Supplementary Material

Table 1: Parameter Values for the 20 Amino Acids

	a_{iAk}	a_{iTk}	a_{iCk}	a_{iGk}	$a_{i+1,Ak}$	$a_{i+1,Tk}$	$a_{i+1,Ck}$	$a_{i+1,Gk}$	$a_{i+2,Ak}$	$a_{i+2,Tk}$	$a_{i+2,Ck}$	$a_{i+2,Gk}$
Ala	0	0	0	1	0	0	1	0	1	1	1	1
Arg	1	0	1	0	0	0	0	1	1	1	1	1
Asn	1	0	0	0	1	0	0	0	0	0	1	1
Asp	0	0	0	1	1	0	0	0	0	1	1	0
Cys	0	1	0	0	0	0	0	1	0	1	1	0
Gln	0	0	1	0	1	0	0	0	1	0	0	1
Glu	0	0	0	1	1	0	0	0	1	0	0	1
Gly	0	0	0	1	0	0	0	1	1	1	1	1
His	0	0	1	0	1	0	0	0	0	1	1	0
Ile	1	0	0	0	0	1	0	0	1	1	1	0
Leu	0	1	1	0	0	1	0	0	1	1	1	1
Lys	1	0	0	0	1	0	0	0	1	0	0	1
Met	1	0	0	0	0	1	0	0	0	0	0	1
Phe	0	1	0	0	0	1	0	0	0	1	1	0
Pro	0	0	1	0	0	0	1	0	1	1	1	1
Ser	1	1	0	0	0	0	1	1	1	1	1	1
Thr	1	0	0	0	0	0	1	0	1	1	1	1
Trp	0	1	0	0	0	0	0	1	0	0	0	1
Tyr	0	1	0	0	1	0	0	0	0	1	1	0
Val	0	0	0	1	0	1	0	0	1	1	1	1

Table 2: Specific Parameter Values for Serine

	b_{iAAk}	b_{iATk}	b_{iACk}	b_{iAGk}	b_{iTAk}	b_{iTTk}	b_{iTCk}	b_{iTGk}	b_{iCAk}	b_{iCTk}	b_{iCCk}	b_{iCGk}	b_{iGAk}	b_{iGTk}	b_{iGCk}	b_{iGGk}
Ser	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0

Table 3: Specific Parameter Values for Arginine, Leucine and Serine

	c_{iAAk}	c_{iATk}	c_{iACk}	c_{iAGk}	c_{iTAk}	c_{iTTk}	c_{iTCk}	c_{iTGk}	c_{iCAk}	c_{iCTk}	c_{iCCk}	c_{iCGk}	c_{iGAk}	c_{iGTk}	c_{iGCk}	c_{iGGk}
Arg	1	0	0	1	0	0	0	0	1	1	1	1	0	0	0	0
Leu	0	0	0	0	1	0	0	1	1	1	1	1	0	0	0	0
Ser	0	1	1	0	1	1	1	1	0	0	0	0	0	0	0	0

Supplementary Material

Objective I Study

```
E. coli             ATGAACATCGTCGTGCTCATCAGCGGCAACGGCAGCAACCTGCAGGCGATCATCGACGCG
human               GCGCGCGTCGCCGTGCTCATCAGCGGCACCGGCAGCAACCTGCAGGCGCTCATCGACTCG
                      *  * *** ***************** ******************* ******** **

E. coli             TGCAAGACGAACAAAATCAAGGGCACGGTCCGCGCCGTGTTCAGCAACAAGGCCGACGCG
human               ACCAGGGAGCCCAACAGCTCGGCCCAGATCGACATCGTGATCAGCAACAAGGCCGCCGTG
                      ** *  *  *** * *  ** *  * **  *  **** *************** ** *

E. coli             TTCGGGCTCGAACGGGCGCGGCAGGCCGGCATCGCGACGCACACGCTCATCGCCAGTGCG
human               GCCGGGCTCGACAAGGCGGAGCGGGCCGGCATCCCGACGCGCGTGATCAACCACAAATTG
                      *********   ****  ** ********** ****** *  * *** *  **    *

E. coli             TTCGACTCCCGCGAGGCGTACGACCGCGAGCTCATCCACGAGATCGACATGTACGCGCCC
Human               TACAAAAACCGCGTGGAGTTCGACAGCGCGATCGACCTCGTGCTCGAAGAGTTCTCGATC
                    * * *   ***** ** ** **** *** * **  ** ** * ****   ** * **  *

