

Supporting Information

Monitoring Patterned Enzymatic Polymerization on DNA Origami at Single-molecule level

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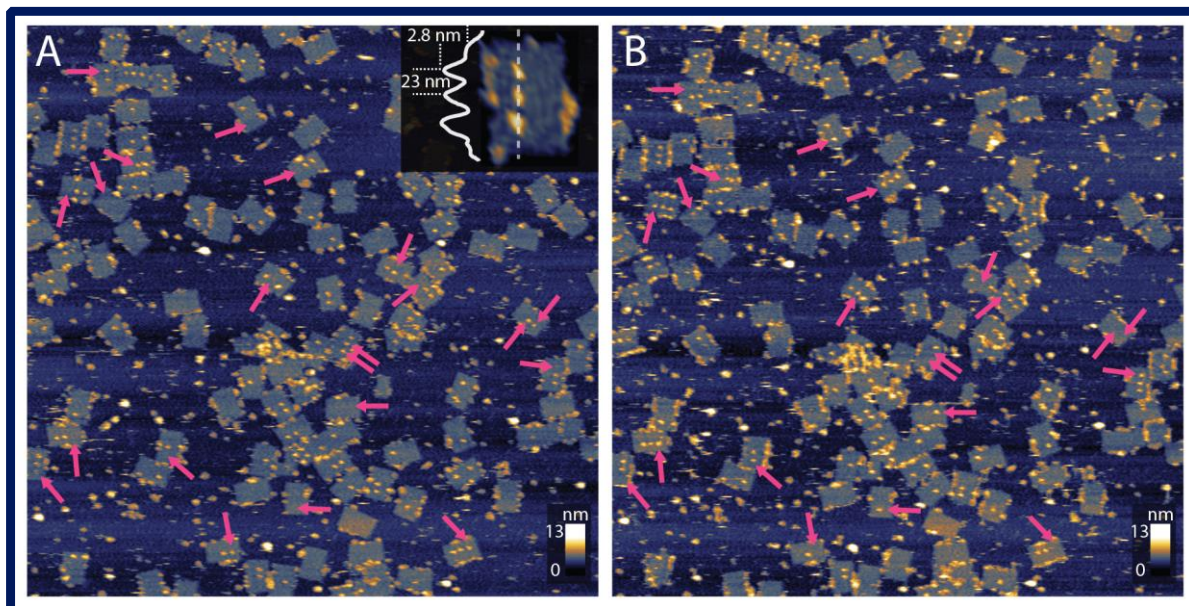


Figure S1. Time lapsed liquid AFM height image of DNA origami canvases with three 3' overhangs. Inset shows a single canvas and line profile (over dashed line). **(a)** DNA canvases imaged 8 min after addition of TdT and dTTP. **(b)** Same area as in (a) imaged 1 h after addition of TdT and dTTP. Transient binding of enzymes is indicated by magenta arrows. Image sizes are 2x2 μm

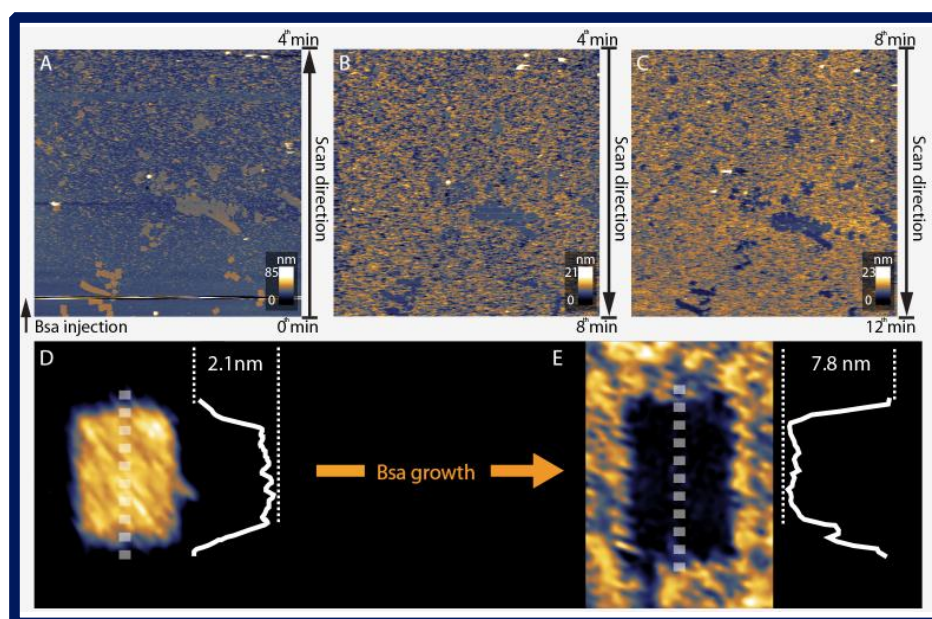


Figure S2. Time lapsed liquid AFM height image of BSA growth on a mica surface with DNA origami canvases. **(a)** BSA injection during scanning. DNA canvases are losing contrast due to BSA coverage. Image size is 5x5 μm **(b,c)** Growth of BSA and increasing surface coverage in time. Image sizes are 5x5 μm . **(d)** Single DNA canvas before BSA injection. Height measurement over the average line profile (dashed line) reads 2.1 nm. **(e)** Single DNA

canvas after BSA growth. Height measurement over the average line profile (dashed line) reads 7.8 nm with a total BSA growth of 9.9 nm over 12 minute period.

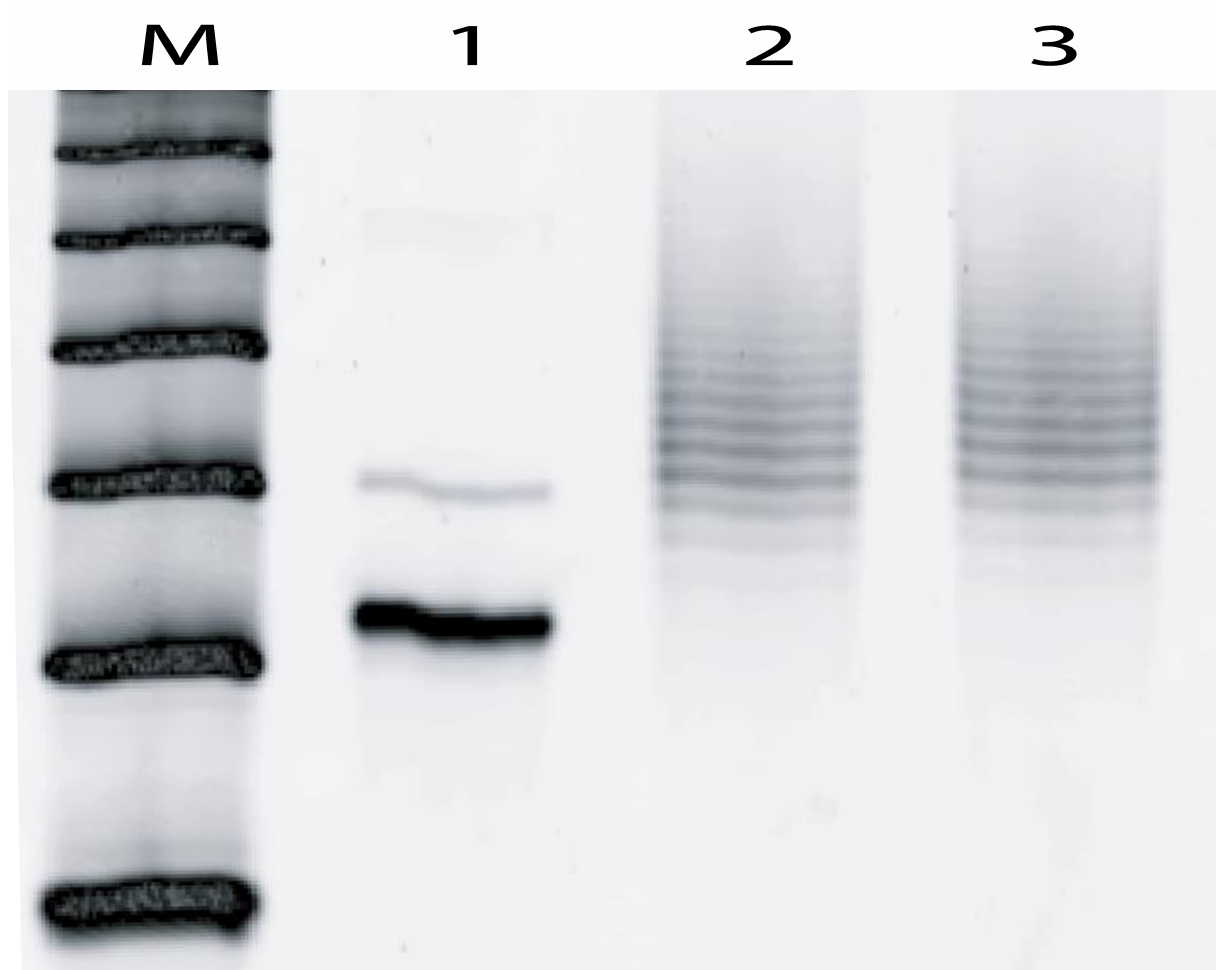


Figure S3. Electrophoresis mobility shift assay on polyacrylamide gel of staple strands elongated by TdT prior to annealing. **(M)** 10 bp marker. **(1)** control staple strands. **(2)** staple strands elongated by TdT in the presence of BSA. **(3)** staple strands elongated by TdT in the absence of BSA.

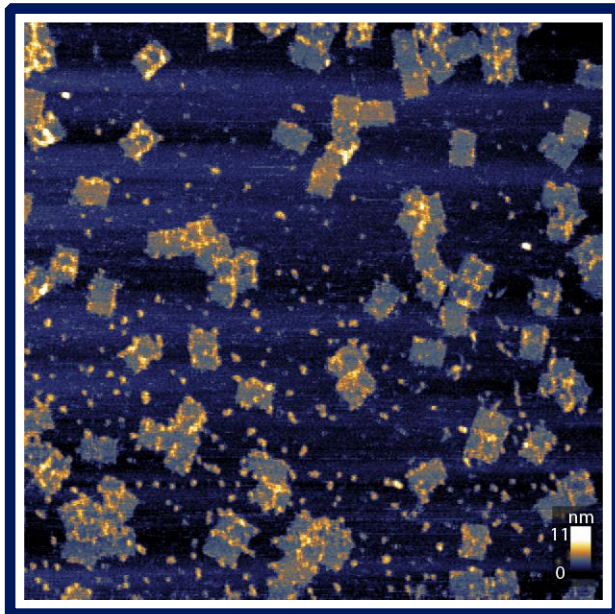


Figure S4. Liquid AFM height image of DNA canvases with available binding sites in the shape of the letter A in TdT buffer without BSA. Growth of nucleotide chains was not observed. Image size 2x2 μm .

