

SEQUENCE LISTING_ST25.TXT
SEQUENCE LISTING

<110> DAIICHI SANKYO COMPANY LIMITED

<120> Novel Endo-Beta, N-acetylglucosaminidase

<130> FP1734

<150> JP2016-234808

<151> 2016-12-02

<160> 23

<170> PatentIn version 3.5

<210> 1

<211> 696

<212> PRT

<213> Rhizomucor pusillus

<400> 1

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

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

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asn Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

SEQUENCE LISTING_ST25.TXT

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205
 Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220
 Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240
 Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255
 Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270
 Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285
 Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300
 Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320
 Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335
 Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350
 His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365
 Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380
 Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400
 His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415
 Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430
 Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445
 Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

SEQUENCE LISTING_ST25.TXT

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
580 585 590

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

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

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

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 2

<211> 696

<212> PRT

<213> Rhizomucor pusillus

<400> 2

SEQUENCE LISTING_ST25.TXT

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Thr
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asn Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

SEQUENCE LISTING_ST25.TXT

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285
 Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300
 Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320
 Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335
 Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350
 His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365
 Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380
 Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400
 His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415
 Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430
 Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445
 Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460
 Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480
 Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495
 Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510
 Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525
 Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

SEQUENCE LISTING_ST25.TXT

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Thr Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
580 585 590

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

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

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

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 3
<211> 696
<212> PRT
<213> Rhizomucor pusillus

<400> 3

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

SEQUENCE LISTING_ST25.TXT

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

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

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asn Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Gly Gln Ser Glu
325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
340 345 350

SEQUENCE LISTING_ST25.TXT

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
405 410 415

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

Tyr Leu Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Val Tyr
515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Thr Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
580 585 590

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

Cys Ser Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

SEQUENCE LISTING_ST25.TXT

Glu Arg Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

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

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 4
<211> 696
<212> PRT
<213> Rhizomucor pusillus
<400> 4

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

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

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asn Ile Glu Ser Asp
Page 9

SEQUENCE LISTING_ST25.TXT

165

170

175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

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

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu

SEQUENCE LISTING_ST25.TXT
440 445

435

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Ala Thr Glu Gly Cys
450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Thr Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
580 585 590

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

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

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

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 5

SEQUENCE LISTING_ST25.TXT

<211> 696
 <212> PRT
 <213> Rhizomucor pusillus

<400> 5

```

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1      5      10      15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
      20      25      30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
      35      40      45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
      50      55      60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65      70      75      80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
      85      90      95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
      100     105     110

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

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
      130     135     140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145     150     155     160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asn Ile Glu Ser Asp
      165     170     175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
      180     185     190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
      195     200     205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
      210     215     220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
225     230     235     240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
      245     250     255
    
```

SEQUENCE LISTING_ST25.TXT

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
405 410 415

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

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
515 520 525

SEQUENCE LISTING_ST25.TXT

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Thr Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
580 585 590

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

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

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

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 6
<211> 697
<212> PRT
<213> Rhizomucor miehei

<400> 6

Met Pro Ser Leu Glu Leu Gln Gln Ala Val Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Thr Pro Leu Met Thr Met Asp Glu Leu Gly Ser Trp Asp Pro Ser
20 25 30

Asn Ala Leu Arg Ala Ser Ile Ala Thr Val Pro Leu His Pro Arg Pro
35 40 45

Ser Ile Asp Pro Thr Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

SEQUENCE LISTING_ST25.TXT

Gly Gly Tyr Lys Glu Asp Phe Ser Ile Gln Gly Asn Ala Tyr Asp Thr
65 70 75 80

Val Tyr Thr Cys Gln Tyr Trp Gln Tyr Val Asp Ile Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Thr Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Ser Leu Gly Thr Phe Ile Val Glu Gly Ala
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Asn Pro Gly
130 135 140

Gln Arg Lys Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Ile Asn Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Ser Pro Ser Met Lys Ala Lys His Leu Ala
180 185 190

Lys Leu Leu Leu Tyr Leu Arg Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Gln Ile Ile Trp Tyr Asp Ser Met Thr Thr Ser Gly Tyr Val Gln
210 215 220

Trp Gln Asn Asn Ile Thr Pro Gln Asn Glu Ile Phe Phe Glu Ala Ala
225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Tyr Pro Pro Phe
245 250 255

Ala Met Gln Val Ala His Tyr Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

Phe Gly Ser Asp Ile Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
275 280 285

Asp Ser Tyr Leu Ala Val Ala Thr Ala Ser Ala Phe Lys Thr Ser Ser
290 295 300

Ala Leu Phe Gly Thr Ala Trp Thr Tyr Glu His Phe Glu Lys Lys Asp
305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
325 330 335

SEQUENCE LISTING_ST25.TXT

Tyr Pro Ala Gln Ala Glu Gly Gln Glu Ser Ile Ala Lys Ser Gly Ser
 340 345 350
 Arg Leu Gly Arg His Pro Gly Ile Thr Asp Val Ala Ala Val Arg Ser
 355 360 365
 Ala Pro Gly Arg Arg Trp Phe Val Thr Trp Phe Asp Arg Gly His Gly
 370 375 380
 Thr Gly Phe Tyr His Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400
 His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Val Ala Arg Leu Gln
 405 410 415
 Arg Lys Glu Asp Asp Gly Val Ser Tyr Phe Leu Ala Asp Asp Ala
 420 425 430
 Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Gly Thr Gln Glu
 435 440 445
 Arg Gln Ile Pro Leu Tyr Gln Leu Asn Tyr Asp Ala Thr Asn Gly Cys
 450 455 460
 Glu Val Gln Phe Val Tyr Lys Ser Pro Glu Pro Asp Met Gln Ser Lys
 465 470 475 480
 Val Gln Ile Tyr Leu Asn Leu Arg Val Thr Asp Val Leu Pro Asp Glu
 485 490 495
 Leu Ala Tyr Tyr Trp His Asp Val Ala Ala Thr Ser Pro Gln Pro Gln
 500 505 510
 Ala Thr Thr Ala Ser Arg Leu Asn Ile Asn Glu Asp Thr Ser Val Tyr
 515 520 525
 Leu Asn Thr Ser Lys Thr Gln Glu Leu Ala Glu Gly Trp Val Leu Cys
 530 535 540
 Ser Val Arg Val Pro Ser Val His Pro Leu Gly Glu Ala Ala Ile Glu
 545 550 555 560
 Glu Leu Gly Ile Tyr Leu Asp Gly Thr Glu Asp Val Leu Phe Arg Leu
 565 570 575
 Gly Leu Leu Thr Ile Val Pro Tyr Thr Asp Thr Ser Ser Thr Leu Ala
 580 585 590
 Ser Lys Ile Thr His Ile Gln Leu Gln Arg Asp Ala Asp Val Ser Ser
 595 600 605

SEQUENCE LISTING_ST25.TXT

Lys Cys Leu Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met
610 615 620

Met Glu Ser Asn Ser Ser Glu Glu Trp Asn Gln Val Asp His Tyr Leu
625 630 635 640

Ile Ser Tyr Gly Asp Ile Asn Ala Asp Gly Ala Ala Thr Phe Leu Gly
645 650 655

Thr Thr Phe Thr Thr Glu Tyr Arg Ile Ser Gly Leu Glu Met Lys Asn
660 665 670

Asp Ile Asp Tyr Ile Gln Ile Ser Ala Val Ser Arg Leu Gly Asn Ile
675 680 685

Leu Ala Gln Gln Thr Ile Gly Ile Gln
690 695

<210> 7
<211> 701
<212> PRT
<213> Artificial Sequence

<220>
<223> The assumed amino acid sequence derived from publicly available
genomic DNA sequence of Rhizomucor pusillus strain CBS 183.67,
which has been assumed to be endo-beta-N-acetylglucosaminidase.

