

# SEQUENCE LISTING

<110> Global Bioenergies

<120> 3-Methylcrotonic acid decarboxylase (MDC) variants

<130> AB1730 PCT S3

<150> EP 18 18 1522.6

<151> 2018-07-03

<160> 9

<170> BiSSAP 1.3.6

<210> 1

<211> 501

<212> PRT

<213> Streptomyces sp. 769

<400> 1

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Met Tyr Val Gln Met Val Phe Val Lys Glu Val Pro Val Gln His Pro
1      5      10      15
Ser Asp Leu Arg Glu His Ile Glu Ala Leu Glu Lys Leu Gly Asp Leu
20     25     30
Asp Arg Val His Asp Glu Val Asp Trp Asn Leu Glu Ala Ala Ala Gln
35     40     45
Thr Arg Tyr Ser Thr Glu His His Leu Pro Ala Pro Leu Phe Glu Asn
50     55     60
Val Ala Gly Val Ala Glu Gly Phe Arg Leu Leu Gly Ala Pro Ala Ala
65     70     75     80
Leu Ser Ser Asp Pro Ser Arg Pro Tyr Ala Arg Val Ala Leu Ser Val
85     90     95
Gly Leu Arg Pro Glu Ala Thr Gly Arg Glu Val Val Glu His Leu Val
100    105    110
Ala Ala Arg His Arg Pro Gly Val Pro Pro Val Ala Val Ala Ala Glu
115    120    125
Ala Ala Pro Val Lys Ala Asn Val Leu Leu Gly Asp Glu Ala Asp Leu
130    135    140
Asn Arg Phe Pro Val Pro Phe Val His Glu Gly Asp Gly Asn Arg Tyr
145    150    155    160
Ala Asn Thr Tyr Gly Val Ile Ile Ala Gln Thr Pro Asp Gly Ser Trp
165    170    175
Thr Asn Trp Ser Ile Ala Arg Ile Met Met Ile Asp Gly Lys His Met
180    185    190
Thr Gly Leu Val Met His Pro Gln His Ile Ala Gln Val Trp Gln Gln
195    200    205
Trp Ala Asp Leu Gly Lys Pro Met Pro Tyr Ala Leu Val Gln Gly Gly
210    215    220

