

Página 1  
LISTADO DE SECUENCIAS

<110> Consejo Superior de Investigaciones Científicas (CSIC).  
 <120> Peroxidasas de elevado potencial redox diseñadas por evolución dirigida.  
 <130> ES1641.432  
 <160> 46  
 <170> PatentIn version 3.4  
 <210> 1  
 <211> 422  
 <212> PRT  
 <213> Artificial  
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 <223> Mutante 11H10. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
 85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
 100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Glu  
 115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
 130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
 145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
 165 170 175

Página 2

Ser Ala Gln Lys<sub>180</sub> Pro Phe Val Ala Lys<sub>185</sub> His Asn Ile Ser Ala<sub>190</sub> Gly Asp  
Phe Ile Gln<sub>195</sub> Phe Ala Gly Ala Val<sub>200</sub> Gly Val Ser Asn Cys<sub>205</sub> Pro Gly Gly  
Val Arg<sub>210</sub> Ile Pro Phe Phe Leu<sub>215</sub> Gly Arg Pro Asp Ala<sub>220</sub> Val Ala Ala Ser  
Pro Asp His Leu Val<sub>230</sub> Glu Pro Phe Asp Ser<sub>235</sub> Val Asp Ser Ile Leu<sub>240</sub>  
Ala Arg Met Gly Asp<sub>245</sub> Ala Gly Phe Ser Pro<sub>250</sub> Val Glu Val Val Trp<sub>255</sub> Leu  
Leu Ala Ser His<sub>260</sub> Ser Ile Ala Ala Ala<sub>265</sub> Asp Lys Val Asp Pro<sub>270</sub> Ser Ile  
Pro Gly Met<sub>275</sub> Pro Phe Asp Ser Thr<sub>280</sub> Pro Gly Val Phe Asp<sub>285</sub> Ser Gln Phe  
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Ser Met Val Asn<sub>340</sub> Asn Gln Pro Lys Ile<sub>345</sub> Gln Asn Arg Phe Ala<sub>350</sub> Ala Thr  
Met Ser Lys<sub>355</sub> Met Ala Leu Leu Gly<sub>360</sub> Gln Asp Lys Thr Lys<sub>365</sub> Leu Ile Asp  
Cys Ser<sub>370</sub> Asp Val Ile Pro Thr<sub>375</sub> Pro Pro Ala Leu Val<sub>380</sub> Gly Ala Ala His  
Leu Pro Ala Gly Phe Ser<sub>390</sub> Leu Ser Asp Val Glu<sub>395</sub> Gln Ala Cys Ala Ala<sub>400</sub>  
Thr Pro Phe Pro Ala<sub>405</sub> Leu Thr Ala Asp Pro<sub>410</sub> Gly Pro Val Thr Ser<sub>415</sub> Val  
Pro Pro Val Pro<sub>420</sub> Gly Ser

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 <213> Artificial

<220>  
 <223> Mutante 11H10. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

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 <213> Artificial

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 <223> Mutante 15G9. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

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Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys  
115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Val Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Thr Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Gln Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
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Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
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Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
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Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
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Pro Pro Val Pro Gly Ser  
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<210> 4

<211> 1269

<212> DNA

<213> Artificial

<220>

<223> Mutante 15G9. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

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aacgggttat tgttttataaa tactactatt gccagcattg ctgctaaaga agaaggggta	240
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc	300
gcaaattgctg catgtttgcat tctgttcccc atcctcgatg acatccaaga aaacctcttc	360
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<213> Artificial

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Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Ala Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Glu  
115 120 125

Val Arg Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Val Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Thr Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Gln Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
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Pro Pro Val Pro Gly Ser  
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<210> 6  
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<212> DNA  
<213> Artificial

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<223> Mutante 4B5. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

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<210> 7  
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<213> Artificial

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20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Glu  
115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Ala Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Thr Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Gln Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Thr Val  
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Pro Pro Val Pro Gly Ser  
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<210> 8  
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<223> Mutante 4B1. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

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aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta      240
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gcaaatgctg catgttgcac tctgttcccc atcctcgatg acatccaaga aaacctcttc      360
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gccagaatgg gtgacgcagg cttcagtccc gccgagggtg tttggctcct ggcttcgcac      780
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<210> 9

<211> 422

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20 25 30

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35 40 45

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Glu  
115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Val Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

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290 295 300

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340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
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Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
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Pro Pro Val Pro Gly Ser  
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<210> 10  
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<212> DNA  
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aacgggttat tgttttataaa tactactatt gccagcattg ctgctaaaga agaaggggta 240  
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc 300  
gcaaattgctg catgttgcatt tctgttcccc atcctcgatg acatccaaga aaacctcttc 360  
gacggtgccc agtgtggaga agaggtgcac gagtcccttc gtttgacttt ccacgatgca 420  
atcggtttct ctcctacttt aggcggagga ggagctgacg gttccatcat cgcgttcgac 480  
accattgaga ctaatttccc cgccaatgct ggcatcgatg aaatcgtcag tgctcagaag 540  
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccgtt 600

```

ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttggtcg cccggatgcc 660
gtggccgcct ccccggaacca cctcgtgcca gagccttttg attctgttga ctccattctt 720
gccagaatgg gtgacgcagg cttcagtccc gtcgaggttg tttggctcct ggcttcgcac 780
tccattgccg ctgccgacaa ggttgacca tcgattcctg gaatgccatt cgattcaacc 840
cccgagattt ttgatttcta attcttcata gaaacgctac ttaaaggcag actcttccca 900
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag 960
tccgatcact tgttggttag agacccccag actgcctgcg aatggcagtc catggttaac 1020
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccaccctcc tgcccttgtc 1140
ggagcggccc acttacggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg 1200
acgcctttcc ctgctcttac tgctgacca ggcccagtaa cctccgtccc tcccgtccct 1260
ggatcgtaa 1269

