**OMP nucleotide sequences**

**Vector: pET11a**

**OmpX**

Mature OmpX

Start and stop codons

Restriction enzyme sites (CATATG=**NdeI** and GGATCC=**BamHI**)

T7 Promoter with *lac* operator

Ribosome binding site

T7 terminator

TAATACGACTCACTATAGGGGAATTGTGAGCGGATAACAATTCCCCTCTAGAAATAATTTTGTTTAACTTTAAGAAGGAGATATACATATGGCGACTTCTACTGTAACTGGCGGTTACGCACAGAGCGACGCTCAGGGCCAAATGAACAAAATGGGCGGTTTCAACCTGAAATACCGCTATGAAGAAGACAACAGCCCGCTGGGTGTGATCGGTTCTTTCACTTACACCGAGAAAAGCCGTACTGCAAGCTCTGGTGACTACAACAAAAACCAGTACTACGGCATCACTGCTGGTCCGGCTTACCGCATTAACGACTGGGCAAGCATCTACGGTGTAGTGGGTGTGGGTTATGGTAAATTCCAGACCACTGAATACCCGACCTACAAACACGACACCAGCGACTACGGTTTCTCCTACGGTGCGGGTCTGCAGTTCAACCCGATGGAAAACGTTGCTCTGGACTTCTCTTACGAGCAGAGCCGTATTCGTAGCGTTGACGTAGGCACCTGGATTGCCGGTGTTGGTTACCGCTTCTAAGGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGCTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTTAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGAT

**Cloning details:**

Cloned by Thuy

Forward primer:

5’ GCTA CATATG GCG ACT TCT ACT GTA ACT GGC 3’

Reverse complement of reverse primer:

5’ GGT GTT GGT TAC CGC TTC TAA GGATCC GCC 3’

**PagP**

Mature PagP

Start and stop codons

Restriction enzyme sites (CATATG=**NdeI** and GGATCC=**BamHI**)

T7 Promoter with *lac* operator

Ribosome binding site

T7 terminator

TAATACGACTCACTATAGGGGAATTGTGAGCGGATAACAATTCCCCTCTAGAAATAATTTTGTTTAACTTTAAGAAGGAGATATACATATGAACGCAGATGAGTGGATGACAACGTTTAGAGAAAATATTGCACAAACCTGGCAACAGCCTGAACATTATGATTTATATATTCCTGCCATCACCTGGCATGCACGTTTCGCTTACGACAAAGAAAAAACCGATCGCTATAACGAGCGACCGTGGGGTGGCGGTTTTGGCCTGTCGCGTTGGGATGAAAAAGGAAACTGGCATGGCCTGTATGCCATGGCATTTAAGGACTCGTGGAACAAATGGGAACCGATTGCCGGATACGGATGGGAAAGTACCTGGCGACCGCTGGCGGATGAAAATTTTCATTTAGGTCTGGGATTCACCGCTGGCGTAACGGCACGCGATAACTGGAATTACATCCCTCTCCCGGTTCTACTGCCATTGGCCTCCGTGGGTTATGGCCCAGTGACTTTTCAGATGACCTACATTCCGGGTACCTACAACAATGGCAATGTGTACTTTGCCTGGATGCGCTTTCAGTTTTGAGGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGCTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTTAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGAT

**Cloning details:**

Cloned by Thuy

Forward primer:

5’ GCTA CATATG AAC GCA GAT GAG TGG ATG AC 3’

Reverse complement of reverse primer:

5’ GG ATG CGC TTT CAG TTT TGA GGATCC GCC 3’

**OmpW**

Mature OmpW

Start and stop codons

Restriction enzyme sites (CATATG=**NdeI** and GGATCC=**BamHI**)