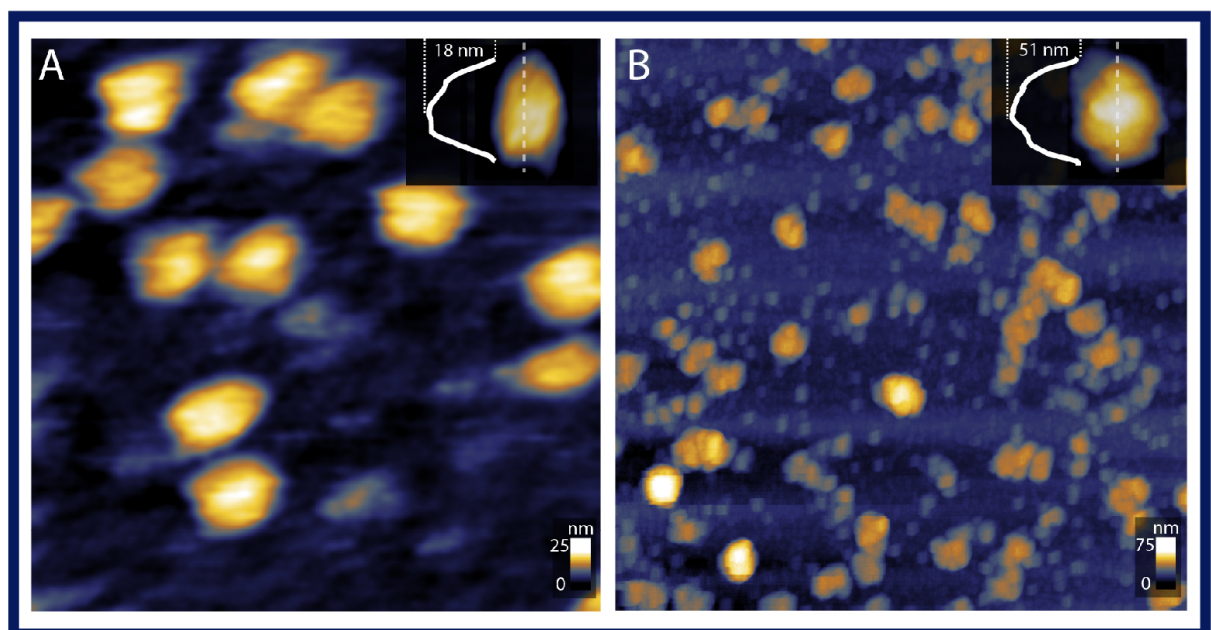


Figure S5. Visualization of growth after A's could no longer be resolved. Liquid AFM height images of DNA canvases with protrusions in the "A" pattern embedded in BSA. **(a)** canvases imaged 16 min after injection of TdT and dTTP. Image size 1x1 μm . **(b)** canvases imaged 1 h after injection of TdT and dTTP. Image size 2x2 μm .

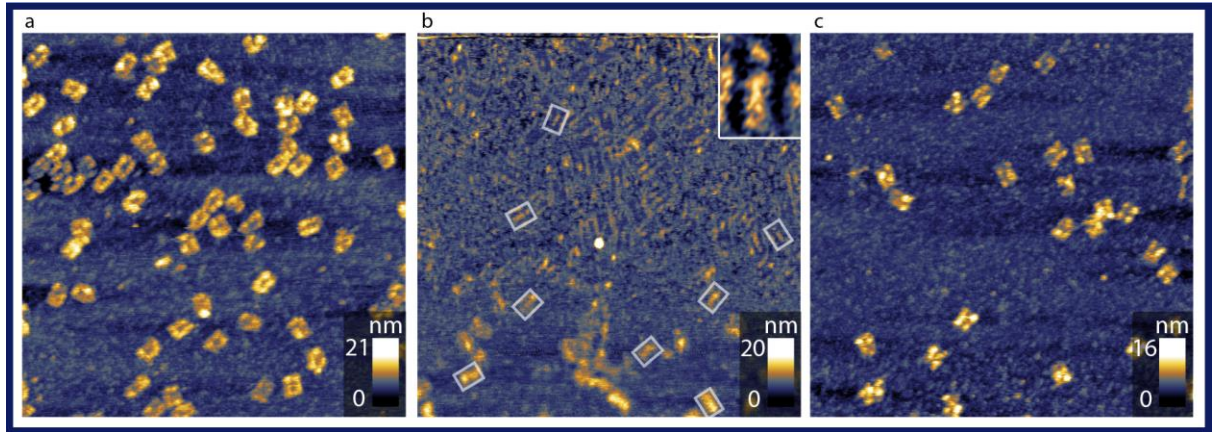


Figure S6. Test of different patterns of staple strand protrusions on the DNA origami. Liquid AFM height images of BSA-embedded DNA canvases with staple strand protrusions in three different patterns: **(a)** “O”, **(b)** “i” and **(c)** N. Image sizes are 2x2 μm .

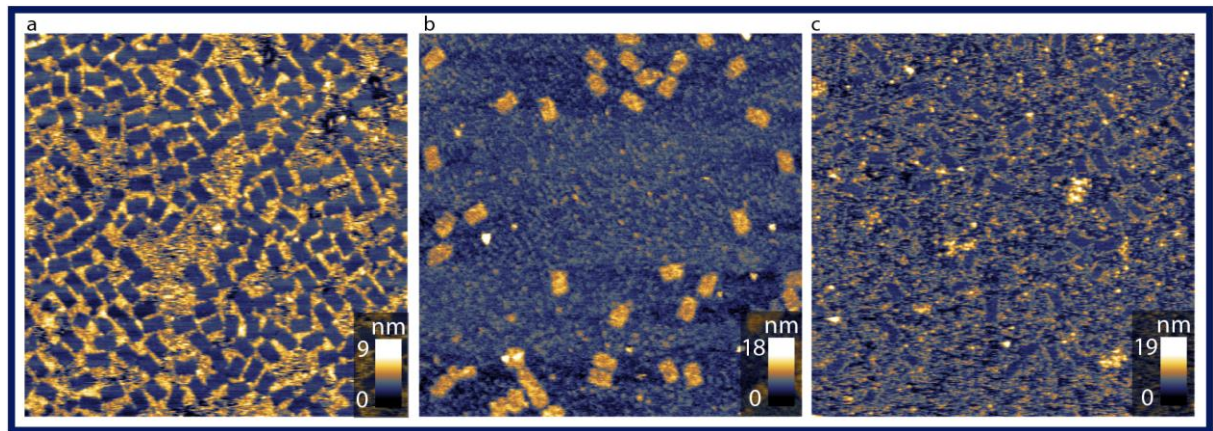


Figure S7. Confirmation that TdT requires 3' protruding DNA strands, Co^{2+} ions and dNTPs to polymerize DNA from DNA origami substrates. AFM images recorded 16 min after injection of TdT and complete TdT reaction buffer, except **(a)** protruding 3' ends, **(b)** Co^{2+} ions or **(c)** dTTP. Image sizes are 2x2 μm .

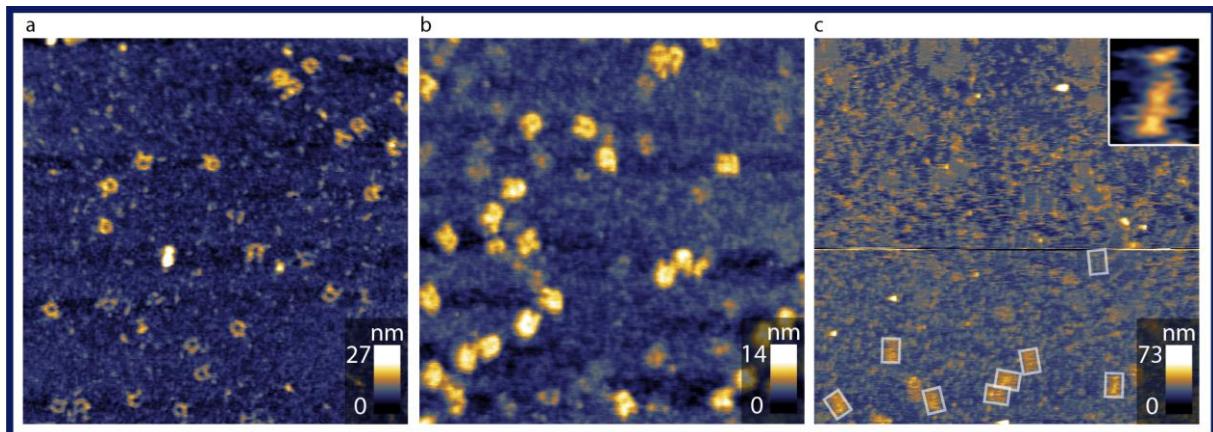


Figure S8. Polymerization reaction by TdT on DNA canvases using functionalized nucleotides. **(a)** Growing A's after injection of TdT and dUTP-biotin. **(b)** Growing A's after injection of TdT and dUTP-Fluorescein. **(c)** Growing i's after injection of TdT and dUTP-PEG. Streak lines in the middle of the image indicate injection point and from there on polymerization occurs. Scan direction is from top to bottom. Image sizes are 2x2 μm .

Experimental Section

DNA origami: Rectangular DNA origami structures were assembled using single stranded M13 DNA (5 nM, NEB), staple strands (20 nM, IDT), Mg(OAc)₂ (12.5 mM), Tris-acetate (40 mM) and EDTA (1 mM) at pH 8.3 over a 40 min thermal annealing ramp from 80 °C to 20 °C. Excess staple strands were removed by Illustra MicroSpin columns S-400 HR as described by the manufacturer (GE Healthcare). Spin columns were equilibrated with DNA origami buffer (Mg(OAc)₂, Tris- acetate, EDTA) three times prior to loading of the sample.

AFM: 4 µl of the sample was deposited onto a freshly cleaved mica surface and left to be adsorbed for 2 min. Reaction buffer was added to the sample and the liquid cell before imaging. Samples were characterized using a MultiMode VIII AFM (Bruker, Santa Barbara, CA, USA) under ambient conditions (temperature: 21 °C and humidity: 47%). Liquid tapping was performed using triangular silicon nitride probes (nominal resonance frequency: 6 kHz, nominal spring constant: 0.02 N/m, and tip radius: 15 nm; TR400PSA, OLYMPUS, USA). Topography, phase and amplitude error images were acquired simultaneously. The linear scanning rate was set to 1–2 Hz with a scan resolution of 512 per line. Integral & amplitude gain and other scan parameters were optimized to achieve the highest possible resolution also to avoid damaging the sample or wearing the tip. Collected images were further processed using SPIP software (Image Metrology ApS, Lyngby, Denmark).

Enzymatic reactions: Enzymatic surface reactions were performed with TdT (2U/µl) and nucleotides (4 µM) in reaction buffer (pH 6.6) containing Potassium cacodylate (200 mM), Tris-HCl (25 mM), BSA (25 mg/ml) and CoCl₂ (all from Roche). BSA-free reaction buffer was prepared by spin filtration of the reaction buffer using 10 kDa MWCO Amicon Ultra spin-dialysis (10,000g; 10 min).

Staple strands, subject to elongation prior to origami assembly, were added in a final concentration of 3 µM to TdT (20U/µL) in TdT reaction buffer with nucleotides (30 µM) and left to react at 37 °C for 30 min. The reaction was terminated for 5 min at 90 °C before staple strands were analyzed on a 10% denaturing polyacrylamide gel, run for 45 min at 20W and stained with Sybr Gold.

