SEQUENCE LISTING

<110> Agency for Science, Technology and Research

<120> Chemical-Inducible Genome Engineering Technology

<130> 9869SG4120

<160> 249

<170> PatentIn version 3.5

<210> 1
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<212> PRT
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Trp Ala Val Ile Thr Asp Glu Tyr Lys Val Pro Ser Lys Lys Phe Lys
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Val Leu Gly Asn Thr Asp Arg His Ser Ile Lys Lys Asn Leu Ile Gly
        35                  40                  45


Ala Leu Leu Phe Asp Ser Gly Glu Thr Ala Glu Ala Thr Arg Leu Lys
    50                  55                  60


Arg Thr Ala Arg Arg Arg Tyr Thr Arg Arg Lys Asn Arg Ile Cys Tyr
65                  70                  75                  80


Leu Gln Glu Ile Phe Ser Asn Glu Met Ala Lys Val Asp Asp Ser Phe
                85                  90                  95


Phe His Arg Leu Glu Glu Ser Phe Leu Val Glu Glu Asp Lys Lys His
            100                 105                 110


Glu Arg His Pro Ile Phe Gly Asn Ile Val Asp Glu Val Ala Tyr His
        115                 120                 125
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Glu Lys Tyr Pro Thr Ile Tyr His Leu Arg Lys Lys Leu Val Asp Ser
    130                 135                 140

Thr Asp Lys Ala Asp Leu Arg Leu Ile Tyr Leu Ala Leu Ala His Met
145                 150                 155                 160

Ile Lys Phe Arg Gly His Phe Leu Ile Glu Gly Asp Leu Asn Pro Asp
                165                 170                 175

Asn Ser Asp Val Asp Lys Leu Phe Ile Gln Leu Val Gln Thr Tyr Asn
            180                 185                 190

Gln Leu Phe Glu Glu Asn Pro Ile Asn Ala Ser Gly Val Asp Ala Lys
        195                 200                 205

Ala Ile Leu Ser Ala Arg Leu Ser Lys Ser Arg Arg Leu Glu Asn Leu
    210                 215                 220

Ile Ala Gln Leu Pro Gly Glu Lys Lys Asn Gly Leu Phe Gly Asn Leu
225                 230                 235                 240

Ile Ala Leu Ser Leu Gly Leu Thr Pro Asn Phe Lys Ser Asn Phe Asp
                245                 250                 255

Leu Ala Glu Asp Ala Lys Leu Gln Leu Ser Lys Asp Thr Tyr Asp Asp
            260                 265                 270

Asp Leu Asp Asn Leu Leu Ala Gln Ile Gly Asp Gln Tyr Ala Asp Leu
        275                 280                 285

Phe Leu Ala Ala Lys Asn Leu Ser Asp Ala Ile Leu Leu Ser Asp Ile
    290                 295                 300

Leu Arg Val Asn Thr Glu Ile Thr Lys Ala Pro Leu Ser Ala Ser Met
305                 310                 315                 320

Ile Lys Arg Tyr Asp Glu His His Gln Asp Leu Thr Leu Leu Lys Ala
                325                 330                 335

Leu Val Arg Gln Gln Leu Pro Glu Lys Tyr Lys Glu Ile Phe Phe Asp
            340                 345                 350
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Gln Ser Lys Asn Gly Tyr Ala Gly Tyr Ile Asp Gly Gly Ala Ser Gln
        355                 360                 365

Glu Glu Phe Tyr Lys Phe Ile Lys Pro Ile Leu Glu Lys Met Asp Gly
    370                 375                 380

Thr Glu Glu Leu Leu Val Lys Leu Asn Arg Glu Asp Leu Leu Arg Lys
385                 390                 395                 400

Gln Arg Thr Phe Asp Asn Gly Ser Ile Pro His Gln Ile His Leu Gly
                405                 410                 415

Glu Leu His Ala Ile Leu Arg Arg Gln Glu Asp Phe Tyr Pro Phe Leu
            420                 425                 430

Lys Asp Asn Arg Glu Lys Ile Glu Lys Ile Leu Thr Phe Arg Ile Pro
        435                 440                 445

Tyr Tyr Val Gly Pro Leu Ala Arg Gly Asn Ser Arg Phe Ala Trp Met
    450                 455                 460

Thr Arg Lys Ser Glu Glu Thr Ile Thr Pro Trp Asn Phe Glu Glu Val
465                 470                 475                 480

Val Asp Lys Gly Ala Ser Ala Gln Ser Phe Ile Glu Arg Met Thr Asn
                485                 490                 495

Phe Asp Lys Asn Leu Pro Asn Glu Lys Val Leu Pro Lys His Ser Leu
            500                 505                 510

Leu Tyr Glu Tyr Phe Thr Val Tyr Asn Glu Leu Thr Lys Val Lys Tyr
        515                 520                 525

Val Thr Glu Gly Met Arg Lys Pro Ala Phe Leu Ser Gly Glu Gln Lys
    530                 535                 540

Lys Ala Ile Val Asp Leu Leu Phe Lys Thr Asn Arg Lys Val Thr Val
545                 550                 555                 560
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Lys Gln Leu Lys Glu Asp Tyr Phe Lys Lys Ile Glu Cys Phe Asp Ser
                565                 570                 575

Val Glu Ile Ser Gly Val Glu Asp Arg Phe Asn Ala Ser Leu Gly Thr
            580                 585                 590

Tyr His Asp Leu Leu Lys Ile Ile Lys Asp Lys Asp Phe Leu Asp Asn
        595                 600                 605

Glu Glu Asn Glu Asp Ile Leu Glu Asp Ile Val Leu Thr Leu Thr Leu
    610                 615                 620

Phe Glu Asp Arg Glu Met Ile Glu Glu Arg Leu Lys Thr Tyr Ala His
625                 630                 635                 640

