

GENOTYPING BY PCR PROTOCOL

MUTANT MOUSE RESOURCE & RESEARCH CENTER: UC DAVIS

mmrrc@ucdavis.edu

530-754-MMRRC

Protocol Name: B6;129S5-Slc39a14^{tm1Lex}/Mmucd MMRRC: 031637-UCD

Protocol:

Reagent/Constituent	Volume (μL)
Water	10.275
10x Buffer	2.5
MgCl ₂ (stock concentration is 25mM)	1.7
Betaine (stock concentration is 5M) <i>Optional</i>	6.5
dNTPs (stock concentration is 10mM)	0.5
DMSO <i>Optional</i>	0.325
Primer 1. (stock concentration is 20μM)	0.5
Primer 2. (stock concentration is 20μM)	0.5
Primer 3. (stock concentration is 20μM)	0.5
Primer 4. (stock concentration is 20μM)	0.5
Taq Polymerase 5Units/μL	0.2
DNA (example) extracted w/ "Qiagen DNeasy columns or other similar silica based kits"	1.0
TOTAL VOLUME OF REACTION:	25.000 μL

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.
- Betaine and DMSO have been standardized due to high GC content. Protocol may be tested without. Also, may adjust MgCl₂ to increase reaction or decrease non-specific amplifications.

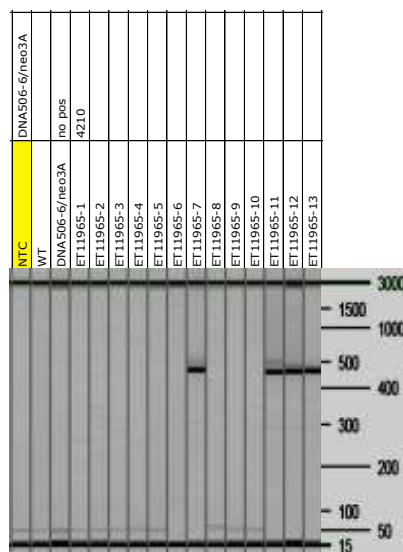
Strategy:

Steps	Temp (°C)	Time (m:ss)	# of Cycles
1. Initiation/Melting HOT START? ☐	94	5:00	1
2. Denaturation	94	0:15	
3. Annealing steps 2-3-4 cycle in sequence	65 to 55 (↓1°C/cycle)	0:30	40x
4. Elongation	72	0:40	
5. Amplification	72	5:00	1
6. Finish	15	∞	n/a

Primers:

Electrophoresis Protocol:

Name	Nucleotide Sequence (5' - 3')	Agarose: 1.5%	V: 90
1. DNA506-100	TCATGGACCGCTATGGAAAG	Estimated Running Time: 90 min.	
2. DNA506-101	GTGTCCAGCGGTATCAACAGAGAG	Primer Combination	Band (bp)
3. Neo3a	GCAGCGCATCGCCTTCTATC	1 & 2	164
4. DNA506-6	TGCCTGGCACATAGAATGC	3 & 4	469
			Genotype
			Wild-type
			Mutant





Lexicon Genetics Incorporated – Genentech Project Materials

Genentech ID:	UNQ5384	Date of Submission:	8.22.05
Lexicon Contract Name:	DNA506	Mutation Type:	X Standard Knock out
LexVision Name:	TRA284N1		☐ Conditional
Reference accessions:	NM_144808.3	Is this gene X-linked?	no

Required Materials:

☐ pKOS clone DNA(s) __pKOS-3_____
☐ Target Vector DNA __pKOS-3TVneo_____
☐ Targeted ES Cell DNA __1D5_____
☐ Genomic Map

Southern Blot Analysis: *External/Internal Probe Strategies*

	<u>5' Internal</u>	<u>3' External</u>
Name of Probe:	IRES 8/9	33/34
Restriction Enzyme for Genomic Digest:	Mfe I	Spe I
Predicted Wild-type Band (kb):	---	12.2 kb
Predicted Mutant Band (kb):	10 kb	14.8 kb
Probe Size:	291 bp	468 bp

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:	DNA506-100	5' Primer Name:	Neo3a
3' Primer Name:	DNA506-101	3' Primer Name:	DNA506-6
Predicted Wild-type Band (bp):	164 bp	Predicted Wild-type Band (bp):	none
Predicted mutant band (bp)	none	Predicted mutant band (bp)	469 bp

5' loxP strategy		Distinguish Cre-excised and wt	
5' Primer Name:		5' Primer Name:	
3' Primer Name:		3' Primer Name:	
Predicted Wild-type Band (bp):		Predicted Wild-type Band (bp):	
Predicted mutant band (bp)		Predicted mutant band (bp)	

Primer sequences:**Southern probes**

IRES-8	5' – AGGAAGCAGTTCCTCTGGAA
IRES-9	5' – CACATGTAAAGCATGTGCACC
DNA506-33	5' – TCAACTCCATGTCTGTGCAG
DNA506-34	5' – ATTCAGTGAGTGCTGTGGTG

PCR Genotyping

DNA506-100	5' – TCATGGACCGCTATGGAAAG
DNA506-101	5' – GTGTCCAGCGGTATCAACAGAGAG
DNA506-6	5' – TGCCTGGCACATAGAATGC
Neo3a	5' – GCAGCGCATCGCCTTCTATC