Nucleotides: dTTP (Life Technologies), dUTP-16-biotin (Jena Bioscience) and Fluorescein-12-dUTP (Thermo Scientific) were commercially available. dUTP-PEG (5 kDa) was synthesized from aminoallyl-dUTP (Jena Bioscience) as previously described.^[23]

DNA origami designs and staple strand sequences

All canvas designs are based on an M13 scaffold strand and 224 staple strands. All designs use the same staple strand set. Patterns are formed by choosing different subsets of staples. Images of the designs and the staple

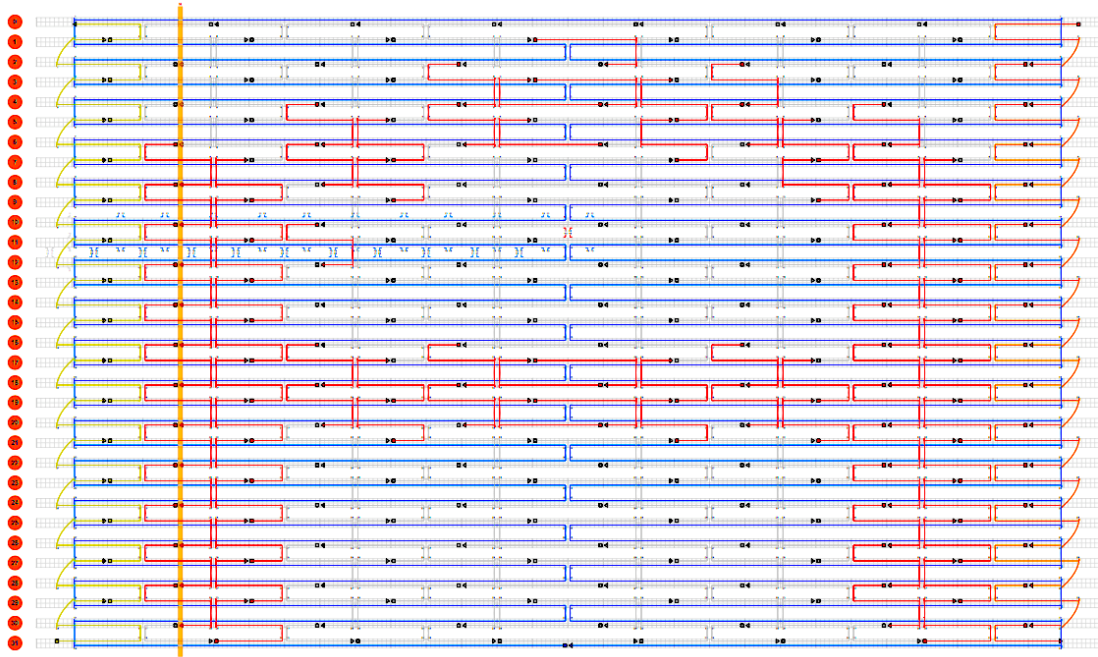
strand sequences forming the patterns can be found below. Images were made using the software cadnano (cadnano.org). The left and the right columns are the same for all designs.

Left column

1[16]	0[8]	CCATGTACAGGGATAGCAAGCCCA
3[16]	1[15]	CGTTGAAAGAATTGCGAATAATAATTTTATAGGAAC
5[16]	3[15]	CGGAACGAACCCTCAGCAGCGAAATTTTTTTTTTCA
7[16]	5[15]	TCGAAATCTGTATCATCGCCTGATTTTTGACAGCAT
9[16]	7[15]	GACGAGAACATTCAGTGAATAAGGTTTTAAATTGTG
11[16]	9[15]	ATACATAAGAATACCACATTCAACTTTTCTTGCCCT
13[16]	11[15]	GAGAATGAAATGCTTTAAACAGTTTTTTAATGCAG
15[16]	13[15]	AGAGCTTAAGAGGTCATTTTTGCGTTTTCAGAAAAC
17[16]	15[15]	TAGTAGCAAGGTGGCATCAATTCTTTTGATGGCTT
19[16]	17[15]	GGGTGAGATAATGTGTAGGTAAAGTTTTACTAATAG
21[16]	19[15]	CAGGAAGATGATAATCAGAAAAGCTTTTATTCAAAA
23[16]	21[15]	ATAGGTCAAAACGGCGATTGACCTTTTCCAAAAA
25[16]	23[15]	GATGTGCTTATTACGCCAGCTGGCTTTTGTAATGGG
27[16]	25[15]	CTGGGGTGAGCCGGAAGCATAAAGTTTTGAAAGGGG
29[16]	27[15]	TCCACGCTCCCTGAGAGAGTTGCATTTTTGTAAAGC
31[4]	29[15]	TTTTCAAGTTTTTTGGGGTCGAACCATCACCCAAATTTTTGCAAGCGG

Right column

0[235]	2[224]	TTTTTGAAAGTATTAAGAGGCTATTATTCTGAAACATTTTGTGACAGC
2[223]	4[224]	ATTGGCCTCAGGAGGTTGAGGCAGTTTTGCGTCAGA
4[223]	6[224]	CTGTAGCGATCAAGTTTGCCTTTATTTTAGACAAAA
6[223]	8[224]	GGGCGACAGGTTTACCAGCGCCAATTTTGCAGATAG
8[223]	10[224]	CCGAACAATTTTTAAGAAAAGTAATTTAACGTCAA
10[223]	12[224]	AAATGAAAAACGATTTTTTGTTTTTTGCTTATCC
12[223]	14[224]	GGTATTCTAAATCAGATATAGAAGTTTTACGCGCCT
14[223]	16[224]	GTTTATCAGTTCAGTAATGCAGATTTTGAAAAGC
16[223]	18[224]	CTGTTTAGGGAATCATAATTACTATTTTCATAGGTC
18[223]	20[224]	TGAGAGACGTGAATTTATCAAATTTTTGAAGATGA
20[223]	22[224]	TGAAACAAAATTACCTGAGCAAAATTTTACTTCTGA
22[223]	24[224]	ATAATGGATGATTGTTTGGATTATTTTTGCCGTCAA
24[223]	26[224]	TAGATAATCAACTAATAGATTAGATTTTCCAGCAGA
26[223]	28[224]	AGATAAAAAATACCGAACGAACCATTTTCTACATTT
28[223]	30[224]	TGACGCTCAGGCTCATGGAAATACTTTTCCAGGAACG
30[223]	31[231]	GTACGCCATTAAAGGGATTTTAGA