<400> 7

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

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

SEQUENCE LISTING_ST25.TXT

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asn Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Asn Thr Tyr Tyr Ile Arg Leu Leu Arg Tyr Leu Lys Asn Ala Met His
195 200 205

Ala Arg Val Pro Gly Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr
210 215 220

Asn Gly Ser Val Gln Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile
225 230 235 240

Phe Phe Glu Ala Ala Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala
245 250 255

Thr Val Pro Pro Leu Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln
260 265 270

Gly Ser Asp Val Tyr Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe
275 280 285

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

Phe Lys Thr Ser Ser Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His
305 310 315 320

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

Gly Asp Gln Ser Glu Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr
340 345 350

Val Lys Val Thr Ser His Leu Gly Arg His Pro Gly Ile Ala Asp Val
355 360 365

Ser Pro Val Arg Ser Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe
370 375 380

Asp Arg Gly Tyr Gly Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu
385 390 395 400

SEQUENCE LISTING_ST25.TXT

Ser Gln Pro Trp Ser His Leu Ser His Gln Ser Ile Pro Pro Asn Leu
405 410 415

Ile Ala Arg Leu Gln Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu
420 425 430

Ala Asp Asp Asp Ala Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala
435 440 445

Glu Ile Thr Gln Glu Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp
450 455 460

Val Thr Glu Gly Cys Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro
465 470 475 480

Asp Met Gln Gly Lys Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp
485 490 495

Ile Leu Pro Asp Glu Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala
500 505 510

Ser Ser Gln Ala Asp Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu
515 520 525

Asn Thr Val Ile Tyr Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu
530 535 540

Gly Trp Leu Leu Cys Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly
545 550 555 560

Ile Ala Thr Ile Lys Glu Leu Gly Ile His Val Asp Gly Thr Glu Thr
565 570 575

Val Leu Phe Arg Leu Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala
580 585 590

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

Asp Ile His Ser Lys Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr
610 615 620

Leu Ser Trp Met Met Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val
625 630 635 640

Asp His Tyr Met Ile Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro
645 650 655

Ile Phe Leu Gly Thr Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu
660 665 670

SEQUENCE LISTING_ST25.TXT

Glu Ile Lys Lys His Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg
675 685

Leu Gly Thr Val Ile Ala Arg Gln Asp Ile Asp Ile Gln
690 695 700

<210> 8
<211> 2091
<212> DNA
<213> Rhizomucor pusillus

```

<400> 8
atgccttcac tcgaactaca gcaagctgct gacacgagac ttttcgagtc tatgccactt      60
cagactatga atgagcttgg ttcttgggaa cctagcaatg cctcgcgagc caacattgca      120
actattcctt tgcacacagc atccaatctt gatccggcag agccgcgctt gatcgtaact      180
cacgatatgg ctggaggcta caaggaagac tcaaatattc agggcaatac gtatgataca      240
atttatagct gtcaatattg gcaatatgtg gatactttta tctattttct gcatcatcga      300
gttacgatac ctctgtcaa ttggataaat gcatgccaca gaaacggtgt caaaacgcta      360
ggaacattca ttgtggaagg agctgcgggc atgtttgcct tggagagatt cgtctacgga      420
cctgagcctg gacagagaaa cagctggagc cttactatg ctgataagct ggtggacata      480
gccgagtttt acggtttcga cggctggctg cttaacattg agagtgattt cttcccttta      540
tatcgaaatc cgtctctgaa agcgatccat ctagcaaagc tgctgcgata tctgaagaat      600
gcaatgcacg ccagagtgcc aggttcagag atcatctggt atgacagcat gacgacaaac      660
ggaagtgtgc agtggcaaaa caatatcacg cccaaaaatt ccatatTTTT tgaagctgca      720
gatggcatat ttttaaatta ttggtggaac gcgacggttc cgccgttggc tttgcaagta      780
gcacatcgtc taggacgtca aggatctgat gtatactttg gaacggatgt ttggggacga      840
ggaacattcg gtggtggcgg attcgattca tatctcgctg ttggcactgc gagggcattc      900
aaaacatcat ctgcgctttt cggcacagca tggatctatg agcatttttg gaagaaagat      960
tttgagctta tggatagact tttgtggtta ggtggtgatc aatcagaata tccagctcag     1020
gaaggagagc agaatcgcac agtaaaagt acatcccatc ttggaagaca tcctggtatc     1080
gccgatgtgt caccggtgcg aagtgtcca gggaaaacat ggttcgcaac gtggtttgat     1140
agaggttacg gaacagggtt ctattatcag ggcaagaaac tattatcaca gccgtggtcg     1200
catttatcgc atcaatctat cccgccgaat cttatagcca gattacagag agaagaaaat     1260
cacggccttt cgtatttcct ggacagcagc gatgcataca tcgggggaac ttcgctgtta     1320
atagcagccg aaatcactca agaacgccaa ttgccgctct atcaactaga gtatgacgtt     1380
actgaaggct gcgagggtgca gtttatatac aagtctccgg aaccagatat gcaaggaaaa     1440
atagatatat atttgaactt gcaagttaca gacatactgc ctgatgagct agccttttac     1500
tggaagatg ttacggatgc ttctcccag gccgatgcaa cgacagccat gcgtttatat     1560
ctaaacgaaa acacagttat ttatctaaag ccgccagga aacaagagct agccgaaggc     1620

```

SEQUENCE LISTING_ST25.TXT

tggttgctct gttccgtgcg tgtgccacct acttatccac ttggtatcgc aacgatcaag	1680
gaactagggga tccatgtgga tggtaaagaa acagtgtctat ttaggctggg tctccttaca	1740
attatacccc ttggagatgc gccgtctgcg ctttccagaa ttaccaggt ccagcttcaa	1800
agggatgagg atatccatag taaatgtcca tctcctcat gcgaactttg ggccacactc	1860
tcgtggatga tggaacacaa ctcaaaagag gactgggacc aggtcgatca ctatatgatt	1920
ttcttcaaaa atgttgattc caaggcagaa cctattttcc ttggcaccag cttcagtacc	1980
gagtacagaa tatcaggcct ggagatcaag aaacacggaa attccatcga gatatgggca	2040
gtaaatcgct taggaaccgt cattgcacgg caagacatcg atatccaata g	2091

<210> 9
 <211> 2109
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Optimized DNA sequence for expression of Endo-Rp in E. coli

<400> 9	
atgccgagcc tggaactgca gcaggcagca gatacccgctc tgtttgaaag catgccgctg	60
cagaccatga atgaactggg tagctgggaa ccgagcaatg caagccgtgc aaatattgca	120
accattccgc tgcacagcg tagcaatctg gatccggcag aaccgctct gattgttacc	180
catgatatgg caggcggtta taaagaagat agcaatattc agggcaacac ctatgatacc	240
atttatagct gtcagtattg gcagtatgtg gacaccttta tctatttttag ccatcaccgt	300
gttaccattc ctccggttaa ttggattaat gcctgtcatc gtaatggtgt taaaaccctg	360
ggcaccttta ttgttgaagg tgcagcaggt atgtttgcac tggaacgttt tgtttatggt	420
ccggaaccgg gtcagcgtaa tagctgggtca ccgtattatg cagataaact ggttgatatc	480
gccgagtttt atggttttga tggttggtg ctgaacatcg aaagcgattt ttttccgctg	540
tatcgtaatc cgagcctgaa agcaattcat ctggcaaac tgctgcgcta tctgaaaaat	600
gcaatgcatg cacgtgttcc gggtagcgaa attatctggt atgatagcat gaccaccaat	660
ggtagcgttc agtggcagaa taacattacc ccgaaaaaca gcatcttttt tgaagcagcc	720
gatggcatct ttctgaatta ttggtggaat gcaaccgttc ctccgctggc actgcaggtt	780
gcacatcgtc tgggtcgta gggtagtgat gtttattttg gcaccgatgt ttggggtcgt	840
ggcacctttg gtggtggtgg ctttgatagt tatctggcag ttggcaccgc acgtgcattt	900
aaaaccagca gcgcactggt tggtagagca tggatttatg aacacttcgg caaaaaagac	960
ttcgaactga tggatcgtct gctgtggctg ggtggtgatc agagcgaata tccggcacia	1020
gaaggtgaac agaatcgta cgttaaagtt accagccatc tgggtcgcca tccgggtatt	1080
gcagatgtta gtccggttcg tagcgcaccg ggtaaaacct ggtttgcaac atggtttgat	1140
cgtggttatg gcaccggttt ctattatcag ggtaaaaaac tgctgagcca gccgtgggtca	1200
catctgagcc atcagagcat tccgccta atctgattgcac gcctgcagcg tgaagaaaat	1260

SEQUENCE LISTING_ST25.TXT

catggcctga gctatcttctt ggcagatgat gatgcatata ttggtggcac cagcctgctg	1320
attgcagcag aaattaccca agaacgtcag ctgcctctgt atcagctgga atatgatgtt	1380
accgaagggt gcgaagtgc gttcatctat aaaagccctg aaccggatat gcagggcaaa	1440
attgatatct atctgaatct gcaggttacc gatatacctgc cggatgaact ggcattttat	1500
tggcaggacg ttaccgatgc aagcagccag gcagatgcaa ccaccgcaat gcgtctgtat	1560
ctgaatgaaa ataccgtgat ttatctgaaa ccgagccgta aacaagaact ggcggaaggc	1620
tggctgctgt gtagcgttcg tgttccgcct acctatccgc tgggtattgc caccattaaa	1680
gaactgggca ttcattgtga ttgtaaagaa accgttctgt ttcgcctggg tctgctgacc	1740
attatcccg c tgggtgatgc accgagcgca ctgagccgta ttaccaggt tcagctgcaa	1800
cgtgatgaag atattcatag caaatgtccg agcagcagct gtgaactgtg ggcaaccctg	1860
agctggatga tggaacataa tagcaaagaa gattgggac aggtcgatca ctacatgatc	1920
tttttcaaaa acgtggatag caaagccgaa ccgatttttc tgggcaccag ctttagcacc	1980
gaatatcgta ttagcggctt ggaaatcaaa aaacatggca acagcattga aatctgggca	2040
gttaatcgcc tgggcacagt tattgcacgt caggatattg atattcagca tcatcaccat	2100
caccattaa	2109