E. coli             GACGTCGTGGTCCTCGCCGGCTTCATGCGCATCCTGTCGCCCGCGTTCGTGTCGCATTAC
human               GACATCGTGTGCCTCGCCGGCTTCATGCGCATCCTGTCGGGCCCGTTCGTGCAGAAGTGG
                    *** *****  ****************************  * ********  * * *

E. coli             GCCGGCAGGCTGCTCAACATCCACCCGTCGCTGCTGCCGAAGTACCCGGGCTTGCACACG
human               AACGGCAAGATGCTCAACATCCACCCGTCGCTGCTGCCGTCGTTCAAGGGCTCGAACGCG
                      ***** * ****************************  ** *  ***** * ** **

E. coli             CACAGGCAGGCGCTCGAGAACGGCGACGAGGAGCACGGCACCTCGGTGCACTTCGTGACC
human               CACGAGCAGGCGCTCGAGACCGGCGTCACGGTGACCGGCTGCACGGTGCACTTCGTGGCC
                    ***  ************** ***** *  ** *  ****  * ************** **

E. coli             GATGAATTGGACGGCGGCCCGGTCATCCTGCAGGCGAAGGTGCCCGTGTTTGCCGGCGAC
human               GAGGACGTGGACGCCGGCCAGATCATCCTGCAGGAGGCGGTGCCCGTGAAACGCGGCGAC
                    ** **  ****** ***** * ************ *  **********     *******

E. coli             TCGGAGGACGACATCACGGCGCGCGTGCAGACGCAGGAGCACGCGATCTACCCGCTCGTG
human               ACGGTGGCCACCCTCTCGGAGCGCGTGAAGCTGGCGGAGCACAAGATCTTCCCGGCCGCG
                     *** ** *  * ** *** ******* **  *  *******  ***** ****  ** *

E. coli             ATCTCGTGGTTCGCGGACGGCAGGTTGAAGATGCACGAGAACGCCGCGTGGCTCGATGGC
human               CTCCAGTTGGTCGCGTCCGGCACGGTGCAGCTGGGCGAGAACGGCAAGATATGCTGGGTC
                     **  ** * *****  ***** * ** ** **  ******** *  *     *   * *

E. coli             CAG
human               AAG
                     **
```

Objective II Study

```
C. freundii         ATGATGAAGAAGAGTATCTGTTGCGCGCTGTTGTTGACC------GCCTCGTTCTCGACG
E. cloacae          ATGATGAAGAAGAGCTTATGCTGTGCCCTGCTACTGGGC------ATCAGTTGTTCGGCG
Y. enterocolitica   ATGATGAAGAAGAGTATCATCAACACCCTGATATTCACGTCTATCGCCACGTTCCCGCTG
K. pneumoniae       ATGCAGCAGAGGAGGGCCTTCGCCTTGCTGACCCTGGGC---AGCCTCTTGTTGGCGCCG
                    ***  * *** ***             ***    *            *   *   **  *

C. freundii         TTCGCGGCCGCGAAAACC---------GAGCAACAAATCGCGGACATCGTGAACCGCACC
E. cloacae          CTAGCGGCGCCGGTCAGC---------GAGAAGCAGCTGGCGGAGGTCGTGGCCAACACG
Y. enterocolitica   TACACGCTCGCGCAAACCAAACTAACAGAGCTGCAGGTGGCGACGATCGTGAACAACACG
K. pneumoniae       TGCACGTACGCGAGCGGC---------GAGGCGCCGCTGACGGCGGCCGTGGACGGCATC
                        **    **     *          ***   *   *  **     ****  *  **
```

```
C. freundii         ATAACGCCGCTGATGCAGGAACAGGCCATCCCCGGCATGGCGGTCGCGATCATTTATGAA
