

GENOTYPING BY PCR PROTOCOL

MUTANT MOUSE RESOURCE & RESEARCH CENTER: UC DAVIS

mmrrc@ucdavis.edu

530-754-MMRRC

Protocol Name: B6N.129S5-II17btm1Lex/Mmucd **MMRRC: 032377-UCD**

Protocol:

Reagent/Constituent	Volume (μL)
Water	5.6
GoTaq® G2 Colorless Master Mix, 2X	7.5
Primer 1. (stock concentration is 20μM)	0.45
Primer 2. (stock concentration is 20μM)	0.45
DNA (example) extracted w/ "Qiagen DNeasy columns or other similar silica based kits"	1.0
TOTAL VOLUME	
15	

Comments on protocol:

- Protocol may work with other DNA extraction methods.
- Use Touch-Down cycling protocol-first 10 cycles anneal at 65°C decreasing in temperature by 1.0°C; next 30 cycles anneal at 55°C.

Strategy:

Steps	Temp (°C)	Time (m:ss)	# of Cycles
1. Initiation/Melting HOT START? ☐	94	2:00	1x
2. Denaturation	94	0:10	
3. Annealing steps 2-3-4 cycle in sequence	65 (↓1°C/cycle)	0:30	10x
4. Elongation	68	2:00	
5. Denaturation	94	0:15	
6. Annealing steps 5-6-7 cycle in sequence	55	0:30	25x
7. Elongation	68	2:00 (↑20sec/cycle)	

Primers:

Electrophoresis Protocol:

Name	Nucleotide Sequence (5' - 3')	Argarose: 1.5% V: 90		
1. DNA483-3	CGAACAAGCCCAATCAATGCC	Estimated Running Time: 90 min.		
2. Neo3a	GCAGCGCATCGCCTTCTATC	Primer Combination	Band (bp)	Genotype
3. DNA483-5	CCGCAGCATCAACCACGAC	1 & 2	285	Mutant
		1 & 3	360	wildtype

mmrrc@ucdavis.edu
530-754-MMRRC





Lexicon Genetics Incorporated – Genentech Project Materials

Genentech ID:	UNQ516	Date of Submission:	2-25-04
Lexicon Contract Name:	DNA483	Mutation Type:	☒ Standard Knock out
LexVision Name:	SEC226N1		☐ Conditional
Reference accessions:	NM_019508	Is this gene X-linked?	NO

Required Materials: X pKOS clone DNA(s) __pKOS39_____
X Target Vector DNA __TV39neo_____
X Targeted ES Cell DNA __DNA483 #67_____
X Genomic Map

Southern Blot Analysis: *External/Internal Probe Strategies*

	<u>5' External</u>	<u>3' External</u>
Name of Probe:	17/18	19/16
Restriction Enzyme for Genomic Digest:	BamHI	EcoRI
Predicted Wild-type Band (kb):	11.9Kb	10.5Kb
Predicted Mutant Band (kb):	6.5Kb	7.9Kb
Probe Size:	566bp	307bp

PCR Strategies:

For standard knockouts, give wildtype and mutant-specific strategies

For conditionals, give 5' loxP and cre-excision strategies

Wild type-specific (absent in targeted allele)		Mutation-specific product (absent in wt)	
5' Primer Name:	5	5' Primer Name:	Neo3a
3' Primer Name:	3	3' Primer Name:	3
Predicted Wild-type Band (bp):	360	Predicted Wild-type Band (bp):	none
Predicted mutant band (bp)	none	Predicted mutant band (bp)	285

Primer sequences:**Southern probes**

DNA483-16 5' – CACCCTACTCAGACTTGTTAAG
DNA483-17 5' – GGGCCTGAGAGTATCCACAGG
DNA483-18 5' – AGCCAGTCTGGGATACAGAGGC
DNA483-19 5' – GCCTGATGGAGCAGGAGCCTAC

PCR Genotyping

DNA483-5 5' – CCGCAGCATCAACCACGAC
DNA483-3 5' - CGAACAAGCCCAATCAATGCC
Neo3a 5' – GCAGCGCATCGCCTTCTATC

Genomic Sequence Deleted:

GAGGCCCAGTCCCTTGGCCCCCTGGGCCTCATCAGGTGCCGCTGGACCTGGTGTCTCGAGTAAAGCCCTACGCTCGAATG
GAAGAGTATGAGCGGAACCTTGGGGAGATGGTGGCCCAGCTGAGGAACAGCTCCGAGCCAGCCAAGAAGAAATGTGA
AGTCAATCTACAGCTGTGGTTGTCCAACAAGAGGAGCCTGTCCCCATGGGGCTACAGGTAGGTGGGCTGGGCACAGCA
GGCCACTTTCCCACTCTCCAGACACTGTGTTCAAGACCTTGGATTCCGATAAGTTTTAAACCCCTTGTCTGCCCTTAC
CAACCGTAAGGCGTTGGGTTGGTTGATTAGTTCTGCTGAGCCTCAGTTTTCCCACTGCCAATGGAAGCTTTGTCAGTA
CAAACCTTTGTAAGCTATTGTAAACAGGTAGCCATACACAACACTGCTTTTTTATCCTCCAGGCGTGCTTCTAAAGGTACT
TTGTTTCAGCACTGTGGTTCACACTTGCTGGCCGAGCTCACATCTTTCATGTGATGGGTGCCTTCTTAATGTCTGCCTC
AGAAACACGTCCGCGTTCCCTGAGCTCACCCGGTCAAACCTCCCTAGGACAGATGCCAGGACCACAGTGTTTTACTTGTCT
CTCTTGCTTACCGTGCACAGTCCCCGCTTTGATTTAGGACTCTCTGCTGCTCTGGGCTGCAGAAGCAGTGCTGTGTGTC
TGTCACCACCTCTTAGGCCAACACGCACGAGGAGCCCAAGATACATGGATTAATAATGGAATAAAGAAATGACTAGTTC
ACTCACAACCTCAGCCCAAAGCGCTCCCAGACATGCTAAGACTCTAGACTAGTACTGTTGGCCAGAATGTCCTTTAATA
AAGTCCACTGTGGTAGGCATGTGACGACTGAACCACGTGGCTAATGAGACTAAAGGACTATAGACTGAAATTTAAGTT
GGCATATGTAGCTGGCGGCTACTGTGTTGAGGGGTGTAGCCCTGGAATGTGACAACAGAGTCAGTAAGGATTCTTCAG
GCCACAGCTTGTTCCTACTTGGCTGTGCCCGTGTGTCAGTCAGCGAGATTGTAAAACCTGTAAGGCTCATTAGGATGTTTC
CAATTCATTTCCAAGAAGCTCCCAGGCAATGAGAGGTGTCTGAGGCTGTATGTTCCCAAGGTCTAATTCTCTTATCTCTTG
CTCTGTTTAACTGAGGAGGAAGTCGAGACAGAAAAGAACAGTGATTCCGGGACAACCTCCAGAAGGCTCTGTGTCCC
GTCCTGTCTGTGTTCTGACCCCCATTCCCGCACCTCGAGAATGCCTAAAGTCTAGGTTATAACAAGGGATGTGTATAA
AAATACAATCCCTAGACTTCACAGCATGGAAGGAGAGAGCTGACTCCCAAACGTTGTCTCCAGCTGGTTGCAAGGAC
TCCCCTGACTCAAACAAACCAACAACACTTGTGAGCTGAGGCTGGTATAATCCCAACCTTGGGAAGACTGAGGCAA
GAGAATTGCAAGCAGGAGGATAGCCAGAGATGCAAAACAAGACCAAGACCGGCTCAAAAATGGGAAAGAAAAA
AAAAAAGACAAGAAACAAAAGAAGCCTAAACCAAAGCCTGTTGAATTTCTGAGTCTCAGTTACACAAGAGAACACAG
GCCCAGATTTTCTTGAATGAATATTCTACACCCATGTGTGCATATTTTATCTCTGTAGATTAATTCCCCACAATATAAA
AATAGGGCAGAGAAGGACGAGGGCTGACTTGGTTTTATTCTGTAGTCCCCATGGTATCTTTCTGGCTGAATGGAGGAAT
CTGGTTTCACAGACCCTGACTACCAGCGATTAGCTTCCAGATTTTGGTCTCTCTTTTCGAAGGAAGAGTTCAATACAAC
ACATCCTGGCTGTTAGCCCTGACCCTAATCGCGCTGATCCCTTGGGGTTGGCATGGGCAGCGCCCTTTGTTGTTCTCTT
GGCACTTACCCTGCTCTCTCCCGCCACCCGCTTCCCGCAGCATCAACCACGACCCACAGCCGCATCCCTGCGGACTTGC
CCGAGGCGCGGTGCCTATGTTTGGGTGCGTGAATCCCTTACCATGCAGGAGGACCGTAGCATGGTGAGCGTGCCAGT
GTTTCAGCCAGGTGCCGGTGCGCCGCCGCTCTGTCTCAACCTCCTCGCCCTGGGCCCTGCCGCCAGCGTGTGCTCATG
GAGACCATCGCTGTGGGT

Genomic Locus: (the deleted sequence represents nt—10,322 to 12,547-----in the sequence below)

ACTGTATGGCCATGGGCAGGTTATTTCTCTTTCCTGGGACTCTTTCTTCTTGTGTTTATAGTGACTTCACTTCCTGTCC
TGAGGAAATGAAGTCTCCAGGATGACTGCTTTTAACTATGGAGTGGAGGGCTGGAGAGATGGCTCAGAGGTTAAGAG
CACTGACTGTCTATCCAGAGGTCCTGAGTTCAGTTCCCAGCAACCACATGGTGGCTCACAACCCATGAGTAATAGGATC
TGAAGACCCCTTCTGGTGTGTCTAAAGACATTGATGTACTACATAAAATAAATAAACTGTGGAGTGCCACATGCCTGT
GAGGAGTGTCACTCTTATCCCCAGGTAGTGGTCACTGCTCTGTGTAGGACATCTCGTGTGTGTCCCGAGCCGGGA
CCACGAAGCTCCTTCCAACATCAAGTGATGATGGAGCTACTTTTCTGGGAGTCAGGCTCTGGAAATGGCCAACATCACC
AGGCTGCCTCTTCTCCCTCATGAGGTGTAGGGAAGTACTGCTCCCTTAGAAATTTGGTGAGATATCACTGTCTTAGGGTT
TTACTGCTGCGAACAGACACCATGACAAAGGCAAATCTATAACGGAACAACATTTAATTGGGGCTGGCTTACAGGTTCA
GGGTTTCAGTCTATTATCATCAAGGACGAGCATGGCAGCATCCAGGCAGGCATGGTGAGGAGGAGCTGAGAGTTCT
GCATCTTCATCTGAAGGCTGTCTAGGAGAATACTGACTTCCAGGCAGCTAGGACAAGGGTCTTAAAGCCACACCCACA
GTGACACACCTACTCCAACAGGGCCACATCTTCTAATAGTGCCACTCTCTGGGTTGAGCATATTCAAACCATCACAGTC
ATCTTCTGGGGACAGCATTTTTTCTCCTATTAAGCTGAGCCAAGGATCACAGGATTCTCAGAAGATGCAGCATGGATCTT
GCAAGAGATACAGATGTTGTCATGGATACAGGAGATGCAGAAGGCTGAGCAGAAGGGTTCAGCAAGAGCTCTTCCAA
GATGTATTGCTGCTCTGGAAGCATGGACATCACACTACAGCACAAGTTTAAAGAACTGGTGTAATGTACCATGTTGTCC
CCCAGTGCCTGGAACAATGTTGGGCGCCTTGAAGTTGCTTAAAGAAGGACACTGCTCACTGACTAGAGAATGCATTTATC
CATCACTGTTTCTCCAAGAGCACACAGACAAGCTCACCAGAGAGGCTGAGTTGTGAGTCACTATAGCCTTAACCACT
ATGAACCTTCTAGTGGTCACTAGGATGGGGACAGAGGCCCTGGCTATGGCCACCAAGGCTCCACACCCAAGGCTAAGC
AAGTGTCTCAGAGTTGTCTGTTTCTAAATGGTGGGTTGTGAGGTGCTCTTGGGGAGAATTCGAGCAAATCTGTGTGTT
TATCCTGGTCTCAGGCTCTCCAGGGCAGGTGAATAAGATACACTCATTGCCTGAAGTAGTGCTCCCTGAAGGCACTCCA
GAACTGTAGCAAAGCACAGACACTACCCTCAAGGCCATACAGCCCCAGATCCACAACAGAGAAACAAATAAAACAAC
TCAGTGTGGTCTCCCCAGCTAGAGACTATTGTTAAATCTGACCTGCTTAAAGGCACAGATTTCCACTCTAGCCACCTCA
CTCCAACAACCTCCTTGTAAAGACGGCAGAAGATACTGGCTGGCCCCCTCATCCCTGTCCCCATAGCCTGGCTAGTTCCTT
CACTGGAAGTGAAGGCTCTACAGCTGCTCGCCCCCTATTTTGTGTTGAGTGAAGGCTCCTTCCACCAAAGAGACACAGA
GCCACCCAGGATGGGGCTGGTGGTGAGTGGTGGCTTGGGAGATGGGTGTCAGAGTCTGGAGACTCTAACAGATTATA
AAAATCCCCTGGGTCTGAGGCGTGGTTGTGTGGGTGAGCAGGGGGCCTGGTGCCTGGGCTATGCAACAGGCTGTTTAT
ATTCTGATCTTTCCGTACCCAGGCCTGCTAGTACTTGCAGGAGGACCATGCTTATGGAGCTCCTGAGGCCTGTACAGAA
AATCAGGGACTTCTCCTTGTGTTGGGGACTCTAAAGCTGGGGAAGCCTGACCTTCTCCCCCCCCACACACACACCTGTCT