```

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<210> 11
<211> 422
<212> PRT
<213> Artificial

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<220>
<223> Mutante 19C2. Peroxidasa versátil (VP) obtenida por evolución
        dirigida. Secuencia aminoacídica.

```

```

<400> 11

```

```

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser
1           5           10           15

```

```

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln
          20           25           30

```

```

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

```

```

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu
          50           55           60

```

```

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

```

```

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp
          85           90           95

```

```

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu
          100          105          110

```

```

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys
          115          120          125

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Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Val Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Gln Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Gly Ser  
420

<210> 12  
<211> 1269  
<212> DNA  
<213> Artificial

<220>  
<223> Mutante 19C2. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

<400> 12  
atgagatttc cttcaatttt tactgctggt ttattcgcag catcctccgc attagctgct 60  
ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggt 120  
tactcagatt tagaagggga tttcgatggt gctgttttgc cattttccaa cagcacaaat 180  
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta 240  
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc 300  
gcaaattgctg catgttgcatt tctgttcccc atcctcgatg acatccaaga aaacctcttc 360  
gacgggtgccc agtgttgaga aaagggtgcac gagtcccttc gtttgacttt ccacgatgca 420  
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac 480  
accattgaga ctaatttccc cgccaatgct ggcattcgatg aaatcgtcag tgctcagaag 540  
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt 600  
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc 660  
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt 720  
gccagaatgg gtgacgcagg cttcagtccc gtcgagggtg tttggctcct ggcttcgcac 780  
tccattgccg ctgccgacaa ggttgaccca tcgattcctg gaatgccatt cgattcaacc 840  
cccggagttt ttgatttcta attcttcatt gaaacgcaac ttaaaggcag actcttccca 900  
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag 960  
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catgggttaac 1020  
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080  
caagacaaga ccaaatgat tgactgttcc gatgttatcc ccaccctcc tgcccttgtc 1140  
ggagcggccc acttaccggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg 1200  
acgcctttcc ctgctcttac tgctgatcca ggcccagtaa cctccgtccc tcccgctcct 1260  
ggatcgtaa 1269



<210> 13  
 <211> 422  
 <212> PRT  
 <213> Artificial

<220>  
 <223> Mutante 20D1. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 13

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

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
 20 25 30

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

Asp Ala Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
 50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
 85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
 100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Glu  
 115 120 125

Val Arg Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
 130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
 145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
 165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
 180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
 195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
 210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Val Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Gln Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Gly Ser  
420

<210> 14  
<211> 1269  
<212> DNA  
<213> Artificial

<220>  
<223> Mutante 20D1. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

<400> 14  
atgagatttc cttcaacttt tactgctggt ttattcgcag catcctccgc attagctgct 60

ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggc 120  
tactcagatt tagaagggga tttcgatgct gctgttttgc cattttccaa cagcacaat 180  
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta 240  
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc 300  
gcaaatgctg catgtttgcat tctgttcccc atcctcgatg acatccaaga aaacctcttc 360  
gacgggtgcc agtgtggaga agagggtgcgc gagtcccttc gtttgacttt ccacgatgca 420  
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac 480  
accattgaga ctaatttccc cgccaatgct ggcacatgac aaatcgtagc tgctcagaag 540  
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt 600  
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttggtcgc cccggatgcc 660  
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt 720  
gccagaatgg gtgacgcagg cttcagtccc gtcgagggtg tttggctcct ggcttcgcac 780  
tccattgccg ctgccgacaa ggttgaccca tcgattcctg gaatgccatt cgattcaacc 840  
cccggagttt ttgatttctc attcttcatc gaaacgcaac ttaaaggcag actcttccca 900  
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag 960  
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catgggtaac 1020  
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080  
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccacccctcc tgcccctgtc 1140  
ggagcggccc acttacggc gggattttct ctagcgatg tagagcaagc gtgcgccgcg 1200  
acgcctttcc ctgctcttac tgctgacca ggcacagtaa cctccgtccc tcccgtccct 1260  
ggatcgtaa 1269

<210> 15

<211> 422

<212> PRT

<213> Artificial

<220>

<223> Mutante 13G1. Peroxidasas versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 15

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
 50 55 60  
 Phe Ile Asn Thr Thr Ile Ala Ser Ile Ala Ala Lys Glu Glu Gly Val  
 65 70 75 80  
 Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
 85 90 95  
 Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
 100 105 110  
 Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Glu  
 115 120 125  
 Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
 130 135 140  
 Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
 145 150 155 160  
 Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
 165 170 175  
 Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
 180 185 190  
 Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
 195 200 205  
 Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
 210 215 220  
 Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
 225 230 235 240  
 Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Ala Glu Val Val Trp Leu  
 245 250 255  
 Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
 260 265 270  
 Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
 275 280 285  
 Phe Ile Glu Thr Gln Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
 290 295 300  
 Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
 305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Gly Ser  
420

