

SequenceListing_2014-04-04.txt
SEQUENCE LISTING

<110> TEKNOLOGIAN TUTKIMUSKESKUS VTT

<120> PRODUCTION OF ACID(S) AND ALCOHOL FROM SUGARS USING YEAST

<130> VTT 378 PCT

<160> 36

<170> PatentIn version 3.5

<210> 1

<211> 747

<212> DNA

<213> *Caulobacter crescentus*

<400> 1

atgtcctcag ccatctatcc cagcctgaag ggcaagcgcg tcgtcatcac cggcggcggc	60
tcgggcatcg gggccggcct caccgccggc ttcgcccgtc agggcgcgga ggtgatcttc	120
ctcgacatcg ccgacgagga ctccagggct cttgaggccg agctggccgg ctcgccgac	180
ccgcccgtct acaagcgctg cgacctgatg aacctcgagg cgatcaaggc ggtcttcgcc	240
gagatcggcg acgtcgacgt gctgggtcaac aacgccggca atgacgaccg ccacaagctg	300
gccgacgtga ccggcgcccta ttgggacgag cggatcaacg tcaacctgcg ccacatgctg	360
ttctgcaccc aggccgtcgc gccgggcatg aagaagcgctg gcggcggggc ggtgatcaac	420
ttcggttcga tcagctggca cctggggctt gaggacctcg tcctctacga aaccgccaa	480
gccggcatcg aaggcatgac ccgcgcgctg gcccgggagc tgggtcccga cgacatccgc	540
gtcacctgcg tgggtgccgg caacgtcaag accaagcgcc aggagaagtg gtacacgccc	600
gaaggcgagg cccagatcgt ggcgcccaa tgcctgaagg gccgcatcgt cccggagaac	660
gtcgccgcgc tgggtgctgtt cctggcctcg gatgacgcgt cgctctgcac cggccacgaa	720
tactggatcg acgccggctg gcgttga	747

<210> 2

<211> 906

<212> DNA

<213> *Escherichia coli*

<400> 2

atgaaaaaat tcagcggcat tattccaccg gtatccagca cgtttcatcg tgacggaacc	60
cttgataaaa aggcaatgcg cgaagtgtcc gacttcctga ttaataaagg ggtcgacggg	120
ctgttttatc tgggtaccgg tgggtgaattt agccaaatga atacagcca gcgcatggca	180
ctcgccgaag aagctgtaac cattgtcgac gggcgagtgc cggattgat tggcgctcgt	240
tccccttcca ctgacgaagc ggtcaaactg gcgcagcatg cgcaagccta cggcgctgat	300
ggtatcgtcg ccatcaacc ctactactgg aaagtcgcac cacgaaatct tgacgactat	360
taccagcaga tcgcccgtag cgtcaccta ccggtgatcc tgtacaactt tccggatctg	420
acgggtcagg acttaacccc ggaaaccgtg acgcgtctgg ctctgcaaaa cgagaatatc	480
gttggcatca aagacacat cgacagcgtt ggtcacttgc gtacgatgat caacacagtt	540

SequenceListing_2014-04-04.txt

aagtcggtac gcccgtcggtt ttcgggtattc tgcggttacg atgatcattt gctgaatacg	600
atgctgctgg gcggcgacgg tgcgataacc gccagcgcta actttgctcc ggaactctcc	660
gtcggcatct accgcgcctg gcgtgaaggc gatctggcga ccgctgcgac gctgaataaa	720
aaactactac aactgcccgc tatttacgcc ctcgaaacac cgtttgtctc actgatcaaa	780
tacagcatgc agtgtgtcgg gctgcctgta gagacatatt gcttaccacc gattcttgaa	840
gcatctgaag aagcaaaaga taaagtccac gtgctgctta ccgcgagggg cattttacca	900
gtctga	906

<210> 3
 <211> 930
 <212> DNA
 <213> Escherichia coli

<400> 3	
atgattcagc aaggagatct catgccgcag tccgcgttgt tcacgggaat cattccccct	60
gtctccacca tttttaccgc cgacggccag ctcgataagc cgggcaccgc cgcgctgac	120
gacgatctga tcaaagcagg cgttgacggc ctgttcttcc tgggcagcgg tggcgagttc	180
tcccagctcg gcgccgaaga gcgtaaagcc attgcccgtt ttgctatcga tcatgtcgat	240
cgtcgcgtgc cgggtgctgat cggcaccggc ggcaccaacg cccgggaaac catcgaactc	300
agccagcacg cgcagcaggc gggcgcgagc ggcacgtggg tgatcaaccc ctactactgg	360
aaagtgtcgg aagcgaacct gatccgctat ttcgagcagg tggccgacag cgtcacgctg	420
ccggtgatgc tctataactt cccggcgctg accgggcagg atctgactcc ggcgctgggtg	480
aaaaccctcg ccgactcgcg cagcaatatt atcggcatca aagacaccat cgactccgtc	540
gcccacctgc gcagcatgat ccataaccgtc aaagggtgcc atccgcactt caccgtgctc	600
tgcgggtacg acgatcatct gttcaatacc ctgctgctcg gcggcgacgg ggcgatatcg	660
gcgagcggca actttgcccc gcagggtgctg gtgaatcttc tgaaagcctg gcgcgacggg	720
gacgtggcga aagcggccgg gtatcatcag accttgctgc aaattccgca gatgtatcag	780
ctggatacgc cgtttgtgaa cgtgattaaa gaggcgatcg tgctctgcgg tcgtcctgtc	840
tccacgcacg tgctgccgcc cgcctcgccg ctggacgagc cgcgcaaggc gcagctgaaa	900
accctgctgc aacagctcaa gctttgctga	930

<210> 4
 <211> 1710
 <212> DNA
 <213> Caulobacter crescentus

<400> 4	
atgaccgcgc tctatctgga gcgcttcatg aactacggga tcacgccgga ggagctgcgc	60
agcggcaagc cgatcatcgg catcgcccag accggcagcg acatctcgcc ctgcaaccgc	120
atccacctgg acctggtcca gcgggtgcgg gacgggatcc gcgacgccgg gggcatcccc	180
atggagttcc cgggtccatcc gatcttcgag aactgccgtc gcccgacggc ggcgctggac	240
cggaacctct cgtacctggg tctcgtcgag accctgcacg gctatccgat cgacgccgtg	300

SequenceListing_2014-04-04.txt

gttctgacca	ccggctgcga	caagaccacc	ccggccggga	tcatggccgc	caccacggtc	360
aatatccccg	ccatcgtgct	gtcggggcgg	ccgatgctgg	acggctggca	cgagaacgag	420
ctcgtgggct	cgggcaccgt	gatctggcgc	tcgcgccgca	agctggcggc	cggcgagatc	480
accgaggaag	agttcatcga	ccgcgccgcc	agctcggcgc	cgtcggcggg	ccactgcaac	540
accatgggca	cggcctcgac	catgaacgcc	gtggccgagg	cgctgggcct	gtcgtgacc	600
ggctgcgcgg	ccatccccgc	cccctaccgc	gagcgcggcc	agatggccta	caagaccggc	660
cagcgcacgc	tcgatctggc	ctatgacgac	gtcaaaccgc	tcgacatcct	gaccaagcaa	720
gccttcgaga	acgccatcgc	cctggtggcg	gcggccggcg	gctcgaccaa	cgcccagccg	780
cacatcgtgg	ccatggcccc	tcacgccggc	gtcgagatca	ccgccgacga	ctggcgcgcg	840
gcctatgaca	tcccgtgat	cgtcaacatg	cagccggccg	gcaagtatct	gggcgagcgc	900
ttccaccgag	ccggcgggcg	gccggcgggtg	ctgtggggagc	tggtgcagca	aggccgcctg	960
cacggcgacg	tgctgaccgt	caccggcaag	acgatgagcg	agaacctgca	aggccgcgaa	1020
accagcgacc	gcgaggtgat	cttcccgtac	cacgagccgc	tggccgagaa	ggccgggttc	1080
ctggtttctca	agggcaacct	cttcgacttc	gcgatcatga	agtccagcgt	gatcggcgag	1140
gagttccgca	agcgctacct	gtcgcagccc	ggccaggaag	gcgtgttcga	agcccgcgcc	1200
atcgtgttcg	acggctcgga	cgactatcac	aagcggatca	acgatccggc	cctggagatc	1260
gacgagcgct	gcacctgggt	gatccgcggc	gcgggtccga	tcggctggcc	cggctcggcc	1320
gaggtcgtca	acatgcagcc	gccggatcac	cttctgaaga	aggggatcat	gagcctgccc	1380
accctgggcg	atggccgtca	gtcgggcacc	gccgacagcc	cctcgatcct	gaacgcctcg	1440
cccgaaagcg	cgatcggcgg	cggcctgtcg	tggctgcgca	ccggcgacac	catccgcac	1500
gacctcaaca	ccggccgctg	cgacgccctg	gtcgacgagg	cgacgatcgc	cgcgcgcaag	1560
caggacggca	tcccggcgggt	tcccgccacc	atgacgccct	ggcaggaaat	ctaccgcgcc	1620
cacgccagtc	agctcgacac	cggcggcggtg	ctggagttcg	cgggtcaagta	ccaggacctg	1680
gcggccaagc	tgccccgcca	caaccactga				1710

