SEQUENCE LISTING

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<120> Screening Method for Cell Ageing

<130> P037286WO

<150> GB 0911885.2
<151> 2009-07-08

<160> 22

<170> PatentIn version 3.5

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<213> Saccharomyces cerevisiae

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            20                  25                  30

Ser Ser Thr Ala Gly Asn Asp Asn Gly Tyr Pro Cys Lys Leu Val Ser
        35                  40                  45

Ser Gly Pro Cys Ala Ser Ser Asn Asn Gly Ala Leu Phe Thr Asn Phe
    50                  55                  60

Thr Leu Gln Thr Ala Thr Pro Thr Thr Ala Ile Ser Gln Asp Leu Tyr
65                  70                  75                  80

Ala Met Gly Thr Thr Gly Ile Thr Ser Glu Asn Ala Leu Phe Gln Met
                85                  90                  95

Lys Ser Met Asn Asn Gly Ile Ser Ser Val Asn Asn Asn Asn Ser Asn
            100                 105                 110

Thr Pro Thr Ile Ile Thr Thr Ser Gln Glu Glu Thr Asn Ala Gly Asn
        115                 120                 125

Val His Gly Asp Thr Gly Gly Asn Ser Leu Gln Asn Ser Glu Asp Asp
    130                 135                 140

Asn Phe Ser Ser Ser Ser Thr Thr Lys Cys Leu Leu Ser Ser Thr Ser
145                 150                 155                 160

Ser Leu Ser Ile Asn Gln Arg Glu Ala Ala Ala Ala Ala Tyr Gly Pro
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Asp Thr Asp Ile Pro Arg Gly Lys Leu Glu Val Thr Ile Ile Glu Ala
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Arg Asp Leu Val Thr Arg Ser Lys Asp Ser Gln Pro Tyr Val Val Cys
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Thr Phe Glu Ser Ser Glu Phe Ile Ser Asn Gly Pro Glu Ser Leu Gly
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Ala Ile Asn Asn Asn Asn Asn Asn Asn Asn Asn Asn Gln His Asn Gln
225                 230                 235                 240

Asn Gln His Ile Asn Asn Asn Asn Glu Asn Thr Asn Pro Asp Ala Ala
                245                 250                 255

Ser Gln His His Asn Asn Asn Ser Gly Trp Asn Gly Ser Gln Leu Pro
            260                 265                 270

Ser Ile Lys Glu His Leu Lys Lys Lys Pro Leu Tyr Thr His Arg Ser
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Ser Ser Gln Leu Asp Gln Leu Asn Ser Cys Ser Ser Val Thr Asp Pro
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Ser Lys Arg Ser Ser Asn Ser Ser Ser Gly Ser Ser Asn Gly Pro Lys
305                 310                 315                 320

Asn Asp Ser Ser His Pro Ile Trp His His Lys Thr Thr Phe Asp Val
                325                 330                 335

Leu Gly Ser His Ser Glu Leu Asp Ile Ser Val Tyr Asp Ala Ala His
            340                 345                 350

Asp His Met Phe Leu Gly Gln Val Arg Leu Tyr Pro Met Ile His Asn
        355                 360                 365

Leu Ala His Ala Ser Gln His Gln Trp His Ser Leu Lys Pro Arg Val
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Ile Asp Glu Val Val Ser Gly Asp Ile Leu Ile Lys Trp Thr Tyr Lys
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Gln Thr Lys Lys Arg His Tyr Gly Pro Gln Asp Phe Glu Val Leu Arg
                405                 410                 415

Leu Leu Gly Lys Gly Thr Phe Gly Gln Val Tyr Gln Val Lys Lys Lys
            420                 425                 430

Asp Thr Gln Arg Ile Tyr Ala Met Lys Val Leu Ser Lys Lys Val Ile
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Val Lys Lys Asn Glu Ile Ala His Thr Ile Gly Glu Arg Asn Ile Leu
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Ser Phe Gln Thr Pro Thr Asp Leu Tyr Leu Val Thr Asp Tyr Met Ser
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Gly Gly Glu Leu Phe Trp His Leu Gln Lys Glu Gly Arg Phe Ser Glu
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Asp Arg Ala Lys Phe Tyr Ile Ala Glu Leu Val Leu Ala Leu Glu His
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Leu His Asp Asn Asp Ile Val Tyr Arg Asp Leu Lys Pro Glu Asn Ile
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Leu Leu Asp Ala Asn Gly Asn Ile Ala Leu Cys Asp Phe Gly Leu Ser
545                 550                 555                 560

Lys Ala Asp Leu Lys Asp Arg Thr Asn Thr Phe Cys Gly Thr Thr Glu
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Tyr Leu Ala Pro Glu Leu Leu Leu Asp Glu Thr Gly Tyr Thr Lys Met
            580                 585                 590

Val Asp Phe Trp Ser Leu Gly Val Leu Ile Phe Glu Met Cys Cys Gly
        595                 600                 605

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

Lys Pro His Leu Val Ser Glu Thr Asp Thr Ser Asn Phe Asp Pro Glu
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Phe Thr Thr Ala Ser Thr Ser Tyr Met Asn Lys His Gln Pro Met Met
705                 710                 715                 720

Thr Ala Thr Pro Leu Ser Pro Ala Met Gln Ala Lys Phe Ala Gly Phe
                725                 730                 735
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Thr Phe Val Asp Glu Ser Ala Ile Asp Glu His Val Asn Asn Asn Arg
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Lys Phe Leu Gln Asn Ser Tyr Phe Met Glu Pro Gly Ser Phe Ile Pro
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Gly Asn Pro Asn Leu Pro Pro Asp Glu Asp Val Ile Asp Asp Asp Gly
770 775 780

Asp Glu Asp Ile Asn Asp Gly Phe Asn Gln Glu Lys Asn Met Asn Asn
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Phe Val Ser Gly Arg Phe Glu Ile
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35 40 45

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Lys Asp Arg Val Gly Leu Ser Leu Tyr Glu Val Gln Tyr Asn Thr His
    50                  55                  60

Thr Asn Ala Lys Cys Pro Ile Pro Arg Asp Ile Ile Lys Glu Val Cys
65                  70                  75                  80

Ser Ala Met Lys Arg Phe Lys Leu Ile Cys Asp Asp Phe Gly Val Pro
                85                  90                  95

Glu Thr Ser Val Arg Val Ile Ala Thr Glu Ala Thr Arg Asp Ala Ile
            100                 105                 110

Asn Ala Asp Glu Phe Val Asn Ala Val Tyr Gly Ser Thr Gly Trp Lys
        115                 120                 125

Val Glu Ile Leu Gly Gln Glu Asp Glu Thr Arg Val Gly Ile Tyr Gly
    130                 135                 140

Val Val Ser Ser Phe Asn Thr Val Arg Gly Leu Tyr Leu Asp Val Ala
145                 150                 155                 160

Gly Gly Ser Thr Gln Leu Ser Trp Val Ile Ser Ser His Gly Glu Val
                165                 170                 175

Lys Gln Ser Ser Lys Pro Val Ser Leu Pro Tyr Gly Ala Gly Thr Leu
            180                 185                 190

Leu Arg Arg Met Arg Thr Asp Asp Asn Arg Ala Leu Phe Tyr Glu Ile
        195                 200                 205

Lys Glu Ala Tyr Lys Asp Ala Ile Glu Lys Ile Gly Ile Pro Gln Glu
    210                 215                 220

Met Ile Asp Asp Ala Lys Lys Glu Gly Gly Phe Asp Leu Trp Thr Arg
225                 230                 235                 240

Gly Gly Gly Leu Arg Gly Met Gly His Leu Leu Leu Tyr Gln Ser Glu
                245                 250                 255

Gly Tyr Pro Ile Gln Thr Ile Ile Asn Gly Tyr Ala Cys Thr Tyr Glu
            260                 265                 270

Glu Phe Ser Ser Met Ser Asp Tyr Leu Phe Leu Lys Gln Lys Ile Pro
        275                 280                 285

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

Leu Gln Leu Pro Ala Val Gly Leu Phe Met Ser Ala Val Phe Glu Ala
305                 310                 315                 320
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            340                 345                 350

Leu Leu Ile Ala Ser Arg Pro Tyr Ala Pro Leu Leu Thr Glu Lys Tyr
        355                 360                 365

Leu Tyr Leu Leu Arg Thr Ser Ile Pro Gln Glu Asp Ile Pro Glu Ile
    370                 375                 380

Val Asn Glu Arg Ile Ala Pro Ala Leu Cys Asn Leu Ala Phe Val His
385                 390                 395                 400

Ala Ser Tyr Pro Lys Glu Leu Gln Pro Thr Ala Ala Leu His Val Ala
                405                 410                 415

Thr Arg Gly Ile Ile Ala Gly Cys His Gly Leu Ser His Arg Ala Arg
            420                 425                 430

Ala Leu Ile Gly Ile Ala Leu Cys Ser Arg Trp Gly Gly Asn Ile Pro
        435                 440                 445

Glu Ser Glu Glu Lys Tyr Ser Gln Glu Leu Glu Gln Val Val Leu Arg
    450                 455                 460

Glu Gly Asp Lys Ala Glu Ala Leu Arg Ile Val Trp Trp Thr Lys Tyr
465                 470                 475                 480

Ile Gly Thr Ile Met Tyr Val Ile Cys Gly Val His Pro Gly Gly Asn
                485                 490                 495

Ile Arg Asp Asn Val Phe Asp Phe His Val Ser Lys Arg Ser Glu Val
            500                 505                 510

Glu Thr Ser Leu Lys Glu Leu Ile Ile Asp Asp Ala Asn Thr Thr Lys
        515                 520                 525

Val Lys Glu Glu Ser Thr Arg Lys Asn Arg Gly Tyr Glu Val Val Val
    530                 535                 540

Arg Ile Ser Lys Asp Asp Leu Lys Thr Ser Ala Ser Val Arg Ser Arg
545                 550                 555                 560

Ile Ile Thr Leu Gln Lys Lys Val Arg Lys Leu Ser Arg Gly Ser Val
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            20                  25                  30