TGTACACCCTGCGCCCCCCCCCCCCCAGCCAGGCTTCTTGCTCTGCTGAAACATATGGGTTGCCCACTCTTCCTTCTC
TTTGGGGTCTCTCTGGGAAGTAAAGGATTTTAGAACCAATCTGACTAGAATTACCCCGTGGTACCTTGTGGACAGAG
CTAAGAACAGTATGTTCAAGCAAACAGTAGCTAAGCCGTCCGTGACACACTTACATACATGTCACACATATGACCTCAC
TTTCATCACTCCCTCTCTCCCTTGATGGAAGTTGGGGTGCATGCTTCTGATTAGGGTTCAGCTTGCTTTGGTTCAAAGTCT
ATGTCTAAACGCCAGTCTTCACGAAAACATAAGAGCAAGAATATACCCGTGAAAGCGCACAAAGAAATGAATTTATAAT
AAAAATAGCCCAAAGAGACCAAATACGACATGCCTGTTATATCAAAGGTAGAATGCGTATCCTGAAAGACTGTCCTGG
AAGGCAGGGAGGTCACCAGCAAAGACCCTACATTGGAAGAACTGGAAAGAGGTCTCTGCCCCGTGGGGATGTCTCTAGG
TAGTGAGTGCTAACCAGATACAAAGCAAACACACAGTCTATCTGCAGCTTAGACGCATGGCCCCGTATTTTTAAGGCTG
GACACTGGCTGACGGACACCTCAGAGTTGGTCACAGAGAATCAAGTCCAATTCATACTTGTGTTGATGCCACCCTTTGG
GGTGACAGTACTAGTGTCTGGCCGAGGCCAGGGTCTACTGATGCGGCTGTCCCTCTACACGGCTCATTACCCAGCC
GTTCCCTTTTTTGAAGACTGGGAGCTCGTTGGCTAGGGCTATTTCCACCAACAATGTTCTGTCTCTGGAGCTTAAATA
GCCCCCTCTTGGCTGGGGCTCTGCAGTGAGCAGTGAGGCAGGCATTTGTGCAAATAAGGGCTTGTGAGAAGGGTTCCTA
CCCAGGAGGGAGGGGCAGACAGCATGACAGAGGAGGCTGGGCCTCCTGGAGGGATGCGCTTGAGTGTCTGTGAGACT
GTTCTGCGCCCTGACCTAACTGGATCCCTTTGACCAAGGATCTGGGCCTACATCCCTCAGAGCCTCCTGGCCTGGCT
GAGATTCCAGGGTAGGCAGAGGTTCACTGAATAGAAAAGCCTTTGAATTCTCCCGCTGGTTACAGCCTCATCCCTACTC
ATTTTCATAATGCCCAAATTTCTACTTAGGAACGCCCCAAAAGCATCCTGGAAAGCTCAAACACTACAACCTATTTTCCTAA
CAGCAATTCCAATGTCTGCCCCCATGAGTTGGCCACTCACTTTGGCTAACACAAAGCACTTTAATGCACATTCTCATTAG
AGCCTTACCACGATCATTAGAAATCAAGTGATTGCTGTTTTGAGACAGGGTCTCTTGAGCCTAGGCTCTCCTCAAATTT
ACTATACAGCTGAGGATGGCCTTAAAGTTCTAATTCTCATGCTTTTGCAGCTCTGAATGCCGGGATTAGAGGCATGAGCC
ACCACACCCGTTTATACAGTGCCAGAAATTGAACCCAGAGCTTTGTGCAAGCTGGGCAAGCCCTCTATCTACCAAGA
GAGCTACATTCCCATCCCCTAGCTTTTATCTCTATTGAACAGAAGAAACAAAGGCTCAGATAAGGCAATTTCTTTCCCA
AGGTCACACAGCTGTGATGAGAAAGATCGGACCAAGACTAAAATCCACCAACCTGTGTAGTCTAACTACGCCTGGTC
CCCTGGATCCCCACAGCTCTCATCTCCACCTTGAGTTCCATCCTATGTTACAACCTGGTTGGATTAGTGTCTCACATTG
TGCTTTCTGTGTGTCATCCATGTTATAGCTAAGCTGCCCTGAGCTTGGGAGTTCTCAGGTCTCAAAGGACTGGAGTTCC
TTCTCTGAGCTCCTAACCTTGCCCCACCTGGCTTGTTTGAGACTGGAAGGTGAGGCTGAGGTGTTACAGGCCCTCTTTGA
TGAGCAGATCCACTCCACTTGAGGGCGGTGTCTTCCACCTATACCACAGAAGGAGACATAGGGGTAGAGTGGACTTGC
TTTGCTCTTCTGTGACTTTGGGGACATGGTTAAATGGACATTCCAAGCCTCTGCATCCCCAGTTATCAATAGAGAACAA
AAGGAGGACTGCACTCCAGGTGTGTTGGGATTGTTCCACAAAACAACACACTCGAAGGTGTTAGCCCCGTGCTGGCAC
CTGGGAGGCGGGCACTAACCAATAACTTCTTATTCCTCATTAGTTCCTCCCTTCTGTCCCCATCTCCTAATCATGTGTGT
ATGTGCATGTATGTGTGAACGTGTGTGCCGCTACGTGTAGGTGGAGGTGACCAGAGGATAGCCTCAGATGCCATTCTC
AGGAGCCAGCCATCTTGTTTTGCTTTTCCAGACAGTTACTCTGTGTAGCCCTGGCTGTCTGGAGCTCGTTTTGTAGAC
CAGGCTGGCCTTGAACCTCAAGAGATCCACCTGCCTCTGCCTCCAGGTACTGGGAGTAAAGGCATGTGCCACCACACCT
GGCTTCCATCTTGTGTTTGGAGACAGGGTCTCTCATTGGTTAAGGGCTTTCCAGGAGGCTAGGCTGGCTGACCAGCAA
GCTCTAGGGAATCTGCCAGGTTTTGCCTCCAGACCTTGAGTATAGTGTATACCAGAGCTTCTGGCTTTTCTGCTTAGGGT
CTGGGGATTGAACCTATCAAGCCCTTGTGGTTACGTGGCAAGCATTTTTATCAACTGAGCTATCTCTAGCTCCGAGGTT
GCTATTTTCTGCGAGTATAGTAACCAAGTTTCACATTCTACAGCCCTAGTATAGCATAGGTGCTTAAGGGAAGGGTGTA
CTTGGGGTCACCAGATAGAAATTCTCAGTAACCTGCCCTTACAGGCTGGGCTGGCTATCCCTACTCTAACGTGGCAGAC
ATCCTTAGCACTAGTTCTCAGCAGCAGTGTTACTGGGAAGCCAGGGGCAGCAAGCACAGGCCTTGCTCCACCACCCACT
GGAGAGCCTGCCTAGCCTCAGAGCCTACTCCAGGAGGAAGGAATGAGCCACTGTTGCTCTTCAGGGCTGTCTGGCTTTC
TGTTGGTGCCATCTAGTGGAAGTACGATGAGGCTCTCAACAGGTCTGCAGTAGACCTTCCAGGGTTTTCTGTATCACA
CCTACTGCCATCTGCCAATCCAACCATCTGCTGTGTGCTACTTCACATGCGCTCTTAAGCCTTATTCATAAAGACCCAAG
GACCCCATCCTCATAACGAGGCAAGAGGAACCTCCAAGTCTGGTTTTCTTCTCCTTCTCTTGGGCCTGAGAGTATCC
ACAGGTTCCAGATACCAGACATCACTGTGGGAAGATGGCCCTTCTGTAGGATGTTAAAGCCAAGGTTGGTGGAAACAGGC
TTCTGTCTGGTCCAAGACAGCCCAGGAACAGGGAAGCTAATGAGGGCTCCTCTGCTATCCCTGGGGCCCATTTGTGAGCA
ATCTGAGCCTCTCAGGAATGACCCAGCTCCTCGGTCTCTATAGACTAGCAAGAAGGCTCAGTGTGGCTCAAGCCTGTC
TGTCAGTTTAAAGTATTGAAGGTAGGACAGTGGATAGAATCACGGAGTTAGTTCTGCTTCTGCTTCCAGCATGAGTGTG
GGTGAGCCTGGACAAGCCCTTGTGGACCTGGGAAGGCCACGTAGCCTGAGCTTTATCCCTGGATGGGGAGTGCAGTG
TAAGGATCTCTGATGCTTCCAGACTGGGTTTGTATTAAATGAAGATTCTGGGTTTTCTTATGTCAAGATCTCTGGATTA
AGACACTACAAGGCAAGCAACACCTTCTTCTTCTCTATTATGCCTTGAAACTGGGCCTCTGTATCCCAGACTGGCTTTG
AACTTGATGTGTGCGGTGAAGAGATCCCCAGATACCTGATCCTTCTGCCTCCATCTCCAAGCGATGCAATCAGAGGCTG
TACTGCCTGGCTCTGTTATTTTGGATTCTCCATTAGCACACCCTGCATGTGGGTACTGGGTAGCTGCTCTTTCATCCTCA
AGAATCAGGAGGAAAAAATGTGTGTACTAGCAAATAAGAGGAATGGATATTTATGGGGTCTGAAAGGCAG
AGGAACCTCTATATTCCAGTATATATATTTCAATTTGCCTCCCCACCCCCACCCCCACCCCCACCCCCAT
CTACGGACCCCAGTGTAGCAGCAGAAGAAAGGGAAGAACTATGCAAGCTGCCCGCACTCACTCCTTAGCCAGGTTCTT
TCATTGTTTAAAGAGGGGTTGGGACAGCCAGGGCTGGGGGTGGGGGCTTGCTGCCCTAGGAGGTATTTTCAGAGTCTCC
CGCCCTCCAGAGTTTCCAAGGACAAAACAGAACCTGTCTAGTATTTGACCAAATATGGTGGTATCTCCCGAGGAACCT
GCGCCCCAGCCAGCTCCTCAGTTATGCTGTGGAAACCTGCCCCACACAGATTAATCTTGTGACATTCAGGAGCCTCTCA
CCCCGCTCTCTCCCTCTCTGGTTCTTGCAAATGGCAAGACTGACCCTCAGCAAGACAAGGCTGAGGAACTTGACCCG
CTTACTAACCCCTTTGCCTCCAACGCCATTCTGCCTCCCAGAGAGTGGACTCGTGGCTTGCTCACATTCTGACAATCA