<210> 5
 <211> 1440
 <212> DNA
 <213> Escherichia coli

<400> 5						
atgtcagtac	ccgttcaaca	tcctatgtat	atcgatggac	agtttgttac	ctggcgtgga	60
gacgcatgga	ttgatgtggt	aaaccctgct	acagaggctg	tcatttcccg	catacccgat	120
ggtcaggccg	aggatgcccc	taaggcaatc	gatgcagcag	aacgtgcaca	accagaatgg	180
gaagcgttgc	ctgctattga	acgcgccagt	tggttgcgca	aaatctccgc	cgggatccgc	240
gaacgcgcca	gtgaaatcag	tgcgctgatt	gttgaagaag	ggggcaagat	ccagcagctg	300
gctgaagtcg	aagtggcttt	tactgccgac	tatatcgatt	acatggcgga	gtgggcacgg	360
cgttacgagg	gcgagattat	tcaaagcgat	cgtccaggag	aaaatattct	tttgtttaaa	420

SequenceListing_2014-04-04.txt

cgtagcgcttg	gtgtgactac	cggcattctg	ccgtggaact	tcccgttctt	cctcattgcc	480
cgcaaatgg	ctcccgtctt	tttgaccggt	aataccatcg	tcattaaacc	tagtgaattt	540
acgccaaaca	atgtagattgc	attcgccaaa	atcgtagatg	aaataggcct	tccgtagcggc	600
gtgtttaacc	ttgtactggg	gcgtggtgaa	accgttgggc	aagaactggc	gggtaaccca	660
aaggtcgcaa	tggtcagtat	gacaggcagc	gtctctgcag	gtgagaagat	catggcgact	720
gcggcgaaaa	acatcaccaa	agtgtgtctg	gaattggggg	gtaaagcacc	agctatcgta	780
atggacgatg	ccgatcttga	actggcagtc	aaagccatcg	ttgattcacg	cgtcattaat	840
agtgggcaag	tgtgtaactg	tgcagaacgt	gtttatgtac	agaaaggcat	ttatgatcag	900
ttcgtcaatc	ggctgggtga	agcgatgcag	gcggttcaat	ttggtaaccc	cgctgaacgc	960
aacgacattg	cgatggggcc	gttgattaac	gccgtagcgc	tggaaagggt	cgagcaaaaa	1020
gtggcgcgcg	cagtagaaga	aggggagaga	gtggcggttcg	gtggcaaagc	ggtagagggg	1080
aaaggatatt	attatccgcc	gacattgctg	ctggatgttc	gccaggaaat	gtcgattatg	1140
catgaggaaa	cctttggccc	ggtgctgcca	gttgctgcag	ttgacacgct	ggaagatgct	1200
atctcaatgg	ctaatacag	tgattacggc	ctgacctcat	caatctatac	ccaaaatctg	1260
aacgtcgca	tgaagccat	taaagggtg	aagtttggtg	aaacttacat	caaccgtgaa	1320
aacttcgaag	ctatgcaagg	cttcacgcc	ggatggcgta	aatccggtat	tggcggcgca	1380
gatggtaaac	atggcttgca	tgaatatctg	cagaccagc	tggtttattt	acagtcttaa	1440

<210> 6
 <211> 972
 <212> DNA
 <213> Lactococcus helveticus

<400> 6						
atggcaagag	aggaaaaacc	tcgtaaagtt	attttagtcg	gtgatggtgc	tgtaggttct	60
acctttgcat	tttcaatggt	acaacaaggt	atcgctgaag	aattaggtat	tatcgatatc	120
gctaaggaac	acgttgaagg	tgacgcaatc	gatttagctg	acgcaactcc	ttggacttct	180
ccaaagaaca	tttacgcagc	tgactacca	gattgtaagg	atgctgactt	agttgttatt	240
actgctggtg	ctccacaaaa	gccaggcgaa	actcgtcttg	atcttgttaa	caagaacttg	300
aagattttat	catcaatcgt	tgaaccagtt	gttgaatcag	gttttgagg	tattttctta	360
gtagtgtgta	accagttga	tatcttaact	cacgcaactt	ggagaatgtc	aggcttcctt	420
aaggatcgtg	ttatcggttc	aggtacttca	cttgatactg	gtcgtcttca	aaaagttatt	480
ggtaaatgg	aaaacgttga	cccaagttca	gttaatgcag	acatgcttgg	tgaacacggt	540
gatactgaat	tcccagcatg	gagctacaac	aatgttgctg	gcgtaaagg	tgctgactgg	600
gttaaggctc	acaacatgcc	tgaatctaag	cttgaagaca	tccaccaaga	agttaaggac	660
atggccttacg	acattattaa	caagaaagg	gctaccttct	acggtatcgg	tactgcttca	720
gcaatgatcg	ctaaggctat	cttgaacgat	gaacaccgtg	tacttccact	ttcagtacca	780
atggatggtg	aatatgggtt	acacgatctt	cacatcggtg	ctcctgcagt	tggtggccgc	840

SequenceListing_2014-04-04.txt

aagggtcttg aacaagttat cgaaatgcc a ttaagcgata aggaacaaga attaatgact 900
gcttcagcag atcaattaaa gaaggttatg gacaaggcct tcaaagaaac tggcgttaag 960
gttcgtcaat aa 972

<210> 7
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer pTEF fw

<400> 7
tagaattccg taatacgact cactataggg cgaattgggt accgggcccc cacacaccat 60
agcttcaaa 69

<210> 8
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer pTEFrev

<400> 8
tagaattccc aaacctctgg cgaagaagtc caaagctgtc gacctcgagt ttgtaattaa 60
aacttagat 69

<210> 9
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer pTPI1 fw

<400> 9
taactagtag aggacaacac ctgttgtaat cgttcttcca cacgctgcag ttcttcagat 60
tccctcatg 69

<210> 10
<211> 76
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer pTPI1 rev

<400> 10
taactagtga aggctttaat ttgcggccgg tacccaattc gccggatccc ccggggttatg 60
tatgtgtttt ttgtag 76

<210> 11
<211> 70
<212> DNA
<213> Artificial Sequence

SequenceListing_2014-04-04.txt

```

<220>
<223> Synthetic oligonucleotide primer pPGK1 fw

<400> 11
taggatccgg ggagggcgtg aatgtaagcg tgacataact aattactagt aagctttcta      60
actgatctat                                                                70

<210> 12
<211> 78
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer pPGK1 rev

<400> 12
taggatccaa agaagcacca ccaccagtag agacatggga gatcccgcgg gcggccgctt      60
ttggttttat atttggtg                                                                78

<210> 13
<211> 74
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer tADH1 fw

<400> 13
taggatccag catagcaatc taatctaagt tttaattaca aactcgaggt cgacagcttt      60
ggacttcttc gcca                                                                74

<210> 14
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer tADH1 rev

<400> 14
taggatcctc tgccgcactt tctccatgag ggaatctgaa gaactgcagc gtgtggaaga      60
acgattaca                                                                69

<210> 15
<211> 76
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic oligonucleotide primer tCYC1 fw

<400> 15
tagaattcgc ttaaattctat aactacaaaa aacacataca taaccggggg gatccacagg      60
ccccttttcc tttgtc                                                                76

<210> 16
<211> 71
<212> DNA
<213> Artificial Sequence

```

SequenceListing_2014-04-04.txt

<220>
 <223> Synthetic oligonucleotide primer tCYC1 rev
 <400> 16
 tagaattcgt aattttcagt tttggataga tcagttagaa agcttactag tgatgagagt 60
 gtaaactgcg a 71
 <210> 17
 <211> 77
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> Synthetic oligonucleotide primer tPGK1 fw
 <400> 17
 tagaattcat tatctacttt ttacaacaaa tataaaacca aaagcggccg cccgcgggat 60
 ctcccatgtc tctactg 77
 <210> 18
 <211> 69
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> Synthetic oligonucleotide primer tPGK1 rev
 <400> 18
 tagaattcgc gcaattaacc ctactaaag ggaacaaaag ctggagctct taacgaacgc 60
 agaattttc 69
 <210> 19
 <211> 63
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> Synthetic oligonucleotide primer yagE fw
 <400> 19
 tagcaatcta atctaagttt taattacaaa ctcgagtaaa atgatacaac aaggtgactt 60
 aat 63
 <210> 20
 <211> 56
 <212> DNA
 <213> Artificial Sequence
 <220>
 <223> Synthetic oligonucleotide primer yagE rev
 <400> 20
 ccaaactct ggcgaagaag tccaaagctg tcgactcagc ataacttta ttgttg 56
 <210> 21
 <211> 5856
 <212> DNA
 <213> Caulobacter crescentus

