

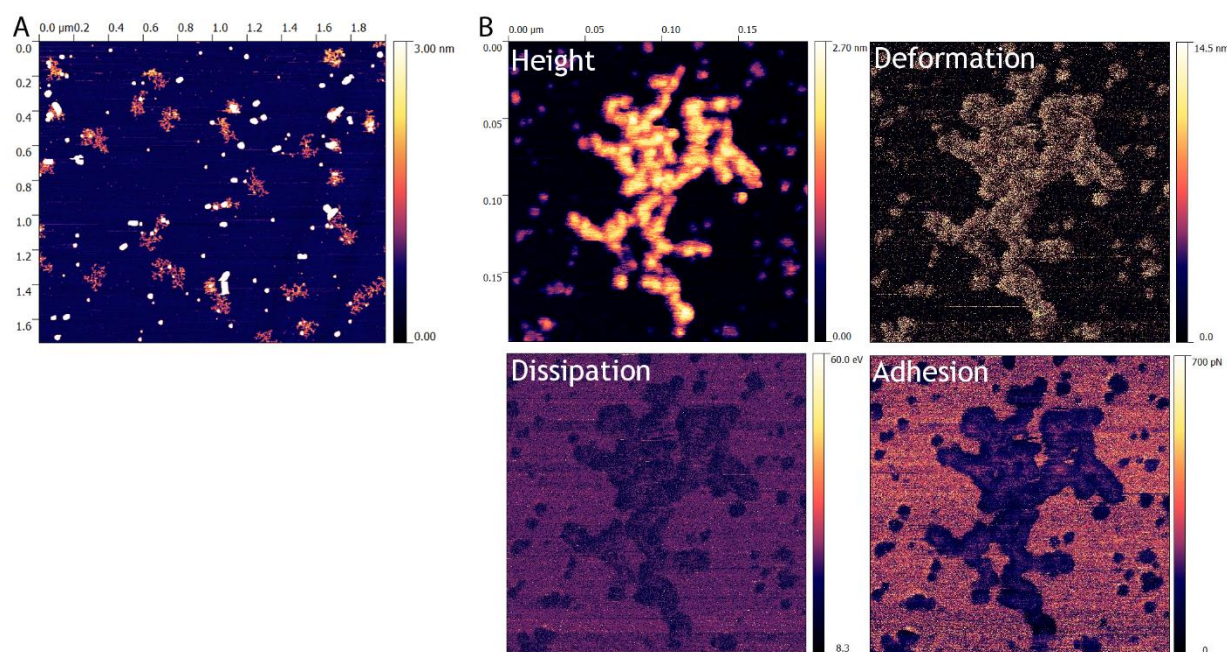
Electronic Supporting Information:

Protein Patterning by DNA Origami Framework

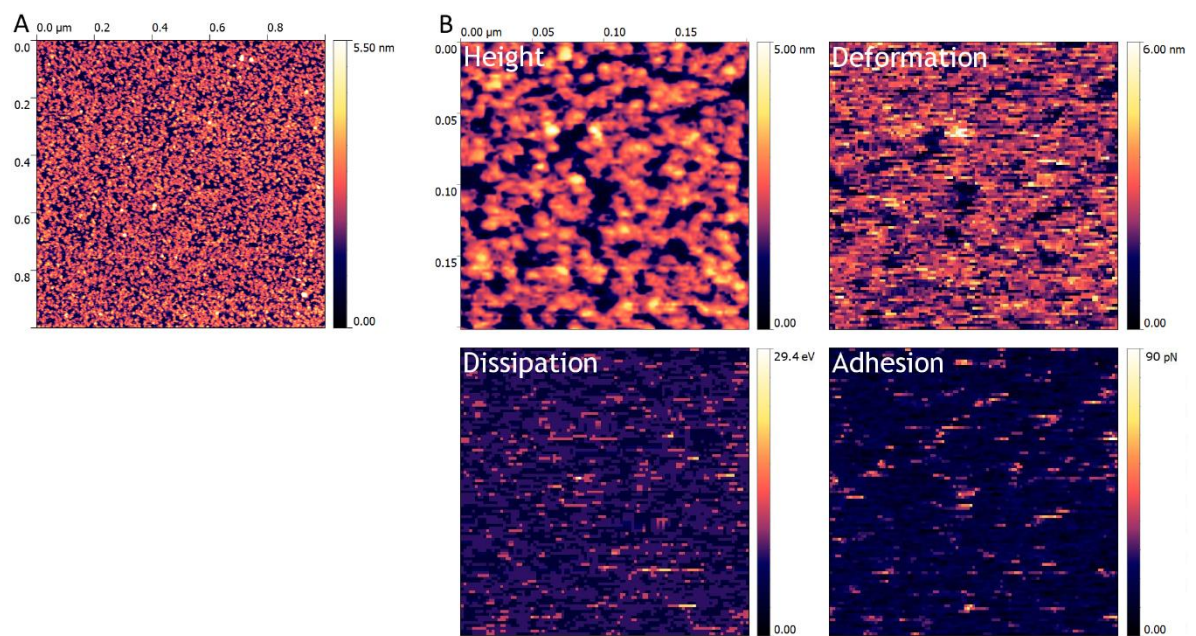
Hüsnü Aslan,^a Abhichart Krissanaprasit,^a Flemming Besenbacher,^a Kurt V. Gothelf^a and Mingdong Dong^{a,*}

^a Center for DNA Nanotechnology (CDNA) and Interdisciplinary Nanoscience (iNANO) Center, Aarhus University, 8000 Aarhus C, Denmark.