<210> 10
 <211> 2091
 <212> DNA
 <213> Rhizomucor pusillus

<400> 10	
atgccttcac tcgaactaca gcaagctgct gacacgagac ttttcgagtc tatgccactt	60
cagactatga atgagcttgg ttcttgggaa cctagcaatg cctcgcgagc caacattgca	120
actatttcctt tgcatacagc atccaatctt gatccggcag agccgcgctt gatcgtaact	180
cacgatatgg ctggaggcta caaggaagac tcaaatattc agggcaatac gtatgataca	240
atttatagct gtcaatattg gcaatatgtg gatactttta tctatttctc gcatcatcga	300
gttacgatac ctctgtcaa ttggataaat gcatgccaca gaaacggtgt caaaacgcta	360
ggaacattca ttgtggaagg aactgcgggc atgtttgcct tggagagatt cgtctacgga	420
cctgagcctg gacagagaaa cagctggagc cttactatg ctgataagct ggtggacata	480
gccgagtttt acggtttcga cggctggctg cttaacattg agagtgattt cttcccttta	540
tatcgaaatc cgtctctgaa agcgatccat ctagcaaagc tgctgcgata tctgaagaat	600
gcaatgcacg ccagagtgcc aggttcagag atcatctggt atgacagcat gacgacaaac	660
ggaagtgtgc agtggaacaa caatatcacg cccaaaaatt ccatattttt tgaagctgca	720
gatggcatat ttttaaatta ttggtggaac gcgacggttc cgccgttggc tttgcaagta	780
gcacatcgtc taggacgtca aggatctgat gtatactttg gaacggatgt ttggggacga	840
ggaacattcg gtggtggcgg attcgattca tatctcgtg ttggcactgc gagggcattc	900

SEQUENCE LISTING_ST25.TXT

aaaacatcat ctgCGctttt cggcacagca tggatctatg agcattttgg gaagaaagat	960
tttgagctta tggatagact tttgtgggta ggtggtgatc aatcagaata tccagctcag	1020
gaaggagagc agaatcgac agtaaaagt acatcccatc ttggaagaca tcctggtatc	1080
gccgatgtgt caccggtgCG aagtgtcca gggaaaacat ggttcgcaac gtggtttgat	1140
agagggttacg gaacagggttt ctattatcag ggcaagaaac tattatcaca gccgtgggtcg	1200
catttatcgC atcaatctat cccgccgaat cttatagcca gattacagag agaagaaaat	1260
cacggccttt cgtatttcct ggcagacgac gatgcataca tcgggggtac ttcgctgtta	1320
atagcagccg aaatcactca agaacgcaa ttgccgtct atcaactaga gtatgacgtt	1380
actgaaggct gcgagggtgca gtttatatac aagtctccg aaccagatat gcaaggaaaa	1440
atagatatat atttgaactt gcaagttaca gacatactgc ctgatgagct agccttttac	1500
tggcaagatg ttacggatgc ttcctcccag gccgatgcaa cgacagccat gcgtttatat	1560
ctaaacgaaa acacagttat ttatctaaag ccgtccagga aacaagagct agccgaaggc	1620
tggttgctct gttccgtgCG tgtgccgcct acttatccac ttggtatcgC aacgatcaag	1680
gaactagggga tccatgtgga tggtagagaa acagtgttat ttaggctggg tctccttaca	1740
attatacccc ttggagatgc gccgtctgCG ctttcagaa ttaccaggt ccagcttcaa	1800
agggatgagg atatccatag taaatgtcca tcctcctcat gcgaactttg ggccacactc	1860
tcgtggatga tggaaacacaa ctcaaaagag gactgggacc aggtcgatca ctatatgatt	1920
ttcttcaaaa atgttgattc caaggcagaa cctattttcc ttggcaccag cttcagtacc	1980
gagtacagaa tatcaggcct ggagatcaag aaacacggaa attccatcga gatatgggca	2040
gtaaatcgct taggaaccgt cattgcacgg caagacatcg atatccaata g	2091

<210> 11
 <211> 2109
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Optimized DNA sequence for expression of Endo-Rp2 in E. coli

<400> 11	
atgccgagcc tggaaactgca gcaggcagca gatacccgctc tgtttgaaag catgccgctg	60
cagaccatga atgaactggg tagctgggaa ccgagcaatg caagccgtgc aaatattgca	120
accattccgc tgcacagcg tagcaatctg gatccggcag aaccgctct gattgttacc	180
catgatatgg caggcggtta taaagaagat agcaatattc agggcaacac ctatgatacc	240
atttatagct gtcagtattg gcagtatgtg gacaccttta tctattttag ccatcaccgt	300
gttaccattc ctccggttaa ttggattaat gcctgtcatc gtaatggtgt taaaaccctg	360
ggcaccttta ttgttgagg taccgcagg atgtttgcac tggaaacgtt tgtttatggg	420
ccggaaccgg gtcagcgtaa tagctgggtca ccgtattatg cagataaact ggttgatatc	480
gccgagtttt atggttttga tggttggctg ctgaacatcg aaagcgattt ttttccgctg	540

SEQUENCE LISTING_ST25.TXT

tatcgtaatc cgagcctgaa agcaattcat ctggcaaaac tgctgcgcta tctgaaaaat	600
gcaatgcatg cacgtgttcc gggtagcgaa attatctggg atgatagcat gaccaccaat	660
ggtagcggtc agtggcagaa taacattacc ccgaaaaaca gcatcttttt tgaagcagcc	720
gatggcatct ttctgaatta ttgggtggaat gcaaccgttc ctccgctggc actgcagggt	780
gcacatcgtc tgggtcgtca gggtagtgat gtttattttg gcaccgatgt ttgggggtcgt	840
ggcacctttg gtgggtgggg ctttgatagt tatctggcag ttggcaccgc acgtgcattt	900
aaaaccagca gcgcactgtt tggtagcagca tggatttatg aacacttcgg caaaaaagac	960
ttcgaactga tggatcgtct gctgtggctg ggtggtgatc agagcgaata tccggcacia	1020
gaaggatgaac agaatcgtac cgttaaagtt accagccatc tgggtcgcca tccgggtatt	1080
gcagatgtta gtccgggttc tagcgcaccg ggtaaaacct ggtttgcaac atggtttgat	1140
cgtgggttatg gcaccgggtt ctattatcag ggtaaaaaac tgctgagcca gccgtgggtca	1200
catctgagcc atcagagcat tccgcctaata ctgattgcac gcctgcagcg tgaagaaaat	1260
catggcctga gctattttct ggcagatgat gatgcatata ttgggtggcac cagcctgctg	1320
attgcagcag aaattaccca agaacgtcag ctgcctctgt atcagctgga atatgatgtt	1380
accgaagggt gcgaagtga gttcatctat aaaagccctg aaccggatat gcagggcaaa	1440
attgatatact atctgaatct gcagggtacc gatatcctgc cggatgaact ggcattttat	1500
tggcaggacg ttaccgatgc aagcagccag gcagatgcaa ccaccgcaat gcgtctgtat	1560
ctgaatgaaa ataccgtgat ttatctgaaa ccgagccgta aacaagaact ggcggaaggc	1620
tggctgctgt gtagcgttcg tgttccgcct acctatccgc tgggtattgc caccattaaa	1680
gaactgggca ttcattgtga tggtagcgaa accgttctgt ttcgcctggg tctgctgacc	1740
attatcccg c tgggtgatgc accgagcgca ctgagccgta ttaccaggt tcagctgcaa	1800
cgtgatgaag atattcatag caaatgtccg agcagcagct gtgaactgtg ggcaaccctg	1860
agctggatga tggaacataa tagcaaagaa gattgggatc aggtcgatca ctacatgatc	1920
tttttcaaaa acgtggatag caaagccgaa ccgatttttc tgggcaccag ctttagcacc	1980
gaatatcgta ttagcgggtc ggaaatcaaa aaacatggca acagcattga aatctgggca	2040
gttaatcgcc tgggcacagt tattgcacgt caggatattg atattcagca tcatcaccat	2100
caccattaa	2109

<210> 12
 <211> 2091
 <212> DNA
 <213> Rhizomucor pusillus

<400> 12	
atgccttcac tcgaactaca gcaagctgct gacacgagac ttttcgagtc tatgccactt	60
cagactatga atgagcttgg ttcttgggaa cctagcaatg cctcgcgagc caacattgca	120
actatttcctt tgcattcagc atccaatctt gatccggcag agccgcgctt gatcgtaact	180
cacgatattg ctggaggcta caaggaagac tcaaattattc agggcaatac gtatgataca	240