<210> 16

<211> 1269

<212> DNA

<213> Artificial

<220>

<223> Mutante 13G1. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

<400> 16

atgagatttc cttcaatttt tactgctggt ttattcgcag catcctccgc attagccgct	60
ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggt	120
tactcagatt tagaagggga tttcgatggt gctgttttgc cattttccaa cagcaciaat	180
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta	240
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc	300
gcaaattgctg catgtttgcat tctgttcccc atcctcgatg acatccaaga aaacctcttc	360
gacggtgccc agtgtggaga agaggtgcac gagtcccttc gtttgacttt ccacgatgca	420
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac	480
accattgaga ctaatttccc cgccaatgct ggcatcgatg aaatcgtcag tgctcagaag	540
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt	600
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc	660
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt	720
gccagaatgg gtgacgcagg cttcagtcct gccgaggttg tttggctcct ggcttcgcac	780

tccattgccg ctgccgacaa ggttgacca tcgattcctg gaatgccatt cgattcaacc	840
cccggagttt ttgatttctca attcttcatc gaaacgcaac ttaaaggcag actcttccca	900
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag	960
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catggttaac	1020
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc	1080
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccaccctcc tgcccttgtc	1140
ggagcggccc acttaccggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg	1200
acgcctttcc ctgctcttac tgctgacca ggcacagtaa cctccgtccc tcccgtccct	1260
ggatcgtaa	1269

<210> 17  
 <211> 422  
 <212> PRT  
 <213> Artificial

<220>  
 <223> Mutante 10C3 y 6B1. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 17

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser	
1 5 10 15	

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln	
20 25 30	

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu	
50 55 60	

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp	
85 90 95	

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu	
100 105 110	

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys	
115 120 125	

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser	
130 135 140	

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Val Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Leu Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Gly Ser  
420

<210> 18  
<211> 1269  
<212> DNA  
<213> Artificial

<220>  
<223> Mutante 10C3. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

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<400> 18
atgagatttc cttcaatttt tactgctggt ttattcgcag catcctccgc attagctgct      60
ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcgggt      120
tactcagatt tagaagggga tttcgatggt gctgttttgc ctttttcaa cagcacaaat      180
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta      240
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc      300
gcaaatgctg catgttgcatt tctgttcccc atcctcgatg acatccaaga aaacctcttc      360
gacggtgccc agtgtggaga aaaggtgcac gagtcccttc gtttgacttt ccacgatgca      420
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac      480
accattgaga ctaatttccc cgccaatgct ggcattcgatg aaatcgtcag tgctcagaag      540
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt      600
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc      660
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt      720
gccagaatgg gtgacgcagg cttcagtcct gtcgagggtt tttggctcct ggcttcgcac      780
tccattgccg ctgccgacaa ggttgaccca tcgattcctg gaatgccgtt cgattcaacc      840
cccggagttt ttgatttcta attcttcatt gaaacgctac ttaaaggcag actcttccca      900
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag      960
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catgggtaac     1020
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc     1080
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccaccctcc tgcccttgtc     1140
ggagcggccc acttaccggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg     1200
acgcctttcc ctgctcttac tgctgaccca ggcccagtaa cctccgtccc tcccgtccct     1260
ggatcgtaa                                         1269
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<210> 19  
<211> 422  
<212> PRT  
<213> Artificial



<220>

<223> Mutante 13E4. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 19

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

Ile Pro Ala Glu Ala Val Ile Gly Tyr Ser Asp Leu Lys Gly Asp Phe  
35 40 45

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys  
115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Ala Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Gln Leu Lys Gly Arg Pro Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Gly Ser  
420

<210> 20

<211> 1269

<212> DNA

<213> Artificial

<220>

<223> Mutante 6B1. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

<400> 20

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ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggt 120

tactcagatt tagaagggga tttcgatggt gctgttttgc cattttccaa cagcacaat 180

aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta 240

tctctcgaga aaagagagggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc 300  
gcaaattgctg catgtttgcat tctgtttcccc atcctcgatg acatccaaga aaacctcttc 360  
gacggtgccc agtgtggaga aaaggtgcac gagtcccttc gtttgacttt ccacgatgca 420  
atcggttttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac 480  
accattgaga ctaatttccc cgccaatgct ggcacatgatg aaatcgtcag tgctcagaag 540  
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggtt 600  
ggagtctcca actgccctgg tgggtgtcagg attccttttct tcttgggtcg cccggatgcc 660  
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt 720  
gccagaatgg gtgacgcagg cttcagtccc gtcgagggtg tttggctcct ggcttcgcac 780  
tccattgccg ctgccgacaa ggttgaccca tcgattcctg gaatgccatt cgattcaacc 840  
cccgagttt ttgatttctca attcttcatc gaaacgctac ttaaaggcag actcttccca 900  
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag 960  
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catggttaac 1020  
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080  
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccacccctcc tgcccttgtc 1140  
ggagcgcccc acttacggc gggatttttct ctagcgatg tagagcaagc gtgcgccgcg 1200  
acgcctttcc ctgctcttac tgctgatcca ggcccagtaa cctccgtccc tcccgtccct 1260  
ggatcgtaa 1269

<210> 21  
<211> 422  
<212> PRT  
<213> Artificial

<220>  
<223> Mutante 6E7. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 21

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Ser Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys  
115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Val Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Leu Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Gly Ser  
420