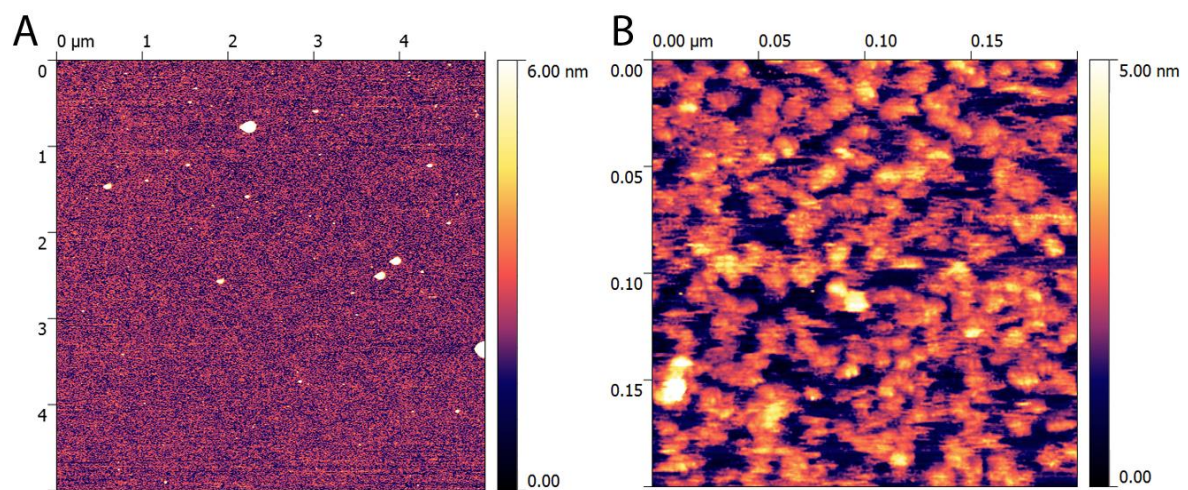
*Corresponding author. E-mail: dong@inano.au.dk



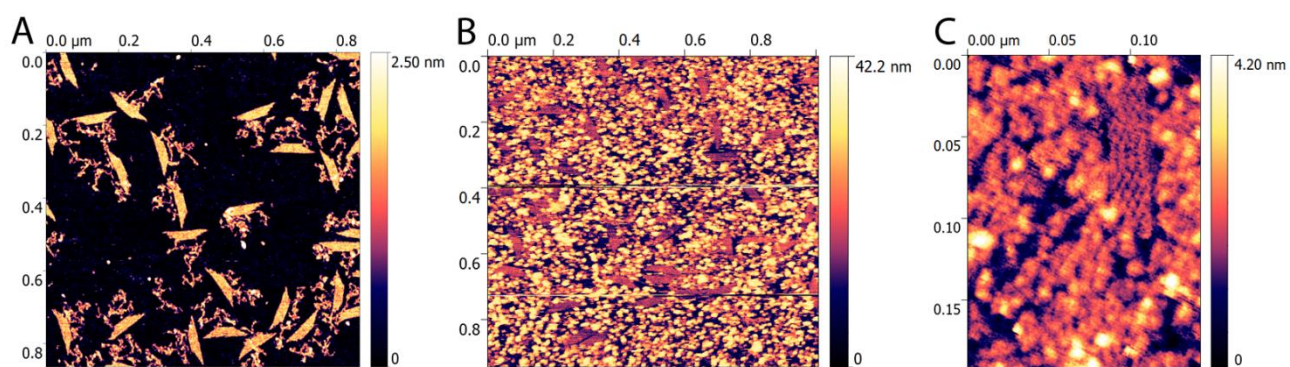
SI Fig. 1 Imaging of M13 ssDNA A) Large scale scan with 256 points per line in liquid PeakForce Tapping image showing several M13 ssDNAs adsorbed on mica surface. (B) Zoom in on an individual m13 ssDNA and its related QNM channels showing drastic contrast change due to DNA and mica surface



