

SEQUENCE LISTING

<110> GreenLight Biosciences

<120> CELL-FREE PRODUCTION OF RIBONUCLEIC ACID

<130> 19-460-WO

<150> 62/826,983

<151> 2019-03-29

<160> 17

<170> PatentIn version 3.5

<210> 1

<211> 266

<212> PRT

<213> *Deinococcus geothermalis*

<400> 1

Met Gln Leu Asp Arg Tyr Arg Val Pro Pro Gly Gln Arg Val Arg Leu
1 5 10 15

Ser Asn Trp Pro Thr Asp Asp Asp Gly Gly Leu Ser Lys Ala Glu Gly
20 25 30

Glu Ala Leu Leu Pro Asp Leu Gln Gln Arg Leu Ala Asn Leu Gln Glu
35 40 45

Arg Leu Tyr Ala Glu Ser Gln Gln Ala Leu Leu Ile Val Leu Gln Ala
50 55 60

Arg Asp Ala Gly Gly Lys Asp Gly Thr Val Lys His Val Ile Gly Ala
65 70 75 80

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

Glu Glu Arg Ala His Asp Phe Leu Trp Arg Ile His Arg Gln Thr Pro
100 105 110

Arg Leu Gly Met Ile Gly Val Phe Asn Arg Ser Gln Tyr Glu Asp Val
115 120 125

Leu Val Thr Arg Val His His Leu Ile Asp Asp Gln Thr Ala Gln Arg
 130 135 140

Arg Leu Lys His Ile Cys Ala Phe Glu Ser Leu Leu Thr Asp Ser Gly
 145 150 155 160

Thr Arg Ile Val Lys Phe Tyr Leu His Ile Ser Pro Glu Glu Gln Lys
 165 170 175

Lys Arg Leu Glu Ala Arg Leu Ala Asp Pro Ser Lys His Trp Lys Phe
 180 185 190

Asn Pro Gly Asp Leu Gln Glu Arg Ala His Trp Asp Ala Tyr Thr Ala
 195 200 205

Val Tyr Glu Asp Val Leu Thr Thr Ser Thr Pro Ala Ala Pro Trp Tyr
 210 215 220

Val Val Pro Ala Asp Arg Lys Trp Phe Arg Asn Leu Leu Val Ser Gln
 225 230 235 240

Ile Leu Val Gln Thr Leu Glu Glu Met Asn Pro Gln Phe Pro Ala Pro
 245 250 255

Ala Phe Asn Ala Ala Asp Leu Arg Ile Val
 260 265

<210> 2
 <211> 280
 <212> PRT
 <213> *Meiothermus ruber*

<400> 2

Met Gly Phe Cys Ser Ile Glu Phe Leu Met Gly Ala Gln Met Lys Lys
 1 5 10 15

Tyr Arg Val Gln Pro Asp Gly Arg Phe Glu Leu Lys Arg Phe Asp Pro
 20 25 30

Asp Asp Thr Ser Ala Phe Glu Gly Gly Lys Gln Ala Ala Leu Glu Ala

35

40

45

Leu Ala Val Leu Asn Arg Arg Leu Glu Lys Leu Gln Glu Leu Leu Tyr
 50 55 60

Ala Glu Gly Gln His Lys Val Leu Val Val Leu Gln Ala Met Asp Ala
 65 70 75 80

Gly Gly Lys Asp Gly Thr Ile Arg Val Val Phe Asp Gly Val Asn Pro
 85 90 95

Ser Gly Val Arg Val Ala Ser Phe Gly Val Pro Thr Glu Gln Glu Leu
 100 105 110

Ala Arg Asp Tyr Leu Trp Arg Val His Gln Gln Val Pro Arg Lys Gly
 115 120 125

Glu Leu Val Ile Phe Asn Arg Ser His Tyr Glu Asp Val Leu Val Val
 130 135 140

Arg Val Lys Asn Leu Val Pro Gln Gln Val Trp Gln Lys Arg Tyr Arg
 145 150 155 160

His Ile Arg Glu Phe Glu Arg Met Leu Ala Asp Glu Gly Thr Thr Ile
 165 170 175

Leu Lys Phe Phe Leu His Ile Ser Lys Asp Glu Gln Arg Gln Arg Leu
 180 185 190

Gln Glu Arg Leu Asp Asn Pro Glu Lys Arg Trp Lys Phe Arg Met Gly