Ile Gln Pro Glu Gln Ala Glu Thr Asn Lys Gln Glu Gly Thr Asp Lys
        35                  40                  45

Glu Asn Lys Gly Lys Phe Glu Lys Glu Thr Glu Arg Ile Gly Gly Ser
    50                  55                  60

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

Gly Val Glu Tyr Thr Phe Lys Glu Arg Pro Ser Val Val Glu Glu Asn
                85                  90                  95

Glu Gly Lys Ile Glu Phe Arg Val Val Asn Asn Asp Asn Thr Lys Glu
            100                 105                 110

Asn Met Met Val Leu Thr Gly Leu Lys Asn Ile Phe Gln Lys Gln Leu
        115                 120                 125

Pro Lys Met Pro Lys Glu Tyr Ile Ala Arg Leu Val Tyr Asp Arg Ser
    130                 135                 140

His Leu Ser Met Ala Val Ile Arg Lys Pro Leu Thr Val Val Gly Gly
145                 150                 155                 160

Ile Thr Tyr Arg Pro Phe Asp Lys Arg Glu Phe Ala Glu Ile Val Phe
                165                 170                 175

Cys Ala Ile Ser Ser Thr Glu Gln Val Arg Gly Tyr Gly Ala His Leu
            180                 185                 190

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

Phe Leu Thr Tyr Ala Asp Asn Tyr Ala Ile Gly Tyr Phe Lys Lys Gln
    210                 215                 220

Gly Phe Thr Lys Glu Ile Thr Leu Asp Lys Ser Ile Trp Met Gly Tyr
225                 230                 235                 240

Ile Lys Asp Tyr Glu Gly Gly Thr Leu Met Gln Cys Ser Met Leu Pro
                245                 250                 255
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Arg Ile Arg Tyr Leu Asp Ala Gly Lys Ile Leu Leu Leu Gln Glu Ala
260 265 270

Ala Leu Arg Arg Lys Ile Arg Thr Ile Ser Lys Ser His Ile Val Arg
275 280 285

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290 295 300

Pro Met Thr Ile Pro Gly Leu Lys Glu Ala Gly Trp Thr Pro Glu Met
305 310 315 320

Asp Ala Leu Ala Gln Arg Pro Lys Arg Gly Pro His Asp Ala Ala Ile
325 330 335

Gln Asn Ile Leu Thr Glu Leu Gln Asn His Ala Ala Ala Trp Pro Phe
340 345 350

Leu Gln Pro Val Asn Lys Glu Glu Val Pro Asp Tyr Tyr Asp Phe Ile
355 360 365

Lys Glu Pro Met Asp Leu Ser Thr Met Glu Ile Lys Leu Glu Ser Asn
370 375 380

Lys Tyr Gln Lys Met Glu Asp Phe Ile Tyr Asp Ala Arg Leu Val Phe
385 390 395 400

Asn Asn Cys Arg Met Tyr Asn Gly Glu Asn Thr Ser Tyr Tyr Lys Tyr
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Glu Tyr Ser His Leu Ile Asp
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Leu Asn Val Asn Met Asn Met Lys Met Asn Ala Ser Arg Asn Gly Asp
        35                  40                  45

Glu Phe Gly Leu Thr Ser Ser Arg Phe Asp Gly Val Val Ile Gly Ser
    50                  55                  60

Asn Gly Asp Val Asn Phe Lys Pro Ile Leu Glu Lys Ile Phe Arg Glu
65                  70                  75                  80

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

Phe Asp Leu Leu Val Ser Leu Glu His Glu Leu Ser Ile Glu Glu Phe
            100                 105                 110

Gln Ala Val Ser Asn Asp Ile Asn Asn Lys Ile Leu Glu Leu Val His
        115                 120                 125

Thr Lys Lys Thr Ser Thr Arg Val Gly Ala Val Leu Ser Ile Asp Thr
    130                 135                 140

Leu Ile Ser Phe Tyr Ala Tyr Thr Glu Arg Leu Pro Asn Glu Thr Ser
145                 150                 155                 160

Arg Leu Ala Gly Tyr Leu Arg Gly Leu Ile Pro Ser Asn Asp Val Glu
                165                 170                 175

Val Met Arg Leu Ala Ala Lys Thr Leu Gly Lys Leu Ala Val Pro Gly
            180                 185                 190

Gly Thr Tyr Thr Ser Asp Phe Val Glu Phe Glu Ile Lys Ser Cys Leu
        195                 200                 205

Glu Trp Leu Thr Ala Ser Thr Glu Lys Asn Ser Phe Ser Ser Ser Lys
    210                 215                 220

Pro Asp His Ala Lys His Arg Ala Leu Leu Ile Ile Thr Ala Leu Ala
225                 230                 235                 240

Glu Asn Cys Pro Tyr Leu Leu Tyr Gln Tyr Leu Asn Ser Ile Leu Asp
                245                 250                 255

Asn Ile Trp Arg Ala Leu Arg Asp Pro His Leu Val Ile Arg Ile Asp
            260                 265                 270
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Ala Ser Ile Thr Leu Ala Lys Cys Leu Ser Thr Leu Arg Asn Arg Asp
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Pro Gln Leu Thr Ser Gln Trp Val Gln Arg Leu Ala Thr Ser Cys Glu
    290                 295                 300

Tyr Gly Phe Gln Val Asn Thr Leu Glu Cys Ile His Ala Ser Leu Leu
305                 310                 315                 320

Val Tyr Lys Glu Ile Leu Phe Leu Lys Asp Pro Phe Leu Asn Gln Val
                325                 330                 335

Phe Asp Gln Met Cys Leu Asn Cys Ile Ala Tyr Glu Asn His Lys Ala
            340                 345                 350

Lys Met Ile Arg Glu Lys Ile Tyr Gln Ile Val Pro Leu Leu Ala Ser
        355                 360                 365

Phe Asn Pro Gln Leu Phe Ala Gly Lys Tyr Leu His Gln Ile Met Asp
    370                 375                 380

Asn Tyr Leu Glu Ile Leu Thr Asn Ala Pro Ala Lys Lys Ile Pro His
385                 390                 395                 400

Leu Lys Asp Asp Lys Pro Gln Ile Leu Ile Ser Ile Gly Asp Ile Ala
                405                 410                 415

Tyr Glu Val Gly Pro Asp Ile Ala Pro Tyr Val Lys Gln Ile Leu Asp
            420                 425                 430

Tyr Ile Glu His Asp Leu Gln Thr Lys Phe Lys Phe Arg Lys Lys Phe
        435                 440                 445

Glu Asn Glu Ile Phe Tyr Cys Ile Gly Arg Leu Ala Val Pro Leu Gly
    450                 455                 460

Pro Val Leu Gly Lys Leu Leu Asn Arg Asn Ile Leu Asp Leu Met Phe
465                 470                 475                 480

Lys Cys Pro Leu Ser Asp Tyr Met Gln Glu Thr Phe Gln Ile Leu Thr
                485                 490                 495

Glu Arg Ile Pro Ser Leu Gly Pro Lys Ile Asn Asp Glu Leu Leu Asn
            500                 505                 510

Leu Val Cys Ser Thr Leu Ser Gly Thr Pro Phe Ile Gln Pro Gly Ser
        515                 520                 525

Pro Met Glu Ile Pro Ser Phe Ser Arg Glu Arg Ala Arg Glu Trp Arg
    530                 535                 540
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Asn Lys Ser Ile Leu Gln Lys Thr Gly Glu Ser Asn Asp Asp Asn Asn
545                 550                 555                 560

Asp Ile Lys Ile Ile Ile Gln Ala Phe Arg Met Leu Lys Asn Ile Lys
                565                 570                 575

Ser Arg Phe Ser Leu Val Glu Phe Val Arg Ile Val Ala Leu Ser Tyr
            580                 585                 590

Ile Glu His Thr Asp Pro Arg Val Arg Lys Leu Ala Ala Leu Thr Ser
        595                 600                 605

Cys Glu Ile Tyr Val Lys Asp Asn Ile Cys Lys Gln Thr Ser Leu His
    610                 615                 620

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

Ile Ala Asp Pro Leu Gln Asp Ile Arg Leu Glu Val Leu Lys Asn Leu
                645                 650                 655

Asn Pro Cys Phe Asp Pro Gln Leu Ala Gln Pro Asp Asn Leu Arg Leu
            660                 665                 670

Leu Phe Ile Ala Leu His Asp Glu Ser Phe Asn Ile Gln Ser Val Ala
        675                 680                 685

Met Glu Leu Val Gly Arg Leu Ser Ser Val Asn Pro Ala Tyr Val Ile
    690                 695                 700

Pro Ser Ile Arg Lys Ile Leu Leu Glu Leu Leu Thr Lys Leu Lys Phe
705                 710                 715                 720

Ser Thr Ser Ser Arg Glu Lys Glu Glu Thr Ala Ser Leu Leu Cys Thr
                725                 730                 735

Leu Ile Arg Ser Ser Lys Asp Val Ala Lys Pro Tyr Ile Glu Pro Leu
            740                 745                 750

Leu Asn Val Leu Leu Pro Lys Phe Gln Asp Thr Ser Ser Thr Val Ala
        755                 760                 765

Ser Thr Ala Leu Arg Thr Ile Gly Glu Leu Ser Val Val Gly Gly Glu
    770                 775                 780

Asp Met Lys Ile Tyr Leu Lys Asp Leu Phe Pro Leu Ile Ile Lys Thr
785                 790                 795                 800

Phe Gln Asp Gln Ser Asn Ser Phe Lys Arg Glu Ala Ala Leu Lys Ala
                805                 810                 815
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Leu Gly Gln Leu Ala Ala Ser Ser Gly Tyr Val Ile Asp Pro Leu Leu
            820                 825                 830

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

Asn Ser Gln Asn Ile Arg Arg Gln Thr Val Thr Leu Ile Gly Ile Leu
    850                 855                 860

Gly Ala Ile Asp Pro Tyr Arg Gln Lys Glu Arg Glu Val Thr Ser Thr
865                 870                 875                 880

Thr Asp Ile Ser Thr Glu Gln Asn Ala Pro Pro Ile Asp Ile Ala Leu
                885                 890                 895