E. cloacae          GTCACCCCGTTGATGAAGGCGCAAAGCATCCCCGGCATGGCGGTCGCGGTAATCTACCAG
Y. enterocolitica   CTAACCCCGTTGCTGGAGAAGCAGGGCATCCCCGGCATGGCGGTCGCGGTCTTCTACGAC
K. pneumoniae       ATCCAGCCGATGCTGAAGGCGTACCGCATCCCCGGCATGGCGGTCGCGGTCCTCAAAGAC
                     *    *** ** ** **    *   ********************* *  *  *  *

C. freundii         GGCAAGCCGTACTACTTCACCTGGGGCAAGGCGGACATAGCCAATAACCATCCCGTGACG
E. cloacae          GGCAAGCCGCACTACTACACATTTGGCAAGGCGGACATCGCGGCCAATAAGCCCGTAACG
Y. enterocolitica   GGCAAGCCGCAATTCTTCAACTATGGCATGGCGGACATAAAGGCCGGCCGGCCCGTGACG
K. pneumoniae       GGCAAGGCGCACTACTTCAACTATGGCGTGGCGAACAGAGAGTCCGGCCAGCGCGTGTCG
                    ****** ** * * ** **  *  ***  **** ***              * ***  **

C. freundii         CAGCAGACGCTGTTCGAGTTGGGCAGCGTCAGCAAGACGTTTAACGGCGTGCTGGGCGGG
E. cloacae          CCGCAGACGCTGTTCGAGCTCGGCAGCATCAGCAAGACGTTCACCGGAGTGCTGGGCGGA
Y. enterocolitica   GAGAATACGCTGTTCGAGCTCGGCAGCGTCAGCAAGACGTTCACCGGCGTGGCGGGCGAG
K. pneumoniae       GAGCAGACGCTGTTCGAGATCGGCAGCGTCAGCAAGACGTTGACCGCCACGCTGGGCGCG
                      * * ************ * ****** ************* * **    *  *****

C. freundii         GACGCGATCGCCCGGGGCGAGATCAAGCTGAGCGACCCCGTGACGAAGTACTGGCCGGAG
E. cloacae          GACGCGATCGCGAGGGGCGAAATCTCGCTGGACGATCCGGTTACGCGCTATTGGCCGCAG
Y. enterocolitica   TACGCGATGCAGACGGGCATAATGAACCTGAACGACCCGGTGACGGAGTACGCGCCGGAG
K. pneumoniae       TACGCGGCCGTGAAGGGCGGGTTCGAGCTGGACGACAAGGTGTCGCAGCACGCGCCGTGG
                     *****        ****    *    ***  ***    **  **    *   ****  *

C. freundii         CTGACGGGCAAACAATGGCGCGGCATCTCGCTGCTTCATCTCGCGACGTATACGGCCGGC
E. cloacae          CTGACTGGCAAGCAGTGGCAAGGCATCAGGATGTTGGACCTCGCGACGTACACAGCCGGG
Y. enterocolitica   CTGACGGGCTCGCAGTGGAAAGACGTCAAGATGCTTCACCTCGCGACGTACACAGCCGGC
K. pneumoniae       CTGAAGGGCAGTGCGTTGGACGGCGTCACGATGGCGGAGCTCGCGACGTACTCAGCCGGC
                    ****  ***      * *   * * **  * **    * ***********  * *****

C. freundii         GGGCTGCCGCTGCAGATCCCGGACGATATCACCGACAAAGCCGCCTTACTGAGATTCTAC
E. cloacae          GGGCTGCCGCTGCAGGTCCCGGACGAGGTGACGGACAACGCGGCGCTCCTTCGGTTTTAC
Y. enterocolitica   GGGCTGCCGCTGCAGCTCCCGGACTCGGTCACGGACCAAAAGTCCCTCTGGCAGTACTAC
K. pneumoniae       GGGCTGCCGCTGCAGTTCCCGGACGAGGTCGACAGCAACGACAAGATGCGGACGTACTAC
                    *************** ********    *      * *        *       *  ***