Leu Phe Asp Asp Lys Val Met Lys Gln Leu Lys Arg Arg Arg Tyr Thr
                645                 650                 655

Gly Trp Gly Arg Leu Ser Arg Lys Leu Ile Asn Gly Ile Arg Asp Lys
            660                 665                 670

Gln Ser Gly Lys Thr Ile Leu Asp Phe Leu Lys Ser Asp Gly Phe Ala
        675                 680                 685

Asn Arg Asn Phe Met Gln Leu Ile His Asp Asp Ser Leu Thr Phe Lys
    690                 695                 700

Glu Asp Ile Gln Lys Ala Gln Val Ser Gly Gln Gly Asp Ser Leu His
705                 710                 715                 720

Glu His Ile Ala Asn Leu Ala Gly Ser Pro Ala Ile Lys Lys Gly Ile
                725                 730                 735

Leu Gln Thr Val Lys Val Val Asp Glu Leu Val Lys Val Met Gly Arg
            740                 745                 750

His Lys Pro Glu Asn Ile Val Ile Glu Met Ala Arg Glu Asn Gln Thr
        755                 760                 765

Thr Gln Lys Gly Gln Lys Asn Ser Arg Glu Arg Met Lys Arg Ile Glu
    770                 775                 780
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Glu Gly Ile Lys Glu Leu Gly Ser Gln Ile Leu Lys Glu His Pro Val
785                 790                 795                 800

Glu Asn Thr Gln Leu Gln Asn Glu Lys Leu Tyr Leu Tyr Tyr Leu Gln
                805                 810                 815

Asn Gly Arg Asp Met Tyr Val Asp Gln Glu Leu Asp Ile Asn Arg Leu
            820                 825                 830

Ser Asp Tyr Asp Val Asp His Ile Val Pro Gln Ser Phe Leu Lys Asp
        835                 840                 845

Asp Ser Ile Asp Asn Lys Val Leu Thr Arg Ser Asp Lys Asn Arg Gly
    850                 855                 860

Lys Ser Asp Asn Val Pro Ser Glu Glu Val Val Lys Lys Met Lys Asn
865                 870                 875                 880

Tyr Trp Arg Gln Leu Leu Asn Ala Lys Leu Ile Thr Gln Arg Lys Phe
                885                 890                 895

Asp Asn Leu Thr Lys Ala Glu Arg Gly Gly Leu Ser Glu Leu Asp Lys
            900                 905                 910

Ala Gly Phe Ile Lys Arg Gln Leu Val Glu Thr Arg Gln Ile Thr Lys
        915                 920                 925

His Val Ala Gln Ile Leu Asp Ser Arg Met Asn Thr Lys Tyr Asp Glu
    930                 935                 940

Asn Asp Lys Leu Ile Arg Glu Val Lys Val Ile Thr Leu Lys Ser Lys
945                 950                 955                 960

Leu Val Ser Asp Phe Arg Lys Asp Phe Gln Phe Tyr Lys Val Arg Glu
                965                 970                 975

Ile Asn Asn Tyr His His Ala His Asp Ala Tyr Leu Asn Ala Val Val
            980                 985                 990
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Gly Thr Ala Leu Ile Lys Lys Tyr  Pro Lys Leu Glu Ser  Glu Phe Val
        995                 1000                1005


Tyr Gly  Asp Tyr Lys Val Tyr  Asp Val Arg Lys Met  Ile Ala Lys
    1010                1015                1020


Ser Glu  Gln Glu Ile Gly Lys  Ala Thr Ala Lys Tyr  Phe Phe Tyr
    1025                1030                1035


Ser Asn  Ile Met Asn Phe Phe  Lys Thr Glu Ile Thr  Leu Ala Asn
    1040                1045                1050


Gly Glu  Ile Arg Lys Arg Pro  Leu Ile Glu Thr Asn  Gly Glu Thr
    1055                1060                1065


Gly Glu  Ile Val Trp Asp Lys  Gly Arg Asp Phe Ala  Thr Val Arg
    1070                1075                1080


Lys Val  Leu Ser Met Pro Gln  Val Asn Ile Val Lys  Lys Thr Glu
    1085                1090                1095


Val Gln  Thr Gly Gly Phe Ser  Lys Glu Ser Ile Leu  Pro Lys Arg
    1100                1105                1110


Asn Ser  Asp Lys Leu Ile Ala  Arg Lys Lys Asp Trp  Asp Pro Lys
    1115                1120                1125


Lys Tyr  Gly Gly Phe Asp Ser  Pro Thr Val Ala Tyr  Ser Val Leu
    1130                1135                1140


Val Val  Ala Lys Val Glu Lys  Gly Lys Ser Lys Lys  Leu Lys Ser
    1145                1150                1155


Val Lys  Glu Leu Leu Gly Ile  Thr Ile Met Glu Arg  Ser Ser Phe
    1160                1165                1170


Glu Lys  Asn Pro Ile Asp Phe  Leu Glu Ala Lys Gly  Tyr Lys Glu
    1175                1180                1185


Val Lys  Lys Asp Leu Ile Ile  Lys Leu Pro Lys Tyr  Ser Leu Phe
    1190                1195                1200
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Glu Leu Glu Asn Gly Arg Lys Arg Met Leu Ala Ser Ala Gly Glu
1205 1210 1215

Leu Gln Lys Gly Asn Glu Leu Ala Leu Pro Ser Lys Tyr Val Asn
1220 1225 1230

Phe Leu Tyr Leu Ala Ser His Tyr Glu Lys Leu Lys Gly Ser Pro
1235 1240 1245

Glu Asp Asn Glu Gln Lys Gln Leu Phe Val Glu Gln His Lys His
1250 1255 1260

Tyr Leu Asp Glu Ile Ile Glu Gln Ile Ser Glu Phe Ser Lys Arg
1265 1270 1275

Val Ile Leu Ala Asp Ala Asn Leu Asp Lys Val Leu Ser Ala Tyr
1280 1285 1290

Asn Lys His Arg Asp Lys Pro Ile Arg Glu Gln Ala Glu Asn Ile
1295 1300 1305

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

Lys Tyr Phe Asp Thr Thr Ile Asp Arg Lys Arg Tyr Thr Ser Thr
1325 1330 1335

Lys Glu Val Leu Asp Ala Thr Leu Ile His Gln Ser Ile Thr Gly
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Leu Tyr Glu Thr Arg Ile Asp Leu Ser Gln Leu Gly Gly Asp
1355 1360 1365