Leu Met Gln Gly Met Ser Pro Ser Asn Asp Glu Tyr Tyr Thr Thr Val
            900                 905                 910

Val Ile His Cys Leu Leu Lys Ile Leu Lys Asp Pro Ser Leu Ser Ser
        915                 920                 925

Tyr His Thr Ala Val Ile Gln Ala Ile Met His Ile Phe Gln Thr Leu
    930                 935                 940

Gly Leu Lys Cys Val Ser Phe Leu Asp Gln Ile Ile Pro Thr Ile Leu
945                 950                 955                 960

Asp Val Met Arg Thr Cys Ser Gln Ser Leu Leu Glu Phe Tyr Phe Gln
                965                 970                 975

Gln Leu Cys Ser Leu Ile Ile Ile Val Arg Gln His Ile Arg Pro His
            980                 985                 990

Val Asp Ser Ile Phe Gln Ala Ile  Lys Asp Phe Ser Ser  Val Ala Lys
        995                 1000                1005

Leu Gln  Ile Thr Leu Val Ser  Val Ile Glu Ala Ile  Ser Lys Ala
    1010                1015                1020

Leu Glu  Gly Glu Phe Lys Arg  Leu Val Pro Leu Thr  Leu Thr Leu
    1025                1030                1035

Phe Leu  Val Ile Leu Glu Asn  Asp Lys Ser Ser Asp  Lys Val Leu
    1040                1045                1050

Ser Arg  Arg Val Leu Arg Leu  Leu Glu Ser Phe Gly  Pro Asn Leu
    1055                1060                1065

Glu Gly  Tyr Ser His Leu Ile  Thr Pro Lys Ile Val  Gln Met Ala
    1070                1075                1080
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Glu Phe  Thr Ser Gly Asn Leu  Gln Arg Ser Ala Ile  Ile Thr Ile
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Gly Lys  Leu Ala Lys Asp Val  Asp Leu Phe Glu Met  Ser Ser Arg
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Ile Val  His Ser Leu Leu Arg  Val Leu Ser Ser Thr  Thr Ser Asp
    1115                 1120                 1125

Glu Leu  Ser Lys Val Ile Met  Asn Thr Leu Ser Leu  Leu Leu Ile
    1130                 1135                 1140

Gln Met  Gly Thr Ser Phe Ala  Ile Phe Ile Pro Val  Ile Asn Glu
    1145                 1150                 1155

Val Leu  Met Lys Lys His Ile  Gln His Thr Ile Tyr  Asp Asp Leu
    1160                 1165                 1170

Thr Asn  Arg Ile Leu Asn Asn  Asp Val Leu Pro Thr  Lys Ile Leu
    1175                 1180                 1185

Glu Ala  Asn Thr Thr Asp Tyr  Lys Pro Ala Glu Gln  Met Glu Ala
    1190                 1195                 1200

Ala Asp  Ala Gly Val Ala Lys  Leu Pro Ile Asn Gln  Ser Val Leu
    1205                 1210                 1215

Lys Ser  Ala Trp Asn Ser Ser  Gln Gln Arg Thr Lys  Glu Asp Trp
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Gln Glu  Trp Ser Lys Arg Leu  Ser Ile Gln Leu Leu  Lys Glu Ser
    1235                 1240                 1245

Pro Ser  His Ala Leu Arg Ala  Cys Ser Asn Leu Ala  Ser Met Tyr
    1250                 1255                 1260

Tyr Pro  Leu Ala Lys Glu Leu  Phe Asn Thr Ala Phe  Ala Cys Val
    1265                 1270                 1275

Trp Thr  Glu Leu Tyr Ser Gln  Tyr Gln Glu Asp Leu  Ile Glu Ser
    1280                 1285                 1290

Leu Cys  Ile Ala Leu Ser Ser  Pro Leu Asn Pro Pro  Glu Ile His
    1295                 1300                 1305

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

Asn Asn  Gln Leu Asn Gln Thr  Asp Ala Ala Ile Gly  Ile Leu Lys
    1370                 1375                 1380

His Ala  Gln Gln His His Ser  Leu Gln Leu Lys Glu  Thr Trp Phe
    1385                 1390                 1395

Glu Lys  Leu Glu Arg Trp Glu  Asp Ala Leu His Ala  Tyr Asn Glu
    1400                 1405                 1410

Arg Glu  Lys Ala Gly Asp Thr  Ser Val Ser Val Thr  Leu Gly Lys
    1415                 1420                 1425

Met Arg  Ser Leu His Ala Leu  Ala Glu Trp Glu Gln  Leu Ser Gln
    1430                 1435                 1440

Leu Ala  Ala Arg Lys Trp Lys  Val Ser Lys Leu Gln  Thr Lys Lys
    1445                 1450                 1455

Leu Ile  Ala Pro Leu Ala Ala  Gly Ala Arg Gly Gly  Ser Gly Glu
    1460                 1465                 1470

Trp Asp  Met Leu Asp Glu Tyr  Ile Ser Val Met Lys  Pro Lys Ser
    1475                 1480                 1485

Pro Asp  Lys Glu Phe Phe Asp  Ala Ile Leu Tyr Leu  His Lys Asn
    1490                 1495                 1500

Asp Tyr  Asp Asn Ala Ser Lys  His Ile Leu Asn Ala  Arg Asp Leu
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Leu Val  Thr Glu Ile Ser Ala  Leu Ile Asn Glu Ser  Tyr Asn Arg
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Ala Tyr  Ser Val Ile Val Arg  Thr Gln Ile Ile Thr  Glu Phe Glu
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Glu Ile  Ile Lys Tyr Lys Gln  Leu Pro Pro Asn Ser  Glu Lys Lys
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Leu His  Tyr Gln Asn Leu Trp  Thr Lys Arg Leu Leu  Gly Cys Gln
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Lys Asn  Val Asp Leu Trp Gln  Arg Val Leu Arg Ile  Arg Ser Leu
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Val Ile Lys Pro Lys Gln Asp Leu Gln Ile Trp Ile Lys Phe Ala
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Asn Leu Cys Arg Lys Ser Gly Arg Met Arg Leu Ala Asn Lys Ala
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Leu Asn Met Leu Leu Glu Gly Gly Thr Ile Leu Val Tyr Gln Ile
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Arg Ser Lys Pro Pro Pro Pro Val Val Tyr Ala Gln Leu Lys Tyr
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Gly Phe Thr Ser Arg Leu Ala His Asp Leu Gly Leu Asp Pro Asn
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Asn Met Ile Ala Gln Ser Val Lys Leu Ser Ser Ala Ser Thr Ala
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Pro Tyr Val Glu Glu Tyr Thr Lys Leu Leu Ala Arg Cys Phe Leu
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Lys Gln Gly Glu Trp Arg Ile Ala Thr Gln Pro Asn Trp Arg Asn
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Thr Asn Pro Asp Ala Ile Leu Gly Ser Tyr Leu Leu Ala Thr His
1730 1735 1740

Phe Asp Lys Asn Trp Tyr Lys Ala Trp His Asn Trp Ala Leu Ala
1745 1750 1755

Asn Phe Glu Val Ile Ser Met Val Gln Glu Glu Thr Lys Leu Asn
1760 1765 1770

Gly Gly Lys Asn Asp Asp Asp Asp Asp Thr Ala Val Asn Asn Asp
1775 1780 1785

Asn Val Arg Ile Asp Gly Ser Ile Leu Gly Ser Gly Ser Leu Thr
1790 1795 1800

Ile Asn Gly Asn Arg Tyr Pro Leu Glu Leu Ile Gln Arg His Val
1805 1810 1815

Val Pro Ala Ile Lys Gly Phe Phe His Ser Ile Ser Leu Leu Glu
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Thr Ser Cys Leu Gln Asp Thr Leu Arg Leu Ser Thr Leu Leu Phe
1835 1840 1845

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

Leu Leu Ser Leu Leu Ser Asp Leu Gly Lys Ala His Pro Gln Ala
    1895                1900                1905

Leu Val Tyr Pro Leu Thr Val Ala Ile Lys Ser Glu Ser Val Ser
    1910                1915                1920

Arg Gln Lys Ala Ala Leu Ser Ile Ile Glu Lys Ile Arg Ile His
    1925                1930                1935

Ser Pro Val Leu Val Asn Gln Ala Glu Leu Val Ser His Glu Leu
    1940                1945                1950

Ile Arg Val Ala Val Leu Trp His Glu Leu Trp Tyr Glu Gly Leu
    1955                1960                1965

Glu Asp Ala Ser Arg Gln Phe Phe Val Glu His Asn Ile Glu Lys
    1970                1975                1980

Met Phe Ser Thr Leu Glu Pro Leu His Lys His Leu Gly Asn Glu
    1985                1990                1995

Pro Gln Thr Leu Ser Glu Val Ser Phe Gln Lys Ser Phe Gly Arg
    2000                2005                2010

Asp Leu Asn Asp Ala Tyr Glu Trp Leu Asn Asn Tyr Lys Lys Ser
    2015                2020                2025

Lys Asp Ile Asn Asn Leu Asn Gln Ala Trp Asp Ile Tyr Tyr Asn
    2030                2035                2040

Val Phe Arg Lys Ile Thr Arg Gln Ile Pro Gln Leu Gln Thr Leu
    2045                2050                2055