GTTGGTTGTTCACTCAATGTTACTGGCCTTAGCCAGAGAGGACAGTCAGTTTAGCTTTTGGGGACCCATGAACCCAGGG
GTCCCTGGCCTCATGAAGCTGTGGCCTGATTTAAGGTTTCATGCAGCCTCTTCTCCAGAAGGCTGGGTTTGAGGGGTA
CATGGGAGAGGTGTTAAGACATCTAAGCCCTAATACTAAGACAGCTGTTGTTTATAATTAATAAATAATTATCACAG
CATTGTTTTATAATAAACAGTAAAGTGCTTATTGAATGCTTACTCTGTGCGGAGCATTGCCAGCTCTGACATGGCTCGTT
TCTTTGTGCTTCGAAGTAATATCTAGAGATGTGGAACAGACTTAGACTTTAAGTAGGAGTTGGCGCGGGGTCACTCTT
CTCAGGTGTAACCTCCATTGTACAGAGAATAACTGAGGCTGAGAGAAGGAAGGTCATAAGTAGTCAGTCCTACAG
GGGTGGAGATCTCTCGTGGAAGGTAGCAAGTGGTACTCCATGAGGGCTGTAACGGTTGGCTAGGAAGTTTGTGCGCA
TCTGCACCTCTGGCCTGGGTGGAGCACACAGACTCAGAGACATGCTCATAGAGGGCTAGAACGGTGCAGAAAATATCC
CAGCACAAACAGTGTGGGATGGTGTGTTGAGTTCTGGATAGGAACCAGGCCCAAAGCCCAGCCCCGACACTGCTAATT
CACTGTGGAATACTGGGAAAATCTCCATCTTATTCAAGTCTCAGTTTCCCTGCCTGTGACCTAGAGGGTAGGCAGCCAA
GCTCACCTGAGGCTGGTTGGGTGGCTGAGTTGTTTCCGGGAGATAGTGTTCCTGTGCTGGGCCAACCTGCTCTC
AGTACATTTTTCTCTCCTGACCAACCAGCAGCCTATCCCTCCTCCACCCTCACCCCTTGCCATCCCCAAAGCAAACGAA
GCTGATTGTCTCAACTGGCGCTGTGGGTGCTGGCTGGTACGCCAGCCGACAGGCCACAGGCAGAGGTGCCATCAGCCAG
GGCCCCACCAGACACACAGGGCATTGTCCTTTGGTCAACAGCCCCTGGGCACCTCAGCCTGGCTCCTGGCCTGCCCCCA
CACACCCCTCACCGCCTGCCACTGTGCTAAGGCACAGCCAGCTGGGGGCCCAAGACTCCCAGCTGACAGTGAGCCAC
CCACCCACACCCCCCAGCAGCCCCCTGTGGAGCTATAATTGCCTCAGTCCATCCTGTTGCTGCCATTCTCTCTACGG
CATCTGGGGTTCTGGCGGTGGCAGCTGCGGCCCTGCCGCTGACTTGGTGGGATGGACTGGCCGCACAGCCTGGTA
CGTGGTGCTCCCTACCCACCTCCACCTTCTGTGAAGTGTTCCTTTCCCATTGATTAATGGCTGCCTGTGTTTGGCTTG
GAATCTGCAGGGACCAGTTCTGTCTCTCCTCCAGGCCCAGAGAGAAACAGAGGCTGGTCTCAGCCTGCCGTCTATGGCC
CAAGGCTGGACACAGTCTGGCCACACTGAACCCCTTTCAAACAAGCAACTGGGGAGATCCGGACAGAGTCAGGCACTA
GGGGTTTTTCCAGGCCTGGCTTCTGGGATCTGGGCAGAATGCATGATCTTAGGCAAGTTGTCTGTCTTTGTTTCCCATC
TGGAATTTAGGGTGGGGCTGTTGAGTCTGGTCCATGATTCCCCTGCAAGGTGAGTTGAGGAGTGTGTGGGAAGCGTC
ACTGAGACAGCCTGGAGGGAGGGAAATATTTCTGCAGCAGAATGGAGGACCAAGAGGAAGAATTTAGCAATCTGATTC
ACTGCTGCGCTGGCGTTGACGCCAGCAAGTGGCTCCGCCAAGAGGGGCTAGGCTGGGACTTGTTCACAGGATCAGAG
CTTGCTGGGGAGCCTGGATAAGAACTAGGCCCAGGCCCTGTGGACTGAGAGGTCCAGGGGAGGCATTAAGCCTGCTA
AGACTCTGAAAAGTAGTGAGGAAAATCAACCAGGAATGGGGAAGGGCAGGTTGTCTTTGAAGGAGGGGGAGGGGAAG
GGAGGGAGGAAGGAAGAGGGGAGGAGAAGGAGGAAGAGGAGGAAGAAGAAGAGGGAGGAGGAGGAAGAAGAGGA
AGAAGAGGAGGAGGAGGTAGTGGTGGTGAGTGCGTGATCTGGAAATGGAGTCTCACAGAAACCATGTGCCAGCTTCAT
GCTGCGTTCTTCTTCTCGCCCACTCTGTTTCAACTCACTTCCTTTACGACAGAGCCTGTAAGCAGCTCCAAAACCTCT
CACTTTCCACATCCCTGGAAGAGTTCTTGTGCTCATGATTCCCTCCTTATTCCATTGGACAAGCCTCTAGAAAAGCTGGC
TGGGCCCAGCCACCTTGCTGACCTAAGCCAAGTGTGAGCCCCAGCCTCCAGCCCCCTCCCCCACTTGTCAATTCCTGCTA
CTTTCCCCACCCTGCCCCCAGGTTAACACCACTGAGTTTCAGGGCAGGTGTGGTGGCGGACGTACTCTGTTCAATTCTG
TTTGTGACCCAGGATGTCTGACAGCATGCAGATACAGACACAAGGAATAAAATTGTGTGGAAAGGCGCTCTATGCTCTT
GGGAGTTGGCGCCATGGGGGTGGGGCTCGGGGCAGCCAAGAGGATACCAAAGTATCACATGTCCAAGTACAGTTGCA
GGCCTGTGAGGGGACGTGCGTTGTGACAACTCCAAGTGTCTCAGCAGTGTGGCTGAGGCAGTGAACCTTGAGCCACC
GCTGGGCAAGGTGTTTGAAGGGAAAACGGAAGAAGTAGAAGTCTGCAGGCAGAGATCTGTGCAAAATCCTGTCAAG
CAGCAAGGACCGTGCTGAGCACAAGCACAGAGGAGCCAAGAGGGGCACAGGAGATCCCCAGGGCCTCGGGAAGGAT
GTTAAGGGGGAAGTGATGTGGACAGACACGCTTCTCAATGGTGGTTGCTGCTGGCCTTGGTGCGGTGAGCTGACTAGA
AGCCAGACAGGTTTGGAAAAGTAGGCTTAGCCGGGCGTGGTGGCGCTTGCTTTAATCCCAGCACTCGGGAGGCAGAG
GCAGGCGGATTTCTGAATTCAAGGCCAGCCTGGTCTACAAAGTGAGCTCCAGGACAGTCAGAGCTATAAAGAGAACT
CTGTCTCGAAAAACCAAAAAAAAAAAAAAAAAAAAAAAAAAAGTAGGCTTGAGTGAGCTGTCTGGGAAGCAACT
ATGGTCTATAGATGGAGTGAAGTGGGTTGATTGGGGGGTTTTCAAGAGATTCCCTATTTTAGGACTTCAAGATAGCTGC
CGTGGGGGTGTGTGGTGTGACCAGTGCCCAACACAAAGCAGGTGTCCATACCCAAGGTGGCCATGGAAGACTTCTCA
CCTCCCTCACCTAACCTATGCTTTGGCCAGAGATGCTTGGCTCTGGCCTTTGACCAGTAGTCTTCTCCTCCCACTCTTC
CTCCTGGCCATCTCCATCTTCTGCGCCAAAGCCACCCCGGAACACCAAAGGCAAAAGAAAAGGGCAAGGGAGGCC
AGTCCCTTGCCCTGGCCCTCATCAGGTGCCGCTGGACCTGGTGTCTCGAGTAAAGCCCTACGCTCGAATGGAAGAGT
ATGAGCGGAACCTTGGGGAGATGGTGGCCAGCTGAGGAACAGCTCCGAGCCAGCCAAGAAGAAATGTGAAGTCAAT
CTACAGCTGTGGTTGTCCAACAAGAGGAGCCTGTCCCATGGGGCTACAGGTAGGTGGGCTGGGCACAGCAGGCCACT
TTCCCACTCTCCAGACACTGTGTTCAAGACCTTGGAATCGGATAAGTTTAACCCCTGTCTGCCCTTACCAACCGT
AAGCGTTGGGTTGGTTGATTAGTTCTGCTGAGCCTCAGTTTCCCCAGCTGCCAATGGAAGCTTTGTGAGTACAACTTT
GTAAGCTATTGTAACAGGTAGCCATACACAACACTGCTTTTTATCCTCCAGGCGTGCTTCTAAAGGTACTTTGTTTCA
CACTGTGGTTCACACTTGCTGGCCGAGCTCACATCTTTCATGTGATGGGTGCCTTCTTAATGTCTGCCTCAGAAACAC
GTCCGCGTTCTGAGCTCACCCGTCAAACTCCCTAGGACAGATGCCAGGACCACAGTGTCTTACTTGTCTCTCTTGGCTT
ACCGTGCACAGTCCCCGCTTTGATTTAGGACTCTCTGCTGCTCTGGGCTGCAGAAGCAGTGTCTGTGTGTCTGTACCAC
CTCTTAGGCCAACACGCACGAGGAGCCCAAGATACATGGATTAATAATGGAATAAAGAAATGACTAGTTCACTCACAAA
CTCAGCCCAAAGCGCTCCAGACATGCTAAGACTCTAGACTAGTACTGTTGGCCAGAATGTCTTTAATAAAGTCCACT
GTGGTAGGCATGTGACGACTGAACCACGTGGCTAATGAGACTAAAGGACTATAGACTGAAATTTAAGTTGGCATATGT
AGCTGGCGGCTACTGTGTTGAGGGGTGTAGCCCTGGAATGTGACAACAGAGTCAGTAAGGATTCTTCAGGCCACAGCT
TGTTCTACTTGGCTGTGCCCCGTGTGTCAGTCAGCGAGATTGTAAACTGTAGGCTCATTACAGGATGTTTCAATTCAAT