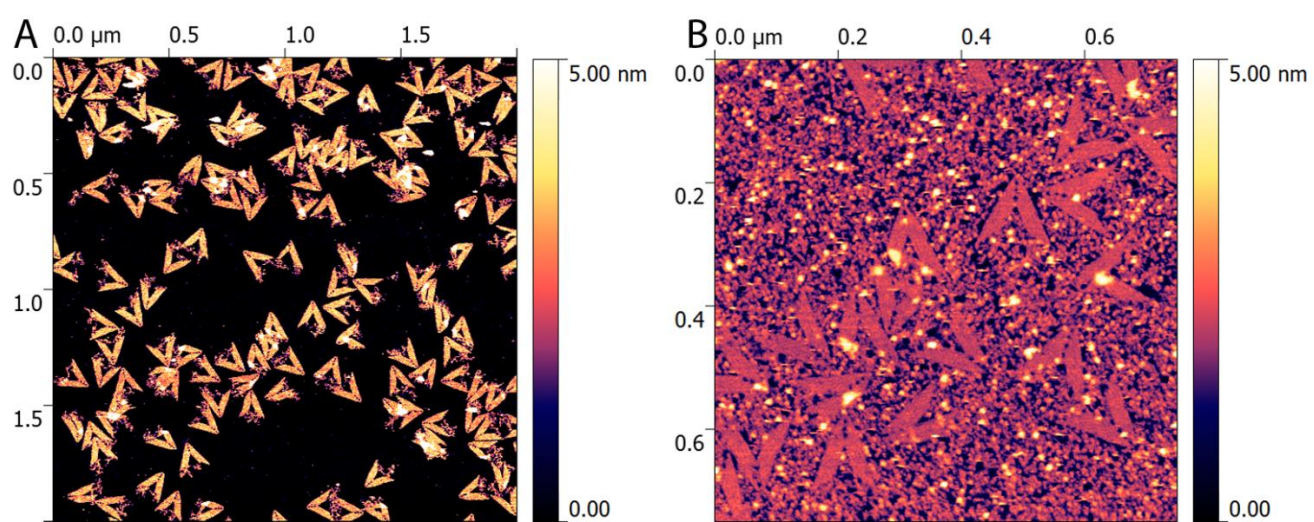
SI Fig.2 *In-situ* BSA addition to M13 ssDNA (A) Overview of *in-situ* BSA addition to M13 ssDNA shows full surface coverage, (B) *In-situ* BSA addition while scanning the single M13 ssDNA also confirms full surface coverage with additional QNM channels showing no drastic contrast change



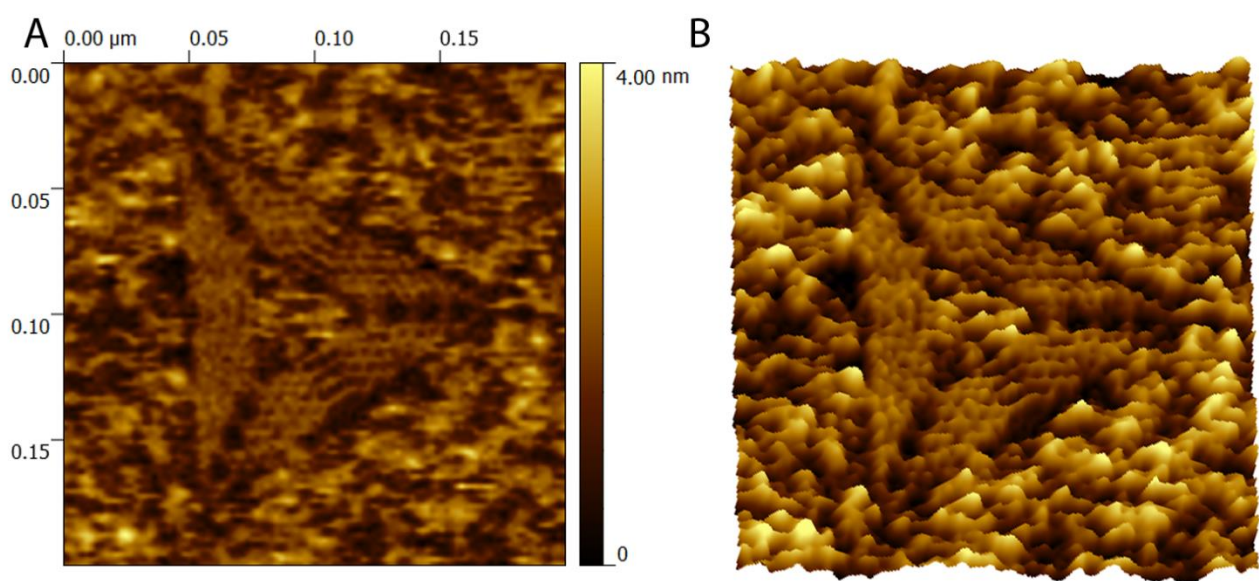
SI Fig. 3 BSA coverage of mica surface in deionized water (A) Large area scan showing full surface coverage (B) small area scan