Asp Leu Gln His Val Ser Pro Gln Leu Leu Ala Thr His Asp Leu
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Glu Leu Ala Val Pro Gly Thr Tyr Phe Pro Gly Lys Pro Thr Ile
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Arg Ile Ala Lys Phe Glu Pro Leu Phe Ser Val Ile Ser Ser Lys
    2090                2095                2100
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Asp Ser Glu Cys Phe Lys Arg His Leu Asp Ile Gln Gln Tyr Pro
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Asn Ser Asp Thr Phe His Val Leu Ile Arg Glu His Arg Asp Ala
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Lys Lys Ile Pro Leu Asn Ile Glu His Trp Val Met Leu Gln Met
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Ala Pro Asp Tyr Glu Asn Leu Thr Leu Leu Gln Lys Ile Glu Val
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Phe Thr Tyr Ala Leu Asp Asn Thr Lys Gly Gln Asp Leu Tyr Lys
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Arg Thr Thr Tyr Thr Arg Ser Leu Ala Val Met Ser Met Thr Gly
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Tyr Ile Leu Gly Leu Gly Asp Arg His Pro Ser Asn Leu Met Leu
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Phe Glu Ala Ala Ile Leu Arg Glu Lys Tyr Pro Glu Lys Val Pro
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Leu Arg Asp Asn Lys Glu Ser Leu Met Ala Ile Leu Glu Ala Phe
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Ala Leu  Asp Pro Leu Ile His  Trp Gly Phe Asp Leu  Pro Pro Gln
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Lys Leu  Thr Glu Gln Thr Gly  Ile Pro Leu Pro Leu  Ile Asn Pro
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Ser Glu  Leu Leu Arg Lys Gly  Ala Ile Thr Val Glu  Glu Ala Ala
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Asn Met  Glu Ala Glu Gln Gln  Asn Glu Thr Arg Asn  Ala Arg Ala
    2405                 2410                 2415

Met Leu  Val Leu Arg Arg Ile  Thr Asp Lys Leu Thr  Gly Asn Asp
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Ile Lys  Arg Phe Asn Glu Leu  Asp Val Pro Glu Gln  Val Asp Lys
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Leu Ile  Gln Gln Ala Thr Ser  Ile Glu Arg Leu Cys  Gln His Tyr
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His Ser Val Pro Lys Glu Lys Phe Leu Asn Thr Met Lys Cys Gly Thr
35 40 45

Cys His Glu Ile Asn Ser Gly Ala Thr Phe Met Cys Leu Gln Cys Gly
50 55 60

Phe Cys Gly Cys Trp Asn His Ser His Phe Leu Ser His Ser Lys Gln
65 70 75 80

Ile Gly His Ile Phe Gly Ile Asn Ser Asn Asn Gly Leu Leu Phe Cys
85 90 95

Phe Lys Cys Glu Asp Tyr Ile Gly Asn Ile Asp Leu Ile Asn Asp Ala
100 105 110

Ile Leu Ala Lys Tyr Trp Asp Asp Val Cys Thr Lys Thr Met Val Pro
115 120 125

Ser Met Glu Arg Arg Asp Gly Leu Ser Gly Leu Ile Asn Met Gly Ser
130 135 140

Thr Cys Phe Met Ser Ser Ile Leu Gln Cys Leu Ile His Asn Pro Tyr
145 150 155 160

Phe Ile Arg His Ser Met Ser Gln Ile His Ser Asn Asn Cys Lys Val
165 170 175

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

Phe Trp Gln Phe Ile Ile Asn Gln Ile His Gln Ser Tyr Val Leu Asp
                245                 250                 255

Leu Pro Asn Ala Lys Glu Val Ser Arg Ala Asn Asn Lys Gln Cys Glu
            260                 265                 270

Cys Ile Val His Thr Val Phe Glu Gly Ser Leu Glu Ser Ser Ile Val
        275                 280                 285

Cys Pro Gly Cys Gln Asn Asn Ser Lys Thr Thr Ile Asp Pro Phe Leu
    290                 295                 300

Asp Leu Ser Leu Asp Ile Lys Asp Lys Lys Lys Leu Tyr Glu Cys Leu
305                 310                 315                 320

Asp Ser Phe His Lys Lys Glu Gln Leu Lys Asp Phe Asn Tyr His Cys
                325                 330                 335

Gly Glu Cys Asn Ser Thr Gln Asp Ala Ile Lys Gln Leu Gly Ile His
            340                 345                 350

Lys Leu Pro Ser Val Leu Val Leu Gln Leu Lys Arg Phe Glu His Leu
        355                 360                 365

Leu Asn Gly Ser Asn Arg Lys Leu Asp Asp Phe Ile Glu Phe Pro Thr
    370                 375                 380

Tyr Leu Asn Met Lys Asn Tyr Cys Ser Thr Lys Glu Lys Asp Lys His
385                 390                 395                 400

Ser Glu Asn Gly Lys Val Pro Asp Ile Ile Tyr Glu Leu Ile Gly Ile
                405                 410                 415

Val Ser His Lys Gly Thr Val Asn Glu Gly His Tyr Ile Ala Phe Cys
            420                 425                 430

Lys Ile Ser Gly Gly Gln Trp Phe Lys Phe Asn Asp Ser Met Val Ser
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Ser Ile Ser Gln Glu Glu Val Leu Lys Glu Gln Ala Tyr Leu Leu Phe
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            20                  25                  30

Leu Tyr Leu Thr Ser Gln Gln Leu Val Val Leu Glu Tyr Leu Leu Ser
        35                  40                  45

Ile Ser Ser Glu Glu Asp Lys Leu Lys Ala Trp Asp Tyr Phe Leu Lys
    50                  55                  60

Gly Asn Ile Ala Leu Asn Val Glu Lys Ser Phe Pro Leu Thr Gln Glu
65                  70                  75                  80

Glu Glu His His Gly Ala Val Ser Pro Ala Val Asp Thr Arg Ser Asp
                85                  90                  95

Asp Val Ser Ser Gln Thr Ile Lys Asp Asn Asn Asn Thr Asn Thr Asn
            100                 105                 110

Thr Ser Ile Ser Asn Glu Asn His Val Glu Asn Glu Ile Glu Asp Lys
        115                 120                 125

Gly Asp Asn Ala Ile Ala Asn Glu Asp Asn Phe Val Asn Asn Asp Glu
    130                 135                 140

Ser Asp Asn Val Glu Glu Asp Leu Phe Lys Leu Asp Leu Glu Asp Leu
145                 150                 155                 160

Lys Gln Gln Ile Ser Gly Thr Arg Phe Ile Gly Asn Leu Ser Leu Lys
                165                 170                 175

Ile Arg Tyr Val Leu Trp Gln Cys Ala Ile Asp Tyr Ile Tyr Cys Asp
            180                 185                 190

Arg Asn Glu Phe Gly Asp Glu Asn Asp Thr Glu Tyr Thr Leu Leu Asp
        195                 200                 205

Val Glu Glu Lys Glu Glu Glu Glu Ile Gly Lys Asn Glu Lys Pro Gln
    210                 215                 220

Asn Lys Glu Gly Ile Ser Lys Phe Ala Glu Asp Glu Asp Tyr Asp Asp
225                 230                 235                 240

Glu Asp Glu Asn Tyr Asp Glu Asp Ser Thr Asp Val Lys Asn Val Asp
                245                 250                 255

Asp Pro Pro Lys Asn Leu Asp Ser Ile Ser Ser Ser Asn Ile Glu Ile
            260                 265                 270
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Asp Asp Glu Arg Arg Leu Val Leu Asn Ile Ser Ile Ser Lys Glu Thr
        275                 280                 285

Leu Ser Lys Leu Lys Thr Asn Asn Val Glu Glu Ile Met Gly Asn Trp
    290                 295                 300

Asn Lys Ile Tyr His Ser Phe Glu Tyr Asp Lys Glu Thr Met Ile Lys
305                 310                 315                 320

Arg Leu Lys Leu Glu Glu Ser Asp Lys Met Ile Glu Lys Gly Lys Lys
                325                 330                 335

Lys Arg Ser Arg Ser Asp Leu Glu Ala Ala Thr Asp Glu Gln Asp Arg
            340                 345                 350

Glu Asn Thr Asn Asp Glu Pro Asp Thr Asn Gln Lys Leu Pro Thr Pro
        355                 360                 365

Glu Gly Ser Thr Phe Ser Asp Thr Gly Asn Lys Arg Pro Lys Gln Ser
    370                 375                 380

Asn Leu Asp Leu Thr Val Asn Leu Gly Ile Glu Asn Leu Ser Leu Lys
385                 390                 395                 400

His Leu Leu Ser Ser Ile Gln Gln Lys Lys Ser Gln Leu Gly Ile Ser
                405                 410                 415

Asp Tyr Glu Leu Lys His Leu Ile Met Asp Val Arg Lys Asn Arg Ser
            420                 425                 430

Lys Trp Thr Ser Asp Glu Arg Ile Gly Gln Glu Glu Leu Tyr Glu Ala
        435                 440                 445

Cys Glu Lys Val Val Leu Glu Leu Arg Asn Tyr Thr Glu His Ser Thr
    450                 455                 460

Pro Phe Leu Asn Lys Val Ser Lys Arg Glu Ala Pro Asn Tyr His Gln
465                 470                 475                 480

Ile Ile Lys Lys Ser Met Asp Leu Asn Thr Val Leu Lys Lys Leu Lys
                485                 490                 495

Ser Phe Gln Tyr Asp Ser Lys Gln Glu Phe Val Asp Asp Ile Met Leu
            500                 505                 510

Ile Trp Lys Asn Cys Leu Thr Tyr Asn Ser Asp Pro Ser His Phe Leu
        515                 520                 525

Arg Gly His Ala Ile Ala Met Gln Lys Lys Ser Leu Gln Leu Ile Arg
    530                 535                 540
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Met Ile Pro Asn Ile Thr Ile Arg Asn Arg Ala Asp Leu Glu Lys Glu
545 550 555 560