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|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asp | Pro | Ala | Ile | Pro | Tyr | Val | Gly | Gly | Ile | Pro | Ile | Gly | Asp | Gly | Val |
| 225 |     |     |     |     | 230 |     |     |     |     | 235 |     |     |     |     | 240 |
| Ala | Glu | Ser | Ala | Tyr | Ile | Gly | Ala | Leu | Ile | Gly | Arg | Pro | Leu | Glu | Val |
|     |     |     |     | 245 |     |     |     |     |     | 250 |     |     |     |     | 255 |
| Val | Lys | Ala | Glu | Leu | Ser | Asp | Leu | Met | Val | Pro | Ala | Gly | Ala | Glu | Ile |
|     |     |     | 260 |     |     |     |     | 265 |     |     |     |     |     | 270 |     |
| Val | Ile | Glu | Gly | His | Leu | Ser | Val | Gln | Arg | Asp | Gly | Val | Glu | Gly | Pro |
|     |     | 275 |     |     |     |     | 280 |     |     |     |     | 285 |     |     |     |
| Phe | Gly | Glu | Phe | Ala | Gly | Tyr | Ile | Pro | Arg | Glu | Thr | Ser | Leu | Gln | Pro |
| 290 |     |     |     |     | 295 |     |     |     |     |     | 300 |     |     |     |     |
| Val | Tyr | Thr | Val | Glu | Ala | Ile | Thr | His | Arg | Asp | Ala | Pro | Ile | Trp | Pro |
| 305 |     |     |     |     | 310 |     |     |     |     | 315 |     |     |     |     | 320 |
| Leu | Val | Ala | Glu | Gly | Lys | Pro | Thr | Asp | Asp | Phe | His | Thr | Val | Thr | Gly |
|     |     |     |     | 325 |     |     |     |     | 330 |     |     |     |     |     | 335 |
| Ile | Gly | Glu | Ala | Ala | Gly | Ala | Leu | Asp | Ala | Ile | Arg | Glu | Ala | Gly | Leu |
|     |     |     | 340 |     |     |     |     | 345 |     |     |     |     | 350 |     |     |
| Pro | Ala | Ala | Ser | Ala | Trp | Ala | Pro | Leu | Ser | Ala | Ala | Ser | His | Trp | Leu |
|     |     | 355 |     |     |     |     | 360 |     |     |     |     |     | 365 |     |     |
| Val | Val | Thr | Ala | Pro | Gly | Asn | Trp | Arg | Glu | Leu | Leu | Pro | Gly | Val | Ser |
|     |     | 370 |     |     |     | 375 |     |     |     |     |     | 380 |     |     |     |
| Glu | Glu | Gln | Tyr | Ala | Arg | Arg | Val | Gly | Glu | Ala | Val | Phe | Gly | Thr | Lys |
| 385 |     |     |     |     | 390 |     |     |     |     | 395 |     |     |     |     | 400 |
| Phe | Gly | Ser | Cys | Leu | Pro | Gln | Val | Phe | Leu | Leu | Asp | Asp | Asp | Phe | Asp |
|     |     |     | 405 |     |     |     |     |     | 410 |     |     |     |     | 415 |     |
| Pro | Thr | Asp | Asp | Ala | Asp | Leu | Leu | Trp | Ala | Leu | Ala | Thr | Arg | Val | His |
|     |     |     | 420 |     |     |     |     | 425 |     |     |     |     | 430 |     |     |
| Pro | Asp | Gly | Arg | Val | Val | Arg | Phe | Glu | Asp | Gly | Pro | Val | Leu | Pro | Leu |
|     |     | 435 |     |     |     |     | 440 |     |     |     |     | 445 |     |     |     |
| Leu | Thr | Cys | Tyr | Thr | Pro | Gln | Glu | Arg | His | Ala | Ala | Arg | Ala | Thr | Lys |
|     | 450 |     |     |     |     | 455 |     |     |     |     | 460 |     |     |     |     |
| Val | Val | His | Glu | Ala | Leu | Leu | Ser | Ala | Pro | Gly | Glu | Arg | Glu | Pro | Gln |
| 465 |     |     |     |     | 470 |     |     |     |     | 475 |     |     |     |     | 480 |
| Ser | Thr | Phe | Ala | Asp | Ala | Tyr | Pro | Ala | Glu | Val | Arg | Ala | Lys | Val | Arg |
|     |     |     |     | 485 |     |     |     |     | 490 |     |     |     |     | 495 |     |
| Ala | Arg | Tyr | Pro | Asn |     |     |     |     |     |     |     |     |     |     |     |
|     |     |     |     | 500 |     |     |     |     |     |     |     |     |     |     |     |

<210> 2

<211> 189

<212> PRT

<213> Escherichia coli K-12

<400> 2

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Lys | Arg | Leu | Ile | Val | Gly | Ile | Ser | Gly | Ala | Ser | Gly | Ala | Ile | Tyr |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Gly | Val | Arg | Leu | Leu | Gln | Val | Leu | Arg | Asp | Val | Thr | Asp | Ile | Glu | Thr |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| His | Leu | Val | Met | Ser | Gln | Ala | Ala | Arg | Gln | Thr | Leu | Ser | Leu | Glu | Thr |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Asp | Phe | Ser | Leu | Arg | Glu | Val | Gln | Ala | Leu | Ala | Asp | Val | Thr | His | Asp |
| 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |
| Ala | Arg | Asp | Ile | Ala | Ala | Ser | Ile | Ser | Ser | Gly | Ser | Phe | Gln | Thr | Leu |
| 65  |     |     |     | 70  |     |     |     |     |     | 75  |     |     |     |     | 80  |
| Gly | Met | Val | Ile | Leu | Pro | Cys | Ser | Ile | Lys | Thr | Leu | Ser | Gly | Ile | Val |
|     |     |     | 85  |     |     |     |     |     | 90  |     |     |     |     | 95  |     |
| His | Ser | Tyr | Thr | Asp | Gly | Leu | Leu | Thr | Arg | Ala | Ala | Asp | Val | Val | Leu |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Lys | Glu | Arg | Arg | Pro | Leu | Val | Leu | Cys | Val | Arg | Glu | Thr | Pro | Leu | His |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Leu | Gly | His | Leu | Arg | Leu | Met | Thr | Gln | Ala | Ala | Glu | Ile | Gly | Ala | Val |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Ile | Met | Pro | Pro | Val | Pro | Ala | Phe | Tyr | His | Arg | Pro | Gln | Ser | Leu | Asp |
| 145 |     |     |     | 150 |     |     |     |     |     | 155 |     |     |     |     | 160 |
| Asp | Val | Ile | Asn | Gln | Thr | Val | Asn | Arg | Val | Leu | Asp | Gln | Phe | Ala | Ile |
|     |     |     | 165 |     |     |     |     | 170 |     |     |     |     |     | 175 |     |
| Thr | Leu | Pro | Glu | Asp | Leu | Phe | Ala | Arg | Trp | Gln | Gly | Ala |     |     |     |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     |     |     |     |

