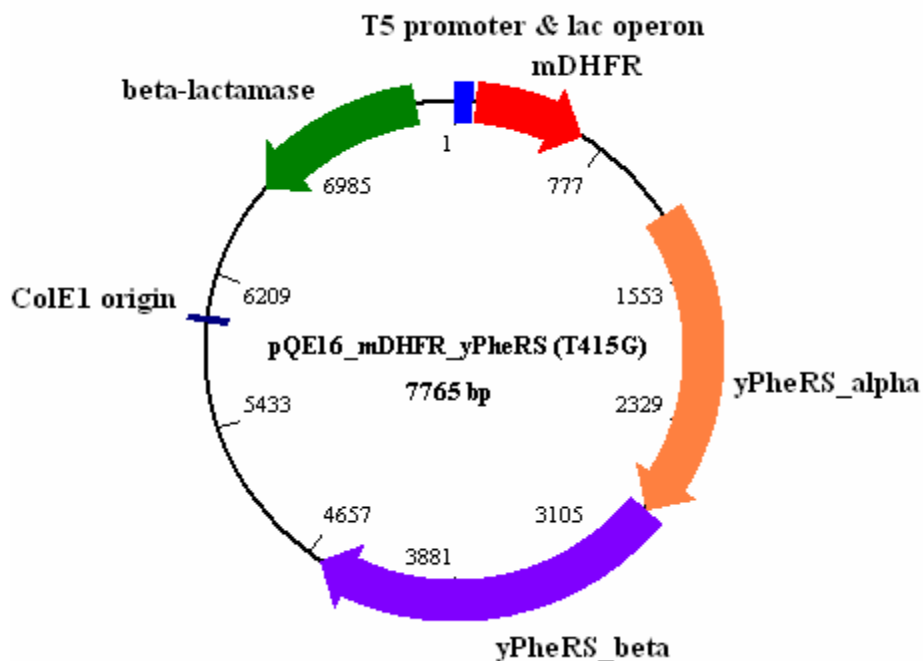


Appendix A

Plasmid Information

Following are sequences and information on plasmids described in the thesis.

1. pQE16_mDHFR_yPheRS (T415G) (7765 bp)



T5 promoter and lac operon 7 - 87 bp

mDHFR_His 115 - 660 bp

yPheRS_alpha subunit 1226 - 2787 bp

yPheRS_beta subunit 2802 - 4589 bp

ColE1 origin 5972 - 5997 bp

beta-lactamase 7560 - 6700 bp

Full sequence

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CTC GAG AAA TCA TAA AAA ATT TAT TTG CTT TGT GAG CGG ATA ACA ATT ATA ATA
GAT TCA ATT GTG AGC GGA TAA CAA TTT CAC ACA GAA TTC ATT AAA GAG GAG AAA
TTA ACT ATG AGA GGA TCC GGC ATC ATG GTT CGA CCA TTG AAC TCG ATC GTC GCC
GTG TCC CAA AAT ATG GGG ATT GGC AAG AAC GGA GAC CTA CCC TGG CCT CCG CTC
AGG AAC GAG TTC AAG TAC TTC CAA AGA ATG ACC ACA ACC TCT TCA GTG GAA GGT
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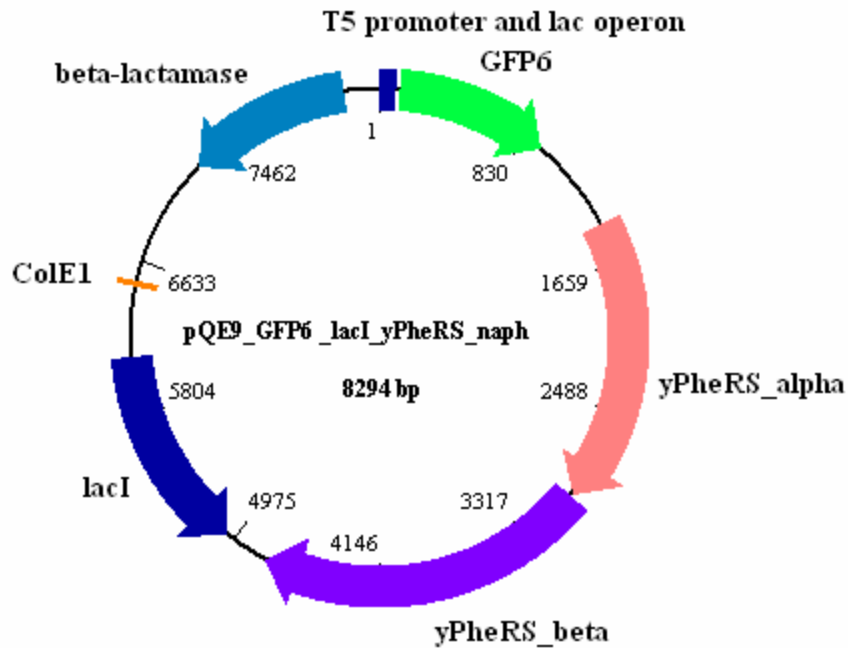
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AAC CTA TAA AAA TAG GCG TAT CAC GAG GCC CTT TCG TCT TCA C

2. pQE9_GFP6_lacI_yPheRS_naph (8,294 bp)



T5 promoter and lac operon	7 - 87 bp
His_GFP6	115 - 921 bp
yPheRS_alpha subunit	1449 - 2972 bp
yPheRS_beta subunit	2987 - 4774 bp
ColE1 origin	6501 - 6526 bp
beta-lactamase	8089 - 7229 bp

Full sequence

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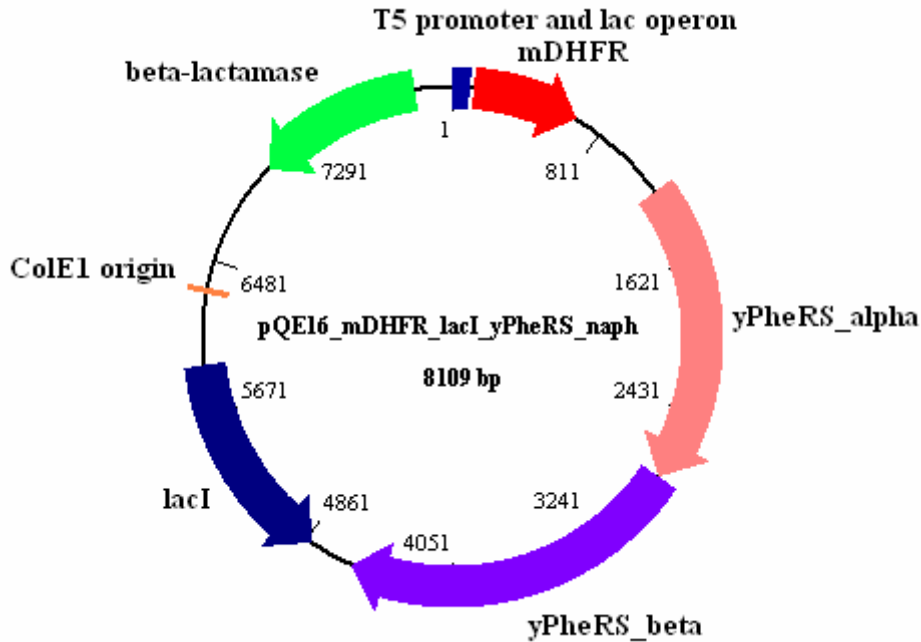
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3. pQE16_mDHFR_lacI_yPheRS_naph (8109 bp)



T5 promoter and lac operon	7 - 87 bp
mDHFR_His	115 - 660 bp
yPheRS_alpha subunit	1264 - 2787 bp
yPheRS_beta subunit	2802 - 4589 bp
lacI ^q	5926 - 4842 bp
ColE1 origin	6501 - 6526 bp
beta-lactamase	7904 - 7044 bp

Full sequence

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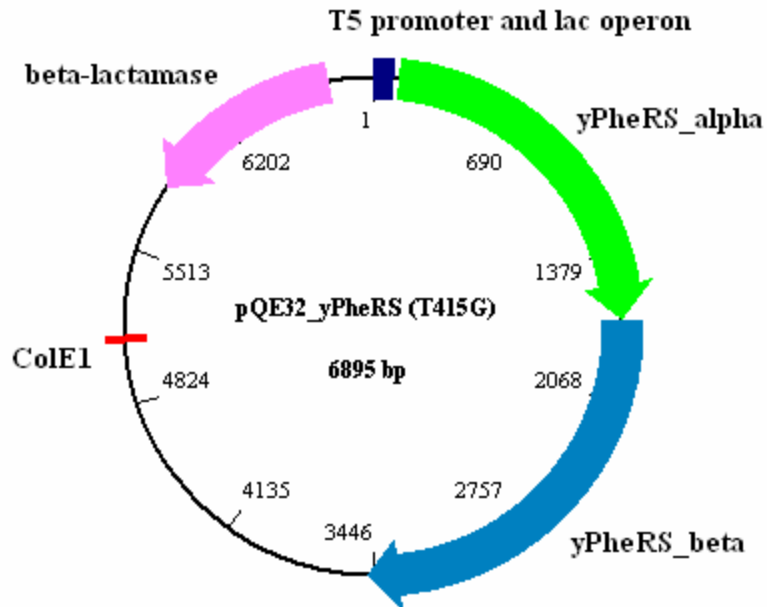
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 GAA AAA GGC ATC AAG TAT AAG TTT GAA GTC TAC GAG AAG AAA GGT TCC AGA TCT
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 GAT CCA GTA ATG ACC TCA GAA CTC CAT CTG GAT TTG TTC AGA ACG CTC GGT TGC
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CGT CTT CAC