SequenceListing_2014-04-04.txt

<400> 21
 gccactagtt caaagggaat gtgataatgc aaggttaggt ttaacaagaa 60
 tgggttggcg gactcgtcaa tggagagtac aatgccaaag ttctccttga ggttattttaa 120
 tcttccacag gttcaaggca ttctggcagc ttctcaattg ggaagttttc gtagatgata 180
 cggtaggtgg tggtaaataag tgggaactca tctgtcctgc ccatgttgga gaggaactcg 240
 taaacttccc tagttgtgtg gataccttga caggattggc cattcaacaa cttttcttca 300
 gcctccgttg cagagacaga atgttgtgcc atatatctac caactctaac gttacggccg 360
 ccggcacagg tagtgattag gtcggcaaca cctgcagatt catgagtaaa gggtgcagca 420
 tgacagccat cgaaaaaagt cttggcaaatt tgaatggttt ccaccaaacc tattctcatg 480
 actgcagcct ttgcattatc accccaacct aaaccttcga caaatgatat cacctaataa 540
 cttcgtatag catacattat acgaagttat attaagggtt ctcgagaatt cttgctgcaa 600
 cggcaacatc aatgtccacg ttacacacc tacatttata tctatatatta tatttatatt 660
 tatttattta tgctacttag cttctatagt tagttaatgc actcacgata ttcaaaattg 720
 acacccttca actactccct actattgtct actactgtct actactcctc ttactatag 780
 ctgctcccaa taggctccac caataggctc tgtcaataca ttttgcgccg ccacctttca 840
 gggtgtgtca ctctgaagg accatattgg gtaatcgtgc aatttctgga agagagtgcc 900
 gcgagaagtg agggcccccac tgtaaattcct cgaggggggca tggagtatgg ggcatgnagg 960
 atggaggatg ggggggggggg gggaaaatag gtagcgaaag gaccgcctat caccaccacc 1020
 ggagaactcg ttgccgggaa gtcataatttc gacactccgg ggagtctata aaaggcgggt 1080
 tttgtctttt gccagttgat gttgctgaga ggacttgttt gccgtttctt ccgatttaac 1140
 agtatagaat caaccactgt taattataca cgttatacta acacaacaaa aacaaaaaca 1200
 acgacaacaa caacaacaat gcctgaactc accgcgacgt ctgtcgagaa gtttctgac 1260
 gaaaagtctg acagcgtctc cgacctgatg cagctctcgg agggcgaga atctcgtgct 1320
 ttcagcttcg atgtaggagg gcgtggatat gtcctgcggg taaatagctg cgccgatggt 1380
 ttctacaaag atcgttatgt ttatcggcac tttgcatcgg ccgcgctccc gattccggaa 1440
 gtgcttgaca ttggggaatt cagcgagagc ctgacctatt gcatctcccg ccgtgcacag 1500
 ggtgtcacgt tgcaagacct gcctgaaacc gaactgcccg ctgttctgca gccggtcgcg 1560
 gaggccatgg atgcgatcgc tgcggccgat cttagccaga cgagcgggtt cggccattc 1620
 ggaccgcaag gaatcggcca atacactaca tggcgtgatt tcatatgcgc gattgctgat 1680
 ccccatgtgt atcactggca aactgtgatg gacgacaccg tcagtgcgtc cgtcgcgcag 1740
 gctctcgatg agctgatgct ttgggccgag gactgccccg aagtccggca cctcgtgcac 1800
 gcggatttcg gtcceaaca tgctctgacg gacaatggcc gcataacagc ggtcattgac 1860
 tggagcgagg cgatgttcgg ggattcccaa tacgaggtcg ccaacatctt cttctggagg 1920
 ccgtggttgg cttgtatgga gcagcagacg cgctacttcg agcggaggca tccggagctt 1980
 gcaggatcgc cgcggtccg ggcgtatatg ctccgcattg gtcttgacca actctatcag 2040

SequenceListing_2014-04-04.txt

agcttggttg	acggcaat	cgatgatgca	gcttgggcgc	agggtcgatg	cgacgcaatc	2100
gtccgatccg	gagccgggac	tgtcgggcgt	acacaaatcg	cccgcagaag	cgcggccgctc	2160
tggaccgatg	gctgtgtaga	agtactcgcc	gatagtggaa	accgacgccc	cagcactcgt	2220
ccgagggcaa	aggaatagag	tagtaagctc	aatgttgagc	aaagcaggac	gagaaaaaaa	2280
aaaataatga	ttgttaagaa	gttcatgaaa	aaaaaaagga	aaaataactca	aataacttata	2340
acagagtgat	taaataataa	acggcagtat	accctatcag	gtattgagat	agttttat	2400
ttgtaggtat	ataatctgaa	gcctttgaac	tattttctcg	tatatatcat	ggagtataca	2460
ttgcattagc	aacattacat	actaggatct	ctagacctaa	taacttcgta	tagcatacat	2520
tatacgaagt	tatattaagg	gttgtcgacg	gatccgcatg	cgatatggat	atggatatgg	2580
atatggagat	gaatttgaat	ttagatttgg	gtcttgat	ggggttgga	ttaaaagggg	2640
ataacaatga	gggttttcc	gttgatttaa	acaatggacg	tgggaggtga	ttgatttaac	2700
ctgatccaaa	aggggtatgt	ctat	gagagtgt	ttgtgtcaaa	ttatggtaga	2760
atgtgtaaag	tagtataaac	tttcctctca	aatgacgagg	tttaaaacac	cccccggtg	2820
agccgagccg	agaatggggc	aattgttcaa	tgtgaaatag	aagtatcgag	tgagaaactt	2880
gggtgttggc	cagccaaggg	ggggggggaa	ggaaaatggc	gcgaatgctc	aggtgagatt	2940
gttttggaat	tgggtgaagc	gaggaaatga	gcgacccgga	ggttgtgact	ttagtggcgg	3000
aggaggacgg	agggaaagcc	aagaggggaag	tgtatataag	gggagcaatt	tgccaccagg	3060
atagaattgg	atgagttata	attctactgt	atttattgta	taatttattt	ctccttttgt	3120
atcaaacaca	ttacaaaaca	cacaaaacac	acaacaacac	acaattacaa	aaattaaatt	3180
cacaatgtct	aatagaactc	caagaagatt	cagatcaaga	gattggtttg	ataaccaga	3240
tcatattgat	atgactgcat	tatacttggg	aagattcatg	aattatggta	ttactccaga	3300
agaattgaga	tcaggtaa	ctattattgg	tattgctcaa	actggttctg	atatttctcc	3360
atgtaacaga	atccatttgg	atttggttca	aagagttaga	gacggtatta	gagatgctgg	3420
tggattcca	atggaatttc	cagttcatcc	aatttttgaa	aactgtagaa	gaccaactgc	3480
tgctttggat	agaaatttgt	cttatttggg	tttggttgaa	actttacatg	gttatccaat	3540
tgatgctgtt	gttttgacta	ctggttgtga	taagactact	ccagctggta	ttatggctgc	3600
tactactgtt	aatattccag	ctatcgtttt	gtctgggtgg	ccaatgttgg	atggttggca	3660
cgaaaatgaa	ttggttgggt	ctgggtactgt	tatttgagaa	tcaagaagaa	aattggctgc	3720
tggtgaaatt	actgaagaag	agttcattga	tagagctgct	tcactctgctc	catctgctgg	3780
tcattgcaac	acaatgggta	ctgcttctac	tatgaatgct	gttgctgaag	ctttgggttt	3840
gtctttgact	ggttgtgctg	ctattccagc	tccatataga	gaaaggggtc	aaatggctta	3900
caaaactgg	caaagaatcg	ttgatttggc	ttacgatgat	gttaagccat	tggatatttt	3960
gacaaagcaa	gcttttgaaa	atgctattgc	tttggttgct	gctgctggtg	gttctactaa	4020
tgctcaacca	catatcgttg	ctatggctag	acatgctgg	gttgaaatta	ctgctgatga	4080
ttggagagct	gcttatgata	ttccattgat	cgttaatatg	caaccagctg	gtaaatattt	4140