<210> 22

<211> 1269

<212> DNA

<213> Artificial

<220>

<223> Mutante 13E4. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

<400> 22

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ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggt	120
tactcagatt taaaagggga tttcgatggt gctgttttgc cattttccaa cagcacaat	180
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta	240
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc	300
gcaaattgctg catgttgcatt tctgttcccc atcctcgatg acatccaaga aaacctcttc	360
gacggtgccc agtgtggaga aaaggtgcac gagtcccttc gtttgacttt ccacgatgca	420
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac	480
accattgaga ctaatttccc cgccaatgct ggcacgatg aaatcgtcag tgctcagaag	540
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccgtt	600
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc	660
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt	720
gccagaatgg gtgacgcagg cttcagtcac gccgaggttg tttggctcct ggcttcgcac	780
tccattgccg ctgccgacaa gggtgaccca tcgattcctg gaatgccatt cgattcaacc	840
cccggagttt ttgatttcta attcttcac gaaacgcaac tttaaaggcag acccttccca	900
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag	960

tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catgggtaac 1020  
 aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080  
 caagacaaga ccaaattgat tgactgttcc gatgttatcc ccaccctcc tgcccttgtc 1140  
 ggagcggccc acttacggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg 1200  
 acgcctttcc ctgctcttac tgctgacca ggcccagtaa cctccgtccc tcccgtccct 1260  
 ggatcgtaa 1269

<210> 23

<211> 422

<212> PRT

<213> Artificial

<220>

<223> Mutante 11F3. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 23

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

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Ala Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Glu  
115 120 125

Val Arg Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys<sub>180</sub> Pro Phe Val Ala Lys<sub>185</sub> His Asn Ile Ser Ala<sub>190</sub> Gly Asp  
Phe Ile Gln<sub>195</sub> Phe Ala Gly Ala Val<sub>200</sub> Gly Val Ser Asn Cys<sub>205</sub> Pro Gly Gly  
Val Arg<sub>210</sub> Ile Pro Phe Phe Leu<sub>215</sub> Gly Arg Pro Asp Ala<sub>220</sub> Val Ala Ala Ser  
Pro Asp His Leu Val<sub>230</sub> Glu Pro Phe Asp Ser<sub>235</sub> Val Asp Ser Ile Leu<sub>240</sub>  
Ala Arg Met Gly Asp<sub>245</sub> Ala Gly Phe Ser Pro<sub>250</sub> Val Glu Val Val Trp<sub>255</sub> Leu  
Leu Ala Ser His<sub>260</sub> Ser Ile Ala Ala Ala<sub>265</sub> Asp Lys Val Asp Pro<sub>270</sub> Ser Ile  
Pro Gly Met<sub>275</sub> Pro Phe Asp Ser Thr<sub>280</sub> Pro Gly Val Phe Asp<sub>285</sub> Ser Gln Phe  
Phe Ile Glu Thr Leu Leu Lys<sub>295</sub> Gly Arg Leu Phe Pro<sub>300</sub> Gly Thr Ala Asp  
Asn Lys Gly Glu Ala Gln<sub>310</sub> Ser Pro Leu Gln Gly<sub>315</sub> Glu Ile Arg Leu Gln<sub>320</sub>  
Ser Asp His Leu Leu<sub>325</sub> Ala Arg Asp Pro Gln<sub>330</sub> Thr Ala Cys Glu Trp<sub>335</sub> Gln  
Ser Met Val Asn<sub>340</sub> Asn Gln Pro Lys Ile<sub>345</sub> Gln Asn Arg Phe Ala<sub>350</sub> Ala Thr  
Met Ser Lys<sub>355</sub> Met Ala Leu Leu Gly<sub>360</sub> Gln Asp Lys Thr Lys<sub>365</sub> Leu Ile Asp  
Cys Ser<sub>370</sub> Asp Val Ile Pro Thr<sub>375</sub> Pro Pro Ala Leu Val<sub>380</sub> Gly Ala Ala His  
Leu Pro Ala Gly Phe Ser<sub>390</sub> Leu Ser Asp Val Glu<sub>395</sub> Gln Ala Cys Ala Ala<sub>400</sub>  
Thr Pro Phe Pro Ala<sub>405</sub> Leu Thr Ala Asp Pro<sub>410</sub> Gly Pro Val Thr Ser<sub>415</sub> Val  
Pro Pro Val Pro<sub>420</sub> Gly Ser

<210> 24  
<211> 1269  
<212> DNA  
<213> Artificial

<220>  
<223> Mutante 6E7. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

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<400> 24
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ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggt      120
tactcagatt tagaagggga tttcgatggt gctgttttgc ctttttccaa cagcacaaat      180
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta      240
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc      300
gcaaattgctg catgttgcatt tctgttcccc atcctcgatg acatccaaga aaacctcttc      360
gacgggtgccc agtgtggaga aaaggtgcac gagtcccttc gtttgacttt ccacgatgca      420
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac      480
accattgaga ctaatttccc cgccaatgct ggcattcgatg aaatcgtcag tgctcagaag      540
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt      600
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc      660
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt      720
gccagaatgg gtgacgcagg cttcagttcc gtcgagggtg tttggctcct ggcttcgcac      780
tccattgccg ctgccgacaa ggttgaccca tcgattcctg gaatgccatt cgattcaacc      840
cccggagttt ttgatttcta attcttcata gaaacgctac ttaaaggcag actcttccca      900
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag      960
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catgggtaac     1020
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc     1080
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccacccctcc tgcccttgtc     1140
ggagcggccc acttaccggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg     1200
acgcctttcc ctgctcttac tgctgacca gggccagtaa cctccgtccc tcccgtcctt     1260
ggatcgtaa                                     1269
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<210> 25  
<211> 422  
<212> PRT  
<213> Artificial