 195 200 205

Asp Leu Glu Asp Arg Arg Leu Trp Asp Arg Tyr Gln Glu Ala Tyr Glu
 210 215 220

Ala Ala Ile Arg Glu Thr Ser Thr Glu Tyr Ala Pro Trp Tyr Val Ile
 225 230 235 240

Pro Ala Asn Lys Asn Trp Tyr Arg Asn Trp Leu Val Ser His Ile Leu
 245 250 255

Val Glu Thr Leu Glu Gly Leu Ala Met Gln Tyr Pro Gln Pro Glu Thr
260 265 270

Ala Ser Glu Lys Ile Val Ile Glu
275 280

<210> 3

<211> 268

<212> PRT

<213> *Meiothermus silvanus*

<400> 3

Met Ala Lys Thr Ile Gly Ala Thr Leu Asn Leu Gln Asp Ile Asp Pro
1 5 10 15

Arg Ser Thr Pro Gly Phe Asn Gly Asp Lys Glu Lys Ala Leu Ala Leu
20 25 30

Leu Glu Lys Leu Thr Ala Arg Leu Asp Glu Leu Gln Glu Gln Leu Tyr
35 40 45

Ala Glu His Gln His Arg Val Leu Val Ile Leu Gln Gly Met Asp Thr
50 55 60

Ser Gly Lys Asp Gly Thr Ile Arg His Val Phe Lys Asn Val Asp Pro
65 70 75 80

Leu Gly Val Arg Val Val Ala Phe Lys Ala Pro Thr Pro Pro Glu Leu
85 90 95

Glu Arg Asp Tyr Leu Trp Arg Val His Gln His Val Pro Ala Asn Gly
100 105 110

Glu Leu Val Ile Phe Asn Arg Ser His Tyr Glu Asp Val Leu Val Ala
115 120 125

Arg Val His Asn Leu Val Pro Pro Ala Ile Trp Ser Arg Arg Tyr Asp
130 135 140

His Ile Asn Ala Phe Glu Lys Met Leu Val Asp Glu Gly Thr Thr Val
 145 150 155 160

Leu Lys Phe Phe Leu His Ile Ser Lys Glu Glu Gln Lys Lys Arg Leu
 165 170 175

Leu Glu Arg Leu Val Glu Ala Asp Lys His Trp Lys Phe Asp Pro Gln
 180 185 190

Asp Leu Val Glu Arg Gly Tyr Trp Glu Asp Tyr Met Glu Ala Tyr Gln
 195 200 205

Asp Val Leu Asp Lys Thr His Thr Gln Tyr Ala Pro Trp His Val Ile
 210 215 220

Pro Ala Asp Arg Lys Trp Tyr Arg Asn Leu Gln Val Ser Arg Leu Leu
 225 230 235 240

Val Glu Ala Leu Glu Gly Leu Arg Met Lys Tyr Pro Arg Pro Lys Leu
 245 250 255

Asn Ile Pro Arg Leu Lys Ser Glu Leu Glu Lys Met
 260 265

<210> 4
 <211> 300
 <212> PRT
 <213> Thermosynechococcus elongatus

<400> 4

Met Ile Pro Gln Asp Phe Leu Asp Glu Ile Asn Pro Asp Arg Tyr Ile
 1 5 10 15

Val Pro Ala Gly Gly Asn Phe His Trp Lys Asp Tyr Asp Pro Gly Asp
 20 25 30

Thr Ala Gly Leu Lys Ser Lys Val Glu Ala Gln Glu Leu Leu Ala Ala
 35 40 45

Gly Ile Lys Lys Leu Ala Ala Tyr Gln Asp Val Leu Tyr Ala Gln Asn
 50 55 60

Ile Tyr Gly Leu Leu Ile Ile Phe Gln Ala Met Asp Ala Ala Gly Lys
65 70 75 80

Asp Ser Thr Ile Lys His Val Met Ser Gly Leu Asn Pro Gln Ala Cys
85 90 95

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

Phe Leu Trp Arg Ala Asn Arg Ala Leu Pro Glu Arg Gly Cys Ile Gly
115 120 125

Ile Phe Asn Arg Ser Tyr Tyr Glu Glu Val Leu Val Val Arg Val His
130 135 140

Pro Asp Leu Leu Asn Arg Gln Gln Leu Pro Pro Glu Thr Lys Thr Lys
145 150 155 160

His Ile Trp Lys Glu Arg Phe Glu Asp Ile Asn His Tyr Glu Arg Tyr