CCATGAAGCGGCTGCACCCAGCCCTCCTAGCTGCCTCCTGTTGGTGCTGTTTGGTATATGGAGAACTGCCCCAGACTCATGCCTCGTCTGCTGGCCCT
GCCGCCCTCAGTGCCACCTCCTTCTCTGGAAGATCTCATGGACCGCTATGGAAGAATGACAGCCTTACCTTGACACAGCTGAAGTCCCTGCTCGACCA
CCTGCATGTGGGAGTGGCGGGGATAATGTTTCCAGCCCAAGGAAGCAGCACTCCACGGTAAGGCTCCTCTGTTGTATACCGCTGGAC
ACAGAGGGGCCAGCAGCTTGGCCAGGGGAGGACAGGTAGACTCTGGTGGCAGCTAGCTCCCATCTTCTACTGGGGTCAGCATATTCTTCATCCTCAGGG
AGGCTTCCCCACTACCTGCATGGTGTGTTTGTGCTCTCACAAAGGGTTAAGAAGAGGGTGGCAGTCCCCAGACAGTTTTGCAGCTGCACCTGGGTGCGT
GCTGGTGAACCATTGGCTCTCAGGAGAGTTTCTGTGTTCTCACACCATGCCAGACGGCGCTCATAATCCCTCAGATGCAGGAAGAATGTTTTTCTGGGG
ATGGGTTTACAGGGGTTCTGGGCTGGGGGGCAAGACTCTAGTCTCAGGGGTCTTCTAGTCCAGTCTCCAGTCTCATGTGAATGTTCTCCCATCCC
ATCTTCCACTATTCAAGTCTGAGGCTGTTTGTGGCAGCCAGTAGTGGTCAAGCTGCGGAGTCCTTCTGTTCTGTTTTGCCCTCACACTGAGCATTATG
GGAAGTGGAGAGGCAGGGTTAGGGTCTCAGTGGCTAAAGAGCAACGGCGGCTCCTGAGGAGGACCCATACACCATGTTGAGTTGAGGGGCTCAGCT
AGCTGGGATAAAAAATGAAGTACCACATTTTGTGGGCTGCATGTAATTTATGGGGTCTCCTATGAGAGAGGGAAGTTGAGGGTTCATGTCATGAGGCA
TGCTGAAGCCACCCCTGAAGGATAAAATAGGCTGGGGCTGAAAGAGGAAAGTGGCCAGGACACTGTGCATCGCAGCAGTCAGAGCTGCTCAACTG
TGACAAGTGTACAGTACTGGGAGGCTGAGTGCCAACGTGGGCAGTGCGTGAAGTGGCAGGCTGAGTTCAGAGGACTTACACGTGGGCTTAGGGAC
TGCAGCAGTGTCTGGGTCAAGTATCCAGGGGGGGCCAACTCTCAGAGGTGGACCCCTGGTAAAAACCACCCTCAGAGAAGGGTTGTGGCTTATGTGAC
TAAACACAAATGAGAAGAATGTGGGCTGGGGAGATGTCTTAGCGATAAGAGCCCTTGCTTTGAAAGCGGTGAGGACCCAAGTTGAATCCACAGACCC
AGGTAAAGGTTGGGAGCCATGCATACCTCTAGTCCAGTGTGCTGTCTTATTTGGCTGCAGGCTAGTTCAGGCCACAATGAGAGACACTGTCTCGAGG
GAATGAGTGGGAGAGCAGTGGAAACAGGACACCTGTGTTCTCTCTGCTCATGAATGTGTGCATACGTATACAGCAGCAGCAGCTCTCAATTTG
ACTTCCCATAAATATGCAAGACTTCCTAAGGTCACAGGTGCCTGTGTCTTTAATCAGCACAGGTCCATCCATATTTCTGCACAGGTATCTATAATCTACA
TTTTTAGTAGAATAGCTCCCTGGGCTATTGTGAAGTGCAGCTAAATTTGCTGTCTGGTTTCCAGATAGAATCCTGTCTCTCTGAAACCACACCCTGGTCA
CGTGATCGGAATCCCGTCTCCACTGCCACCCCAACCCCAAGTAGCATTGGACCTAGGCCAGGCCAAGTCAGGTCCAGCACTGTGTTTACTGTATTCTTTT
CTCACTTGGGATGGGTTGCACGCTGGGGGTGGAGGGTTTCGCTGAGCTGTGCAGGCTAGGTTGAATTTGCGTAGCAGCTCAGACATTCTTGAG
GCTGTGGTCTTCTCGCTTGGCCACCCAAGTAGCCAAGATTAAGGTTCCCTTGGAACTGTGTTCCCAAAACGCTTTTCTATAACCAGATTATAGTTGTGT
GCCCTGAGCATTACCATGGCTGATCTGAGATCCAAACCAGGCTTTCAAGTGTGGGGCTTTCTGACGCTCATCCCTGGAGACAAGACTCCAGATTCTC
TGCAGTGTGGCTGTGTCTGTTTCTGTTTATTCTCAGGGGTTGAGTTCCTTGCAAGGTCGAGTCGTGTAGGGCAGGGTAGGGCGGGAGTTTGGATTCT
TAAGAACCCTTCTGCCCTCTCTGATTTAGTGTCTTAGGACCTCTTTGCGGCGCAACAACCTGAGCGAGCGATCTCAGATCGGGGCGAGTGAG
TTCAGGAGTTCTGCCCACTTCTCAGCAGCTGGATTCCCAAGGCTGCACCTCAGAAAACCAGAAGTCTGAGGAGAATGAACAGCAGAGGAGGG
GAAGCCAAGCGCCATTGAAGGTAAGTACGGACTGGATTGGGGCAATGGTGGATATCGATGATGGATACGCGTACCCAGACTGTTACACACATCACCAG
ACCCTGGGTGGGCTGACTGTTGAGACTGCTGGGTGAGCTGACCTGCCAGCATGTGGAATATGTTTTCTTTTACTACCCCTTGTTTTCATTAAACTGTA
AGAGTGCCAATCTTTATGACCTCTCTTTGGCTACTTCTTCACTTCCCACTCCCATGCCCTCAACCCCTCTGCTTCTTAGTACCTCCCTCTACCTAGAGGGGACT
CACCCTGCTCTGAGTAAGTCTTGAATTGCCCTTTCAAAGTCTATAGCACTAGCAAGGGCTACCAGACCTTAACCTGTGTTGCCATCATAAAGTACACATAC
TGTCTAACTCATGGTACTCCACCATGTTGCGTCTCCAGTCTCTTCTCTAAAGGGTAGGCTGCTGAGATAGCAGCCTCAACCTTGTGTTTTCCCGAGGCTTC
CCTAACAAAGAGATGGAGTCAGCAGACATTTCTGAGGGGCTGCTGGATCTCTGTATGCCTACATCACTGTGAGCAGCGTTACTCCCTCAGTAATGGAGG
CCCTCGTCTGTTCTGTTTCTCTCCACAGTGTGGGGCTTTGGGTTCTCAGTGTCTCGCTGATTAACTGGCCTCTCTCTGGGAGTCTCTGGTCTGCCGTGC
ACGGAAGAAAGCGTTTTTCAGCCGTGTGCTCACTTACTTCATCGCCCTGTCCATTGGAACGCTGCTCTCTAACGCCCTTTTCCAGCTCATCCAGAGGTGC
AGTAGAACAGGCGCG