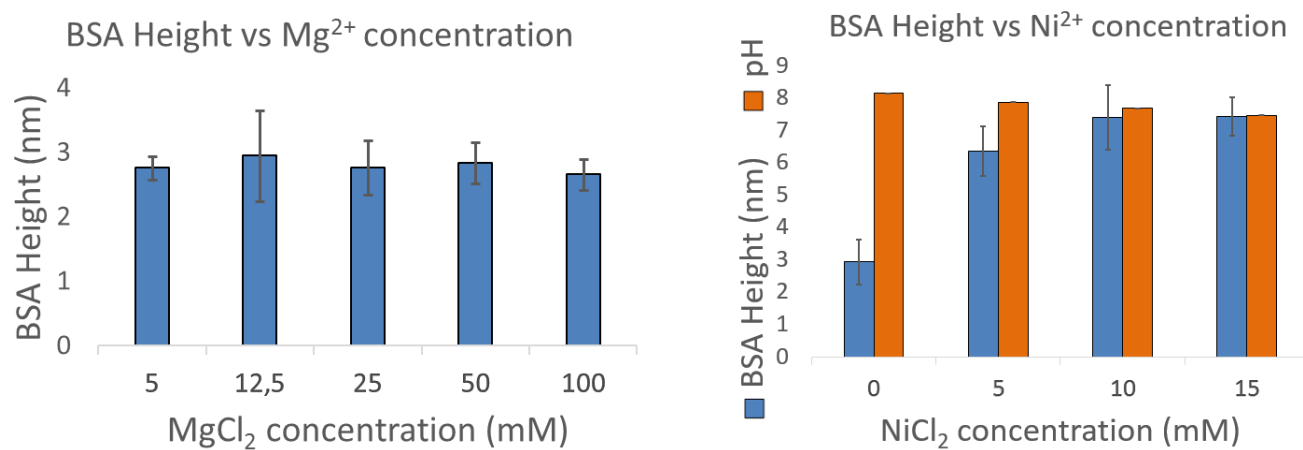
SI Fig. 4 Partially folded m13 ssDNA (A) Large scale image of multiple partially folded M13 ssDNAs (B) *in-situ* BSA addition, image is shifted due to thermal drift (C) zoom in on a singlet



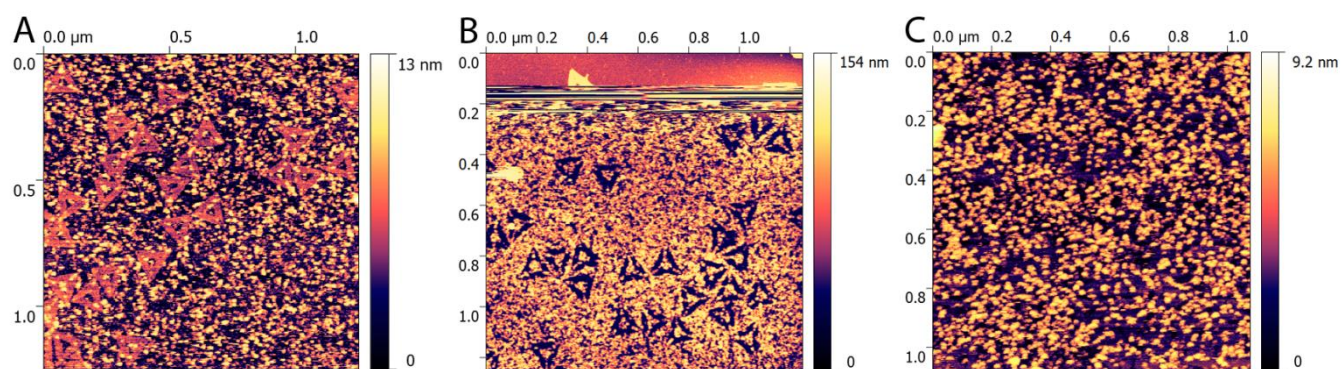
SI Fig. 5 V-shaped DNA origamis with unfolded pieces, (A) Large scale image before BSA addition, (B) Smaller area image of the same area after BSA addition



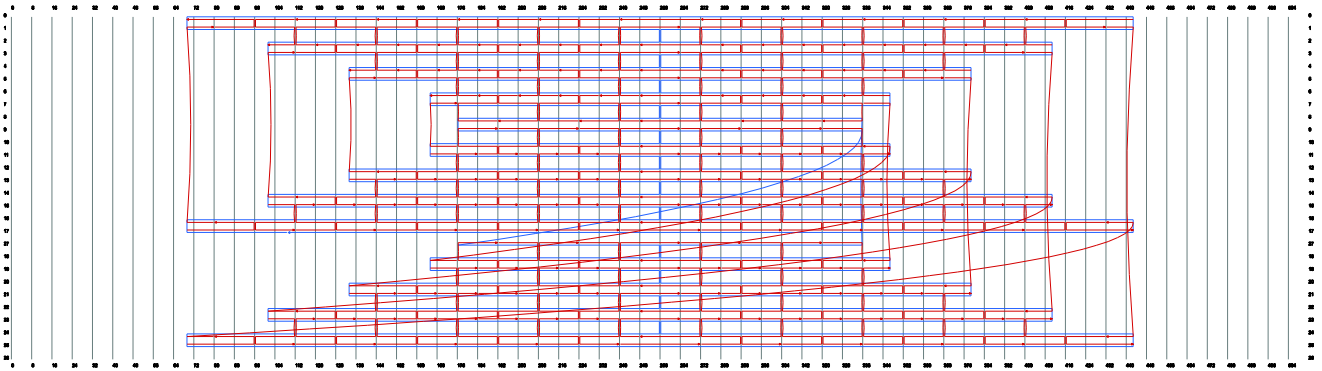
SI Fi. 6 Fully folded tDOF singlet with BSA (A) AFM in liquid topography image, (B) Three-dimensional representation of the same image.



