

S2 Table. Oligonucleotide DNA sequences used for constructing generation two library. Sequences are composed of standard nucleotides (ACGT), degenerate nucleotides (RYMKSWHBDN), and a specialty codon mix (xyz) which uses the following nucleotide frequencies : 20% A, 15% C, 25% G, and 40% T at site 1, 50% A, 25% C, 15% G, and 10% T at site 2, and 0% A, 45% C, 10% G, and 45% T at site 3. Oligos are arranged by loop (BC, DE, FG), loop specific sublibraries, and amino acid length of the diversified region within the loop.

Loop/Sublib/Len (AA)	Oligo Sequence
BC/a/10	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC
BC/b/10	ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC
BC/c/10	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC
BC/d/10	ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC
BC/e/10	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC
BC/f/10	ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC
BC/g/10	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC
BC/h/10	ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC
BC/a/9	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC
BC/b/9	ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC
BC/c/9	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC
BC/d/9	ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC
BC/e/9	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC
BC/f/9	ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC
BC/g/9	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC
BC/h/9	ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC
BC/a/8	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC
BC/b/8	ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC
BC/c/8	ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC

BC/d/8 ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC

BC/e/8 ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC

BC/f/8 ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC

BC/g/8 ACTCTCTGACTATTTCTTGGGACGCACCAxyzxyzDCTxyzGGATACCGTATCACCTACGGCGAAAC

BC/h/8 ACTCTCTGACTATTTCTTGGGACDMTYMTxyzxyzDCTxyzTATTACCGTATCACCTACGGCGAAAC

DE/a/5 CGAGCCAGGAATTCACTGTCCGGAWMTWMTWMTWMTGCGACCATCAGCGGTCTGAAAC

DE/a/4 CGAGCCAGGAATTCACTGTCCGGAWMTWMTWMTGCGACCATCAGCGGTCTGAAAC

FG/a/11 CATTACCGTGACGCTGTARSCDVTxyzRRCxyzxyzxyzxyzTCAAACCAATCAGCATCAATTATCGCAC

FG/a/10 CATTACCGTGACGCTGTARSCDVTxyzRRCxyzxyzxyzxyzTCAAACCAATCAGCATCAATTATCGCAC

FG/a/9 CATTACCGTGACGCTGTARSCDVTxyzRRCxyzxyzxyzTCAAACCAATCAGCATCAATTATCGCAC

FG/a/8 CATTACCGTGACGCTGTARSCDVTxyzRRCxyzxyzTCAAACCAATCAGCATCAATTATCGCAC

FG/a/7 CATTACCGTGACGCTGTARSCDVTxyzRRCxyzTCAAACCAATCAGCATCAATTATCGCAC