T7 Promoter with *lac* operator

Ribosome binding site

T7 terminator

TAATACGACTCACTATAGGGGAATTGTGAGCGGATAACAATTCCCCTCTAGAAATAATTTTGTTTAACTTTAAGAAGGAGATATACATATGCATGAAGCAGGCGAATTTTTTATGCGTGCAGGTTCTGCAACCGTACGTCCAACAGAAGGTGCTGGTGGTACGTTAGGAAGTCTGGGTGGATTCAGCGTGACCAATAACACGCAACTGGGCCTTACGTTTACTTATATGGCGACCGACAACATTGGTGTGGAATTACTGGCAGCGACGCCGTTCCGCCATAAAATCGGCACCCGGGCGACCGGCGATATTGCAACCGTTCATCATCTGCCACCAACACTGATGGCGCAGTGGTATTTTGGTGATGCCAGCAGCAAATTCCGTCCTTACGTTGGGGCAGGTATTAACTACACCACCTTCTTTGATAATGGATTTAACGATCATGGCAAAGAGGCAGGGCTTTCCGATCTCAGTCTGAAAGATTCCTGGGGAGCTGCCGGGCAGGTGGGGGTTGATTATCTGATTAACCGTGACTGGTTGGTTAACATGTCAGTGTGGTACATGGATATCGATACCACCGCCAATTATAAGCTGGGCGGTGCACAGCAACACGATAGCGTACGCCTCGATCCGTGGGTGTTTATGTTCTCAGCAGGATATCGTTTTTAAGGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGCTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTTAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGAT

**Cloning details:**

Cloned by Thuy

Forward primer:

5’ GCTA CATATG CAT GAA GCA GGC GAA TTT TTT ATG 3’

Reverse complement of reverse primer:

5’ G TTC TCA GCA GGA TAT CGT TTT TAA GGATCC GCC 3’

**OmpA**

Mature OmpA (has mutation Nancy made to remove internal BamHI site)

Start and stop codons

Restriction enzyme sites (CATATG=**NdeI** and GGATCC=**BamHI**)

T7 Promoter with *lac* operator

Ribosome binding site

T7 terminator

TAATACGACTCACTATAGGGGAATTGTGAGCGGATAACAATTCCCCTCTAGAAATAATTTTGTTTAACTTTAAGAAGGAGATATACATATGGCTCCGAAAGATAACACCTGGTACACTGGTGCTAAACTGGGCTGGTCCCAGTACCATGACACTGGTTTCATCAACAACAATGGCCCGACCCATGAAAACCAACTGGGCGCTGGTGCTTTTGGTGGTTACCAGGTTAACCCGTATGTTGGCTTTGAAATGGGTTACGACTGGTTAGGTCGTATGCCGTACAAAGGCAGCGTTGAAAACGGTGCATACAAAGCTCAGGGCGTTCAACTGACCGCTAAACTGGGTTACCCAATCACTGACGACCTGGACATCTACACTCGTCTGGGTGGCATGGTATGGCGTGCAGACACTAAATCCAACGTTTATGGTAAAAACCACGACACCGGCGTTTCTCCGGTCTTCGCTGGCGGTGTTGAGTACGCGATCACTCCTGAAATCGCTACCCGTCTGGAATACCAGTGGACCAACAACATCGGTGACGCACACACCATCGGCACTCGTCCGGACAACGGCATGCTGAGCCTGGGTGTTTCCTACCGTTTCGGTCAGGGCGAAGCAGCTCCAGTAGTTGCTCCGGCTCCAGCTCCGGCACCGGAAGTACAGACCAAGCACTTCACTCTGAAGTCTGACGTTCTGTTCAACTTCAACAAAGCAACCCTGAAACCGGAAGGTCAGGCTGCTCTGGATCAGCTGTACAGCCAGCTGAGCAACCTGGACCCGAAAGACGGTTCCGTAGTTGTTCTGGGTTACACCGACCGCATCGGTTCTGACGCTTACAACCAGGGTCTGTCCGAGCGCCGTGCTCAGTCTGTTGTTGATTACCTGATCTCCAAAGGTATCCCGGCAGACAAGATCTCCGCACGTGGTATGGGCGAATCCAACCCGGTTACTGGCAACACCTGTGACAACGTGAAACAGCGTGCTGCACTGATCGACTGCCTGGCTCCGGATCGTCGCGTAGAGATCGAAGTTAAAGGTATCAAAGACGTTGTAACTCAGCCGCAGGCTTAAGGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGCTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTTAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGAT

One mutation: GAC instead of GAT (both code for Asp)

**Cloning details:**

Cloned by Nancy as “OmpA326”

Forward primer used:

5’ GGCATCC CATATG GCT CCG AAA GAT AAC ACC TG 3’

Reverse complement of reverse primer used:

5’ GTA ACT CAG CCG CAG GCT TAA GGATCC CG 3’

**OmpA171**

Mature OmpA171 (OmpA barrel only)

Start and stop codons

Restriction enzyme sites (CATATG=**NdeI** and GGATCC=**BamHI**)