SEQUENCE LISTING_ST25.TXT

atttatagct gtcaatattg gcaatatgtg gatacttttta tctattttctc gcatcatcga	300
gttacgatac ctcctgtcaa ttggataaat gcatgccaca gaaacggtgt caaaacgcta	360
ggaacattca tcgtggaagg agctgcgggc atgtttgcct tggagagatt cgtctacgga	420
cctgagcctg gacagagaaa cagctggagc ctttactatg ctgataagct ggtggacata	480
gccgagtttt acggttttcga cggctggctg cttaacattg agagtgattt cttcccttta	540
tatcgaaatc cgtctctgaa agcgatccat ctagcaaagc tgctgcgata tctgaagaat	600
gcaatgcacg ccagagtgcc aggttcagag atcatctggt atgacagcat gacgacaaac	660
ggaagtgtgc agtggcaaaa caatatcacg cccaaaaatt ccatattttt tgaagctgca	720
gatggcatat ttttaaatta ttggtggaac gcgacggttc cgccgttggc tttgcaagta	780
gcacatcgtc taggacgtca aggatctgat gtatactttg gaacggatgt ttggggacga	840
ggaacattcg gtggtggcgg attcgattca tatctcgtctg ttggcactgc gagggcattc	900
aaaacatcat ctgcgctttt cggcacagca tggatctatg agcatttttg gaagaaagat	960
tttgagctta tggatagact tttgtggtta ggtggtggtc aatcagaata tccagctcag	1020
gaaggagagc agaatcgcac agtaaaagt acatcccac ttggaagaca tcctggtatc	1080
gccgatgtgt caccggtgcg aagtgtcca gggaaaacat ggttcgcaac gtggtttgat	1140
agaggttacg gaacaggttt ctattatcag ggcaagaaac tattatcaca gccgtggtcg	1200
catttatcgc atcaatctat cccgccgaat cttatagcca gattacagag agaagaaaat	1260
cacggccttt cgtattttctt ggcagacgac gatgcatacc tcgggggaac ttcgttggtta	1320
atagcagccg aaatcactca agaacgcaa ttgccgtctt atcaactaga gtatgacgtt	1380
actgaaggct gcgagggtgca gtttatatac aagtctccgg aaccagatat gcaaggaaaa	1440
atagatatat atttgaactt gcaagttaca gacatactgc ctgatgagct agccttttac	1500
tggcaagatg ttacggatgc ttcctcccag gccgatgcaa cgacagccat gcgtttatat	1560
ctaaacgaaa acacagttgt ttatctaaag ccatccagga aacaagagct agccgaaggc	1620
tggttgctct gttccgtgcg tgtgccacct acttatccac ttggtatcgc aacgatcaag	1680
gaactagggg tccacgtgga cggtagagaa acagtgttat ttaggctggg tctccttaca	1740
attatacccc ttggagatgc gccgtctgcg ctttccagaa ttaccaggt ccagcttcaa	1800
agggatgagg atatccatag taaatgttca tcctcctcat gcgaactttg ggccacactc	1860
tcgtggatga tggaaacgcaa ttcaaaagag gactgggacc aggtcgatca ctatatgatt	1920
ttcttcaaaa atgttgattc caaggcagaa cctattttcc ttggcaccag cttcagtacc	1980
gagtacagaa tatcaggcct ggagatcaag aaacacggaa attccatcga gatatgggca	2040
gtaaatcgct taggaaccgt cattgcacgg caagacatcg atatccaata g	2091

<210> 13
 <211> 2109
 <212> DNA
 <213> Artificial Sequence

SEQUENCE LISTING_ST25.TXT

<220>

<223> Optimized DNA sequence for expression of Endo-Rp3 in E. coli

<400> 13

atgccgagcc tggaactgca gcaggcagca gatacccgtc tgtttgaaag catgccgctg	60
cagaccatga atgaactggg tagctgggaa ccgagcaatg caagccgtgc aaatattgca	120
accattccgc tgcattcagcg tagcaatctg gatccggcag aaccgctctt gattgttacc	180
catgatattg caggcgggta taaagaagat agcaatattc agggcaacac ctatgatacc	240
atttatagct gtcagtattg gcagtattgt gacaccttta tctatttttag ccatcaccgt	300
gttaccattc ctccgggtta ttggattaat gcctgtcatc gtaatgggtg taaaaccctg	360
ggcaccttta ttgttgaaag tgcagcaggt atgtttgcac tggaacgttt tgtttatggg	420
ccggaaccgg gtcagcgtaa tagctgggtc ccgtattatg cagataaact gggtgatatc	480
gccgagtttt atggttttga tgggtggctg ctgaacatcg aaagcgattt ttttccgctg	540
tatcgtaatc cgagcctgaa agcaattcat ctggcaaaac tgctgcgcta tctgaaaaat	600
gcaatgcatg cacgtgttcc gggtagcgaa attatctggg atgatagcat gaccaccaat	660
ggtagcgttc agtggcagaa taacattacc ccgaaaaaca gcatcttttt tgaagcagcc	720
gatggcatct ttctgaatta ttgggtggaat gcaaccgttc ctccgctggc actgcagggt	780
gcacatcgtc tgggtcgtca gggtagtgat gtttattttg gcaccgatgt ttggggctgt	840
ggcacctttg gtgggtgggtg ctttgatagt tatctggcag ttggcaccgc acgtgcattt	900
aaaaccagca gcgcactgtt tgggtacagca tggatttatg aacacttcgg caaaaaagac	960
ttcgaactga tggatcgtct gctgtggctg ggtgggtggc agagcgaata tccggcacia	1020
gaaggtgaac agaatcgtag cgtaaagtt accagccatc tgggtcgcca tccgggtatt	1080
gcagatgtta gtccggttcg tagcgcaccg ggtaaaacct ggtttgcaac atggtttgat	1140
cgtgggttatg gcaccggttt ctattatcag ggtaaaaaac tgctgagcca gccgtgggtc	1200
catctgagcc atcagagcat tccgcctaata ctgattgcac gcctgcagcg tgaagaaaat	1260
catggcctga gctattttct ggcagatgat gatgcataac tgggtggcac cagcctgctg	1320
attgcagcag aaattaccca agaacgtcag ctgcctctgt atcagctgga atatgatgtt	1380
accgaagggt gcgaagtgc gttcatctat aaaagccctg aaccggatat gcagggcaaa	1440
attgatattc atctgaatct gcagggtacc gatatcctgc cggtatgaact ggcattttat	1500
tggcaggacg ttaccgatgc aagcagccag gcagatgcaa ccaccgcaat gcgtctgtat	1560
ctgaatgaaa ataccgtggg ctatctgaaa ccgagccgta aacaagaact ggcggaaggc	1620
tggctgctgt gtagcggttcg tggtccgcct acctatccgc tgggtattgc caccattaaa	1680
gaactgggca ttcattgtgga tggtagcgaa accgttctgt ttcgcctggg tctgctgacc	1740
attatcccg c tgggtgatgc accgagcgca ctgagccgta ttaccaggt tcagctgcaa	1800
cgtgatgaag atattcatag caaatgtagc agcagcagct gtgaactgtg ggcaaccctg	1860
agctggatga tggaacgtaa tagcaaagaa gattgggatc aggtcgatca ctacatgatc	1920

SEQUENCE LISTING_ST25.TXT

tttttcaaaa acgtggatag caaagccgaa ccgatttttc tgggcaccag ctttagcacc	1980
gaatatcgta ttagcgggtct ggaaatcaaa aaacatggca acagcattga aatctgggca	2040
gttaatcgcc tgggcacagt tattgcacgt caggatattg atattcagca tcatcaccat	2100
caccattaa	2109