<210> 3

<211> 229

<212> PRT

<213> Candida albicans

<220>

<223> Candida albicans (strain SC5314 / ATCC MYA-2876)

<400> 3

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ile | Ala | Arg | Val | Cys | Leu | Arg | Arg | Ser | Asn | Val | Leu | Pro | Ile | Phe |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Gln | Ile | Pro | Ser | Arg | Lys | Tyr | Ser | Ile | Asn | Tyr | Glu | Lys | Val | Asn | Asn |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Ser | Ile | Tyr | Asn | Asn | Val | Ile | Lys | Pro | Lys | Arg | Ile | Val | Leu | Ala | Ile |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Thr | Gly | Ala | Thr | Gly | Thr | Gln | Ile | Gly | Val | Arg | Leu | Leu | Glu | Ile | Leu |
|     | 50  |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |     |
| Lys | Glu | Leu | Gly | Val | Glu | Thr | His | Leu | Val | Met | Ser | Lys | Trp | Gly | Ile |
| 65  |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |     |
| Ala | Thr | Leu | Lys | Tyr | Glu | Thr | Asp | Tyr | Gln | Val | Asp | Tyr | Val | Thr | Ser |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |     |
| Leu | Ala | Thr | Lys | Thr | Tyr | Ser | Ala | Arg | Asp | Val | Thr | Ala | Pro | Ile | Ser |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Ser | Gly | Ser | Phe | Val | His | Asp | Gly | Met | Ile | Val | Ala | Pro | Cys | Ser | Met |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Lys | Ser | Leu | Ser | Ala | Ile | Arg | Thr | Gly | Phe | Thr | Glu | Asp | Leu | Ile | Val |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Arg | Ala | Ala | Asp | Val | Ser | Leu | Lys | Glu | Arg | Arg | Lys | Leu | Leu | Leu | Val |
| 145 |     |     |     | 150 |     |     |     |     |     | 155 |     |     |     |     | 160 |
| Ala | Arg | Glu | Thr | Pro | Leu | Ser | Asp | Ile | His | Leu | Asp | Asn | Met | Leu | Tyr |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|     |     |     |     | 165 |     |     |     | 170 |     |     |     | 175 |     |     |     |
| Leu | Ser | Arg | Met | Gly | Val | Thr | Ile | Phe | Pro | Pro | Val | Pro | Ala | Phe | Tyr |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Thr | Lys | Pro | Lys | Thr | Ile | Asp | Asp | Ile | Val | Glu | Gln | Thr | Cys | Gly | Arg |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Ile | Leu | Asp | Asn | Phe | Gly | Ile | Asn | Ile | Asp | Thr | Phe | Glu | Arg | Trp | Asp |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Gly | Ile | Asn | His | Arg |     |     |     |     |     |     |     |     |     |     |     |
| 225 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