165 170 175

Leu Thr Arg Asn Gly Ile Leu Ile Leu Lys Phe Phe Leu His Ile Ser
180 185 190

Lys Ala Glu Gln Lys Lys Arg Phe Leu Glu Arg Ile Ser Arg Pro Glu
195 200 205

Lys Asn Trp Lys Phe Ser Ile Glu Asp Val Arg Asp Arg Ala His Trp
210 215 220

Asp Asp Tyr Gln Gln Ala Tyr Ala Asp Val Phe Arg His Thr Ser Thr
225 230 235 240

Lys Trp Ala Pro Trp His Ile Ile Pro Ala Asn His Lys Trp Phe Ala
245 250 255

Arg Leu Met Val Ala His Phe Ile Tyr Gln Lys Leu Ala Ser Leu Asn
260 265 270

Leu His Tyr Pro Met Leu Ser Glu Ala His Arg Glu Gln Leu Leu Glu
 275 280 285

Ala Lys Ala Leu Leu Glu Asn Glu Pro Asp Glu Asp
 290 295 300

<210> 5

<211> 281

<212> PRT

<213> Anaerolinea thermophila

<400> 5

Met Gly Glu Ala Met Glu Arg Tyr Phe Ile Lys Pro Gly Glu Lys Val
 1 5 10 15

Arg Leu Lys Asp Trp Ser Pro Asp Pro Pro Lys Asp Phe Glu Gly Asp
 20 25 30

Lys Glu Ser Thr Arg Ala Ala Val Ala Glu Leu Asn Arg Lys Leu Glu
 35 40 45

Val Leu Gln Glu Arg Leu Tyr Ala Glu Arg Lys His Lys Val Leu Val
 50 55 60

Ile Leu Gln Gly Met Asp Thr Ser Gly Lys Asp Gly Val Ile Arg Ser
 65 70 75 80

Val Phe Glu Gly Val Asn Pro Gln Gly Val Lys Val Ala Asn Phe Lys
 85 90 95

Val Pro Thr Gln Glu Glu Leu Asp His Asp Tyr Leu Trp Arg Val His
 100 105 110

Lys Val Val Pro Gly Lys Gly Glu Ile Val Ile Phe Asn Arg Ser His
 115 120 125

Tyr Glu Asp Val Leu Val Val Arg Val His Asn Leu Val Pro Pro Glu
 130 135 140

Val Trp Lys Lys Arg Tyr Glu Gln Ile Asn Gln Phe Glu Arg Leu Leu

145		150		155		160									
His	Glu	Thr	Gly	Thr	Thr	Ile	Leu	Lys	Phe	Phe	Leu	Phe	Ile	Ser	Arg
				165					170					175	
Glu	Glu	Gln	Lys	Gln	Arg	Leu	Leu	Glu	Arg	Leu	Ala	Asp	Pro	Ala	Lys
			180					185					190		
His	Trp	Lys	Phe	Asn	Pro	Gly	Asp	Leu	Lys	Glu	Arg	Ala	Leu	Trp	Glu
		195					200					205			
Glu	Tyr	Glu	Lys	Ala	Tyr	Glu	Asp	Val	Leu	Ser	Arg	Thr	Ser	Thr	Glu
	210					215					220				
Tyr	Ala	Pro	Trp	Ile	Leu	Val	Pro	Ala	Asp	Lys	Lys	Trp	Tyr	Arg	Asp
225					230					235					240
Trp	Val	Ile	Ser	Arg	Val	Leu	Val	Glu	Thr	Leu	Glu	Gly	Leu	Glu	Ile
				245					250					255	
Gln	Leu	Pro	Pro	Pro	Leu	Ala	Asp	Ala	Glu	Thr	Tyr	Arg	Arg	Gln	Leu
			260					265					270		
Leu	Glu	Glu	Asp	Ala	Pro	Glu	Ser	Arg							
	275						280								
<210> 6															
<211> 270															
<212> PRT															
<213> Caldilinea aerophila															
<400> 6															
Met	Asp	Val	Asp	Arg	Tyr	Arg	Val	Pro	Pro	Gly	Ser	Thr	Ile	His	Leu
1				5					10					15	
Ser	Gln	Trp	Pro	Pro	Asp	Asp	Arg	Ser	Leu	Tyr	Glu	Gly	Asp	Lys	Lys
			20					25					30		
Gln	Gly	Lys	Gln	Asp	Leu	Ser	Ala	Leu	Asn	Arg	Arg	Leu	Glu	Thr	Leu
		35					40					45			