4. pQE32_yPheRS (T415G) (6,895 bp)



T5 promoter and lac operon	7 - 87 bp
yPheRS_alpha subunit	115 - 1680 bp
yPheRS_beta subunit	1695 - 3482 bp
ColE1 origin	5103 - 5127 bp
beta-lactamase	6690 - 5830 bp

Full sequence

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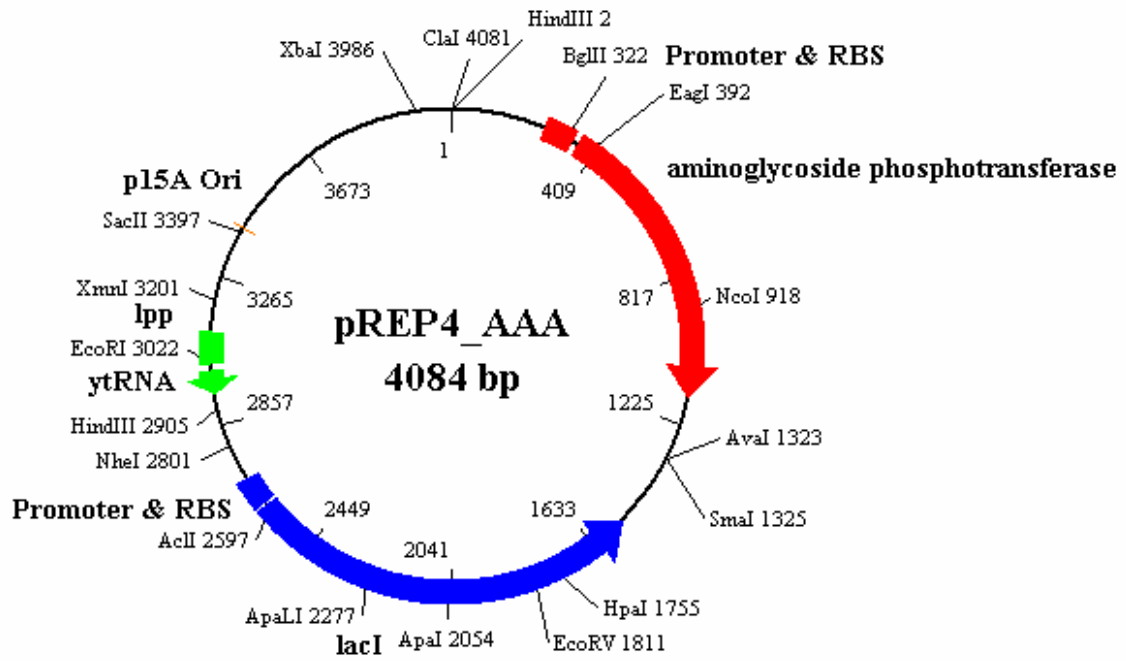
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TCC GCT TTG AAC TCT TTG AAA GCC CAC AAC AAG TTA GAG TTT TCC AAG GTC GAC
ACG GTT ACG TAT GAC TTG ACC AAA GAA GGT GCT CAA ATT TTG AAT GAA GGT TCG
TAC GAA ATT AAA CTA GTC AAG CTC ATC CAA GAG TTG GGT CAA CTT CAA ATC AAA
GAT GTG ATG TCC AAA CTA GGC CCT CAA GTT GGT AAG GTC GGT CAG GCT AGA GCT
TTC AAG AAC GGC TGG ATC GCC AAA AAC GCC TCA AAC GAG CTT GAA CTC TCC GCA
AAA TTG CAA AAT ACC GAT TTA AAT GAG CTT ACT GAT GAA ACG CAA TCT ATT CTA
GCG CAA ATC AAG AAC AAC TCG CAT CTG GAT AGC ATT GAC GCC AAG ATT TTG AAC
GAC TTG AAG AAA AGA AAG TTA ATT GCT CAA GGT AAA ATC ACA GAT TTC AGT GTC

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ACC AAA GGG CCA GAG TTC TCG ACC GAC CTC ACC AAA TTG GAA ACC GAT CTT ACC
 TCC GAC ATG GTC TCC ACC AAT GCA TAC AAG GAC TTG AAG TTC AAG CCT TAC AAT
 TTC AAT TCT CAA GGT GTG CAA ATA TCT TCA GGT GCT CTT CAC CCC TTA AAC AAA
 GTC AGA GAG GAA TTT AGA CAA ATT TTC TTT TCC ATG GGA TTC ACA GAG ATG CCC
 TCG AAC CAA TAC GTC GAG ACA GGT TTC TGG AAC TTC GAT GCC CTT TAC GTC CCA
 CAA CAG CAT CCT GCT CGT GAC CTG CAA GAC ACT TTC TAC ATC AAG GAC CCA CTA
 ACC GCT GAG TTG CCC GAT GAC AAG ACA TAC ATG GAC AAT ATC AAA GCC GTT CAC
 GAA CAG GGG AGA TTC GGG TCC ATC GGT TAT CGT TAC AAC TGG AAG CCA GAA GAA
 TGT CAA AAA TTG GTC TTG AGA ACT CAC TCC ACA GCC ATC TCT GCC AGA ATG CTG
 CAC GAT TTG GCC AAA GAT CCA AAG CCC ACC AGA TTG TTT TCT ATC GAC CGT GTT
 TTC CGT AAC GAA GCA GTT GAC GCC ACC CAT TTG GCC GAA TTC CAC CAG GTG GAA
 GGT GTT CTT GCC GAC TAC AAC ATT ACT CTG GGT GAC CTG ATC AAG TTC ATG GAA
 GAG TTT TTC GAA AGA ATG GGT GTC ACC GGT TTG AGA TTC AAG CCT ACC TAC AAT
 CCT TAC GGC GAG CCA TCA ATG GAA ATC TTT TCT TGG CAC GAA GGT TTG CAA AAA
 TGG GTC GAA ATC GGT AAC TCT GGT ATG TTC AGA CCA GAA ATG CTC GAG TCC ATG
 GGT CTA CCA AAG GAT CTA AGA GTC CTT GGT TGG GGG TTA TCC TTG GAA AGA CCT
 ACC ATG ATC AAA TAT AAG GTT CAA AAC ATC AGA GAA CTG TTA GGT CAT AAA GTC
 TCT TTG GAC TTT ATC GAA ACC AAT CCT GCT GCT AGA TTG GAC GAA GAC TTG TAC
 GAA TAA GGC AGG AAT AGA TTA TGC CTA CCG TCT CCG TGA ACA AGC AGC AAT TAT
 TTG ATC TTC TAG GCA AAG ACT ACA CTT CCC AAG AGT TCG ACG AAT TAT GTT TTG
 AAT TCG GTA TGG AAA TGG ACG AAG ACA CCA CAG AAG AGG CCT TGA AAA CCG GGG
 AGG AGC CGG AAT TGA AGC TTG ATA TCA GTG CCA ATC GTT ACG ATT TGC TTT GTA
 TCG AAG GTA TTT CAC AGT CGC TGA ACG AAT ACT TGG AAC GTA AAG AAA GAC CTG
 ACT ATA AAT TAA GCA AGC CAA CCA CTA AGT TGA TCA TCG ACA AAT CAA CGG AGC
 AAA TTA GAC CTT TTG CTA CCG CTG CTG TAT TGA GAA ATA TCA AGC TTA ACG AAA
 AAT CTT ACG CTT CTT TTA TTG CCT TGC AAG ATA AAT TAC ATG CCA ATC TAT GTA
 GAA ACA GAA GCT TGG TTG CCA TGG GTA CTC ACG ATT TAG ATT CAA TTG AAG GTC
 CAT TCC ATT ACA GAG CTC TAC CAC CAA AGG ACA TCA AGT TCG TAC CAT TGA ATC
 AAA CCC AAG AGT TTA CTG GTG ACA AAT TGA TCG AGT TTT ATA AAT CTC CAG AAC
 AGA AAA ACA ACA TAG GGA GAT ACG TTC ACA TTA TTG AGG ATT CTC CAG TCT TCC
 CAG TTA TTA TGG ACA GCA AAG ATC GTG TTT GCT CCC TGC CAC CAT TAA TCA ATA
 GTG AAC ATT CGA AGA TCT CTG TGA ACA CCC GTA ACA TTT TGA TTG ATA TAA CCG
 CCA CCG ATA AGA CCA AAG CCG AGA TCG TTT TGA ACA TAT TAA CTA CAA TGT TCT
 CAC GTT ATT GTG ACG AAC CAT TCA CGG TTG AGC CTG TAG AAA TTG TCT CTG AAC
 ACA ATG GCC AAT CCC GTT TGG CGC CAA ACT TCA ACG ATA GAA TTA TGG ATG TCT
 CCA TTA AGT ACA TCA ACT CCT GTC TTG GCC TAG ATC AAT CCG CTG ATG AAA TTG
 CTC ATT GTC TAA AAA AGA TGT CGT TGC ATG CCG TTC AAT CAA AGG AAG ACA AGG
 ACA TCT TGC ACG TTG ACA TTC CGG TAA CTA GAC CTG ATA TTT TGC ACG CTT GTG
 ATA TAA TGG AAG ATG CCG CTG TCG GTT ATG GTT TCA ATA ATT TGC CAA AGG GTG
 AGA AAT TAT CCA ATG CCA ACT TCA TTG CCA AAC CAT TAC CAA TCA ACA AGG TTT
 CTG ATA TTT TCA GAG TTG CAT CCT CTC AAG CCA CGT GGG TTG AGG TTT TAC CAT
 TGA CCT TAT GTT CGC ACG ATG AAA ACT TTA AAT TTC TAA GAC AAT CCG ACA ATG
 ATG ATT TAG CTG TCA AAT TGG CCA ACC CAA AGA CTT TGG AAT ACC AAG TTG TTA
 GAA CCA CTT TAT TGC CTG GTA TCT TAA AGA CAG TCA AGG AAA ACA GAA AAC ATT
 CCT TAC CAA TCA AAG TCT TTG AAA CCG GTG ACG TTG TAT TTA AAG ACG ACA AAC
 TAG AAA GGA AGG CGT ACA ATG AAC GTC ACT GGG CTG CCA TCT ACG TGG GTA AGA
 ATT CTG GGT TTG AAA TCA TTC AAG GGT TAT TGG GTA AAA TCA TGC AAA CTT TTA
 GAA CAG AGT GGA TTG CAG ACT ACG GTG CTG CTG CTT CTG GCA GAG GTT ACT GGA
 TTG AAG AAG ACG ATT CTG TGA AAA CCT ATT TCC CAG GTA GAG GTG CCA AGG TCA
 TGT TCA GAT CCA AAG AAG GCG CTG AGC CAA AGC AAA TCG GCC ACT TGG GTG TCT
 TGC ATC CTG AAG TCA TGA TGA ATT TCG ACG TTC CAT TCG CTG CAT CCT TTG TAG
 AGG TTA ATG CCG AAG TCT TCC TAT AAT GTA ATG TTC TAA CAA AAA TTT TTA CTG
 ATT TAT AAA ACT TAT ATA GAT AGA TAG ACA CAT AAA TGT ATC TAT ATA TAG AAA
 CAC AAC TAA AGT TTA CCA TCT TAA AGG TAA TGG GTA CCC CGG GTC GAC CTG CAG
 CCA AGC TTA ATT AGC TGA GCT TGG ACT CCT GTT GAT AGA TCC AGT AAT GAC CTC
 AGA ACT CCA TCT GGA TTT GTT CAG AAC GCT CGG TTG CCG CCG GGC GTT TTT TAT
 TGG TGA GAA TCC AAG CTA GCT TGG CGA GAT TTT CAG GAG CTA AGG AAG CTA AAA

