SEQUENCE LISTING

<110> CUREVAC GMBH

<120> Nucleic acid comprising or coding for a histone stem-loop and a poly(A) sequence or a polyadenylation signal for increasing the expression of an encoded pathogenic antigen

<130> CU01P127WO1

<140> PCT/EP2012/000673
<141> 2012-02-15

<160> 56

<170> PatentIn version 3.5

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<210> 6
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<210> 7
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<210> 8
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<210> 10
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<210> 11
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<212> RNA
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<400> 11
dghycudyuh asrrcc 16

<210> 12
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<210> 13
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vgyyyyhhth rvvrcb 16

<210> 14
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<212> DNA
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sgyyyttytm arrrcs 16

<210> 15
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<210> 16
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<210> 17
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<400> 18
rgndbyhyth rdhncy 16

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<400> 20
sgyyctttytm agrrcs 16

<210> 21
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<210> 22
<211> 16
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ggyycttyth agrrcc 16

<210> 23
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<210> 24
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dghyctdyth asrrcc 16

<210> 26
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ggcyctttтm agrgcc 16

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hhhhvvgyyy yhhthrvvrc bvhhnn 26

<210> 29
<211> 26
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mhmhmsgyyy ttytmarrrc smchhh 26

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<211> 26
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mmmmmsgyyc ttttmagrrc sachmh 26

<210> 31

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<210> 34
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<210> 35
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<210> 36
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mmmmmsgyyc ttttmagrrc sachmh 26

<210> 37
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hhmamggyyc ttythagrrc cvhnnm 26

<210> 38
<211> 26
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hhaamggcyc ttytmagrgc cvchhm 26

<210> 39
<211> 26
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mmaamggctc ttttmagrgc cmcymm 26

<210> 40
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<210> 41
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<222> (25)..(25)
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<210> 42
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<220>
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hmaaaggcyc ttttmagrgc crmyhm 26

<210> 43
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cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

ccaccggauc guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

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<223> mRNA sequence of ppLuc(GC)-ag-A64

<400> 44
gggagaaagc uugaggaugg aggacgccaa gaacaucaag aagggcccgg cgcccuucua 60

cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

ccaccggauc gugggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaagggggug gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaa 1806

<210> 45
<211> 1772
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-histoneSL

<400> 45
gggagaaagc uugaggaugg aggacgccaa gaacaucaag aagggcccgg cgcccuucua 60

cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

ccaccggauc gugggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaagggggug gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auagaucuca aaggcucuuu ucagagccac ca 1772

<210> 46
<211> 1835
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-A64-histoneSL

<400> 46
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cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

ccaccggauc gugguguugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaagggggug gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaaugca ucaaaggcuc uuuucagagc cacca 1835

<210> 47
<211> 1869
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-A120

<400> 47
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cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

ccaccggauc guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaagggggug gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auagaucuaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1860

aaaaaaaaa 1869

<210> 48
<211> 1858
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-A64-ag

<400> 48
gggagaaagc uugaggaugg aggacgccaa gaacaucaag aagggcccgg cgcccuucua 60

cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

ccaccggauc guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaagggggug gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaaugca uccugcccga ugggccuccc aacgggcccu ccuccccucc uugcaccg 1858

<210> 49
<211> 1894
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-A64-aCPSL

<400> 49
gggagaaagc uugaggaugg aggacgccaa gaacaucaag aagggcccgg cgcccuucua 60

cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

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ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaagggggug gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaaugca ucaauuccua cacgugaggc gcugugauuc ccuaucccccc uucauucccu 1860

auacauuagc acagcgccau ugcauguagg aauu 1894

<210> 50
<211> 1909
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-A64-PolioCL

<400> 50
gggagaaagc uugaggaugg aggacgccaa gaacaucaag aagggcccgg cgcccuucua 60

cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

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ccaccggauc guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaagggggug gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaaugca ucaauucuaa aacagcucug ggguuguacc caccccagag gcccacgugg 1860

cggcuaguac uccgguauug cgguacccuu guacgccugu uuuagaauu 1909

<210> 51
<211> 1841
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-A64-G30

<400> 51
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cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

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ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaaggggugg gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaaugca uggggggggg gggggggggg gggggggggg g 1841

<210> 52
<211> 1841
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-A64-U30

<400> 52
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cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120

ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

ccaccggauc guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaaggggugg gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcgguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaaugca uuuuuuuuuu uuuuuuuuuu uuuuuuuuuu u 1841

<210> 53
<211> 1857
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-A64-SL

<400> 53
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ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

ccaccggauc guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaagggggug gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcgguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu 900

cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaaugca uuauggcggc cguguccacc acggauauca ccguggugga cgcggcc 1857

<210> 54
<211> 1838
<212> RNA
<213> artificial

<220>
<223> ppLuc(GC)-ag-A64-N32

<400> 54
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ggugccgggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180

guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240

ccaccggauc gugugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300

ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360

gaacagcaug gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480

gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg 540

cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600

caugaacagc agcggcagca ccggccugcc gaagggggug gcccugccgc accggaccgc 660

cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720

cgccauccug agcguggugc cguuccacca cggcuucggc auguucacga cccugggcua 780

ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840

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cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960

gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcgguucc accucccggg 1020

cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg 1080

ggacgacaag ccgggcgccg ugggcaaggu ggucccguuc uucgaggcca agguggugga 1140

ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggcc 1200

gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccuca ucgacaagga 1260

cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320

cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380

gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440

cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500

gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560

cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620

ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua 1740

auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 1800

aaaaaaugca ucccccucua gacaauugga auuccaua 1838

<210> 55
<211> 1902
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of HA (H1N1/PR8) (GC)-ag-A64-C30