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

Gln Gly Met Asp Thr Ser Gly Lys Asp Gly Val Ile Arg His Val Phe
65 70 75 80

Asn Gly Val Asn Pro Gln Gly Val Lys Val Ala Ser Phe Lys Val Pro
85 90 95

Thr Ala Val Glu Leu Ala His Asp Phe Leu Trp Arg Ile His Arg Gln
100 105 110

Thr Pro Gly Ser Gly Glu Ile Val Ile Phe Asn Arg Ser His Tyr Glu
115 120 125

Asp Val Leu Val Val Arg Val His Gly Leu Val Pro Pro Glu Val Trp
130 135 140

Ala Arg Arg Tyr Glu His Ile Asn Ala Phe Glu Lys Leu Leu Val Asp
145 150 155 160

Glu Gly Thr Thr Ile Leu Lys Phe Phe Leu His Ile Ser Lys Glu Glu
165 170 175

Gln Arg Gln Arg Leu Leu Glu Arg Leu Glu Met Pro Glu Lys Arg Trp
180 185 190

Lys Phe Ser Val Gly Asp Leu Ala Glu Arg Lys Arg Trp Asp Glu Tyr
195 200 205

Met Ala Ala Tyr Glu Ala Val Leu Ser Lys Thr Ser Thr Glu Tyr Ala
210 215 220

Pro Trp Tyr Ile Val Pro Ser Asp Arg Lys Trp Tyr Arg Asn Leu Val
225 230 235 240

Ile Ser His Val Ile Ile Asn Ala Leu Glu Gly Leu Asn Met Arg Tyr
245 250 255

Pro Gln Pro Glu Asp Ile Ala Phe Asp Thr Ile Val Ile Glu
260 265 270

<210> 7
<211> 294
<212> PRT
<213> Chlorobaculum tepidum
<400> 7

Met Lys Leu Asp Leu Asp Ala Phe Arg Ile Gln Pro Gly Lys Lys Pro
1 5 10 15

Asn Leu Ala Lys Arg Pro Thr Arg Ile Asp Pro Val Tyr Arg Ser Lys
20 25 30

Gly Glu Tyr His Glu Leu Leu Ala Asn His Val Ala Glu Leu Ser Lys
35 40 45

Leu Gln Asn Val Leu Tyr Ala Asp Asn Arg Tyr Ala Ile Leu Leu Ile
50 55 60

Phe Gln Ala Met Asp Ala Ala Gly Lys Asp Ser Ala Ile Lys His Val
65 70 75 80

Met Ser Gly Val Asn Pro Gln Gly Cys Gln Val Tyr Ser Phe Lys His
85 90 95

Pro Ser Ala Thr Glu Leu Glu His Asp Phe Leu Trp Arg Thr Asn Cys
100 105 110

Val Leu Pro Glu Arg Gly Arg Ile Gly Ile Phe Asn Arg Ser Tyr Tyr
115 120 125

Glu Glu Val Leu Val Val Arg Val His Pro Glu Ile Leu Glu Met Gln
130 135 140

Asn Ile Pro His Asn Leu Ala His Asn Gly Lys Val Trp Asp His Arg
145 150 155 160

Tyr Arg Ser Ile Val Ser His Glu Gln His Leu His Cys Asn Gly Thr
165 170 175

Arg Ile Val Lys Phe Tyr Leu His Leu Ser Lys Glu Glu Gln Arg Lys
180 185 190

Arg Phe Leu Glu Arg Ile Asp Asp Pro Asn Lys Asn Trp Lys Phe Ser
195 200 205

Thr Ala Asp Leu Glu Glu Arg Lys Phe Trp Asp Gln Tyr Met Glu Ala
210 215 220

Tyr Glu Ser Cys Leu Gln Glu Thr Ser Thr Lys Asp Ser Pro Trp Phe
225 230 235 240

Ala Val Pro Ala Asp Asp Lys Lys Asn Ala Arg Leu Ile Val Ser Arg
245 250 255

Ile Val Leu Asp Thr Leu Glu Ser Leu Asn Leu Lys Tyr Pro Glu Pro
260 265 270

Ser Pro Glu Arg Arg Lys Glu Leu Leu Asp Ile Arg Lys Arg Leu Glu
275 280 285

Asn Pro Glu Asn Gly Lys
290

<210> 8
<211> 269
<212> PRT
<213> Oceanithermus profundus

<400> 8