SequenceListing_2014-04-04.txt

gggtgaaaga	tttcatagag	ctggtggtgc	tccagctggt	ttgtgggaat	tattgcaaca	4200
aggtagattg	catggtgatg	ttttgactgt	tactggtaaa	actatgtctg	aaaacttgca	4260
aggtagagaa	acttctgata	gagaagttat	tttcccatat	catgaaccat	tggtgaaaa	4320
agctggtttt	ttggttttga	agggtaat	gttcgatttt	gctattatga	agtcattctgt	4380
tattggtgaa	gagttcagaa	aaagatactt	gtctcaacca	ggtcaagaag	gtgtttttga	4440
agctagagca	atcgtttttg	atggttctga	tgattaccat	aagagaatca	atgatccagc	4500
tttggaatt	gacgaaagat	gtattttggt	tattagaggt	gcaggtccaa	ttggttgcc	4560
aggttctgct	gaagttgtta	acatgcaacc	tccagatcat	ttgttgaaaa	agggtattat	4620
gtctttgcc	actttgggtg	atggtagaca	atctggtact	gctgattctc	catctatttt	4680
gaatgcttct	ccagaatctg	ctattggtgg	tggtttgtct	tggttgagaa	ctggtgatac	4740
aattagaatt	gatttgaaca	ctggtagatg	tgatgctttg	gttgatgaag	ctactattgc	4800
tgctagaaaa	caagatggta	ttccagctgt	tccagctact	atgactccat	ggcaagaaat	4860
ctatagagca	catgcttctc	aattggatac	tggtggtggt	ttggaatttg	ctgttaagta	4920
tcaagatttg	gctgctaaat	tgccaagaca	taatcattga	ggatctaacc	catgtctcta	4980
ctggtggtgg	tgcttctttg	gaattattgg	aaggtaagga	attgccaggt	gttgctttct	5040
tatccgaaaa	gaaataaatt	gaattgaatt	gaaatcgata	gatcaatttt	tttcttttct	5100
ctttcccat	cctttacgct	aaaataatag	tttattttat	tttttgaaata	ttttttattt	5160
atatacgtat	atatagacta	ttatttatct	tttaatgatt	attaagattt	ttattaaaaa	5220
aaaattcgct	cctcttttaa	tgcctttatg	cagttttttt	ttccattcgc	atatttctat	5280
gttcgggttc	agcgtatttt	aagtttaata	actcgaaaat	tctgcgttcg	ttaacctgca	5340
ggaattcgag	ctcgggtacc	ggggatccat	tcttggtaaa	aattggtgag	gaatattaaa	5400
gacaatcaag	tctgagcctg	cacaagcctc	aacaatgtct	ggaactgcaa	caacgttaac	5460
tggaacttg	atacctggca	agtacttgac	gttttcgtgt	ttggtattta	tgatttcagt	5520
caacttttcg	ccttcaatca	attcttcata	gaccacata	ttaacatctc	tttgaaattg	5580
acgaggtctc	tcaacggtgt	tttccgctat	aaccttgga	attgtacacc	cccagttacc	5640
ggaaccaaca	accgtcacct	tgaacggatg	ttccggaatg	tcttctggtt	gtaatgatgt	5700
agaatctttt	ctgtttggct	tgattgtgga	cgcaatagta	gataatcttt	cagcagggga	5760
caccatttta	atgtttgatc	tattcaatgt	cttgatagta	tttgagaaac	tccttgtaaa	5820
gtgtaaactc	tttgagatta	gaaacataca	gctggc			5856

<210> 22
 <211> 5893
 <212> DNA
 <213> Caulobacter crescentus

<400> 22						
ggccgcaata	gagagtgacc	tatccaagct	ttgggggtct	aagttttaat	ggcccagggga	60
atcattactt	ttttttctca	atccttgatg	gataaaagta	ttacatacgt	acaggattgt	120

SequenceListing_2014-04-04.txt

gtattagtgt atttcgttat atgattaaac aaagtttata gattgtaaag tagacgtaaa	180
gtttagtaat tcattttaat gttcatttta cattcagatg tcattaagcg gcttttagagt	240
tgatttcatc agataattta gcttgagcaa ccaagatttc tggagcatcg aattcatcca	300
agaataattc aatgactcta atcttatctt ccttgttgaa tgcttcatcc ttcatcaaag	360
cgtccaagtc cttagcggat ttaacaacat ggttttcata ttgggtcttg tcagcaaaga	420
gcttcaataa caattggtga tcccatgggt gaatttggtt gtagtcctca tgacgaccgt	480
ggatcaactt ttcgatagtg taacctctgt tgtttaagat gaagatgtat ggcttgatgt	540
tccatcttgc agcatctgag attgattgga cagtcaattg taaagaacca tcaccaataa	600
acaaaacagt tcttctttct tgttcgccag tttgtttgtg tgcatttca gcagcaaag	660
cagcaccaac tgcagctggt aaggagaaac caatggaacc ccataagact tgggagatag	720
actttgaatc tcttggtatg ggtagccaag actagtcgat atcacctaata aacttcgtat	780
agcatacatt atacgaagtt atattaaggg ttctcgagaa ttcttgctgc aacggcaaca	840
tcaatgtcca cgtttacaca cctacattta tatctatatt tatatttata tttatttatt	900
tatgctactt agcttctata gttagttaat gcactcacga tattcaaaat tgacaccctt	960
caactactcc ctactattgt ctactactgt ctactactcc tctttactat agctgctccc	1020
aataggctcc accaataggc tctgtcaata cattttgcgc cgccaccttt cagggtgtgt	1080
cactcctgaa ggaccatatt gggtaatcgt gcaatttctg gaagagagtg ccgcgagaag	1140
tgaggcccc actgtaaatc ctcgaggggg catggagtat ggggcatgna ggatggagga	1200
tggggggggg gggggaaaat aggtagcgaa aggaccgct atcacccac ccggagaact	1260
cgttgccggg aagtcataat tcgacactcc ggggagtcta taaaaggcgg gttttgtctt	1320
ttgccagttg atgttgctga gaggacttgt ttgccgtttc ttccgattta acagtataga	1380
atcaaccact gttaattata cacgttatac taacacaaca aaaacaaaaa caacgacaac	1440
aacaacaaca atgtttgctt tctactttct caccgcatgc accactttga aggggtgttt	1500
cggagtttct ccgagttaca atggtcttgg tctcaccca cagatgggtt gggacagctg	1560
gaatacgttt gcctgcatg tcagtgaaca gctacttcta gacactgctg atagaatttc	1620
tgacttgggg ctaaaggata tgggttaca gtatgtcatc ctagatgact gttggtctag	1680
cggcagggat tccgacggtt tcctcgttgc agacaagcac aaatttcca acggtatggg	1740
ccatgttgca gaccacctgc ataataacag ctttcttttc ggtatgtatt cgtctgctgg	1800
tgagtacacc tgtgctgggt accctgggtc tctggggcgt gaggaagaag atgctcaatt	1860
ctttgcaaata aaccgcgttg actacttgaa gtatgataat tgttacaata aagggtcaatt	1920
tggtacacca gacgtttctt accaccgtta caaggccatg tcagatgctt tgaataaaac	1980
tggtaggcct attttctatt ctctatgtaa ctggggctcag gatttgacat tttactgggg	2040
ctctggtatc gccaatctt ggagaatgag cggagatatt actgctgagt tcaccgctcc	2100
agatagcaga tgtccctgtg acggtgacga atatgattgc aagtacgccg gtttccattg	2160