A

1[112]	2[128]	TTTGTCTGATACAGGAGTGTACTATACATGG
2[95]	4[96]	TTTCTGTAGTGAATTTCTTAACAACAACCAT
2[159]	4[160]	GAATTTACCCCTCAGAGCCACCACTCTTTTCA
3[112]	4[128]	CCGATAGTCTCCCTCAGAGCCGCCACCACC
4[63]	6[64]	AGGCTTGCAAAGACTTTTTTCATGATGACCCCC
4[95]	6[96]	CGCCACGCGGGTAAAATACGTAAGAGGCAAA
4[127]	3[111]	GGAACCGCTGCGCCGACAATGACAGCTTGATA
4[159]	6[160]	TAATCAAATAGCAAGGCCGAAACTAAAGGTG
4[191]	6[192]	TAGCCCCCTCGATAGCAGCACCGTAGGGAAGG
5[144]	3[143]	ATTACCATATCACCGGAACCAGAGACCCTCAG
6[31]	8[32]	CGGAGATTCGCGACCTGCTCCATGACGTAACA
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6[191]	8[192]	TAAATATTTATTTTGTCAATCCCGAGGAA
7[80]	5[79]	GAACCGAACTAAAACACTCATCTTGGAAGTTT
7[144]	5[143]	GCAACATACCGTCACCGACTTGAGGTAGCACC
7[176]	5[175]	GAATAAGTGACGGAAATTATTCATGTCACCAA
8[31]	10[32]	AAGCTGCTACACCAGAACGAGTAGATCAGTTG
8[191]	10[192]	ACGCAATAATGAAATAGCAATAGCAGAGAATA
9[48]	7[47]	GCTTGAGATTCATTACCCAAATCATTACTTAG
9[80]	7[79]	TGTGAATTTTCATCAAGAGTAATCTTCATAAGG
9[176]	7[175]	AAGAAACAATAACGGAATACCCAAACACCACG
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12[31]	14[32]	CCCCCTCACCATAAATCAAAAATCATTGCTCC
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13[48]	11[47]	ACCCTGACAATCGTCATAAATATTGAGGCATA
13[208]	11[207]	TAGCAAGCAAGAACGCGAGGCGTTTCCCAATC
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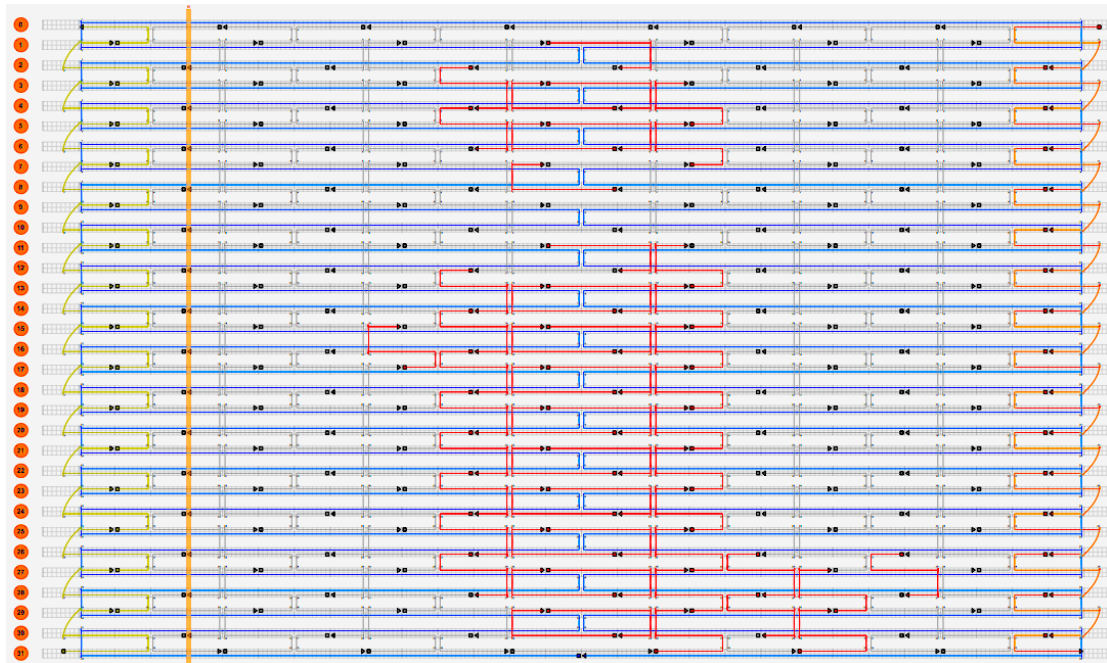
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26[159]	28[160]	GCAGCAAAATATTTTTGAATGGCTACCAGTAA
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27[112]	28[128]	AATCGGCCACCTGAAAGCGTAAGAAGATAGAA
27[144]	25[143]	CACAGACATGAAAAATCTAAAGCAAATCAATA
27[176]	25[175]	TTAATGCGGCAACAGTGCCACGCTTTGAAAGG
28[63]	30[64]	CAGTGAGATGGTGGTCCGAAATCAACGTCAA
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28[127]	27[111]	CCCTTCTGAACGCGCGGGGAGAGGCATTAATG
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30[95]	31[103]	CCACTATTAAGCCGGCGAACGTGG
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30[159]	31[167]	ATCACGCATTGACGAGCACGTATA
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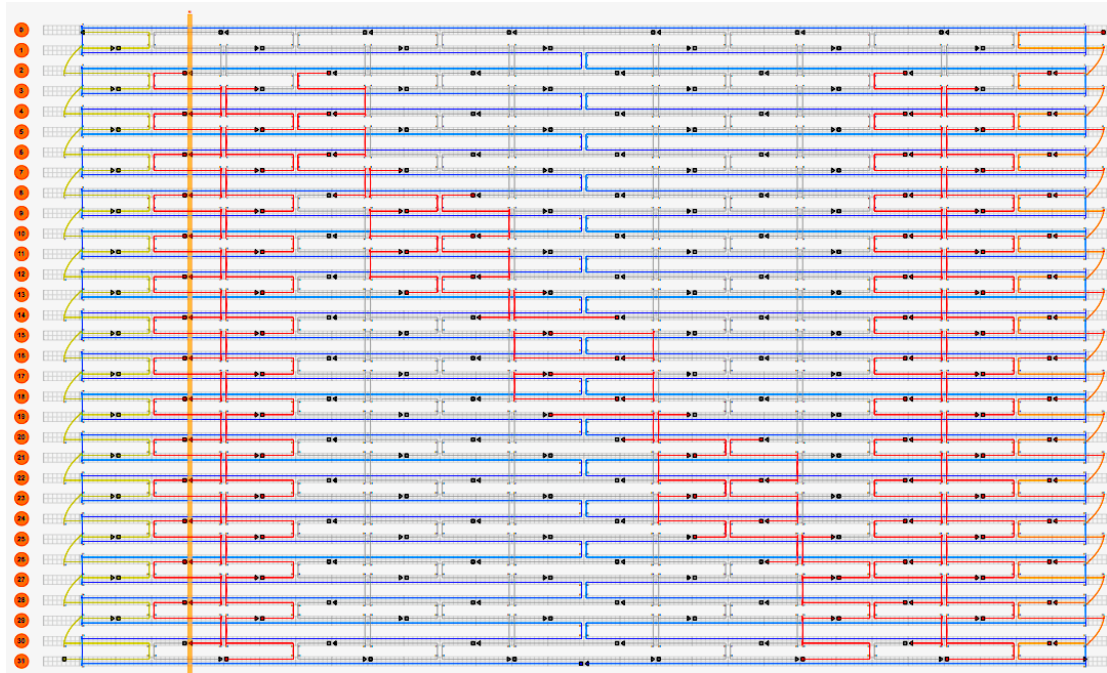
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7[80]	5[79]	GAACCGAACTAAAACACTCATCTTGGAAGTTT
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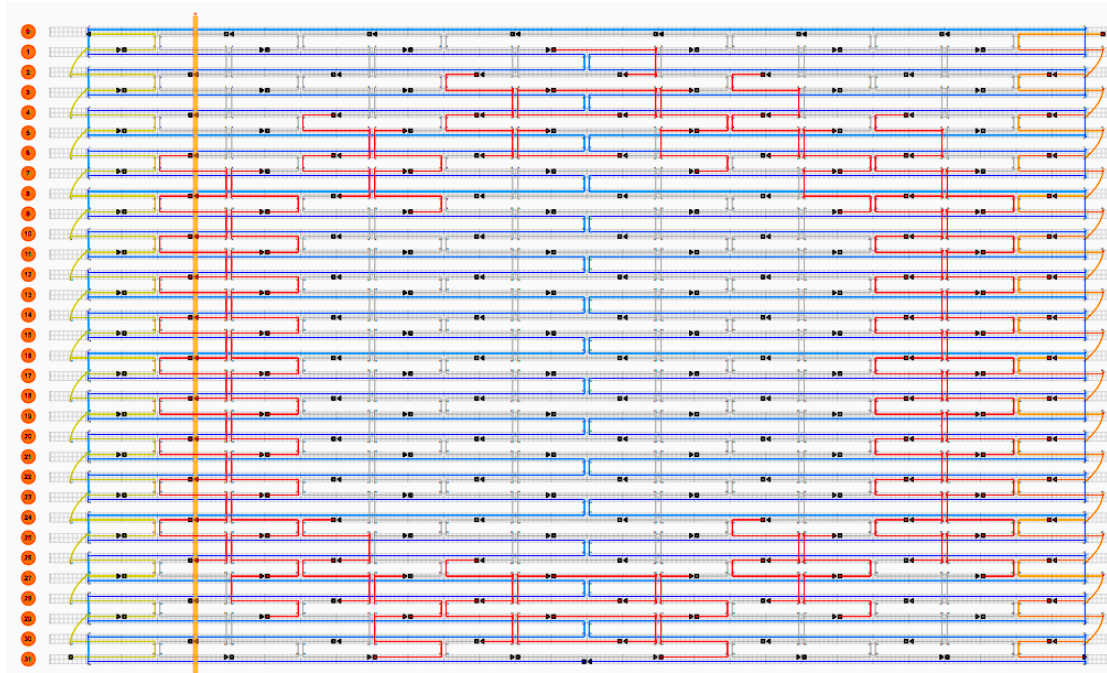
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1[208]	0[200]	TTCGGAACCTGAGACTCCTCAAGA
2[95]	4[96]	TTTCTGTAGTGAATTTCTTAAACAACAACCAT
2[127]	1[111]	CTTTTGATCTTCCAGACGTTAGTTCTAAAGT
2[159]	4[160]	GAATTTACCCCTCAGAGCCACCCTCTTTTCA
3[48]	1[47]	GGAGCCTTAGCGGAGTGAGAATAGGTCACCAG
3[80]	1[79]	CTTTCGAGTGGGATTTTGCTAAACTCCACAGA
3[112]	4[128]	CCGATAGTCTCCCTCAGAGCCGCCACCACC
3[144]	1[143]	AACCGCCACGTTCCAGTAAGCGTCGGTAATAA
3[176]	1[175]	CCGCCACCGCCAGAATGGAAAGCGGTAACAGT
3[208]	1[207]	AGCATTGATGATATTCACAAACAATGCCTAT
4[95]	6[96]	CGCCCACGCGGGTAAAATACGTAAGAGGCCAAA
4[127]	3[111]	GGAACCGCTGCGCCGACAATGACAGCTTGATA
4[159]	6[160]	TAATCAAATAGCAAGGCCGAAACTAAAGGTG
5[80]	3[79]	CCATTAACATAACCGATATATTCTCAGCTTG
5[112]	6[128]	CGAAGGCAGCCAGCAAATCACCACCATTGG
5[144]	3[143]	ATTACCATATCACCGGAACCAGAGACCCTCAG
5[176]	3[175]	TGAAACCATTATTAGCGTTTGCCACCTCAGAG
6[95]	8[96]	AGAATACTGACCAACTTTGAAAATAGGCTG
6[127]	5[111]	GAATTAGACCAACCTAAAACGAAATGCCACTA
6[159]	8[160]	AATTATCATAAAAGAAACGCAAAGAAGAACTG
7[80]	5[79]	GAACCGAACTAAAACACTCATCTTGGAAAGTTT
7[112]	8[128]	ATGAACGGGTAGAAAATACATACAGTATGT
7[144]	5[143]	GCAACATACCGTCACCGACTTGAGGTAGCACC
7[176]	5[175]	GAATAAGTGACGGAAATTTATTCATGTCACCAA
8[63]	10[64]	ACCGGATATGGTTTAATTTCAACTACGGAACA
8[127]	7[111]	TAGCAAAGTGTACAGACCAGGCGGAGGACAG

8[159]	10[160]	GCATGATTTGAGTTAAGCCCAATAGACGGGAG
9[112]	10[128]	CTCATTATGCGCTAATATCAGAGAGTCAGAGG
9[144]	7[143]	ACAAGAATAAGACTCCTTATTACGTAAGGTG
9[176]	7[175]	AAGAAACAATAACGGAATACCCAAACACCACG
10[63]	12[64]	ACATTATTAACACTATCATAACCCGCGTCCAA
10[127]	9[111]	GTAATTGAACCAGTCAGGACGTTGAGAACTGG
10[159]	12[160]	AATTAACTTTCCAGAGCCTAATTTAAGCCTTA
11[112]	12[128]	CTTTTGCAATCCTGAATCTTACCAACCCAGCT
11[144]	9[143]	GAGCGTCTGAACACCCTGAACAAAGATAACCC
11[176]	9[175]	CAAAATAAACAGGGAAGCGCATTAAATAAGAGC
12[63]	14[64]	TACTGCGGTATTATAGTCAGAAGCCTCCAACA
12[127]	11[111]	ACAATTTTAAAGAAGTTTTGCCAGGCGAGAGG
12[159]	14[160]	AATCAAGAATCGAGAACAAGCAAGCGAGCATG
13[112]	14[128]	GACTTCAACAAGAACGGGTATTAATCTTTCCT
13[144]	11[143]	CCGCACTCTAGTTGCTATTTTGCACGCTAAC
13[176]	11[175]	ATTTTCATCTTGCGGGAGGTTTTGGCCAGTTA
14[63]	16[64]	GGTCAGGATTTAAATATGCAACTAGGTCAATA
14[95]	16[96]	AAAGCGAAAGTTTCATTCCATATATTTAGTTT
14[159]	16[160]	TAGAAACCAGAGAATATAAAGTACCAGTAGGG
15[80]	13[79]	TGTCTGGACCAGACCGGAAGCAAAAAGCGGA
15[144]	13[143]	CAGTAATAAATCAATAATCGGCTGACCAAGTA
15[176]	13[175]	GGTAAAGTATCCCATCCTAATTTACCGTTTTT
16[63]	18[64]	ACCTGTTTAGAATTAGCAAAATTAGGATAAAA
16[95]	18[96]	GACCATTAAGCATAAAGCTAAATCCTTTTGCG
16[159]	18[160]	CTTAATTGCTAAATTTAATGGTTTTGCTGATG
17[80]	15[79]	AGCCTCAGGATACATTTCGCAAATAAGTACGG
17[144]	15[143]	CTTCTGACAGAATCGCCATATTTATTTGAGC
17[176]	15[175]	GACCGTGTTAAAGCCAACGCTCAACGACAAAA
18[63]	20[64]	ATTTTTAGGATATTCAACCGTTCTGATGAACG
18[95]	20[96]	GGAGAAGCCCGGAGAGGGTAGCTATTGCCTGA
18[159]	20[160]	CAAATCCATTTTCCTTAGAATCCCCTTTTTT
19[80]	17[79]	AATTAATGCTTTATTTCAACGCAAAGCAATAA
19[144]	17[143]	TTAATTAATCGCAAGACAAAGAAAATTTTCAT
19[176]	17[175]	ATAGCGATTATAACTATATGTAAAGAAATACC
20[63]	22[64]	GTAATCGTAATATTTTGTTAAAATAACATTAA
20[95]	22[96]	GAGTCTGGTTAAATCAGCTCATTTGCGTCTG
20[127]	19[111]	GTGAATAAAAAGGCTATCAGGTCAATTTTGAG
21[80]	19[79]	AATTTTTGAGCAAACAAGAGAATCAGCTGATA
21[112]	22[128]	ATAGGAACAACAGTACCTTTTACACAGATGAA
21[176]	19[175]	ACCAAGTTAATTTCAATTTGAATTATTGAAAAC
22[63]	24[64]	ATGTGAGCATCTGCCAGTTTGAGGTCAGGCTG
22[95]	24[96]	GCCTTCCTGGCCTCAGGAAGATCGTGCCGGAA
22[127]	21[111]	TATACAGTGCCATCAAAAATAATTTTAAACCA
23[80]	21[79]	ACAGTATCGTAGCCAGCTTTTCATCTCGCATT
23[112]	24[128]	CCAGCTTTACATTATCATTTTGCGTTTAAAAG
23[176]	21[175]	TTCCTGATCACGTAAAACAGAAATCTTTGAAT