TGG AGA AAA AAA TCA CTG GAT ATA CCA CCG TTG ATA TAT CCC AAT GGC ATC GTA
 AAG AAC ATT TTG AGG CAT TTC AGT CAG TTG CTC AAT GTA CCT ATA ACC AGA CCG
 TTC AGC TGG ATA TTA CGG CCT TTT TAA AGA CCG TAA AGA AAA ATA AGC ACA AGT
 TTT ATC CGG CCT TTA TTC ACA TTC TTG CCC GCC TGA TGA ATG CTC ATC CGG AAT
 TTC GTA TGG CAA TGA AAG ACG GTG AGC TGG TGA TAT GGG ATA GTG TTC ACC CTT
 GTT ACA CCG TTT TCC ATG AGC AAA CTG AAA CGT TTT CAT CGC TCT GGA GTG AAT
 ACC ACG ACG ATT TCC GGC AGT TTC TAC ACA TAT ATT CGC AAG ATG TGG CGT GTT
 ACG GTG AAA ACC TGG CCT ATT TCC CTA AAG GGT TTA TTG AGA ATA TGT TTT TCG
 TCT CAG CCA ATC CCT GGG TGA GTT TCA CCA GTT TTG ATT TAA ACG TGG CCA ATA
 TGG ACA ACT TCT TCG CCC CCG TTT TCA CCA TGG GCA AAT ATT ATA CGC AAG GCG
 ACA AGG TGC TGA TGC CGC TGG CGA TTC AGG TTC ATC ATG CCG TTT GTG ATG GCT
 TCC ATG TCG GCA GAA TGC TTA ATG AAT TAC AAC AGT ACT CGG ATG AGT GGC AGG
 GCG GGG CGT AAT TTT TTT AAG GCA GTT ATT GGT GCC CTT AAA CGC CTG GGG TAA
 TGA CTC TCT AGC TTG AGG CAT CAA ATA AAA CGA AAG GCT CAG TCG AAA GAC TGG
 GCC TTT CGT TTT ATC TGT TGT TTG TCG GTG AAC GCT CTC CTG AGT AGG ACA AAT
 CCG CCC TCT AGA GCT GCC TCG CGC GTT TCG GTG ATG ACG GTG AAA ACC TCT GAC
 ACA TGC AGC TCC CGG AGA CGG TCA CAG CTT GTC TGT AAG CGG ATG CCG GGA GCA
 GAC AAG CCC GTC AGG GCG CGT CAG CGG GTG TTG GCG GGT GTC GGG GCG CAG CCA
 TGA CCC AGT CAC GTA GCG ATA GCG GAG TGT ATA CTG GCT TAA CTA TGC GGC ATC
 AGA GCA GAT TGT ACT GAG AGT GCA CCA TAT GCG GTG TGA AAT ACC GCA CAG ATG
 CGT AAG GAG AAA ATA CCG CAT CAG GCG CTC TTC CGC TTC CTC GCT CAC TGA CTC
 GCT GCG CTC GGT CGT TCG GCT GCG GCG AGC GGT ATC AGC TCA CTC AAA GGC GGT
 AAT ACG GTT ATC CAC AGA ATC AGG GGA TAA CGC AGG AAA GAA CAT GTG AGC AAA
 AGG CCA GCA AAA GGC CAG GAA CCG TAA AAA GGC CGC GTT GCT GGC GTT TTT CCA
 TAG GCT CCG CCC CCC TGA CGA GCA TCA CAA AAA TCG ACG CTC AAG TCA GAG GTG
 GCG AAA CCC GAC AGG ACT ATA AAG ATA CCA GGC GTT TCC CCC TGG AAG CTC CCT
 CGT GCG CTC TCC TGT TCC GAC CCT GCC GCT TAC CGG ATA CCT GTC CGC CTT TCT
 CCC TTC GGG AAG CGT GGC GCT TTC TCA TAG CTC ACG CTG TAG GTA TCT CAG TTC
 GGT GTA GGT CGT TCG CTC CAA GCT GGG CTG TGT GCA CGA ACC CCC CGT TCA GCC
 CGA CCG CTG CGC CTT ATC CGG TAA CTA TCG TCT TGA GTC CAA CCC GGT AAG ACA
 CGA CTT ATC GCC ACT GGC AGC AGC CAC TGG TAA CAG GAT TAG CAG AGC GAG GTA
 TGT AGG CGG TGC TAC AGA GTT CTT GAA GTG GTG GCC TAA CTA CGG CTA CAC TAG
 AAG GAC AGT ATT TGG TAT CTG CGC TCT GCT GAA GCC AGT TAC CTT CGG AAA AAG
 AGT TGG TAG CTC TTG ATC CGG CAA ACA AAC CAC CGC TGG TAG CGG TGG TTT TTT
 TGT TTG CAA GCA GCA GAT TAC GCG CAG AAA AAA AGG ATC TCA AGA AGA TCC TTT
 GAT CTT TTC TAC GGG GTC TGA CGC TCA GTG GAA CGA AAA CTC ACG TTA AGG GAT
 TTT GGT CAT GAG ATT ATC AAA AAG GAT CTT CAC CTA GAT CCT TTT AAA TTA AAA
 ATG AAG TTT TAA ATC AAT CTA AAG TAT ATA TGA GTA AAC TTG GTC TGA CAG TTA
 CCA ATG CTT AAT CAG TGA GGC ACC TAT CTC AGC GAT CTG TCT ATT TCG TTC ATC
 CAT AGT TGC CTG ACT CCC CGT CGT GTA GAT AAC TAC GAT ACG GGA GGG CTT ACC
 ATC TGG CCC CAG TGC TGC AAT GAT ACC GCG AGA CCC ACG CTC ACC GGC TCC AGA
 TTT ATC AGC AAT AAA CCA GCC AGC CGG AAG GGC CGA GCG CAG AAG TGG TCC TGC
 AAC TTT ATC CGC CTC CAT CCA GTC TAT TAA TTG TTG CCG GGA AGC TAG AGT AAG
 TAG TTC GCC AGT TAA TAG TTT GCG CAA CGT TGT TGC CAT TGC TAC AGG CAT CGT
 GGT GTC ACG CTC GTC GTT TGG TAT GGC TTC ATT CAG CTC CGG TTC CCA ACG ATC
 AAG GCG AGT TAC ATG ATC CCC CAT GTT GTG CAA AAA AGC GGT TAG CTC CTT CGG
 TCC TCC GAT CGT TGT CAG AAG TAA GTT GGC CGC AGT GTT ATC ACT CAT GGT TAT
 GGC AGC ACT GCA TAA TTC TCT TAC TGT CAT GCC ATC CGT AAG ATG CTT TTC TGT
 GAC TGG TGA GTA CTC AAC CAA GTC ATT CTG AGA ATA GTG TAT GCG GCG ACC GAG
 TTG CTC TTG CCC GGC GTC AAT ACG GGA TAA TAC CGC GCC ACA TAG CAG AAC TTT
 AAA AGT GCT CAT CAT TGG AAA ACG TTC TTC GGG GCG AAA ACT CTC AAG GAT CTT
 ACC GCT GTT GAG ATC CAG TTC GAT GTA ACC CAC TCG TGC ACC CAA CTG ATC TTC
 AGC ATC TTT TAC TTT CAC CAG CGT TTC TGG GTG AGC AAA AAC AGG AAG GCA AAA
 TGC CGC AAA AAA GGG AAT AAG GGC GAC ACG GAA ATG TTG AAT ACT CAT ACT CTT
 CCT TTT TCA ATA TTA TTG AAG CAT TTA TCA GGG TTA TTG TCT CAT GAG CGG ATA
 CAT ATT TGA ATG TAT TTA GAA AAA TAA ACA AAT AGG GGT TCC GCG CAC ATT TCC