Met Asp Val Ser Arg Tyr Arg Val Pro Pro Gly Ser Gly Phe Asp Pro
1 5 10 15

Glu Ala Trp Pro Thr Arg Glu Asp Asp Asp Phe Ala Gly Gly Lys Lys
20 25 30

Glu Ala Lys Lys Glu Leu Ala Arg Leu Ala Val Arg Leu Gly Glu Leu
35 40 45

Gln Ala Arg Leu Tyr Ala Glu Gly Arg Gln Ala Leu Leu Ile Val Leu
50 55 60

Gln Gly Met Asp Thr Ala Gly Lys Asp Gly Thr Ile Arg His Val Phe
65 70 75 80

Arg Ala Val Asn Pro Gln Gly Val Arg Val Thr Ser Phe Lys Lys Pro
85 90 95

Thr Ala Leu Glu Leu Ala His Asp Tyr Leu Trp Arg Val His Arg His
100 105 110

Ala Pro Ala Arg Gly Glu Ile Gly Ile Phe Asn Arg Ser His Tyr Glu
115 120 125

Asp Val Leu Val Val Arg Val His Glu Leu Val Pro Pro Glu Val Trp
130 135 140

Gly Arg Arg Tyr Asp His Ile Asn Ala Phe Glu Arg Leu Leu Ala Asp
145 150 155 160

Glu Gly Thr Arg Ile Val Lys Phe Phe Leu His Ile Ser Lys Asp Glu
165 170 175

Gln Lys Arg Arg Leu Glu Ala Arg Leu Glu Asn Pro Arg Lys His Trp
180 185 190

Lys Phe Asn Pro Ala Asp Leu Ser Glu Arg Ala Arg Trp Gly Asp Tyr
195 200 205

Ala Ala Ala Tyr Ala Glu Ala Leu Ser Arg Thr Ser Ser Asp Arg Ala
210 215 220

Pro Trp Tyr Ala Val Pro Ala Asp Arg Lys Trp Gln Arg Asn Arg Ile
225 230 235 240

Val Ala Gln Val Leu Val Asp Ala Leu Glu Ala Met Asp Pro Arg Phe
245 250 255

Pro Arg Val Asp Phe Asp Pro Ala Ser Val Arg Val Glu

260

265

<210> 9
 <211> 290
 <212> PRT
 <213> Roseiflexus castenholzii

<400> 9

Met Tyr Ala Gln Arg Val Val Pro Gly Met Arg Val Arg Leu His Asp
 1 5 10 15

Ile Asp Pro Asp Ala Asn Gly Gly Leu Asn Lys Asp Glu Gly Arg Ala
 20 25 30

Arg Phe Ala Glu Leu Asn Ala Glu Leu Asp Val Met Gln Glu Glu Leu
 35 40 45

Tyr Ala Ala Gly Ile His Ala Leu Leu Leu Ile Leu Gln Gly Met Asp
 50 55 60

Thr Ala Gly Lys Asp Gly Ala Ile Arg Asn Val Met Leu Asn Leu Asn
 65 70 75 80

Pro Gln Gly Cys Arg Val Glu Ser Phe Lys Val Pro Thr Glu Glu Glu
 85 90 95

Leu Ala His Asp Phe Leu Trp Arg Val His Arg Val Val Pro Arg Lys
 100 105 110

Gly Met Val Gly Val Phe Asn Arg Ser His Tyr Glu Asp Val Leu Val
 115 120 125

Val Arg Val His Ser Leu Val Pro Glu Ser Val Trp Arg Ala Arg Tyr
 130 135 140

Asp Gln Ile Asn Ala Phe Glu Arg Leu Leu Ala Asp Thr Gly Thr Ile
 145 150 155 160

Ile Val Lys Cys Phe Leu His Ile Ser Lys Glu Glu Gln Glu Gln Arg
 165 170 175

Leu Leu Ala Arg Glu Arg Asp Val Ser Lys Ala Trp Lys Leu Ser Ala
180 185 190

Gly Asp Trp Arg Glu Arg Ala Phe Trp Asp Asp Tyr Met Ala Ala Tyr
195 200 205

Glu Glu Ala Leu Thr Arg Cys Ser Thr Asp Tyr Ala Pro Trp Tyr Ile
210 215 220

Ile Pro Ala Asn Arg Lys Trp Tyr Arg Asp Leu Ala Ile Ser Glu Ala
225 230 235 240

Leu Val Glu Thr Leu Arg Pro Tyr Arg Asp Asp Trp Arg Arg Ala Leu
245 250 255