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Leu Arg Phe Glu Leu Ile Pro Gln Gly Lys Thr Leu Lys His Ile Gln
            20                  25                  30

Glu Gln Gly Phe Ile Glu Glu Asp Lys Ala Arg Asn Asp His Tyr Lys
        35                  40                  45

Glu Leu Lys Pro Ile Ile Asp Arg Ile Tyr Lys Thr Tyr Ala Asp Gln
    50                  55                  60

Cys Leu Gln Leu Val Gln Leu Asp Trp Glu Asn Leu Ser Ala Ala Ile
65                  70                  75                  80

Asp Ser Tyr Arg Lys Glu Lys Thr Glu Glu Thr Arg Asn Ala Leu Ile
                85                  90                  95

Glu Glu Gln Ala Thr Tyr Arg Asn Ala Ile His Asp Tyr Phe Ile Gly
            100                 105                 110

Arg Thr Asp Asn Leu Thr Asp Ala Ile Asn Lys Arg His Ala Glu Ile
        115                 120                 125

Tyr Lys Gly Leu Phe Lys Ala Glu Leu Phe Asn Gly Lys Val Leu Lys
    130                 135                 140

Gln Leu Gly Thr Val Thr Thr Thr Glu His Glu Asn Ala Leu Leu Arg
145                 150                 155                 160

Ser Phe Asp Lys Phe Thr Thr Tyr Phe Ser Gly Phe Tyr Glu Asn Arg
                165                 170                 175

Lys Asn Val Phe Ser Ala Glu Asp Ile Ser Thr Ala Ile Pro His Arg
            180                 185                 190

Ile Val Gln Asp Asn Phe Pro Lys Phe Lys Glu Asn Cys His Ile Phe
        195                 200                 205
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```
Thr Arg Leu Ile Thr Ala Val Pro Ser Leu Arg Glu His Phe Glu Asn
    210                 215                 220

Val Lys Lys Ala Ile Gly Ile Phe Val Ser Thr Ser Ile Glu Glu Val
225                 230                 235                 240

Phe Ser Phe Pro Phe Tyr Asn Gln Leu Leu Thr Gln Thr Gln Ile Asp
                245                 250                 255

Leu Tyr Asn Gln Leu Leu Gly Gly Ile Ser Arg Glu Ala Gly Thr Glu
            260                 265                 270

Lys Ile Lys Gly Leu Asn Glu Val Leu Asn Leu Ala Ile Gln Lys Asn
        275                 280                 285

Asp Glu Thr Ala His Ile Ile Ala Ser Leu Pro His Arg Phe Ile Pro
    290                 295                 300

Leu Phe Lys Gln Ile Leu Ser Asp Arg Asn Thr Leu Ser Phe Ile Leu
305                 310                 315                 320

Glu Glu Phe Lys Ser Asp Glu Glu Val Ile Gln Ser Phe Cys Lys Tyr
                325                 330                 335

Lys Thr Leu Leu Arg Asn Glu Asn Val Leu Glu Thr Ala Glu Ala Leu
            340                 345                 350

Phe Asn Glu Leu Asn Ser Ile Asp Leu Thr His Ile Phe Ile Ser His
        355                 360                 365

Lys Lys Leu Glu Thr Ile Ser Ser Ala Leu Cys Asp His Trp Asp Thr
    370                 375                 380

Leu Arg Asn Ala Leu Tyr Glu Arg Arg Ile Ser Glu Leu Thr Gly Lys
385                 390                 395                 400

Ile Thr Lys Ser Ala Lys Glu Lys Val Gln Arg Ser Leu Lys His Glu
                405                 410                 415

Asp Ile Asn Leu Gln Glu Ile Ile Ser Ala Ala Gly Lys Glu Leu Ser
            420                 425                 430
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Glu Ala Phe Lys Gln Lys Thr Ser Glu Ile Leu Ser His Ala His Ala
        435                 440                 445

Ala Leu Asp Gln Pro Leu Pro Thr Thr Leu Lys Lys Gln Glu Glu Lys
    450                 455                 460

Glu Ile Leu Lys Ser Gln Leu Asp Ser Leu Leu Gly Leu Tyr His Leu
465                 470                 475                 480

Leu Asp Trp Phe Ala Val Asp Glu Ser Asn Glu Val Asp Pro Glu Phe
                485                 490                 495

Ser Ala Arg Leu Thr Gly Ile Lys Leu Glu Met Glu Pro Ser Leu Ser
            500                 505                 510

Phe Tyr Asn Lys Ala Arg Asn Tyr Ala Thr Lys Lys Pro Tyr Ser Val
        515                 520                 525

Glu Lys Phe Lys Leu Asn Phe Gln Met Pro Thr Leu Ala Ser Gly Trp
    530                 535                 540

Asp Val Asn Lys Glu Lys Asn Asn Gly Ala Ile Leu Phe Val Lys Asn
545                 550                 555                 560

Gly Leu Tyr Tyr Leu Gly Ile Met Pro Lys Gln Lys Gly Arg Tyr Lys
                565                 570                 575

Ala Leu Ser Phe Glu Pro Thr Glu Lys Thr Ser Glu Gly Phe Asp Lys
            580                 585                 590

Met Tyr Tyr Asp Tyr Phe Pro Asp Ala Ala Lys Met Ile Pro Lys Cys
        595                 600                 605