TCCAAGAAGCTCCCAGGCAATGAGAGGTGTCTGAGGCTGTATGTTCCCAGGTCTAATTCTCTTATCTCTTGCTCCTGTTT
AACTGAGGAGGAAGTCGAGACAGAAAAGAACAGTGATTCCGGGACAACCTCCAGAAGGCTCTGTGTCCCGTCTCTGTTT
TGTGTTCTGACCCCCATTCCCGCACCTCGAGAATGCCTAAAGTCTAGGTTATAACAAGGGATGTGTATAAAAAATACAAT
CCCTAGACTTCACAGCATGGAAGGAGAGAGCTGACTCCCAAACGTTGTCTCCAGCTGGTTGCAAGGACTCCCCTGACT
CAAACAACCAACAACAACCTTGTGAGCTGAGGCTGGTATAATCCCAAACCTTGGGAAGACTGAGGCAAGAGAATTGCA
AGCAGGAGGATAGCCAGAGATGCAAAACAAGACCAAGACCGGCTCAAAAATGGGAAAGAAAAAAGACA
AGAAACAAAAGAAGCCTAAACCAAGCCTGTTGAATTTCTGAGTCTCAGTTACACAAGAGAACACAGGCCAGATTTT
CTTGCAATGAATATTCTACACCCATGTGTGCATATTTTATCTCTGTAGATTAATTCCCCACAATATAAAAAATAGGGCAGA
GAAGGACGAGGGCTGACTTGGTTTTATTCTGTAGTCCCATGGTATCTTTCTGGCTGAATGGAGGAATCTGGTTTCACA
GACCCTGACTACCAGCGATTAGCTTCCAGATTTTGGTCTCCTCTTTTCGAAGGAAGAGTTCAATACAACACATCCTGGCT
GTTAGCCCTGACCCTAATCGCGCTGATCCCTTGGGTTGGCAGTGGGACGCGCCTTTGTTGTTCTCTTGGCAGCTTACCC
TGCTCTCTCCCGCCACCCGCTTCCCGCAGCATCAACCACGACCCAGCCGATCCCTGCGGACTTGGCCGAGGCGCGG
TGCCATGTTTTGGGTTGCGTGAATCCCTTCACCATGCAGGAGGACCGTAGCATGGTGAGCGTGCCAGTGTTACGCCAGG
TGCCGGTGCGCCGCCGCTCTGTCTCAACCTCCTCGCCCTGGGCCCTGCCGCCAGCGTGTCTCATGGAGACCATCGC
TGTGGGTTGCACCTGCATCTTCTGAGCCAACCACCAACCCGGTGGCCTCTGCAACAACCTCCCTCCCTGCACCCACTG
TGACCCTCAAGGCTGATAAACAGTAAACGCTGTTCTTTGTAAAGGAAGGCATTGATTGGGCTTGTTCCTTTTAGGACGC
GCTAAAATGGTGTGCGGGTTGGAGATCCCTGGGACACAGATTCCAGATCAGCGTGAGTGAGCATTTTCCAGGATGTAG
CTCAGTTGATAAGAGTGTCTGCCCAGCACAAACGAAGACCTGTATAAACCCAATGGAGGCGGTGCACACCTATATGTA
ATCTCTGTGCTCTGATGATGGGTAGATCAGGAACTCAAGGCCATCCTTGACTATGAATACAGCCTTAGATACAGGAGA
ATCCCTCAGGAAACAAATACTGCTCTCCTTTTTTACATTTAAGATCTGGGTGTGCTTTCTTTGGGCTCCTGAGTCTGTGT
AGCAGCTATGTGTAATAGAAGCCTGGTTGCCTTAAGCCAATATGCTACCCAACTAACTCAAAGTTACTAGGATTTTTAA
GTTAGTAGTTACTCTTAAGAAGAGGCTGGCTCCAGGCTCTGCAGTGACAACTAGGGATCAGCGTTTCCCGGATTTGGT
GGAGCTGACCCTTGTGAGCTGGAAGGTTGCCCCAACCAGGATTCTTTGCAGAACAGACCTAACTCCCCTAAAG
AACCTCTGCTTGCCAAAAGAGGCATGAAAATATTCACATACACACACACAAACATATGAATATATATACATATATATAC
ATACATACATATACATATACATATACATATACATATACATATACATATACATATACATATACATATACATATACATATA
CATATACATATACATATACATATACATATACATATATATCCTGGGAAGAGGAACCTCTTTTTTTTTTTTTTAAATCCAGCCA
CTTATCTGCAGTGCTGGATGTATGTATCTGTGATCCTCAAAATGTCAGTGTGAGTCAGCCACCTGGGAAGCTTGTTCAG
CCAGACACAACCTGGCCTAGCACTCAGGATGCTGACTTAGGTGGGCCCTTGAGTGTAGTGACTTCTTTTAATTACTACAT
TATAGGTCTTGGCGGTGGCTTATGCGGCCATCTGTGACCAAACTCTGAGAACCACTGGATCAGCAAGACATTCTACT
GACCAGCACAGGCAGTATGGAAGAGTTATCCTAAAGCCCCTACAGTTTTTTTTTTTTTTTGGCCCCGTTGATGCTCTTTC
CCCCTTGAAATTGAATCTTACCCCCTGGGCCTTCTAACCCACAGCAAATCCATAATCAGCTGTCTCTGGGCTCTAAAAA
TACCCTGCCCCCCCCCAGAACAGCTGAGGGGCTTGGGCTATTTCCATGGGCGAGTTAGCATTTTGGAGTTACCCCTCTG
GGAAAGGGTCAATAGCCCCCTGTAGGAATATTTCACTTGGTTGCTTGAGATCCTGCGCATACAGCAGCTTCAATATGC
AGAATTTTAACTGTCTTAATTCATGAAAAGCCCATGGTTAGGTATGTGCTGTCTGGGCTGGAAGTAACTTACCTTTTT
TGGTATTGTTGTAGAGTGATACTGGTTAAAATACCCTGGGAAGTTTTGGCCTGGGTCCAGACACATGGAAAATACAC
TCCAGTGCCAGCTCATGCCGATCCGTTTAGCAGACACTTCTGCAGGGCTGCTTGTCTCTAAGGCTCCCACAGAGGCT
CTCTGAGTCTGTGGGTTGTGGCCTTGTGCTTAATGGGCACTGCCCATCCCTACCCAGCACTCTTAAAGAAACACA
ACATGTAAATAAATGCAGGCTTCGAGGGACCCCTGGCTTTCCTTAGTGCTGTTTCATGACTAGGTGAGGAGAAAGGCAT
TCCTTAACGTTCTATCTCTAAAGGTTGGCCATCTTGGGTCATCTGCTCTAGAAAGTAGAACATTTGTGCAGTTTTATGTT
TTTCTTTCTCTTTTCTTCTTCTTCTTCTTTTTTTTTTCTGAGACAGAAATTTATGTACCCAGGCTAGCTTCAAA
TTTACTATGTAGCCAAGGATGACCTTGAATTTCTGATCCTCCTGCCTCATCTCCTGAAGGCTGGATTCCCAAGCAGGGAT
GACCGTAACTCAAGGCTTCGTGCATACTAGGAAAGGACTCTACTGACTGAGCTACATTCTTAGCCTGTGTGCAGGGCTT
TAAGTGCTCCTCATGCTGTACTGAGGACTACGGGCCATCTGGGTGGTACCTTTTCTGTTTTACTGGCCAGATTCAACAAGC
CTTTCTGGGCCTGGGGAGGATTGCTGGTCTTGGCCTGAGAAGGCTAAGTTGGGCCCTGGGACTAGCTCTCAGCTGGCC
TGTGTGTTCCCTTTCTGGAATCTGTCTGAAAGTACGGAGAGCAAGAGTCGAACCTGAAGGCTTGTGCAAGCAGGCCT
GAGGGCATTGGGAGTGGCTCTGGATTGGAGCTGTTTAGGCTCCCATTCAGGCAAAGGACTCTGAAGAGTGCAGCCAGC
TCAACCTTAGCCTAAAGCCCCAGCCAGCCAGGACCTGCTCTGGGGTCTAAGCCACACCCTCCTTAGGGATCTGAAGG
AGGGATGGTTAAGAAGCAGCGAGTTTGCATTGTCTTTGGTCTTCTGACATACAATGATAACTTGAGCCATCAGACTAAC
TGAAAGACTCTATCATATGTTTGACTGATGTCATGGATCTTGGGGGCTGGGTCCACAGCCTTGACATTTGGGTAAGAC
CTCTGCTCCAGGAATTATATTATTAGAACCTGTTATTCTAAGAAAATCAGTTTATTCTGTTGTCCATTATTAGACAAGT
CAGCACTTGACCTTCCCTGGCATAGGTGGCAGGGCCAGTCTATAAGGTCTATGTTAGGAATTTGGCTCAGCGGCTGTG
GAAGAGCTCCCCTGGGGTGGGGGGAGGCTGTTGACAGCAGTCTTTGGTTGTGGGAGAGAATCTGGGATTTGCTTTGTG
CTCTGCCTGTGGCCGAAAGTCGTTTTAACCATTTTGTCTTTATTGTTTCAGTTTTTCAATTTGTTTTTCTTCTACTTCGACCAAG
TTTGTCTTCTGGTGTGCCAGTCTTACGGCTTCTGTTACACCTGCCACACGCAGATCATGTGTGTCTAAAGACCATCTC
TTCTGCCATTGCTATTGCCTGATGGAGCAGGAGCCTACGCTCCGGTGTGAACCTCACTGCACGGCAAGGGCTTCTCCT
CTGTGCTGAACCTTAATTAAGGTGAGGCCCCGGATCCGGGGTGTGCTTTAAACTGAAGCCGAGACCTCAGACAAGTTA
CGTTCTTCTTATGTGGGCTCTCGTCTCCCTGCAGAAGGAAGCAGCCAGGCGACTCTCAGGACTATCTGTTGGGCAAG
AGTGTGCTAGAACCCTCAGGTGGCAATGTTTCTGTGTGCACCCAAGCACCTCCCTAAACCCTAGCTTAACAAGTCTG
AGTAGGGTGTGTGTGTGTGTGTGTGTGTGTCTATTTGCTTCTGTGTGTCCGTGTGGGTGGGCAGAGCCCATACTGGCT