C. freundii         CAAAACTGGCAGCCGCAATGGACGCCGGGCGCGAAACGCCTTTACGCGAACTCGAGCATC
E. cloacae          CAGAACTGGCAGCCGCAGTGGAAACCGGGCACGACCCGCTTGTATGCGAACGCGAGCATC
Y. enterocolitica   CAGCAATGGCAGCCGCAGTGGGCGCCGGGCGTGATGCGCAATTACTCGAACGCGAGCATC
K. pneumoniae       CGGAGCTGGTCGCCGGTGTACCCGGCGGGCACGCACCGCCAGTACTCGAACCCGAGCATC
                    *     ***  ****   *      *****  *   ***   **  ***** ********

C. freundii         GGCCTGTTCGGGGCCCTCGCGGTCAAACCCTCGGGGATGTCGTACGAGGAGGCCATGACG
E. cloacae          GGCCTGTTCGGGGCGCTCGCGGTCAAGCCCAGTGGGATGGGGTACGAGCAGGCGATGACG
Y. enterocolitica   GGCCTGTTCGGGGCCCTCGCGGTCAAGCGCTCGCAGCTGACGTTCGAGAATTACATGAAG
K. pneumoniae       GGCCTGTTCGGGCACCTCGCGGCCAACTCCTTGGGGCAGCCGTTCGAGCAGCTCATGTCG
                    ************   ******* ***   *     *  *  ** **** *    ***  *

C. freundii         CGGCGCGTGCTCCAACCCCTGAAGCTGGCCCACACGTGGATAACGGTCCCGCAGTCGGAG
E. cloacae          ACGAGAGTGCTCAAGCCGCTGAAGCTGGACCACACGTGGATCAATGTCCCGAAGGCGGAA
Y. enterocolitica   GAGTACGTGTTCCAGCCGCTGAAGCTGGACCACACGTTCATCACGATCCCGGAGTCGATG
K. pneumoniae       CAGACCTTGCTCCCGAAGCTGGGGCTGCACCACACGTACATCCAGGTCCCGGAGTCGGCG
                      *    ** **      ***  ****  ********  **     ***** ** **

C. freundii         CAAAAGAACTACGCGTGGGGCTAC---AGGGAGGGCAAGCCGGTGCACGTCAGTCCCGGC
E. cloacae          GAGGCACACTACGCGTGGGGCTAC---CGGGATGGCAAGGCGGTGCGCGTCTCACCCGGC
Y. enterocolitica   CAGTCGAACTACGCGTGGGGCTAC---AAGGATGGCCAGCCGGTGCGCGTCACGCTCGGC
K. pneumoniae       ATGGTGAACTACGCGTATGGCTACTCTAAGGAGGACAAGCCGGTGCGCGTCACGCCCGGC
                           *********  ******     *** * * ** ****** ****   * ****

C. freundii         CAGCTCGACGCGGAGGCGTACGGCCTCAAGTCGAGCGTTATCGATATGGCCAGGTGGGTG
E. cloacae          ATGCTCGACGCGCAGGCGTACGGCGTCAAGACGAATGTGCAAGACATGGCGAATTGGGTT
Y. enterocolitica   ATGCTCGGCGAGGAGGCGTACGGCGTCAAGTCGACCTCGCAAGACATGGTCAGGTTTATG
K. pneumoniae       GTGCTCGCCGCGGAGGCGTACGGCATCAAGACGGGCTCGGCCGACCTGCTCAAGTTTGCG
                      ***** ** * *********** ***** **         **  **   *  *

C. freundii         CAGGCGAACATGGACGCATCTCACGTTCAGGAAAAGACC------TTGCAGCAGGGCATA
E. cloacae          ATGGCGAACATGGCCCCCGAGAAAGTGGCGGACGCGTCC------CTGAAGCAAGGCATC
Y. enterocolitica   CAGGCGAACATGGACCCAGAGAGCCTGCCGGCCGGGAACGATAAATTGAAGGAGGCCATC
K. pneumoniae       GAGGCGAACATGGGC------TACCAGGGGGACGCGGCC------GTGAAGTCGGCCATC
                      *********** *              **    *  *       ** **   * ***