<210> 14
 <211> 2091
 <212> DNA
 <213> Rhizomucor pusillus

<400> 14	
atgccttcac tcgaactaca gcaagctgct gacacgagac ttttcgagtc tatgccactt	60
cagactatga atgagcttgg ttcttgggaa cctagcaatg cctcgcgagc caacattgca	120
actatttcctt tgcatcagcg atccaatctt gatccggcag agccgcgctt gatcgtaact	180
cacgatatgg ctggaggcta caaggaagac tcaaatattc agggcaatac gtatgataca	240
atttatagct gtcaatattg gcaatatgtg gatactttta tctattttctc gcatcatcga	300
gttacgatac ctctgtcaa ttggataaat gcatgccaca gaaacggtgt caaaacgcta	360
ggaacattca ttgtggaagg agctgcgggc atgtttgcct tggagagatt cgtctacgga	420
cctgagcctg gacagagaaa cagctggagc cttactatg ctgataagct ggtggacata	480
gccgagtttt acggtttcga cggctggctg cttaacattg agagtgattt tttcccttta	540
tatcgaaatc cgtctctgaa agcgatccat ctagcaaagc tgctgcgata tctgaagaat	600
gcaatgcacg ccagagtgcc aggttcagag atcatctggt atgacagcat gacgacaaac	660
ggaagtgtgc agtggcaaaa caatatcacg cccaaaaatt ccatatTTTT tgaagctgca	720
gatggcatat ttttaaatta ttggtggaac gcgacggttc cgccgttggc tttgcaagta	780
gcacatcgtc taggacgtca aggatctgat gtatactttg gaacggatgt ttggggacga	840
ggaacattcg gtggtggcgg attcgattca tatctcgctg ttggcactgc gagggcattc	900
aaaacatcat ctgcgctttt cggcacagca tggatctatg agcatttttg gaagaaagat	960
tttgagctta tggatagact tttgtggtta ggtggtgatc aatcagaata tccagctcag	1020
gaaggagagc agaatcgcac agtaaaaagt acatcccatc ttggaagaca tcctggtatc	1080
gccgatgtgt caccggtgcy aagtgtcca gggaaaacat gggtcgcaac gtggtttgat	1140
agaggttacg gaacagggtt ctattatcag ggcaagaaac tattatcaca gccgtggtcg	1200
catttatcgc atcaatctat cccgccgaat cttatagcca gattacagag agaagaaaat	1260
cacggccttt cgtatttcct ggcagacgac gatgcataca tcggggggaac ttcgctgtta	1320
atagcagccg aaatcactca agaacgccaa ttgccgtct atcaactaga gtatgacgct	1380
actgaaggct gcgaggtgca gtttatatac aagtctccgg aaccagatat gcaaggaaaa	1440
atagatatat atttgaactt gcaagttaca gacatactgc ctgatgagct agccttttac	1500
tggcaagatg ttacggatgc ttctcccag gccgatgcaa cgacagccat gcgtttatat	1560

SEQUENCE LISTING_ST25.TXT

ctaaacgaaa acacagttat ttatctaaag ccgtccagga aacaagagct agccgaaggc	1620
tggttgctct gttccgtgcg tgtgccacct acttatccac ttggtatcgc aacgatcaag	1680
gaactagggga tccatgtgga tggtagagaa acagtgttat ttaggctggg tctccttaca	1740
attataccccc ttggagatgc gccgtctgcg ctttcagaa ttaccaggt ccagcttcaa	1800
agggatgagg atatccatag taaatgtcca tcctcctcat gcgaactttg ggccacactc	1860
tcgtggatga tggaacacaa ctcaaaagag gactgggacc aggtcgatca ctatatgatt	1920
ttcttcaaaa atgttgattc caaggcagaa cctattttcc ttggcaccag cttcagtacc	1980
gagtacagaa tatcaggcct ggagatcaag aaacacggaa attccatcga gatatgggca	2040
gtaaatcgct taggaaccgt cattgcacgg caagacatcg atatccaata g	2091

<210> 15
 <211> 2109
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Optimized DNA sequence for expression of Endo-Rp4 in E. coli

<400> 15	
atgccgagcc tggaactgca gcaggcagca gatacccgtc tgtttgaaag catgccgctg	60
cagaccatga atgaactggg tagctgggaa ccgagcaatg caagccgtgc aaatattgca	120
accattccgc tgcattcagc tagcaatctg gatccggcag aaccgctct gattgttacc	180
catgatatgg caggcgggta taaagaagat agcaatattc agggcaacac ctatgatacc	240
atttatagct gtcagtattg gcagtatgtg gacaccttta tctatttttag ccatcaccgt	300
gttaccattc ctccgggtta ttggattaat gcctgtcatc gtaatggtgt taaaaccctg	360
ggcaccttta ttgttgaaag tgcagcaggc atgtttgcac tggaacgttt tgtttatggt	420
ccggaaccgg gtcagcgtaa tagctgggtc ccgtattatg cagataaact gggtgatatc	480
gccgagtttt atggttttga tgggtggctg ctgaacatcg aaagcgattt tttccgctg	540
tatcgtaatc cgagcctgaa agcaattcat ctggcaaaac tgctgcgcta tctgaaaaat	600
gcaatgcatg cacgtgttcc gggtagcgaa attatctggt atgatagcat gaccaccaat	660
ggtagcgttc agtggcagaa taacattacc ccgaaaaaca gcatcttttt tgaagcagcc	720
gatggcatct ttctgaatta ttggtggaat gcaaccgttc ctccgctggc actgcaggtt	780
gcacatcgtc tgggtcgta gggtagtgat gtttattttg gcaccgatgt ttggggtcgt	840
ggcacctttg gtggtggtgg ctttgatagt tatctggcag ttggcaccgc acgtgcattt	900
aaaaccagca gcgcactgtt tggtagagca tggatttatg aacacttcgg caaaaaagac	960
ttcgaactga tggatcgctc gctgtggctg ggtggtgatc agagcgaata tccggcacia	1020
gaaggtgaac agaatcgta cgttaaagtt accagccatc tgggtcgcca tccgggtatt	1080
gcagatgtta gtccggttcg tagcgcaccg ggtaaaacct ggtttgcaac atggtttgat	1140
cgtaggttatg gcaccggttt ctattatcag ggtaaaaaac tgctgagcca gccgtggtca	1200

SEQUENCE LISTING_ST25.TXT

catctgagcc atcagagcat tccgcctaatt ctgattgcac gcctgcagcg tgaagaaaat	1260
catggcctga gctattttct ggcagatgat gatgcatata ttggtggcac cagcctgctg	1320
attgcagcag aaattaccca agaacgtcag ctgcctctgt atcagctgga atatgatgca	1380
accgaagggtt gcgaagtgc gttcatctat aaaagccctg aaccggatat gcagggcaaa	1440
attgatatct atctgaatct gcaggttacc gatatcctgc cggatgaact ggcattttat	1500
tggcaggacg ttaccgatgc aagcagccag gcagatgcaa ccaccgcaat gcgtctgtat	1560
ctgaatgaaa ataccgtgat ttatctgaaa ccgagccgta aacaagaact ggcggaaggc	1620
tggctgctgt gtagcgttcg tgttccgcct acctatccgc tgggtattgc caccattaaa	1680
gaactgggca ttcattgtga ttgtaccgaa accgttctgt ttcgcctggg tctgctgacc	1740
attatcccg c tgggtgatgc accgagcgca ctgagccgta ttaccagggt tcagctgcaa	1800
cgtgatgaag atattcatag caaatgtccg agcagcagct gtgaactgtg ggcaaccctg	1860
agctggatga tggaaacataa tagcaaagaa gattgggatc aggtcgatca ctacatgatc	1920
tttttcaaaa acgtggatag caaagccgaa ccgatttttc tgggcaccag ctttagcacc	1980
gaatatcgta ttagcgggtct ggaaatcaaa aaacatggca acagcattga aatctgggca	2040
gttaatcgcc tgggcacagt tattgcacgt caggatattg atattcagca tcatcaccat	2100
caccattaa	2109

<210> 16
 <211> 2091
 <212> DNA
 <213> Rhizomucor pusillus

<400> 16	
atgccttcac tcgaactaca gcaagctgct gacacgagac ttttcgagtc tatgccactt	60
cagactatga atgagcttgg ttcttgggaa cctagcaatg cctcgcgagc caacattgca	120
actatttcctt tgcattcagc atccaatctt gatccggcag agccgcgctt gatcgtaact	180
cacgatattg ctggaggcta caaggaagac tcaaataattc agggcaatac gtatgataca	240
atttatagct gtcaatattg gcaatatgtg gatactttta tctattttctc gcatcatcga	300
gttacgatac ctctgtcaa ttggataaat gcatgccaca gaaacgggtgt caaacgcta	360
ggaacattca ttgtggaagg agctgcgggc atgtttgcct tggagagatt cgtctacgga	420
cctgagcctg gacagagaaa cagctggagc cttactatg ctgataagct ggtggacata	480
gccgagtttt acggtttcga cggctggctg cttaacattg agagtgattt cttcccttta	540
tatcgaaatc cgtctctgaa agcgatccat ctagcaaagc tgctgcgata tctgaagaat	600
gcaatgcacg ccagagtgcc aggttcagag atcatctggt atgacagcat gacgacaaac	660
ggaagtgtgc agtggcaaaa caatatcacg cccaaaaatt ccatattttt tgaagctgca	720
gatggcatat ttttaaatta ttggtggaac gcgacgggtc cgccgttggc tttgcaagta	780
gcacatcgtc taggacgtca aggatctgat gtatactttg gaacggatgt ttggggacga	840
ggaacattcg gtgggtggcgg attcgattca tatctcgctg ttggcactgc gagggcattc	900