<220>  
<223> Mutante R4. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 25



Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys  
115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Ala Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met<sub>275</sub> Pro Phe Asp Ser Thr<sub>280</sub> Pro Gly Val Phe Asp<sub>285</sub> Ser Gln Phe

Phe Ile<sub>290</sub> Glu Thr Leu Leu Lys<sub>295</sub> Gly Arg Leu Phe Pro Gly Thr Ala Asp

Asn Lys Gly Glu Ala Gln<sub>310</sub> Ser Pro Leu Gln Gly<sub>315</sub> Glu Ile Arg Leu Gln<sub>320</sub>

Ser Asp His Leu<sub>325</sub> Ala Arg Asp Pro Gln<sub>330</sub> Thr Ala Cys Glu Trp<sub>335</sub> Gln

Ser Met Val Asn<sub>340</sub> Asn Gln Pro Lys Ile<sub>345</sub> Gln Asn Arg Phe Ala<sub>350</sub> Ala Thr

Met Ser Lys<sub>355</sub> Met Ala Leu Leu Gly<sub>360</sub> Gln Asp Lys Thr Lys<sub>365</sub> Leu Ile Asp

Cys Ser<sub>370</sub> Asp Val Ile Pro Thr<sub>375</sub> Pro Pro Ala Leu Val<sub>380</sub> Gly Ala Ala His

Leu Pro Ala Gly Phe Ser<sub>390</sub> Leu Ser Asp Val Glu<sub>395</sub> Gln Ala Cys Ala<sub>400</sub> Ala

Thr Pro Phe Pro<sub>405</sub> Ala Leu Thr Ala Asp Pro<sub>410</sub> Gly Pro Val Thr Ser<sub>415</sub> Val

Pro Pro Val<sub>420</sub> Pro Gly Ser

<210> 26

<211> 1269

<212> DNA

<213> Artificial

<220>

<223> Mutante 11F3. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

<400> 26

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ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggt 120

tactcagatt tagaagggga tttcgatgct gctgttttgc ctttttccaa cagcaciaat 180

aacgggttat tgttttataaa tactactatt gccagcattg ctgctaaaga agaaggggta 240

tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc 300

gcaaattgctg catgtttgcat tctgttcccc atcctcgatg acatccaaga aaacctcttc 360

gacggtgccc agtgtggaga agaggtgcgc gagtcccttc gtttgacttt ccacgatgca 420

atcggtttct ctctacttt aggcggagga ggagctgacg gttccatcat cgcgttcgac 480  
accattgaga ctaatttccc cgccaatgct ggcacgatg aaatcgtcag tgctcagaag 540  
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt 600  
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc 660  
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt 720  
gccagaatgg gtgacgcagg cttcagtccc gtcgagggtg tttggctcct ggcttcgcac 780  
tccattgccg ctgccgacaa ggttgacca tcgattcctg gaatgccatt cgattcaacc 840  
cccgagttt ttgatttca attcttcatc gaaacgctac ttaaaggcag actcttccca 900  
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag 960  
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catggttaac 1020  
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080  
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccacccctcc tgcccttgtc 1140  
ggagcggccc acttacggc gggattttct ctagcgatg tagagcaagc gtgcgccgcg 1200  
acgcctttcc ctgctcttac tgctgacca ggcccagtaa cctccgtccc tcccgtcct 1260  
ggatcgtaa 1269

<210> 27

<211> 422

<212> PRT

<213> Artificial

<220>

<223> Mutante 24E10. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 27

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys  
115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Ala Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Leu Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Arg Ser  
420

<210> 28

<211> 1269

<212> DNA

<213> Artificial

<220>

<223> Mutante R4. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

<400> 28

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tactcagatt	tagaagggga	tttcgatggt	gctgttttgc	cattttccaa	cagcacaaat	180
aacgggttat	tgttttataaa	tactactatt	gccagcattg	ctgctaaaga	agaaggggta	240
tctctcgaga	aaagagaggc	tgaagctgaa	ttcgcaactt	gcgacgacgg	acgcaccacc	300
gcaaattgctg	catgtttgcat	tctgttcccc	atcctcgatg	acatccaaga	aaacctcttc	360
gacggtgccc	agtgtggaga	aaagggtgcac	gagtcccttc	gtttgacttt	ccacgatgca	420
atcggtttct	ctcctacttt	aggcggagga	ggagctgacg	gttccatcat	cgcgttcgac	480
accattgaga	ctaatttccc	cgccaatgct	ggcatcgatg	aaatcgtcag	tgctcagaag	540
ccattcgtgg	ctaaacacaa	catctccgcc	ggcgacttca	ttcaatttgc	tggcgccggt	600
ggagtctcca	actgccctgg	tggtgtcagg	attcctttct	tcttgggtcg	cccggatgcc	660
gtggccgcct	ccccggacca	cctcgtgcca	gagccttttg	attctgttga	ctccattctt	720
gccagaatgg	gtgacgcagg	cttcagtccc	gccgagggtg	tttggctcct	ggcttcgcac	780
tccattgccg	ctgccgacaa	ggttgaccca	tcgattcctg	gaatgccatt	cgattcaacc	840
cccggagttt	ttgatttctca	attcttcatc	gaaacgctac	ttaaaggcag	actcttccca	900
ggcactgctg	acaacaaggg	agaagcccaa	tctccattgc	aaggagagat	caggcttcag	960
tccgatcact	tgttggctag	agacccccag	actgcctgcg	aatggcagtc	catggttaac	1020
aaccaaccga	agattcagaa	ccgtttcgct	gctaccatgt	cgaagatggc	tcttcttggc	1080
caagacaaga	ccaaattgat	tgactgttcc	gatgttatcc	ccacccctcc	tgcccttgtc	1140