SI Fig. 7 [Mg^{2+}] and [Ni^{2+}] vs BSA height. Error bars are S.D. values.



SI Fig. 8 $[\text{Ni}^{2+}]$ effect on BSA formation. With increasing concentration BSA gets more granular form and increases its size. In addition shows higher binding affinity. $[\text{Ni}^{2+}]$ change as follows (A) 5 mM, (B) 10 mM, (C) 15 mM



SI Fig. 9 Triangular DNA Origami Frame (tDOF) design using caDNAno software for DNA origami design. Blue and red strands represent M13 scaffold and staple strands, respectively. Followed by the sequence.

Start	End	Sequence
0[111]	2[101]	AAAGAAGTTTTGCCAGCATAAATATTCATTGACTCAACATGTT
0[143]	2[136]	GATAAAAACCAAAATATTAACAGTTCAGAAATTAGAGCT
0[175]	2[168]	AACACTATCATAACCCATCAAAAATCAGGTCTCCTTTTGA
0[207]	2[200]	CGCCAAAAGGAATTACAGTCAGAAGCAAAGCGCAGGTCAG
0[239]	2[232]	GAATACCACATTCAACTTAAGAGGAAGCCCGATCAAAGCG
0[271]	0[240]	ACAGGTAGAAAGATTCATCAGTTGAGATTTAG
0[303]	2[296]	TTAATAAAACGAACTAACCGAACTGACCAACTCCTGATAA
0[335]	2[328]	ACCAGTCAGGACGTTGGAACGGTGTACAGACCGAAACAAA
0[367]	2[360]	ACCTTATGCGATTTTATGACCTTCATCAAGAGCATCTTG
0[399]	2[392]	TGGTTTAATTTCAACTCGGATATTCATTACCCACGAAAGA
0[442]	1[431]	CCTGACGAGAAACACCAGAACGAGTAGGCTGCTCATTCACTGA
1[80]	0[69]	AATACTGCGGAATCGTAGGGGGTAATAGTAAATGTTTAGACT
1[264]	2[248]	GCGCAGACTCCATGTTACTTAGCCCGTTTTAA
1[432]	24[432]	ATAAGGCTTGCAACAAAGTTAC
2[119]	0[112]	TGCTGTAGATCCCCCTCAAATGCTGCGAGAGGCTTTTGCA
2[135]	4[133]	TAATTGCTTGGAAGTTTCATTCCAAATCGGTTGTA
2[151]	0[144]	CGGATGGCACGAGAATGACCATAATCGTTTACCAGACGAC
2[167]	4[168]	TAAGAGGTCAATTCTGCGAACGAGATTAAGCA
2[183]	0[176]	TAATTGCTTTACCCTGACTATTATGAGGCATAGTAAGAGC
2[199]	4[200]	GATTAGAGATTAGATACATTTTCGCAAATCATA
2[215]	0[208]	AACTCCAAGATTGCATCAAAAAGATAATGCAGATACATAA
2[231]	4[232]	AACCAGACGTTTAGCTATATTTTCTTCTACTA
2[247]	1[263]	TTCGAGCTAAGACTTCAAATATCGGGAACGAG
2[279]	0[272]	CGACCTGCGGTCAATCATAAGGGAACGGAACAACATTATT
2[295]	4[296]	ATTGTGTCTCAGCAGCGAAAGACACCATCGCC
2[311]	0[304]	TATCATCGTTGAAAGAGGACAGATGGAAGAAAAATCTACG
2[327]	4[328]	GTACAACGAGCAACGGCTACAGAGGATACCGA
2[343]	0[336]	CCAAGCGCAGGCGCATAGGCTGGCAGAACTGGCTCATTAT
2[359]	4[360]	ACCCCAGACTTTTTTCATGAGGAACTTGCTTT
2[375]	0[368]	AAAACACTTAATCTTGACAAGAACTTAATCATTGTGAATT
2[391]	3[399]	GGCAAAAGTAAAATACGTAATGCC
2[410]	0[400]	ACCAACCTAAAAAATCAACGTAACAAATAAATTGGGCTTGAGA
3[112]	2[120]	ACTAAAGTACGGTGTGCAATATAA
3[264]	4[248]	GCCGCTTTGCTGAGGCTTGAGGGGAAAAGGT
3[400]	22[400]	ACTACGAAGGCTTAGCACCATTA
4[151]	2[152]	TAAAGCTATATAACAGTTGATTCCCATTTTTG
4[167]	6[165]	ATAAAGCCTTTGCGGGAGAAGCCTGGAGAGGGTAG
4[183]	2[184]	TTAGCAAATAGATTTAGTTTGACCAGTACCTT
4[199]	6[200]	CAGGCAAGATAAAAAATTTTAGAATATTCAAC
4[215]	2[216]	CATCCAATAAATGGTCAATAACCTCGGAAGCA
4[231]	6[232]	ATAGTAGTATGCAATGCCTGAGTAGGCCGGAG
4[247]	3[263]	GGCATCAAATTTGGGGCGCGAGCTAGTTAAAG
4[279]	2[280]	ATTCGGTCTGCGGGATCGTCACCCGAAATCCG
4[295]	6[296]	CACGCATAAGAAAGGAACAACCTAAGTCTTTCC