CTCGGCGCTGGGGTTGTAGCCTGTTGGTAGGTAGAACATTGGCTTAGCATATATGAGGCCCTCAGCTCCACAAAGGGAATGGAGAAAAGAATAATTAC
TAGCTTTCTAATTTTGATACACAGAGACTGACAGGCTGACCGTGTCAATTGTTAGTTTGACCAATAAACGAAGATGTTATAGTAAATGTTGTAGAA
GAATCATAGTGTTCAGATGTGTCAGCAGCTGTTTCTGTAGGGTGTTGGGTGTTTCAITTTGGTTTGGTTTGTAGACAAAGGTTTCTTT
TATAGAGCTGACTGCTGGAACCTACTCTGTAGACTAGGTTGGCCTCAAATGATAGACACCCACCCACCTCTGCCTCTAAGTGTGCCACCACCTGC
CCAGTGGGTTTTAGGTTTTGTGCTATACTTAAGAAAGTTTGGGCTGAGATGTAGCTCAGTTGGCAGAGTGCTTGCCTCATATGCCCCAAGGATCTATCTA
GGTTTGGTCCCCAGCATTGCATAAACTGGTGTGCCTCTGAGAATCTCAGCACTCAGGAGGCAGAGGCAGGAACATCAGGAGTGCAAAGTCTGCCTCAG
TCACATATAAAATGGAGGCGAGCTGAGGCTACGTGAGTCTGTGTTTCAAAGGAAGGAGGAAGGGATGAAGTCAGTGCTGAGTGCCTGTCTTTCT
TAACCTTGTGTCATTCCCACATCACAGCTGGGTCGATCAATAGGCTGAAGCAGACAAAGCAAAACCACATCGACTCCAGGCTCTCAGAAATATCTA
GCCTTTTGCTGGGCTGTGGTGGTGCATGCTTTTAGTCCAGCAGCTTGGGAGGAAGAAGCCGCCATATCTCTGTGAGCTGAATCCCAGCCTGGTCTACAG
AGTGAGTTCACAGGACAGCCAAGGGCTAAGTAGAGAGACCCTGATTCAAAAAACAACCACAAACAAAATATACATCGACAGTATTCCAAAGATTCTT
CCAAGCATAAATCAGACAGAAATGGACATTGAAAAATAGGTATAAATACCTCTCTGGAGTAGCTTTGCAATTCTTGAAGTGAACAGAAGAGAAGAAA
CTGCAATAAACTAAAGGGGATTGTAAGCGTTGAAGAAATATGTTCTTTGCAAGAGATAATTTCCACCCAGCAACGTTACGTGCTTGTGTTCTGTGA
ATTACTCTTTTAAATTTAGACAGTGCTGTGACTCTTACTCTATTTTCAGAGAAGCTTTTGCCTTCTCGCACCATCTGGTCTCCCTCCCTAACACAATT
ATGCTAATTACATTATTGGAATGTCTCCATTTTTTTTTAAAAAAGGATTTCTTCTAACCCAGGATTTCTGCCTTTGTAAAGCGTTTGCAAAATTTAATTTTATT
ATTTCTGTGTGTAGGTTGGATGTGTACCACAGATCACGTCGGGAAGTCAGAGGGCAGAGTTTTCCTTTTACCTTGTGTTGAGACAGGGTCCCTTAGCTCTG
CGCATAGGTGCTCTGGCCCCGAGCTGCTAGATGCTCTCATGCTAGCCTTCTCAGCCTCTGTCTTGTGTGCAAAAGCTGGGATTGCAAGTGGGTTCCCC
TACAATCGGCTTCTTTCCAAAAAATAATTTTTTAAAGATTATTTCTATTTTATGTTTCTGAGTGTTGTTTGGCTGTATGGATGTGTGCCGGATGAGT