CCG AAA AGT GCC ACC TGA CGT CTA AGA AAC CAT TAT TAT CAT GAC ATT AAC CTA
TAA AAA TAG GCG TAT CAC GAG GCC CTT TCG TCT TCA C

5. pREP4_ytRNA^{Phe}_AAA (4084 bp)

Vector size	4084 bp
agpt promoter	259-260 bp
RBS	336-344 bp
Aminoglycosie phosphotransferase	357-1151 bp
<i>lacI</i> promoter	2638-2639 bp
<i>lacI</i> repressor	1529-2611 bp
<i>lpp</i> promoter	3029-3083 bp
ytRNA	2945-3020 bp
transcriptional terminator(rrnC)	2938-2909 bp
p15A origin of replication	3408-3411 bp

Full sequence

AAG CTT CAC GCT GCC GCA AGC ACT CAG GGC GCA AGG GCT GCT AAA GGA AGC GGA
 ACA CGT AGA AAG CCA GTC CGC AGA AAC GGT GCT GAC CCC GGA TGA ATG TCA GCT

ACT GGG CTA TCT GGA CAA GGG AAA ACG CAA GCG CAA AGA GAA AGC AGG TAG CTT
 GCA GTG GGC TTA CAT GGC GAT AGC TAG ACT GGG CGG TTT TAT GGA CAG CAA GCG
 AAC CGG AAT TGC CAG CTG GGG CGC CCT CTG GTA AGG TTG GGA AGC CCT GCA AAG
 TAA ACT GGA TGG CTT TCT TGC CGC CAA GGA TCT GAT GGC GCA GGG GAT CAA GAT
 CTG ATC AAG AGA CAG GAT GAC GGT CGT TTC GCA TGC TTG AAC AAG ATG GAT TGC
 ACG CAG GTT CTC CGG CCG CTT GGG TGG AGA GGC TAT TCG GCT ATG ACT GGG CAC
 AAC AGA CAA TCG GCT GCT CTG ATG CCG CCG TGT TCC GGC TGT CAG CGC AGG GGC
 GCC CGG TTC TTT TTG TCA AGA CCG ACC TGT CCG GTG CCC TGA ATG AAC TGC AGG
 ACG AGG CAG CGC GGC TAT CGT GGC TGG CCA CGA CGG GCG TTC CTT GCG CAG CTG
 TGC TCG ACG TTG TCA CTG AAG CGG GAA GGG ACT GGC TGC TAT TGG GCG AAG TGC
 CGG GGC AGG ATC TCC TGT CAT CTC ACC TTG CTC CTG CCG AGA AAG TAT CCA TCA
 TGG CTG ATG CAA TGC GGC GGC TGC ATA CGC TTG ATC CGG CTA CCT GCC CAT TCG
 ACC ACC AAG CGA AAC ATC GCA TCG AGC GAG CAC GTA CTC GGA TGG AAG CCG GTC
 TTG TCG ATC AGG ATG ATC TGG ACG AAG AGC ATC AGG GGC TCG CGC CAG CCG AAC
 TGT TCG CCA GGC TCA AGG CGC GCA TGC CCG ACG GCG AGG ATC TCG TCG TGA CCC
 ATG GCG ATG CCT GCT TGC CGA ATA TCA TGG TGG AAA ATG GCC GCT TTT CTG GAT
 TCA TCG ACT GTG GCC GGC TGG GTG TGG CGG ACC GCT ATC AGG ACA TAG CGT TGG
 CTA CCC GTG ATA TTG CTG AAG AGC TTG GCG GCG AAT GGG CTG ACC GCT TCC TCG
 TGC TTT ACG GTA TCG CCG CTC CCG ATT CGC AGC GCA TCG CCT TCT ATC GCC TTC
 TTG ACG AGT TCT TCT GAG CGG GAC TCT GGG GTT CGA AAT GAC CGA CCA AGC GAC
 GCC CAA CCT GCC ATC ACG AGA TTT CGA TTC CAC CGC CGC CTT CTA TGA AAG GTT
 GGG CTT CGG AAT CGT TTT CCG GGA CGC CTG GAT GAT CCT CCA GCG CGG GGA
 TCT CAT GCT GGA GTT CTT CGC CCA CCC CGG GCT CGA TCC CCT CGC GAG TTG GTT
 CAG CTG CTG CCT GAG GCT GGA CGA CCT CGC GGA GTT CTA CCG GCA GTG CAA ATC
 CGT CGG CAT CCA GGA AAC CAG CAG CGG CTA TCC GCG CAT CCA TGC CCC CGA ACT
 GCA GGA GTG GGG AGG CAC GAT GGC CGC TTT GGT CGA CAA TTC GCG CTA ACT TAC
 ATT AAT TGC GTT GCG CTC ACT GCC CGC TTT CCA GTC GGG AAA CCT GTC GTG CCA
 GCT GCA TTA ATG AAT CGG CCA ACG CGC GGG GAG AGG CGG TTT GCG TAT TGG GCG
 CCA GGG TGG TTT TTC TTT TCA CCA GTG AGA CGG GCA ACA GCT GAT TGC CCT TCA
 CCG CCT GGC CCT GAG AGA GTT GCA GCA AGC GGT CCA CGC TGG TTT GCC CCA GCA
 GGC GAA AAT CCT GTT TGA TGG TGG TTA ACG GCG GGA TAT AAC ATG AGC TGT CTT
 CGG TAT CGT CGT ATC CCA CTA CCG AGA TAT CCG CAC CAA CGC GCA GCC CGG ACT
 CGG TAA TGG CGC GCA TTG CGC CCA GCG CCA TCT GAT CGT TGG CAA CCA GCA TCG
 CAG TGG GAA CGA TGC CCT CAT TCA GCA TTT GCA TGG TTT GTT GAA AAC CGG ACA
 TGG CAC TCC AGT CGC CTT CCC GTT CCG CTA TCG GCT GAA TTT GAT TGC GAG TGA
 GAT ATT TAT GCC AGC CAG CCA GAC GCA GAC GCG CCG AGA CAG AAC TTA ATG GGC
 CCG CTA ACA GCG CGA TTT GCT GGT GAC CCA ATG CGA CCA GAT GCT CCA CGC CCA
 GTC GCG TAC CGT CTT CAT GGG AGA AAA TAA TAC TGT TGA TGG GTG TCT GGT CAG
 AGA CAT CAA GAA ATA ACG CCG GAA CAT TAG TGC AGG CAG CTT CCA CAG CAA TGG
 CAT CCT GGT CAT CCA GCG GAT AGT TAA TGA TCA GCC CAC TGA CGC GTT GCG CGA
 GAA GAT TGT GCA CCG CCG TTT TAC AGG CTT CGA CGC CGC TTC GTT CTA CCA TCG
 ACA CCA CCA CGC TGG CAC CCA GTT GAT CGG CGC GAG ATT TAA TCG CCG CGA CAA
 TTT GCG ACG GCG CGT GCA GGG CCA GAC TGG AGG TGG CAA CGC CAA TCA GCA ACG
 ACT GTT TGC CCG CCA GTT GTT GTG CCA CGC GGT TGG GAA TGT AAT TCA GCT CCG
 CCA TCG CCG CTT CCA CTT TTT CCC GCG TTT TCG CAG AAA CGT GGC TGG CCT GGT
 TCA CCA CGC GGG AAA CGG TCT GAT AAG AGA CAC CGG CAT ACT CTG CGA CAT CGT
 ATA ACG TTA CTG GTT TCA CAT TCA CCA CCC TGA ATT GAC TCT CTT CCG GGC GCT
 ATC ATG CCA TAC CGC GAA AGG TTT TGC GCC ATT CGA TGG TGT CAA CGT AAA TGC
 ATG CCG CTT CGC CTT CGC GCG CGA ATT GTC GAC CCT GTC CCT CCT GTT CAG CTA
 CTG ACG GGG TGG TGC GTA ACG GCA AAA GCA CCG CCG GAC ATC AGC GCT AGC GGA
 GTG TAC TGG CGA AAG GGG GAG GTG CTG CAA GGC GAT TAA GTT GGG TAA CGC CAG
 GGT TTT CCC AGT CAC GAC GTT GTA AAA CGA CGG CCA GTG CCA AGC TTA AAA AAA
 ATC CTT AGC TTT CGC TAA GGA TCT GCA GTG GTG CGA ACT CTG TGG ATC GAA CAC
 AGG ACC TCC AGA TTT TTA GTC TGG CGC TCT CCC AAC TGA GCT AAG TCC GCG AAT
 TCA GCG TTA CAA GTA TTA CAC AAA GTT TTT TAT GTT GAG AAT ATT TTT TTG ATG
 GGG CGC CAC TTA TTT TTG ATC GTT CGC TCA AAG AAG CGG CGC CAG GGT GGT TTT
 TCT TTT CAC CAG TGA GAC GGG CAA CAG CTG GCT TAC TAT GTT GGC ACT GAT GAG
 GGT GTC AGT GAA GTG CTT CAT GTG GCA GGA AAA AGG CTG CAC CGG TGC GTC
 AGC AGA ATA TGT GAT ACA GGA TAT ATT CCG CTT CCT CGC TCA CTG ACT CGC TAC
 GCT CGG TCG TTC GAC TGC GGC GAG CGG AAA TGG CTT ACG AAC GGG GCG GAG ATT
 TCC TGG AAG ATG CCA GGA AGA TAC TTA ACA GGG AAG TGA GAG GGC CGC GGC AAA
 GCC GTT TTT CCA TAG GCT CCG CCC CCC TGA CAA GCA TCA CGA AAT CTG ACG CTC
 AAA TCA GTG GTG GCG AAA CCC GAC AGG ACT ATA AAG ATA CCA GGC GTT TCC CCT
 GGC GGC TCC CTC GTG CGC TCT CCT GTT CCT GCC TTT CGG TTT ACC GGT GTC ATT

