Pro Pro Leu Ile Thr Cys Thr Gly Ser Asp Val Asp Val Gln
1085 1090 1095

Leu Gln Val Ala Val Pro Gln Pro Gly Arg Tyr Ala Leu Val Val
1100 1105 1110

Glu Tyr Ala Asn Glu Asp Ala Arg Gln Glu Val Gly Val Ala Val
1115 1120 1125

His Thr Pro Gln Arg Ala Pro Gln Gln Gly Leu Leu Ser Leu His
1130 1135 1140

Pro Cys Leu Tyr Ser Thr Leu Cys Arg Gly Thr Ala Arg Asp Thr
1145 1150 1155

Gln Asp His Leu Ala Val Phe His Leu Asp Ser Glu Ala Ser Val
1160 1165 1170

Arg Leu Thr Ala Glu Gln Ala Arg Phe Phe Leu His Gly Val Thr
1175 1180 1185

Leu Val Pro Ile Glu Glu Phe Ser Pro Glu Phe Val Glu Pro Arg
1190 1195 1200

Val Ser Cys Ile Ser Ser His Gly Ala Phe Gly Pro Asn Ser Ala
1205 1210 1215

Ala Cys Leu Pro Ser Arg Phe Pro Lys Pro Pro Gln Pro Ile Ile
1220 1225 1230

Leu Arg Asp Cys Gln Val Ile Pro Leu Pro Pro Gly Leu Pro Leu
1235 1240 1245

Thr His Ala Gln Asp Leu Thr Pro Ala Met Ser Pro Ala Gly Pro
1250 1255 1260

Arg Pro Arg Pro Pro Thr Ala Val Asp Pro Asp Ala Glu Pro Thr
1265 1270 1275

Leu Leu Arg Glu Pro Gln Ala Thr Val Val Phe Thr Thr His Val
1280 1285 1290

Pro Thr Leu Gly Arg Tyr Ala Phe Leu Leu His Gly Tyr Gln Pro
1295 1300 1305

Ala His Pro Thr Phe Pro Val Glu Val Leu Ile Asn Ala Gly Arg
1310 1315 1320

Val Trp Gln Gly His Ala Asn Ala Ser Phe Cys Pro His Gly Tyr
1325 1330 1335

Gly Cys Arg Thr Leu Val Val Cys Glu Gly Gln Ala Leu Leu Asp
1340 1345 1350

Val Thr His Ser Glu Leu Thr Val Thr Val Arg Val Pro Lys Gly
1355 1360 1365

Arg Trp Leu Trp Leu Asp Tyr Val Leu Val Val Pro Glu Asn Val
1370 1375 1380

Tyr Ser Phe Gly Tyr Leu Arg Glu Glu Pro Leu Asp Lys Ser Tyr
1385 1390 1395

Asp Phe Ile Ser His Cys Ala Ala Gln Gly Tyr His Ile Ser Pro
1400 1405 1410

Ser Ser Ser Ser Leu Phe Cys Arg Asn Ala Ala Ala Ser Leu Ser
1415 1420 1425

Leu Phe Tyr Asn Asn Gly Ala Arg Pro Cys Gly Cys His Glu Val
1430 1435 1440

Gly Ala Thr Gly Pro Thr Cys Glu Pro Phe Gly Gly Gln Cys Pro
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Cys His Ala His Val Ile Gly Arg Asp Cys Ser Arg Cys Ala Thr
1460 1465 1470

Gly Tyr Trp Gly Phe Pro Asn Cys Arg Pro Cys Asp Cys Gly Ala
1475 1480 1485

Arg Leu Cys Asp Glu Leu Thr Gly Gln Cys Ile Cys Pro Pro Arg
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Thr Ile Pro Pro Asp Cys Leu Leu Cys Gln Pro Gln Thr Phe Gly
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Gly Ile Gln Glu Leu Thr Asp Pro Thr Cys Asp Thr Asp Ser Gly
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Gln Cys Lys Cys Arg Pro Asn Val Thr Gly Arg Arg Cys Asp Thr
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Cys Ser Pro Gly Phe His Gly Tyr Pro Arg Cys Arg Pro Cys Asp
1565 1570 1575