4[311]	2[312]	GACAACAAGCATCGGAACGAGGGTGAGATTG
4[327]	6[328]	TAGTTGCGAATTTTTTCACGTTGATCATAGTT
4[343]	2[344]	AACAGCTTGCTTTGAGGACTAAAGCGATTATA
4[359]	5[367]	CGAGGTGAGGCTCCAAAAGGAGCC
4[378]	2[376]	CGGTTTATCAGGTTTCCATTAAACGGGAATACACT
5[144]	4[152]	ATGACCCTGTAATACTTCAGAGCA
5[264]	6[248]	CAACAGTTTATGGGATTTTGCTAATCAAAAGG
5[368]	20[368]	TTTAATTGTATTTCCACCAGAGCC
6[183]	4[184]	TTAATGCCTTATTTCAACGCAAGGGCAAAGAA
6[199]	8[192]	CGTTCTAGTCAGGTCATTGCCTGACAGGAAGATTGTATAA
6[215]	4[216]	CAATATGACCCTCATATATTTTAAAGCATTAA
6[231]	8[224]	ACAGTCAAAGAGAATCGATGAACGACCCCGTTGATAATC
6[247]	5[263]	GTGAGAAAATGTGTAGGTAAAGATACAACCTT
6[279]	4[280]	ATTTTCTGTGACGCGGAGTGAGAATACCGATAT
6[295]	8[288]	AGACGTTACCATGTACCGTAACACCCCTCAGAACCGCCAC
6[311]	4[312]	GTTTTGTGAGGAATTGCGAATAATCCGACAAT
6[327]	8[320]	AGCGTAACTACAACTACAACGCCTATCACCGTACTCAGG
6[346]	4[344]	ACAGACAGCCCAAATCTCCAAAAAAATTTCTTA
7[264]	8[248]	AGGGATAGCTCAGAGCCACCACCCCATGTCAA
7[336]	18[336]	TGTAGCATTCTTTTATAAACAGTT
8[191]	6[184]	GCAAATATTTAAATTGAGATCTACAAAGGCTACTGATAAA
8[223]	6[216]	AGAAAAGCCCCAAAAAGAGTCTGGAGCAAACAATCACCAT
8[247]	7[263]	TCATATGTGTAATCGTAAACTAGTCATTTTC
8[287]	6[280]	CCTCAGAACC GCCACCCAAGCCCAATAGGAACGTAAATGA
8[319]	6[312]	AGGTTTAGTACCGCCATGAGTTTCGTCACCAGGATCTAAA
9[192]	11[199]	GTTAAATTCGCATTAATGTGAGCGAGTAACACACGTTGG
9[224]	11[231]	GCTCATTTTTTAACCAGCCTTCCTGTAGCCAGGCATCTGC
9[264]	10[248]	TCGGGAGATATACAGTAACAGTACAAATAATT
9[288]	11[295]	CCTGATTGCTTTGAATTGCGTAGATTTTCAGGCATCAATA
9[320]	11[327]	GCGCAGAGGCGAATTAATTATTTGCACGTAAATTCTGAAT
10[247]	9[263]	CGCGTCTGATAGGAACGCCATCAACTTTTACA
10[175]	7[175]	GTGGAACAAATTTCTATTTTGTAG
11[165]	13[167]	CGGCGGATTGAATTCAGGCTGCGCAACGGGGGATG
11[184]	9[191]	GGATAGGTACCCGTCGGATTCTCCTAAACGTTAATATTTT
11[200]	13[199]	TGTAGATGGGTGCCGGAACAGGAACGCCAG
11[216]	9[223]	GTAACCGTCTTTCATCAACATTAATAATTTTGTAAATCA
11[232]	13[231]	CAGTTTGACGCACTCCAGCCAGCTAAACGACG
11[264]	12[248]	CCTGATTAAAGGAGCGGAATTATCTCGGCCTC
11[280]	9[287]	TGGCAATTTTTAACGTCAGATGAAAACAATAACGGATTTCG
11[296]	13[295]	TAATCCTGATTATCATTTTGCGGAGAGGAAGG
11[312]	9[319]	GATTATACACAGAAATAAAGAAATACCAAGTTACAAAATC
11[328]	13[327]	AATGGAAGCGAACGTTATTAATTTCTAACAAC
12[143]	5[143]	CGGTGCGGGCCTTCCAAAAACATT
12[247]	11[263]	AGGAAGATGGGGACGACGACAGTAATCATATT
12[367]	13[359]	ACAATTCGACAACCTCGTAATACAT
13[133]	15[135]	TCTTCGCTATTGGAAGCATAAAGTGTATGCCCGCT