GCTAGGTGCCCCGTGGAGGCCAGAGGAGACCCAAGGATGGCAGATACCCAGGAAGTGGAGTTACAGATAGTTGTGAGCCACTGTGTGGGTACTGGG
AATGGAACCCAGGTCTCTGTAAAGATAACAAGTGCTTAACTAAAGCGTGCTCTCTCTCCAGTCCCAGCAAAACAATTTTTCTATATGCCGTGG
GGTCTCAGGTCAACACACAGAGTTTGTGGGGCCAGACCTTAGGCTGTCTTGCTTACTTGTCTCTCAAATCTTCATGTCTCTTCTTTGACCACTCTCAA
ACTCTCTTTATGAGAGAGAGAGAGAGAGAGAGAGAGAGAGAAGAAAGGACAGGGCAGGGCAGGGCAGGGGAGGGAGAGAG
GGAAAGAGGAAGAGCAAGCTACATTTTCATTGTGAAGTCATTTTCTCCCTGGCAAGGGAATTTCTTTTATGCTTGGGAATCTCTACTTGTAACTTAATG
AGATCTTGCCAAGGATAAATCTCTTATTTGTTTGTGTTGTTTCTTAGGAATTGAACCCAGGACCTTACACTTTTGCTAGGCAAGCACTTAACTGCC
AACTCTAGCCCCACTGGTTGGTTGGTTGGTTGGTTGTTGTTGTTGTTTAAATTTTGAATTAGGTTCTCACTAAATTGACAAAGCCAA
CCTTGAATGACTTTTGTGCTGGCTGGACTCAACTTTGTGGCCCATGGCTTTGCCTTGAATTCATAATCTCCTCTGCTCTCTGAGTGTGGGATTA
CAAGCTGGGCTTTAAGACTCAACAAGGAATAATGCTTTTGGGTTTTTCTCTGATGCCATAGCTGCCTATATACTAAGACTAGCTTGAACCTCTAA
CCTTCTTGGTTGTATAAAGCTTCTCTGAGTGCTGGGATTAAGCACTACCAGGCCTTTCCATCGGAGTAGTGTGTGCATTCTGCTTATTTCTGATGCTG
AATGTTACTATAAGGAGATGAGAGTAGTGAATGAACTCCCATGTA AAAAAGGTTTTAGTCAGGCATGGTGGTGTGTGTATGTCTGTACACCACCTTGTG
GGAGGCTGAGGCAAGACAGGACCATGAATTTCAAGCTCGCTGAGCCACCTCCCAAGGCTATGCCTTCCCCACCTTAAAGATTTATTTATGTTTGT
GTGTTTGCCTGTGTGAATTTATGTACATCTCTATGTGTGAAGAGCCTGTGGAGTTGTGAAGAGGGTGTGGATTTTGGCAATGGAAGTGTGAGATGAT
TGTGGGTACTGGAAACCTGTTTTTCTCCCTCTTACAATAGTTTTCTCAAGCTTCCTTTTGTGGTATGTCTGGTCTAAGTTCTCTGGCAGAATTCGGTTCT
CTGACAACATAATCTATCTCTAGTACCTCTGTGGTGCCGTTGGTTCTCTCTCTCTCTTTTCTTTTGTGTAGCTAGCTCCACTCTGCACGTGTGTG
TCATGTATTTTGTACACACGCCTGTGTGTGCACGTGAGTGAATCTGCATGTGTAGGAGTATGTATGGAACCCAGGGGCCAATGTTAGGCATCTTCTCT
CAAGTCTCTTGGCTGACTGTTTGGGAGCTGTTCCTCCCTGTACTGACCTTACCTAGGCTGTGGCAGCAAGCCCCGGAATGAATCCTCTTGGCTCTTCTT
TCCAGTGTGACATTAACAAGCCCTGGCTCCCATAGCTGTCTCTACATGGGCGCTGGGGAAGTGAAGTATCTCCCTCAGCCCTCGTTTATGATTGTGTG