Ser Thr Gln Leu Lys Ala Val Thr Ala His Phe Gln Thr His Thr Thr
    610                 615                 620

Pro Ile Leu Leu Ser Asn Asn Phe Ile Glu Pro Leu Glu Ile Thr Lys
625                 630                 635                 640
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Glu Ile Tyr Asp Leu Asn Asn Pro Glu Lys Glu Pro Lys Lys Phe Gln
                645                 650                 655

Thr Ala Tyr Ala Lys Lys Thr Gly Asp Gln Lys Gly Tyr Arg Glu Ala
            660                 665                 670

Leu Cys Lys Trp Ile Asp Phe Thr Arg Asp Phe Leu Ser Lys Tyr Thr
        675                 680                 685

Lys Thr Thr Ser Ile Asp Leu Ser Ser Leu Arg Pro Ser Ser Gln Tyr
    690                 695                 700

Lys Asp Leu Gly Glu Tyr Tyr Ala Glu Leu Asn Pro Leu Leu Tyr His
705                 710                 715                 720

Ile Ser Phe Gln Arg Ile Ala Glu Lys Glu Ile Met Asp Ala Val Glu
                725                 730                 735

Thr Gly Lys Leu Tyr Leu Phe Gln Ile Tyr Asn Lys Asp Phe Ala Lys
            740                 745                 750

Gly His His Gly Lys Pro Asn Leu His Thr Leu Tyr Trp Thr Gly Leu
        755                 760                 765

Phe Ser Pro Glu Asn Leu Ala Lys Thr Ser Ile Lys Leu Asn Gly Gln
    770                 775                 780

Ala Glu Leu Phe Tyr Arg Pro Lys Ser Arg Met Lys Arg Met Ala His
785                 790                 795                 800

Arg Leu Gly Glu Lys Met Leu Asn Lys Lys Leu Lys Asp Gln Lys Thr
                805                 810                 815

Pro Ile Pro Asp Thr Leu Tyr Gln Glu Leu Tyr Asp Tyr Val Asn His
            820                 825                 830

Arg Leu Ser His Asp Leu Ser Asp Glu Ala Arg Ala Leu Leu Pro Asn
        835                 840                 845

Val Ile Thr Lys Glu Val Ser His Glu Ile Ile Lys Asp Arg Arg Phe
    850                 855                 860
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Thr Ser Asp Lys Phe Phe Phe His Val Pro Ile Thr Leu Asn Tyr Gln
865                 870                 875                 880


Ala Ala Asn Ser Pro Ser Lys Phe Asn Gln Arg Val Asn Ala Tyr Leu
                885                 890                 895


Lys Glu His Pro Glu Thr Pro Ile Ile Gly Ile Asp Arg Gly Glu Arg
            900                 905                 910


Asn Leu Ile Tyr Ile Thr Val Ile Asp Ser Thr Gly Lys Ile Leu Glu
        915                 920                 925


Gln Arg Ser Leu Asn Thr Ile Gln Gln Phe Asp Tyr Gln Lys Lys Leu
    930                 935                 940


Asp Asn Arg Glu Lys Glu Arg Val Ala Ala Arg Gln Ala Trp Ser Val
945                 950                 955                 960


Val Gly Thr Ile Lys Asp Leu Lys Gln Gly Tyr Leu Ser Gln Val Ile
                965                 970                 975


His Glu Ile Val Asp Leu Met Ile His Tyr Gln Ala Val Val Val Leu
            980                 985                 990


Glu Asn Leu Asn Phe Gly Phe Lys  Ser Lys Arg Thr Gly  Ile Ala Glu
        995                 1000                1005


Lys Ala  Val Tyr Gln Gln Phe  Glu Lys Met Leu Ile  Asp Lys Leu
    1010                1015                1020


Asn Cys  Leu Val Leu Lys Asp  Tyr Pro Ala Glu Lys  Val Gly Gly
    1025                1030                1035


Val Leu  Asn Pro Tyr Gln Leu  Thr Asp Gln Phe Thr  Ser Phe Ala
    1040                1045                1050


Lys Met  Gly Thr Gln Ser Gly  Phe Leu Phe Tyr Val  Pro Ala Pro
    1055                1060                1065
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Tyr Thr  Ser Lys Ile Asp Pro  Leu Thr Gly Phe Val  Asp Pro Phe
    1070                1075                1080

Val Trp  Lys Thr Ile Lys Asn  His Glu Ser Arg Lys  His Phe Leu
    1085                1090                1095

Glu Gly  Phe Asp Phe Leu His  Tyr Asp Val Lys Thr  Gly Asp Phe
    1100                1105                1110

Ile Leu  His Phe Lys Met Asn  Arg Asn Leu Ser Phe  Gln Arg Gly
    1115                1120                1125

Leu Pro  Gly Phe Met Pro Ala  Trp Asp Ile Val Phe  Glu Lys Asn
    1130                1135                1140

Glu Thr  Gln Phe Asp Ala Lys  Gly Thr Pro Phe Ile  Ala Gly Lys
    1145                1150                1155

Arg Ile  Val Pro Val Ile Glu  Asn His Arg Phe Thr  Gly Arg Tyr
    1160                1165                1170

Arg Asp  Leu Tyr Pro Ala Asn  Glu Leu Ile Ala Leu  Leu Glu Glu
    1175                1180                1185

Lys Gly  Ile Val Phe Arg Asp  Gly Ser Asn Ile Leu  Pro Lys Leu
    1190                1195                1200

Leu Glu  Asn Asp Asp Ser His  Ala Ile Asp Thr Met  Val Ala Leu
    1205                1210                1215

Ile Arg  Ser Val Leu Gln Met  Arg Asn Ser Asn Ala  Ala Thr Gly
    1220                1225                1230

Glu Asp  Tyr Ile Asn Ser Pro  Val Arg Asp Leu Asn  Gly Val Cys
    1235                1240                1245