13[152]	12[144]	TGGCGAAATGTTGGGAAGGGCGAT
13[168]	15[167]	TGCTGCAAATCCGCTCACAATCCCAGCTGCA
13[184]	11[183]	AGTTGGGTCAAAGCGCCATTGCCCCGTAATG
13[200]	15[199]	GGTTTTCCATGGTCATAGCTGTTTGAGAGGCG
13[216]	11[215]	ACGTTGTATTCCGGCACCGCTTCTGGCGCATC
13[232]	15[231]	GCCAGTGCGATCCCCGGGTACCGAGTTTTTCT
13[264]	14[248]	GCAAATCACCTCAATCAATATCTGCAGGTCGA
13[280]	11[279]	AAGGAATTACAAAGAAACCACCAGTCAGATGA
13[296]	15[295]	TTATCTAAAGCATCACCTTGCTGATGGCCAAC
13[312]	11[311]	TAGGAGCATAAAAAGTTTGAGTAACATTGTTTG
13[328]	15[327]	TAATAGATCGCTGAGAGCCAGCAGAAGCGTAA
13[344]	11[346]	TCAATAGATATTAATCCTTTGCCGGTTAGAACCT
13[360]	15[359]	TTGAGGATGGTCAGTATTAACACCTTGAATGG
14[111]	3[111]	ATGAGTGAGCTTTTAAATATGCA
14[247]	13[263]	CTCTAGAGCAAGCTTGCATGCCTGGTCAGTTG
14[399]	15[391]	ACCACCAGCAGAAGATGATAGCCC
15[101]	17[111]	AACTCACATTATTGAGTGTTGTCCAGAAACCGTCTATCAGGG
15[120]	14[112]	GCGCTCACAAGCCTGGGGTGCCTA
15[136]	17[143]	TTCCAGTCCTTATAAATCAAAAGAGAACCATCACCCAAAT
15[152]	13[151]	TGTCGTGCACACAACATACGAGCCACGCCAGC
15[168]	17[175]	TTAATGAAGTTTGATGGTGGTTCCGAGGTGCCGTAAAGCA
15[184]	13[183]	CGCGCGGGCCTGTGTGAAATTGTTGGCGATTA
15[200]	17[207]	GTTTGCGTCACGCTGGTTTGCCCCAAGGGAGCCCCGATT
15[216]	13[215]	CCAGGGTGGCTCGAATTCGTAATCCAGTCACG
15[232]	17[239]	TTTACCAGCCTGGCCCTGAGAGAAAGCCGGCGAACGTGG
15[264]	16[248]	CGACCAGTACATTGGCAGATTCACCTGATTGC
15[280]	13[279]	GGACATTCACCTCAAATATCAAACACAGTTGA
15[296]	17[303]	AGAGATAGTTTGACGCTCAATCGTACGTGCTTTCCTCGTT
15[312]	13[311]	TGACCTGACAAATGAAAAATCTAAAATATCTT
15[328]	17[335]	GAATACGTAACAGGAAAAACGCTCCTAAACAGGAGGCCGA
15[344]	13[343]	CAATATTTGCTGCAACAGTGCCATAGAGCCG
15[360]	17[367]	CTATTAGTATATCCAGAACAATATCAGGAACGGTACGCCA
15[376]	13[378]	CGCGAACTAAAACAGAGGTGAGGCTTAGAAGTATT
15[392]	17[399]	TAAAACATTAGAAGAACTCAAACCTTTTATAATCAGTGAG
16[79]	1[79]	ACTATTAAAGAGGATAGCGTCC
16[247]	15[263]	CCTTCACCGTGAGACGGGCAACAGCAGTCACA
16[431]	17[442]	TCTTTGATTAGTAATAGTCTGTCCATCACGCAAATTAACCGTT
17[112]	15[119]	CGATGGCCCACTACGTATAGCCCAGATAGGGATTGCGTT
17[144]	15[151]	CAAGTTTTTTGGGGTCGAAATCGGCAAAATCCGGGAAACC
17[176]	15[183]	CTAAATCGGAACCCTAAGCAGGCGAAAATCCTTCGGCCAA
17[208]	15[215]	TAGAGCTTGACGGGGAGTTGCAGCAAGCGGTCATTGGGCG
17[240]	17[271]	CGAGAAAGGAAGGGAAGCGTACTATGGTTGCT
17[272]	15[279]	TTGACGAGCACGTATACTGAAATGGATTATTTAATAAAAAG
17[304]	15[311]	AGAATCAGAGCGGGAGATGGAAATACCTACATAACCCCTTC
17[336]	15[343]	TTAAAGGGATTTTAGATACCGCCAGCCATTGCGGCACAGA
17[368]	15[375]	GAATCCTGAGAAGTGTATCGGCCTTGCTGGTACTTTAATG