Ile Glu Asp Met Glu Lys Asp Lys Asp Tyr Glu Leu Asp Glu Glu Glu
565 570 575

Glu Val Ala Gly Ser Gly Arg Lys Gly Leu Asn Met Gly Ala His Met
580 585 590

Leu Ala Lys Glu Asn Gly Lys Val Ser Glu Lys Asp Ser Ser Lys Thr
595 600 605

Val Lys Asp Glu Ala Pro Thr Asn Asp Asp Lys Leu Thr Ser Val Ile
610 615 620

Pro Glu Gly Glu Lys Glu Lys Asp Lys Thr Ala Ser Ser Thr Val Thr
625 630 635 640

Val His Glu Asn Val Asn Lys Asn Glu Ile Lys Glu Asn Gly Lys Asn
645 650 655

Glu Glu Gln Asp Met Val Glu Glu Ser Ser Lys Thr Glu Asp Ser Ser
660 665 670

Lys Asp Ala Asp Ala Ala Lys Lys Asp Thr Glu Asp Gly Leu Gln Asp
675 680 685

Lys Thr Ala Glu Asn Lys Glu Ala Gly Glu Asn Asn Glu Glu Glu Glu
690 695 700

Asp Asp Asp Asp Glu Asp Glu Asp Glu Asp Met Val Asp Ser Gln Ser
705 710 715 720

Tyr Leu Leu Glu Lys Asp Asp Asp Arg Asp Asp Leu Glu Ile Ser Val
725 730 735

Trp Lys Thr Val Thr Ala Lys Val Arg Ala Glu Ile Cys Leu Lys Arg
740 745 750

Thr Glu Tyr Phe Lys Asn Gly Lys Leu Asn Ser Asp Ser Glu Ala Phe
755 760 765

Leu Lys Asn Pro Gln Arg Met Lys Arg Phe Asp Gln Leu Phe Leu Glu
770 775 780

Tyr Lys Glu Gln Lys Ala Leu Glu Ser Tyr Arg Gln Lys Ile Glu Gln
785 790 795 800

Asn Ser Ile Met Lys Asn Gly Phe Gly Thr Val Leu Lys Gln Glu Asp
805 810 815

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Asp Asp Gln Leu Gln Phe His Asn Asp His Ser Leu Asn Gly Asn Glu
            820                 825                 830

Ala Phe Glu Lys Gln Pro Asn Asp Ile Glu Leu Asp Asp Thr Arg Phe
        835                 840                 845

Leu Gln Glu Tyr Asp Ile Ser Asn Ala Ile Pro Asp Ile Val Tyr Glu
    850                 855                 860

Gly Val Asn Thr Lys Thr Leu Asp Lys Met Glu Asp Ala Ser Val Asp
865                 870                 875                 880

Arg Met Leu Gln Asn Gly Ile Asn Lys Gln Ser Arg Phe Leu Ala Asn
                885                 890                 895

Lys Asp Leu Gly Leu Thr Pro Lys Met Asn Gln Asn Ile Thr Leu Ile
            900                 905                 910

Gln Gln Ile Arg His Ile Cys His Lys Ile Ser Leu Ile Arg Met Leu
        915                 920                 925

Gln Ser Pro Leu Ser Ala Gln Asn Ser Arg Ser Asn Pro Asn Ala Phe
    930                 935                 940

Leu Asn Asn His Ile Tyr Asn Tyr Thr Ile Ile Asp Asp Ser Leu Asp
945                 950                 955                 960

Ile Asp Pro Val Ser Gln Leu Pro Thr His Asp Tyr Lys Asn Asn Arg
                965                 970                 975

Glu Leu Ile Trp Lys Phe Met His Lys Asn Ile Ser Lys Val Ala Met
            980                 985                 990

Ala Asn Gly Phe Glu Thr Ala His  Pro Ser Ala Ile Asn  Met Leu Thr
        995                 1000                1005

Glu Ile  Ala Gly Asp Tyr Leu  Ser Asn Leu Ile Lys  Thr Leu Lys
    1010                1015                1020

Leu His  His Glu Thr Asn Ser  Leu Asn Arg Gly Thr  Asn Val Glu
    1025                1030                1035

Met Leu  Gln Thr Thr Leu Leu  Glu Asn Gly Ile Asn  Arg Pro Asp
    1040                1045                1050

Asp Leu  Phe Ser Tyr Val Glu  Ser Glu Phe Gly Lys  Lys Thr Lys
    1055                1060                1065

Lys Leu  Gln Asp Ile Lys Gln  Lys Leu Glu Ser Phe  Leu Arg Ala
    1070                1075                1080
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Leu Leu  Arg Pro Thr Leu Gln  Glu Leu Ser Glu Arg  Asn Phe Glu
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Asp Glu  Ser Gln Ser Phe Phe  Thr Gly Asp Phe Ala  Ser Glu Leu
    1100                1105                1110

Thr Gly  Glu Asp Phe Phe Gly  Phe Arg Glu Leu Gly  Leu Glu Lys
    1115                1120                1125

Glu Phe  Gly Val Leu Ser Ser  Ser Val Pro Leu Gln  Leu Leu Thr
    1130                1135                1140

Thr Gln  Phe Gln Thr Val Asp  Gly Glu Thr Lys Val  Gln Ala Lys
    1145                1150                1155

Lys Ile  Gln Pro Glu Glu Ser  Asp Ser Ile Val Tyr  Lys Lys Ile
    1160                1165                1170

Thr Lys  Gly Met Leu Asp Ala  Gly Ser Phe Trp Asn  Thr Leu Leu
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Pro Leu  Leu Gln Lys Asp Tyr  Glu Arg Ser Lys Ala  Tyr Ile Ala
    1190                1195                1200

Lys Gln  Ser Lys Ser Ser Ala  Asn Asp Lys Thr Ser  Met Thr Ser
    1205                1210                1215

Thr Glu  Asp Asn Ser Phe Ala  Leu Leu Glu Glu Asp  Gln Phe Val
    1220                1225                1230

Ser Lys  Lys Thr Ala Thr Lys  Ala Arg Leu Pro Pro  Thr Gly Lys
    1235                1240                1245

Ile Ser  Thr Thr Tyr Lys Lys  Lys Pro Ile Ala Ser  Ala Phe Ile
    1250                1255                1260

Leu Pro  Glu Glu Asp Leu Glu  Asn Asp Val Lys Ala  Asp Pro Thr
    1265                1270                1275

Thr Thr  Val Asn Ala Lys Val  Gly Ala Glu Asn Asp  Gly Asp Ser
    1280                1285                1290

Ser Leu  Phe Leu Arg Thr Pro  Gln Pro Leu Asp Pro  Leu Asp Met
    1295                1300                1305

Asp Asp  Ala Phe Asp Asp Thr  Asn Met Gly Ser Asn  Ser Ser Phe
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Ser Leu  Ser Leu Pro Arg Leu  Asn Gln
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Gln Asp Leu Glu Gly Asn Asp Asp Gly Gly Glu Asp Glu Glu Asp Asp
35 40 45