T7 Promoter with *lac* operator

Ribosome binding site

T7 terminator

TAATACGACTCACTATAGGGGAATTGTGAGCGGATAACAATTCCCCTCTAGAAATAATTTTGTTTAACTTTAAGAAGGAGATATACATATGGCTCCGAAAGATAACACCTGGTACACTGGTGCTAAACTGGGCTGGTCCCAGTACCATGACACTGGTTTCATCAACAACAATGGCCCGACCCATGAAAACCAACTGGGCGCTGGTGCTTTTGGTGGTTACCAGGTTAACCCGTATGTTGGCTTTGAAATGGGTTACGACTGGTTAGGTCGTATGCCGTACAAAGGCAGCGTTGAAAACGGTGCATACAAAGCTCAGGGCGTTCAACTGACCGCTAAACTGGGTTACCCAATCACTGACGACCTGGACATCTACACTCGTCTGGGTGGCATGGTATGGCGTGCAGACACTAAATCCAACGTTTATGGTAAAAACCACGACACCGGCGTTTCTCCGGTCTTCGCTGGCGGTGTTGAGTACGCGATCACTCCTGAAATCGCTACCCGTCTGGAATACCAGTGGACCAACAACATCGGTGACGCACACACCATCGGCACTCGTCCGGACAACGGCATGCTGAGCCTGGGTGTTTCCTACCGTTTTGGTTGAGGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGCTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTTAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGAT

One mutation: TTT instead of TTC (both code for Phe).

**Cloning details:**

Cloned by Nancy as “OmpA171” using primers from Pautsch, et al. Proteins 1999; 34: 167-172.

Forward primer used:

5’ GGCATCC CATATG GCT CCG AAA GAT AAC ACC TG 3’

Reverse complement of reverse primer used:

5’ GGT GTT TCC TAC CGT TTT GGT TGA GGATCC CG 3’

The mutation is in Pautsch’s reverse primer so they must have chosen to make the mutation for reasons unknown to me (I verified this by looking up the paper but they don’t say why). It doesn’t change the amino acid though so Nancy went with it.

**OmpT**

Mature OmpT

Start and stop codons

Restriction enzyme sites (CATATG=**NdeI** and GGATCC=**BamHI**)

T7 Promoter with *lac* operator

Ribosome binding site

T7 terminator

TAATACGACTCACTATAGGGGAATTGTGAGCGGATAACAATTCCCCTCTAGAAATAATTTTGTTTAACTTTAAGAAGGAGATATACATATGTCTACCGAGACTTTATCGTTTACTCCTGACAACATAAATGCGGACATTAGTCTTGGAACTCTGAGCGGAAAAACAAAAGAGCGTGTTTATCTAGCCGAAGAAGGAGGCCGAAAAGTCAGTCAACTCGACTGGAAATTCAATAACGCTGCAATTATTAAAGGTGCAATTAATTGGGATTTGATGCCCCAGATATCTATCGGGGCTGCTGGCTGGACAACTCTCGGCAGCCGAGGTGGCAATATGGTCGATCAGGACTGGATGGATTCCAGTAACCCCGGAACCTGGACGGATGAAAGTAGACACCCTGATACACAACTCAATTATGCCAACGAATTTGATCTGAATATCAAAGGCTGGCTCCTCAACGAACCCAATTACCGCCTGGGACTCATGGCCGGATATCAGGAAAGCCGTTATAGCTTTACAGCCAGAGGTGGTTCCTATATCTACAGTTCTGAGGAGGGATTCAGAGATGATATCGGCTCCTTCCCGAATGGAGAAAGAGCAATCGGCTACAAACAACGTTTTAAAATGCCCTACATTGGCTTGACTGGAAGTTATCGTTATGAAGATTTTGAACTCGGTGGCACATTTAAATACAGCGGCTGGGTGGAATCATCTGATAACGATGAACACTATGACCCGGGAAAAAGAATCACTTATCGCAGTAAGGTCAAAGACCAAAATTACTATTCTGTTGCAGTCAATGCAGGTTATTACGTCACACCTAACGCAAAAGTTTATGTTGAAGGCGCATGGAATCGGGTTACGAATAAAAAAGGTAATACTTCACTTTATGATCACAATAATAACACTTCAGACTACAGCAAAAATGGAGCAGGTATAGAAAACTATAACTTCATCACTACTGCTGGTCTTAAGTACACATTTTAAGGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGCTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTTAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGAT

**Cloning details:**

Cloned by Thuy

Forward primer:

5’ GCTA CATATG TCT ACC GAG ACT TTA TCG TTT ACT CC 3’

Reverse complement of reverse primer:

5’ CT GCT GGT CTT AAG TAC ACA TTT TAA GGATCC GCC 3’

**OmpLa**

Mature OmpLa

Start and stop codons

Restriction enzyme sites (CATATG=**NdeI** and GGATCC=**BamHI**)

T7 Promoter with *lac* operator

Ribosome binding site

T7 terminator

TAATACGACTCACTATAGGGGAATTGTGAGCGGATAACAATTCCCCTCTAGAAATAATTTTGTTTAACTTTAAGAAGGAGATATACATATGCAAGAGGCAACGGTGAAAGAGGTGCATGACGCGCCAGCGGTGCGTGGCAGTATTATCGCCAATATGCTGCAGGAGCATGACAATCCGTTCACGCTCTATCCTTATGACACCAACTACCTCATTTACACCCAAACCAGCGATCTGAATAAAGAAGCGATTGCCAGTTACGACTGGGCGGAAAATGCGCGTAAGGATGAAGTAAAGTTTCAGTTGAGCCTGGCATTTCCGCTGTGGCGTGGGATTTTAGGCCCGAACTCGGTGTTGGGTGCGTCTTATACGCAAAAATCCTGGTGGCAACTGTCCAATAGCGAAGAGTCTTCACCGTTTCGTGAAACCAACTACGAACCGCAATTGTTCCTCGGTTTTGCCACCGATTACCGTTTTGCAGGTTGGACGCTGCGCGATGTGGAGATGGGGTATAACCACGACTCTAACGGGCGTTCCGACCCGACCTCCCGCAGCTGGAACCGCCTTTATACTCGCCTGATGGCAGAAAACGGTAACTGGCTGGTAGAAGTGAAGCCGTGGTATGTGGTGGGTAATACTGACGATAACCCGGATATCACCAAATATATGGGTTACTACCAGCTTAAAATCGGCTATCACCTCGGCGATGCGGTGCTCAGTGCGAAAGGACAGTACAACTGGAACACCGGCTACGGCGGCGCGGAGTTAGGCTTAAGTTACCCGATCACCAAACATGTGCGCCTTTATACTCAGGTTTACAGCGGCTATGGCGAATCGCTCATCGACTATAACTTCAACCAGACCCGTGTCGGTGTGGGGGTTATGCTAAACGATTTGTTTTAAGAATGCGGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGCTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTTAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGAT

One mutation: GGC instead of GGT (both code for glycine)

No idea if someone put this here on purpose or why.

**Cloning details:** (from Karen’s word document on Ompla primer design)

Forward primer used:

5’ GGCAGTA CATATG CAA GAG GCA ACG GTG AAA G 3’

Reverse complement of reverse primer used:

5’ G GTT ATG CTA AAC GAT TTG TTT TAA GAATGC GGATCC CG 3’

GAATGC is recognition site for BsmI for use during cloning (unique site to check if insert is present in plasmid).

**FadL**

Mature FadL

Start and stop codons

Restriction enzyme sites (CATATG=**NdeI** and GGATCC=**BamHI**)