CCG CTG TTA TGG CCG CGT TTG TCT CAT TCC ACG CCT GAC ACT CAG TTC CGG GTA
GGC AGT TCG CTC CAA GCT GGA CTG TAT GCA CGA ACC CCC CGT TCA GTC CGA CCG
CTG CGC CTT ATC CGG TAA CTA TCG TCT TGA GTC CAA CCC GGA AAG ACA TGC AAA
AGC ACC ACT GGC AGC AGC CAC TGG TAA TTG ATT TAG AGG AGT TAG TCT TGA AGT
CAT GCG CCG GTT AAG GCT AAA CTG AAA GGA CAA GTT TTG GTG ACT GCG CTC CTC
CAA GCC AGT TAC CTC GGT TCA AAG AGT TGG TAG CTC AGA GAA CCT TCG AAA AAC
CGC CCT GCA AGG CGG TTT TTT CGT TTT CAG AGC AAG AGA TTA CGC GCA GAC CAA
AAC GAT CTC AAG AAG ATC ATC TTA TTA ATC AGA TAA AAT ATT TCT AGA TTT CAG
TGC AAT TTA TCT CTT CAA ATG TAG CAC CTG AAG TCA GCC CCA TAC GAT ATA AGT
TGT TAA TTC TCA TGT TTG ACA GCT TAT CAT CGA T

Appendix B

Marker Protein Information

1. GFP_{UV} (Clontech) (without a N-terminal hexa-histidine tag)

DNA sequence

ATG AGT AAA GGA GAA GAA CTT TTC ACT GGA GTT GTC CCA ATT CTT GTT GAA TTA
 GAT GGT GAT GTT AAT GGG CAC AAA TTT TCT GTC AGT GGA GAG GGT GAA GGT GAT
 GCA ACA TAC GGA AAA CTT ACC CTT AAA TTT ATT TGC ACT ACT GGA AAA CTA CCT
 GTT CCA TGG CCA ACA CTT GTC ACT ACT TTC TCT TAT GGT GTT CAA TGC TTT TCC
 CGT TAT CCG GAT CAT ATG AAA CGG CAT GAC TTT TTC AAG AGT GCC ATG CCC GAA
 GGT TAT GTA CAG GAA CGC ACT ATA TCT TTC AAA GAT GAC GGG AAC TAC AAG ACG
 CGT GCT GAA GTC AAG TTT GAA GGT GAT ACC CTT GTT AAT CGT ATC GAG TTA AAA
 GGT ATT GAT TTT AAA GAA GAT GGA AAC ATT CTC GGA CAC AAA CTC GAG TAC AAC
 TAT AAC TCA CAC AAT GTA TAC ATC ACG GCA GAC AAA CAA AAG AAT GGA ATC AAA
 GCT AAC TTC AAA ATT CGC CAC AAC ATT GAA GAT GGA TCC GTT CAA CTA GCA GAC
 CAT TAT CAA CAA AAT ACT CCA ATT GGC GAT GGC CCT GTC CTT TTA CCA GAC AAC
 CAT TAC CTG TCG ACA CAA TCT GCC CTT TCG AAA GAT CCC AAC GAA AAG CGT GAC
 CAC ATG GTC CTT CTT GAG TTT GTA ACT GCT GCT GGG ATT ACA CAT GGC ATG GAT
 GAG CTC TAC AAA CTG CAG CCA AGC TTA ATT AGC TGA

Amino acid sequence

MSKGEELFTGVVPIILVELDGDVNGHKFSVSGEGEGDATYGLTLKFICTTGKLPVPWPPTLVTTFSYGVQCF
 SRYPDHMKRHDFFKSAMPEGYVQERTISFKDDGNYKTRAEVKFEGLTLVNRIELKGIDFKEDGNILGHKLE
 YNYSNHNVIYITADKQKNGIKANFKIRHNIEDGSVQLADHYQQNTPIGDGPVLLPDNHYLSTQSALS KDPNE
 KRDHMVLLLEFVTAAGITHGMDELYKLQPSLIS

2. GFP_{UV}

DNA sequence

ATG AGA GGA TCG CAT CAC CAT CAC CAT CAC GGA TCC GTC GAC CTG CAG CCC CGG
 GTA CCG GTA GAA AAA ATG AGT AAA GGA GAA GAA CTT TTC ACT GGA GTT GTC CCA
 ATT CTT GTT GAA TTA GAT GGT GAT GTT AAT GGG CAC AAA TTT TCT GTC AGT GGA
 GAG GGT GAA GGT GAT GCA ACA TAC GGA AAA CTT ACC CTT AAA TTT ATT TGC ACT
 ACT GGA AAA CTA CCT GTT CCA TGG CCA ACA CTT GTC ACT ACT TTC TCT TAT GGT
 GTT CAA TGC TTT TCC CGT TAT CCG GAT CAT ATG AAA CGG CAT GAC TTT TTC AAG
 AGT GCC ATG CCC GAA GGT TAT GTA CAG GAA CGC ACT ATA TCT TTC AAA GAT GAC
 GGG AAC TAC AAG ACG CGT GCT GAA GTC AAG TTT GAA GGT GAT ACC CTT GTT AAT
 CGT ATC GAG TTA AAA GGT ATT GAT TTT AAA GAA GAT GGA AAC ATT CTC GGA CAC
 AAA CTC GAG TAC AAC TAT AAC TCA CAC AAT GTA TAC ATC ACG GCA GAC AAA CAA
 AAG AAT GGA ATC AAA GCT AAC TTC AAA ATT ATG AGA GGA TCG CAT CAC CAT CAC
 CAT CAC GGA TCC GTC GAC CTG CAG CCC CGG GTA CCG GTA GAA AAA ATG AGT AAA
 GGA GAA GAA CTT TTC ACT GGA GTT GTC CCA ATT CTT GTT GAA TTA GAT GGT GAT
 GTT AAT GGG CAC AAA TTT TCT GTC AGT GGA GAG GGT GAA GGT GAT GCA ACA TAC
 GGA AAA CTT ACC CTT AAA TTT ATT TGC ACT ACT GGA AAA CTA CCT GTT CCA TGG
 CCA ACA CTT GTC ACT ACT TTC TCT TAT GGT GTT CAA TGC TTT TCC CGT TAT CCG
 GAT CAT ATG AAA CGG CAT GAC TTT TTC AAG AGT GCC ATG CCC GAA GGT TAT GTA
 CAG GAA CGC ACT ATA TCT TTC AAA GAT GAC GGG AAC TAC AAG ACG CGT GCT GAA
 GTC AAG TTT GAA GGT GAT ACC CTT GTT AAT CGT ATC GAG TTA AAA GGT ATT GAT
 TTT AAA GAA GAT GGA AAC ATT CTC GGA CAC AAA CTC GAG TAC AAC TAT AAC TCA
 CAC AAT GTA TAC ATC ACG GCA GAC AAA CAA AAG AAT GGA ATC AAA GCT AAC TTC
 AAA ATT CGC CAC AAC ATT GAA GAT GGA TCC GTT CAA CTA GCA GAC CAT TAT CAA
 CAA AAT ACT CCA ATT GGC GAT GGC CCT GTC CTT TTA CCA GAC AAC CAT TAC CTG