Asp Asp Asp Asp Glu Asp Asp Asp Asp Asp Glu Asp Glu Arg Glu Asp
50 55 60

Asp Asp Glu Gln Glu Asp Asp Asp Gly Glu Asp Asp Ala Ala Arg Met
65 70 75 80

Asp Lys Thr Ala Thr Pro Thr Asn Glu His Gln His Asp Glu Gln Lys
85 90 95

Ala Ala Ala Ala Gly Ala Gly Gly Ala Gly Asp Ser Gly Asp Ala Val
100 105 110

Thr Lys Ile Gly Ser Glu Asp Val Lys Leu Ser Asp Val Asp Gly Gly
115 120 125

Val Gly Ser Arg Glu Ala Ser Ser Ser Thr His Glu Ala Ser Ala Asn
130 135 140

Gly Glu Val Tyr Glu Tyr Tyr Lys His Met Leu Asn Ala Ala Gln Ile
145 150 155 160

Ala Asp Ser Tyr Asn Ile Tyr Pro Thr Ala Ala Ile Pro Ile Gln Thr
165 170 175

His Val Asn Ala Leu Ala Val Ser Arg Gly Leu Lys Tyr Leu Phe Leu
180 185 190

Gly Gly Ser Asp Gly Tyr Ile Arg Lys Tyr Asp Leu Leu Asn Thr Leu
195 200 205

Glu Gly Lys Leu Ser Leu Thr Ile Leu Gln Lys His Ser Leu Ala Glu
210 215 220

```
Ser Ile Gln Asn Ala Gly Ile Leu Gln Ser Tyr Trp Glu Asn Glu Ile
225                 230                 235                 240

Pro Gln Lys Lys Ser Glu Met Lys Leu Ser Ala Asn Lys Thr Asp Tyr
                245                 250                 255

Glu Pro Lys Val Ser Pro Val His Ser Leu Glu Val Gln Ser Glu Cys
            260                 265                 270

Leu Phe Ile Leu Ser Gly Leu Gln Asn Gly Gly Ile Thr Met Gln Gly
        275                 280                 285

Val Arg Tyr Met Glu Gly Ser Ile Ala His Tyr Phe Lys Gly Arg Asn
    290                 295                 300

Gly His Thr Gln Ile Val Asn Ile Leu Arg Leu Asn Gly Gln Glu Asp
305                 310                 315                 320

Arg Phe Leu Ser Gly Ser Trp Asp Lys Arg Leu Leu Glu Trp Asp Leu
                325                 330                 335

Gln Thr Gly Asp Ile Val Asn Glu Phe Lys Lys Ser Arg Ser Glu Leu
            340                 345                 350

Ser Ser Leu Glu Met Arg Pro Leu Tyr Ser Ser Val Asp Val Ser Gly
        355                 360                 365

Asn Val Asn Ser Gly Lys Glu Asn Glu Asn Ala Asp Asp Asp Met Asp
    370                 375                 380

Ser Leu Phe Gly Asp Glu Asp Glu Asp Glu Lys Gln Asp Ala Gly Asn
385                 390                 395                 400

Glu Pro Val Glu Thr Gly Asp Gly Ser Asn Gly Glu Glu Asn Lys Glu
                405                 410                 415

Gln Ile Ser Glu Glu Ser Leu Asn Ile Val Tyr Asp Glu Ser Val Phe
            420                 425                 430

Met Thr Ser Gly Leu Asn Gly Ser Val His Ile Trp Asp Arg Arg Met
        435                 440                 445

Thr Gln Ser Pro Ala Leu Ser Leu Glu Arg Gly Ala Gly Val Pro Pro
    450                 455                 460

Trp Cys Leu Ser Ala Cys Trp Gly Val Asp Gly Asp His Val Tyr Ala
465                 470                 475                 480

Gly Arg Arg Asn Ala Cys Val Glu Gln Phe Asp Leu Lys Met Pro Ser
                485                 490                 495
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Lys Pro Ile His Asn Leu Lys Leu Pro Ser Ile Ser Gly Pro Val Ser
500 505 510

Cys Val Lys Ala Met Pro Asn Asn Lys His Leu Leu Cys Ala Ser Arg
515 520 525

Asp Asn Ile Arg Leu Tyr Asn Val Glu Ile Ala Val Asp Ala Ser Asn
530 535 540

Ser Thr Thr Lys Ser Ser Lys Val Pro Phe Leu Ile Val Pro Gly His
545 550 555 560

His Gly Gly Ile Ile Ser Asn Leu Tyr Leu Asp Pro Thr Ser Arg Phe
565 570 575

Ile Ile Ser Thr Ser Gly Asn Arg Gly Trp Gln Gly Asn Ser Thr Asp
580 585 590

Thr Thr Leu Ile Tyr Asp Ile Asp Leu Glu
595 600

<210> 14
<211> 1809
<212> DNA
<213> Saccharomyces cerevisiae

<400> 14
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gaagagatgc tgagtgggct ggaaaacgac tcaaagcagg acctcgaggg gaatgatgac 120

ggtggtgaag atgaagagga tgacgatgat gatgatgagg acgatgatga tgacgaggac 180

gaacgagagg acgacgatga acaggaggac gacgatggtg aggacgacgc cgcaagaatg 240

gataagactg ctacaccgac gaatgagcac cagcatgatg agcaaaaggc tgctgctgct 300

ggtgctggcg gtgcaggcga tagtggcgat gctgttacta agattggatc cgaggatgtg 360

aaattgagcg atgttgatgg aggagtgggg tccagggaag catcttcctc tacacacgaa 420

gcctctgcta atggagaggt ttatgagtac tataagcaca tgttgaatgc cgcacagatt 480

gcggattcgt acaatatcta ccccacggca gccataccca tccagacgca cgtcaatgcg 540

ttggccgtgt ccaggggtct caagtacctg tttttgggcg gtagcgatgg atacataagg 600

aagtacgact tgctgaacac gcttgagggg aaactttctc taactatcct gcagaagcat 660

tcgttggctg agtctattca gaacgcgggt atcttgcagt cgtactggga aaatgagatc 720

ccgcagaaaa aatcagaaat gaaactctcc gctaataaga cagattacga gcccaaagtt 780

agccccgttc attctttgga agtccaaagc gaatgcctct ttatactgag cgggctacag 840

aatggtggga ttaccatgca gggcgttcgc tacatggagg ggagcattgc gcactatttt 900

aagggcagga atggacatac ccaaatcgtt aacatactga gattaaacgg tcaagaggac 960

aggtttttga gtggttcctg ggataagcgt cttttggaat gggatttgca gacgggtgac 1020

atagttaatg agtttaaaaa atcaaggtct gaattgtcat ctttggaaat gcggccgctg 1080

tactcgtccg tggatgtgtc cggtaacgtc aacagtggta aagagaatga aaatgcagat 1140

gacgatatgg attctctgtt tggtgatgaa gacgaagacg aaaagcaaga tgctggcaac 1200

gaacccgtcg agacggggga tggttctaat ggtgaagaga acaaagaaca gatatctgaa 1260

gaatctttga acatagtcta tgatgaatcc gtttttatga cctcagggtt gaacggttcc 1320

gtgcatattt gggaccgacg catgacgcag tcgccagcat tgtctctgga gagaggtgca 1380

ggcgtcccac cgtggtgttt gtccgcatgt tggggtgtag atggtgatca tgtgtatgca 1440

gggagaagga atgcctgtgt ggagcagttt gacttgaaga tgccctcgaa acctatccat 1500

aatttgaaac tgccttctat ttcagggcct gtctcttgtg ttaaagccat gcctaataac 1560

aagcatttac tatgtgcatc gcgggataat atcagattgt acaacgttga aattgcagta 1620

gatgcttcga attcgactac aaagagttct aaagtgccgt tcctcatcgt gccgggccat 1680

cacggtggta ttatatcaaa cttatacctc gaccccactt caagatttat aataagcaca 1740

agtggcaaca gaggctggca ggggaattct acggacacga cccttattta cgatatagac 1800

ttagaatag 1809

<210> 15
<211> 633
<212> PRT
<213> Saccharomyces cerevisiae

<400> 15

Met Ser Ser Asn Asn Asn Thr Asn Thr Ala Pro Ala Asn Ala Asn Ser
1 5 10 15

Ser His His His His His His His His His His His His Gly His
20 25 30

Gly Gly Ser Asn Ser Thr Leu Asn Asn Pro Lys Ser Ser Leu Ala Asp
35 40 45

Gly Ala His Ile Gly Asn Tyr Gln Ile Val Lys Thr Leu Gly Glu Gly
50 55 60

Ser Phe Gly Lys Val Lys Leu Ala Tyr His Thr Thr Thr Gly Gln Lys
65 70 75 80

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

Gln Gly Arg Ile Glu Arg Glu Ile Ser Tyr Leu Arg Leu Leu Arg His
100 105 110

Pro His Ile Ile Lys Leu Tyr Asp Val Ile Lys Ser Lys Asp Glu Ile
115 120 125

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Ile Met Val Ile Glu Tyr Ala Gly Asn Glu Leu Phe Asp Tyr Ile Val
    130                 135                 140

Gln Arg Asp Lys Met Ser Glu Gln Glu Ala Arg Arg Phe Phe Gln Gln
145                 150                 155                 160

Ile Ile Ser Ala Val Glu Tyr Cys His Arg His Lys Ile Val His Arg
                165                 170                 175

Asp Leu Lys Pro Glu Asn Leu Leu Leu Asp Glu His Leu Asn Val Lys
            180                 185                 190

Ile Ala Asp Phe Gly Leu Ser Asn Ile Met Thr Asp Gly Asn Phe Leu
        195                 200                 205

Lys Thr Ser Cys Gly Ser Pro Asn Tyr Ala Ala Pro Glu Val Ile Ser
    210                 215                 220

Gly Lys Leu Tyr Ala Gly Pro Glu Val Asp Val Trp Ser Cys Gly Val
225                 230                 235                 240

Ile Leu Tyr Val Met Leu Cys Arg Arg Leu Pro Phe Asp Asp Glu Ser
                245                 250                 255

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

Lys Phe Leu Ser Pro Gly Ala Ala Gly Leu Ile Lys Arg Met Leu Ile
        275                 280                 285

Val Asn Pro Leu Asn Arg Ile Ser Ile His Glu Ile Met Gln Asp Asp
    290                 295                 300

Trp Phe Lys Val Asp Leu Pro Glu Tyr Leu Leu Pro Pro Asp Leu Lys
305                 310                 315                 320

Pro His Pro Glu Glu Glu Asn Glu Asn Asn Asp Ser Lys Lys Asp Gly
                325                 330                 335

Ser Ser Pro Asp Asn Asp Glu Ile Asp Asp Asn Leu Val Asn Ile Leu
            340                 345                 350

Ser Ser Thr Met Gly Tyr Glu Lys Asp Glu Ile Tyr Glu Ser Leu Glu
        355                 360                 365

Ser Ser Glu Asp Thr Pro Ala Phe Asn Glu Ile Arg Asp Ala Tyr Met
    370                 375                 380

Leu Ile Lys Glu Asn Lys Ser Leu Ile Lys Asp Met Lys Ala Asn Lys
385                 390                 395                 400
```