Cys His Glu Ala Gly Thr Ala Pro Gly Val Cys Asp Pro Leu Thr
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Gly Gln Cys Tyr Cys Lys Glu Asn Val Gln Gly Pro Lys Cys Asp
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Gly Cys Thr Arg Cys Phe Cys Phe Gly Ala Thr Glu Arg Cys Arg
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Ser Ser Ser Tyr Thr Arg Gln Glu Phe Val Asp Met Glu Gly Trp
1640 1645 1650

Val Leu Leu Ser Thr Asp Arg Gln Val Val Pro His Glu Arg Gln
1655 1660 1665

Pro Gly Thr Glu Met Leu Arg Ala Asp Leu Arg His Val Pro Glu
1670 1675 1680

Ala Val Pro Glu Ala Phe Pro Glu Leu Tyr Trp Gln Ala Pro Pro
1685 1690 1695

Ser Tyr Leu Gly Asp Arg Val Ser Ser Tyr Gly Gly Thr Leu Arg
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Tyr Glu Leu His Ser Glu Thr Gln Arg Gly Asp Val Phe Val Pro
1715 1720 1725

Met Glu Ser Arg Pro Asp Val Val Leu Gln Gly Asn Gln Met Ser
1730 1735 1740

Ile Thr Phe Leu Glu Pro Ala Tyr Pro Thr Pro Gly His Val His
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Arg Gly Gln Leu Gln Leu Val Glu Gly Asn Phe Arg His Thr Glu
1760 1765 1770