ggagcggccc acttaccggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg 1200  
acgcctttcc ctgctcttac tgctgaccca ggcccagtaa cctccgtccc tcccgtccct 1260  
ggatcgtaa 1269

<210> 29  
<211> 422  
<212> PRT  
<213> Artificial

<220>  
<223> Mutante 3H9. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 29

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys  
115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Ala Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Leu Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Ala  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Arg Ser  
420

<210> 30  
<211> 1269  
<212> DNA  
<213> Artificial  
<220>

<223> Mutante 24E10. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

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<400> 30
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ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggg      120
tactcagatt tagaagggga tttcgatggt gctgttttgc cattttccaa cagcacaaat      180
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta      240
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc      300
gcaaattgctg catgttgcac tctgttcccc atcctcgatg acatccaaga aaacctcttc      360
gacgggtgccc agtgtggaga aaaggtgcac gagtcccttc gtttgacttt ccacgatgca      420
atcggtttct ctcctacttt aggcggagga ggagctgacg gttccatcat cgcgttcgac      480
accattgaga ctaatttccc cgccaatgct ggcacgatg aaatcgtcag tgctcagaag      540
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt      600
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc      660
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt      720
gccagaatgg gtgacgcagg cttcagtccc gccgagggtg tttggctcct ggcttcgcac      780
tccattgccg ctgccgacaa ggttgaccca tcgattcctg gaatgccatt cgattcaacc      840
cccggagttt ttgatttcta attcttcacg gaaacgctac ttaaaggcag actcttccca      900
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag      960
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catgggtaac     1020
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc     1080
caagacaaga ccaattgat tgactgttcc gatgttatcc ccaccctcc tgcccttgtc     1140
ggagcggccc acttaccggc gggattttct ctagcgatg tagagcaagc gtgcgccgcg     1200
acgcctttcc ctgctcttac tgctgacca ggcccagtaa cctccgtccc tcccgtcct     1260
agatcgtaa                                           1269

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<210> 31

<211> 422

<212> PRT

<213> Artificial

<220>

<223> Mutante 15B4. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 31

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30



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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys  
115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Ala Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Leu Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Ile Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Thr Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Arg Ser  
420

<210> 32  
<211> 1269  
<212> DNA  
<213> Artificial

<220>  
<223> Mutante 3H9. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

<400> 32  
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ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggt 120  
tactcagatt tagaagggga tttcgatggt gctgttttgc ctttttcaa cagcacaat 180  
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta 240  
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc 300  
gcaaattgctg catgttgcatt tctgttcccc atcctcgatg acatccaaga aaacctcttc 360  
gacggtgccc agtgtggaga aaaggtgcac gagtcccttc gtttgacttt ccacgatgca 420  
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac 480  
accattgaga ctaatttccc cgccaatgct ggcacgatg aaatcgtcag tgctcagaag 540  
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccgtt 600

ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttggtcg cccggatgcc 660  
gtggccgcct ccccggaacca cctcgtgcca gagccttttg attctgttga ctccattctt 720  
gccagaatgg gtgacgcagg cttcagtccc gccgaggttg tttggctcct ggcttcgcac 780  
tccattgccc ctgccgacaa ggttgaccca tcgattcctg gaatgccatt cgattcaacc 840  
cccggagttt ttgatttcta attcttcatc gaaacgctac ttaaaggcag actcttccca 900  
ggcactgctg ccaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag 960  
tccgatcact tgttggttag agacccccag actgcctgcg aatggcagtc catggtaaac 1020  
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080  
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccaccctcc tgcccttgtc 1140  
ggagcggccc acttacggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg 1200  
acgcctttcc ctgctcttac tgctgacca gggccagtaa cctccgtccc tcccgctcct 1260  
agatcgtaa 1269

<210> 33  
<211> 422  
<212> PRT  
<213> Artificial

<220>  
<223> Mutante 2-1B. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia aminoacídica.

<400> 33

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Lys  
115 120 125

Val Arg Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Ala Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Met Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Leu Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Ala  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Arg Ser  
420

<210> 34  
<211> 1269  
<212> DNA  
<213> Artificial

<220>  
<223> Mutante 15B4. Peroxidasa versátil (VP) obtenida por evolución dirigida. Secuencia nucleotídica.