Ser Val Ser Asp Glu Leu Asp Thr Phe Leu Ser Gln Ser Pro Pro Thr
405 410 415

Phe Gln Gln Gln Ser Lys Ser His Gln Lys Ser Gln Val Asp His Glu
420 425 430

Thr Ala Lys Gln His Ala Arg Arg Met Ala Ser Ala Ile Thr Gln Gln
435 440 445

Arg Thr Tyr His Gln Ser Pro Phe Met Asp Gln Tyr Lys Glu Glu Asp
450 455 460

Ser Thr Val Ser Ile Leu Pro Thr Ser Leu Pro Gln Ile His Arg Ala
465 470 475 480

Asn Met Leu Ala Gln Gly Ser Pro Ala Ala Ser Lys Ile Ser Pro Leu
485 490 495

Val Thr Lys Lys Ser Lys Thr Arg Trp His Phe Gly Ile Arg Ser Arg
500 505 510

Ser Tyr Pro Leu Asp Val Met Gly Glu Ile Tyr Ile Ala Leu Lys Asn
515 520 525

Leu Gly Ala Glu Trp Ala Lys Pro Ser Glu Glu Asp Leu Trp Thr Ile
530 535 540

Lys Leu Arg Trp Lys Tyr Asp Ile Gly Asn Lys Thr Asn Thr Asn Glu
545 550 555 560

Lys Ile Pro Asp Leu Met Lys Met Val Ile Gln Leu Phe Gln Ile Glu
565 570 575

Thr Asn Asn Tyr Leu Val Asp Phe Lys Phe Asp Gly Trp Glu Ser Ser
580 585 590

Tyr Gly Asp Asp Thr Thr Val Ser Asn Ile Ser Glu Asp Glu Met Ser
595 600 605

Thr Phe Ser Ala Tyr Pro Phe Leu His Leu Thr Thr Lys Leu Ile Met
610 615 620

Glu Leu Ala Val Asn Ser Gln Ser Asn
625 630

<210> 16
<211> 1902
<212> DNA
<213> Saccharomyces cerevisiae

<400> 16
atgagcagta acaacaacac aaacacagca cctgccaatg caaattctag ccaccaccac 60

caccatcacc accatcacca ccaccatcac ggtcatggcg gaagcaactc gacgctaaac 120

aatcccaagt cgtccttagc ggatggtgca catatcggga actaccaaat cgtcaaaacg 180

ctgggagagg ggtcctttgg taaagttaaa ttggcatatc ataccactac gggccaaaaa 240

gttgctctaa aaatcattaa taagaaggtt ttggcaaaga gtgatatgca gggcagaatt 300

gaaagagaaa tatcttatct gagactctta agacaccccc acatcatcaa actgtatgat 360

gttatcaaat ccaaagatga aatcattatg gttatagagt acgccgggaa cgaattgttt 420

gactatattg ttcagagaga caaaatgagc gagcaagagg caagaagatt tttccagcag 480

atcatcagtg ccgtcgagta ctgccatagg cacaaaattg tccatagaga tctgaagcct 540

gaaaacttac tactagatga gcatctgaat gtaaagattg ccgattttgg tttgtcaaac 600

atcatgactg atggtaattt cttaaagact tcttgtggtt ctcccaatta tgcggctcct 660

gaagttatca gcggtaagct gtacgcaggc ccagaagtgg acgtgtggtc atgtggggtt 720

atcctttatg ttatgctttg tcgtcgtcta ccgtttgacg atgaaagcat cccagtgctt 780

ttcaagaata tcagcaacgg tgtttacacc ttgcctaaat ttttatctcc tggagctgct 840

gggctaatca aaagaatgtt aatcgttaat ccattgaaca gaataagcat tcatgaaatt 900

atgcaagacg attggttcaa agttgacctg ccagaatatc tacttccacc agatttgaaa 960

ccacacccag aagaagagaa tgaaaataat gactcaaaaa aggatggcag cagcccagat 1020

aacgatgaaa ttgatgacaa ccttgtcaat attttatcat cgaccatggg ttacgaaaaa 1080

gacgagattt atgagtcctt agaatcatca gaagacactc ctgcattcaa cgaaattagg 1140

gacgcgtaca tgttgattaa ggagaataaa tctttgatca aggatatgaa ggcaaacaaa 1200

agcgtcagtg atgaactgga tacctttctg tcccagtcac ctccaacttt tcaacaacaa 1260

agcaaatccc atcaaaagag tcaagtagat catgaaactg ccaagcaaca cgcaagaagg 1320

atggcaagtg ctatcactca acaaaggaca tatcaccaat caccttcat ggatcagtat 1380

aaagaagaag actctacagt ttccattttg cctacatctt tacctcagat ccacagagct 1440

aatatgttag cacaaggttc gccagctgcc tctaaaatat ctcctcttgt aacgaaaaaa 1500

tctaaaacga gatggcattt tggtatacga tctcgctcat atccattaga cgttatgggt 1560

gaaatttata ttgccttgaa gaatttgggt gccgaatggg ccaagccatc tgaagaggat 1620

ttatggacta tcaaattaag gtggaaatat gatattggaa acaagacaaa cactaatgaa 1680

aaaatacctg atttaatgaa aatggtaatt caattatttc aaattgaaac caataattat 1740

ttggtggatt tcaaatttga cggctgggaa agtagttatg gagatgatac tactgtttct 1800

aatatttctg aagatgaaat gagtactttt tcagcctacc atttttaca tttaacaaca 1860

aaactaatta tggaattagc cgttaacagt caaagcaatt ga 1902

<210> 17
<211> 713
<212> PRT
<213> Saccharomyces cerevisiae

<400> 17

Met Ser Pro Ser Ala Val Gln Ser Ser Lys Leu Glu Glu Gln Ser Ser
1 5 10 15

Glu Ile Asp Lys Leu Lys Ala Lys Met Ser Gln Ser Ala Ala Thr Ala
20 25 30

Gln Arg Lys Lys Glu His Glu Tyr Glu His Leu Thr Ser Val Lys Ile
35 40 45

Val Pro Gln Arg Pro Ile Ser Asp Arg Leu Gln Pro Ala Ile Ala Thr
50 55 60

His Tyr Ser Pro His Leu Asp Gly Leu Gln Asp Tyr Gln Arg Leu His
65 70 75 80

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

Gln Phe Leu Asn Trp Ser Lys Pro Phe Asp Lys Val Phe Ile Pro Asp
100 105 110

Pro Lys Thr Gly Arg Pro Ser Phe Gln Asn Asn Ala Trp Phe Leu Asn
115 120 125

Gly Gln Leu Asn Ala Cys Tyr Asn Cys Val Asp Arg His Ala Leu Lys
130 135 140

Thr Pro Asn Lys Lys Ala Ile Ile Phe Glu Gly Asp Glu Pro Gly Gln
145 150 155 160

Gly Tyr Ser Ile Thr Tyr Lys Glu Leu Leu Glu Glu Val Cys Gln Val
165 170 175

Ala Gln Val Leu Thr Tyr Ser Met Gly Val Arg Lys Gly Asp Thr Val
180 185 190

Ala Val Tyr Met Pro Met Val Pro Glu Ala Ile Ile Thr Leu Leu Ala
195 200 205

Ile Ser Arg Ile Gly Ala Ile His Ser Val Val Phe Ala Gly Phe Ser
210 215 220

Ser Asn Ser Leu Arg Asp Arg Ile Asn Asp Gly Asp Ser Lys Val Val
225 230 235 240

Ile Thr Thr Asp Glu Ser Asn Arg Gly Gly Lys Val Ile Glu Thr Lys
245 250 255

Arg Ile Val Asp Asp Ala Leu Arg Glu Thr Pro Gly Val Arg His Val
260 265 270

```
Leu Val Tyr Arg Lys Thr Asn Asn Pro Ser Val Ala Phe His Ala Pro
        275                 280                 285

Arg Asp Leu Asp Trp Ala Thr Glu Lys Lys Lys Tyr Lys Thr Tyr Tyr
    290                 295                 300

Pro Cys Thr Pro Val Asp Ser Glu Asp Pro Leu Phe Leu Leu Tyr Thr
305                 310                 315                 320

Ser Gly Ser Thr Gly Ala Pro Lys Gly Val Gln His Ser Thr Ala Gly
                325                 330                 335

Tyr Leu Leu Gly Ala Leu Leu Thr Met Arg Tyr Thr Phe Asp Thr His
            340                 345                 350

Gln Glu Asp Val Phe Phe Thr Ala Gly Asp Ile Gly Trp Ile Thr Gly
        355                 360                 365

His Thr Tyr Val Val Tyr Gly Pro Leu Leu Tyr Gly Cys Ala Thr Leu
    370                 375                 380

Val Phe Glu Gly Thr Pro Ala Tyr Pro Asn Tyr Ser Arg Tyr Trp Asp
385                 390                 395                 400

Ile Ile Asp Glu His Lys Val Thr Gln Phe Tyr Val Ala Pro Thr Ala
                405                 410                 415

Leu Arg Leu Leu Lys Arg Ala Gly Asp Ser Tyr Ile Glu Asn His Ser
            420                 425                 430

Leu Lys Ser Leu Arg Cys Leu Gly Ser Val Gly Glu Pro Ile Ala Ala
        435                 440                 445

Glu Val Trp Glu Trp Tyr Ser Glu Lys Ile Gly Lys Asn Glu Ile Pro
    450                 455                 460

Ile Val Asp Thr Tyr Trp Gln Thr Glu Ser Gly Ser His Leu Val Thr
465                 470                 475                 480

Pro Leu Ala Gly Gly Val Thr Pro Met Lys Pro Gly Ser Ala Ser Phe
                485                 490                 495

Pro Phe Phe Gly Ile Asp Ala Val Val Leu Asp Pro Asn Thr Gly Glu
            500                 505                 510

Glu Leu Asn Thr Ser His Ala Glu Gly Val Leu Ala Val Lys Ala Ala
        515                 520                 525

Trp Pro Ser Phe Ala Arg Thr Ile Trp Lys Asn His Asp Arg Tyr Leu
    530                 535                 540
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Asp Thr Tyr Leu Asn Pro Tyr Pro Gly Tyr Tyr Phe Thr Gly Asp Gly
545 550 555 560

Ala Ala Lys Asp Lys Asp Gly Tyr Ile Trp Ile Leu Gly Arg Val Asp
565 570 575

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

Ala Ala Ile Ile Glu Asp Pro Ile Val Ala Glu Cys Ala Val Val Gly
595 600 605

Phe Asn Asp Asp Leu Thr Gly Gln Ala Val Ala Ala Phe Val Val Leu
610 615 620

Lys Asn Lys Ser Ser Trp Ser Thr Ala Thr Asp Asp Glu Leu Gln Asp
625 630 635 640

Ile Lys Lys His Leu Val Phe Thr Val Arg Lys Asp Ile Gly Pro Phe
645 650 655

Ala Ala Pro Lys Leu Ile Ile Leu Val Asp Asp Leu Pro Lys Thr Arg
660 665 670

Ser Gly Lys Ile Met Arg Arg Ile Leu Arg Lys Ile Leu Ala Gly Glu
675 680 685

Ser Asp Gln Leu Gly Asp Val Ser Thr Leu Ser Asn Pro Gly Ile Val
690 695 700

Arg His Leu Ile Asp Ser Val Lys Leu
705 710

<210> 18
<211> 2142
<212> DNA
<213> Saccharomyces cerevisiae

<400> 18
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ttgaaagcaa aaatgtccca gtctgccgcc actgcgcagc agaagaagga acatgagtat 120

gaacatttga cttcggtcaa gatcgtgcca caacggccca tctcagatag actgcagccc 180

gcaattgcta cccactattc tccacacttg gacgggttgc aggactatca gcgcttgcac 240

aaggagtcta ttgaagaccc tgctaagttc ttcggttcta aagctaccca atttttaaac 300

tggtctaagc cattcgataa ggtgttcatc ccagacccta aaacgggcag gccctccttc 360

cagaacaatg catggttcct caacggccaa ttaaacgcct gttacaactg tgttgacaga 420

catgccttga agactcctaa caagaaagcc attattttcg aaggtgacga gcctggccaa 480

ggctattcca ttacctacaa ggaactactt gaagaagttt gtcaagtggc acaagtgctg 540

acttactcta tgggcgttcg caagggcgat actgttgccg tgtacatgcc tatggtccca 600

gaagcaatca taaccttgtt ggccatttcc cgtatcggtg ccattcactc cgtagtcttt 660

gccgggtttt cttccaactc cttgagagat cgtatcaacg atggggactc taaagttgtc 720

atcactacag atgaatccaa cagaggtggt aaagtcattg agactaaaag aattgttgat 780

gacgcgctaa gagagacccc aggcgtgaga cacgtcttgg tttatagaaa gaccaacaat 840

ccatctgttg ctttccatgc ccccagagat ttggattggg caacagaaaa gaagaaatac 900

aagacctact atccatgcac acccgttgat tctgaggatc cattattctt gttgtatacg 960

tctggttcta ctggtgcccc caagggtgtt caacattcta ccgcaggtta cttgctggga 1020