Thr Arg Asn Thr Val Ser Arg Glu Glu Leu Met Met Val Leu Ala
1775 1780 1785

Ser Leu Glu Gln Leu Gln Ile Arg Ala Leu Phe Ser Gln Ile Ser
1790 1795 1800

Ser Ala Val Phe Leu Arg Arg Val Ala Leu Glu Val Ala Ser Pro
1805 1810 1815

Ala Gly Gln Gly Ala Leu Ala Ser Asn Val Glu Leu Cys Leu Cys
1820 1825 1830

Pro Ala Ser Tyr Arg Gly Asp Ser Cys Gln Glu Cys Ala Pro Gly
1835 1840 1845

Phe Tyr Arg Asp Val Lys Gly Leu Phe Leu Gly Arg Cys Val Pro
1850 1855 1860

Cys Gln Cys His Gly His Ser Asp Arg Cys Leu Pro Gly Ser Gly
1865 1870 1875

Val Cys Val Asp Cys Gln His Asn Thr Glu Gly Ala His Cys Glu
1880 1885 1890

Arg Cys Gln Ala Gly Phe Val Ser Ser Arg Asp Asp Pro Ser Ala
1895 1900 1905

Pro Cys Val Ser Cys Pro Cys Pro Leu Ser Val Pro Ser Asn Asn
1910 1915 1920

Phe Ala Glu Gly Cys Val Leu Arg Gly Gly Arg Thr Gln Cys Leu
1925 1930 1935

Cys Lys Pro Gly Tyr Ala Gly Ala Ser Cys Glu Arg Cys Ala Pro
1940 1945 1950

Gly Phe Phe Gly Asn Pro Leu Val Leu Gly Ser Ser Cys Gln Pro
1955 1960 1965

Cys Asp Cys Ser Gly Asn Gly Asp Pro Asn Leu Leu Phe Ser Asp
1970 1975 1980

Cys Asp Pro Leu Thr Gly Ala Cys Arg Gly Cys Leu Arg His Thr
1985 1990 1995

Thr Gly Pro Arg Cys Glu Ile Cys Ala Pro Gly Phe Tyr Gly Asn
2000 2005 2010

Ala Leu Leu Pro Gly Asn Cys Thr Arg Cys Asp Cys Thr Pro Cys
2015 2020 2025

Gly Thr Glu Ala Cys Asp Pro His Ser Gly His Cys Leu Cys Lys
2030 2035 2040

Ala Gly Val Thr Gly Arg Arg Cys Asp Arg Cys Gln Glu Gly His
2045 2050 2055

Phe Gly Phe Asp Gly Cys Gly Gly Cys Arg Pro Cys Ala Cys Gly
2060 2065 2070

Pro Ala Ala Glu Gly Ser Glu Cys His Pro Gln Ser Gly Gln Cys
2075 2080 2085

His Cys Arg Pro Gly Thr Met Gly Pro Gln Cys Arg Glu Cys Ala
2090 2095 2100

Pro Gly Tyr Trp Gly Leu Pro Glu Gln Gly Cys Arg Arg Cys Gln
2105 2110 2115

Cys Pro Gly Gly Arg Cys Asp Pro His Thr Gly Arg Cys Asn Cys
2120 2125 2130

Pro Pro Gly Leu Ser Gly Glu Arg Cys Asp Thr Cys Ser Gln Gln
2135 2140 2145

His Gln Val Pro Val Pro Gly Gly Pro Val Gly His Ser Ile His
2150 2155 2160

Cys Glu Val Cys Asp His Cys Val Val Leu Leu Leu Asp Asp Leu
2165 2170 2175

Glu Arg Ala Gly Ala Leu Leu Pro Ala Ile His Glu Gln Leu Arg
2180 2185 2190

Gly Ile Asn Ala Ser Ser Met Ala Trp Ala Arg Leu His Arg Leu
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Gly Pro Arg His Glu Thr Ala Gln Gln Leu Glu Val Leu Glu Gln
2225 2230 2235

Gln Ser Thr Ser Leu Gly Gln Asp Ala Arg Arg Leu Gly Gly Gln
2240 2245 2250

Ala Val Gly Thr Arg Asp Gln Ala Ser Gln Leu Leu Ala Gly Thr
2255 2260 2265

Glu Ala Thr Leu Gly His Ala Lys Thr Leu Leu Ala Ala Ile Arg
2270 2275 2280

Ala Val Asp Arg Thr Leu Ser Glu Leu Met Ser Gln Thr Gly His
2285 2290 2295

Leu Gly Leu Ala Asn Ala Ser Ala Pro Ser Gly Glu Gln Leu Leu
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Arg Thr Leu Ala Glu Val Glu Arg Leu Leu Trp Glu Met Arg Ala
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Arg Asp Leu Gly Ala Pro Gln Ala Ala Ala Glu Ala Glu Leu Ala
2330 2335 2340

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2345 2350 2355

Leu Trp Glu Glu Asn Gln Ala Leu Ala Thr Gln Thr Arg Asp Arg
2360 2365 2370

Leu Ala Gln His Glu Ala Gly Leu Met Asp Leu Arg Glu Ala Leu
2375 2380 2385

Asn Arg Ala Val Asp Ala Thr Arg Glu Ala Gln Glu Leu Asn Ser
2390 2395 2400

Arg Asn Gln Glu Arg Leu Glu Glu Ala Leu Gln Arg Lys Gln Glu
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Leu Ser Arg Asp Asn Ala Thr Leu Gln Ala Thr Leu His Ala Ala
2420 2425 2430

Arg Asp Thr Leu Ala Ser Val Phe Arg Leu Leu His Ser Leu Asp
2435 2440 2445

Gln Ala Lys Glu Glu Leu Glu Arg Leu Ala Ala Ser Leu Asp Gly
2450 2455 2460

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Gly Ser Lys Leu Arg Leu Val Glu Ala Ala Glu Ala His Ala Gln
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Gln Leu Gly Gln Leu Ala Leu Asn Leu Ser Ser Ile Ile Leu Asp
2495 2500 2505

Val Asn Gln Asp Arg Leu Thr Gln Arg Ala Ile Glu Ala Ser Asn
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Ala Tyr Ser Arg Ile Leu Gln Ala Val Gln Ala Ala Glu Asp Ala
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2540 2545 2550

Val Arg Gln Gly Leu Val Asp Arg Ala Gln Gln Leu Leu Ala Asn
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Ser Thr Ala Leu Glu Glu Ala Met Leu Gln Glu Gln Gln Arg Leu
2570 2575 2580

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2585 2590 2595

Asp Val Arg Ala Lys Lys Asp Gln Leu Glu Ala His Ile Gln Ala
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2615 2620 2625