TCG ACA CAA TCT GCC CTT TCG AAA GAT CCC AAC GAA AAG CGT GAC CAC ATG GTC
 CTT CTT GAG TTT GTA ACT GCT GCT GGG ATT ACA CAT GGC ATG GAT GAG CTC TAC
 AAA CTG CAG CCA AGC TTA ATT AGC TGA

Amino acid sequence

MRGSHHHHHHGSVDLQPRVPVEKMSKGEELFTGVVPILEVELDGDVNGHKFSVSGEGEGDATYGLTLKFLIC
 TTGKLPVPWPTLVTTTFSYGVQCFSRYPDHMKRHDFFKSAMPEGYVQERTISFKDDGNYKTRAEVKFEGDTL
 VNRIELKGIDFKEDGNILGHKLEYNYNSHNVYITADKQKNGIKANFKIRHNIEDGSVQLADHYQQNTPIGD
 GPVLLPDNHYLSTQSALSKDPNEKRDHMLLEFVTAAGITHGMDELYKLQPSLIS

3. GFP3

F64L, S65T, S99F, and T153M mutations in GFP_{UV}

DNA sequence

ATG AGA GGA TCG CAT CAC CAT CAC CAT CAC GGA TCC GTC GAC CTG CAG CCC CGG
 GTA CCG GTA GAA AAA ATG AGT AAA GGA GAA GAA CTT TTC ACT GGA GTT GTC CCA
 ATT CTT GTT GAA TTA GAT GGT GAT GTT AAT GGG CAC AAA TTT TCT GTC AGT GGA
 GAG GGT GAA GGT GAT GCA ACA TAC GGA AAA CTT ACC CTT AAA TTT ATT TGC ACT
 ACT GGA AAA CTA CCT GTT CCA TGG CCA ACA CTT GTC ACT ACT CTG ACC TAT GGT
 GTT CAA TGC TTC TCC CGT TAT CCG GAT CAT ATG AAA CGG CAT GAC TTT TTC AAG
 AGT GCC ATG CCC GAA GGT TAT GTA CAG GAA CGC ACT ATA TTC TTC AAA GAT GAC
 GGG AAC TAC AAG ACG CGT GCT GAA GTC AAG TTT GAA GGT GAT ACC CTT GTT AAT
 CGT ATC GAG TTA AAA GGT ATT GAT TTT AAA GAA GAT GGA AAC ATT CTC GGA CAC
 AAA CTC GAG TAC AAC TAT AAC TCA CAC AAT GTA TAC ATC ATG GCA GAC AAA CAA
 AAG AAT GGA ATC AAA GCT AAC TTC AAA ATT CGC CAC AAC ATT GAA GAT GGA TCC
 GTT CAA CTA GCA GAC CAT TAT CAA CAA AAT ACT CCA ATT GGC GAT GGC CCT GTC
 CTT TTA CCA GAC AAC CAT TAC CTG TCG ACA CAA TCT GCC CTT TCG AAA GAT CCC
 AAC GAA AAG CGT GAC CAC ATG GTC CTT CTT GAG TTT GTA ACT GCT GCT GGG ATT
 ACA CAT GGC ATG GAT GAG CTC TAC AAA CTG CAG CCA AGC TTA ATT AGC TGA

Amino acid sequence

MRGSHHHHHHGSVDLQPRVPVEKMSKGEELFTGVVPILEVELDGDVNGHKFSVSGEGEGDATYGLTLKFLIC
 TTGKLPVPWPTLVTTTLTYGVQCFSRYPDHMKRHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEGDTL
 VNRIELKGIDFKEDGNILGHKLEYNYNSHNVYIMADKQKNGIKANFKIRHNIEDGSVQLADHYQQNTPIGD
 GPVLLPDNHYLSTQSALSKDPNEKRDHMLLEFVTAAGITHGMDELYKLQPSLIS

4. GFP6

L64F mutation and all Phe codons are changed to UUU in GFP3

DNA sequence

ATG AGA GGA TCG CAT CAC CAT CAC CAT CAC GGA TCC GTC GAC CTG CAG CCC CGG
 GTA CCG GTA GAA AAA ATG AGT AAA GGA GAA GAA CTT TTT ACT GGA GTT GTC CCA
 ATT CTT GTT GAA TTA GAT GGT GAT GTT AAT GGG CAC AAA TTT TCT GTC AGT GGA
 GAG GGT GAA GGT GAT GCA ACA TAC GGA AAA CTT ACC CTT AAA TTT ATT TGC ACT

ACT GGA AAA CTA CCT GTT CCA TGG CCA ACA CTT GTC ACT ACT TTT ACC TAT GGT
 GTT CAA TGC TTT TCC CGT TAT CCG GAT CAT ATG AAA CGG CAT GAC TTT TTT AAG
 AGT GCC ATG CCC GAA GGT TAT GTA CAG GAA CGC ACT ATA TTT TTT AAA GAT GAC
 GGG AAC TAC AAG ACG CGT GCT GAA GTC AAG TTT GAA GGT GAT ACC CTT GTT AAT
 CGT ATC GAG TTA AAA GGT ATT GAT TTT AAA GAA GAT GGA AAC ATT CTC GGA CAC
 AAA CTC GAG TAC AAC TAT AAC TCA CAC AAT GTA TAC ATC ATG GCA GAC AAA CAA
 AAG AAT GGA ATC AAA GCT AAC TTT AAA ATT CGC CAC AAC ATT GAA GAT GGA TCC
 GTT CAA CTA GCA GAC CAT TAT CAA CAA AAT ACT CCA ATT GGC GAT GGC CCT GTC
 CTT TTA CCA GAC AAC CAT TAC CTG TCG ACA CAA TCT GCC CTT TCG AAA GAT CCC
 AAC GAA AAG CGT GAC CAC ATG GTC CTT CTT GAG TTT GTA ACT GCT GCT GGG ATT
 ACA CAT GGC ATG GAT GAG CTC TAC AAA CTG CAG CCA AGC TTA ATT AGC TGA

Amino acid sequence

MRGSHHHHHHGSVDLQPRVPVEKMSKGEELFTGVVPILEVELDGDVNGHKFSVSGEGEGDATYGKLTCLKFIC
 TTGKLPVPWPTLVTTFTYGVQCFSTRYPDHMKRHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEGDTL
 VNRIELKGIDFKEDGNILGHKLEYNYNSHNVYIMADKQKNGIKANFKIRHNIEDGSVQLADHYQQNTPIGD
 GPVLLPDNHYLSTQSALS KDPNEKRDMVLLFEVTAAGITHGMDELYKLQPSLIS