<400> 55
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gacgccgaca ccaucugcau cggcuaccac gccaacaaca gcaccgacac ggucgacacc 120

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gggaagcugu gccggcugaa gggcaucgcg ccccuccagc uggggaagug caacaucgcc 240

ggcuggcugc ucgggaaccc ggagugcgac ccccugcugc ccgugcgcuc cuggagcuac 300

aucgucgaga cgcccaacuc cgagaacggc aucugcuacc cgggcgacuu caucgacuac 360

gaggagcucc gggagcagcu gagcuccgug agcuccuucg agcgcuucga gaucuucccc 420

aaggagagcu ccuggcccaa ccacaacacc aacgggguga ccgccgccug cagccacgag 480

ggcaagucca gcuucuaccg gaaccugcuc uggcugaccg agaaggaggg guccuacccc 540

aagcugaaga acagcuacgu caacaagaag ggcaaggagg ugcucgugcu gugggggauc 600

caccacccgc ccaacuccaa ggagcagcag aaccuguacc agaacgagaa cgcguacguc 660

agcgugguga cguccaacua caaccgccgg uucacccccg agaucgccga gcgccccaag 720

guccgggacc aggccggccg caugaacuac uacuggaccc uccugaagcc gggcgacacc 780

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ggcuggaccg ggaugaucga cggcugguac ggguaccacc accagaacga gcagggcagc 1140

ggguacgccg ccgaccagaa guccacccag aacgccauca acggcaucac caacaaggug 1200

aacacgguga ucgagaagau gaacauccag uucaccgcgg ucggcaagga guucaacaag 1260

cucgagaagc gcauggagaa ccugaacaag aagguggacg acggguuccu ggacaucugg 1320

accuacaacg ccgagcuccu ggugcugcuc gagaacgagc ggacccugga cuuccacgac 1380

agcaacguca agaaccugua cgagaaggug aagucccagc ucaagaacaa cgccaaggag 1440

aucggcaacg ggugcuucga guucuaccac aagugcgaca acgagugcau ggagagcguc 1500

cgcaacggca cguacgacua ccccaaguac uccgaggaga gcaagcugaa ccgggagaag 1560

guggacgggg ugaagcugga guccaugggc aucuaccaga uccucgccau cuacagcacc 1620

gucgccucca gccuggugcu gcuggugucc cucggcgcga ucagcuucug gaugugcagc 1680

aacggguccc ugcagugccg caucugcauc ugaccacuag uuauaagacu gacuagcccg 1740

augggccucc caacgggccc uccucccccuc cuugcaccga gauuaauaaa aaaaaaaaaa 1800

aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa auauucccccc 1860

ccccccccccc ccccccccccc cccccucuag acaauuggaa uu 1902

<210> 56
<211> 1915
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of HA (H1N1/PR8) (GC)-ag-A64-C30-histoneSL

<400> 56

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gugcuggaga agaacgugac cgucacccac uccgugaacc ugcucgagga cagccacaac 180

gggaagcugu gccggcugaa gggcaucgcg ccccuccagc uggggaagug caacaucgcc 240

ggcuggcugc ucgggaaccc ggagugcgac ccccugcugc ccgugcgcuc cuggagcuac 300

aucgucgaga cgcccaacuc cgagaacggc aucugcuacc cgggcgacuu caucgacuac 360

gaggagcucc gggagcagcu gagcuccgug agcuccuucg agcgcuucga gaucuucccc 420

aaggagagcu ccuggcccaa ccacaacacc aacgggguga ccgccgccug cagccacgag 480

ggcaagucca gcuucuaccg gaaccugcuc uggcugaccg agaaggaggg guccuacccc 540

aagcugaaga acagcuacgu caacaagaag ggcaaggagg ugcucgugcu gugggggauc 600

caccacccgc ccaacuccaa ggagcagcag aaccuguacc agaacgagaa cgcguacguc 660

agcgugguga cguccaacua caaccgccgg uucacccccg agaucgccga gcgccccaag 720

guccgggacc aggccggccg caugaacuac uacuggaccc uccugaagcc gggcgacacc 780

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ggcuggaccg ggaugaucga cggcugguac ggguaccacc accagaacga gcagggcagc 1140

ggguacgccg ccgaccagaa guccacccag aacgccauca acggcaucac caacaaggug 1200

aacacgguga ucgagaagau gaacauccag uucaccgcgg ucggcaagga guucaacaag 1260

cucgagaagc gcauggagaa ccugaacaag aagguggacg acggguuccu ggacaucugg 1320

accuacaacg ccgagcuccu ggugcugcuc gagaacgagc ggacccugga cuuccacgac 1380

agcaacguca agaaccugua cgagaaggug aagucccagc ucaagaacaa cgccaaggag 1440

aucggcaacg ggugcuucga guucuaccac aagugcgaca acgagugcau ggagagcguc 1500

cgcaacggca cguacgacua ccccaaguac uccgaggaga gcaagcugaa ccgggagaag 1560

guggacgggg ugaagcugga guccaugggc aucuaccaga uccucgccau cuacagcacc 1620

gucgccucca gccuggugcu gcuggugucc cucggcgcga ucagcuucug gaugugcagc 1680

aacggguccc ugcagugccg caucugcauc ugaccacuag uuauaagacu gacuagcccg 1740

augggccucc caacgggccc uccucccccuc cuugcaccga gauuaauaaa aaaaaaaaaa 1800

aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa augcauccccc 1860

ccccccccccc ccccccccccc ccccccccaaa ggcucuuuuc agagccacca gaauu 1915