SEQUENCE LISTING_ST25.TXT

aaaacatcat ctgcgctttt cggcacagca tggatctatg agcatttttg gaagaaagat	960
tttgagctta tggatagact tttgtggtta ggtggtgatc aatcagaata tccagctcag	1020
gaaggagagc agaatcgcac agtaaaagtt acatcccatc ttggaagaca tcctggtatc	1080
gccgatgtgt caccggtgcg aagtgtcca gggaaaacat ggttcgcaac gtggtttgat	1140
agagggttacg gaacagggtt ctattatcag ggcaagaaac tattatcaca gccgtggtcg	1200
catttatcgc atcaatctat cccgccgaat cttatagcca gattacagag agaagaaaat	1260
cacggccttt cgtatttctt ggcagacgac gatgcataca tcgggggaac ttcgctgtta	1320
atagcagccg aaatcactca agaacgcaa ttgccgtct atcaactaga gtatgacgtt	1380
actgaaggct gcgaggtgca gtttatatac aagtctccgg aaccagatat gcaaggaaaa	1440
atagatatat atttgaactt gcaagttaca gacatactgc ctgatgagct agccttttac	1500
tggcaagatg ttacggatgc ttctcccag gccgatgcaa cgacagccat gcgtttatat	1560
ctaaacgaaa acacagttat ttatctaaag ccgtccagga aacaagagct agccgaaggc	1620
tgggtgtctt gttccgtgcg tgtgccacct acttatccac ttggtatcgc aacgatcaag	1680
gaactagggg tccatgtgga tggtagagaa acagtgtat ttaggctggg tctccttaca	1740
attatacccc ttggagatgc gccgtctgcg ctttccagaa ttaccaggt ccagcttcaa	1800
agggatgagg atatccatag taaatgtcca tctctctcat gcgaactttg ggccacactc	1860
tcgtggatga tggaacacaa ctcaaaagag gactgggacc aggtcgatca ctatatgatt	1920
ttcttcaaaa atgttgattc caaggcagaa cctattttcc ttggcaccag cttcagtacc	1980
gagtacagaa tatcaggcct ggagatcaag aaacacggaa attccatcga gatatgggca	2040
gtaaatcgct taggaaccgt cattgcacgg caagacatcg atatccaata g	2091

<210> 17

<211> 2109

<212> DNA

<213> Artificial Sequence

<220>

<223> Optimized DNA sequence for expression of Endo-Rp5 in E. coli

<400> 17

atgccgagcc tggaactgca gcaggcagca gatacccgctc tgtttgaaag catgccgctg	60
cagaccatga atgaactggg tagctgggaa ccgagcaatg caagccgtgc aaatattgca	120
accattccgc tgcattcagc tagcaatctg gatccggcag aaccgctct gattgttacc	180
catgatatgg caggcgggta taaagaagat agcaatattc agggcaacac ctatgatacc	240
atttatagct gtcagtattg gcagtatgtg gacaccttta tctatttttag ccatcaccgt	300
gttaccattc ctccgggtta ttggattaat gcctgtcatc gtaatggtgt taaaaccctg	360
ggcaccttta ttgttgaaag tgcagcagg atgtttgcac tggaacgttt tgtttatggt	420
ccggaaccgg gtcagcgtaa tagctgggtca ccgtattatg cagataaact ggttgatatt	480
gccgagtttt atgggttttg tgggtggctg ctgaacatcg aaagcgattt ttttccgctg	540

SEQUENCE LISTING_ST25.TXT

tatcgtaatc cgagcctgaa agcaattcat ctggcaaaac tgctgcgcta tctgaaaaat	600
gcaatgcatg cacgtgttcc gggtagcgaa attatctggt atgatagcat gaccaccaat	660
ggtagcggtc agtggcagaa taacattacc ccgaaaaaca gcatcttttt tgaagcagcc	720
gatggcatct ttctgaatta ttggtggaat gcaaccgttc ctccgctggc actgcagggt	780
gcacatcgtc tgggtcgtca gggtagtgat gtttattttg gcaccgatgt ttggggctgt	840
ggcacctttg gtggtggtgg ctttgatagt tatctggcag ttggcaccgc acgtgcattt	900
aaaaccagca gcgcactgtt tggtagcagca tggatttatg aacacttcgg caaaaaagac	960
ttcgaactga tggatcgtct gctgtggctg ggtggtgatc agagcgaata tccggcacia	1020
gaaggatgaac agaatcgtac cgttaaagt accagccatc tgggtcgcca tccgggtatt	1080
gcagatgtta gtccggttcg tagcgccaccg ggtaaaacct ggtttgcaac atggtttgat	1140
cgtgggttatg gcaccggttt ctattatcag ggtaaaaaac tgctgagcca gccgtggtca	1200
catctgagcc atcagagcat tccgcctaata ctgattgcac gcctgcagcg tgaagaaaat	1260
catggcctga gctattttct ggcatgatgat gatgcataata ttggtggcac cagcctgctg	1320
attgcagcag aaattaccca agaacgtcag ctgcctctgt atcagctgga atatgatgtt	1380
accgaagggt gcgaagtgc gttcatctat aaaagccctg aaccggatat gcagggcaaa	1440
attgatattct atctgaatct gcagggtacc gatattctgc cggatgaact ggcattttat	1500
tggcaggacg ttaccgatgc aagcagccag gcagatgcaa ccaccgcaat gcgtctgtat	1560
ctgaatgaaa ataccgtgat ttatctgaaa ccgagccgta aacaagaact ggcggaaggc	1620
tggctgctgt gtagcggttcg tgttccgcct acctatccgc tgggtattgc caccattaaa	1680
gaactgggca ttcattgtga tggtagcgaa accgttctgt ttcgcctggg tctgctgacc	1740
attatccccg tgggtgatgc accgagcgca ctgagccgta ttaccagggt tcagctgcaa	1800
cgtgatgaag atattcatag caaatgtccg agcagcagct gtgaactgtg ggcaaccctg	1860
agctggatga tggaaacataa tagcaaagaa gattgggatc aggtcgatca ctacatgatc	1920
tttttcaaaa acgtggatag caaagccgaa ccgatttttc tgggcaccag ctttagcacc	1980
gaatatcgta ttagcgggtct ggaaatcaaa aaacatggca acagcattga aatctgggca	2040
gttaatcgcc tgggcacagt tattgcacgt caggatattg atattcagca tcattcaccat	2100
caccattaa	2109

<210> 18
 <211> 2094
 <212> DNA
 <213> Rhizomucor miehei

<400> 18	
atgccctcac tcgaacttca gcaagccgtg gacacaagac tcttcgagtc aacaccactt	60
atgactatgg atgagcttgg ctccctgggat cctagcaatg ctttgcgagc cagcattgcg	120
acagttcctc tgcattccgcg accaagcatc gatccgacag aaccacgctt gattgtgaca	180

SEQUENCE LISTING_ST25.TXT

cacgatatgg caggaggcta caaggaagac tttagtattc agggcaatgc atatgacacc	240
gtttacacct gccaatattg gcaatacgtg gacattttta tctacttctc gcatcatcga	300
gttacgatac cacccgtaaa ctggacgaat gcttgccaca ggaacggtgt caaaagtctc	360
ggaacattta ttgttgaagg agcagcaggc atgtttgccc tggagagggt cgtgtatggc	420
cctaaccctg ggcaaaggaa gagctggagc ccatattatg cagataagct agtggacatt	480
gccgaatttt atggtttcga tggatggttg atcaatattg aaagcgattt tttccctctg	540
tatcgaagcc cgtcaatgaa ggcgaaacat ttggcaaagc tgctgtata tctcaggaat	600
gctatgcatg ccagagtacc gggttcgcag atcatctggt atgacagcat gaccacaagt	660
ggatacgttc aatggcaaaa caatattaca cctcagaatg agatattctt tgaggctgcc	720
gatggtatat ttttgaatta ctggtggaat gcaacatacc caccttttgc catgcaggta	780
gcgcattatc tgggtcgcca aggatccgat gtatactttg gttctgacat ttggggacga	840
ggaacttttg gtggtggtgg cttcgattca tacctggcag ttgctaccgc gagtgccttt	900
aagacgtcat ctgcactttt cggcacagca tggacttatg aacattttga aaagaaggac	960
tttgagctga tggataggct actgtggtta ggcggtgatc aatcagagta tccagctcaa	1020
gcagaagggc aggaaagcat agcaaagtct gggtcgcgac tcggaagaca cccaggcatt	1080
accgatgtgg ctgcagttcg tagcgctcca ggtcgaagat ggtttgtaac ttggttcgat	1140
agaggacatg gaaccggttt ctatcatcaa ggaaagaaac tactatcaca accatggtcc	1200
catttgctctc atcaatctat accgcccaat ctcgtcgcca gactgcaaag gaaagaagat	1260
gacggcgttt cgtacttctt ggccgacgat gatgcttaca ttggaggaac gtctctatta	1320
atagcagcag agggtagcca agaacgtcag ataccacttt atcaactgaa ttatgacgcc	1380
acaaacggat gtgaagtgca gtttgtttat aagtccccag agccggatat gcaaagcaaa	1440
gtgcagatat atttgaacct cagagtgaca gatgttctac ctgacgaact cgcttactac	1500
tggcacgacg ttgcagctac ctctccccag cctcaggcaa caacagcctc gcgtttgaac	1560
atcaacgaag acaccagtgt ttatttgaat acttcgaaga cgcaagaatt ggcagaaggc	1620
tgggtgttgt gctccgttcg agtgccatct gttcacccgc taggcgaagc tgcaattgaa	1680
gaattaggaa tctatttgga cggaactgag gatgtgctgt tcagattggg gcttttgact	1740
atcgtgccct acacagatac gtcacttact cttgcaagca aaataactca catccagctt	1800
caaagggatg cagacgtcag cagtaaatgc ttatcatctt cgtgcgaact ctgggctacg	1860
ttatcctgga tgatggagtc gaattctagt gaggaatgga accaagtcga tcactatctc	1920
atttcctacg gagatatcaa tgctgatggt gcagctacat ttctcggtac tactttcact	1980
acagagtata ggatatcagg tctggagatg aagaatgaca tcgactatat ccaaatttcg	2040
gcagtgaagc gcctaggcaa tatacttgca cagcaaacga tcggcataca gtag	2094