SequenceListing_2014-04-04.txt

ttctattatg aatattctta acaaggcagc tccaatgggg caaatgcag gtgttggtgg	2220
ttggaacgat ctggacaatc tagagggtcgg agtcggtaat ttgactgacg atgaggaaaa	2280
ggccatttc tctatgtggg caatggtaaa gtccccactt atcattgggtg cgcacgtgaa	2340
tcacttaaag gcatcttcgt actcgatcta cagtcaagcc tctgtcatcg caattaatca	2400
agatccaaag ggtattccag ccacaagagt ctggagatat tatgtttcag acaccgatga	2460
atatggacaa ggtgaaattc aaatgtggag tgggccgctt gacaatgggtg accaagtgggt	2520
tgctttattg aatggaggaa gcgtagcaag accaatgaac acgaccttgg aagagatttt	2580
ctttgacagc aatttggggtt caaaggaact gacatcgact tgggatattt acgacttatg	2640
ggccaacaga gttgacaact ctacggcgtc tgctatcctt gaacagaata aggagccac	2700
cggatttctc tacaatgcta cagagcagtc ttataaagac ggtttgtcta agaatagatac	2760
aagactgttt ggccagaaaa ttggtagtct ttctccaaat gctatactta acacaactgt	2820
tccagctcat ggtatcgctt tctatagggt gagaccctcg gcttaagctc aatgttgagc	2880
aaagcaggac gagaaaaaaa aaaataatga ttgttaagaa gttcatgaaa aaaaaagga	2940
aaaatactca aatacttata acagagtgat taaataataa acggcagtat accctatcag	3000
gtattgagat agttttattt ttgtaggtat ataatctgaa gcctttgaac tattttctcg	3060
tatatatcat ggagtataca ttgcattagc aacattacat actaggatct ctagacctaa	3120
taacttcgta tagcatacat tatacgaagt tatattaagg gttgtcgacg gatccttgct	3180
gcaacggcaa catcaatgtc cacgtttaca cacctacatt tatatctata tttatattta	3240
tattttattta tttatgctac ttagcttcta tagttagtta atgcactcac gatattcaaa	3300
attgacaccc ttcaactact ccctactatt gtctactact gtctactact cctctttact	3360
atagctgctc ccaataggct ccaccaatag gctctgtcaa tacattttgc gccgccacct	3420
ttcagggtgt gtcactcctg aaggaccata ttgggtaatc gtgcaatttc tggaagagag	3480
tgccgcgaga agtgaggccc ccactgtaaa tcctcgaggg ggcatggagt atggggcatg	3540
naggatggag gatggggggg gggggggaaa ataggtagcg aaaggacccg ctatcacccc	3600
acccggagaa ctcgttgccg ggaagtcata tttcgacact ccggggagtc tataaaaggc	3660
gggttttgtc ttttgccagt tgatgttgct gagaggactt gtttgccgtt tcttccgatt	3720
taacagtata gaatcaacca ctgttaatta tacacgttat actaacacaa caaaaacaaa	3780
aacaacgaca acaacaacaa caagatctat gtcactgtca atttaccat ctttgaaagg	3840
taagagagtt gttattactg gtggtggttc tggatttggg gctggtttga ctgctggttt	3900
tgctagacaa ggtgctgaag ttattttctt ggatattgct gatgaagatt ctagagcttt	3960
ggaagctgaa ttggctgggt ctccaattcc accagtttac aaaagatgtg atttgatgaa	4020
cttggaagct attaaagctg tttttgctga aattgggtgat gttgatgttt tggttaacaa	4080
tgctggtaat gatgatagac ataagttggc tgatgttact ggtgcttatt gggatgaaag	4140
aattaacgtt aacttgagac acatgttggt ttgtactcaa gctgttgctc caggatatgaa	4200
aaaaagaggt ggtggtgctg ttattaactt tggttctatt tcttggcatt tgggtttgga	4260

SequenceListing_2014-04-04.txt

agatttggtt ttgtatgaaa ctgctaaagc tggatttgaa ggtatgacta gagcttttagc	4320
tagagaattg ggtccagatg atatttagagt tactttgtgtt gttccaggta atgttaaaac	4380
taagagacaa gaaaaatggt atactccaga aggtgaagct caaattgttg ctgctcaatg	4440
tttgaaagggt agaattgttc cagaaaaatgt tgctgctttg gttttgtttt tggcttctga	4500
tgatgcttct ttgtgtactg gtcataaata ttggattgat gctggttgga gatgaagatc	4560
ttccaagctt tggacttctt cgccagagggt ttgggtcaagt ctccaatcaa ggttgctcggc	4620
ttgtctacct tgccagaaat ttacgaaaag atggaaaagg gtcaaatacgt tggtagatac	4680
gttggttgaca cttctaaata agcgaatttc ttatgattta tgatttttat tattaataaa	4740
gttataaaaa aaataagtgt atacaaattt taaagtgact cttagggtttt aaaacgaaaa	4800
ttcttattct tgagtaactc tttcctgtag gtcaggttgc tttctcagggt atagcatgag	4860
gtcgtcttta ttgaccacac ctctaccggc atgccgagca aatgcctgca aatcgctccc	4920
catttcaccc aattgtagat atgctaactc cagcaatgag ttgatgaatc tcggtgtgta	4980
ttttatgtcc tcagaggaca acacctgttg taatcgttct tccacacgga tccgtatcat	5040
ttgtagccca cgccaccggg aaaaaccacc attgtcctca gcagtcgcc aaaatatgga	5100
tgcgctcaat caactttccc tccccgtca atgccaaaag gataacgaca cactattaag	5160
agcgcatcat ttgtaaaagc cgaggaaggg ggatacgcta accggagacg tctcgctca	5220
ctctcggagc tgagccgccc tccttaagaa attcatggga agaacaccct tcgcggttc	5280
tgaacggctc gccctcgtcc attggtcacc tcacagtggc aactaataag gacattatag	5340
caatagaaat taaaatgggtg cacagaaata caataggatc gaataggata ggatacaata	5400
agatacgga tattagacta tactgtgata cggtacggta cgatacgcta cgatacgata	5460
cgatagagga taccacggat ataacgtagt attatttttc attattgggg gtttttttct	5520
gtttgaattt tccacgtcaa gagtatccca tctgacagga accgatggac tcgtcacagt	5580
acctatcgcc cgagttcaat ccatggacgc ttcgggtgaa ggatcttcgt ccgctgttgg	5640
caagccatgg gatcagggcg tcgccaaggg acagaaaggc ggatcttgta cgtctcttca	5700
acacagagct gcgtccgaaa cttactgaga gtcttaacac caataatccc aaaaacaaca	5760
acaacaatac agatactata gacactatag acactataga cactactaac anccctttaa	5820
agcgccgccg attaagcaat gttgatgagc cgtcaattcc atatactctg cagcgtacga	5880
agcttcagct ggc	5893

<210> 23
 <211> 7955
 <212> DNA
 <213> Escherichia coli

<400> 23	
ggccgcgagc tctaagtttt aatggcccag ggaatcatta cttttttttc tcaatccttg	60
atggataaaa gtattacata cgtacaggat tgtgtattag tgtatttcgt tatatgatta	120
aacaaagttt atagattgta aagtagacgt aaagtttagt aattcatttt aatgttcatt	180

SequenceListing_2014-04-04.txt

ttacattcag atgtcattaa gcggttttag agttgatttc atcagataat ttagcttgag	240
caaccaagat ttctggagca tcgaattcat ccaagaataa ttcaatgact ctaatcttat	300
cttccttggt gaatgcttca tccttcatca aagcgtccaa gtccttagcg gatttaacaa	360
catggttttc atattgggtc ttgtcagcaa agagcttcaa taacaattgg tgatcccatg	420
gttgaatttg gttgtagtcc tcatgacgac cgtggatcaa cttttcgata gtgtaacctc	480
tgttgtttaa gatgaagatg tatggcttga tgttccatct tgcagcatct gagattgatt	540
ggacagtcaa ttgtaaagaa ccatcaccaa taaacaaaac agttcttctt tcttgttcgc	600
cagtttgttt gtgtgcatct tcagcagcaa atgcagcacc aactgcagct ggtaaggaga	660
aaccaatgga accccataag acttgggaga tagactttga atctcttggt atgggtagcc	720
aagactagtc gatatcacct aataacttcg tatagcatac attatacgaa gttatatataa	780
gggttctcga gaattcttgc tgcaacggca acatcaatgt ccacgtttac acacctacat	840
ttatatctat atttatattt atatttattt atttatgcta cttagcttct atagttagtt	900
aatgcactca cgatattcaa aattgacacc cttcaactac tccctactat tgtctactac	960
tgtctactac tcctctttac tatagctgct cccaataggc tccaccaata ggctctgtca	1020
atacattttg cgccgccacc tttcagggtg tgctactcct gaaggaccat attgggtaat	1080
cgtgcaattt ctggaagaga gtgccgcgag aagtgaggcc cccactgtaa atcctcgagg	1140
gggcatggag tatggggcat gnaggatgga ggatgggggg ggggggggaa aataggtagc	1200
gaaaggaccc gctatcaccc caccgggaga actcgttgcc gggaaagtc atttcgacac	1260
tccggggagt ctataaaagg cgggttttgt cttttgccag ttgatgttgc tgagaggact	1320
tgtttgccgt ttcttccgat ttaacagtat agaatcaacc actgttaatt atacacgtta	1380
tactaacaca acaaaaacaa aaacaacgac aacaacaaca acaatgcctg aactcaccgc	1440
gacgtctgtc gagaagtttc tgatcgaataa gttcgacagc gtctccgacc tgatgcagct	1500
ctcggagggc gaagaatctc gtgctttcag cttcgatgta ggagggcggt gatatgtcct	1560
gcgggttaa atagctgcgag atgggtttcta caaagatcgt tatgtttatc ggcactttgc	1620
atcggccgcg ctcccgatc cggaagtgtg tgacattggg gaattcagcg agagcctgac	1680
ctattgcatc tcccgccgtg cacagggtgt cacgttgcaa gacctgcctg aaaccgaact	1740
gcccgtgtt ctgcagccgg tcgaggaggc catggatgag atcgctgcgg ccgatcttag	1800
ccagacgagc gggttcggcc cattcggacc gcaaggaatc ggtcaataca ctacatggcg	1860
tgatttcata tgcgcgattg ctgatcccca tgtgtatcac tggcaaactg tgatggacga	1920
caccgtcagt gcgtccgtcg cgcagggtct cgatgagctg atgctttggg ccgaggactg	1980
ccccgaagtc cggcacctcg tgcacgcgga tttcgggtcc aacaatgtcc tgacggacaa	2040
tggccgcata acagcgggtca ttgactggag cgaggcgatg ttcgggggatt cccaatacga	2100
ggtcgccaac atcttcttct ggaggccgtg gttggcttgt atggagcagc agacgcgcta	2160
cttcgagcgg aggcattccg agcttgcagg atcgccgcgg ctccgggctg atatgctccg	2220