24[63]	26[64]	CGCAACTGTTCCAGTCACGACGTGTTTCCTG
24[95]	26[96]	ACCAGGCAGTGCCAAGCTTGCATGCCGAGCTC
24[127]	23[111]	TTTGAGTACCGGCACCGCTTCTGGCACTCCAG
25[80]	23[79]	GACGGCCAAAGCGCCATTGCCCATGGACGACG
25[112]	26[128]	TCGACTCTCAAATATCAAACCCTCTCACCTTG
25[176]	23[175]	AATTGAGGAAACAATTCGACAACTTCATCATA
26[63]	28[64]	TGTGAAATTTGCGCTCACTGCCCGCTTTTAC
26[95]	28[96]	GAATTCGCCTGTGCGTCCAGCTGCGGTTTGC
26[127]	25[111]	CTGAACCTAGAGGATCCCCGGGTACCTGCAGG
26[159]	28[160]	GCAAGCAAAATATTTTGAATGGCTACCAGTAA
27[80]	25[79]	TCGGGAAAAATCATGGTCATAGCTTGTAAAC
27[112]	28[128]	AATCGGCCACCTGAAAGCGTAAGAAGATAGAA
27[144]	25[143]	CACAGACATGAAAAATCTAAAGCAAATCAATA
28[63]	30[64]	CAGTGAGATGGTGGTCCGAAATCAACGTCAA
28[95]	30[96]	GTATTGGGAATCAAAAGAATAGCCACAAGAGT
28[127]	27[111]	CCCTTCTGAACGCGCGGGGAGAGGCATTAATG
28[159]	30[160]	TAAAAGGGCAAATATCGGCCTGGTCTGTCC
29[80]	27[79]	CCCTTATACGCCAGGGTGGTTTTTCTTTCCAG
29[112]	30[128]	GGTTGAGTGAATAACATCACTTGAATACTTC
29[144]	27[143]	GAAGAACTACATTCTGGCCAACAGATACGTGG
30[31]	31[39]	CACTACGTGAGGTGCCGTAAAGCA
30[63]	31[71]	AGGGCGAAAAGGGAGCCCCGATT
30[95]	31[103]	CCACTATTAAGCCGGCGAACGTGG
30[127]	29[111]	TTTGATTAGTTGTTCCAGTTTGGACGAGATAG
30[159]	31[167]	ATCACGCATTGACGAGCACGTATA
30[191]	31[199]	TCAGTGAGAGAATCAGAGCGGGAG
31[72]	29[79]	TAGAGCTTGACGGGGAAAAGAACGTGGACTCCGGCAAAAT
31[104]	31[135]	CGAGAAAGGAAGGGAATGCGCCGCTACAGGGC
31[136]	29[143]	GCGTACTATGTTGCTAATTAACCGTTGTAGCCCTGAGTA



O

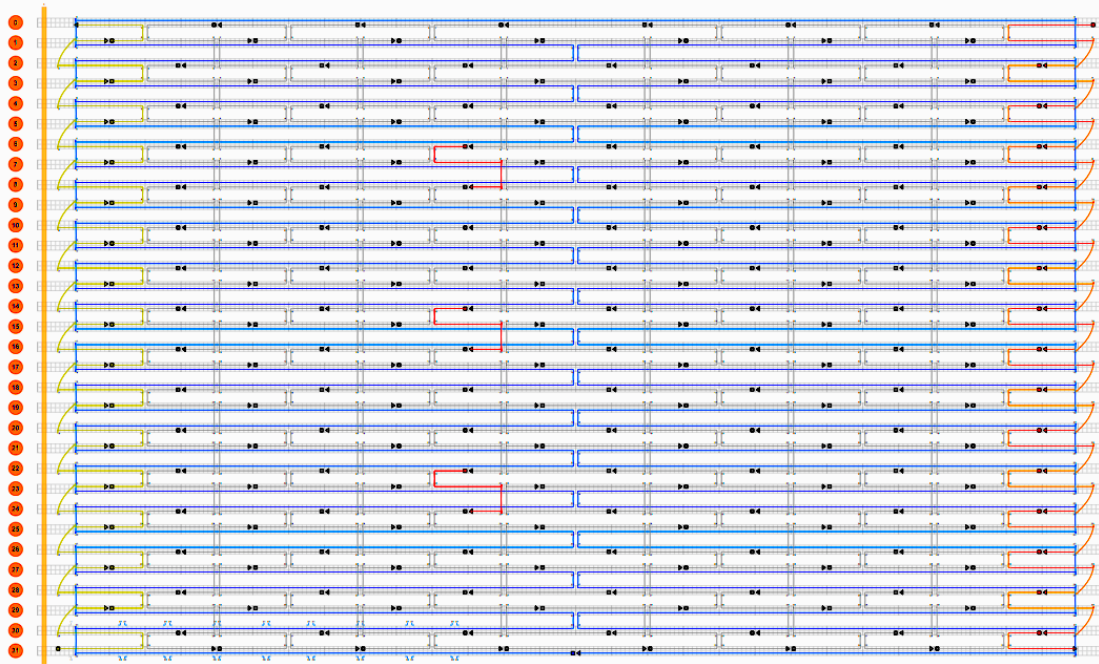
1[112]	2[128]	TTTGTCTGATACAGGAGTGTACTATACATGG
2[95]	4[96]	TTTCTGTAGTGAATTTCTTAAACAACAACCAT
2[159]	4[160]	GAATTTACCCCTCAGAGCCACCACTCTTTTCA
3[112]	4[128]	CCGATAGTCTCCCTCAGAGCCGCCACCACC
4[63]	6[64]	AGGCTTGCAAAGACTTTTTTCATGATGACCCCC
4[95]	6[96]	CGCCACGCGGGTAAAATACGTAAGAGGCCAAA
4[127]	3[111]	GGAACCGCTGCGCCGACAATGACAGCTTGATA
4[159]	6[160]	TAATCAAATAGCAAGGCCGAAACTAAAGGTG
4[191]	6[192]	TAGCCCCCTCGATAGCAGCACCGTAGGGAAGG
5[144]	3[143]	ATTACCATATCACCGGAACCAGAGACCCTCAG
6[31]	8[32]	CGGAGATTGCGACCTGCTCCATGACGTAACA
6[63]	8[64]	AGCGATTAAGGGCAGACGGTCAATGACAAGA
6[127]	5[111]	GAATTAGACCAACCTAAAACGAAATGCCACTA
6[191]	8[192]	TAAATATTTTATTTTGTACAATCCCGAGGAA
7[80]	5[79]	GAACCGAACTAAAACACTCATCTTGAAGTTT
7[144]	5[143]	GCAACATACCGTCACCGACTTGAGGTAGCACC
7[176]	5[175]	GAATAAGTGACGGAAATTATTCATGTCACCAA
8[31]	10[32]	AAGCTGCTACACCAGAACGAGTAGATCAGTTG
8[191]	10[192]	ACGCAATAATGAAATAGCAATAGCAGAGAATA
9[48]	7[47]	GCTTGAGATTCATTACCCAAATCATTACTTAG
9[80]	7[79]	TGTGAATTCATCAAGAGTAATCTTCATAAGG
9[176]	7[175]	AAGAAACAATAACGGAATACCCAAACACCACG
9[208]	7[207]	CGAAGCCCAGTTACCAGAAGGAAAAATAGAAA
10[31]	12[32]	AGATTTAGCGCCAAAAGGAATTACCATTGAAT
10[191]	12[192]	ACATAAAAACAGCCATATTATTTATTAGCGAA
11[48]	9[47]	GTAAGAGCACAGGTAGAAAGATTCTAAATTGG
11[208]	9[207]	CAAATAAGATAGCAGCCTTTACAGTATCTTAC

12[31]	14[32]	CCCCCTCACCATAAATCAAAAATCATTGCTCC
12[191]	14[192]	CCTCCCGACGTAGGAATCATTACCGAACAAGA
13[48]	11[47]	ACCCTGACAATCGTCATAAATATTGAGGCATA
13[208]	11[207]	TAGCAAGCAAGAACGCGAGGCGTTTCCCAATC
14[31]	16[32]	TTTTGATAATTGCTGAATATAATGGGGGCGCG
14[191]	16[192]	AAAATAATAATTCTGTCCAGACGACAAAATTCT
15[48]	13[47]	CAACATGTTTAGAGAGTACCTTTAAGGTCTTT
15[208]	13[207]	AACAACATACAATAGATAAGTCTGCGCCCAA
16[31]	18[32]	AGCTGAAATTAACATCCAATAAATAAATGCAA
16[191]	18[192]	TACCAGTAGATAAATAAGGCGTTAGGCTTAGG
17[48]	15[47]	CAAGGCAAAGCTATATTTTCATTCTGTAGCT
17[208]	15[207]	TAAACACCTATCATATGCGTTATACGACAATA
18[31]	20[32]	TGCCTGAGAAGGCCGAGACAGTCTCATATGT
18[191]	20[192]	TTGGGTAAAGCTTAGATTAAGACGATTAATTA
19[48]	17[47]	ATCAATATAACCCCTCATATTTTCATACAGG
19[208]	17[207]	AGTCAATATACCTTTTTAACCTCCAATAAGAA
20[31]	22[32]	ACCCCGTTTTGTATAAGCAAATATGATTCTCC
20[191]	22[192]	CATTTAACACAAAATCGCGCAGAGATATCAAA
21[48]	19[47]	TAAACGTTAAACTAGCATGTCAAAAATCACC
21[208]	19[207]	TTCATTTACATCAAGAAAACAACTGAGAAG
22[31]	24[32]	GTGGGAACCGTTGGTGTAGATGGGGTGCGGGC
22[191]	24[192]	ATTATTTGTATCAGATGATGGCAAAGTATTA
23[48]	21[47]	AACCGTGCGAGTAACAACCCGTCGTTAAATTG
23[208]	21[207]	TATAATCCAGGGTTAGAACCTACCGCAATTA
24[31]	26[32]	CTCTTCGCGCAAGGCGATTAAGTTTTCCACAC
24[63]	26[64]	CGCAACTGTTCCAGTCACGACGTGTTTCCTG
24[159]	26[160]	ATCCTTTGGTTGGCAAATCAACAGGAGAGCCA
24[191]	26[192]	GACTTTACAAGGTTATCTAAAATAAGTATTA
25[48]	23[47]	CCAGGGTTTTGGGAAGGGCGATCGCGCATCGT
25[208]	23[207]	AGCACTAACATTTGAGGATTTAGTTCATCAA
26[63]	28[64]	TGTGAAATTTGCGCTCACTGCCCGCTTTTCAC
26[95]	28[96]	GAATTCGTCTGTGCGTCCAGCTGCGGTTTGC
26[159]	28[160]	GCAGCAAATATTTTTGAATGGCTACCAGTAA
27[48]	25[47]	TAATTGCGTGTTATCCGCTCACAAGGGTAACG
27[112]	28[128]	AATCGGCCACCTGAAAGCGTAAGAAGATAGAA
27[176]	25[175]	TTAATGCGGCAACAGTGCCACGCTTTGAAAGG
27[208]	25[207]	CCATTAACAGAGGTGAGGCGGTCTCTTAGG
28[95]	30[96]	GTATTGGGAATCAAAGAATAGCCACAAGAGT
28[127]	27[111]	CCCTTCTGAACGCGCGGGGAGAGGCATTAATG
29[48]	27[47]	CTGTTTGACGGGCAACAGCTGATTACTCATAT
29[80]	27[79]	CCCTTATACGCCAGGGTGGTTTTTCTTTCCAG
29[112]	30[128]	GGTTGAGTGAATAACATCACTTGAATACTTC
29[144]	27[143]	GAAGAACTACATTCTGGCCAACAGATACGTGG
29[176]	27[175]	ATCCAGAAATTCACCAGTCACACGATTAGTCT
30[127]	29[111]	TTTGATTAGTTGTTCCAGTTTGGACGAGATAG
31[72]	29[79]	TAGAGCTTGACGGGGAAAAGAACGTGGACTCCGGCAAAT