```

```
C. freundii         GAGCTGGCGCAATCGAGGTACTGGAGGATTGGCGACATGTACCAGGGCCTCGGCTGGGAA
E. cloacae          TCGCTCGCGCAGTCGCGGTACTGGCGAATCGGCAGCATGTACCAGGGCCTCGGCTGGGAG
Y. enterocolitica   ATAGCGTCGCAGTCGAGGTACTTCCAGGCCGGCGACATGTTCCAGGGCCTCGGCTGGGAG
K. pneumoniae       GCGCTGACGCACACGGGGTTCTACTCGGTCGGCGACATGACCCAGGGCCTCGGCTGGGAG
                           ****  ** *** **         ***  ****  *****************

C. freundii         ATGTTAAACTGGCCGCTCAAGGCGGATTCGATCATCAACGGCAGCGATTCCAAGGTCGCG
E. cloacae          ATGCTCAACTGGCCGGTCGAAGCCAACACGGTAATCGAGGGCTCCGACAGTAAAGTGGCG
Y. enterocolitica   ATGTACTCCTGGCCGATCAACCCGCAGGGGGTGATCGCCGACAGCGGCAACGACATTGCG
K. pneumoniae       TCGTACGCCTACCCGGTCACGGAGCAGACGCTCCTCGCCGGCAACGCCCCCGCGGTCTCG
                      *     **  *** **       *   * *  **   * *  **         *  **

C. freundii         TTAGCGGCGCTCCCGGCGGTCGAGGTCAACCCGCCGGTGCCGGCGGTCAAGGCCAGCTGG
E. cloacae          CTCGCCCCGTTACCGGTCGCGGAAGTCAATCCCCCGGCTCCGCCTGTCGAGGCGTCCTGG
Y. enterocolitica   CTCAAGCCACGCAAGGTCGAGGCGCTCGTTCCGGCGCAGCCGGCTGTCAGGGCCAGCTGG
K. pneumoniae       TTCCAGGCGAACCCGGTCACGCGGTTCGCCGTGCCGAAGGCGATGGGCGAGCAGCGCTTG
                     *     *      **         **       **    **   * *  *     ** *

C. freundii         GTTCACAAGACCGGGTCGACGGGCGGCTTCGGCTCGTACGTCGCGTTCGTCCCGGAGAAA
E. cloacae          GTCCACAAGACCGGGTCGACGGGCGGCTTCGGTTCGTACGTCGCGTTCATCCCGGAAAAG
Y. enterocolitica   GTCCACAAGACCGGGGCGACGAACGGCTTCGGCGCGTACATCGTGTTCATCCCGGAGGAG
K. pneumoniae       TACAACAAGACCGGGTCGACGGGCGGCTTCGGCGCGTACGTCGCGTTCGTCCCGGCGAGG
                        *********** *****  *********  ***** *** **** ******

C. freundii         AACTTAGGCATCGTCATGCTCGCGAACAAGAGCTACCCGAACCCGGTGCGCGTGGAGGCG
E. cloacae          CAGATCGGCATCGTCATGCTCGCGAACAAATCCTACCCGAATCCTGCGCGCGTCGAGGCG
Y. enterocolitica   AAGGTAGGCATCGTCATGCTCGCGAACAAGAACTACCCGAACCCGGTGCGCGTGCAGGCG
K. pneumoniae       GGGATCGCCATCGTCATGCTCGCGAACAGGAACTACCCGATCGAGGCGCGCGTGAAGGCG
                        * * ********************    ********     * ******  *****

C. freundii         GCGTGGCGCATCCTGGAGAAGCTGCAA---
E. cloacae          GCGTATCACATCCTGGACGCGCTGCAG---
Y. enterocolitica   GCGTATGACATCCTGCAGGCGCTGCGG---
K. pneumoniae       GCGCATGCCATCCTGTCGCAGCTGGCAGAA
                    ***     *******     ****
```

Objective III Study

loop-optimized:

```
E. coli             GAGAACAAGGTTTGTGGGCTCACGCGCGGACAGGACGCTAAGGCCGCCTACGACGCCGGC