[illegible]

AGGGTCCTCAGTGGCTAAAGAGCAACGGCGGCTCTGAGGAGGACCCATACACCATGTTGAGTTGAGGGGCTCAGCTAGCTGGGATAAAAAATGAAGT
ACCACATTTTGTGGGTGCACTGTAATTATGGGTTCTCCTATGAGAGAGGGAAGTTGAGGGTCATGTGCATGAGGCATGCTGAAGCCACACCCTGAA
GGATAAATAGGCTGGGGCTGAAAGGAGAAAAGTGGCCAGGACACTGTGCATCGCACGCATGCAGAGCTGCTCAACTGTGACAAGTGCAGCATCACT
GGGGAGGCTGAGTGCCAACGTGGGCAGTGCCTGAGTGGCAGGCTGAGTTTACAGAGGACTTACACGTGGGCCTTAGGGACTGCAGCAGTGTCTGGGTCA
GTAATCCCAGGGGGGGCCAACTCTCAGAGGTGGACCCTGGTAAAACCAACCCTCAGAGAAGGGTTGTGGCTTATGTGACTAAAACACAATGAGAAGAA
TGTGGGCTGGGGAGATGTCTTAGCGATAAGAGCCCTTGCTTTGAAAGCGTGAGGACCCAAGTTTGAATCCACAGCACCCAGGTAAAGGTTGGGCAGCC
ATGCATACCTCTAGTCCCAGTGTGTCTTATTGGCTGCAGGCTAGTTCCAGGCACAATGAGAGACACTGTCTCGAGGGAATGAGGTGGGGAGAGC
AGTGGAACAGGACACCCTGTGTCTCTCTGCTCATGAATGTGTGCATACGTCATACACGCACACACGCTCTCAATTTGACTTCCCATATAATGCAA
GACTTCCTAAGGTCACAGGTGCCTGTGTCTTTAATCAGCACAGGTCCATCCATATTCCTGCACAGGTATCTATAATCTACATTTTTAGTAGAATAGCTC
CCTGGGCTATTGTGAAGTGCAGCTAAATTTGCTGTCTGGTTTCCAGATAGAATCCTGTCTCTCTGAAACCACACCCTGGTCACGTGATCGGAATCCCGTC
CTCCACTGCCACCCACCCCACTAGTACCTTGGACCTAGGCCAGCCCCAAGTCAGGTCACGACTCTGTTTACTGTATTCTTTTCTCACTTGGGGATGGGGT
GCACGCTGGGGGGTGGAGGGGTTTCGCTGAGCTGTGCAGGCTAGGTTTGAATTTGCGTAGCAGCTCAGACATTTCTTTAGGGCTGTGGTCTTCTGCCTT
GGCCACCAAGTAGCCAAGATTAAGGTTCCCTTGGAAATCTGTTCCCAACCGTCTTCTATAACCAGATTATAGTTGTGTGCCCTGAGCATTACCCT
GGCTGATCTGAGATCCAAACAGGCTTTCAAGTGTGGGGCTTTCCTGACGCTCATCCCTGGAGACAAGACTCCAGATTCTCTGCAGTGTGGCTGTGTCT
GTTTTCTGTTTTATTCTGAGGGGTTGATTTCCCTGCAGGCTCGAGTCGTGTAGGCAGGGTAGGGCGGGAGTTTTGGATTCTAAGAACCCTTCTGCC
CTCCTGATTTACAGTCTTTAGCTCTGGAGACCTCTTTGGCGGCACAACITTAGGCGAGCGATCTCAGATCGGGGCGAGTGAGTTCCAGGAGTTCTGCC
CACCATTCTCCAGCAGCTGGATTCCAGGCTGCACCTCAGAAAACCAGAACTGTGAGGAGAATGAACAGACAGAGGAGGGGAAGCCAAGCGCCATT
GAAGGTAAGTACGGAAGTGGATTGGGGCAATGGTGGATATCGATGATGGATACGCGTACCCAGACTGTTACACACATCACCAGACCCTGGGTGGGCTGA
CTGGTGAGCAGTGGTGGACTGGACCCCTGGCCAGCATGTGAATATGTTTTCTTTTACTCACCTTTGTTTTTCAATTAAGTGTGAAGTGCCAATCTTTA
TGACCTCTTTGGCTCATTCTCCCATGCCATGCCCCCAACCCTGTGCTCTTACCTTACCTGCCCTCTACCTAGAGGGGACTACCCCTGTCTGAGTAA
GTCCTTGATTGCCTTTCTAAAGTCTATAGCACTAGCAAGGGCTACCAGACCTAACCTGTGTGGCCATCATAAGTACACATACTGTCTAACTCATGGTAC
TCCACCATGTTGCGTCTCCAGTCTCTTCTCTATAAAGGGTAGGCTGTGATAGCAGCCTCAACCTTGTTTTCCCGAGGCTTCCCTAACAAGAGATGGA
GTCAGCAGACATTTCTGAGGGGCTGTGGATCTCTGTATGCTTACATCACTGTCAGCAGCGTTACTCCCTCAGTAAATGGAGGCCCTCGTGTCTTGT
TCCTCCACAGTGTGGGCTTTGGGTTCTCAGTGTCTCGCTAGTTAACTTGGCTCTCTCTGGGAGTCTGGTCTGCGTCCAGCGGAGAAAGCGTTT