Asp Ala Met Ser Arg Ala Arg Arg Ala Glu Leu Glu Ala Phe Arg Ala
260 265 270

Glu Gln His Ala Met Glu Gly Arg Pro Gln Gly Ala Gly Gly Val Ser
275 280 285

Arg Arg
290

<210> 10
<211> 282
<212> PRT
<213> Roseiflexus sp

<400> 10

Met His Tyr Ala His Thr Val Ile Pro Gly Thr Gln Val Arg Leu Arg
1 5 10 15

Asp Ile Asp Pro Asp Ala Ser Gly Gly Leu Thr Lys Asp Glu Gly Arg
20 25 30

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

Leu Tyr Ala Ala Gly Val His Ala Leu Leu Leu Ile Leu Gln Gly Met

50

55

60

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

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

Glu Leu Ala His Asp Phe Leu Trp Arg Val His Lys Val Val Pro Arg
100 105 110

Lys Gly Met Val Gly Val Phe Asn Arg Ser His Tyr Glu Asp Val Leu
115 120 125

Val Val Arg Val His Ser Leu Val Pro Glu His Val Trp Arg Ala Arg
130 135 140

Tyr Asp Gln Ile Asn Ala Phe Glu Arg Leu Leu Thr Asp Thr Gly Thr
145 150 155 160

Ile Ile Val Lys Cys Phe Leu His Ile Ser Lys Asp Glu Gln Glu Lys
165 170 175

Arg Leu Leu Ala Arg Glu Gln Asp Val Thr Lys Ala Trp Lys Leu Ser
180 185 190

Ala Gly Asp Trp Arg Glu Arg Glu Arg Trp Asp Glu Tyr Met Ala Ala
195 200 205

Tyr Glu Glu Ala Leu Thr Arg Cys Ser Thr Glu Tyr Ala Pro Trp Tyr
210 215 220

Ile Ile Pro Ala Asn Arg Lys Trp Tyr Arg Asp Leu Ala Ile Ser Glu
225 230 235 240

Val Leu Val Glu Thr Leu Arg Pro Tyr Arg Asp Asp Trp Gln Arg Ala
245 250 255

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

His Gln Gln Thr Ala Gly Ala Thr Arg Leu
275 280

<210> 11
<211> 274
<212> PRT
<213> Truepera radiovictrix

<400> 11

Met Ser Gln Gly Ser Ala Lys Gly Leu Gly Lys Leu Asp Lys Lys Val
1 5 10 15

Tyr Ala Arg Glu Leu Ala Leu Leu Gln Leu Glu Leu Val Lys Leu Gln
20 25 30

Gly Trp Ile Lys Ala Gln Gly Leu Lys Val Val Val Leu Phe Glu Gly
35 40 45

Arg Asp Ala Ala Gly Lys Gly Ser Thr Ile Thr Arg Ile Thr Gln Pro
50 55 60

Leu Asn Pro Arg Val Cys Arg Val Val Ala Leu Gly Ala Pro Thr Glu
65 70 75 80

Arg Glu Arg Thr Gln Trp Tyr Phe Gln Arg Tyr Val His His Leu Pro
85 90 95

Ala Ala Gly Glu Met Val Leu Phe Asp Arg Ser Trp Tyr Asn Arg Ala
100 105 110

Gly Val Glu Arg Val Met Gly Phe Cys Thr Glu Ala Glu Tyr Arg Glu
115 120 125

Phe Leu His Ala Cys Pro Thr Phe Glu Arg Leu Leu Leu Asp Ala Gly
130 135 140

Ile Ile Leu Ile Lys Tyr Trp Phe Ser Val Ser Ala Ala Glu Gln Glu
145 150 155 160

Arg Arg Met Arg Arg Arg Asn Glu Asn Pro Ala Lys Arg Trp Lys Leu
165 170 175

Ser Pro Met Asp Leu Glu Ala Arg Ala Arg Trp Val Ala Tyr Ser Lys
180 185 190

Ala Lys Asp Ala Met Phe Tyr His Thr Asp Thr Lys Ala Ser Pro Trp
195 200 205

Tyr Val Val Asn Ala Glu Asp Lys Arg Arg Ala His Leu Ser Cys Ile
210 215 220