CTACTACTTCTCTGTGCTCCCTCTGTAGTAAAGAGCCAGATCCAAAGGAATGAAGACACAAGTTCCACTCCGTTGTTAAAAAAG
GAATTTTGGGGGTGGGGTGGGGGGAGTAGTGGTGTCTGAGACCTGAACCAGGGGTTTCACACATGCCAAACATATGCCC
TCTAGTGAACATATGCCCGTACTCAATGCTAATTTTTTTTTTAATTTATTTAATGGCCCGGGGAGCCAACGCTAAGGCCTCT
CAAATGCTAGGCCAGCACTCTCCTACTGAAGTGTATCTCCAGCTCCAACCTACTGATCTTTATAGGTTACAGAAGAAGC
AAAGCATAATTCTCTCTCTTAAGCTAGGGCCAGATTAAGCTCTGAAGAACTCTGTCCCATGCCTCCTTTTGAGGGTGAG
GTAGGCCCACTCTCTGAGGACTTGTCTCCGTTGCAAGACAGATCTATCACATGACTCCTGTGCGCTGGCCGATACCTCC
AGGGGTGGTCAGAAGCATCTCTTCTCCCGAAAGCCCAGCGTGGCTCCATTATCATGATTGACAAGCAGCCCAGAGCTC
TACTGAAGGCAGTGGCGGGGGTAAACATCTCTCCCTCAGATCGGAAGTGTGGAGATGGTCTCTAAGGAAGTTCTGAGC
TTGAACCCTCTCCAAACAGCCTATCCAAATGCTTATTTTCTGACCTTGCCTTTCTGTTTTTAAGTATCTGGTTGTAAATGT
TTACTTTGCAAGGCTGTGCAATTTTGAGAAGACGAGAATGGAAGACAGGAACGAAAGAAATAAACTAGTTCTCTGCTC
TATACCCCTTCTCAGTCATCTTGGCTCCATGTGAAAAAAAAAAAAAAAAAAAAAAAAAAGAATAAGTCAGAAAGTAGCTTGGAGG
ATGAATTTATATTTCTTCTTGAAAAACAGTAACCAACAAACAAACAAACAAACAAACCCCCCAAAACAAACAAACGAC
CAACCCCCCAAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAAC
CAACACCACAAAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAACAAAC
TTTTCTTAATCGTCTCCTTAAAAAAAAAAAAAAAAAAAAAGGCAGCCTCTAAGAGGATCCTTAGATAAGCAGACAGCAGATC
GCCCCGGGCCACATGGGGGACCCCTGTTCAATCCATGAGAGCAGAGAAAGCCACAGAGCCCATGGGTGTGGCCTCGTCA
GTCTTGC CGCGGTGAGATGCGCTCCATCTCAGTTATCTTCAGTGTGGCGCAGAGTCCCTGGGCTCTCCTGGGAGCCCTC
ACAGTTCAGTCTTGACCTTATGGATTAGGCTCCTTCTGGTCAATCTTATCCAGGTCCTGGTACCAGCGGTTATAAGCCCAAC
AGAGCCACATTCTTAGCAGCTACAGCCGTACCTCCACGGAGCTGGCCGCCCACTCCAAGGCATTGAGGTAGAAGAGC
TGATCGTGCAGGGCGAACCTCGGGAGGGTGC GGCGGGAGCCGTAGAGGGGGTGGGCCTGCCACTCCGCCGTCTGGACT
GAGTAATAGGAACGGAAGAGGGTCTTCAGCTCCGTGCGGAAGAGGGGCTTCGGGGACTGCACTCGCCACACGGCGGC
CTCCTGGGGTTGCTTCCGCCGGAAGCTGGCCGAGATGTTGACGGGACAGATGTTGTCCAGAGTGCAGAAGAAGCTCGG
GAAGTCCGTGGTGAGGATGTTGGCGAAGGGGAAAAGCTTAGGGTCCGGGAAACCGAAGTAGGAAGAGTTGAGGTAGC
CATGGACCAGGGAGACCACGGTGGGCTGGAAGGAGCCCTGAATGTCTCAATGGGCGGAGTAAAGCCTTCAAAGGTG
ATGTTGTTGTTGCTGCTGTTGTCCAGGTGCAGGGGCGTGGCGATGACCACGATGTCTGTAAGTCAGAGCTGTTGCCCT
TGTCACTCTCGTACGCCACTTGGTACAGGGCTTTCCCTTCTAGCAGGAAAGAACATAGCGTTCATTTTGATACCCACCAT
CCTTCCCTGTGGGGCCTAGCCCTGGGGGTGCAGGGAGAGTCTGGGGTCAGGAGCAGCTGGGCGGTCACATTGATGCAG
CTGCTGGGCAAGCACTGATCCGGCTGTTAGAAAGGCCGGGGGCCCTTCCGCTGGTTCTGCTGCTGACTGGCTGAGGTAG
GGATGTCACACTCAAATTCTCAGTGCTCACAGGAGTCGAGTGGAGACTCAAGTCTCTGTGAACCACGACAGTGCCCTCTA
GTGTTGGTAGGCCTCCCACTGATTTTTCTGAAAAAATACTTCTACACCGACCACTAGGTGGAGGTACAGAAGAGAAA
GGATAATGGGACTTCTGCACCATTCACCTACCTGTACTGTGCAGGGTCACAGAGGTCACCGTGGCGTGGATCACGGTGG
CCTTGGCGAGCTTCAGCAAACCAGAACAAACCAGCTTGTGCCCCCTTCCACGGACCACAGGTTGCCCTGAGCCCCAGC
TAGGGACATGGCTCCTGGGAGAGAGAAGAAAGATCTTGGGCCTTCATCCCAGGACAAGACTCCTCCTACCCATGGGTG
TTGATTTCAAACATTAAATACAACGTGATTTTTAACTTAAAAACATTAAGAAAGGGGACTGGAGAGATGGCTCAGCG
GTTAAGAGCACTGACTGTTCTTCCAGAGGTCTGAGTTCAAATCCCTGCAACCACATGGAGACTCAACTATCTGTAATG
GGGTTTGTATGCCCTCTTCTGTGTGTCTGAAGCCAGCTGCAGTGTGCTCATATACATTAAATAAATAAATCTCTTAAAA
AAAAAAAGGGCTGGGCGTGGTGTGCACACCTTAAATCCAGCACTTGGGAGGCAGAGGCGAGGCGGAGTTCTGAGTTC
AAGGTACGCCTGGTCTACAGAGTTCCAGTACAGCCAGGGCTACAGAGAAGCCCTGTCTCGAAAAAACCAACACCAACC
CAAAAAGGGGGGGCCTGGAGAGATGGCTCAGCGGATAAGAACACTGACTGCTCTACCAGAGGTCTGAGTTCAATTCC
CAGCAACCACATGATGGCTCACAACCATCTGCAATGGGGTTTGATACCCTTTTCTGGTGTGTCTGAAGAGAGCAATGGT
GTACTCACATACATTAAATCAATCAATCAATCAATCAATCAATCAATCTTTAAAAACATAAAGAAAGAAGGAAAGAAA
GAAGGCCATGGTAGTAAGCCACAGGGTCTTCATGGGACCCAGCTTGTCTAAGTATATGGACAGGAAGGACAAGCAGG
CTGAAGGTTGCAAACCTTACCAGCAAAGGCGGGCATTGATGCCGACTGGCCATAGCTGGCCCGTAGGACCGCAGAGACG
ACATCATCAATAAAGCGCTGTGTGACGCCCACCTGGAGCAGGGACTCGGCCACGGACCGCTGGGTGATGTTGACAAAG
GTGGCTTCCCCCAGTGAGTAGAGTAGCTCTTCTACCCCCGAGAAGGCATAGCCGTGAGCCTGGTACTTGTAGATCCTAG
GAGAAGCGAGTGACTGGAATCTTGTGCAGACAGGCTTTCAGGGTGACCACCCAGAGGAGGTCCCCCTGCGGGCCTGCC
ATTCCCAGGTGCTGGTGATGTCTCTGAACACGAGTGGATTTGATTTTCTAGCTTCAGATCTGCTCTGGCTTCAAGGAA
CGAGCTGGGTTGATGGCAACAGCCTGATACCACTACTGTCTTCCCTCTGGCTTGGCCTGTGCGGGATCTCACTGGCTC
AGAGCTCCTGTCTTATCCCCCTCCATTCAATTCGGCCTCCGAAGTACACAGATGGGAACCACCTGCTGATACAATTCT
GGACTAGCTTGCCCTTTGAATGGCTGCCTTTTTCTGAGCCTGGTTTTCAATTGGGCCACTAGATAGGAATGAGGGACCAGA
AGAAGACAGGCAGAACTTGCTTCCGCCATAGGGAACAGTCAGCATGGCAGGGTAACTTAAAACTGACGAGAGAGAAG
AGCATATGGAGGAAAAGAGGGGCCGAGCATGACTGTGTACATGACGGAAGAAATGCAGTCCCAGGACTTGGGAGGGT
GAGACAGGAGGATTGTGAGTTTGAGGGCCAGGCTAGATGACACAGTGAGATTCTGTGCCAACCCAAGGCAGAAAGGTG
ACCAAAAAAAAAAAAAAAAAAAGAAAAGAAAAGAAAAAGCTGGGTGGGGAGGAGAGTTGTGAAATAGTCTTATGGGCA
GGCCATGGCTGTGGCACTCAAGAATTCACCACAACCTGTGGTTGGCTGCATAGAGCACGCAGAGAAGATAGACCCCTATAA
AATTCAGTACAGATTGGGGGAGCTCACGGGCCCCAGCCATCTAGGAAGCTAAAAAGCAAGCCAGAGCTGTCTGG
AGAAGAGGAAGCCACTGTGGTCAACGAGAGAGTGAACCACTACTCTAGGACAGATTCCACACCAATGCCCTGTGTGCA
GCCCTGCTTAAACCCAGGGGATGGCAAACAAACACAAAAACAAGGCAGAAAGACAGAAGAGTGAGATGAGGTCTTG
GTGGGAGTGGAAGAGAGGTTGAGTAAGAAAAGGGAGGAGGGAAGAGGAGGAGGGAGGAGGGAAGAGGAAGGAAGA