TCAGCCGTGTGCTCACTTACTTCATCGCCCTGTCCATTGGAACGCTGTCTCTAAACGCCCTTTTCCAGCTCATCCCAGAGGTGCAGTAGAACAGGCGCG
CGTTCACTTTTCTGGGCTGACGCAGCCAGTCCCCCTCGGGCTGACATTCTCCTCTGTGTCTTAAAGCCCCCAACAATTGCCACCCGAAAAATGAAT
TGACTCTTCATATCAGGGGCTTAATACTTCTCTCATGTCTCTGTTCACTCAAGTTGGCGTGGCCCTCTTCGGATGATATCAGATGCAAGGTTCTAAAA
CATTGTGCTCCCTTTGGGGAATCTTTGACTCCATTTCTAGAGCTTGATTATAGGAGTCCAAAGCAAAGTTGCCGTTTGTGCTATGTGCGCA
GGCAGGAGCTGACAATTAAGGGAAATCTTGGGGGTGCTCGTGTGTGGACTCCAGTTGATCTCTCAATGATGTGTGAGGCAGAGGGAGGGAGGTACCA
GGGGAACCTGGCCTCAATGGTGTGATCCTGATTTTAATTAAGGCAGCTGTGGCAGCTCATGCCTGCAGTTGCAGCACTTGAATCTGAGGCAGGAGGA
TCACAGCTTGGTCAACCTAAAAAATAGGTTGTTCCACCAAAAAACAAAACAAAACAAAACAAAACAAAACAAAACAAAACAAAACAAAACAAAAC
GAGAAGCTCATTCTGTTGTGCTTGCATCTGATCTTTCCCGCAATAGGTCTGACTTCCCTGGTCCACTCACCTAACTTCTTAAATGTTCAATAATTCTGT
TTTTAATCGCCTCAGTCTAGGAGCTGCAAAAATAAGATCCGAAGTTGAGAGTTTCCAGCTGTTCCAGCTGAGGACAGGCTGCTGTTGGAGAATAAC
TTGTAGCTACCTAGTTGGCCACTTTGGTGGCGTGAGATCTTTTATAAAGGCTCACATCATTGGCTTTTGGCCCTCCTCAACCAAGAGGTTAACTGAGGA
AAGCTCTCTCTGAGGTGTCACGCTCACCCGCTCCCCCTTCATCATGAGGGAAGAAGTGAATTAAGGCTACCTCCCTTGTTTTCTGAGAGGCCCTCAC
CTTGGGCTATTTTTTTCAGCTCCAGCCATGAATTTACTAATTTTTTTTTAAGGATTTGAAATGAAGTGTTTTATTGCTGTTTATTGGGACTACTACCA
TCGCTCGTGTCCGCTTTGGGACACACAAGGGTCAACAACTGGTACAGTTCTGTACTGTCTCCTCACAACCCAGAGTGTGCTATTGGAAATGCG
ATTTGAAATTAATTTTTATAACGAGTTGGTCTTGGAACTCTGCTTTCTACCCAGATCTCTCAAAGCAAATGGGAACACACATAGCTGCTCAGAGACTG
AATCTGACAGGCAGCCTGCTCTGTGACCCCTCCCGTCTGTACGCAACTTTGTTGTTTCTTGCACAAACCGAATGATCCTTGGGTAGTGTACACTCGCCA
CTGTGATGTGGCTTAAATAGGCACAGTAGAGCCAACGACACACCAACCTTCTCTCCCACTCGCTCTGGTGTCTCTGTTAAAGACCTTTGAGTCTTA
GTCTGCACCGCCCGAGCAGCTGCTGAATGCGTGATCGGATGAGGACAGTACGCTGCTTGTGGCAGTACACAGGATGAGTGTGCTGACTAGGAG
CACCTTGGGAGCAGGGGAGTAGTCACAGGGTTCGAGAGCCACCTCAAATTCCTCCTCATACCTCCTGCACTGATTGAAGGAAATGTCATCAGACCCA
AATCACTAACAATCTCCTATTTCT
TGGGGTCTCTTGTTCATACCCACAATTTCTCTGTCCACCTCCTTCCCGTCTGGGGGTGCTTGTCTCCCTGTCTGGTGGGCTGGCAGTATGGGGT
ACGGTTTCTCTGCGTTACCGTATCT
CTTCATAGCCTTGGGATTTGGAACCCCTCTACTCCAACGCCCTTTCCAGCTCATCCCAGAGGTATGACAAGCTGCAGCGCTCTCACAGAGCACCCCTG
TCAGCGAGGGGCGAGTAGGCACAGTGGGGGGAGCCTCTATGTACATGGAAGTTACAGGACTGGCCCCCAAGACTCCTTTGTTTGGAAAGGAAAGCTA
GGACCAAGCTAGGCAAGATTTAAGGGCTAGGTTAAAAATCCCATCCTTAACCGAGCCCCACACATGGACGAGCCATTCACTTCTGTCTTTGTATAAGAT
GAGAAACAATAGGATGACTTCAAAGGCATATGGGTGCTCCCAAGGCTGGGACCGTAGAGTGAACGCCAATGAACCTTGGCATGGAAGAGATGG
CTCAGCTGGTGGATTGCGAGTACCCACAGGAGCTTACAACCTTCACTCAGTTCCAGATAGTCTAGTCCCTTTTGTGGCCTTGCAGGTACGAGTACGAG