SequenceListing_2014-04-04.txt

cattggtctt gaccaactct atcagagctt ggttgacggc aatttcgatg atgcagcttg	2280
ggcgcaggggt cgatgcgacg caatcgtccg atccggagcc gggactgtcg ggcgtacaca	2340
aatcgcccg agaacgcgg ccgctctggac cgatggctgt gtagaagtac tcgccgatag	2400
tggaaaccga cgccccagca ctctgtccgag ggcaaaggaa tagagtagta agctcaatgt	2460
tgagcaaagc aggacgagaa aaaaaaaaaat aatgattgtt aagaagttca tgaaaaaaaa	2520
aagggaaaaat actcaaatac ttataacaga gtgattaaat aataaacggc agtataccct	2580
atcaggtatt gagatagttt tttttttgta ggtatataat ctgaagcctt tgaactattt	2640
tctcgtatat atcatggagt atacattgca ttagcaacat tacatactag gatctctaga	2700
cctaataact tcgtatagca tacattatac gaagttatat taagggttgt cgacggatcc	2760
ttgctgcaac ggcaacatca atgtccacgt ttacacacct acatttatat ctatatttat	2820
atttatattt atttatattt gctacttagc ttctatagtt agttaatgca ctcacgatat	2880
tcaaaattga cacccttcaa ctactcccta ctattgtcta ctactgtcta ctactcctct	2940
ttactatagc tgctcccaat aggctccacc aataggctct gccaatacat tttgcgccgc	3000
cacctttcag gttgtgtcac tcctgaagga ccatattggg taatcgtgca atttctggaa	3060
gagagtccgc gagaagttag gccccactg taaatcctcg agggggcatg gagtatgggg	3120
catggaggat ggaggatggg ggggggcgaa aaataggtag cgaaaggacc cgctatcacc	3180
ccaccggag aactcgttgc cggaagtca tatttcgaca ctccggggag tctataaaag	3240
gcgggttttg tcttttgcca gttgatgttg ctgagaggac ttgtttgccg tttcttccga	3300
tttaacagta tagaatcaac cactgttaat tatacacgtt atactaacac aacaaaaaca	3360
aaaacaacga caacaacaac aacaagatct gaattcatga tacaacaagg tgacttaatg	3420
cctcaatccg ctttattcac tggataatc cctcctgtct ccactatttt tactgccgac	3480
ggcgaattgg ataaaccagg tactgctgca ttaatagatg acttgatcaa ggctgggtgtt	3540
gacggtttat ttttcttggg ttctgggtgg gaattttcac aattaggtgc cgaagaaaga	3600
aaagcaatag ccagattcgc tatcgcacat gttgacagaa gagtaccagt tttgattggt	3660
actggtggta caaacgcaag agaaacaatc gaattgtctc aacacgcca acaagctggt	3720
gcagatggta tcgttgtcat taatccttat tactggaagg tttccgaagc taacttgatc	3780
agatacttcg aacaagtagc agattctgtt accttaccag tcatgttgta caatttcctt	3840
gctttaaccg gtcaagattt gactccagca ttgggttaaaa ccttagccga ctctagatca	3900
aacataatcg gtattaagga tactatagac tccgtcgccc atttgagaag tatgattcac	3960
acagtcaaag gtgcacatcc acactttacc gtattgtgtg gttacgatga ccatttgttt	4020
aatactttgt tattgggtgg tgacggtgcc atttccgcta gtggtaattt tgctcctcaa	4080
gtctcagtaa acttattgaa agcttgagaa gatggtgacg ttgcaaaggc cgctgggttac	4140
catcaaactt tgttgcaaat cccacaaatg taccaattag atacaccttt cgttaacgctc	4200
atcaaggaag ctattgtttt gtgcggtaga ccagtatcta cacacgtttt accacctgca	4260
tcacctttag atgaaccaag aaaagcccaa ttaaaaacct tattacaaca attaaagtta	4320

SequenceListing_2014-04-04.txt

tgctgaggat	cttccaagct	ttggacttct	tcgccagagg	tttgggtcaag	tctccaatca	4380
aggttgtcgg	cttgtctacc	ttgccagaaa	tttacgaaaa	gatggaaaag	ggtcaaattcg	4440
ttggtagata	cgttgttgac	acttctaaat	aagcgaatth	cttatgattt	atgattttta	4500
ttattaaata	agttataaaa	aaaataagtg	tatacaaatt	ttaaagtgac	tcttaggttt	4560
taaaacgaaa	attcttattc	ttgagtaact	ctttcctgta	ggtcagggtg	ctttctcagg	4620
tatagcatga	ggtcgctctt	attgaccaca	cctctaccgg	catgcgatat	ggatatggat	4680
atggatatgg	agatgaatth	gaatttagat	ttgggtcttg	atttggggtt	ggaattaaaa	4740
ggggataaca	atgagggttt	tcctgttgat	ttaaacaatg	gacgtgggag	gtgattgatt	4800
taacctgatc	caaaaggggt	atgtctatth	tttagagagt	gtttttgtgt	caaattatgg	4860
tagaatgtgt	aaagtagtat	aaactttcct	ctcaaattgac	gaggttttaa	acaccccccg	4920
ggtgagccga	gccgagaatg	gggcaattgt	tcaatgtgaa	atagaagtat	cgagtggaaa	4980
acttgggtgt	tggccagcca	aggggggggg	ggaaggaaaa	tggcgcgaa	gctcagggtga	5040
gattgttttg	gaattgggtg	aagcgaggaa	atgagcgacc	cggagggttg	gacttttagtg	5100
gcggaggagg	acggaggaaa	agccaagagg	gaagtgtata	taaggggagc	aatttgccac	5160
caggatagaa	ttggatgagt	tataattcta	ctgtatttat	tgtataatth	atttctcctt	5220
ttgtatcaaa	cacattacaa	aacacacaaa	acacacaaac	aaacacaatt	acaaaaatta	5280
attaaaatga	gtgtccctgt	tcaacacca	atgtacatcg	acggtcaatt	cgtaacctgg	5340
agaggtgacg	cctggataga	cgtagtcaac	cctgcaactg	aagccgttat	atcaagaatc	5400
ccagatggtc	aagctgaaga	cgcaagaaaa	gccatcgatg	ctgctgaaag	agcacaacca	5460
gaatgggaag	ctttacctgc	aatagaaaga	gcacacctgg	tgagaaaaat	tagtgctggt	5520
ataagagaaa	gagcatctga	aatctcagcc	ttgatagtth	aagaagggtg	taaaatacaa	5580
caattggctg	aagtagaagt	tgcctttacc	gctgattaca	tagactatat	ggcagaatgg	5640
gccagaagat	acgaagggtga	aattatacaa	tctgatagac	cagggtgaaa	catattgttg	5700
tttaaaagag	cattaggtgt	tactacaggt	attttgccat	ggaacttccc	atttttcttg	5760
atagctagaa	agatggcacc	tgccttggtg	accggtaaca	ctatcgttat	taaaccatct	5820
gagtttactc	ctaacaacgc	tattgcattc	gccaaagatg	tcgatgaaat	cggtttgcca	5880
agagggtgtt	ttaatttggt	tttgggtaga	ggtgaaacag	ttgggtcaaga	attggctggt	5940
aaccctaaag	ttgcaatggg	ctcaatgacc	ggttccgtta	gtgccgggtga	aaagataatg	6000
gctactgccg	ctaagaatat	cacaaaagta	tgttttagaat	tgggtggtaa	agctccagca	6060
attgttatgg	atgacgcaga	tttgggaattg	gctgtcaagg	caattgtaga	ctccagagtt	6120
ataaatagtg	gtcaagtttg	taactgcgct	gaaagagtct	acgtacaaaa	gggtatctat	6180
gatcaattcg	ttaacagatt	gggtgaagcc	atgcaagctg	tccaattcgg	taatccagca	6240
gaaagaaacg	acatcgccat	gggtcctttg	attaatgcag	ccgctttgga	aagagtcgaa	6300
caaaaggtag	ccagagctgt	tgaagaagg	gcaagagtcg	cctttgggtg	taaagctgta	6360