Phe Asp  Ser Arg Phe Gln Asn  Pro Glu Trp Pro Met  Asp Ala Asp
    1250                1255                1260

Ala Asn  Gly Ala Tyr His Ile  Ala Leu Lys Gly Gln  Leu Leu Leu
    1265                1270                1275
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Asn His Leu Lys Glu Ser Lys Asp Leu Lys Leu Gln Asn Gly Ile
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Ser Asn Gln Asp Trp Leu Ala Tyr Ile Gln Glu Leu Arg Asn
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Leu Arg Phe Lys Ala Ile Pro Val Gly Lys Thr Gln Glu Asn Ile Asp
            20   25   30

Asn Lys Arg Leu Leu Val Glu Asp Glu Lys Arg Ala Glu Asp Tyr Lys
        35   40   45

Gly Val Lys Lys Leu Leu Asp Arg Tyr Tyr Leu Ser Phe Ile Asn Asp
    50   55   60

Val Leu His Ser Ile Lys Leu Lys Asn Leu Asn Asn Tyr Ile Ser Leu
65   70   75   80

Phe Arg Lys Lys Thr Arg Thr Glu Lys Glu Asn Lys Glu Leu Glu Asn
                85   90   95

Leu Glu Ile Asn Leu Arg Lys Glu Ile Ala Lys Ala Phe Lys Gly Asn
            100   105   110

Glu Gly Tyr Lys Ser Leu Phe Lys Lys Asp Ile Ile Glu Thr Ile Leu
        115   120   125