<400> 34  
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ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggt 120  
tactcagatt tagaagggga tttcgatggt gctgttttgc ctttttcaa cagcacaat 180  
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta 240  
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc 300  
gcaaattgctg catgttgcatt tctgttcccc atcctcgatg acatccaaga aaacctcttc 360  
gacggtgccc agtgtggaga aaaggtgcac gagtcccttc gtttgacttt ccacgatgca 420  
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac 480  
accattgaga ctaatttccc cgccaatgct ggcacgatg aaatcgtcag tgctcagaag 540  
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt 600  
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc 660  
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt 720  
gccagaatgg gtgacgcagg cttcagtccc gccgagggtt tttggctcct ggcttcgcac 780  
tccattgccg ctgccgacaa ggttgaccca tcgattcctg gaatgccatt cgattcaacc 840  
cccggagttt ttgatttcta attcttcatc gaaacgctac tttaaaggcag actcttcca 900  
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag 960  
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catgggtaac 1020  
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080  
caagacaaga ccaattgat tgactgttcc gatgttatcc ccatccctcc tgcccttgtc 1140  
ggagcggccc acttaccggc gggattttct cttagcgatg tagagcaagc gtgcaccgcg 1200  
acgcctttcc ctgctcttac tgctgaccca ggcccagtaa cctccgtccc tcccgctcct 1260  
agatcgtaa 1269

<210> 35  
 <211> 422  
 <212> PRT  
 <213> Artificial

<220>  
 <223> Construcción ALPHA-VP. Secuencia aminoacídica.

<400> 35

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
 1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
 20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
 50 55 60

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

Ser Leu Glu Lys Arg Glu Ala Glu Ala Glu Phe Ala Thr Cys Asp Asp  
 85 90 95

Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile Leu Phe Pro Ile Leu  
 100 105 110

Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala Gln Cys Gly Glu Glu  
 115 120 125

Val His Glu Ser Leu Arg Leu Thr Phe His Asp Ala Ile Gly Phe Ser  
 130 135 140

Pro Thr Leu Gly Gly Gly Gly Ala Asp Gly Ser Ile Ile Ala Phe Asp  
 145 150 155 160

Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly Ile Asp Glu Ile Val  
 165 170 175

Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn Ile Ser Ala Gly Asp  
 180 185 190

Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser Asn Cys Pro Gly Gly  
 195 200 205

Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp Ala Val Ala Ala Ser  
 210 215 220

Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser Val Asp Ser Ile Leu  
225 230 235 240

Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Val Glu Val Val Trp Leu  
245 250 255

Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys Val Asp Pro Ser Ile  
260 265 270

Pro Gly Thr Pro Phe Asp Ser Thr Pro Gly Val Phe Asp Ser Gln Phe  
275 280 285

Phe Ile Glu Thr Gln Leu Lys Gly Arg Leu Phe Pro Gly Thr Ala Asp  
290 295 300

Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly Glu Ile Arg Leu Gln  
305 310 315 320

Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr Ala Cys Glu Trp Gln  
325 330 335

Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn Arg Phe Ala Ala Thr  
340 345 350

Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys Thr Lys Leu Ile Asp  
355 360 365

Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu Val Gly Ala Ala His  
370 375 380

Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu Gln Ala Cys Ala Ala  
385 390 395 400

Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly Pro Val Thr Ser Val  
405 410 415

Pro Pro Val Pro Gly Ser  
420

<210> 36  
<211> 1269  
<212> DNA  
<213> Artificial

<220>  
<223> Mutante 2-1B. Peroxidasa versátil (VP) obtenida por evolución  
dirigida. Secuencia nucleotídica.

<400> 36  
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ccagtcaaca ctacaacaga agatgaaacg gcacaaattc cggctgaagc tgtcatcggt 120

tactcagatt tagaagggga tttcgatggt gctgttttgc cattttccaa cagcaciaaat 180  
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta 240  
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc 300  
gcaaattgctg catgtttgcat tctgttcccc atcctcgatg acatccaaga aaacctcttc 360  
gacggtgccc agtgtggaga aaaggtgctg gagtcccttc gtttgacttt ccacgatgca 420  
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac 480  
accattgaga ctaatttccc cgccaatgct ggcacgcatg aaatcgtcag tgctcagaag 540  
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt 600  
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc 660  
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt 720  
gccagaatgg gtgacgcagg cttcagtcct gccgaggttg tttggctcct ggcttcgcac 780  
tccattgccg ctgccgacaa ggttgacca tcgattcctg gaatgccatt cgattcaacc 840  
cccggagttt ttgatttctc attcttcatc gaaacgctac tttaaaggcag actcttccca 900  
ggcactgctg ccaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag 960  
tccgatcact tgttggctag agacccccag actgcctgct aatggcagtc catgggtaac 1020  
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080  
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccaccctcc tgcccttgtc 1140  
ggagcggccc acttacggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg 1200  
acgcctttcc ctgctcttac tgctgacca ggcccagtaa cctccgtccc tcccgctcct 1260  
agatcgtaa 1269

<210> 37  
<211> 89  
<212> PRT  
<213> Saccharomyces cerevisiae

<400> 37

Met Arg Phe Pro Ser Ile Phe Thr Ala Val Leu Phe Ala Ala Ser Ser  
1 5 10 15

Ala Leu Ala Ala Pro Val Asn Thr Thr Thr Glu Asp Glu Thr Ala Gln  
20 25 30

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

Asp Val Ala Val Leu Pro Phe Ser Asn Ser Thr Asn Asn Gly Leu Leu  
50 55 60

Phe Ile Asn Thr Thr Ile Ala Ser Ile Ala Ala Lys Glu Glu Gly Val



65

70

80

Ser Leu Glu Lys Arg Glu Ala Glu Ala  
85

<210> 38  
<211> 1269  
<212> DNA  
<213> Artificial

<220>  
<223> Construcción ALPHA-VP.Secuencia nucleotídica.