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

Leu Glu Met Pro Pro Arg Asp Leu Ala Gly Ala Asp Glu Gly Tyr Glu
245 250 255

Arg Pro Asp Lys Ala His Gln Thr Trp Val Pro Asp Tyr Val Pro Pro
260 265 270

Thr Arg

<210> 12
<211> 186
<212> PRT
<213> Thermus thermophilus

<400> 12

Met Asp Val Gly Gln Ala Val Ile Phe Leu Gly Pro Pro Gly Ala Gly
1 5 10 15

Lys Gly Thr Gln Ala Ser Arg Leu Ala Gln Glu Leu Gly Phe Lys Lys
20 25 30

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

Leu Gly Glu Arg Val Arg Pro Ile Met Glu Arg Gly Asp Leu Val Pro
50 55 60

Asp Asp Leu Ile Leu Glu Leu Ile Arg Glu Glu Leu Ala Glu Arg Val
65 70 75 80

Ile Phe Asp Gly Phe Pro Arg Thr Leu Ala Gln Ala Glu Ala Leu Asp
85 90 95

Arg Leu Leu Ser Glu Thr Gly Thr Arg Leu Leu Gly Val Val Leu Val
100 105 110

Glu Val Pro Glu Glu Glu Leu Val Arg Arg Ile Leu Arg Arg Ala Glu
115 120 125

Leu Glu Gly Arg Ser Asp Asp Asn Glu Glu Thr Val Arg Arg Arg Leu
130 135 140

Glu Val Tyr Arg Glu Lys Thr Glu Pro Leu Val Gly Tyr Tyr Glu Ala
145 150 155 160

Arg Gly Val Leu Lys Arg Val Asp Gly Leu Gly Thr Pro Asp Glu Val
165 170 175

Tyr Ala Arg Ile Arg Ala Ala Leu Gly Ile
180 185

<210> 13
<211> 208
<212> PRT
<213> Thermus thermophilus

<400> 13

Met Arg Gly Ile Val Thr Ile Asp Gly Pro Ser Ala Ser Gly Lys Ser
1 5 10 15

Ser Val Ala Arg Arg Val Ala Ala Ala Leu Gly Val Pro Tyr Leu Ser
20 25 30

Ser Gly Leu Leu Tyr Arg Ala Ala Ala Phe Leu Ala Leu Arg Ala Gly
35 40 45

Val Asp Pro Gly Asp Glu Glu Gly Leu Leu Ala Leu Leu Glu Gly Leu
50 55 60

Gly Val Arg Leu Leu Ala Gln Ala Glu Gly Asn Arg Val Leu Ala Asp
65 70 75 80

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

Val Ser Ala Val Ala Arg Leu Pro Gly Val Arg Ala Trp Val Asn Arg
100 105 110

Arg Leu Lys Glu Val Pro Pro Pro Phe Val Ala Glu Gly Arg Asp Met
115 120 125

Gly Thr Ala Val Phe Pro Glu Ala Ala His Lys Phe Tyr Leu Thr Ala
130 135 140

Ser Pro Glu Val Arg Ala Trp Arg Arg Ala Arg Glu Arg Pro Gln Ala
145 150 155 160

Tyr Glu Glu Val Leu Arg Asp Leu Leu Arg Arg Asp Glu Arg Asp Lys
165 170 175

Ala Gln Ser Ala Pro Ala Pro Asp Ala Leu Val Leu Asp Thr Gly Gly
180 185 190

Met Thr Leu Asp Glu Val Val Ala Trp Val Leu Ala His Ile Arg Arg
195 200 205

<210> 14
<211> 225
<212> PRT
<213> Pyrococcus furiosus

<400> 14

Met Arg Ile Val Phe Asp Ile Gly Gly Ser Val Leu Val Pro Glu Asn
1 5 10 15

Pro Asp Ile Asp Phe Ile Lys Glu Ile Ala Tyr Gln Leu Thr Lys Val
20 25 30

Ser Glu Asp His Glu Val Ala Val Val Val Gly Gly Gly Lys Leu Ala
35 40 45

Arg Lys Tyr Ile Glu Val Ala Glu Lys Phe Asn Ser Ser Glu Thr Phe
50 55 60

Lys Asp Phe Ile Gly Ile Gln Ile Thr Arg Ala Asn Ala Met Leu Leu