Pro Glu Phe Leu Asp Asp Lys Asp Glu Ile Ala Leu Val Asn Ser Phe
    130   135   140

```
Asn Gly Phe Thr Thr Ala Phe Thr Gly Phe Phe Asp Asn Arg Glu Asn
145                 150                 155                 160

Met Phe Ser Glu Glu Ala Lys Ser Thr Ser Ile Ala Phe Arg Cys Ile
                165                 170                 175

Asn Glu Asn Leu Thr Arg Tyr Ile Ser Asn Met Asp Ile Phe Glu Lys
            180                 185                 190

Val Asp Ala Ile Phe Asp Lys His Glu Val Gln Glu Ile Lys Glu Lys
        195                 200                 205

Ile Leu Asn Ser Asp Tyr Asp Val Glu Asp Phe Phe Glu Gly Glu Phe
    210                 215                 220

Phe Asn Phe Val Leu Thr Gln Glu Gly Ile Asp Val Tyr Asn Ala Ile
225                 230                 235                 240

Ile Gly Gly Phe Val Thr Glu Ser Gly Glu Lys Ile Lys Gly Leu Asn
                245                 250                 255

Glu Tyr Ile Asn Leu Tyr Asn Gln Lys Thr Lys Gln Lys Leu Pro Lys
            260                 265                 270

Phe Lys Pro Leu Tyr Lys Gln Val Leu Ser Asp Arg Glu Ser Leu Ser
        275                 280                 285

Phe Tyr Gly Glu Gly Tyr Thr Ser Asp Glu Glu Val Leu Glu Val Phe
    290                 295                 300

Arg Asn Thr Leu Asn Lys Asn Ser Glu Ile Phe Ser Ser Ile Lys Lys
305                 310                 315                 320

Leu Glu Lys Leu Phe Lys Asn Phe Asp Glu Tyr Ser Ser Ala Gly Ile
                325                 330                 335

Phe Val Lys Asn Gly Pro Ala Ile Ser Thr Ile Ser Lys Asp Ile Phe
            340                 345                 350
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```
Gly Glu Trp Asn Val Ile Arg Asp Lys Trp Asn Ala Glu Tyr Asp Asp
        355                 360                 365

Ile His Leu Lys Lys Lys Ala Val Val Thr Glu Lys Tyr Glu Asp Asp
    370                 375                 380

Arg Arg Lys Ser Phe Lys Lys Ile Gly Ser Phe Ser Leu Glu Gln Leu
385                 390                 395                 400

Gln Glu Tyr Ala Asp Ala Asp Leu Ser Val Val Glu Lys Leu Lys Glu
                405                 410                 415

Ile Ile Ile Gln Lys Val Asp Glu Ile Tyr Lys Val Tyr Gly Ser Ser
            420                 425                 430

Glu Lys Leu Phe Asp Ala Asp Phe Val Leu Glu Lys Ser Leu Lys Lys
        435                 440                 445

Asn Asp Ala Val Val Ala Ile Met Lys Asp Leu Leu Asp Ser Val Lys
    450                 455                 460

Ser Phe Glu Asn Tyr Ile Lys Ala Phe Phe Gly Glu Gly Lys Glu Thr
465                 470                 475                 480

Asn Arg Asp Glu Ser Phe Tyr Gly Asp Phe Val Leu Ala Tyr Asp Ile
                485                 490                 495

Leu Leu Lys Val Asp His Ile Tyr Asp Ala Ile Arg Asn Tyr Val Thr
            500                 505                 510

Gln Lys Pro Tyr Ser Lys Asp Lys Phe Lys Leu Tyr Phe Gln Asn Pro
        515                 520                 525

Gln Phe Met Gly Gly Trp Asp Lys Asp Lys Glu Thr Asp Tyr Arg Ala
    530                 535                 540

Thr Ile Leu Arg Tyr Gly Ser Lys Tyr Tyr Leu Ala Ile Met Asp Lys
545                 550                 555                 560

Lys Tyr Ala Lys Cys Leu Gln Lys Ile Asp Lys Asp Asp Val Asn Gly
                565                 570                 575
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```
Asn Tyr Glu Lys Ile Asn Tyr Lys Leu Leu Pro Gly Pro Asn Lys Met
            580                 585                 590

Leu Pro Lys Val Phe Phe Ser Lys Lys Trp Met Ala Tyr Tyr Asn Pro
        595                 600                 605

Ser Glu Asp Ile Gln Lys Ile Tyr Lys Asn Gly Thr Phe Lys Lys Gly
    610                 615                 620

Asp Met Phe Asn Leu Asn Asp Cys His Lys Leu Ile Asp Phe Phe Lys
625                 630                 635                 640

Asp Ser Ile Ser Arg Tyr Pro Lys Trp Ser Asn Ala Tyr Asp Phe Asn
                645                 650                 655

Phe Ser Glu Thr Glu Lys Tyr Lys Asp Ile Ala Gly Phe Tyr Arg Glu
            660                 665                 670

Val Glu Glu Gln Gly Tyr Lys Val Ser Phe Glu Ser Ala Ser Lys Lys
        675                 680                 685

Glu Val Asp Lys Leu Val Glu Glu Gly Lys Leu Tyr Met Phe Gln Ile
    690                 695                 700

Tyr Asn Lys Asp Phe Ser Asp Lys Ser His Gly Thr Pro Asn Leu His
705                 710                 715                 720

Thr Met Tyr Phe Lys Leu Leu Phe Asp Glu Asn Asn His Gly Gln Ile
                725                 730                 735

Arg Leu Ser Gly Gly Ala Glu Leu Phe Met Arg Arg Ala Ser Leu Lys
            740                 745                 750

Lys Glu Glu Leu Val Val His Pro Ala Asn Ser Pro Ile Ala Asn Lys
        755                 760                 765

Asn Pro Asp Asn Pro Lys Lys Thr Thr Thr Leu Ser Tyr Asp Val Tyr
    770                 775                 780
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Lys Asp Lys Arg Phe Ser Glu Asp Gln Tyr Glu Leu His Ile Pro Ile
785                 790                 795                 800


Ala Ile Asn Lys Cys Pro Lys Asn Ile Phe Lys Ile Asn Thr Glu Val
                805                 810                 815


Arg Val Leu Leu Lys His Asp Asp Asn Pro Tyr Val Ile Gly Ile Asp
            820                 825                 830


Arg Gly Glu Arg Asn Leu Leu Tyr Ile Val Val Val Asp Gly Lys Gly
        835                 840                 845


Asn Ile Val Glu Gln Tyr Ser Leu Asn Glu Ile Ile Asn Asn Phe Asn
    850                 855                 860


Gly Ile Arg Ile Lys Thr Asp Tyr His Ser Leu Leu Asp Lys Lys Glu
865                 870                 875                 880


Lys Glu Arg Phe Glu Ala Arg Gln Asn Trp Thr Ser Ile Glu Asn Ile
                885                 890                 895


Lys Glu Leu Lys Ala Gly Tyr Ile Ser Gln Val Val His Lys Ile Cys
            900                 905                 910


Glu Leu Val Glu Lys Tyr Asp Ala Val Ile Ala Leu Glu Asp Leu Asn
        915                 920                 925


Ser Gly Phe Lys Asn Ser Arg Val Lys Val Glu Lys Gln Val Tyr Gln
    930                 935                 940


Lys Phe Glu Lys Met Leu Ile Asp Lys Leu Asn Tyr Met Val Asp Lys
945                 950                 955                 960


Lys Ser Asn Pro Cys Ala Thr Gly Gly Ala Leu Lys Gly Tyr Gln Ile
                965                 970                 975


Thr Asn Lys Phe Glu Ser Phe Lys Ser Met Ser Thr Gln Asn Gly Phe
            980                 985                 990


Ile Phe Tyr Ile Pro Ala Trp Leu  Thr Ser Lys Ile Asp  Pro Ser Thr
        995                 1000                1005
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Gly Phe  Val Asn Leu Leu Lys  Thr Lys Tyr Thr Ser  Ile Ala Asp
    1010                1015                1020

Ser Lys  Lys Phe Ile Ser Ser  Phe Asp Arg Ile Met  Tyr Val Pro
    1025                1030                1035

Glu Glu  Asp Leu Phe Glu Phe  Ala Leu Asp Tyr Lys  Asn Phe Ser
    1040                1045                1050

Arg Thr  Asp Ala Asp Tyr Ile  Lys Lys Trp Lys Leu  Tyr Ser Tyr
    1055                1060                1065

Gly Asn  Arg Ile Arg Ile Phe  Arg Asn Pro Lys Lys  Asn Asn Val
    1070                1075                1080

Phe Asp  Trp Glu Glu Val Cys  Leu Thr Ser Ala Tyr  Lys Glu Leu
    1085                1090                1095

Phe Asn  Lys Tyr Gly Ile Asn  Tyr Gln Gln Gly Asp  Ile Arg Ala
    1100                1105                1110

Leu Leu  Cys Glu Gln Ser Asp  Lys Ala Phe Tyr Ser  Ser Phe Met
    1115                1120                1125

Ala Leu  Met Ser Leu Met Leu  Gln Met Arg Asn Ser  Ile Thr Gly
    1130                1135                1140

Arg Thr  Asp Val Asp Phe Leu  Ile Ser Pro Val Lys  Asn Ser Asp
    1145                1150                1155

Gly Ile  Phe Tyr Asp Ser Arg  Asn Tyr Glu Ala Gln  Glu Asn Ala
    1160                1165                1170

Ile Leu  Pro Lys Asn Ala Asp  Ala Asn Gly Ala Tyr  Asn Ile Ala
    1175                1180                1185

Arg Lys  Val Leu Trp Ala Ile  Gly Gln Phe Lys Lys  Ala Glu Asp
    1190                1195                1200
```

Glu Lys Leu Asp Lys Val Lys Ile Ala Ile Ser Asn Lys Glu Trp
    1205   1210   1215

Leu Glu Tyr Ala Gln Thr Ser Val Lys His
    1220   1225

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Ala Gly Asp Met Arg Ala Ala Asn Leu Trp Pro Ser Pro Leu Met Ile
1   5   10   15