<400> 38  
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tactcagatt tagaagggga tttcgatggt gctgttttgc ctttttcaa cagcacaaat 180  
aacgggttat tgtttataaa tactactatt gccagcattg ctgctaaaga agaaggggta 240  
tctctcgaga aaagagaggc tgaagctgaa ttcgcaactt gcgacgacgg acgcaccacc 300  
gcaaattgctg catgtttgcat tctgttcccc atcctcgatg acatccaaga aaacctcttc 360  
gacgggtgccc agtgttgaga agagggtgcac gagtcccttc gtttgacttt ccacgatgca 420  
atcggtttct ctctactttt aggcggagga ggagctgacg gttccatcat cgcgttcgac 480  
accattgaga ctaatttccc cgccaatgct ggcacgatg aaatcgtcag tgctcagaag 540  
ccattcgtgg ctaaacacaa catctccgcc ggcgacttca ttcaatttgc tggcgccggt 600  
ggagtctcca actgccctgg tgggtgtcagg attcctttct tcttgggtcg cccggatgcc 660  
gtggccgcct ccccggaaca cctcgtgcca gagccttttg attctgttga ctccattctt 720  
gccagaatgg gtgacgcagg cttcagtcac gtcgagggtt tttggctcct ggcttcgcac 780  
tccattgccg ctgccgacaa ggttgaccca tcgattcctg gaacgccatt cgattcaacc 840  
cccggagttt ttgatttcta attcttcac gaaacgcaac ttaaaggcag actcttccca 900  
ggcactgctg acaacaaggg agaagcccaa tctccattgc aaggagagat caggcttcag 960  
tccgatcact tgttggctag agacccccag actgcctgcg aatggcagtc catgggtaac 1020  
aaccaaccga agattcagaa ccgtttcgct gctaccatgt cgaagatggc tcttcttggc 1080  
caagacaaga ccaaattgat tgactgttcc gatgttatcc ccaccctcc tgcccttgtc 1140  
ggagcggccc acttaccggc gggattttct cttagcgatg tagagcaagc gtgcgccgcg 1200  
acgcctttcc ctgctcttac tgctgaccca ggcccagtaa cctccgtccc tcccgtcctt 1260  
ggatcgtaa 1269

<210> 39  
<211> 331  
<212> PRT  
<213> Pleurotus eryngii

<400> 39

Ala Thr Cys Asp Asp Gly Arg Thr Thr Ala Asn Ala Ala Cys Cys Ile  
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Leu Phe Pro Ile Leu Asp Asp Ile Gln Glu Asn Leu Phe Asp Gly Ala  
20 25 30

Gln Cys Gly Glu Glu Val His Glu Ser Leu Arg Leu Thr Phe His Asp  
35 40 45

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

Ile Ile Ala Phe Asp Thr Ile Glu Thr Asn Phe Pro Ala Asn Ala Gly  
65 70 75 80

Ile Asp Glu Ile Val Ser Ala Gln Lys Pro Phe Val Ala Lys His Asn  
85 90 95

Ile Ser Ala Gly Asp Phe Ile Gln Phe Ala Gly Ala Val Gly Val Ser  
100 105 110

Asn Cys Pro Gly Gly Val Arg Ile Pro Phe Phe Leu Gly Arg Pro Asp  
115 120 125

Ala Val Ala Ala Ser Pro Asp His Leu Val Pro Glu Pro Phe Asp Ser  
130 135 140

Val Asp Ser Ile Leu Ala Arg Met Gly Asp Ala Gly Phe Ser Pro Val  
145 150 155 160

Glu Val Val Trp Leu Leu Ala Ser His Ser Ile Ala Ala Ala Asp Lys  
165 170 175

Val Asp Pro Ser Ile Pro Gly Thr Pro Phe Asp Ser Thr Pro Gly Val  
180 185 190

Phe Asp Ser Gln Phe Phe Ile Glu Thr Gln Leu Lys Gly Arg Leu Phe  
195 200 205

Pro Gly Thr Ala Asp Asn Lys Gly Glu Ala Gln Ser Pro Leu Gln Gly  
210 215 220

Glu Ile Arg Leu Gln Ser Asp His Leu Leu Ala Arg Asp Pro Gln Thr  
225 230 235 240

Ala Cys Glu Trp Gln Ser Met Val Asn Asn Gln Pro Lys Ile Gln Asn  
245 250 255

Arg Phe Ala Ala Thr Met Ser Lys Met Ala Leu Leu Gly Gln Asp Lys  
260 265 270

Thr Lys Leu Ile Asp Cys Ser Asp Val Ile Pro Thr Pro Pro Ala Leu  
275 280 285

Val Gly Ala Ala His Leu Pro Ala Gly Phe Ser Leu Ser Asp Val Glu  
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Gln Ala Cys Ala Ala Thr Pro Phe Pro Ala Leu Thr Ala Asp Pro Gly  
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Pro Val Thr Ser Val Pro Pro Val Pro Gly Ser  
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tactcagatt tagaagggga tttcgatggt gctgttttgc cattttccaa cagcaciaat 180  
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<213> *Pleurotus eryngii*

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