65 70 75 80

Ile Ala Ala Leu Arg Glu Lys Ala Tyr Pro Val Val Val Glu Asp Phe
85 90 95

Trp Glu Ala Trp Lys Ala Val Gln Leu Lys Lys Ile Pro Val Met Gly
100 105 110

Gly Thr His Pro Gly His Thr Thr Asp Ala Val Ala Ala Leu Leu Ala
115 120 125

Glu Phe Leu Lys Ala Asp Leu Leu Val Val Ile Thr Asn Val Asp Gly
130 135 140

Val Tyr Thr Ala Asp Pro Lys Lys Asp Pro Thr Ala Lys Lys Ile Lys
145 150 155 160

Lys Met Lys Pro Glu Glu Leu Leu Glu Ile Val Gly Lys Gly Ile Glu
165 170 175

Lys Ala Gly Ser Ser Ser Val Ile Asp Pro Leu Ala Ala Lys Ile Ile
180 185 190

Ala Arg Ser Gly Ile Lys Thr Ile Val Ile Gly Lys Glu Asp Ala Lys
195 200 205

Asp Leu Phe Arg Val Ile Lys Gly Asp His Asn Gly Thr Thr Ile Glu
210 215 220

Pro
225

<210> 15
 <211> 207
 <212> PRT
 <213> Thermotoga maritima

<400> 15

Met Lys Gly Gln Leu Phe Val Ile Cys Gly Pro Ser Gly Ala Gly Lys
 1 5 10 15

Thr Ser Ile Ile Lys Glu Val Leu Lys Arg Leu Asp Asn Val Val Phe
 20 25 30

Ser Val Ser Cys Thr Thr Arg Pro Lys Arg Pro His Glu Glu Asp Gly
 35 40 45

Lys Asp Tyr Phe Phe Ile Thr Glu Glu Glu Phe Leu Lys Arg Val Glu
 50 55 60

Arg Gly Glu Phe Leu Glu Trp Ala Arg Val His Gly His Leu Tyr Gly
 65 70 75 80

Thr Leu Arg Ser Phe Val Glu Ser His Ile Asn Glu Gly Lys Asp Val
 85 90 95

Val Leu Asp Ile Asp Val Gln Gly Ala Leu Ser Val Lys Lys Lys Tyr
 100 105 110

Ser Asn Thr Val Phe Ile Tyr Val Ala Pro Pro Ser Tyr Ala Asp Leu
 115 120 125

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

Val Arg Leu Glu Asn Ala Lys Trp Glu Leu Met Phe Met Asp Glu Phe
 145 150 155 160

Asp Tyr Ile Val Val Asn Glu Asn Leu Glu Asp Ala Val Glu Met Val
 165 170 175

Val Ser Ile Val Arg Ser Glu Arg Ala Lys Val Thr Arg Asn Gln Asp

180

185

190

Lys Ile Glu Arg Phe Lys Met Glu Val Lys Gly Trp Lys Lys Leu
 195 200 205

<210> 16

<211> 142

<212> PRT

<213> Aquifex aeolicus

<400> 16

Met Ala Val Glu Arg Thr Leu Ile Ile Val Lys Pro Asp Ala Met Glu
 1 5 10 15

Lys Gly Ala Leu Gly Lys Ile Leu Asp Arg Phe Ile Gln Glu Gly Phe
 20 25 30

Gln Ile Lys Ala Leu Lys Met Phe Arg Phe Thr Pro Glu Lys Ala Gly
 35 40 45

Glu Phe Tyr Tyr Val His Arg Glu Arg Pro Phe Phe Gln Glu Leu Val
 50 55 60

Glu Phe Met Ser Ser Gly Pro Val Val Ala Ala Val Leu Glu Gly Glu
 65 70 75 80

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

Glu Ala Arg Lys Val Ala Pro Asn Ser Ile Arg Ala Gln Phe Gly Thr
 100 105 110

Asp Lys Gly Lys Asn Ala Ile His Ala Ser Asp Ser Pro Glu Ser Ala
 115 120 125

Gln Tyr Glu Ile Cys Phe Ile Phe Ser Gly Leu Glu Ile Val
 130 135 140

<210> 17

<211> 15

<212> DNA

<213> Unknown

<220>

<223> Initially Transcribed Sequence

<400> 17

gggagaccag gaatt

15