Lys Arg Ser Lys Lys Asn Ser Leu Ala Leu Ser Leu Thr Ala Asp Gln
            20   25   30

Met Val Ser Ala Leu Leu Asp Ala Glu Pro Pro Ile Leu Tyr Ser Glu
        35   40   45

Tyr Asp Pro Thr Arg Pro Phe Ser Glu Ala Ser Met Met Gly Leu Leu
    50   55   60

Thr Asn Leu Ala Asp Arg Glu Leu Val His Met Ile Asn Trp Ala Lys
65   70   75   80

Arg Val Pro Gly Phe Val Asp Leu Thr Leu His Asp Gln Val His Leu
                85   90   95

Leu Glu Cys Ala Trp Leu Glu Ile Leu Met Ile Gly Leu Val Trp Arg
            100   105   110

Ser Met Glu His Pro Val Lys Leu Leu Phe Ala Pro Asn Leu Leu Leu
        115   120   125

Asp Arg Asn Gln Gly Lys Cys Val Glu Gly Met Val Glu Ile Phe Asp
    130   135   140

```
Met Leu Leu Ala Thr Ser Ser Arg Phe Arg Met Met Asn Leu Gln Gly
145                 150                 155                 160


Glu Glu Phe Val Cys Leu Lys Ser Ile Ile Leu Leu Asn Ser Gly Val
                165                 170                 175


Tyr Thr Phe Leu Ser Ser Thr Leu Lys Ser Leu Glu Glu Lys Asp His
            180                 185                 190


Ile His Arg Val Leu Asp Lys Ile Thr Asp Thr Leu Ile His Leu Met
        195                 200                 205


Ala Lys Ala Gly Leu Thr Leu Gln Gln Gln His Gln Arg Leu Ala Gln
    210                 215                 220


Leu Leu Leu Ile Leu Ser His Ile Arg His Met Ser Asn Lys Gly Met
225                 230                 235                 240


Glu His Leu Tyr Ser Met Lys Cys Lys Asn Val Val Pro Leu Tyr Asp
                245                 250                 255


Leu Leu Leu Glu Ala Ala Asp Ala His Arg Leu His Ala Pro Thr Ser
            260                 265                 270


Arg Gly Gly Ala Ser Val Glu Glu Thr Asp Gln Ser His Leu Ala Thr
        275                 280                 285


Ala Gly Ser Thr Ser Ser His Ser Leu Gln Lys Tyr Tyr Ile Thr Gly
    290                 295                 300


Glu Ala Glu Gly Phe Pro Ala Thr Ala
305                 310


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Ala Pro Lys Lys Lys Arg Lys Val Gly Ile His Gly Val Pro Ala Ala
1   5   10   15

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Ser Arg Ala Asp Pro Lys Lys Lys Arg Lys Val
1   5   10

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Leu Gly Phe Val Gly Arg Val Ala Ala Ala Pro Ala Ser Gly Ala Leu
1   5   10   15

Arg Arg Leu Thr Pro Ser Ala Ser Leu Pro Pro Ala Gln Leu Leu Leu
            20   25   30

Arg Ala Ala Pro Thr Ala Val His Pro Val Arg Asp Tyr Ala Ala Gln
        35   40   45

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Leu Ser Arg Ala Val Cys Gly Thr Ser Arg Gln Leu Ala Pro Val Leu
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Gly Tyr Leu Gly Ser Arg Gln Lys His Ser Leu Pro Asp
            20   25

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

Arg Leu Pro Val Pro Arg Ala Lys Ile His Ser Leu
            20   25

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Leu Phe Asn Leu Arg Ile Leu Leu Asn Asn Ala Ala Phe Arg Asn Gly
1   5   10   15

His Asn Phe Met Val Arg Asn Phe Arg Cys Gly Gln Pro Leu Gln
            20   25   30

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Ala Phe Leu Arg Ser Met Trp Gly Val Leu Ser Ala Leu Gly Arg Ser
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Gly Ala Glu Leu Cys Thr Gly Cys Gly Ser Arg Leu Arg Ser Pro Phe
20 25 30

Ser Phe Val Tyr Leu Pro Arg Trp Phe
35 40

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Gly Lys Pro Ile Pro Asn Pro Leu Leu Gly Leu Asp Ser Thr
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<400> 13

Ser Arg Gly Ser Gly Glu Gly Arg Gly Ser Leu Leu Thr Cys Gly Asp
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Val Glu Glu Asn Pro Gly Pro
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Met Asn Leu Ser Lys Asn Val Ser Val Ser Val Tyr Met Lys Gly Asn
1 5 10 15

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Val Asn Asn His Glu Phe Glu Tyr Asp Gly Glu Gly Gly Gly Asp Pro
            20                  25                  30

Tyr Thr Gly Lys Tyr Ser Met Lys Met Thr Leu Arg Gly Gln Asn Ser
        35                  40                  45

Leu Pro Phe Ser Tyr Asp Ile Ile Thr Thr Ala Phe Gln Tyr Gly Phe
    50                  55                  60

Arg Val Phe Thr Lys Tyr Pro Glu Gly Ile Val Asp Tyr Phe Lys Asp
65                  70                  75                  80

Ser Leu Pro Asp Ala Phe Gln Trp Asn Arg Arg Ile Val Phe Glu Asp
                85                  90                  95

Gly Gly Val Leu Asn Met Ser Ser Asp Ile Thr Tyr Lys Asp Asn Val
            100                 105                 110

Leu His Gly Asp Val Lys Ala Glu Gly Val Asn Phe Pro Pro Asn Gly
        115                 120                 125

Pro Val Met Lys Asn Glu Ile Val Met Glu Glu Pro Thr Glu Glu Thr
    130                 135                 140

Phe Thr Pro Lys Asn Gly Val Leu Val Gly Phe Cys Pro Lys Ala Tyr
145                 150                 155                 160

Leu Leu Lys Asp Gly Ser Tyr Tyr Tyr Gly Asn Met Thr Thr Phe Tyr
                165                 170                 175

Arg Ser Lys Lys Ser Gly Gln Ala Pro Pro Gly Tyr His Phe Val Lys
            180                 185                 190

His Arg Leu Val Lys Thr Asn Val Gly His Gly Phe Lys Thr Val Glu