T7 Promoter with *lac* operator

Ribosome binding site

T7 terminator

TAATACGACTCACTATAGGGGAATTGTGAGCGGATAACAATTCCCCTCTAGAAATAATTTTGTTTAACTTTAAGAAGGAGATATACATATGGCAGGCTTTCAGTTAAACGAATTTTCTTCCTCTGGCCTGGGCCGGGCTTATTCAGGGGAAGGCGCAATTGCCGATGATGCAGGTAACGTCAGCCGTAACCCCGCATTGATTACTATGTTTGACCGCCCGACATTTTCTGCGGGTGCGGTTTATATTGACCCGGATGTAAATATCAGCGGAACGTCTCCATCTGGTCGTAGCCTGAAAGCCGATAACATCGCGCCTACGGCATGGGTTCCGAACATGCACTTTGTTGCACCGATTAACGACCAATTTGGTTGGGGCGCTTCTATTACCTCTAACTATGGTCTGGCTACAGAGTTTAACGATACTTATGCAGGCGGCTCTGTCGGGGGTACAACCGACCTTGAAACCATGAACCTGAACTTAAGCGGTGCGTATCGCTTAAATAATGCATGGAGCTTTGGTCTTGGTTTCAACGCCGTCTACGCTCGCGCGAAAATTGAACGTTTCGCAGGCGATCTGGGGCAGTTGGTTGCTGGCCAAATTATGCAATCTCCTGCTGGCCAAACTCAGCAAGGGCAAGCATTGGCAGCTACCGCCAACGGTATTGACAGTAATACCAAAATCGCTCATCTGAACGGTAACCAGTGGGGCTTTGGCTGGAACGCCGGAATCCTGTATGAACTGGATAAAAATAACCGCTATGCACTGACCTACCGTTCTGAAGTGAAAATTGACTTCAAAGGTAACTACAGCAGCGATCTTAATCGTGCGTTTAATAACTACGGTTTGCCAATTCCTACCGCGACAGGTGGCGCAACGCAATCGGGTTATCTGACGCTGAACCTGCCTGAAATGTGGGAAGTGTCAGGTTATAACCGTGTTGATCCACAGTGGGCGATTCACTATAGCCTGGCTTACACCAGCTGGAGTCAGTTCCAGCAGCTGAAAGCGACCTCAACCAGTGGCGACACGCTGTTCCAGAAACATGAAGGCTTTAAAGATGCTTACCGCATCGCGTTGGGTACCACTTATTACTACGATGATAACTGGACCTTCCGTACCGGTATCGCCTTTGATGACAGCCCAGTTCCTGCACAGAATCGTTCTATCTCCATTCCGGACCAGGACCGTTTCTGGCTGAGTGCAGGTACGACTTACGCATTTAATAAAGATGCTTCAGTCGACGTTGGTGTTTCTTATATGCACGGTCAGAGCGTGAAAATTAACGAAGGCCCATACCAGTTCGAGTCTGAAGGTAAAGCCTGGCTGTTCGGTACTAACTTTAACTACGCGTTCTGAGGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGCTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTTAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGAT

**Cloning details:**

Cloned by Thuy

Forward primer:

5’ GCTA CATATG GCA GGC TTT CAG TTA AAC GAA TTT TC 3’

Reverse complement of reverse primer:

5’ GGT ACT AAC TTT AAC TAC GCG TTC TGA GGATCC GCC 3’

**Omp85**

Mature Omp85 (YaeT, BamA)

Start and stop codons

Restriction enzyme sites (CATATG=**NdeI** and GGATCC=**BamHI**)