gctttgttga ccatgcgcta cacttttgac actcaccaag aagacgtttt cttcacagct 1080

ggagacattg gctggattac aggccacact tatgtggttt atggtccctt actatatggt 1140

tgtgccactt tggtctttga agggactcct gcgtacccaa attactcccg ttattgggat 1200

attattgatg aacacaaagt cacccaattt tatgttgcgc caactgcttt gcgtttgttg 1260

aaaagagctg gtgattccta catcgaaaat cattccttaa aatctttgcg ttgcttgggt 1320

tcggtcggtg agccaattgc tgctgaagtt tgggagtggt actctgaaaa aataggtaaa 1380

aatgaaatcc ccattgtaga cacctactgg caaacagaat ctggttcgca tctggtcacc 1440

ccgctggctg gtggtgttac accaatgaaa ccgggttctg cctcattccc cttcttcggt 1500

attgatgcag ttgttcttga ccctaacact ggtgaagaac ttaacaccag ccacgcagag 1560

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gataggtatc tagacactta tttgaaccct taccctggct actatttcac tggtgatggt 1680

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cctggcattg ttagacatct aattgattcg gtcaagttgt aa 2142

<210> 19
<211> 1119
<212> PRT
<213> Saccharomyces cerevisiae

<400> 19

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

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Ala Leu Leu Lys Leu Thr Glu Lys Leu Phe Asn Lys Asn Phe Phe Asp
            20                  25                  30

Leu Tyr Leu Thr Ser Gln Gln Leu Val Val Leu Glu Tyr Leu Leu Ser
        35                  40                  45

Ile Ser Ser Glu Glu Asp Lys Leu Lys Ala Trp Asp Tyr Phe Leu Lys
    50                  55                  60

Gly Asn Ile Ala Leu Asn Val Glu Lys Ser Phe Pro Leu Thr Gln Glu
65                  70                  75                  80

Glu Glu His His Gly Ala Val Ser Pro Ala Val Asp Thr Arg Ser Asp
                85                  90                  95

Asp Val Ser Ser Gln Thr Ile Lys Asp Asn Asn Asn Thr Asn Thr Asn
            100                 105                 110

Thr Ser Ile Ser Asn Glu Asn His Val Glu Asn Glu Ile Glu Asp Lys
        115                 120                 125

Gly Asp Asn Ala Ile Ala Asn Glu Asp Asn Phe Val Asn Asn Asp Glu
    130                 135                 140

Ser Asp Asn Val Glu Glu Asp Leu Phe Lys Leu Asp Leu Glu Asp Leu
145                 150                 155                 160

Lys Gln Gln Ile Ser Gly Thr Arg Phe Ile Gly Asn Leu Ser Leu Lys
                165                 170                 175

Ile Arg Tyr Val Leu Trp Gln Cys Ala Ile Asp Tyr Ile Tyr Cys Asp
            180                 185                 190

Arg Asn Glu Phe Gly Asp Glu Asn Asp Thr Glu Tyr Thr Leu Leu Asp
        195                 200                 205

Val Glu Glu Lys Glu Glu Glu Glu Ile Gly Lys Asn Glu Lys Pro Gln
    210                 215                 220

Asn Lys Glu Gly Ile Ser Lys Phe Ala Glu Asp Glu Asp Tyr Asp Asp
225                 230                 235                 240

Glu Asp Glu Asn Tyr Asp Glu Asp Ser Thr Asp Val Lys Asn Val Asp
                245                 250                 255

Asp Pro Pro Lys Asn Leu Asp Ser Ile Ser Ser Ser Asn Ile Glu Ile
            260                 265                 270

Asp Asp Glu Arg Arg Leu Val Leu Asn Ile Ser Ile Ser Lys Glu Thr
        275                 280                 285
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Leu Ser Lys Leu Lys Thr Asn Asn Val Glu Glu Ile Met Gly Asn Trp
290                 295                 300

Asn Lys Ile Tyr His Ser Phe Glu Tyr Asp Lys Glu Thr Met Ile Lys
305                 310                 315                 320

Arg Leu Lys Leu Glu Glu Ser Asp Lys Met Ile Glu Lys Gly Lys Lys
                325                 330                 335

Lys Arg Ser Arg Ser Asp Leu Glu Ala Ala Thr Asp Glu Gln Asp Arg
            340                 345                 350

Glu Asn Thr Asn Asp Glu Pro Asp Thr Asn Gln Lys Leu Pro Thr Pro
        355                 360                 365

Glu Gly Ser Thr Phe Ser Asp Thr Gly Asn Lys Arg Pro Lys Gln Ser
370                 375                 380

Asn Leu Asp Leu Thr Val Asn Leu Gly Ile Glu Asn Leu Ser Leu Lys
385                 390                 395                 400

His Leu Leu Ser Ser Ile Gln Gln Lys Lys Ser Gln Leu Gly Ile Ser
                405                 410                 415

Asp Tyr Glu Leu Lys His Leu Ile Met Asp Val Arg Lys Asn Arg Ser
            420                 425                 430

Lys Trp Thr Ser Asp Glu Arg Ile Gly Gln Glu Glu Leu Tyr Glu Ala
        435                 440                 445

Cys Glu Lys Val Val Leu Glu Leu Arg Asn Tyr Thr Glu His Ser Thr
450                 455                 460

Pro Phe Leu Asn Lys Val Ser Lys Arg Glu Ala Pro Asn Tyr His Gln
465                 470                 475                 480

Ile Ile Lys Lys Ser Met Asp Leu Asn Thr Val Leu Lys Lys Leu Lys
                485                 490                 495

Ser Phe Gln Tyr Asp Ser Lys Gln Glu Phe Val Asp Asp Ile Met Leu
            500                 505                 510

Ile Trp Lys Asn Cys Leu Thr Tyr Asn Ser Asp Pro Ser His Phe Leu
        515                 520                 525

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

Val His Glu Asn Val Asn Lys Asn Glu Ile Lys Glu Asn Gly Lys Asn
                645                 650                 655

Glu Glu Gln Asp Met Val Glu Glu Ser Ser Lys Thr Glu Asp Ser Ser
            660                 665                 670

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

Leu Lys Asn Pro Gln Arg Met Lys Arg Phe Asp Gln Leu Phe Leu Glu
    770                 775                 780

Tyr Lys Glu Gln Lys Ala Leu Glu Ser Tyr Arg Gln Lys Ile Glu Gln
785                 790                 795                 800

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

Leu Gln Glu Tyr Asp Ile Ser Asn Ala Ile Pro Asp Ile Val Tyr Glu
    850                 855                 860

Gly Val Asn Thr Lys Thr Leu Asp Lys Met Glu Asp Ala Ser Val Asp
865                 870                 875                 880

Arg Met Leu Gln Asn Gly Ile Asn Lys Gln Ser Arg Phe Leu Ala Asn
                885                 890                 895

Lys Asp Leu Gly Leu Thr Pro Lys Met Asn Gln Asn Ile Thr Leu Ile
            900                 905                 910

Gln Gln Ile Arg His Ile Cys His Lys Ile Ser Leu Ile Arg Met Leu
        915                 920                 925

Gln Ser Pro Leu Ser Ala Gln Asn Ser Arg Ser Asn Pro Asn Ala Phe
    930                 935                 940

Leu Asn Asn His Ile Tyr Asn Tyr Thr Ile Ile Asp Asp Ser Leu Asp
945                 950                 955                 960

Ile Asp Pro Val Ser Gln Leu Pro Thr His Asp Tyr Lys Asn Asn Arg
                965                 970                 975

Glu Leu Ile Trp Lys Phe Met His Lys Asn Ile Ser Lys Val Ala Met
            980                 985                 990

Ala Asn Gly Phe Glu Thr Ala His  Pro Ser Ala Ile Asn  Met Leu Thr
        995                 1000                1005

Glu Ile  Ala Gly Asp Tyr Leu  Ser Asn Leu Ile Lys  Thr Leu Lys
    1010                1015                1020

Leu His  His Glu Thr Asn Ser  Leu Asn Arg Gly Thr  Asn Val Glu
    1025                1030                1035

Met Leu  Gln Thr Thr Leu Leu  Glu Asn Gly Ile Asn  Arg Pro Asp
    1040                1045                1050

Asp Leu  Phe Ser Tyr Val Glu  Ser Glu Phe Gly Lys  Lys Thr Lys
    1055                1060                1065

Lys Leu  Gln Asp Ile Lys Gln  Lys Leu Glu Ser Phe  Leu Arg Ala
    1070                1075                1080

Leu Leu  Arg Pro Thr Leu Gln  Glu Leu Ser Glu Arg  Asn Phe Glu
    1085                1090                1095
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Thr Gly Glu Asp Phe Phe
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Glu Asp Ile Val Arg Gly Gln Val Ile Glu Ile Leu Leu Gln Ser Asn
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Lys Thr Ala His Leu Arg Gly Ser Arg Ser Ile Leu Pro Glu Asp Val
    50                  55                  60

Ile Phe Leu Ile Arg His Asp Lys Ala Lys Val Asn Arg Leu Arg Thr
65                  70                  75                  80

Tyr Leu Ser Trp Lys Asp Leu Arg Lys Asn Ala Lys Asp Gln Asp Ala
                85                  90                  95

Ser Ala Gly Val Ala Ser Gly Thr Gly Asn Pro Gly Ala Gly Gly Glu
            100                 105                 110

Asp Asp Leu Lys Lys Ala Gly Gly Gly Glu Lys Asp Glu Lys Asp Gly
        115                 120                 125

Gly Asn Met Met Lys Val Lys Lys Ser Gln Ile Lys Leu Pro Trp Glu
    130                 135                 140

Leu Gln Phe Met Phe Asn Glu His Pro Leu Glu Asn Asn Asp Asp Asn
145                 150                 155                 160

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

Ile Val Cys Ser Leu Thr Glu Thr Ala Leu Lys Ile Lys Gln Arg Glu
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Gln Val Leu Gln Thr Gln Lys Asp Lys Ser Gln Gln Ser Ser Gln Asp
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Asn Thr Asn Phe Glu Phe Ala Ser Ser Thr Leu His Arg Lys Lys Arg
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