TGTGTGTCCGCGACCACACACACACACACACACACACACACACACACAGTGCACACATGTACATGCAGGCAAAACACACTTACACATAGGTGG
AAGACAAGCAACCTCGAATAGCTCTGACCCTCAGTGTGGGGCTTTAATTTAGAGAAGCAAACCACAGCGAAACCCCCAGTTCTCAGTAAAAACCCAGC
TCTTTGTGAGGAGTTTGAGGGCAAAGGAAATCCAGGAAAGCAGGACATTTGTGGTACCTTACGGTGGGTGACCTTCCACGGGAGAGAAGGGAGC
CACTGTTTTGAAGCTGCGTGTATGAGAGATGTTTCAAGTGACCTGCTAATTAATAAAGCAATGCAATTCAGTTCGGGTGCTGACAAGCCCTG
AGCAAAGGCAAGGGCCAGTCTCACATGCTTCTGAGAACACTGTTTTCTACAGTATTGTTTTGTGTTCTAGGTGGAGCAATTGTGATGTCTGTTAAATGA
ATCATGTCTCTCCTGTCTCCACGCCCCCTACCCCCAAAAAAGTCTGACCTGCATGAGTGGCCACTACCCTAAGCTTAGGTCTAATGAGTCTGTGCTC
TTGAGTCCCGCCTCACTACTGGCTCGTCTTCACTTTTCCAGGGTGCACCTCTTCTCCAGAAGAGCTGGCCTGCAAGCAGGGGTTCTTTAACATTTG
CCCTCCTGGTCTCTTAGAGGCGAGGCTAGAGCAGCCCTTAAGGCGCGTGTCTGCTTAACTGTCTCCAGGAAGAGAAATGTTGTCCCTTGAAGCTATTGG
GGTCTCCTTACAGGAGGGTAGCTCTTGTCTCTGTCTGTTTCCCAAGAGACCTGGAGTATATTTTTGGAGATAGCCTCACCTCATGGGTTTAGACTTGCT
GTCTTCTGCTCCGTCTCCCAAGTACTGGGAATTGAGCCTGTTTTCTGTTAGAAACGACACAAAACAGGTCAATTGGATACTTGGCACCATAAACCAGGA
GCCAGACTTAGGACAGCTCTCTGGCTACTCCCATCTTCTTTTACCCTTCTTACTTAAGTGAAATTTCCAGAAAGAACTCAGAGCAGCATACCCCCAGT
CCATTCTTTCAAAAATATTTTTATTTTGTCTAGAGAAATGGAACCTTTGTGGGCAGGCTGGCCTTAGAGTCTGGGCTCTCCACCTCTCTCTCTCT
GAGTTTGGGAAACTAGGCTTGTGGAACCTAGGCTGGCTTTTATCCACCCCAAGTACGCTGCGGACAGAGGCTGCTTTTTTGGTTTGTGGCTCTT
CAAGATTCTGTGGTACGAGCATGTGCAATTCTTGCTGTGGAAGTGAATGGATTTTCTCCTTTTGAATCGTAACTAAGCCACTTCCCGTGTGTTTT
ACGGGCAGATGAACCGAGGACAGTAGATGAGGCAAAAATAAACGCAAGGTGGCTCCCTTTATACGTGGAATTTGCTGACTAAGTGCTTTTGTGGCTAA
GCACTAACAGAGATTAAGACAGCGTCTCATTAAAGGAGACAACCACTTTTAATCCCCAGATCTGGGGAGGTAGAGGCAAGGCTGACCTCTGTGAGT
CTGAGGACAGATCTGGTCTATGTAGTAGACCTAGTCAAAAAGAAAAGAAAAGAAAAGCAAGCAAGGCAAGTGGCCATGGTAGTTCTGCTCATG
CGACCCAGAATGCTTGCCGCTCTTCCCGCTCTTCCCGAGGCCAGGGTTGGCTCCAGCGTGCACATGGCTCCCGGGTGGGTGTCTACAGCTCCAGGT
TCAGGTGAACCTGGCACCTCCTCTGGCCTCCTCAGCCACCTACATGCATATTTGCAAACGCACACATTCACGTACACATAAAATAAAAGTTAAGTAAATG
TAAATAACATATAATAAAACCCATAAGAGCTGGAGATGTAGCTTAGTGTAAGGTGATGCTGACAAACCAAGGTCCTGGATCCCAATGCCAGGAT
CAGAAAAGCCTAAGAGCAGGCTGCTCTTTTGTATCCAAAGAACTATGCAGGCACAGGCTAGTGTGGCGAGTCAGGCGAATGCAGAGGCTAGGTTT
TGCTGGCAGGAGAATGGGCAGCCAGCAGACTGCCCGTCTCCAGAGTGGAGAGTGGTAAGCAGATGAGAGCCGCTGAAGGCTTATGTTTGTAAACTCA
TTCTGTTTTCTGTGCCATAGGCTTTTGGCTTCAACCTCAGGACAATTACGTCTCAAGTCTGCAGTGGTGTGGGGGTTTCTACCTTTTCTTTTCA
CAGAAAAGATCCTGAAGATGCTCTTGAAGCAGAAAAACGAGGTGAGGCCAGTTGTTAATGATGACCTATCCAGTGAAAAACCCCTAACCTCGAAAAAC