31[136]	29[143]	GCGTACTATGGTTGCTAATTAACCGTTGTAGCCCTGAGTA
O background		
0[39]	2[32]	CACCACCCTCATTTTCCGTAACACTGAGTTTCAAAGGAAC
0[71]	2[64]	ACCGCCACCCTCAGAAACAACGCCTGTAGCATAACTTTCA
0[103]	2[96]	TACTCAGGAGGTTTAGATAGTTAGCGTAACGAAAATGAAT
0[135]	0[104]	TATAAGTATAGCCCAGGAATAGGTGTATCACCG
0[167]	2[160]	ACCAGGCGGATAAGTGGGGTTCAGTGCCTTGACAGTCTCT
0[199]	2[192]	GAAGGATTAGGATTAGAAAACAGTTAATGCCCCATAAATCC
1[48]	0[40]	TACAAACTCCGCCACCCTCAGAGC
1[80]	0[72]	CAGCCCTCTACGCCACCCTCAGA
1[144]	0[136]	GTTTTAACCCGTCGAGAGGGTTGA
1[176]	0[168]	GCCCGTATCGGGGTTTTGCTCAGT
1[208]	0[200]	TTCGGAACCTGAGACTCCTCAAGA
2[31]	4[32]	AACTAAAGATCTCCAAAAAAGGCTTTTGCG
2[63]	4[64]	ACAGTTTCTAATTGTATCGGTTTAGGTCGCTG
2[127]	1[111]	CTTTTGATCTTTCCAGACGTTAGTTCTAAAAGT
2[191]	4[192]	TCATTAAGAAGAACACCACCAGAGTTCGGTCA
3[48]	1[47]	GGAGCCTTAGCGGAGTGAGAATAGGTCACCAG
3[80]	1[79]	CTTTCGAGTGGGATTTTGCTAACTCCACAGA
3[144]	1[143]	AACCGCCACGTTCCAGTAAGCGTCGGTAATAA
3[176]	1[175]	CCGCCACCGCCAGAATGGAAAGCGGTAACAGT
3[208]	1[207]	AGCATTGATGATATTCACAAACAATGCCTAT
4[31]	6[32]	GGATCGTCGGGTAGCAACGGCTACAAGTACAA
5[48]	3[47]	TGAGGACTAGGGAGTTAAAGGCCGCTCCAAAA
5[80]	3[79]	CCATTAACATAACCGATATATTCTCAGCTTG
5[112]	6[128]	CGAAGGCAGCCAGCAAAATCACCACCATTTGG
5[176]	3[175]	TGAAACCATTATTAGCGTTTGCCACCTCAGAG
5[208]	3[207]	GCGACAGACGTTTTTCATCGGCATTCCGCCGCC
6[95]	8[96]	AGAATACACTGACCAACTTTGAAAATAGGCTG
6[159]	8[160]	AATTATCATAAAAGAAACGCAAGAAGAAGTCTG
7[48]	5[47]	CCGGAACGTACCAAGCGCGAAACAAGAGGCTT
7[112]	8[128]	ATGAACGGGTAGAAAATACATACACAGTATGT
7[208]	5[207]	ATTCATATTTCAACCGATTGAGGGAATCAGTA
8[63]	10[64]	ACCGGATATGGTTTAATTTCAACTACGGAACA
8[95]	10[96]	GCTGACCTACCTTATGCGATTTTAGGAAGAAA
8[127]	7[111]	TAGCAAAGTACAGACCAGGCGGAGGACAG
8[159]	10[160]	GCATGATTTGAGTTAAGCCCAATAGACGGGAG
9[112]	10[128]	CTCATTATGCGCTAATATCAGAGAGTCAGAGG
9[144]	7[143]	ACAAGAATAAGACTCCTTATTACGTAAGGTTG
10[63]	12[64]	ACATTATTAACACTATCATAACCCGCGTCCAA
10[95]	12[96]	AATCTACGGATAAAAACCAAAATAAGGGGGTA
10[127]	9[111]	GTAATTGAACCAGTCAGGACGTTGAGAACTGG
10[159]	12[160]	AATTAACCTTCCAGACCTAATTTAAGCCTTA
11[80]	9[79]	CAGACGACTTAATAAAACGAACTATTAATCAT
11[112]	12[128]	CTTTGCAATCCTGAATCTTACCAACCCAGCT

11[144]	9[143]	GAGCGTCTGAACACCCTGAACAAAGATAACCC
11[176]	9[175]	CAAAATAAACAGGGAAGCGCATTAAATAAGAGC
12[63]	14[64]	TACTGCGGTATTATAGTCAGAAGCCTCCAACA
12[95]	14[96]	ATAGTAAAAAAGATTAAGAGGAACGAGCTTC
12[127]	11[111]	ACAATTTTAAAGAAGTTTTGCCAGGCGAGAGG
12[159]	14[160]	AATCAAGAATCGAGAACAAGCAAGCGAGCATG
13[80]	11[79]	TTGCATCAATGTTTAGACTGGATATCGTTTAC
13[112]	14[128]	GACTTCAACAAGAACGGGTATTAATCTTTCCT
13[144]	11[143]	CCGCACTCTAGTTGCTATTTTGCACGCTAAC
13[176]	11[175]	ATTTTCATCTTGCGGGAGGTTTTGGCCAGTTA
14[63]	16[64]	GGTCAGGATTTAAATATGCAACTAGGTCAATA
14[95]	16[96]	AAAGCGAAAGTTTCATTCCATATATTTAGTTT
14[127]	13[111]	TATCATTCAATCGCGTTTTAATTGCCCGAAA
14[159]	16[160]	TAGAAACCAGAGAATATAAAGTACCAGTAGGG
15[80]	13[79]	TGTCTGGACCAGACCGGAAGCAAAAAAGCGGA
15[112]	16[128]	TTCCCAATATTTAGGCAGAGGCATACAACGCC
15[144]	13[143]	CAGTAATAAATCAATAATCGGCTGACCAAGTA
15[176]	13[175]	GGTAAAGTATCCCATCCTAATTTACCGTTTTT
16[63]	18[64]	ACCTGTTTAGAATTAGCAAAATTAGGATAAAA
16[95]	18[96]	GACCATTAAGCATAAAGCTAAATCCTTTTGCG
16[127]	15[111]	AACATGTATCTGCGAACGAGTAGAACAGTTGA
16[159]	18[160]	CTTAATTGCTAAATTTAATGGTTTTGCTGATG
17[80]	15[79]	AGCCTCAGGATACATTTTCGCAAATAAGTACGG
17[112]	18[128]	CAAAAACACAAATATATTTTAGTTCGCGAGAA
17[144]	15[143]	CTTCTGACAGAATCGCCATATTTATTTGAGC
17[176]	15[175]	GACCGTGTTAAAGCCAACGCTCAACGACAAAA
18[63]	20[64]	ATTTTTAGGATATTCAACCGTTCTGATGAACG
18[95]	20[96]	GGAGAAGCCCGGAGAGGGTAGCTATTGCCTGA
18[127]	17[111]	AACTTTTTTTATGACCCTGTAATAGTTGTAC
18[159]	20[160]	CAAATCCATTTTCCCTTAGAATCCCCTTTTTT
19[80]	17[79]	AATTAATGCTTTATTTCAACGCAAAGCAATAA
19[112]	20[128]	AGATCTACCCTTGCTTCTGTAATATATGTGA
19[144]	17[143]	TTAATTAATCGCAAGACAAAGAAAATTTTCAT
19[176]	17[175]	ATAGCGATTATAACTATATGTAAAGAAATACC
20[63]	22[64]	GTAATCGTAATATTTTGTTAAAATAACATTAA
20[95]	22[96]	GAGTCTGGTTAAATCAGCTCATTTTCGCGTCTG
20[127]	19[111]	GTGAATAAAAAGGCTATCAGGTCATTTTTGAG
20[159]	22[160]	AATGGAAACGGATTCGCCTGATTGAAAGAAAT
21[80]	19[79]	AATTTTTGAGCAAACAAGAGAATCAGCTGATA
21[112]	22[128]	ATAGGAACAACAGTACCTTTTACACAGATGAA
21[144]	19[143]	AACAATAACAGTACATAAATCAATCGTCGCTA
21[176]	19[175]	ACCAAGTTAATTTCAATTTGAATTATTGAAAAC
22[63]	24[64]	ATGTGAGCATCTGCCAGTTTGAGGTCAGGCTG
22[95]	24[96]	GCCTTCCTGGCCTCAGGAAGATCGTGCCGGAA
22[127]	21[111]	TATACAGTGCCATCAAAAATAATTTTAAACCA
22[159]	24[160]	TGCGTAGAAGAAGGAGCGGAATTACGTATTAA

23[80]	21[79]	ACAGTATCGTAGCCAGCTTTCATCTCGCATT
23[112]	24[128]	CCAGCTTACATTATCATTGCGTTAAAAG
23[144]	21[143]	AAACCACCTTTCAGGTTAACGTTCCGGGAGA
23[176]	21[175]	TTCCTGATCACGTAACAGAAATCTTGAAT
24[95]	26[96]	ACCAGGCAGTGCCAAGCTTGCATGCCGAGCTC
24[127]	23[111]	TTTGAGTACCGGCACCGCTTCTGGCACTCCAG
25[80]	23[79]	GACGGCCAAAGCGCCATTCGCCATGGACGACG
25[112]	26[128]	TCGACTCTCAAATATCAAACCCTCTCACCTTG
25[144]	23[143]	TCTGGTCACCGAACGTTATTAATGAACAAAG
25[176]	23[175]	AATTGAGGAAACAATTCGACAACCTTCATCATA
26[31]	28[32]	AACATACGCCTAATGAGTGAGCTAGCCCTTCA
26[127]	25[111]	CTGAACCTAGAGGATCCCCGGGTACCTGCAGG
26[191]	28[192]	CACCGCCTCGAACTGATAGCCCTATTATTAC
27[80]	25[79]	TCGGGAAAAATCATGGTCATAGCTTGAAAAAC
27[144]	25[143]	CACAGACATGAAAAATCTAAAGCAAATCAATA
28[31]	30[32]	CCGCCTGGGGTTTGGCCAGCAGGCGATGGCC
28[63]	30[64]	CAGTGAGATGGTGGTCCGAAATCAACGTCAA
28[159]	30[160]	TAAAAGGGCAAATATCGGCCTTGGTCTGTCC
28[191]	30[192]	ATTGGCAGCAATATTACCGCCAGCTTTTATAA
29[208]	27[207]	CAGGAAAAATCGTCTGAAATGGAAAACATCG
30[31]	31[39]	CACTACGTGAGGTGCCGTAAAGCA
30[63]	31[71]	AGGGCGAAAAGGGAGCCCCCGATT
30[95]	31[103]	CCACTATTAAGCCGGCGAACGTGG
30[159]	31[167]	ATCACGCATTGACGAGCACGTATA
30[191]	31[199]	TCAGTGAGAGAATCAGAGCGGGAG
31[40]	29[47]	CTAAATCGGAACCCTAAAACCGTCTATCAGGGCGAAAATC
31[104]	31[135]	CGAGAAAGGAAGGAATGCGCCGCTACAGGGC
31[168]	29[175]	ACGTGCTTTCCTCGTTGCCACCGAGTAAAAGACTGGTAAT
31[200]	29[207]	CTAAACAGGAGGCCGAGAATCCTGAGAAGTGCATTGCAA