Ile Ala His Ala Lys Ala Val Ala Ala Glu Ala Gln Asp Thr Ala
2630 2635 2640

Thr Arg Val Gln Ser Gln Leu Gln Ala Met Gln Glu Asn Val Glu
2645 2650 2655

Arg Trp Gln Gly Gln Tyr Glu Gly Leu Arg Gly Gln Asp Leu Gly
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Lys Val Pro Met Lys Phe Asn Gly Arg Ser Gly Val Gln Leu Arg
2735 2740 2745

Thr Pro Arg Asp Leu Ala Asp Leu Ala Ala Tyr Thr Ala Leu Lys
2750 2755 2760

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Asp Arg Phe Val Met Tyr Met Gly Ser Arg Gln Ala Thr Gly Asp
2780 2785 2790

Tyr Met Gly Val Ser Leu Arg Asp Lys Lys Val His Trp Val Tyr
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2840 2845 2850

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2855 2860 2865

Leu Arg Pro Asp Asp Phe Val Phe Tyr Val Gly Gly Tyr Pro Ser
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2885 2890 2895

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Cys Ala Arg Ser Lys Ser Thr Gly Asp Pro Trp Leu Thr Asp Gly
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Ser Tyr Leu Asp Gly Thr Gly Phe Ala Arg Ile Ser Phe Asp Ser
2945 2950 2955

Gln Ile Ser Thr Thr Lys Arg Phe Glu Gln Glu Leu Arg Leu Val
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Arg Leu Phe Pro Thr Gly Gly Ser Val Arg Gly Cys Val Lys Gly
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Gly Pro Arg Gly Leu Gln Ala Thr Ala Arg Lys Ala Ser Arg Arg
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Ser Arg Gln Pro Ala Arg His Pro Ala Cys Met Leu Pro Pro His
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Ser His Leu Glu Phe Val Gly Ile Leu Ala Arg His Arg Asn Trp
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Val Gly Gly Leu Pro Ala Ser Ser His Ser Ser Lys Leu Pro Val
3470 3475 3480

Thr Val Gly Phe Ser Gly Cys Val Lys Arg Leu Arg Leu His Gly
3485 3490 3495

Arg Pro Leu Gly Ala Pro Thr Arg Met Ala Gly Val Thr Pro Cys
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Gly Val Ile Thr Leu Asp Leu Pro Gly Ala Thr Leu Pro Asp Val
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Gly Leu Glu Leu Glu Val Arg Pro Leu Ala Val Thr Gly Leu Ile
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Phe His Leu Gly Gln Ala Arg Thr Pro Pro Tyr Leu Gln Leu Gln
3560 3565 3570

Val Thr Glu Lys Gln Val Leu Leu Arg Ala Asp Asp Gly Ala Gly
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Glu Phe Ser Thr Ser Val Thr Arg Pro Ser Val Leu Cys Asp Gly
3590 3595 3600

Gln Trp His Arg Leu Ala Val Met Lys Ser Gly Asn Val Leu Arg
3605 3610 3615

Leu Glu Val Asp Ala Gln Ser Asn His Thr Val Gly Pro Leu Leu
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Pro Glu Pro Met Ala Val Gln Pro Trp Pro Pro Ala Tyr Cys Gly
3650 3655 3660