        195                 200                 205

Gln Thr Glu Tyr Ala Thr Ala His Val Ser Asp Leu Pro Lys Phe Glu
    210                 215                 220

Ala
225
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Xaa Pro Arg Xaa Pro Gly Xaa Xaa
1   5

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Xaa Thr Gly Xaa Ser Gly Ser Glu Gly Ala Xaa Xaa
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Xaa Thr Gly Xaa Gly Ala Ser Gly Ser Lys Thr Pro Gly Xaa Xaa
1 5 10 15

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1 5 10 15

Gly Ala Xaa Xaa
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Xaa Thr Gly Xaa Ser Gly Ser Glu Thr Pro Gly Thr Gly Pro Gly Gly
1 5 10 15

Ala Xaa Xaa

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Xaa Thr Gly Xaa Ser Glu Ser Ala Thr Pro Glu Ser Gly Ala Xaa Xaa
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1 5 10 15

Ala Xaa Xaa

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Xaa Thr Gly Xaa Gly Gly Ser Gly Gly Ser Gly Ala Xaa Xaa
1 5 10

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Xaa Thr Gly Pro Gly Pro Gly Gly Ser Xaa Gly Ala Xaa Xaa
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Xaa Thr Gly Pro Gly Pro Gly Gly Ser Ala Gly Asp Thr Thr Gly Pro
1 5 10 15

Gly Thr Gly Pro Gly Xaa Gly Ala Xaa Xaa
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Xaa Thr Gly Xaa Gly Ala Xaa Gly Gly Gly Ser Xaa
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Xaa Thr Gly Gly Gly Ser Xaa Thr Pro Glu Ser Gly Ala Xaa Xaa
1 5 10 15

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Xaa Thr Gly Gly Gly Ser Xaa Ser Glu Ser Ala Thr Pro Glu Ser Gly
1 5 10 15

Ala Xaa Xaa

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Xaa Thr Gly Gly Gly Ser Xaa Ser Gly Ser Glu Gly Ala Xaa Xaa
1   5   10   15

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Xaa Thr Gly Gly Gly Ser Xaa Ser Gly Ser Glu Thr Pro Gly Thr Gly
1   5   10   15

Ala Xaa Xaa

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1   5   10   15

Glu Gly Ala Xaa Xaa
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Xaa Thr Gly Gly Gly Ser Xaa Pro Arg Gly Gly Ser Xaa Thr Pro Glu
1   5   10   15

Ser Gly Ala Xaa Xaa
            20

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Xaa Thr Gly Gly Gly Ser Xaa Gly Gly Ser Pro Arg Gly Gly Ser Xaa
1 5 10 15

Thr Pro Glu Ser Gly Ala Xaa Xaa
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Xaa Thr Gly Xaa Gly Ala Xaa Xaa Pro Ala Gly Xaa
1   5   10

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Xaa Thr Gly Xaa Gly Ala Xaa Xaa Pro Ala Gly Gly Gly Ser Xaa
1   5   10   15

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Xaa Thr Gly Gly Gly Ser Xaa Ser Gly Ser Glu Thr Pro Gly Thr Pro
1 5 10 15

Gly Gly Ala Xaa Xaa
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Xaa Thr Gly Gly Gly Ser Xaa Pro Arg Gly Gly Ser Xaa Thr Pro Glu
1   5   10   15

Ser Gly Ala Xaa Xaa Pro Ala Gly Xaa
            20   25

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Xaa Thr Gly Gly Gly Ser Xaa Pro Arg Xaa Thr Pro Glu Ser Gly Ala
1   5   10   15

Xaa Xaa Pro Ala Gly Gly Gly Ser Xaa
            20   25

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Xaa Thr Gly Xaa Gly Gly Ser Pro Arg Gly Gly Ser Xaa Thr Pro Glu
1   5   10   15

Ser Gly Ala Xaa Xaa Pro Ala Gly Gly Gly Ser Xaa
            20   25

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Ser Gly Ala Xaa Xaa
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Gly Ala Xaa Xaa Xaa
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Ala Xaa Xaa Xaa
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Xaa

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1 5 10 15

Ala Xaa Xaa Xaa
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Gly Gly Ala Xaa Xaa Xaa
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1   5   10

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1   5   10

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Glu Gly Ala Xaa Xaa Xaa
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Ser Xaa Gly Ala Xaa Xaa Xaa
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Ala Xaa Xaa Xaa
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Xaa Thr Gly Xaa Gly Ala Xaa Xaa Gly Gly Gly Ser Xaa
1   5   10

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Ser Gly Ala Xaa Xaa Xaa
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1 5 10 15

Thr Pro Glu Ser Gly Ala Xaa Xaa Xaa
20 25

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1 5 10 15

Ser Gly Ala Xaa Xaa Xaa
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1   5   10

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1 5 10 15

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Ser Gly Ala Xaa Xaa Xaa Pro Ala Gly Gly Gly Ser Xaa
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Thr Pro Glu Ser Gly Ala Xaa Xaa Xaa Pro Ala Gly Gly Gly Ser Xaa
20 25 30

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Ser Gly Ala Xaa Xaa Xaa Pro Ala Gly Xaa
            20   25

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1 5 10 15

Thr Pro Glu Ser Gly Ala Xaa Xaa Xaa Pro Ala Gly Xaa
20 25

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1 5 10 15

Ser Gly Ala Xaa Xaa Xaa Pro Ala Gly Xaa
20 25

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