<210> 19
 <211> 2112
 <212> DNA

SEQUENCE LISTING_ST25.TXT

<213> Artificial Sequence

<220>

<223> Optimized DNA sequence for expression of Endo-Rm in *E. coli*

<400> 19

atgccgagcc tggaactgca gcaggcagtt gatacccgtc tgtttgaaag cacaccgctg	60
atgacccatgg atgaactggg tagctgggat ccgagcaatg cactgcgtgc aagcattgca	120
accgttccgc tgcattccgc tccgagcatt gatccgaccg aaccgctct gattgttacc	180
catgatattg caggcgggta taaagaagat tttagcattc agggcaacgc ctatgatacc	240
gtttatacct gtcagtattg gcagtatgtg gacatcttta tctatttttag ccatcaccgt	300
gttaccattc cgcctgttaa ttggaccaat gcatgtcatc gtaatggtgt taaaagcctg	360
ggcaccttta ttgttgaaag tgcagcaggt atgtttgcac tggaacgttt tgtttatggt	420
ccgaatccgg gtcagcgtaa aagctggtca ccgtattatg cagataaact ggttgatata	480
gccgagtttt atggttttga tggttggtg attaacatcg agagcgattt ttttccgctg	540
tatcgtagcc cgagcatgaa agcaaaaacat ctggcaaaac tgctgctgta tctgcgtaat	600
gcaatgcatg cccgtgttcc gggtagccag attatttggg atgatagcat gaccaccagt	660
ggttatgttc agtggcagaa taacattaca ccgcagaacg aaatcttttt tgaagcagcc	720
gatggcatct ttctgaatta ttggtggaat gcaacctatc cgccttttgc aatgcagggt	780
gcacattatc tgggtcgtca gggtagtgat gtttattttg gtagcgatat ttggggctgt	840
ggcacctttg gtggtggtgg ctttgatagt tatctggcag ttgcaaccgc aagcgcat	900
aaaaccagca gcgcactgtt tggcaccgca tggacctatg aacattttga gaaaaagac	960
ttcgagctga tggatcgtct gctgtggctg ggtggtgatc agagcgaata tccggcacag	1020
gcagaagggtc aagaaagcat tgccaaaagc ggtagccgtc tgggtcgcca tccgggtatt	1080
accgatgttg cagcagttcg tagcgaccg ggtcgtcgtt gggttggtac ctggtttgat	1140
cgtggtcatg gcaccggttt ttatcatcag ggtaaaaaac tgctgagcca gccgtggtca	1200
catctgagcc atcagagcat tcctccgaat ctggttgac gtctgcagcg caaagaagat	1260
gacggcggtta gctattttct ggcagatgat gatgcatata ttggtggcac cagcctgctg	1320
attgcagcag aaggcaccga agaacgtcag attcctctgt atcagctgaa ttatgatgca	1380
accaatgggt gtgaagtgca gttcgtgtat aaaagtccgg aaccggatat gcagagcaaa	1440
gttcagattt atctgaatct gcgtgtgacc gatgttctgc cggatgagct ggcatattat	1500
tggcatgatg ttgccgcaac cagtccgag ccgcaggcaa ccaccgcaag ccgtctgaat	1560
attaacgaag ataccagcgt gtatctgaac accagcaaaa cacaagaact ggccgaagggt	1620
tgggttctgt gtagcgttcg tggtccgagc gttcatccgc tgggtgaagc agcaattgaa	1680
gaactgggca tttatctgga tggcaccgaa gatgttctgt ttcgcctggg tctgctgacc	1740
attgttccgt ataccgatac cagcagcacc ctggcaagca aaatcaccca tattcagctg	1800
cagcgtgatg cagatgttag cagcaaatgt ctgagcagca gctgtgaact gtgggcaacc	1860

SEQUENCE LISTING_ST25.TXT

ctgagctgga tgatggaaag caatagcagc gaagaatgga atcaggtgga tcattatctg	1920
attagctatg gcgatattaa tgcagatggt gcagccacct ttctgggcac cacctttacc	1980
accgaatatc gtattagcgg tctggaaatg aaaaacgaca tcgattacat tcagattagc	2040
gcagttagtc gtctgggtaa tattctggcc cagcagacca ttggtattca gcatcatcac	2100
catcaccact aa	2112

<210> 20
 <211> 2106
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> The assumed DNA sequence derived from publicly available genomic DNA sequence of *Rhizomucor pusillus* strain CBS 183.67, which has been assumed to encode endo-beta-N-acetylglucosaminidase.

<400> 20	
atgccttcac tcgaactaca gcaagctgct gacacgagac ttttcgagtc tatgccactt	60
cagactatga atgagcttgg ttcttgggaa cctagcaatg cctcgcgagc caacattgca	120
actatttcctt tgcacgagcg atccaatctt gatccggcag agccgcgctt gatcgtaact	180
cacgatatgg ctggaggcta caaggaagac tcaaataattc agggcaatac gtatgataca	240
atttatagct gtcaatatgt gcaatatgtg gatactttta tctattttctc gcatcatcga	300
gttacgatac ctccgtgtcaa ttggataaat gcatgccaca gaaacgggtgt caaaacgcta	360
ggaacattca ttgtggaagg agctgcgggc atgtttgcct tggagagatt cgtctacgga	420
cctgagcctg gacagagaaa cagctggagc cttactatg ctgataagct ggtggacata	480
gccgagtttt acggtttcga cggctggctg cttaacattg agagtgattt cttcccttta	540
tatcgaaatc cgtctctgaa agcgatccat ctagcaaata catattatat aaggctgctg	600
cgatatctga agaattgcaat gcacgccaga gtgccagggt cagagatcat ctggtatgac	660
agcatgacga caaacggaag tgtgcagtgg caaaacaata tcacgcccaa aaattccata	720
ttttttgaag ctgcagatgg catattttta aattattggg ggaacgcgac ggttccgccg	780
ttggctttgc aagtagcaca tcgtctagga cgtcaaggat ctgatgtata ctttggaaacg	840
gatgtttggg gacgaggaac attcgggtgg ggcggattcg attcatatct cgctgttggc	900
actgcgaggg cattcaaaac atcatctgcg cttttcggca cagcatggat ctatgagcat	960
tttgggaaga aagattttga gcttatggat agacttttgt ggtaggtgg tgatcaatca	1020
gaatatccag ctgaggaagg agagcagaat cgcacagtaa aagttacatc ccatcttggg	1080
agacatcctg gtatcgccga tgtgtcaccg gtgcgaagtg ctccaggga aacatgggtc	1140
gcaacgtggt ttgatagagg ttacggaaca ggtttctatt atcagggcaa gaaactatta	1200
tcacagccgt ggtcgcattt atcgcatcaa tctatcccg cgaatcttat agccagatta	1260
cagagagaag aaaatcacgg cttttcgtat ttcttggcag acgacgatgc atacatcggg	1320
ggaacttcgc tgttaatagc agccgaaatc actcaagaac gccaatggc gctctatcaa	1380

SEQUENCE LISTING_ST25.TXT

ctagagtatg acgttactga aggctgagag gtgcagttta tatacaagtc tccggaacca	1440
gatatgcaag gaaaaataga tatatatattg aacttgcaag ttacagacat actgcctgat	1500
gagctagcct ttacttgga agatgttacg gatgcttcct cccaggccga tgcaacgaca	1560
gccatgctgtt tataatctaaa cgaaaacaca gttattttatc taaagccgtc caggaaacaa	1620
gagctagccg aaggctgggt gctctgttcc gtgcgtgtgc cacctactta tccacttgggt	1680
atcgcaacga tcaaggaact agggatccat gtggatggta cagaaacagt gctatttagg	1740
ctgggtctcc ttacaattat accccttggga gatgcgccgt ctgcgctttc cagaattacc	1800
cagggtccagc ttcaaagggg tgaggatatc catagtaaata gtccatcctc ctcatgcaaa	1860
ctttgggcca cactctcgtg gatgatggaa cacaactcaa aagaggactg ggaccagggtc	1920
gatcactata tgatttttctt caaaaatgtt gattccaagg cagaacctat tttccttggc	1980
accagcttca gtaccgagta cagaatatca ggcctggaga tcaagaaaca cggaaattcc	2040
atcgagatat gggcagtaaa tcgcttagga accgtcattg cacggcaaga catcgatatc	2100
caatag	2106