T7 Promoter with *lac* operator

Ribosome binding site

T7 terminator

TAATACGACTCACTATAGGGGAATTGTGAGCGGATAACAATTCCCCTCTAGAAATAATTTTGTTTAACTTTAAGAAGGAGATATACATATGGAAGGGTTCGTAGTGAAAGATATTCATTTCGAAGGCCTTCAGCGTGTCGCCGTTGGTGCGGCCCTCCTCAGTATGCCGGTGCGCACAGGCGACACGGTTAATGATGAAGATATCAGTAATACCATTCGCGCTCTGTTTGCTACCGGCAACTTTGAGGATGTTCGCGTCCTTCGTGATGGTGATACCCTTCTGGTTCAGGTAAAAGAACGTCCGACCATTGCCAGCATTACTTTCTCCGGTAACAAATCGGTGAAAGATGACATGCTGAAGCAAAACCTCGAGGCTTCTGGTGTGCGTGTGGGCGAATCCCTCGATCGCACCACCATTGCCGATATCGAGAAAGGTCTGGAAGACTTCTACTACAGCGTCGGTAAATATAGCGCCAGCGTAAAAGCTGTCGTGACCCCGCTGCCGCGCAACCGTGTTGACCTAAAACTGGTGTTCCAGGAAGGTGTGTCAGCTGAAATCCAGCAAATTAACATTGTTGGTAACCATGCTTTCACCACCGACGAACTGATCTCTCATTTCCAACTGCGTGACGAAGTGCCGTGGTGGAACGTGGTAGGCGATCGTAAATACCAGAAACAGAAACTGGCGGGCGACCTTGAAACCCTGCGCAGCTACTATCTGGATCGCGGTTATGCCCGTTTCAACATCGACTCTACCCAGGTCAGTCTGACGCCAGATAAAAAAGGTATTTACGTCACGGTGAACATCACCGAAGGCGATCAGTACAAGCTTTCTGGCGTTGAAGTGAGCGGCAACCTTGCCGGGCACTCCGCTGAAATTGAGCAGCTGACTAAGATCGAGCCGGGTGAGCTGTATAACGGCACCAAAGTGACCAAGATGGAAGATGACATCAAAAAGCTTCTCGGTCGCTATGGTTATGCCTATCCGCGCGTACAGTCGATGCCCGAAATTAACGATGCCGACAAAACCGTTAAATTACGTGTGAACGTTGATGCGGGTAACCGTTTCTACGTGCGTAAGATCCGTTTTGAAGGTAACGATACCTCGAAAGATGCCGTCCTGCGTCGCGAAATGCGTCAGATGGAAGGTGCATGGCTGGGGAGCGATCTGGTCGATCAGGGTAAGGAGCGTCTGAATCGTCTGGGCTTCTTTGAAACTGTCGATACCGATACCCAACGTGTTCCGGGTAGCCCGGACCAGGTTGATGTCGTCTACAAGGTAAAAGAGCGCAACACCGGTAGCTTCAACTTTGGTATTGGTTACGGTACTGAAAGTGGCGTGAGCTTCCAGGCTGGTGTGCAGCAGGATAACTGGTTAGGTACAGGTTATGCTGTTGGTATCAACGGGACCAAAAACGATTACCAGACCTATGCTGAACTGTCGGTAACCAACCCGTACTTCACCGTAGATGGCGTAAGCCTCGGTGGTCGTCTCTTCTATAATGACTTCCAGGCAGATGACGCCGACCTGTCCGACTATACCAACAAGAGTTATGGTACAGACGTGACGTTGGGCTTCCCGATTAACGAATATAACTCGCTGCGTGCAGGTCTGGGTTATGTACATAACTCCCTGTCCAACATGCAGCCTCAGGTTGCGATGTGGCGTTATCTGTACTCTATGGGTGAACATCCGAGCACCTCTGATCAGGATAACAGCTTCAAAACGGACGACTTCACGTTCAACTATGGTTGGACCTATAACAAGCTTGACCGTGGTTACTTCCCGACAGATGGTTCACGTGTCAACCTGACCGGTAAAGTGACCATTCCTGGATCGGATAACGAATACTACAAAGTGACGTTAGACACGGCGACTTATGTGCCGATCGATGACGATCACAAATGGGTTGTTCTGGGGCGTACCCGCTGGGGTTATGGTGATGGTTTAGGCGGCAAAGAGATGCCGTTCTACGAGAACTTCTATGCCGGTGGTTCCAGCACCGTGCGTGGCTTCCAGTCCAATACCATTGGTCCGAAAGCAGTTTACTTCCCGCATCAGGCCAGTAATTATGATCCGGACTATGATTACGAATGTGCGACTCAGGACGGCGCGAAAGACCTGTGTAAATCGGATGATGCTGTAGGCGGTAACGCCATGGCGGTTGCCAGCCTCGAGTTCATCACCCCGACGCCGTTTATTAGCGATAAGTATGCTAACTCGGTTCGTACTTCCTTCTTCTGGGATATGGGTACCGTTTGGGATACAAACTGGGATTCCAGCCAATATTCTGGATATCCGGACTATAGTGATCCAAGCAATATCCGTATGTCTGCGGGTATCGCATTACAATGGATGTCCCCATTGGGGCCGTTGGTGTTCTCCTACGCCCAGCCGTTCAAAAAGTACGATGGAGACAAGGCAGAACAGTTCCAGTTTAACATCGGTAAAACCTGGTAAGTGTTCTCCACAAAGGAATGTAGTGGGATCCGGCTGCTAACAAAGCCCGAAAGGAAGCTGAGTTGGCTGCTGCCACCGCTGAGCAATAACTAGCATAACCCCTTGGGGCCTCTAAACGGGTCTTTAGGGGTTTTTTGCTGAAAGGAGGAACTATATCCGGAT

**Cloning details:**

Re-cloned by Thuy (after Ann Marie’s first attempt)

Forward primer:

5’ GCTA CATATG GAA GGG TTC GTA GTG AAA GAT AT 3’

Reverse complement of reverse primer:

5’ GT TCT CCA CAA AGG AAT GTA GTG GGATCC GCC 3’

Thuy designed the reverse primer to clone beyond the stop codon because they were having problems with expression and Karen theorized that it might have to do with mRNA stability.