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35 40 45

Pro Ala Thr Gly Asp Leu Leu Val Gly Arg Ala Asp Arg Leu Thr Ala
50 55 60

Ser Ser Thr Cys Gly Leu Asn Gly Pro Gln Pro Tyr Cys Ile Val Ser
65 70 75 80

His Leu Gln Asp Glu Lys Lys Cys Phe Leu Cys Asp Ser Arg Arg Pro

85 90 95

Phe Ser Ala Arg Asp Asn Pro His Ser His Arg Ile Gln Asn Val Val
100 105 110

Thr Ser Phe Ala Pro Gln Arg Arg Ala Ala Trp Trp Gln Ser Glu Asn
115 120 125

Gly Ile Pro Ala Val Thr Ile Gln Leu Asp Leu Glu Ala Glu Phe His
130 135 140

Phe Thr His Leu Ile Met Thr Phe Lys Thr Phe Arg Pro Ala Ala Met
145 150 155 160

Leu Val Glu Arg Ser Ala Asp Phe Gly Arg Thr Trp His Val Tyr Arg
165 170 175

Tyr Phe Ser Tyr Asp Cys Gly Ala Asp Phe Pro Gly Val Pro Leu Ala
180 185 190

Pro Pro Arg His Trp Asp Asp Val Val Cys Glu Ser Arg Tyr Ser Glu
195 200 205

Ile Glu Pro Ser Thr Glu Gly Glu Val Ile Tyr Arg Val Leu Asp Pro
210 215 220

Ala Ile Pro Ile Pro Asp Pro Tyr Ser Ser Arg Ile Gln Asn Leu Leu
225 230 235 240

Lys Ile Thr Asn Leu Arg Val Asn Leu Thr Arg Leu His Thr Leu Gly
245 250 255

Asp Asn Leu Leu Asp Pro Arg Arg Glu Ile Arg Glu Lys Tyr Tyr Tyr
260 265 270

Ala Leu Tyr Glu Leu Val Val Arg Gly Asn Cys Phe Cys Tyr Gly His
275 280 285

Ala Ser Glu Cys Ala Pro Ala Pro Gly Ala Pro Ala His Ala Glu Gly
290 295 300

Met Val His Gly Ala Cys Ile Cys Lys His Asn Thr Arg Gly Leu Asn
305 310 315 320

Cys Glu Gln Cys Gln Asp Phe Tyr Arg Asp Leu Pro Trp Arg Pro Ala
325 330 335

Glu Asp Gly His Ser His Ala Cys Arg Lys Cys Glu Cys His Gly His
340 345 350

Thr His Ser Cys His Phe Asp Met Ala Val Tyr Leu Ala Ser Gly Asn

355 360 365

Val Ser Gly Gly Val Cys Asp Gly Cys Gln His Asn Thr Ala Gly Arg
370 375 380

His Cys Glu Leu Cys Arg Pro Phe Phe Tyr Arg Asp Pro Thr Lys Asp
385 390 395 400

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

Ser Gln Asp Gly Gly Arg Cys Asp Ser His Asp Asp Pro Ala Leu Gly
420 425 430

Leu Val Ser Gly Gln Cys Arg Cys Lys Glu His Val Val Gly Thr Arg
435 440 445

Cys Gln Gln Cys Arg Asp Gly Phe Phe Gly Leu Ser Ile Ser Asp Arg
450 455 460

Leu Gly Cys Arg Arg Cys Gln Cys Asn Ala Arg Gly Thr Val Pro Gly
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Ser Thr Pro Cys Asp Pro Asn Ser Gly Ser Cys Tyr Cys Lys Arg Leu
485 490 495

Val Thr Gly Arg Gly Cys Asp Arg Cys Leu Pro Gly His Trp Gly Leu
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Ser His Asp Leu Leu Gly Cys Arg Pro Cys Asp Cys Asp Val Gly Gly
515 520 525

Ala Leu Asp Pro Gln Cys Asp Glu Gly Thr Gly Gln Cys His Cys Arg
530 535 540

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

625 630 635 640

Ile Val Gln Arg Pro Gly Pro Val Pro Ala His Ser Leu Cys Gly His
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Leu Val Pro Lys Asp Asp Arg Ile Gln Gly Thr Leu Gln Pro His Ala
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Arg Tyr Leu Ile Phe Pro Asn Pro Val Cys Leu Glu Pro Gly Ile Ser
675 680 685

Tyr Lys Leu His Leu Lys Leu Val Arg Thr Gly Gly Ser Ala Gln Pro
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Glu Thr Pro Tyr Ser Gly Pro Gly Leu Leu Ile Asp Ser Leu Val Leu
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Leu Pro Arg Val Leu Val Leu Glu Met Phe Ser Gly Gly Asp Ala Ala
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Ala Leu Glu Arg Gln Ala Thr Phe Glu Arg Tyr Gln Cys His Glu Glu
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Gly Leu Val Pro Ser Lys Thr Ser Pro Ser Glu Ala Cys Ala Pro Leu
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Leu Ile Ser Leu Ser Thr Leu Ile Tyr Asn Gly Ala Leu Pro Cys Gln
770 775 780