SequenceListing_2014-04-04.txt

gagggtaaag gttattacta tccacctact ttgttattgg atgtcagaca agaaatgtcc	6420
attatgcatg aagaaacctt tgggtccagta ttacctgttg tcgctttcga tacttttgaa	6480
gacgccatat ctatggctaa tgattcagac tacggtttaa catcttcaat ctatacccaa	6540
aatttgaacg ttgctatgaa agcaatcaag ggtttgaaat tcggtgaaac atacataaac	6600
agagaaaact tcgaagcaat gcaaggtttc cacgctgggt ggagaaaatc tggatttgggt	6660
ggtgcagatg gtaaacaatg tttacacgaa tacttacaaa ctcaagtcgt ctacttacaa	6720
tcataattaa ttaacccatg tctctactgg tgggtggtgct tctttggaat tattggaagg	6780
taaggaattg ccagggtgttg ctttcttctc cgaaaagaaa taaattgaat tgaattgaaa	6840
tcgatagatc aatttttttc ttttctcttt ccccatcctt tacgctaaaa taatagttta	6900
ttttattttt tgaatatttt ttatttatat acgtatatat agactattat ttatctttta	6960
atgattatta agatttttat taaaaaaaaa ttcgctcctc ttttaatgcc tttatgcagt	7020
ttttttttcc cattcgatat ttctatgttc gggttcagcg tattttaagt ttaataactc	7080
gaaaattctg cgttcgtaa cctgcaggga tccgtatcat ttgtagccca cgccaccg	7140
aaaaaccacc attgtcctca gcagtcgcc aaaatatgga tgcgctcaat caactttccc	7200
tccccgtca atgccaaaag gataacgaca cactattaag agcgcatcat ttgtaaaagc	7260
cgaggaaggg ggatacgcta accggagacg tctcgctca ctctcgagc tgagccgccc	7320
tccttaagaa attcatggga agaacaccct tcgcggcttc tgaacggctc gccctcgcc	7380
attggtcacc tcacagtggc aactaataag gacattatag caatagaaat taaaatggtg	7440
cacagaaata caataggatc gaataggata ggatacaata agatacgga tattagacta	7500
tactgtgata cggtacggta cgatacgcta cgatacgata cgatagagga taccacggat	7560
ataacgtagt attatttttc attattgggg gtttttttct gtttgaattt tccacgtcaa	7620
gagtatccca tctgacagga accgatggac tcgtcacagt acctatcgcc cgagttcaat	7680
ccatggacgc ttcgggtgaa ggatcttcgt ccgctgttg caagccatgg gatcagggcg	7740
tcgccaaggg acagaaaggc ggatcttgta cgtctcttca acacagagct gcgtccgaaa	7800
cttactgaga gtcttaacac caataatccc aaaaacaaca acaacaatac agatactata	7860
gacactatag aactataga cactactaac anccctttaa agcgccgccc attaatgaat	7920
gttgatgagc cgtcaattcc atatactcag ctggc	7955

<210> 24
 <211> 5771
 <212> DNA
 <213> Lactobacillus helveticus

<400> 24	
ggccgcatag gccactagtt gacatcgcca acatctctat ctgcatggaa caaactacaa	60
caactttatg aatccaaggg caaatctttc tctactagag atgcctttgc atccaaccca	120
aaaagagttg aggaattctc acatactttc tccaactttg acgattcaaa gatcttattt	180
gatttctcca agaacttgat tgacactgaa atcttgtcta cattaattga attagcaaag	240

SequenceListing_2014-04-04.txt

gaagctaattg	tcgaacaatt	gagagatgaa	atgttccaag	gtaaacaacat	caatactacc	300
gaggaccgtg	ccgtttatca	tggttgcttta	agaaacagag	acaacaagcc	aatgtacgtc	360
gatggcgta	atgttgcacc	agaagttgat	gcagttcttc	agcacatgaa	ggaattctcc	420
gattctgtca	gatctggtga	atggaaaggt	tacacgggca	agaagattga	aaatgtcgtg	480
aacattggta	ttgggtggttc	tgatttaggt	cctgtcatgg	tcaccgaggc	cttgaagcac	540
tatgcccacg	aatcaatcaa	agttcacttt	gtttccaatg	ttgatgggtac	ccatattgcc	600
gaaacgttaa	aagtctgtgc	ggatccttgc	tgcaacggca	acatcaatgt	ccacgtttac	660
acacctacat	ttatatctat	atttatattt	atattttattt	atttatgcta	cttagcttct	720
atagttagtt	aatgcactca	cgatattcaa	aattgacacc	cttcaactac	ttcctactat	780
tgtctactac	tgtctactac	tcctctttac	tatagctgct	cccaataggc	tccaccaata	840
ggctctgcca	atacatTTTT	cgccgccacc	tttcagggtg	tgtcactcct	gaaggaccat	900
attgggtaat	cgtgcaattt	ctggaagaga	gtccgcgaga	agtgaggccc	ccactgtaaa	960
tcctcgaggg	ggcatggagt	atggggcatg	gaggatggag	gatggggggg	ggcgaaaaat	1020
aggtagcgaa	aggaccgct	atcacccac	ccggagaact	cgttgccggg	aagtcatatt	1080
tcgacactcc	ggggagtcta	taaaaggcgg	gttttgtctt	ttgccagttg	atgttgctga	1140
gaggacttgt	ttgccgtttc	ttccgattta	acagtataga	atcaaccact	gttaattata	1200
cacgttatac	taacacaaca	aaaacaaaaa	caacgacaac	aacaacaaca	agatctatgg	1260
caagagagga	aaaacctcgt	aaagttattt	tagtcggtga	tggtgctgta	ggttctacct	1320
ttgcattttc	aatggtacaa	caaggtatcg	ctgaagaatt	aggtattatc	gatatcgcta	1380
aggaacacgt	tgaagggtgac	gcaatcgatt	tagctgacgc	aactccttgg	acttctccaa	1440
agaacattta	cgagctgac	taccagatt	gtaaggatgc	tgacttagtt	gttattactg	1500
ctggtgctcc	acaaaagcca	ggcgaaactc	gtcttgatct	tgtaacaag	aacttgaaga	1560
ttttatcatc	aatcgttgaa	ccagttgttg	aatcaggttt	tgaaggattt	ttcttagtag	1620
ttgctaacc	agttgatatc	ttaactcacg	caacttgag	aatgtcaggc	ttccctaagg	1680
atcgtgttat	cggttcaggt	acttcacttg	atactggtcg	tcttcaaaaa	gttatttgta	1740
aaatggaaaa	cgttgacca	agttcagtta	atgcatacat	gcttggtgaa	cacggtgata	1800
ctgaattttc	agcatggagc	tacaacaatg	ttgctggcgt	aaagggttgc	gactgggtta	1860
aggctcaca	catgcctgaa	tctaagcttg	aagacatcca	ccaagaagtt	aaggacatgg	1920
cttacgacat	tattaacaag	aaagggtgta	ccttctacgg	tatcggtact	gcttcagcaa	1980
tgatcgctaa	ggctatcttg	aacgatgaac	accgtgtact	tccactttca	gtaccaatgg	2040
atggtgaata	tggtttacac	gatcttcaca	tcggtactcc	tgctgttggt	ggccgcaagg	2100
gtcttgaaca	agttatcgaa	atgccattaa	gcgataagga	acaagaatta	atgactgctt	2160
cagcagatca	attaaagaag	gttatggaca	aggccttcaa	agaaactggc	gttaagggttc	2220
gtcaataaag	atcttccaag	ctttggactt	cttcgccaga	ggtttggtca	agtcctccaat	2280
caagggtgtc	ggcttgctta	ccttgccaga	aattttacgaa	aagatggaaa	agggtcaaat	2340