Three-dotted pattern

6[95]	8[96]	AGAATACACTGACCAACTTTGAAAATAGGCTG-GTGCAGACAAC
14[95]	16[96]	AAAGCGAAAGTTTCATTCCATATATTTAGTTT-GTGCAGACAAC
22[95]	24[96]	GCCTTCTGGCCTCAGGAAGATCGTGCCGGAA-GTGCAGACAAC

Background for three-dotted pattern

0[39]	2[32]	CACCACCCTCATTTTCCGTAACACTGAGTTTCAAAGGAAC
0[71]	2[64]	ACCGCCACCCTCAGAAACAACGCCTGTAGCATAACTTTCA
0[103]	2[96]	TACTCAGGAGGTTTAGATAGTTAGCGTAACGAAAATGAAT
0[135]	0[104]	TATAAGTATAGCCCGAATAGGTGTATCACCG
0[167]	2[160]	ACCAGGCGGATAAGTGGGGTCAGTGCCTTGACAGTCTCT
0[199]	2[192]	GAAGGATTAGGATTAGAAACAGTTAATGCCCCATAAATCC
0[235]	2[224]	TTTTTGAAAGTATTAAGAGGCTATTATTCTGAAACATTTTGTGACACG
1[16]	0[8]	CCATGTACAGGGATAGCAAGCCCA
1[48]	0[40]	TACAAACTCCGCCACCCTCAGAGC
1[80]	0[72]	CAGCCCTCTACGCCACCCTCAGA
1[112]	2[128]	TTTGTGCGTATACAGGAGTGTACTATACATGG
1[144]	0[136]	GTTTTAACCCGTCGAGAGGGTTGA
1[176]	0[168]	GCCCGTATCGGGTTTTGCTCAGT
1[208]	0[200]	TTCGGAACCTGAGACTCCTCAAGA

2[31]	4[32]	AACTAAAGATCTCCAAAAAAAAGGCTTTTGCG
2[63]	4[64]	ACAGTTTCTAATTGTATCGGTTTAGGTCGCTG
2[95]	4[96]	TTTCTGTAGTGAATTTCTTAAACAACAACCAT
2[127]	1[111]	CTTTTGATCTTCCAGACGTTAGTTCTAAAGT
2[159]	4[160]	GAATTTACCCCTCAGAGCCACCACTCTTTTCA
2[191]	4[192]	TCATTAAGAAGAACCAACCAGAGTTCGGTCA
2[223]	4[224]	ATTGGCCTCAGGAGGTTGAGGCAGTTTTGCGTCAGA
3[16]	1[15]	CGTTGAAAGAATTGCGAATAATAATTTTATAGGAAC
3[48]	1[47]	GGAGCCTTAGCGGAGTGAGAATAGGTCACCAG
3[80]	1[79]	CTTTCGAGTGGGATTTTGCTAAACTCCACAGA
3[112]	4[128]	CCGATAGTCTCCCTCAGAGCCGCCACCACC
3[144]	1[143]	AACCGCCACGTTCCAGTAAGCGTCGGTAATAA
3[176]	1[175]	CCGCCACCGCCAGAATGGAAAGCGGTAACAGT
3[208]	1[207]	AGCATTGATGATATTCACAAACAACTGCCTAT
4[31]	6[32]	GGATCGTCGGGTAGCAACGGCTACAAGTACAA
4[63]	6[64]	AGGCTTGCAAAGACTTTTTTCATGATGACCCCC
4[95]	6[96]	CGCCACGCGGGTAAAATACGTAAGAGGCCAAA
4[127]	3[111]	GGAACCGCTGCGCCGACAATGACAGCTTGATA
4[159]	6[160]	TAATCAAATAGCAAGGCCGGAACTAAAGGTG
4[191]	6[192]	TAGCCCCCTCGATAGCAGCACCGTAGGGAAGG
4[223]	6[224]	CTGTAGCGATCAAGTTTGCCTTTATTTTAGACAAAA
5[16]	3[15]	CGGAACGAACCCTCAGCAGCGAAATTTTTTTTTTCA
5[48]	3[47]	TGAGGACTAGGGAGTTAAAGGCCGCTCCAAAA
5[80]	3[79]	CCATTAACATAACCGATATATTCTCAGCTTG
5[112]	6[128]	CGAAGGCAGCCAGCAAATCACCACCATTGG
5[144]	3[143]	ATTACCATATCACCGGAACCAGAGACCCTCAG
5[176]	3[175]	TGAAACCATTATTAGCGTTTGCCACCTCAGAG
5[208]	3[207]	GCGACAGACGTTTTTCATCGGCATTCCGCCGCC
6[31]	8[32]	CGGAGATTCGCGACCTGCTCCATGACGTAACA
6[63]	8[64]	AGCGATTAAGGCGCAGACGGTCAATGACAAGA
6[127]	5[111]	GAATTAGACCAACCTAAAACGAAATGCCACTA

6[159]	8[160]	AATTATCATAAAAGAAACGCAAAGAAGAACTG
6[191]	8[192]	TAAATATTTTATTTTGTCCACAATCCCGAGGAA
6[223]	8[224]	GGGCGACAGGTTTACCAGCGCCAATTTTGCAGATAG
7[16]	5[15]	TCGAAATCTGTATCATCGCCTGATTTTTGACAGCAT
7[48]	5[47]	CCGGAACGTACCAAGCGCGAAACAAGAGGCTT
7[80]	5[79]	GAACCGAACTAAAACACTCATCTTGGAAGTTT
7[112]	8[128]	ATGAACGGGTAGAAAATACATACAGTATGT
7[144]	5[143]	GCAACATACCGTCACCGACTTGAGGTAGCACC
7[176]	5[175]	GAATAAGTGACGGAAATTATTCATGTCACCAA
7[208]	5[207]	ATTCATATTTCAACCGATTGAGGGAATCAGTA
8[31]	10[32]	AAGCTGCTACACCAGAACGAGTAGATCAGTTG
8[63]	10[64]	ACCGGATATGGTTTAATTTCAACTACGGAACA
8[95]	10[96]	GCTGACCTACCTTATGCGATTTTAGGAAGAAA
8[127]	7[111]	TAGCAAAGTGTACAGACCAGGCGCGAGGACAG
8[159]	10[160]	GCATGATTTGAGTTAAGCCCAATAGACGGGAG
8[191]	10[192]	ACGCAATAATGAAATAGCAATAGCAGAGAATA
8[223]	10[224]	CCGAACAATTTTAAAGAAAAGTAATTTAACGTCAA
9[16]	7[15]	GACGAGAACATTCAGTGAATAAGGTTTTAAATTGTG
9[48]	7[47]	GCTTGAGATTCATTACCCAAATCATTACTTAG
9[80]	7[79]	TGTGAATTCATCAAGAGTAATCTTCATAAGG
9[112]	10[128]	CTCATTATGCGCTAATATCAGAGAGTCAGAGG
9[144]	7[143]	ACAAGAATAAGACTCCTTATTACGTAAGGTG
9[176]	7[175]	AAGAAACAATAACGGAATACCCAAACACCACG
9[208]	7[207]	CGAAGCCCAGTTACCAGAAGGAAAAATAGAAA
10[31]	12[32]	AGATTTAGCGCCAAAAGGAATTACCATTGAAT
10[63]	12[64]	ACATTATTAACACTATCATAACCCGCGTCCAA
10[95]	12[96]	AATCTACGATAAAAACCAAATAAGGGGGTA
10[127]	9[111]	GTAATTGAACCAGTCAGGACGTTGAGAACTGG
10[159]	12[160]	AATTAACTTTCCAGAGCCTAATTTAAGCCTTA
10[191]	12[192]	ACATAAAAACAGCCATATTATTTATTAGCGAA
10[223]	12[224]	AAATGAAAAACGATTTTTTGTTTTTTGCTTATCC

11[16]	9[15]	ATACATAAGAATACCACATTCAACTTTTCTTGCCCT
11[48]	9[47]	GTAAGAGCACAGGTAGAAAAGATTCTAAATTGG
11[80]	9[79]	CAGACGACTTAATAAAACGAACTATTAATCAT
11[112]	12[128]	CTTTTGCAATCCTGAATCTTACCAACCCAGCT
11[144]	9[143]	GAGCGTCTGAACACCCTGAACAAAGATAACCC
11[176]	9[175]	CAAATAAACAGGGAAGCGCATTAAATAAGAGC
11[208]	9[207]	CAAATAAGATAGCAGCCTTTACAGTATCTTAC
12[31]	14[32]	CCCCCTACCATAAAATCAAAAATCATTGCTCC
12[63]	14[64]	TACTGCGGTATTATAGTCAGAAGCCTCCAACA
12[95]	14[96]	ATAGTAAAAAAGATTAAGAGGAACGAGCTTC
12[127]	11[111]	ACAATTTTAAAGAAGTTTTGCCAGGCGAGAGG
12[159]	14[160]	AATCAAGAATCGAGAACAAGCAAGCGAGCATG
12[191]	14[192]	CCTCCCGACGTAGGAATCATTACCGAACCAAGA
12[223]	14[224]	GGTATTCTAAATCAGATATAGAAGTTTTACGCGCCT
13[16]	11[15]	GAGAATGAAATGCTTTAAACAGTTTTTTAATGCAG
13[48]	11[47]	ACCCTGACAATCGTCATAAATATTGAGGCATA
13[80]	11[79]	TTGCATCAATGTTTAGACTGGATATCGTTTAC
13[112]	14[128]	GACTTCAACAAGAACGGGTATTAATCTTTCCT
13[144]	11[143]	CCGCACTCTAGTTGCTATTTTGACGCTAAC
13[176]	11[175]	ATTTTCATCTTGCGGGAGGTTTTGGCCAGTTA
13[208]	11[207]	TAGCAAGCAAGAACGCGAGGCGTTTCCCAATC
14[31]	16[32]	TTTTGATAATTGCTGAATATAATGGGGGCGCG
14[63]	16[64]	GGTCAGGATTTAAATATGCAACTAGGTCAATA
14[127]	13[111]	TATCATTATATCGCGTTTTAATTGCCGAAA
14[159]	16[160]	TAGAAACCAGAGAATATAAAGTACCAGTAGGG
14[191]	16[192]	AAAATAATAATTCTGTCCAGACGACAAATTCT
14[223]	16[224]	GTTTATCAGTTCAGCTAATGCAGATTTTGAAAAAGC
15[16]	13[15]	AGAGCTTAAGAGGTCATTTTTGCGTTTTAGAAAAC
15[48]	13[47]	CAACATGTTTAGAGAGTACCTTTAAGGTCTTT
15[80]	13[79]	TGTCTGGACCAGACCGGAAGCAAAAAAGCGGA
15[112]	16[128]	TTCCAATATTTAGGCAGAGGCATACAACGCC