Cys Asn Pro Gln Gly Ser Leu Ser Ser Glu Cys Asn Pro His Gly Gly
785 790 795 800

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

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His Gly Asp Pro Arg Leu Pro Tyr Gly Gly Gln Cys Arg Pro Cys Pro
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Cys Pro Glu Gly Pro Gly Ser Gln Arg His Phe Ala Thr Ser Cys His
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Gln Asp Glu Tyr Ser Gln Gln Ile Val Cys His Cys Arg Ala Gly Tyr
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Thr Gly Leu Arg Cys Glu Ala Cys Ala Pro Gly His Phe Gly Asp Pro
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Ser Arg Pro Gly Gly Arg Cys Gln Leu Cys Glu Cys Ser Gly Asn Ile
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Asp Pro Met Asp Pro Asp Ala Cys Asp Pro His Thr Gly Gln Cys Leu
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Arg Cys Leu His His Thr Glu Gly Pro His Cys Ala His Cys Lys
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Pro Gly Phe His Gly Gln Ala Ala Arg Gln Ser Cys His Arg Cys
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Asp Gln Cys His Cys Asp Pro Ser Ser Gly Gln Cys Pro Cys Leu
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Pro Asn Val Gln Gly Pro Ser Cys Asp Arg Cys Ala Pro Asn Phe
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Trp Asn Leu Thr Ser Gly His Gly Cys Gln Pro Cys Ala Cys His
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Pro Ser Arg Ala Arg Gly Pro Thr Cys Asn Glu Phe Thr Gly Gln
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Cys His Cys Arg Ala Gly Phe Gly Gly Arg Thr Cys Ser Glu Cys
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Gln Glu Leu His Trp Gly Asp Pro Gly Leu Gln Cys His Ala Cys
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Pro Cys His Ala Cys Phe Gly Asp Trp Asp Arg Val Val Gln Asp
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Gln Gln Thr Gly Val Leu Gly Ala Phe Glu Ser Ser Phe Trp His
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Met Gln Glu Lys Leu Gly Ile Val Gln Gly Ile Val Gly Ala Arg
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Ser Asn Phe Leu Gly Ala Tyr Asp Ser Ile Arg His Ala His Ser
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Val Lys Asp Phe Leu Asn Gln Glu Gly Ala Asp Pro Asp Ser Ile
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Tyr Glu Glu Asn Glu Arg Ala Leu Glu Ser Lys Ala Ala Gln Leu
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Asp Gly Leu Glu Ala Arg Met Arg Ser Val Leu Gln Ala Ile Asn
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Arg Cys Met Pro Glu Phe Val Asn Ala Ala Phe Asn Val Thr Val Val
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Gly Val Thr Gly Val Thr Lys Ser Cys His Leu Cys Asp Ala Gly Gln
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Tyr Pro Ser Ser Ile Asn Leu Thr Leu His Leu Gly Lys Ala Phe Asp
    130                 135                 140

Ile Thr Tyr Val Arg Leu Lys Phe His Thr Ser Arg Pro Glu Ser Phe
145                 150                 155                 160

Ala Ile Tyr Lys Arg Thr Arg Glu Asp Gly Pro Trp Ile Pro Tyr Gln
                165                 170                 175