SequenceListing_2014-04-04.txt

cgttggtaga	tacgttggtg	acacttctaa	ataagcgaat	ttcttatgat	ttatgatttt	2400
tattattaaa	taagttataa	aaaaaataag	tgtatacaaa	ttttaaagtg	actcttaggt	2460
tttaaaacga	aaattcttat	tcttgagtaa	ctctttcctg	taggtcaggt	tgcttttctca	2520
ggtatagcat	gaggtcgctc	ttattgacca	cacctctacc	ggcatgccga	gcaaatgcct	2580
gcaaatcgct	ccccatttca	cccaattgta	gatatgctaa	ctccagcaat	gagttgatga	2640
atctcgggtg	gtattttatg	tcctcagagg	acaacacctg	ttgtaatcgt	tcttccacac	2700
ggatccgcgg	atatcaccta	ataacttcgt	atagcataca	ttatacgaag	ttatattaag	2760
ggttctcgag	aattcttgct	gcaacggcaa	catcaatgtc	cacgtttaca	cacctacatt	2820
tatatctata	tttatattta	tattttattta	tttatgctac	ttagcttcta	tagttagtta	2880
atgcactcac	gatattcaaa	attgacaccc	ttcaactact	ccctactatt	gtctactact	2940
gtctactact	cctctttact	atagctgctc	ccaataggct	ccaccaatag	gctctgtcaa	3000
tacattttgc	gccgccacct	ttcaggttgt	gtcactcctg	aaggaccata	ttgggtaatc	3060
gtgcaatttc	tggaagagag	tgccgcgaga	agtgaggccc	ccactgtaaa	tcctcgaggg	3120
ggcatggagt	atggggcatg	naggatggag	gatggggggg	gggggggaaa	ataggtagcg	3180
aaaggacccg	ctatcacccc	acccggagaa	ctcgttgccg	ggaagtcata	tttcgacact	3240
ccgggggagtc	tataaaaggc	gggttttgct	ttttgccagt	tgatgttgct	gagaggactt	3300
gtttgccgtt	tcttccgatt	taacagtata	gaatcaacca	ctgttaatta	tacacgttat	3360
actaacacaa	caaaaacaaa	aacaacgaca	acaacaacaa	caatgtttgc	tttctacttt	3420
ctcaccgcat	gcaccacttt	gaagggtggt	ttcggagtgt	ctccgagtta	caatgggtctt	3480
ggtctcacc	cacagatggg	ttgggacagc	tggaatacgt	ttgcctgcga	tgtcagtga	3540
cagctacttc	tagacactgc	tgatagaatt	tctgacttgg	ggctaaagga	tatgggttac	3600
aagtatgtca	tcctagatga	ctgttggtct	agcggcaggg	attccgacgg	tttcctcggt	3660
gcagacaagc	acaaatttcc	caacggtatg	ggccatgttg	cagaccacct	gcataataac	3720
agctttcttt	tcggtatgta	ttcgtctgct	ggtgagtaca	cctgtgctgg	gtaccctggg	3780
tctctggggc	gtgaggaaga	agatgctcaa	ttctttgcaa	ataaccgcgt	tgactacttg	3840
aagtatgata	attgttacaa	taaagggtcaa	tttggtacac	cagacgtttc	ttaccaccgt	3900
tacaaggcca	tgtcagatgc	tttgaataaa	actggtaggc	ctattttcta	ttctctatgt	3960
aactgggggtc	aggatttgac	atcttactgg	ggctctggta	tcgccaattc	ttggagaatg	4020
agcggagata	ttactgctga	gttcacccgt	ccagatagca	gatgtccctg	tgacgggtgac	4080
gaatatgatt	gcaagtacgc	cggtttccat	tgttctatta	tgaatattct	taacaaggca	4140
gctccaatgg	ggcaaaatgc	aggtgttggt	ggttggaacg	atctggacaa	tctagaggtc	4200
ggagtcggta	atctgactga	cgatgaggaa	aaggcccatt	tctctatgtg	ggcaatggta	4260
aagtccccac	ttatcattgg	tgccgacgtg	aatcacttaa	aggcatcttc	gtactcgatc	4320
tacagtcaag	cctctgtcat	cgcaattaat	caagatccaa	agggtattcc	agccacaaga	4380

SequenceListing_2014-04-04.txt

gtctggagat attatgtttc agacaccgat gaatatggac aaggtgaaat tcaaattgtgg	4440
agtgggtccgc ttgacaatgg tgaccaagtg gttgctttat tgaatggagg aagcgtagca	4500
agaccaatga acacgacctt ggaagagatt ttctttgaca gcaatttggg ttcaaaggaa	4560
ctgacatcga cttgggatat ttacgactta tgggccaaca gagttgacaa ctctacggcg	4620
tctgctatcc ttgaacagaa taaggcagcc accggtattc tctacaatgc tacagagcag	4680
tcttataaag acggtttgtc taagaatgat acaagactgt ttggccagaa aattggtagt	4740
ctttctccaa atgctatact taacacaact gttccagctc atggtatcgc cttctatagg	4800
ttgagaccct cggcttaagc tcaatgttga gcaaagcagg acgagaaaaa aaaaaataat	4860
gattgttaag aagttcatga aaaaaaaaaaag gaaaaataact caaatactta taacagagtg	4920
attaaataat aaacggcagt ataccctatc aggtattgag atagttttat ttttgtaggt	4980
atataatctg aagcctttga actattttct cgtatatatc atggagtata cattgcatta	5040
gcaacattac atactaggat ctctagacct aataacttcg tatagcatac attatacgaa	5100
gttatattaa gggttgtcga ctccacaagg ctcaaactaa attagttgct cttttcgacc	5160
aatacatgca cagattccca gcttacttgc agcaattgtc aatggaatct aacggtaaat	5220
ctgttacaaa agattctaaa tttgtcaatt acgaaacagg tgttgtctta tttggtgaac	5280
caaccactaa tgcccaacat tctttcttcc aattagttca ccaaggtacc aaattgatcc	5340
caaccgactt tatccttgca gctcaatccc ataaccfaat tgagaacaat aagcaccaac	5400
tcatgcttgc ttccaactat tttgccaag ccgaatctct tatgttaggt aagtccagag	5460
aacaagttga aagcgaaggc accaccggta gtttagtccc acacaagcaa ttctctggta	5520
acagaccaac tacctctatc ttggctcaga aaattactcc agccacactc ggtgctttga	5580
ttgcgtacta cgaacacgtc accttcgttg aaggtgctat ctggggcatc aactcatttg	5640
atcaatgggg tggtgaatta ggtaaggttt tagccaaggt catcttgaag gaattgcaag	5700
aagaaggcca agttgaaact catgatgctt caaccagagc tctaattaac caattcaaag	5760
cttcagctgg c	5771

<210> 25
 <211> 52
 <212> DNA
 <213> Pichia kudriavzevii

<400> 25	
ggaattccag ctgtatgttt ctaatctcaa agagtttaca ctttacaagg ag	52

<210> 26
 <211> 62
 <212> DNA
 <213> Pichia kudriavzevii

<400> 26	
gaattcgtcg acggatccat tcttggtaaa aattggtgag gaatattaaa gacaatcaag	60
tc	62

SequenceListing_2014-04-04.txt

```

<210> 27
<211> 46
<212> DNA
<213> Pichia kudriavzevii

<400> 27
ggaattcgat atcatttgtc gaaggtttag gttgggggtga taatgc 46

<210> 28
<211> 37
<212> DNA
<213> Pichia kudriavzevii

<400> 28
ggaattcact agttcaaagg gaatgtgata atgcaag 37

<210> 29
<211> 50
<212> DNA
<213> Pichia kudriavzevii

<400> 29
ggaattcgga tccgcatgcg atatggatat ggatatggat atggagatga 50

<210> 30
<211> 94
<212> DNA
<213> Pichia kudriavzevii

<400> 30
ggaattcgca tgcggatccc tgcagagatc tttaattaat ttttgtaatt gtgtttgttt 60
gtgtgttttg tgtgttttgt aatgtgtttg atac 94

<210> 31
<211> 39
<212> DNA
<213> Escherichia coli

<400> 31
ggccttaatt aaaatgagtg tccctgttca acaccaat 39

<210> 32
<211> 36
<212> DNA
<213> Escherichia coli

<400> 32
ggccttaatt aattatgatt gtaagtagac gacttg 36

<210> 33
<211> 40
<212> DNA
<213> Pichia kudriavzevii

<400> 33
gggcccgact agttgacatc gccaacatct ctatctgcat 40

<210> 34
<211> 63
<212> DNA
<213> Pichia kudriavzevii

```

SequenceListing_2014-04-04.txt

<400>	34		
gggccccgat	atccgcggat	ccgcacagac	ttttaacgtt tcggcaatat gggtagcatc
			60
aac			63
<210>	35		
<211>	52		
<212>	DNA		
<213>	Pichia kudriavzevii		
<400>	35		
ccggaattcc	gtcgactcca	caaggctcaa	actaaattag ttgctccttt cg
			52
<210>	36		
<211>	43		
<212>	DNA		
<213>	Pichia kudriavzevii		
<400>	36		
cggaattcct	aagccaagc	tttgaattgg	ttaattagag ctc
			43