Selection Cassette: IRES/Bgal/MC1neo

GGCCGCTCTAGAGGCCATAGCGGCCATTTAAATGGCGCGCCGGATCCCGGGCCGCTCTAGCTAGACTAGTCTAGCTAG
AGGAATTCCGCCCCCTCTCCCTCCCCCCCCCTAACGTTACTGGCCGAAGCCGCTTGAATAAGGCCGGTGTGCGTTTGT
CTATATGTTATTTTCCACCATATTGCCGTCTTTTGCCAATGTGAGGGGCCGGAACCTGGCCCTGTCTTCTTGACGAGCA
TTCCTAGGGGTCTTTCCCTCTCGCCAAAGGAATGCAAGGTCTGTTGAATGTCGTGAAGGAAGCAGTTTCTCTGGAAGC
TTCTTGAAGACAAACAACGTCTGTAGCGACCCTTTGCAGGCAGCGGAACCCCCACCTGGCGACAGGTGCCTCTGCGG
CCAAAAGCCACGTGTATAAGATACACCTGCAAAGGCGGCACAACCCCACTGCCACGTTGTGAGTTGGATAGTTGTGGA
AAGAGTCAAATGGCTCTCCTCAAGCGTATTCAACAAGGGGCTGAAGGATGCCCAGAAGGTACCCCATTTGTATGGGATC
TGATCTGGGGCCTCGGTGCACATGCTTTACATGTGTTTAGTCGAGGTTAAAAAACGTTCTAGGCCCCCGAACCACGGG
GACGTGGTTTTCTTTGAAAAACACGATGATAAGCTTGCCACAACCATGGAAGATCCCGTCGTTTTACAACGTCGTGAC
TGGGAAAACCTTGGCGTTACCCAACTTAATCGCCTTGCCAGCATCCCCCTTTCGCCAGCTGGCGTAATAGCGAAGAGG
CCCGCACCGATCGCCCTTCCCAACAGTTGCGCAGCCTGAATGGCGAATGGCGCTTTGCCTGGTTTCCGGCACCCAGAAGC
GGTGCCGGAAGCTGGCTGGAGTGCGATCTTCTGAGGCCGATACTGTCTGTCGTCCTCCCTCAAACCTGGCAGATGCACGGT
TACGATGCGCCCATCTACACCAACGTAACCTATCCCATACGGTCAATCCGCGTTTTGTTCCACGGAGAATCCGACGG
GTTGTTACTCGCTCACATTTAATGTTGATGAAAGCTGGCTACAGGAAGGCCAGACGCGAATTATTTTTGATGGCGTTAA
CTCGGCGTTTTATCTGTGGTGCAACGGGCGCTGGGTGCGTTACGGCCAGGACAGTCGTTTTGCCGTCTGAATTTGACCTG
AGCGCATTTTTACGCGCCGAGAAAACCGCCTCGCGGTGATGGTGCTGCGCTGGAGTGACGGCAGTTATCTGGAAGAT
CAGGATATGTGGCGGATGAGCGGCATTTTCCGTGACGTCTCGTTGCTGCATAAACCGACTACACAAATCAGCGATTTCC
ATGTTGCCACTCGCTTTAATGATGATTTTACGCCGCGCTGTACTGGAGGCTGAAGTTCAGATGTGCGGCGAGTTGCGTGA
CTACCTACGGGTAAACAGTTTTCTTTATGGCAGGGTGAAACGCAGGTGCGCAGCGGCACCGCGCCTTTCCGGCGGTGAAATT
ATCGATGAGCGTGGTGGTTATGCCGATCGCGTCACACTACGTCTGAACGTGCAAAAACCCGAAACTGTGGAGCGCCGAA
ATCCCGAATCTCTATCGTGCGGTGGTTGAACTGCACACCGCCGACGGCAGCTGATTGAAGCAGAAGCCTGCGATGTC
GGTTTCCGCGAGGTGCGGATTGAAAATGGTCTGCTGCTGCTGAACGGCAAGCCGTTGCTGATTCGAGGCGTTAACCGTC
ACGAGCATCATCCTCTGCATGGTCAGGTCATGGATGAGCAGACGATGGTGACGAGATATCCTGCTGATGAAGCAGAACA
ACTTTAACGCCGTGCGCTGTTTCGATTATCCGAACCATCCGCTGTGGTACACGCTGTGCGACCGCTACGGCCTGTATGT
GGTGGATGAAGCCAATATTGAAACCCACGGCATGGTGCCAATGAATCGTCTGACCGATGATCCGCGCTGGCTACCGGC
GATGAGCGAACCGGTAACGCGAATGGTGACGCGGATCGTAATCACCCGAGTGTGATCATCTGGTCGCTGGGGAATGA
ATCAGGCCACGGCGCTAATCACGACGCGCTGTATCGCTGGATCAAATCTGTGATCCTTCCCGCCCGGTGCAGTATGAA
GGCGGCGGAGCCGACACCACGGCCACCGATATTATTTGCCCGATGTACGCGCGCGTGGATGAAGACCAGCCCTTCCCG
GCTGTGCCGAAATGGTCCATCAAAAAATGGCTTTCGCTACCTGGAGAGACGCGCCCGCTGATCCTTTGCGAATACGCCC
ACGCGATGGGTAACAGTCTTGCGGTTTTCGCTAAATACTGGCAGGCGTTTTCGTCAGTATCCCCGTTTACAGGGCGGCTT
CGTCTGGGACTGGGTGGATCAGTCGCTGATTAAATATGATGAAAACGGCAACCCGTGGTCGGCTTACGGCGGTGATTTT
GGCGATACGCCGAACGATCGCCAGTTCTGTATGAACGGTCTGGTCTTTGCCGACCGCACGCCGCATCCAGCGCTGACGG
AAGCAAAACACCAGCAGCAGTTTTTCCAGTTCCGTTTTATCCGGGCAAACCATCGAAGTGACCAGCGAATACCTGTTCCG
TCATAGCGATAACGAGCTCCTGCACTGGATGGTGCGCTGGATGGTAAGCCGCTGGCAAGCGGTGAAGTGCCTCTGGA
TGTCGCTCCACAAGGTAAACAGTTGATTGAACTGCCTGAACTACCGCAGCCGAGAGCGCCGGGCAACTCTGGCTCAC
AGTACGCGTAGTGCAACCCGACCGCAGCCGATGGTCAGAAAGCCGCCACATGACGCGCTGGCAGCAGTGCGCTTGGC
GGAAAACCTCAGTGTGACGCTCCCCCGCTCCCAACGCCATCCCGCATCTGACCACCAAGCAATGATTTTTTGCATC
GAGCTGGGTAATAAGCGTTGGCAATTTAACCGCCAGTCAGGCTTTCTTTTACAGATGTGGATTGGCGATAAAAAACAAC
TGCTGACGCCGCTGCGCGATCAGTTCACCCGTGACCCGCTGGATAACGACATTGGCGTAAGTGAAGCGACCCGCATTG
ACCTAACGCCTGGGTGCAACGCTGGAAGGCGGCGGGCCATTACCAGGCCGAAGCAGCGTTGTTGACGTGCACGGCAG
ATACACTTGCTGATGCGGTGCTGATTACGACCGCTCACGCGTGGCAGCATCAGGGGAAAACCTTATTTATCAGCCGGAA
AACCTACCGGATTGATGGTAGTGGTCAAATGGCGATTACCGTTGATGTTGAAGTGGCGAGCGATACACCGCATCCGGC
GCGGATTGGCCTGAACTGCCAGCTGGCGCAGGTAGCAGAGCGGGTAAACTGGCTCGGATTAGGGCCGCAAGAAAACCTA
TCCCGACCGCCTTACTGCCGCTGTTTTGACCGCTGGGATCTGCCATTGTGACACATGTATACCCCGTACGTCTTCCCGA
GCGAAAACGGTCTGCGCTGCGGGACGCGCAATTGAATTATGGCCACACACAGTGGCGCGGCGACTTCCAGTTCAACA
TCAGCCGCTACAGTCAACAGCAACTGATGGAACACAGCCATCGCCATCTGCTGCACGCGGAAGAAGGCACATGGCTGA
ATATCGACGGTTTTCCATATGGGGATTGGTGCGACGACTCCTGGAGCCCGTCAGTATCGGCGGAATTCCAGCTGAGCGC
CGGTGCTACCATACCAGTTGGTCTGGTGTCAAAAATAATAATAACCGGGCAGGCCATGTCTGCCCGTATTTCCGCGTA
AGGAAATCCATTATGTACTATTTAAAAAACACAACTTTTGATGTTCCGTTTATTCTTTTTCTTTTACTTTTTTATCATG
GGAGCCTACTTCCCGTTTTTCCCGATTTGGCTACATGACATCAACCATATCAGCAAAAGTGATACGGGTATTATTTTGC
CGTATTTCTCTGTTCTCGCTATTATTCCAACCGCTGTTTGGTCTGCTTTCTGACAAACTCGGAACCTTGTTTATTGCAGCT
TATAATGGTTACAAATAAAGCAATAGCATCACAAATTTACAAATTTAATTAAGGCCGCGGGATCGATCCCGTCCGAGC
AGTGTGGTTTTCAAGAGGAAGCAAAAAGCCTCTCCACCCAGGCCTGGAATGTTTCCACCCAATGTGAGCAGTGTGGTT
TTGCAAGAGGAAGCAAAAAGCCTCTCCACCCAGGCCTGGAATGTTTCCACCCAATGTGAGCAAAACCCCGCCAGCGT
CTTGTCATTGGCGAATTGCAACACGCAGATGCAGTCGGGGCGGCGCGGTCCAGGTCCACTTCGCATATTAAGGTGACG
CGTGTGGCCTCGAACACCGAGCGACCCCTGCAGCCAATATGGGATCGGCCATTGAACAAGATGGATTGCACGCAGGTTT
TCCGGCCGCTTGGGTGGAGAGGCTATTCCGCTATGACTGGGCACAACAGACAATCGGCTGCTCTGATGCCGCCGTGTTT
CGGCTGTACGCGCAGGGGCGCCCGGTTCTTTTTGTCAAGACCGACCTGTCCGGTGCCCTGAATGAACTGCAGGACGAG

GCAGCGCGGCTATCGTGGCTGGCCACGACGGGCGTTTCCTTGCGCAGCTGTGCTCGACGTTGTCACTGAAGCGGGAAGG
GACTGGCTGCTATTGGGCGAAGTGCCGGGGCAGGATCTCCTGTCATCTCACCTTGCTCCTGCCGAGAAAGTATCCATCA
TGGCTGATGCAATGCGGCGGCTGCATACGCTTGATCCGGCTACCTGCCCATTTCGACCACCAAGCGAAACATCGCATCGA
GCGAGCACGTA CTGGATGGAAGCCGGTCTTGTCGATCAGGATGATCTGGACGAAGAGCATCAGGGGGCTCGCGCCAGC
CGAACTGTTCCGCCAGGCTCAAGGCGCGCATGCCCCACGGCGAGGATCTCGTCGTGACCCATGGCGATGCCTGCTTGCC
GAATATCATGGTGAAAAATGGCCGCTTTTCTGGATTTCGACTGTGGCCGGCTGGGTGTGGCGGACCGCTATCAGGAC
ATAGCGTTGGCTACCCGTGATATTGCTGAAGAGCTTGCGCGGAATGGGCTGACCGCTTCTCTGTGCTTTACGGTATCG
CCGCTCCCGATTTCGACGCGCATCGCCTTCTATCGCCTTCTTGACGAGTTCTTCTGAGGGGATCGGCAATAAAAAGACAG
AATAAACGACGCGGTGTTGGGTCGTTTGTTTCGGATCCGAATTCCTCGAGGGCGCGCCATTTAAATGGCCAGCGAGGCC
GGTACCCAATTCGCCCTATAG

Targeted Locus:

GATCCTTCTGCCTCCATCTCCCAAGCGATGCAATCAGAGGCTGTACTGCCTGGCTCTGTTATTTTGGATTCTCCATTAGC
ACACCCTGCATGTGGGTACTGGGTAGTCTCTTTTCATCCTCAAGAATCAGGAGGAAAAAATGTGTGTACTA
GCAAATAAGAGGAATGGATATTTATGGGGTCTGAAAGGCGAGGAACCTCTATATTCCAGTATATATATTTTCATTGTC
CTCCCCACCCCCACCCCCACCCCCACCCCCACCTACGACGCCCCAGTGAGCAGCAGAAGAAAGGAA
GAACTATGCAAGCTGCCCCGCACTCACTCCTTAGCCAGGTTCTTTCATTGTTTAAAGAGGGGTTGGGACAGCCAGGGCTG
GGGGTGGGGGCTTGCTGCCCTAGGAGGTATTTTCAGAGTCTCCCGCCCTCCAGAGTTTCCAAGGACAAAACAGAACCCT
GTCTAGTATTTGACCAAATATGGTGGTATCTCCCGAGGAACTCGCGCCCCAGCCAGCTCCTCAGTTATGCTGTGAAAC
CTGCCCCACACAGATTAATCTTGACATTTCAGGAGCCTCTCACCCCGCTCTCCTCCCTCTCTGGTTCTTGCAAATGGC
AAGACTGACCCTCAGCAAGACAAGGCTGAGGAACTTGACCCGCTTACTAACCCCTTTGCTCCAACGCCATTCTGCTG
TCCCAGAGAGTGGACTCGTGGCTTGCTCACATTCTGACAATCAGTTGGTTGTTCACTCAATGTTACTGGCCTTAGCCAGA
GAGGACAGTCAGTTTAGCTTTTGGGGACCCATGAACCCAGGGGTCCCCTGGCCTCATGAAGCTGTGGCCTGATTTAAGG
TTTCATGCAGCCTCTTCTCCAGAAGGCTGGGTTTGAGGGGTACATGGGAGAGGTGTTAAGACATCTAAGCCCTAATACT
AAGACAGCTGTTGTTTATAATTAATAAATAATTATCACAGCATTGTTTTATAATAAACAGTAAAGTGCTTATTGAAT
GCTTACTCTGTGCGGAGCATTGCCAGCTCTGACATGGCTCGTTTCTTGTGCTTCGAAGTAATATCTAGAGATGTGGA
CAGACTTAGACTTTAAGTAGGAGTTGGCGCGGGGTCACTCTTCTCAGGGTGTAACCTCCATTGTACAGAGAATAATACT
GAGGCTGAGAGAAGGAAGGTCATAAGTAGTCAGTCCTACAGGGGGTGAGATCTCTCGTGGAAGGTAGCAAGTGTA
CTCCATGAGGGCTGTAACGTTGGCTAGGAAGTTTGTGCGCATCTGCACCTCTGGCCTGGGTGGAGCACACAGACTCAG
AGACATGCTCATAGAGGGCTAGAACGGTGCGAGAAAATATCCCAGCACAAACAGTGTTGGGATGGTGTGTTGAGTTCTGG
ATAGGAACCAGGCCCCAAGCCAGCCCCGACACTGCTAATTCAGTGTGGAATACTGGGAAAATCTCCATCTTATTTCAG
GTCTCAGTTTCCCTGCCTGTGACCTAGAGGGTAGGCAGCCAAGCTCACCTGAGGCTGGTTGGGTGGCTGGAGTTGTTTC
TCCGGGAGATAGTGTTCCTGGTGCTGGGCCAACCTGGTCTCAGTACATTTTTCTCTCCTGACCAACCAGCAGCCTATCC
CTCCTCCACCCTCACCCCTTGCCATCCCCAAAGCAAACGAAGCTGATTGTCTCAACTGGCGCTGTGGGTGCTGGCTGG
TCAGCCAGCCGCAGGCCACAGGCAGAGGTGCCATCAGCCAGGGCCCCACCAGACACACAGGGCATTGTCTTTGGTCA
ACAGCCCCTGGGCACCTCAGCCTGGCTCCTGGCCTGCCCCACACACCCCTCACCGCTGCCACTGTGCTAAGGCACAG
CCAGCTGGGGGCCCAAGACTCCCAGCTGACAGTGAGCCCACCCACCCACACCCCTGTGGAGCTAT
AATTGCCTCAGTCCATCCTGTTGCTGCCATTCTCTCTACGGCATCTGGGGTTCCTGGCGGGTGCCAGCTGCGGGCCTG
CCGCTGACTTGGTGGGATGGACTGGCCGCACAGCCTGGTACGTGGTGCTCCCTACCCACCTCCACCTTCTCTGTAA
GTGTTTCTTTCCATTGATTAATGGCTGCCTGTGTTTGGCAATCTGCAGGACCAGTTCTGTCTCTCCTCCAGGC
CCAGAGAGAAACAGAGGTTGGTCTCAGCCTGCCGTGATGGCCAAAGGCTGGACACAGTCTGGCCACTGCAACCCCTT
TCAAACAAGCAACTGGGGAGATCCGGACAGAGTCAGGCACTAGGGGTTTTTCCAGGCCTGGCTTCTGGGATCTGGGCA
GAATGCATGATCTTAGGCAAGTTGTCTGTCTTTGTTTCCCATCTGGAAATTGAGGGTGGGGCTGTTGAGTCTGGTCCAT
GATTCCCCTGCAAGGTGAGTTGAGGAGTGTGTGGGAAGCGTCACTGAGACAGCCTGGAGGGAGGGAAATATTTCTGCA
GCAGAATGGAGGACCAAGAGGAAGAATTTAGCAATCTGATTCAGTCTGCGCTGGCGTTGACGCCAGCAAGTGCTCC
GCCAAGAGGGGCTAGGCTGGGACTTGTTCCTCAAGGATCAGAGCTTGCTGGGGAGCCTGGATAAGAACTAGGCCCAGG
CCCTGTGGACTGAGAGGTCCAGGGGAGGCATTAAGCCTGGTAAGACTCTGAAAAGTAGTGAGGAAAATCAACCAGGA
ATGGGGAAGGGCAGGTTGTCTTTGAAGGAGGGGGAGGGGAAGGGAGGGAGGAAGGAAGAGGGGAGGAGAAGGAGGA
AGAGGAGGAAGAAGAAGAGGGAGGAGGAGGAAGAAGAGGAAGAAGAGGAGGAGGAGGTAGTGGTGGTGAGTGCCT
GATCTGGAATGGAGTCTCACAGAAACCATGTGCCAGCTTCATGCTGCGTTCCTTCTCTCGCCACTCTGTTTCAACTC
ACTTCCTTTCAGCAGAGCCTGTAAGCAGCTCCAAAACCTCTCTCACTTTCCACATCCCTGGAAGAGTTCTTGTGCTCAT
GATTCCTCCTTATTCCATTGGACAAGCCTCTAGAAAAGCTGGCTGGGCCCAGCCACCTTGCTGACCTAAGCCAAGTGTG
AGCCCCAGCCTCCAGCCCCTCCCCCACTTGTCATTCTGCTACTTTCCCCACCTGCCCCCACAGTTAACACCACTGA
GTTTCAGGGCAGGTGTGGTGGCGGACGTA CTCTGTTTATTCTGTTGTGACCCAGGATGTCTGACAGCATGCAGATACA
GACACAAGGAATAAAATTGTGTGGAAGGCGCTCTATGCTCTTGGGGAGTTGGCGCCATGGGGGTGGGGCTCGGGGCA
GCCAAGAGGATACCAAAGTATCACATGTCCAAGTACAGTTGCAGGCCTGTGAGGGGCACGTGCGTTGTGACAACTCCA
AGCTGCTCAGCAGTGTGGCTGAGGCAGTGAACCTTGAGCCACCGCTGGGCAAGGTGTTTGAAGGGAAAACGGAAGAA
GTAGAACTCTGCAGGCAGAGATCTGTGCAAAATCCTGTCTACAGCAGCAAGGACCGTGCTGAGCACAAGCACAGAGGA
GCCAAGAGGGGCACAGGAGATCCCCCAGGGCCTCGGGAAGGATGTTAAGGGGGAAGTGATGTGGACAGACACGCTTC