<210> 21
 <211> 2124
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Optimized DNA sequence for expression of the assumed amino acid sequence of SEQ ID NO:7 in E. coli

<400> 21	
atgccgagcc tggaactgca gcaggcagca gatacccgctc tgtttgaaag catgccgctg	60
cagaccatga atgaactggg tagctgggaa ccgagcaatg caagccgtgc aaatattgca	120
accattccgc tgcacagcg tagcaatctg gatccggcag aaccgctct gattgttacc	180
catgatattg caggcgggta taaagaagat agcaatattc agggcaacac ctatgatacc	240
atttatagct gtcagtattg gcagtatgtg gacaccttta tctatttttag ccatcaccgt	300
gttaccattc ctccggttaa ttggattaat gcctgtcatc gtaatgggtg taaaaccctg	360
ggcaccttta ttgttgagg tgcagcagg atgtttgcac tggaacgttt tgtttatgggt	420
ccggaaccgg gtcagcgtaa tagctgggtc ccgtattatg cagataaact gggtgatatc	480
gccgagtttt atggttttga tggttggtc ctgaacatcg aaagcgattt tttccgctg	540
tatcgtaatc cgagcctgaa agcaattcat ctggcaaaca cctattatat ccgtctgctg	600
cgctatctga aaaatgcaat gcatgcacgt gttccgggta gcgaaattat ctggtatgat	660
agcatgacca ccaatggtag cggtcagtg cagaataaca ttacccgaa aaacagcatc	720
ttttttgaag cagccgatgg catctttctg aattattgggt ggaatgcaac cgttcctccg	780
ctggcactgc aggttgcaac tcgtctgggt cgtcagggta gtgatgttta ttttggcacc	840
gatgtttggg gtcgtggcac ctttggtgggt ggtggctttg atagttatct ggcagttggc	900
accgcacgtg catttaaaac cagcagcgca ctgtttggta cagcatggat ttatgaacac	960

SEQUENCE LISTING_ST25.TXT

ttcggcaaaa aagacttcga actgatggat cgtctgctgt ggctgggtgg tgatcagagc	1020
gaatatccgg cacaagaagg tgaacagaat cgtaccgtta aagttaccag ccatctgggt	1080
cgccatccgg gtattgcaga tgtagtccg gttcgtagcg caccgggtaa aacctggttt	1140
gcaacatggg ttgatcgtgg ttatggcacc ggtttctatt atcagggtaa aaaactgctg	1200
agccagccgt ggtcacatct gagccatcag agcattccgc ctaatctgat tgcacgcctg	1260
cagcgtgaag aaaatcatgg cctgagctat tttctggcag atgatgatgc atatattggg	1320
ggcaccagcc tgctgattgc agcagaaatt acccaagaac gtcagctgcc tctgtatcag	1380
ctggaatatg atgttaccga aggttgcgaa gtgcagttca tctataaaaag ccctgaaccg	1440
gatatgcagg gcaaaattga tatctatctg aatctgcagg ttaccgatat cctgccggat	1500
gaactggcat ttatttggca ggacgttacc gatgcaagca gccaggcaga tgcaaccacc	1560
gcaatgcgtc tgtatctgaa tgaaaatacc gtgatttatt tgaaaccgag ccgtaaacaa	1620
gaactggcgg aaggctggct gctgtgtagc gttcgtgttc cgcctaccta tccgctgggt	1680
attgccacca ttaaagaact gggcattcat gtggatggta ccgaaaccgt tctgtttcgc	1740
ctgggtctgc tgaccattat cccgctgggt gatgcaccga gcgcactgag ccgtattacc	1800
cagggttcagc tgcaacgtga tgaagatatt catagcaaat gtccgagcag cagctgtgaa	1860
ctgtgggcaa ccctgagctg gatgatggaa cataatagca aagaagattg ggatcaggtc	1920
gatcactaca tgatcttttt caaaaacgtg gatagcaaag ccgaaccgat ttttctgggc	1980
accagcttta gcaccgaata tcgtattagc ggtctggaaa tcaaaaaaca tggcaacagc	2040
attgaaatct gggcagttaa tcgcctgggc acagttattg cacgtcagga tattgatatt	2100
cagcatcatc accatcacca ttaa	2124

<210> 22
 <211> 26
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> PCR primer for cloning of Endo-Rp gene

<400> 22
 atgccttcac tcgaactaca gcaagc 26

<210> 23
 <211> 696
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Possible mutations in Endo-Rp amino acid sequence, which are confirmed to work in working examples.

<220>
 <221> mutation
 <222> (128)..(128)
 <223> The position can be various amino acid, preferably Ala or Thr

SEQUENCE LISTING_ST25.TXT

```

<220>
<221> mutation
<222> (172)..(172)
<223> The position can be various amino acid, preferably Asn, Asp, Gln,
    Glu, Ala, Cys, His, Phe, Gly, Leu, Ile, Lys, Met, Pro, Ser, Thr
    or Val.

<220>
<221> mutation
<222> (176)..(176)
<223> The position can be various amino acid, preferably Asp or Arg.

<220>
<221> mutation
<222> (214)..(214)
<223> The position can be various amino acid with large side chain,
    preferably Tyr or Phe.

<220>
<221> mutation
<222> (216)..(216)
<223> The position can be various amino acid with small side chain,
    preferably Ser, Ala or Val.

<220>
<221> mutation
<222> (245)..(245)
<223> The position can be various amino acid, preferably Leu or Ser.

<220>
<221> mutation
<222> (246)..(246)
<223> The position can be various amino acid, preferably Asn or Asp.

<220>
<221> mutation
<222> (275)..(275)
<223> The position can be various amino acid, preferably Thr or Ile.

<220>
<221> mutation
<222> (278)..(278)
<223> The position can be various amino acid with hydrophobic side
    chain, preferably, Phe, Tyr, Ala, Leu or Ile.

<220>
<221> mutation
<222> (283)..(283)
<223> The position can be various amino acid, preferably Phe or Ser.

<220>
<221> mutation
<222> (306)..(306)
<223> The position can be various amino acid, preferably Leu or Ile.

<220>
<221> mutation
<222> (307)..(307)
<223> The position can be various amino acid, preferably Phe, Tyr or
    His.

<220>
<221> mutation
<222> (310)..(310)
<223> The position can be various amino acid with poler or charged side
    chain, preferably Asp, Glu,

```

SEQUENCE LISTING_ST25.TXT

<220>
 <221> mutation
 <222> (314)..(314)
 <223> The position can be various amino acid, preferably Glu or Gln.

<220>
 <221> mutation
 <222> (333)..(333)
 <223> The position can be various amino acid, preferably Asp or Gly.

<220>
 <221> mutation
 <222> (434)..(434)
 <223> The position can be various amino acid, preferably Ile or Leu.

<220>
 <221> mutation
 <222> (460)..(460)
 <223> The position can be various amino acid, preferably Val or Ala.

<220>
 <221> mutation
 <222> (527)..(527)
 <223> The position can be various amino acid, preferably Ile or Val.

<220>
 <221> mutation
 <222> (569)..(569)
 <223> The position can be various amino acid, preferably Lys or Thr

<220>
 <221> mutation
 <222> (610)..(610)
 <223> The position can be various amino acid, preferably Phe or Ser.

<220>
 <221> mutation
 <222> (626)..(626)
 <223> The position can be various amino acid, preferably His or Arg.

<400> 23

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

SEQUENCE LISTING_ST25.TXT

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Xaa
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Xaa Ile Glu Ser Xaa
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Glu Ile Ile Trp Xaa Asp Xaa Met Thr Thr Asn Gly Ser Val Gln
210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
225 230 235 240

Asp Gly Ile Phe Xaa Xaa Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

Phe Gly Xaa Asp Val Xaa Gly Arg Gly Thr Xaa Gly Gly Gly Gly Phe
275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
290 295 300

Ala Xaa Xaa Gly Thr Xaa Trp Ile Tyr Xaa His Phe Gly Lys Lys Asp
305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Xaa Gln Ser Glu
325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
370 375 380

SEQUENCE LISTING_ST25.TXT

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400
 His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415
 Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430
 Tyr Xaa Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445
 Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Xaa Thr Glu Gly Cys
 450 455 460
 Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480
 Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495
 Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510
 Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Xaa Tyr
 515 520 525
 Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540
 Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560
 Glu Leu Gly Ile His Val Asp Gly Xaa Glu Thr Val Leu Phe Arg Leu
 565 570 575
 Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590
 Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605
 Cys Xaa Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620
 Glu Xaa Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640
 Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

SEQUENCE LISTING_ST25.TXT

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695