S. enterica Typhi   GAAAATAAAGTCTGCGGGCTCACGCGCGCTCAAGATGCGAAAGCGGCGTGTGATGCGGGC
                    ** ** ** ** ** *************  ** ** ** ** ** ** *  ** ** ***

E. coli             GCGATCTACGGAGGACTTATATTCGTGGCGACGTCGCCGCGCTGCGTCAACGTAGAGCAG
S. enterica Typhi   GCGATCTATGGTGGTTTGATCTTCGTGCCGTCGTCGCCGCGCGCCGTCAGCGTCGAACAA
                    ******** ** **  * ** ****** ** ***********  ***** *** ** **

E. coli             GCGCAAGAGGTCATGGCGGCCGCGCCGCTGCAGTACGTAGGAGTTTTTCGGAACCACGAC
S. enterica Typhi   GCCAGGGAAGTAATTTCGGGCGCGCCGCTGCAATATGTCGGTGTCTTCAAGAACGCCGAC
                    **    ** ** **  *** ************ ** ** ** ** **   ****  ****

E. coli             ATAGCCGACGTAGTGGATAAGGCCAAGGTACTCTCGCTGGTGGCCGTACAGCTCCACGGC
S. enterica Typhi   ATCGCGGATGTCTGTCAAAAAGCGGCCGTCTTATCGCTGTCGGCGGTTCAATTACACGGC
                    ** ** ** **     * ** **    **  * ******  *** ** **  * ******

E. coli             AACGAGGAACAACTTTACATAGACACCCTCCGTGAGGCCCTGCCGGCCCACGTGGCTATT
S. enterica Typhi   AGCGAGGACCAGGCCTATGTCAATGCGTTAAGAGAAGCGCTGCCGCGCAACGTGCAGATC
                    * ****** **    **  *  *  *  *  * ** ** ******  * *****   **

E. coli             TGGAAGGCCTTAAGTGTGGGCGAAACCCTTCCCGCCCGTGAATTTCAACACGTCGACAAG
S. enterica Typhi   TGGAAAGCGCTCTCTGTGAGCAACGCGTTACCGGCGAGAGATTACCATCACGTCGACAAA
                    ***** **  *   **** ** *  *  * ** **  * ** *  ** ***********
```

```
E. coli             TACGTACTAGACAACGGCCAGGGCGGCAGCGGCCAGCGCTTCGACTGGTCTCTCCTCAAT
S. enterica Typhi   TATATCTTCGATAACGGCCAGGGCGGCAGCGGCCAGCGCTTCGATTGGAGTTTATTACAA
                    **  *  * ** ******************************** ***  * *  *  *

E. coli             GGCCAGACGCTCGGCAACGTCCTCTTAGCCGGCGGGCTCGGCGCCGACAACTGCGTAGAG
S. enterica Typhi   GGCCAGCCGCTCGACGACGTATTACTCGCCGGCGGGCTCGCCGCCGACAACTGTGTCCAA
                    ****** ****** * ****  *  * ************* ************ **  *

E. coli             GCCGCCCAGACCGGCTGCGCGGGACTCGACTTTAACAGCGCCGTCGAGTCGCAGCCCGGC
S. enterica Typhi   GCGGCGCAGGTCGGCTGCGCGGGTTTAGATTTCAACAGCGGCGTCGAGTCGCAGCCCGGC
                    ** ** ***  ************  * ** ** ******* *******************

E. coli             ATCAAGGACGCCAGACTCCTCGCCAGCGTTTTCCAGACCCTCAGAGCCTAC
S. enterica Typhi   ATCAAGGACGCGCGTTTATTAGCGTCGGTCTTTCAAACGTTACGTGCGTAT
                    ***********  *  *  * **    ** ** ** **  *  * ** **
```

scaffold-optimized:

```