5. GFP_WC

All Phe codons are changed to UUC in GFP3

DNA sequence

ATG AGA GGA TCG CAT CAC CAT CAC CAT CAC GGA TCC GTC GAC CTG CAG CCC CGG
 GTA CCG GTA GAA AAA ATG AGT AAA GGA GAA GAA CTT TTC ACT GGA GTT GTC CCA
 ATT CTT GTT GAA TTA GAT GGT GAT GTT AAT GGG CAC AAA TTC TCT GTC AGT GGA
 GAG GGT GAA GGT GAT GCA ACA TAC GGA AAA CTT ACC CTT AAA TTC ATT TGC ACT
 ACT GGA AAA CTA CCT GTT CCA TGG CCA ACA CTT GTC ACT ACT CTG ACC TAT GGT
 GTT CAA TGC TTC TCC CGT TAT CCG GAT CAT ATG AAA CGG CAT GAC TTC TTC AAG
 AGT GCC ATG CCC GAA GGT TAT GTA CAG GAA CGC ACT ATA TTC TTC AAA GAT GAC
 GGG AAC TAC AAG ACG CGT GCT GAA GTC AAG TTC GAA GGT GAT ACC CTT GTT AAT
 CGT ATC GAG TTA AAA GGT ATT GAT TTC AAA GAA GAT GGA AAC ATT CTC GGA CAC
 AAA CTC GAG TAC AAC TAT AAC TCA CAC AAT GTA TAC ATC ATG GCA GAC AAA CAA
 AAG AAT GGA ATC AAA GCT AAC TTC AAA ATT CGC CAC AAC ATT GAA GAT GGA TCC
 GTT CAA CTA GCA GAC CAT TAT CAA CAA AAT ACT CCA ATT GGC GAT GGC CCT GTC
 CTT TTA CCA GAC AAC CAT TAC CTG TCG ACA CAA TCT GCC CTT TCG AAA GAT CCC
 AAC GAA AAG CGT GAC CAC ATG GTC CTT CTT GAG TTC GTA ACT GCT GCT GGG ATT
 ACA CAT GGC ATG GAT GAG CTC TAC AAA CTG CAG CCA AGC TTA ATT AGC TGA

Amino acid sequence

MRGSHHHHHHGSVDLQPRVPVEKMSKGEELFTGVVPILEVELDGDVNGHKFSVSGEGEGDATYGKLTCLKFIC
 TTGKLPVPWPTLVTTTLYGVQCFSTRYPDHMKRHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEGDTL
 VNRIELKGIDFKEDGNILGHKLEYNYNSHNVYIMADKQKNGIKANFKIRHNIEDGSVQLADHYQQNTPIGD
 GPVLLPDNHYLSTQSALS KDPNEKRDMVLLFEVTAAGITHGMDELYKLQPSLIS

6. GFP6 (2UUU)

AGA (Arg) to UUU (Phe) mutation in position 2 of GFP6

7. GFP6 (2UUC)

AGA (Arg) to UUU (Phe) mutation in position 2 of GFP6

8. GFP6 (158Am)

AAA (Lys) to UAG (an amber codon) mutation in position 158 of GFP6

9. GFP3C

GFP3 with a C-terminal hexa-histidine tag

DNA sequence

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ATG CGA GGA TCC CTG CAG CCC CGG GTA CCG GTA GAA AAA ATG AGT AAA GGA GAA
GAA CTT TTC ACT GGA GTT GTC CCA ATT CTT GTT GAA TTA GAT GGT GAT GTT AAT
GGG CAC AAA TTT TCT GTC AGT GGA GAG GGT GAA GGT GAT GCA ACA TAC GGA AAA
CTT ACC CTT AAA TTT ATT TGC ACT ACT GGA AAA CTA CCT GTT CCA TGG CCA ACA
CTT GTC ACT ACT CTG ACC TAT GGT GTT CAA TGC TTC TCC CGT TAT CCG GAT CAT
ATG AAA CGG CAT GAC TTT TTC AAG AGT GCC ATG CCC GAA GGT TAT GTA CAG GAA
CGC ACT ATA TTC TTC AAA GAT GAC GGG AAC TAC AAG ACG CGT GCT GAA GTC AAG
TTT GAA GGT GAT ACC CTT GTT AAT CGT ATC GAG TTA AAA GGT ATT GAT TTT AAA
GAA GAT GGA AAC ATT CTC GGA CAC AAA CTC GAG TAC AAC TAT AAC TCA CAC AAT
GTA TAC ATC ATG GCA GAC AAA CAA AAG AAT GGA ATC AAA GCT AAC TTC AAA ATT
CGC CAC AAC ATT GAA GAT GGA TCC GTT CAA CTA GCA GAC CAT TAT CAA CAA AAT
ACT CCA ATT GGC GAT GGC CCT GTC CTT TTA CCA GAC AAC CAT TAC CTG TCG ACA
CAA TCT GCC CTT TCG AAA GAT CCC AAC GAA AAG CGT GAC CAC ATG GTC CTT CTT
GAG TTT GTA ACT GCT GCT GGG ATT ACA CAT GGC ATG GAT GAG CTC TAC AAA CTG
CAG CAT CAC CAT CAC CAT CAC TAA

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Amino acid sequence

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MRGSLQPRVPVEKMSKGEELFTGVVPIVLVDGDVNGHKFSVSGEGEGDATYGKLTCLKFICTTGKLPVWP
TLVTTLTLYGVQCFSRYPDHMKRHDFFKSAMPEGYVQERTIFFKDDGNYKTRAEVKFEQDTLVNRIELKGID
FKEDGNILGHKLEYNYNSHNVYIMADKQKNGIKANFKIRHNIEDGSVQLADHYQQNTPIGDGPVLLPDNHY
LSTQSALS KDPNEKRDHMLLEFVTAAGITHGMDELYKLQHSHHHH

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10. GFP3C (158UUG)

AAA (Lys) to UUG (Leu) mutation in position 158 of GFP3C

11. mDHFR (Qiagen)

C-terminal hexa-histidine tag

DNA sequence

ATG AGA GGA TCC GGC ATC ATG GTT CGA CCA TTG AAC TCG ATC GTC GCC GTG TCC
 CAA AAT ATG GGG ATT GGC AAG AAC GGA GAC CTA CCC TGG CCT CCG CTC AGG AAC
 GAG TTC AAG TAC TTC CAA AGA ATG ACC ACA ACC TCT TCA GTG GAA GGT AAA CAG
 AAT CTG GTG ATT ATG GGT AGG AAA ACC TGG TTC TCC ATT CCT GAG AAG AAT CGA
 CCT TTA AAG GAC AGA ATT AAT ATA GTT CTC AGT AGA GAA CTC AAA GAA CCA CCA
 CGA GGA GCT CAT TTT CTT GCC AAA AGT TTG GAT GAT GCC TTA AGA CTT ATT GAA
 CAA CCG GAA TTG GCA AGT AAA GTA GAC ATG GTT TGG ATA GTC GGA GGC AGT TCT
 GTT TAC CAG GAA GCC ATG AAT CAA CCA GGC CAC CTT AGA CTC TTT GTG ACA AGG
 ATC ATG CAG GAA TTT GAA AGT GAC ACG TTT TTC CCA GAA ATT GAT TTG GGG AAA
 TAT AAA CTT CTC CCA GAA TAC CCA GGC GTC CTC TCT GAG GTC CAG GAG GAA AAA
 GGC ATC

Amino acid sequence

MRGSGIMVRPLNSIVAVSQNMGIGKNGDLPWPPLRNEFKYFQRM TTTSSVEGKQNLVIMGRKTFWFSIPEKN
 RPLKDRINIVLSRELKEPPRGAHFLAKSLDDALRLIEQPELASKVDMVWIVGGSSVYQEAMNQPGHLRLFV
 TRIMQEFESDTFFPEIDLKGYKLLPEYPGVLSVQEEKGI

12. mDHFR2

UUC (Phe) in position 38 and UUU (Phe) in position 95 to UUG (Leu) mutations in mDHFR

DNA sequence

ATG AGA GGA TCC GGC ATC ATG GTT CGA CCA TTG AAC TCG ATC GTC GCC GTG TCC
 CAA AAT ATG GGG ATT GGC AAG AAC GGA GAC CTA CCC TGG CCT CCG CTC AGG AAC
 GAG TTG AAG TAC TTC CAA AGA ATG ACC ACA ACC TCT TCA GTG GAA GGT AAA CAG
 AAT CTG GTG ATT ATG GGT AGG AAA ACC TGG TTC TCC ATT CCT GAG AAG AAT CGA
 CCT TTA AAG GAC AGA ATT AAT ATA GTT CTC AGT AGA GAA CTC AAA GAA CCA CCA
 CGA GGA GCT CAT TTG CTT GCC AAA AGT TTG GAT GAT GCC TTA AGA CTT ATT GAA
 CAA CCG GAA TTG GCA AGT AAA GTA GAC ATG GTT TGG ATA GTC GGA GGC AGT TCT
 GTT TAC CAG GAA GCC ATG AAT CAA CCA GGC CAC CTC AGA CTC TTT GTG ACA AGG
 ATC ATG CAG GAA TTT GAA AGT GAC ACG TTT TTC CCA GAA ATT GAT TTG GGG AAA
 TAT AAA CTT CTC CCA GAA TAC CCA GGC GTC CTC TCT GAG GTC CAG GAG GAA AAA
 GGC ATC AAG TAT AAG TTT GAA GTC TAC GAG AAG AAA GGT TCC AGA TCT CAT CAC
 CAT CAC CAT CAC

Amino acid sequence

MRGSGIMVRPLNSIVAVSQNMGIGKNGDLPWPPLRNELKYFQRM TTTSSVEGKQNLVIMGRKTFWFSIPEKN
 RPLKDRINIVLSRELKEPPRGAHLLAKSLDDALRLIEQPELASKVDMVWIVGGSSVYQEAMNQPGHLRLFV
 TRIMQEFESDTFFPEIDLKGYKLLPEYPGVLSVQEEKGIKYKFEVYEKKGSRSHHHHHH