TCAATGGTGGTTGCTGCTGGCCTTGGTGCGGTGAGCTGACTAGAAGCCAGACAGGTTTGGAAAAGTAGGCTTAGCCGG
GCGTGGTGGCGCTTGCTTTAATCCCAGCACTCGGGAGGCAGAGGCAGGCGGATTTCTGAATTC AAGGCCAGCCTGGTG
TACAAAGTGAGCTCCAGGACAGTCAGAGCTATAAAGAGAACTCTGTCTCGAAAAACCAAAAAAAAAAAAAAAAAA
AAAAAAAAAGTAGGCTTGAGTGAGCTGTCCTGGGAAGCAACTATGGTCTATAGATGGAGTGAAGGCTGACCTAGGGTGCATTGGG
GGGTTTTCAAGAGATTCCCTATTTTAGGACTTCAAGATAGCTGCCGTGGGGGTGTGTGGTGTGACCAGTGCCCAACACA
AAGCAGGTGTCCATACCCAAGGTGGCCATGGAAGACTTCTCACCTCCCTCACCTAACCTATGCTTTGGCCAGAGATG
CTTGGCTCTGGCCTTTGACCAGTAGTCTTCTCCCCAGCTCTTCTCCTGGCCATCTCCATCTTCTGGCGCCAAGCCAC
CCCCGGAACACCAAGGCAAAAGAAAAGGGCAAGGGGCCGCTCTAGAGGCCATAGCGGCCATTTAAATGGCGCGCCG
GATCCCGGGCCGCTCTAGCTAGACTAGTCTAGCTAGAGGAATTCGCCCCCTCTCCCTCCCCCCCCCCTAACGTTACTGG
CCGAAGCCGCTTGGAATAAGGCCGGTGTGCGTTTGTCTATATGTTATTTTCCACCATATTGCCGTCTTTTGGCAATGTGA
GGGCGCGGAACCTGGCCCTGTCTTCTGACGAGCATTCTAGGGGTCTTTCCCTCTCGCCAAAGGAATGCAAGGTCT
GTTGAATGTCTGTAAGGAAGCAGTCTCTTCTGGAAGCTTCTTGAAGACAAACAACGTCTGTAGCGACCTTTGCAAGGCAG
CGGAACCCCCACCTGGCGACAGGTGCCTCTGCGGCCAAAGCCACGTGTATAAGATACACCTGCAAAGGCGGCACAA
CCCCAGTGCCACGTTGTGAGTTGGATAGTTGTGGAAAGAGTCAAATGGCTCTCCTCAAGCGTATTCAACAAGGGGCTGA
AGGATGCCCAGAAGGTACCCCATTTGTATGGGATCTGATCTGGGGCCTCGGTGCACATGCTTTACATGTGTTTAGTCGAG
GTTAAAAAACGTCTAGGCCCCCCGAACCACGGGGACGTGGTTTTCTTTGAAAAACACGATGATAAGCTTGCCACAA
CCATGGAAGATCCCGTCGTTTTACAACGTCGTGACTGGGAAAACCTGGCGTTACCCAACTTAATCGCCTTGACGACACA
TCCCCCTTTGCGCAGCTGGCGTAATAGCGAAGAGGCCCGCACCGATCGCCCTTCCCAACAGTTGCGCAGCCTGAATGGC
GAATGGCGCTTTGCCTGGTTTCCGGCACCAAGCGGTGCCGAAAGCTGGCTGGAGTGCGATCTTCTGAGGCCGAT
ACTGTCTGTCGTCCCTCAAACCTGGCAGATGCACGGTTACGATGCGCCCATCTACACCAACGTAACCTATCCCATACGG
TCAATCCGCCGTTTGTTCACGAGAAATCCGACGGGTTGTTACTCGCTCACATTTAATGTTGATGAAAGCTGGCTACA
GGAAGGCCAGACGCGAATTATTTTGTATGGCGTTAACTCGCGTTTTCATCTGTGGTGCAACGGGCGCTGGGTGCGTTAC
GGCCAGGACAGTCGTTTGCCGTCTGAATTTGACCTGAGCGCATTTTTACGCGCCGGAGAAAACCGCCTCGCGGTGATGG
TGCTGCGCTGGAGTGACGGCAGTTATCTGGAAGATCAGGATATGTGGCGGATGAGCGGCATTTTCCGTGACGTCTCGTT
GCTGCATAAACCGACTACACAAATCAGCGATTTCCATGTTGCCACTCGCTTTAATGATGATTTACAGCCGCGCTGTACTG
GAGGCTGAAGTTCAGATGTGCGGCGAGTTGCGTGACTACCTACGGGTAAACAGTTTCTTTATGGCAGGGTGAAACGCAG
GTCGCCAGCGGCACCGCGCCTTTCCGGCGGTGAAATTATCGATGAGCGTGTTGTTATGCCGATCGCGTCACACTACGTC
TGAACGTGAAAAACCCGAAACTGTGGAGCGCCGAAATCCCGAATCTCTATCGTGCGGTGGTTGAACTGCACACCGCCG
ACGGCACGCTGATTGAAGCAGAAGCCTGCGATGTGCGTTTCCGCGAGGTGCGGATTGAAAATGGTCTGCTGCTGCTGA
ACGGCAAGCCGTTGCTGATTTCGAGGCGTTAACCGTCACGAGCATCATCCTCTGCATGGTCAGGTCATGGATGAGCAGAC
GATGGTGCAGGATATCCTGCTGATGAAGCAGAACAACTTTAACGCCGTGCGCTGTTTCGATTATCCGAACCATCCGCTG
TGGTACACGCTGTGCGACCGCTACGGCCTGTATGTGGTGGATGAAGCCAATATTGAAACCCACGGCATGGTGCCAATG
AATCGTCTGACCGATGATCCGCGCTGGCTACCGGCGATGAGCGAACGCGTAACGCGAATGGTGCAGCGCGATCGTAAT
CACCCGAGTGTGATCATCTGGTCGCTGGGGAATGAATCAGGCCACGGCGCTAATCAGACGCGCTGTATCGCTGGATC
AAATCTGTGATCCTTCCCGCCGGTGCAATGAAGGCGGCGGAGCCGACACCACGGCCACCGATATTATTTGCCCGA
TGTACGCGCGCTGGATGAAGACAGCCCTTCCCGCTGTGCCGAAATGGTCCATCAAAAAATGGCTTTTCGCTAACCTGG
AGAGACGCGCGCTGATCCTTTGCGAATACGCCACGCGATGGGTAACAGTCTTGGCGGTTTCGCTAAATACTGGCAG
GCGTTTCGTCAGTATCCCCGTTTACAGGGCGGCTTCGTCTGGGACTGGGTGGATCAGTCGCTGATTAAATATGATGAAA
ACGGCAACCCGTGGTGGCTTACGGCGGTGATTTTGGCGATACGCCGAACGATCGCCAGTTCTGTATGAACGGTCTGGT
CTTTGCCGACCGCACGCGCATCCAGCGCTGACGGAAGCAAAACACCAGCAGCAGTTTTTCCAGTTCCGTTTATCCGGG
CAAACCATCGAAGTGACCAGCGAATACCTGTTCCGTCATAGCGATAACGAGCTCCTGCACTGGATGGTGGCGCTGGAT
GGTAAGCCGCTGGCAAGCGGTGAAGTGCCTCTGGATGTGCTCCACAAGGTAAACAGTTGATTGAACTGCCTGAACTA
CCGCAGCCGGAGAGCGCCGGGCAACTCTGGCTCACAGTACGCGTAGTGCAACCGAACGCGACCGCATGGTCAGAAGCC
GGGCACATCAGCGCCTGGCAGCAGTGGCGTCTGGCGGAAAACCTCAGTGTGACGCTCCCCGCGCGTCCCACGCCATC
CCGCATCTGACCACCAGCGAAATGGATTTTTGCATCGAGCTGGGTAATAAGCGTTGGCAATTTAACCGCCAGTCAGGCT
TTCTTTACAGATGTGGATTGGCGATAAAAAACAACCTGCTGACGCCGCTGCGCGATCAGTTCACCCGTGCACCGCTGGA
TAACGACATTGGCGTAAGTGAAGCGACCCGATTGACCTAACGCCTGGGTGGAACGCTGGAAGGCGGCGGGCCATTA
CCAGGCCGAAGCAGCGTTGTTGCAGTGCACGGCAGATACACTTGCTGATGCGGTGCTGATTACGACCGCTCACGCGTG
GCAGCATCAGGGGAAAACCTTATTTATCAGCCGAAAACCTACCGGATTGATGGTAGTGGTCAAATGGCGATTACCGT
TGATGTTGAAGTGGCGAGCGATACACCGCATCCGGCGCGGATTGGCCTGAACTGCCAGCTGGCGCAGGTAGCAGAGCG
GGTAAACTGGCTCGGATTAGGGCCGCAAGAAAACCTATCCCGACCGCCTTACTGCCGCTGTTTTGACCGCTGGGATCTG
CCATTGTCAGACATGTATACCCCGTACGCTTCCCGAGCGAAAACGGTCTGCGCTGCGGGACGCGCGAATTGAATTATG
GCCACACCAAGTGGCGCGGCGACTTCCAGTTCAACATCAGCCGCTACAGTCAACAGCAACTGATGGAACCCAGCCATC
GCCATCTGCTGCACGCGGAAGAAGGCACATGGCTGAATATCGACGGTTTCCATATGGGGATTGGTGGCGACGACTCCT
GGAGCCCGCTCAGTATCGGCGGAATTCAGCTGAGCGCCGGTCTGCTACCATTACAGTTGGTCTGGTGTCAAAAAATAATA
ATAACCGGGCAGGCCATGTCTGCCCCGATTTTCGCGTAAGGAAATCCATTATGTACTATTTAAAAAACACAACTTTTGG
ATGTTCCGTTTATTCTTTTCTTTTACTTTTTATCATGGGAGCCTACTTCCCGTTTTTCCCGATTTGGCTACATGACATCA
ACCATATCAGCAAAAGTGATACGGGTATTATTTTGGCGCTATTTCTCTGTTCTCGCTATTATTCCAACCGCTGTTTGGTC
TGCTTTCTGACAACTCGGAACCTGTTTATTGCAGCTTATAATGGTTACAAATAAAGCAATAGCATCACAAATTCACA