<210> 4

<211> 227

<212> PRT

<213> Aspergillus niger

<400> 4

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Phe | Asn | Ser | Leu | Leu | Ser | Gly | Thr | Thr | Thr | Pro | Asn | Ser | Gly | Arg |
| 1   |     |     |     | 5   |     |     |     | 10  |     |     |     |     |     | 15  |     |
| Ala | Ser | Pro | Pro | Ala | Ser | Glu | Met | Pro | Ile | Asp | Asn | Asp | His | Val | Ala |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Val | Ala | Arg | Pro | Ala | Pro | Arg | Arg | Arg | Arg | Ile | Val | Val | Ala | Met | Thr |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Gly | Ala | Thr | Gly | Ala | Met | Leu | Gly | Ile | Lys | Val | Leu | Ile | Ala | Leu | Arg |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Arg | Leu | Asn | Val | Glu | Thr | His | Leu | Val | Met | Ser | Lys | Trp | Ala | Glu | Ala |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Thr | Ile | Lys | Tyr | Glu | Thr | Asp | Tyr | His | Pro | Ser | Asn | Val | Arg | Ala | Leu |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Ala | Asp | Tyr | Val | His | Asn | Ile | Asn | Asp | Met | Ala | Ala | Pro | Val | Ser | Ser |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Gly | Ser | Phe | Arg | Ala | Asp | Gly | Met | Ile | Val | Val | Pro | Cys | Ser | Met | Lys |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Thr | Leu | Ala | Ala | Ile | His | Ser | Gly | Phe | Cys | Asp | Asp | Leu | Ile | Ser | Arg |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Thr | Ala | Asp | Val | Met | Leu | Lys | Glu | Arg | Arg | Arg | Leu | Val | Leu | Val | Ala |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Arg | Glu | Thr | Pro | Leu | Ser | Glu | Ile | His | Leu | Arg | Asn | Met | Leu | Glu | Val |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     | 175 |     |     |
| Thr | Arg | Ala | Gly | Ala | Val | Ile | Phe | Pro | Pro | Val | Pro | Ala | Phe | Tyr | Ile |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Lys | Ala | Gly | Ser | Ile | Glu | Asp | Leu | Ile | Asp | Gln | Ser | Val | Gly | Arg | Met |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     | 205 |     |     |     |
| Leu | Asp | Leu | Phe | Asp | Leu | Asp | Thr | Gly | Asp | Phe | Glu | Arg | Trp | Asn | Gly |
|     | 210 |     |     |     |     | 215 |     |     |     |     | 220 |     |     |     |     |
| Trp | Glu | Lys |     |     |     |     |     |     |     |     |     |     |     |     |     |
| 225 |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

<210> 5

<211> 242

<212> PRT

<213> *Saccharomyces cerevisiae* S288c

<400> 5

```
Met Leu Leu Phe Pro Arg Arg Thr Asn Ile Ala Phe Phe Lys Thr Thr
1          5          10          15
Gly Ile Phe Ala Asn Phe Pro Leu Leu Gly Arg Thr Ile Thr Ser
          20          25          30
Pro Ser Phe Leu Thr His Lys Leu Ser Lys Glu Val Thr Arg Ala Ser
          35          40          45
Thr Ser Pro Pro Arg Pro Lys Arg Ile Val Val Ala Ile Thr Gly Ala
          50          55          60
Thr Gly Val Ala Leu Gly Ile Arg Leu Leu Gln Val Leu Lys Glu Leu
65          70          75          80
Ser Val Glu Thr His Leu Val Ile Ser Lys Trp Gly Ala Ala Thr Met
          85          90          95
Lys Tyr Glu Thr Asp Trp Glu Pro His Asp Val Ala Ala Leu Ala Thr
          100          105          110
Lys Thr Tyr Ser Val Arg Asp Val Ser Ala Cys Ile Ser Ser Gly Ser
          115          120          125
Phe Gln His Asp Gly Met Ile Val Val Pro Cys Ser Met Lys Ser Leu
          130          135          140
Ala Ala Ile Arg Ile Gly Phe Thr Glu Asp Leu Ile Thr Arg Ala Ala
145          150          155          160
Asp Val Ser Ile Lys Glu Asn Arg Lys Leu Leu Leu Val Thr Arg Glu
          165          170          175
Thr Pro Leu Ser Ser Ile His Leu Glu Asn Met Leu Ser Leu Cys Arg
          180          185          190
Ala Gly Val Ile Ile Phe Pro Pro Val Pro Ala Phe Tyr Thr Arg Pro
          195          200          205
Lys Ser Leu His Asp Leu Leu Glu Gln Ser Val Gly Arg Ile Leu Asp
          210          215          220
Cys Phe Gly Ile His Ala Asp Thr Phe Pro Arg Trp Glu Gly Ile Lys
225          230          235          240
Ser Lys
```