15[144]	13[143]	CAGTAATAAATCAATAATCGGCTGACCAAGTA
15[176]	13[175]	GGTAAAGTATCCCATCCTAATTTACCGTTTTT
15[208]	13[207]	AACAACATACAATAGATAAGTCCTGCGCCCAA
16[31]	18[32]	AGCTGAAATTAACATCCAATAAATAAATGCAA
16[63]	18[64]	ACCTGTTTAGAATTAGCAAAATTAGGATAAAA
16[95]	18[96]	GACCATTAAGCATAAAGCTAAATCCTTTTGCG
16[127]	15[111]	AACATGTATCTGCGAACGAGTAGAACAGTTGA
16[159]	18[160]	CTTAATTGCTAAATTTAATGGTTTTGCTGATG
16[191]	18[192]	TACCAGTAGATAAATAAGGCGTTAGGCTTAGG
16[223]	18[224]	CTGTTTAGGGAATCATAATTACTATTTTCATAGGTC
17[16]	15[15]	TAGTAGCAAGGTGGCATCAATCTTTTTGATGGCTT
17[48]	15[47]	CAAGGCAAAGCTATATTTTCATTTCTGTAGCT
17[80]	15[79]	AGCCTCAGGATACATTTGCAATAAAGTACGG
17[112]	18[128]	CAAAAACACAAATATATTTTAGTTCGCGAGAA
17[144]	15[143]	CTTCTGACAGAATCGCCATATTTATTTGAGC
17[176]	15[175]	GACCGTGTTAAAGCCAACGCTCAACGACAAAA
17[208]	15[207]	TAAACACCTATCATATGCGTTATACGACAATA
18[31]	20[32]	TGCCTGAGAAGGCCGGAGACAGTCTCATATGT
18[63]	20[64]	ATTTTTAGGATATTCAACCGTTCTGATGAACG
18[95]	20[96]	GGAGAAGCCCGGAGAGGGTAGCTATTGCCTGA
18[127]	17[111]	AACTTTTTTATGACCCTGTAATAGGTTGTAC
18[159]	20[160]	CAAATCCATTTCCCTTAGAATCCCCTTTTTT
18[191]	20[192]	TTGGGTTAAGCTTAGATTAAGACGATTAATTA
18[223]	20[224]	TGAGAGACGTGAATTTATCAAAATTTTGAAGATGA
19[16]	17[15]	GGGTGAGATAATGTGTAGGTAAAGTTTTACTAATAG
19[48]	17[47]	ATCAATATAACCCTCATATATTTTCATACAGG
19[80]	17[79]	AATTAATGCTTTATTTCAACGCAAAGCAATAA
19[112]	20[128]	AGATCTACCCTTGCTTCTGTAAATATATGTGA
19[144]	17[143]	TTAATTAATCGCAAGACAAAGAAAATTTTCAT
19[176]	17[175]	ATAGCGATTATAACTATATGTAAAGAAATACC
19[208]	17[207]	AGTCAATATACCTTTTTAACCTCCAATAAGAA

20[31]	22[32]	ACCCCGGTTTGTATAAGCAAATATGATTCTCC
20[63]	22[64]	GTAATCGTAATATTTTGTAAAATAACATTAA
20[95]	22[96]	GAGTCTGGTTAAATCAGCTCATTTTCGCGTCTG
20[127]	19[111]	GTGAATAAAAAGGCTATCAGGTCATTTTGTAG
20[159]	22[160]	AATGGAAACGGATTCGCCTGATTGAAAGAAAT
20[191]	22[192]	CATTTAACACAAAATCGCGCAGAGATATCAA
20[223]	22[224]	TGAAACAAAATTACCTGAGCAAAATTTTACTTCTGA
21[16]	19[15]	CAGGAAGATGATAATCAGAAAAGCTTTTATTCAAAA
21[48]	19[47]	TAAACGTTAAACTAGCATGTCAAAAATCACC
21[80]	19[79]	AATTTTGTAGCAAACAAGAGAATCAGCTGATA
21[112]	22[128]	ATAGGAACAACAGTACCTTTTACACAGATGAA
21[144]	19[143]	AACAATAACAGTACATAAATCAATCGTCGCTA
21[176]	19[175]	ACCAAGTTAATTTTCAATTTGAATTATTGAAAAC
21[208]	19[207]	TTCATTTACATCAAGAAAACAACTGAGAAG
22[31]	24[32]	GTGGGAACCGTTGGTGTAGATGGGGTGCGGGC
22[63]	24[64]	ATGTGAGCATCTGCCAGTTTGTAGGTCAGGCTG
22[127]	21[111]	TATACAGTGCCATCAAAAATAATTTTAAACCA
22[159]	24[160]	TGCGTAGAAGAAGGAGCGGAATTACGTATTAA
22[191]	24[192]	ATTATTTGTATCAGATGATGGCAAAAGTATTA
22[223]	24[224]	ATAATGGATGATTGTTTGGATTATTTTGCCTCAA
23[16]	21[15]	ATAGGTCAAACGGCGGATTGACCTTTTCCAAAAA
23[48]	21[47]	AACCGTGCGAGTAACAACCCGTCGTTAAATTG
23[80]	21[79]	ACAGTATCGTAGCCAGCTTTCATCTCGCATT
23[112]	24[128]	CCAGCTTACATTATCATTTTGCCTTAAAAG
23[144]	21[143]	AAACCACCTTTTTCAGGTTTAAACGTTTCGGGAGA
23[176]	21[175]	TTCCTGATCACGTAAAACAGAAATCTTTGAAT
23[208]	21[207]	TATAATCCAGGGTTAGAACCTACCGGAATTA
24[31]	26[32]	CTCTTCGCGCAAGGCGATTAAGTTTTCCACAC
24[63]	26[64]	CGCAACTGTTCCAGTCACGACGTGTTTCCTG
24[95]	26[96]	ACCAGGCAGTGCCAAGCTTGCATGCCGAGCTC
24[127]	23[111]	TTGAGTACCGGCACCGCTTCTGGCACTCCAG

24[159]	26[160]	ATCCTTTGGTTGGCAAATCAACAGGAGAGCCA
24[191]	26[192]	GACTTTACAAGGTTATCTAAAATAAGTATTAA
24[223]	26[224]	TAGATAATCAACTAATAGATTAGATTTTCCAGCAGA
25[16]	23[15]	GATGTGCTTATTACGCCAGCTGGCTTTTGTAAATGGG
25[48]	23[47]	CCAGGGTTTTGGGAAGGGCGATCGCGCATCGT
25[80]	23[79]	GACGGCCAAAGCGCCATTGCCCATGGACGACG
25[112]	26[128]	TCGACTCTCAAATATCAAACCCTCTCACCTTG
25[144]	23[143]	TCTGGTCACCCGAACGTTATTAATGAACAAAG
25[176]	23[175]	AATTGAGGAAACAATTCGACAACCTTCATCATA
25[208]	23[207]	AGCACTAAACATTTGAGGATTTAGTTCATCAA
26[31]	28[32]	AACATACGCCTAATGAGTGAGCTAGCCCTTCA
26[63]	28[64]	TGTGAAATTTGCGCTCACTGCCCGCTTTTCAC
26[95]	28[96]	GAATTCGTCTGTGCGTGCCAGCTGCGGTTTGC
26[127]	25[111]	CTGAACCTAGAGGATCCCCGGGTACCTGCAGG
26[159]	28[160]	GCAGCAAAATATTTTTGAATGGCTACCAGTAA
26[191]	28[192]	CACCGCCTCGAACTGATAGCCCTATTATTAC
26[223]	28[224]	AGATAAAAAATACCGAACGAACCATTTTCTACATTT
27[16]	25[15]	CTGGGGTGAGCCGGAAGCATAAAGTTTTGAAAGGGG
27[48]	25[47]	TAATTGCGTGTTATCCGCTCACAAGGGTAACG
27[80]	25[79]	TCGGGAAAAATCATGGTCATAGCTTGTA AAAAC
27[112]	28[128]	AATCGGCCACCTGAAAGCGTAAGAAGATAGAA
27[144]	25[143]	CACAGACATGAAAAATCTAAAGCAAATCAATA
27[176]	25[175]	TTAATGCGGCAACAGTGCCACGCTTTGAAAGG
27[208]	25[207]	CCATTAACAGAGGTGAGGCGGTCTCTTTAGG
28[31]	30[32]	CCGCCTGGGGTTTGCCCCAGCAGGCGATGGCC
28[63]	30[64]	CAGTGAGATGGTGGTTCCGAAATCAACGTCAA
28[95]	30[96]	GTATTGGGAATCAAAGAATAGCCACAAGAGT
28[127]	27[111]	CCCTTCTGAACGCGCGGGGAGAGGCATTAATG
28[159]	30[160]	TAAAAGGGCAAACCTATCGGCCTTGGTCTGTCC
28[191]	30[192]	ATTGGCAGCAATATTACCGCCAGCTTTTATAA
28[223]	30[224]	TGACGCTCAGCTCATGAAATACTTTTCAGGAACG

29[16]	27[15]	TCCACGCTCCCTGAGAGAGTTGCATTTTTGTAAAGC
29[48]	27[47]	CTGTTTGACGGGCAACAGCTGATTACTCACAT
29[80]	27[79]	CCCTTATACGCCAGGGTGGTTTTTCTTTCCAG
29[112]	30[128]	GGTTGAGTGAATAACATCACTTGAATACTTC
29[144]	27[143]	GAAGAACTACATTCTGGCCAACAGATACGTGG
29[176]	27[175]	ATCCAGAAATTCACCAGTCACACGATTAGTCT
29[208]	27[207]	CAGGAAAAAATCGTCTGAAATGGAAAACATCG
30[31]	31[39]	CACTACGTGAGGTGCCGTAAAGCA
30[63]	31[71]	AGGGCGAAAAGGGAGCCCCGATT
30[95]	31[103]	CCACTATTAAGCCGGCGAACGTGG
30[127]	29[111]	TTTGATTAGTTGTTCCAGTTTGGACGAGATAG
30[159]	31[167]	ATCACGCATTGACGAGCACGTATA
30[191]	31[199]	TCAGTGAGAGAATCAGAGCGGGAG
30[223]	31[231]	GTACGCCATTAAAGGGATTTTAGA
31[4]	29[15]	TTTTCAAGTTTTTTGGGGTGAACCATCACCCAAATTTTTGCAAGCGG
31[40]	29[47]	CTAAATCGGAACCCTAAAACCGTCTATCAGGGCGAAAATC
31[72]	29[79]	TAGAGCTTGACGGGAAAAGAACGTGGACTCCGGCAAAT
31[104]	31[135]	CGAGAAAGGAAGGAATGCGCCGCTACAGGGC
31[136]	29[143]	GCGTACTATGGTTGCTAATTAACCGTTGTAGCCCTGAGTA
31[168]	29[175]	ACGTGCTTTCCTCGTTGCCACCGAGTAAAAGACTGGTAAT
31[200]	29[207]	CTAAACAGGAGGCCGAGAATCCTGAGAAGTGCATTGCAA