AATTTAATTAAGGCCGCGGGATCGATCCCGTCGAGCAGTGTGGTTTTCAAGAGGAAGCAAAAAGCCTCTCCACCCAGG
CCTGGAATGTTTCCACCCAATGTCGAGCAGTGTGGTTTTGCAAGAGGAAGCAAAAAGCCTCTCCACCCAGGCCTGGAAT
GTTTCCACCCAATGTCGAGCAAACCCCGCCAGCGTCTTGTCAATTGGCGAATTCGAACACGCAGATGCAGTCGGGGCG
GCGCGGTCCCAGGTCCACTTCGCATATTAAGGTGACGCGTGTGGCCTCGAACACCCGAGCGACCCTGCAGCCAATATGG
GATCGGCCATTGAACAAGATGGATTGCACGCAGGTTCTCCGGCCGCTTGGGTGGAGAGGCTATTTCGGCTATGACTGGG
CACAACAGACAATCGGCTGCTCTGATGCCGCCGTGTTCCGGCTGTCAGCGCAGGGGCGCCCGGTTCTTTTTGTCAAGAC
CGACCTGTCCGGTGGCCTGAATGAACTGCAGGACGAGGCAGCGCGGCTATCGTGGCTGGCCACGACGGGCGTTCCTTG
CGCAGCTGTGCTCGACGTTGTCACTGAAGCGGGAAGGGACTGGCTGCTATTGGGCGAAGTGCCGGGGCAGGATCTCCT
GTCATCTCACCTTGCTCCTGCCGAGAAAGTATCCATCATGGCTGATGCAATGCGGCGGCTGCATACGCTTGATCCGGCT
ACCTGCCCATTTCGACCACCAAGCGAAACATCGCATCGAGCGAGCACGTACTCGGATGGAAGCCGGTCTTGTGCGATCAG
GATGATCTGGACGAAGAGCATCAGGGGCTCGCGCCAGCCGAACCTGTTTCGCCAGGCTCAAGGCGCGCATGCCGACGGC
GAGGATCTCGTCGTGACCCATGGCGATGCCTGCTTGCCGAATCATGGTGGAATAATGGCCGCTTTTCTGGATTTCATCG
ACTGTGGCCGGCTGGGTGTGGCGGACCGCTATCAGGACATAGCGTTGGCTACCCGTGATATTGCTGAAGAGCTTGCGG
GCGAATGGGCTGACCGCTTCCTCGTGCTTTACGGTATCGCCGCTCCCGATTTCGCAGCGCATCGCCTTCTATCGCCTTCTT
GACGAGTTCTTCTGAGGGGATCGGCAATAAAAAGACAGAATAAAACGCACGGGTGTTGGGTCGTTTGTTCGGATCCGA
ATTCTTCGAGGGCGCGCCATTTAAATGGCCAGCGAGGCCGGTACCCAATTTCGCCCTATAGGCACCTGCATCTTCTGAGC
CAACCACCAACCCGGTGGCCTCTGCAACAACCCTCCCTCCCTGCACCCACTGTGACCCTCAAGGCTGATAAACAGTAA
CGCTGTTCTTTGTAAAGGAAGGCATTGATTGGGCTTGTTCCTTTTAGGACGCGCTAAAATGGTGTGCGGGTGGAGATC
CCTGGGACACAGATTCCAGATCAGCGTGAGTGAGCATTTTCCAGGATGTAGCTCAGTTGATAAGAGTGTCTGCCAGCA
CAAACGAAGACCTGTATAAACCCAATGGAGGCGGTGCACACCTATATGTAATCTCTGTGCTCTGATGATGGGTAGATCA
GGAACTCAAGGCCATCCTTGACTATGAATACAGCCTTAGATACAGGAGAATCCCTCAGGAAACAAATACTGCTCTCCT
TTTTTACATTTAAGATCTGGGTGTGCTTTCTTTGGGCTCCTGAGTCTGTGTAGCAGCTATGTGTAATAGAAGCCTGGTTG
CCTTAAGCCAATATGCTACCCAATACTCAAAGTTACTAGGATTTTAAAGTTAGTAGTTACTCTTAAGAAGAGGCTGG
CTCCAGGCTCTGCAGTGACAACTAGGGATCAGCGTTTCCCGATTGTTGGTGGAGCTGACCCTTGTGCACTGGAAGGT
TGCCCCAACCCAGGATTCTTTCGAGAACAGACCTAAACTCCCCTAAAGAACCTCTGCTTGCCAAAAGAGGCATGAAA
ATATTCACATACACACACACAAACATATGAATATATATACATATATATACATACATACATATACATATACATATACATA
TACATATACATATACATATACATATACATATACATATACATATACATATACATATACATATACATATACATATACATAT
ACATATATATCCTGGGAAGAGGAACCTTTTTTTTTTTTTTAAATCCAGCCACTTATCTGCAGTGCTGGATGTATGTATCT
GTGATCCTCAAAATGTCAGTGTGAGTCAGCCACCTGGGAAGCTTGTTTCAGCCAGACACAACCTGGCCTAGCACTCAGGAT
GCTGACTTAGGTGGGCCCTTGAGTGTAGTGACTTCTTTAATTACTACATTATAGGTCTTGGCGGTGGCTTATGCGGCCA
TCTGTGACCAAACCTCTGAGAACCACTGGATCAGCAAGACATTCTACTGACCAGCACAGGCAGTATGGAAAGAGTTA
TCCTAAAGCCCCTACAGTTTTTTTTTTTTTGCCCCCGTTGATGCTCTTCCCCCTTGAAATTGAATCTTACCCCCTGGGC
CTTCTAACCCACAGCAAATCCATAATCAGCTGTCTGGGCTCTAAAAATACCCTGCCCCCCCCCAGAACAGCTGAGGG
GCTTGGGCTATTTCCATGGGCGAGTTAGCATTTTGGAGTTACCCTCTGGGAAAGGGTCAATAGCCCCCTGTAGGAAT
ATTTCACTTGGTTGCTTGAGATCCTGCGCATAAGCAGCTTCAATATGCAGAATTTTAACTGTCTTAATTCATGAAAAGC
CCATGGTTAGGTATGTGCTGTCTGGGCTGAAAGTAACCTTTTTTGGTATTGTTGTAGAGTGTATAGTACTGGTTAA
ATTACCCTGGGAAGTTTTGGCCTGGGTCCAGACACATGGAAAATACACTCCACGTGCCAGTCATGCCGATCCGTTTAG
CAGACACTTCTGCAGGGGCTGCTTGTCTCTAAGGCTCCCACAGAGGCTCTCTGAGTCTGTGGGGTGTGGCCTTGTCTGC
CTTAATGGGCACTGCCCATCCCTACCCAGCACTCTTAAAGAAACACAACATGTAAATAAATGCAGGCTTCGAGGGACC
CCTGGCTTTCCTTAGTGCTGTTTCATGACTAGGTGAGGAGAAAGGCATTCTTAACGTTCTATCTCTAAAGGTTGGCCAT
CTTGGGTCATCTGCTCTAGAAAGTAGAACATTTGTGCAGTTTTATGTTTTCTTTCTCTTTTCTTCTTCTTCTTCTTCTT
TTATTTTTTTCTGAGACAGAATTTTATGTACCCAGGCTAGCTTCAAATTTACTATGTAGCCAAGGATGACCTTGAATTT
CTGATCCTCCTGCCTCATCTCCTGAAGGCTGGATTCCCAAGCAGGGATGACCGTAACTCAAGGCTTCGTGCATACTAGG
AAAGGACTCTACTGACTGAGCTACATTCTTAGCCTGTGTGCAGGGCTTTAAGTGCTCCTCATGCTGTACTGAGGACTAC
GGGCCATCTGGGTGGTACCTTTTCTGTTTTACTGGCCAGATTACAAAGCCTTTCTGGGCCTGGGGAGGGATTGCTGGTCC
TGGCCTGAGAAGGCTAAGTTGGGCCCTGGGACTAGCTCTCAGCTGGCCTGTGTGTTCCTTTCTGGAATCTGTCTCTGA
AAGTACGGAGAGCAAGAGTCGAACTTGAAGGCTTGTGCAAGCAGGCCTGAGGGCATTGGGAGTGGCTCTGGATTGGAG
CTGTTTAGGCTCCCATTCAGGCAAAGGACTCTGAAGAGTGCAGCCAGCTCAACCTTAGCCTAAAGCCCCAGCCCAGCCC
AGGACCTGCTCTGGGGTCTAAGCCACACCCTCCTTAGGGATCTGAAGGAGGGATGGTTAAGAACAGCGAGTTTTGCATT
GTCTTTGGTCTTCTGACATACAATGATAACTTGAGCCATCAGACTAACTGAAAGACTCTATCATATGTTTTGACTGATGT
CATGGATCTTGGGGGCTGGGTCCACAGCCTTGACATTTGGGTAAAGACCTCTGCTCCAGGAATTATATTATTAGAACCTG
TTATTCTAAGAAAATCAGTTTATTCTGTTGTCCCATTTATTAGACAAGTCAGCACTTGACCCTTCCCTGGCATAGGTGGCA
GGGCCAGTCTATAAGGTCTATGTTAGGAATTTGGCTCAGCGGCTGTGGAAGAGCTCCCCTGGGGTGGGGGGAGGCTGT
TGACAGCAGTCTTTGGTTGTGGGAGAGAATCTGGGATTTGCTTTGTGCTCTGCCTGTGGCCGAAAGTCGTTTTAACCAT
TTTGTCTTTATTGTTTCAGTTTTTCATTTGTTTTCTTCTACTTCGACCAAAGTTTGCTTCTGGTGTGCCAGTCTTACGGCTT
CTGTTACACCTGCCACACGCAGATC