Tyr Tyr Ser Gly Ser Cys Glu Asn Thr Tyr Ser Lys Ala Asn Arg Gly
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Phe Ile Arg Thr Gly Gly Asp Glu Gln Gln Ala Leu Cys Thr Asp Glu
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Phe Ser Asp Ile Ser Pro Leu Thr Gly Gly Asn Val Ala Phe Ser Thr
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Leu Glu Gly Arg Pro Ser Ala Tyr Asn Phe Asp Asn Ser Pro Val Leu
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Gln Glu Trp Val Thr Ala Thr Asp Ile Arg Val Thr Leu Asn Arg Leu
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Asn Thr Phe Gly Asp Glu Val Phe Asn Asp Pro Lys Val Leu Lys Ser
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Tyr Tyr Tyr Ala Ile Ser Asp Phe Ala Val Gly Gly Arg Cys Lys Cys
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Asn Gly His Ala Ser Glu Cys Met Lys Asn Glu Phe Asp Lys Leu Val
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Cys Asn Cys Lys His Asn Thr Tyr Gly Val Asp Cys Glu Lys Cys Leu
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Pro Phe Phe Asn Asp Arg Pro Trp Arg Arg Ala Thr Ala Glu Ser Ala
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Ser Glu Cys Leu Pro Cys Asp Cys Asn Gly Arg Ser Gln Glu Cys Tyr
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Phe Asp Pro Glu Leu Tyr Arg Ser Thr Gly His Gly Gly His Cys Thr
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Ser Cys Lys Pro Gly Val Met Gly Asp Lys Cys Asp Arg Cys Gln Pro
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Gly Phe His Ser Leu Thr Glu Ala Gly Cys Arg Pro Cys Ser Cys Asp
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Pro Ser Gly Ser Ile Asp Glu Cys Asn Ile Glu Thr Gly Arg Cys Val
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Cys Phe Gly His Ser Ser Val Cys Thr Asn Ala Val Gly Tyr Ser Val
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Tyr Ser Ile Ser Ser Thr Phe Gln Ile Asp Glu Asp Gly Trp Arg Ala
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Glu Gln Arg Asp Gly Ser Glu Ala Ser Leu Glu Trp Ser Ser Glu Arg
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Gln Asp Ile Ala Val Ile Ser Asp Ser Tyr Phe Pro Arg Tyr Phe Ile
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Ala Pro Ala Lys Phe Leu Gly Lys Gln Val Leu Ser Tyr Gly Gln Asn
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Ile Ala Gln Gly Asn Ser Tyr Pro Ser Glu Thr Thr Val Lys Tyr Val
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Leu Ser Gly Tyr Arg Arg Glu Thr Pro Asn Leu Gly Pro Tyr Ser Pro
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Cys Val Leu Cys Ala Cys Asn Gly His Ser Glu Thr Cys Asp Pro Glu
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Thr Gly Val Cys Asn Cys Arg Asp Asn Thr Ala Gly Pro His Cys Glu
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Lys Cys Ser Asp Gly Tyr Tyr Gly Asp Ser Thr Ala Gly Thr Ser Ser
755 760 765

Asp Cys Gln Pro Cys Pro Cys Pro Gly Gly Ser Ser Cys Ala Val Val
770 775 780

Pro Lys Thr Lys Glu Val Val Cys Thr Asn Cys Pro Thr Gly Thr Thr
785 790 795 800

Gly Lys Arg Cys Glu Leu Cys Asp Asp Gly Tyr Phe Gly Asp Pro Leu
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Gly Arg Asn Gly Pro Val Arg Leu Cys Arg Leu Cys Gln Cys Ser Asp
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Asn Ile Asp Pro Asn Ala Val Gly Asn Cys Asn Arg Leu Thr Gly Glu
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Cys Leu Lys Cys Ile Tyr Asn Thr Ala Gly Phe Tyr Cys Asp Arg Cys
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Lys Asp Gly Phe Phe Gly Asn Pro Leu Ala Pro Asn Pro Ala Asp Lys
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Cys Lys Ala Cys Asn Cys Asn Leu Tyr Gly Thr Met Lys Gln Gln Ser
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Ser Cys Asn Pro Val Thr Gly Gln Cys Glu Cys Leu Pro His Val Thr
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Gly Gln Asp Cys Gly Ala Cys Asp Pro Gly Phe Tyr Asn Leu Gln Ser
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Gly Gln Gly Cys Glu Arg Cys Asp Cys His Ala Leu Gly Ser Thr Asn
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Gly Gln Cys Asp Ile Arg Thr Gly Gln Cys Glu Cys Gln Pro Gly Ile
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Thr Gly Gln His Cys Glu Arg Cys Glu Val Asn His Phe Gly Phe Gly
965 970 975

Pro Glu Gly Cys Lys Pro Cys Asp Cys His Pro Glu Gly Ser Leu Ser
980 985 990

Leu Gln Cys Lys Asp Asp Gly Arg Cys Glu Cys Arg Glu Gly Phe Val
995 1000 1005

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