13. mDHFR2 (100UUA)

UUG to UUA mutation in position 100 of mDHFR2

Appendix C

Names and Sequences of PCR Primers

Primer name	Primer sequence
GFP1	5'- AC CTGCAG CCC CGG GTA CCG GTA GAA - 3'
GFP2	5'- AC CTGCAG TTT GTA GAG CTC ATC CAT - 3'
F64LS65T_f	5'- CTT GTC ACT ACT CTG ACC TAT GGT GTT CAA TGC TTC TCC CGT - 3'
F64LS65T_r	5'- ACG GGA GAA GCA TTG AAC ACC ATA GGT CAG AGT AGT GAC AAG - 3'
S99F_f	5'- GTA CAG GAA CGC ACT ATA TTC TTC AAA GAT GAC GGG AAC - 3'
S99F_r	5'- GTT CCC GTC ATC TTT GAA GAA TAT AGT GCG TTC CTG TAC - 3'
T153M_f	5'- CAC AAT GTA TAC ATC ATG GCA GAC AAA CAA AAG AAT GGA - 3'
T153M_r	5'- TCC ATT CTT TTG TTT GTC TGC CAT GAT GTA TAC ATT GTG - 3'
Primer 1	5'- GTG CCA CCT GAC GTC TAA GAA ACC ATT ATT ATC ATG ACA TTA ACC - 3'
Primer 2	5'- GAG TAA AGG AGA AGA ACT TTT TAC TGG AGT TGT CCC AAT TC - 3'
Primer 3	5'- GAA TTG GGA CAA CTC CAG TAA AAA GTT CTT CTC CTT TAC TC - 3'
Primer 4	5'- GGC CAA CAC TTG TCA CTA CTT TTA CCT ATG GTG TTC AAT GCT T - 3'
Primer 5	5'- AAG CAT TGA ACA CCA TAG GTA AAA GTA GTG ACA AGT GTT GGC C - 3'
Primer 6	5'- CAT ATG AAA CGG CAT GAC TTT TTT AAG AGT GCC ATG CCC GAA G - 3'
Primer 7	5'- CTT CGG GCA TGG CAC TCT TAA AAA AGT CAT GCC GTT TCA TAT G - 3'
Primer 8	5'- GTT ATG TAC AGG AAC GCA CTA TAT TTT TCA AAG ATG ACG GGA ACT ACA A - 3'
Primer 9	5'- TTG TAG TTC CCG TCA TCT TTG AAA AAT ATA GTG CGT TCC TGT ACA TAA C - 3'
Primer 10	5'- ACA AAA GAA TGG AAT CAA AGC TAA CTT TAA AAT TCG CCA CAA CAT TGA AGA TG - 3'
Primer 11	5'- CAT CTT CAA TGT TGT GGC GAA TTT TAA AGT TAG CTT TGA TTC CAT TCT TTT GT - 3'
Primer 12	5'- CGC CAA GCT AGC TTG GAT TCT CAC CAA TAA AAA ACG CCC - 3'
Primer 13	5'- TAC CTA TGG TGT TCA ATG CTT TTC CCG TTA TCC GGA TCA TAT G - 3'
Primer 14	5'- CAT ATG ATC CGG ATA ACG GGA AAA GCA TTG AAC ACC ATA GGT A - 3'

Primer 15	5'- GTT ATG TAC AGG AAC GCA CTA TAT TTT TTA AAG ATG ACG GGA ACT ACA AG - 3'
Primer 16	5'- CTT GTA GTT CCC GTC ATC TTT AAA AAA TAT AGT GCG TTC CTG TAC ATA AC - 3'
Primer 17	5'- GT GAT GTT AAT GGG CAC AAA TTC TCT GTC AGT GGA GAG GGT- 3'
Primer 18	5'- ACC CTC TCC ACT GAC AGA GAA TTT GTG CCC ATT AAC ATC AC- 3'
Primer 19	5'- CA TAC GGA AAA CTT ACC CTT AAA TTC ATT TGC ACT ACT GGA AAA CTA CC- 3'
Primer 20	5'- GGT AGT TTT CCA GTA GTG CAA ATG AAT TTA AGG GTA AGT TTT CCG TAT G- 3'
Primer 21	5'- AT CAT ATG AAA CGG CAT GAC TTC TTC AAG AGT GCC ATG CCC- 3'
Primer 22	5'- GGG CAT GGC ACT CTT GAA GAA GTC ATG CCG TTT CAT ATG AT- 3'
Primer 23	5'- CG CGT GCT GAA GTC AAG TTC GAA GGT GAT ACC CTT GT- 3'
Primer 24	5'- AC AAG GGT ATC ACC TTC GAA CTT GAC TTC AGC ACG CG- 3'
Primer 25	5'- CGT ATC GAG TTA AAA GGT ATT GAT TTC AAA GAA GAT GGA AAC ATT CTC GGA- 3'
Primer 26	5'- TCC GAG AAT GTT TCC ATC TTC TTT GAA ATC AAT ACC TTT TAA CTC GAT ACG - 3'
<i>lacI_AflIII_f</i>	5'- CAT ATT CTT AAG TCA TGC GCA CCC GTG GCC AGG ACC C - 3'
<i>lacI_SacII_r</i>	5'- CAA CTC CCG CGG TTA CGT GCA GAT GAT AAG CTG TCA AAC - 3'
<i>pQE_AflIII_f</i>	5'-CAA GTA CTT AAG CGG TGT GAA ATA CCG CAC AGA TGC GTA AGG -3'
<i>pQE_SacII_r</i>	5'- GAT CAT CCG CGG TTT TCC CAG TCA CGA CGT TGT AAA ACG - 3'
437_f	5' - GTC GAA ATC GGT AAC NNK GGT ATG TTC AGA CCA GAA ATG CTC G -3'
437_r	5' - CGA GCA TTT CTG GTC TGA ACA TAC CMN NGT TAC CGA TTT CGA C - 3'
412_415_418_f	5' - C AAG CCT ACC TAC NNK CCT TAC NNK GAG CCA NNK ATG GAA ATC TTT T - 3'
412_415_418_r	5'- A AAA GAT TTC CAT MNN TGG CTC MNN GTA AGG MN N GTA GG T AGG CTT G - 3'
2F_UUU_f	5' - C ATT AAA GAG GAG AAA TTA ACT ATG TTT GGA TCG CAT CAC - 3'
2F_UUU_r	5' - GTG ATG CGA TCC AAA CAT AGT TAA TTT CTC CTC TTT AAT G - 3'
2F_UUC_f	5' - C ATT AAA GAG GAG AAA TTA ACT ATG TTC GGA TCG CAT CAC - 3'

2F_UUC_r	5' - GTG ATG CGA TCC GAA CAT AGT TAA TTT CTC CTC TTT AAT G - 3'
R_lacP_f	GCA CCC CAG TCT TTA CAC TAT GCC TAC CGT CTC CGT GAA C
R_lacP_r	GTT CAC GGA GAC GGT AGG CAT AGT GTA AAG ACT GGG GTG C
Ins_SD_A_Del_lacO_f	CGT ATA ATG GAT CC C GAT TTT CAC ATA AGG AGC AGA CC ATG
Ins_SD_A_Del_lacO_r	CAT GGT CTG CTC CTT ATG TGA AAA TCG GGA TCC ATT ATA CG
ytRNA-GAA_f	5' - CAC AGG ACC TCC AGA TTT TCA GTC TGG CGC TCT CC - 3'
ytRNA-GAA_r	5' - GGA GAG CGC CAG ACT GAA AAT CTG GAG GTC CTG TG - 3'
ytRNA-CAA_f	5' - CAC AGG ACC TCC AGA TTT TGA GTC TGG CGC TCT CC - 3'
ytRNA-CAA_r	5' - GGA GAG CGC CAG ACT CAA AAT CTG GAG GTC CTG TG - 3'
L100_UUA_f	5' - CTT GCC AAA AGT TTA GAT GAT GCC TTA AGA C - 3'
L100_UUA_r	5' - GTC TTA AGG CAT CAT CTA AAC TTT TGG CAA G - 3'
PstI_70_f	5' - GCA TGC GAG GAT CCC TGC AGC ATC ACC ATC ACC - 3'
PstI_70_r	5' - GGT GAT GGT GAT GCT GCA GGG ATC CTC GCA TGC - 3'
K158_UUG_f	5' - ATG GCA GAC AAA CAA TTG AAC GGA ATC AAA GCT AAC TTC - 3'
K158_UUG_r	5' - GAA GTT AGC TTT GAT TCC GTT CAA TTG TTT GTC TGC CAT - 3'
K158_UAG_f	5' - CAT CAT GGC AGA CAA ACA ATA GAA TGG AAT CAA AGC TAA C - 3'
K158_UAG_r	5' - GTT AGC TTT GAT TCC ATT CTA TTG TTT GTC TGC CAT GAT G - 3'