E. coli             GAGAACAAGGTGTGCGGACTTACCCGTGGCCAGGACGCGAAGGCCGCGTACGACGCGGGA
S. enterica Typhi   GAGAACAAGGTGTGCGGTTTGACGAGAGCCCAGGACGCGAAGGCCGCGTGCGACGCGGGT
                    *****************  * **  * * ******************** *********

E. coli             GCTATATACGGCGGGCTCATCTTCGTAGCTACAAGTCCCCGTTGCGTAAATGTCGAGCAG
S. enterica Typhi   GCGATCTACGGCGGGCTCATCTTTGTCCCGAGCTCACCGAGAGCGGTCAGCGTCGAGCAG
                    ** ** ***************** **  * *     **  *    ** *  *********

E. coli             GCGCAGGAGGTCATGGCGGCCGCACCCCTCCAGTACGTCGGCGTGTTCAGAAACCACGAC
S. enterica Typhi   GCGCGGGAGGTCATCAGCGGGGCTCCGTTACAGTACGTCGGCGTGTTCAAGAATGCGGAT
                    **** *********    *  ** **  * *******************  **    **

E. coli             ATCGCCGACGTGGTCGACAAGGCGAAGGTGCTGAGTCTCGTTGCCGTGCAGCTGCACGGA
S. enterica Typhi   ATCGCCGACGTGTGCCAAAAGGCGGCGGTGCTGTCTTTATCTGCCGTGCAGCTGCATGGT
                    ************  * * ******  *******  * *   *************** **

E. coli             AACGAGGAACAGCTGTACATCGACACGCTGCGCGAGGCGCTTCCCGCTCACGTAGCGATC
S. enterica Typhi   TCGGAAGATCAGGCGTACGTCAACGCGCTGCGCGAGGCGTTACCGCGTAATGTCCAGATC
                       ** ** ***  **** ** ** ************** * **   * * **   ****

E. coli             TGGAAGGCGCTGTCGGTAGGGGAAACGCTGCCCGCGCGCGAGTTCCAACACGTAGACAAG
S. enterica Typhi   TGGAAGGCGCTGTCGGTCTCCAATGCGCTGCCCGCGCGCGATTACCACCATGTCGATAAG
                    *****************     *  *************** * *** ** ** ** ***

E. coli             TACGTCCTCGACAACGGACAGGGAGGAAGCGGACAGAGATTTGACTGGTCGCTGCTGAAC
S. enterica Typhi   TACATCTTCGACAATGGTCAAGGTGGTTCGGGTCAACGTTTCGACTGGTCGCTGCTGCAA
                    *** ** ******* ** ** ** **    ** **  * ** *************** *

E. coli             GGACAGACCTTAGGGAACGTGCTGCTGGCCGGAGGATTAGGCGCCGACAATTGCGTGGAG
S. enterica Typhi   GGTCAACCGCTCGATGATGTGCTGCTGGCGGGTGGTCTCGCGGCGGATAACTGCGTGCAG
                    ** **  *  * *   * *********** ** **  * *  ** ** ** ****** **

E. coli             GCCGCGCAAACCGGATGCGCCGGGCTCGACTTCAATTCGGCCGTAGAATCACAGCCCGGA
S. enterica Typhi   GCCGCGCAGGTGGGTTGTGCGGGGCTCGACTTCAACAGCGGGGTCGAGAGTCAACCGGGT
                    ********    ** ** ** **************    *  ** **    ** ** **

E. coli             ATAAAGGACGCGCGGCTGCTCGCGAGCGTGTTCCAGACGCTGCGCGCGTAC
S. enterica Typhi   ATCAAAGATGCGCGGCTGCTCGCGAGCGTGTTCCAGACGCTGCGCGCGTAC
                    ** ** ** ******************************************
```