<210> 6

<211> 180

<212> PRT

<213> *Cryptococcus gattii* WM276

<220>

<223> serotype B

<400> 6

```
Met Arg Arg Lys Arg Tyr Val Val Ala Val Thr Gly Ala Thr Gly Ala
1          5          10          15
```

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Thr | Leu | Ala | Ile | Arg | Leu | Leu | Gln | Ala | Leu | Arg | Ala | Leu | Asp | Ile | Glu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Thr | His | Leu | Ile | Ile | Ser | Lys | Trp | Ala | Val | Lys | Thr | Leu | Lys | Tyr | Glu |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Thr | Asp | Met | Ile | Glu | Arg | Glu | Leu | Lys | Asp | Leu | Ala | Asp | Tyr | Ser | Tyr |
|     |     | 50  |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Ser | Asn | Ser | Asp | Leu | Ala | Ala | Pro | Pro | Ser | Ser | Gly | Ser | Phe | Ile | His |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Asp | Gly | Met | Phe | Ile | Ile | Pro | Cys | Ser | Met | Lys | Thr | Leu | Ala | Ala | Val |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |
| Arg | Ile | Gly | Leu | Gly | Asp | Glu | Leu | Ile | Ser | Arg | Ser | Ala | Asp | Val | Cys |
|     |     | 100 |     |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Leu | Lys | Glu | Gly | Arg | Lys | Leu | Met | Leu | Val | Val | Arg | Glu | Thr | Pro | Leu |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Asn | Asp | Ile | His | Leu | Glu | Asn | Met | Leu | Phe | Leu | Arg | Arg | Ala | Gly | Ala |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Ile | Ile | Phe | Pro | Pro | Val | Pro | Ala | Tyr | Tyr | Ile | Arg | Pro | Gln | Thr | Ile |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Asp | Asp | Leu | Thr | Asn | Gln | Thr | Val | Gly | Arg | Ile | Leu | Asp | Ser | Ser | Lys |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Cys | Ser | Gln | Lys |     |     |     |     |     |     |     |     |     |     |     |     |
|     |     |     | 180 |     |     |     |     |     |     |     |     |     |     |     |     |

<210> 7

<211> 192

<212> PRT

<213> Bacillus subtilis

<400> 7

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Lys | Leu | Val | Ile | Gly | Met | Thr | Gly | Ala | Thr | Gly | Ala | Ile | Phe | Gly |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ile | Arg | Leu | Leu | Glu | Tyr | Leu | Lys | Ala | Ala | Glu | Ile | Glu | Thr | His | Leu |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Val | Val | Ser | Pro | Trp | Ala | Asn | Val | Thr | Ile | Thr | His | Glu | Thr | Asp | Tyr |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Thr | Leu | Lys | Asp | Val | Glu | Lys | Leu | Ala | Ser | Tyr | Thr | Tyr | Ser | His | Lys |
|     |     | 50  |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Asp | Gln | Ala | Ala | Ala | Ile | Ser | Ser | Gly | Ser | Phe | Glu | Thr | Asp | Gly | Met |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     | 80  |     |
| Ile | Ile | Ala | Pro | Cys | Ser | Met | Lys | Ser | Leu | Ala | Ser | Ile | Arg | Thr | Gly |
|     |     |     | 85  |     |     |     |     | 90  |     |     |     |     |     | 95  |     |
| Met | Ala | Asp | Asn | Leu | Leu | Thr | Arg | Ala | Ala | Asp | Val | Ile | Leu | Lys | Glu |
|     |     |     | 100 |     |     |     |     | 105 |     |     |     |     | 110 |     |     |
| Arg | Lys | Lys | Leu | Val | Leu | Leu | Thr | Arg | Glu | Thr | Pro | Leu | Ser | Gln | Ile |
|     |     | 115 |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| His | Leu | Glu | Asn | Met | Leu | Ala | Leu | Thr | Lys | Met | Gly | Ser | Val | Ile | Leu |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Pro | Pro | Met | Pro | Ala | Phe | Tyr | Asn | Lys | Pro | Ala | Asp | Met | Asp | Glu | Leu |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Ile | Asp | His | Ile | Val | Phe | Arg | Thr | Leu | Asp | Gln | Phe | Gly | Ile | Arg | Leu |
|     |     |     |     | 165 |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Pro | Glu | Ala | Lys | Arg | Trp | Tyr | Gly | Ile | Glu | Lys | Gln | Lys | Gly | Gly | Ile |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |

<210> 8  
 <211> 209  
 <212> PRT  
 <213> *Pseudomonas aeruginosa*

<400> 8

|     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Met | Ser | Gly | Pro | Glu | Arg | Ile | Thr | Leu | Ala | Met | Thr | Gly | Ala | Ser | Gly |
| 1   |     |     |     | 5   |     |     |     |     | 10  |     |     |     |     | 15  |     |
| Ala | Gln | Tyr | Gly | Leu | Arg | Leu | Leu | Asp | Cys | Leu | Val | Gln | Glu | Glu | Arg |
|     |     |     | 20  |     |     |     |     | 25  |     |     |     |     | 30  |     |     |
| Glu | Val | His | Phe | Leu | Ile | Ser | Lys | Ala | Ala | Gln | Leu | Val | Met | Ala | Thr |
|     |     | 35  |     |     |     |     | 40  |     |     |     |     | 45  |     |     |     |
| Glu | Thr | Asp | Val | Ala | Leu | Pro | Ala | Lys | Pro | Gln | Ala | Met | Gln | Ala | Phe |
|     | 50  |     |     |     |     | 55  |     |     |     |     | 60  |     |     |     |     |
| Leu | Thr | Glu | Tyr | Cys | Gly | Ala | Ala | Ala | Gly | Gln | Ile | Arg | Val | Phe | Gly |
| 65  |     |     |     |     | 70  |     |     |     |     | 75  |     |     |     |     | 80  |
| Gln | Asn | Asp | Trp | Met | Ala | Pro | Pro | Ala | Ser | Gly | Ser | Ser | Ala | Pro | Asn |
|     |     |     |     | 85  |     |     |     |     | 90  |     |     |     |     | 95  |     |
| Ala | Met | Val | Ile | Cys | Pro | Cys | Ser | Thr | Gly | Thr | Leu | Ser | Ala | Val | Ala |
|     |     |     | 100 |     |     |     |     |     | 105 |     |     |     |     | 110 |     |
| Thr | Gly | Ala | Cys | Asn | Asn | Leu | Ile | Glu | Arg | Ala | Ala | Asp | Val | Ala | Leu |
|     | 115 |     |     |     |     |     | 120 |     |     |     |     | 125 |     |     |     |
| Lys | Glu | Arg | Arg | Pro | Leu | Val | Leu | Val | Pro | Arg | Glu | Ala | Pro | Phe | Ser |
|     | 130 |     |     |     |     | 135 |     |     |     |     | 140 |     |     |     |     |
| Ser | Ile | His | Leu | Glu | Asn | Met | Leu | Lys | Leu | Ser | Asn | Leu | Gly | Ala | Val |
| 145 |     |     |     |     | 150 |     |     |     |     | 155 |     |     |     |     | 160 |
| Ile | Leu | Pro | Ala | Ala | Pro | Gly | Phe | Tyr | His | Gln | Pro | Gln | Ser | Val | Glu |
|     |     |     | 165 |     |     |     |     |     | 170 |     |     |     |     | 175 |     |
| Asp | Leu | Val | Asp | Phe | Val | Val | Ala | Arg | Ile | Leu | Asn | Thr | Leu | Gly | Ile |
|     |     |     | 180 |     |     |     |     | 185 |     |     |     |     | 190 |     |     |
| Pro | Gln | Asp | Met | Leu | Pro | Arg | Trp | Gly | Glu | Gln | His | Leu | Val | Ser | Asp |
|     |     | 195 |     |     |     |     | 200 |     |     |     |     |     | 205 |     |     |

Glu

<210> 9  
 <211> 219  
 <212> PRT  
 <213> *Enterobacter* sp.

<220>