17[400]	15[410]	GCCACCGAGTAAAAGAACATCACTTGCCTGAGCGCCATTAAAA
17[69]	16[80]	ACGTGGACTCCAACGTCAAAGGGCGAATTTGGAACAAGAGTCC
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18[247]	27[263]	CCTTTTTTCATTTAACAAATTCATAGGATTAG
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19[200]	21[199]	GATTAAGAAATGCTGATGCAAATCAGAATAAA
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19[232]	21[231]	TTATCAAACCGGCTTAGGTTGGGTAAGCCTGT
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19[296]	21[295]	TGTACTGGAAATCCTCATTAAAGCAGAGCCAC
19[312]	27[319]	TTTAACGGTTCGGAACCTATTATTAGGGTTGATATAAGTA
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21[133]	23[135]	TTCTGACCTAAAAATATAAAGTACCGACTGCAGAAC
21[152]	20[144]	GTTTGAAATTCAAATATATTTTAG
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22[247]	21[263]	AGTATAAAATATGCGTTATACAAAGCCATCTT
22[399]	23[391]	CCATTAGCAAGGCCGGGGGAATTA
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23[136]	25[143]	GCGCCTGTTATTCTAAGAACGCGATTCCAGAGCCTAATTT
23[152]	21[151]	AATAGATAGAGCCAGTAATAAGAGATTTAATG
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23[232]	25[239]	TTTCCTTAGCACTCATCGAGAACAAATAGCAGCCTTTACAG
23[264]	24[248]	ATGGTTTATGTCACAATCAATAGATATTAAAC
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23[296]	25[303]	CATTCAACAAACGCAAAGACACCAGAACACCCTGAACAAA

23[312]	21[311]	GGAGGGAATTTAGCGTCAGACTGTCCGCCTCC
23[328]	25[335]	TTGACGGAAATACATACATAAAGGGCGCTAATATCAGAGA
23[344]	21[343]	ATTAAAGGCCGTAATCAGTAGCGAGCCACCCT
23[360]	25[367]	CACCGTCACCTTATTACGCAGTATTGAGTTAAGCCCAATA
23[376]	21[378]	AGCCATTTAAACGTCACCAATGAACACCAGAACCA
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24[79]	16[432]	TCAAGATTAGTGTAGCAATACT
24[247]	23[263]	CAAGTACCTCATTCCAAGAACGGGAAATTCAT
24[431]	25[442]	CAGAAGGAAACCGAGGTTTTTAAGAAAAGTAAGCAGATAGCCG
25[112]	23[119]	ACGCTAACGAGCGTCTGGCGTTTTAGCGAACCCAACATGT
25[144]	23[151]	GCCAGTTACAAAATAATAGAAGGCTTATCCGGTTATCAAC
25[176]	23[183]	TCCAATCCAAATAAGATTACGCGCCCAATAAATAATAT
25[208]	23[215]	AACGTCAAAAATGAAAAGCAAGCCGTTTTTATGAAACCAA
25[240]	25[271]	AGAGAATAACATAAAAAACAGGGAAGCGCATT
25[272]	23[279]	GACGGGAGAATTAACCTCGGAATAAGTTTATTTCCAGCGCC
25[304]	23[311]	GTCAGAGGGTAATTGATGGCAACATATAAAAGCGATTGAG
25[336]	23[343]	GATAACCCACAAGAATGTTAGCAAACGTAGAAAATTATTC
25[368]	23[375]	ATAAGAGCAAGAAACATGGCATGATTAAGACTCCGACTTG
25[400]	23[410]	TATCTTACCGAAGCCCAAACGCAATAATAACGAAAATCACCAG
25[69]	24[80]	TGCTATTTTGACCCAGCTACAATTTTGTTTGAAGCCTTAAA
27[192]	19[199]	GAGCAAAAGAAGATGAGTGAATAACCTTGCTTATAGCTTA
27[224]	19[231]	AAAACAAAATTAATTAATGGAAACAGTACATTAGTGAAT
27[264]	18[248]	CGGGGTTTCCTCAAGAGAAGGATTTTGAATTA
27[288]	19[295]	GATAAGTGCCGTCGAGCTGAAACATGAAAGTATACAGGAG
27[320]	19[327]	TAGCCCGGAATAGGTGAATGCCCCCTGCCTATGGTCAGTG