[illegible]

AACTCAGGTGTTATGAGAATTAGAAAATAAAATAATTTATGTCATGTGAACTGTAAATGTTTTATTGTGAAGATTCTATAAAATAAGCTATATTCTGTA
ATTGGTGAGTCCCAAGTGTCGGCTTGCTTCAGCCTTAAGAGCTGGGGCATA

Selection Cassette:

CTGGCTTTGTGTTCTAGATCCGTGGTCAGGCCGCTCTAGAGGCCATAGCGGCCATTTAAATGGCGCGCCGGATCCCGGGCCGCTCTAGCTAGACTAG
TCTAGCTAGAGAATTCGCCCCCTCTCCCTCCCCCCCCCTAACGTTACTGGCCGAAGCCGCTTGAATAAAGGCCGGTGTGCGTTTGTCTATATGTTATTT
TCCACCATATTGCCGTCTTTTGGCAATGTGAGGGCCCGGAAACCTGGCCCTGTCTTCTTGACGAGCATTCTAGGGGTCTTTCCCTCTCGCCAAAGGA
ATGCAAGGTCTGTTGAATGTCGTGAAGGAAGCAGTTCCTCTGGAAGCTTCTTGAAGACAAACAACGTCTGTAGCGACCCCTTTCAGGCAGCGGAACCC
CCCACCTGGCGACAGGTGCCTCTGCGGCCAAAAGCCACGTGTATAAGATACACCTGCAAAGGCCGCACAACCCAGTGCCACGTTGTGAGTTGGATAG
TTGTGGAAAGAGTCAAATGGCTCTCCTCAAGCGTATTCAACAAGGGGCTGAAGGATGCCAGAAGGTACCCCATTTGTATGGGATCTGATCTGGGGCCT
CGGTGCACATGCTTTACATGTGTTTGTGCGAGGTTAAAAAACGTCTAGGCCCCCGAACCACGGGGACGTGGTTTCCCTTTGAAAAACACGATGATAA
GCTTGGCCACAACCATGGAAGATCCCGTCGTTTACAAACGTCTGACTGGGAAAACCCCTGGCGTTACCCAACCTTAATCGCCTTGCAGCACATCCCCCTTT
CGCCAGCTGGCGTAATAGCGAAGAGGCCGACCGATCGCCCTTCCCAACAGTTGCGCAGCCTGAATGGCGAATGGCGCTTTGCCCTGGTTCCGGCAC
CAGAAGCGGTGGCGGAAAGCGGTGAGTGCAGTCTTCCGTGAGCGCTGATTGTGCTGCTGATAAACCCGCTCAAACTGGCGAGTACACGGTTACGATCGCC
ATCTACACCAACGTAACCTATCCCATTACGGTCAATCCGCCGTTTGTTCACCGGAGAATCCGACGGGTGTTACTCGCTCACATTTAATGTTGATGAA
AGCTGGCTACAGGAAGGCCAGACGCGAATTATTTTGTATGGCGTTAACTCGCGCTTTCATCTGTGGTGCAACGGGGCGCTGGGTGGTTACGGCCAGGA
CAGTCGTTTGGCGTCTGAATTTGACCTGAGCGCATTTTTACGCGCCGGAGAAAACCGCCTCGCGGTGATGGTGCTCGCTGGAGTGACGGCAGTTATCT
GGAAGATCAGGATATGTCGGGATGAGCGCATTTTCCGTAAGTGCCTGCTGCTGAACCGCAAGCCGTTGCTGATTGACGGCTTAACCGTACAGCATCACTCG
CTTTAATGATGATTTACGCCGCGCTGTACTGGAGGCTGAAGTTCAGATGTGCGGCGAGTTGCGTGACTACCTACGGGTAACAGTTTCTTTATGGCAGGG
TGAAACCGCAGGTGCGCCAGCGCACCGCGCCTTTCGGCGGTGAAATTATCGATGAGCGTGGTGGTTATGCCGATCGCGTCACACTACGTCTGAACGTCG
AAAACCCGAAACTGTGGAGCGCCGAAATCCCGAATCTCTATCGTGCGGTGGTTGAACCTGCACACCGCCGACGGCACGCTGATTGAAGCAGAAGCCTGC
GATGTCGGTTCCCGGAGGTGCGGATTGAAAATGGTCTGCTGCTGCTGAACCGCAAGCCGTTGCTGATTGACGGCTTAACCGTACAGCATCACTCG
CTGTCATGGTCAGGTCATGGATGAGCAGACGATGGTGCAGGATATCCTGCTGATGAAGCAGAACAACCTTAAACGCCGTGCGCTGTTCCGATTATCCGAA
CCATCCGCTGTGGTACACGCTGTGCGACCGCTACGGCCTGTATGTGGTGGATGAAGCCAATATTGAAACCCACGGCATGGTGCCAAATGAATCGTCTGA
CCGATGATCCGCGCTGGCTACCGGCGATGAGCGAACGCGTAACGCGAATGGTGCAGCGCGATCGTAATCACCCGAGTGTGATCATCTGGTCGCTGGGG
AATGAATCAGGCCACGGCGCTAATCAGCAGCGCTGTATCGCTGGATCAAACTGCTGCTATCTTCCGCCCCGTCAGATGAAGCGCGCGGAGCCGA
CACCACGGCCACCGATATTATTGGCCGATGTACGGCGCGTGAGTGAAGACCCCTTCCCGCTGTGCGCGAAATGGTCCATCAAAAAATGGCTTTT
GCTACCTGGAGAGACGCGCCCGCTGATCCTTTGCGAATACGCCCACGCGATGGGTAACAGTCTTGGCGGTTTCGCTAAATACTGGCAGGCGTTTCGTCA
GTATCCCGCTTTACAGGGCGGCTTCGCTCTGGGACTGGGTGGATCAGTCGCTGATTAATATATGATGAAAACGGCAACCCGTGGTGGCTTACGGCGGTG
ATTTTGGCGATACGCCGAACGATGCCAGTTCGTGTATGAACGGTCTGGTCTTTGCGGACCGCACCGCGCATCCAGCGCTGACGGAAGCAAAACACCAG
CAGCAGTTTTTCCAGTTCGCTTTATCCGGGCAACCATTCGTAAGTGACCGCAATACCTGTTCGCTCATAGCGATAACGAGCTCCTGCACTGGATGGT
GCGCTGGATGGTAAGCCGCTGGCAAGCGGTGAAGTGCCTCTGGATGTGCTCCACAAGGTAACAGTTGATTGAAGTGCCTGAAGTACCGCAGCCGGA
GAGCGCCGGGCAACTCTGGCTCACAGTACGCGTAGTGCAACCGAACGCGACCGCATGGTCAGAAGCCGGGACATCAGCGCCTGGCAGCAGTGGCGT
CTGGCGGAAAACTCAGTGTGACGCTCCCCGCCGCTCCACAGCCATCCCGCATTGACCACCACGGAATGGATTTTTGTCATCGAGCTGGGTAATAA
GCGTTGGGCAATTTAAACCCGAGTCAGGCTTTCTTACAGATGTGGATTGGCGATAAAAAACAACTGCTGACGCGCTGCGCGATCAGTTACCCGTGC
ACCGCTGGATAACGACATTGGCGTAAGTGAAGCGACCCGCTTACCCCTAACGCGCTGGGTGCAACGCTGGAAGGCCGGCGGGCCATTACCAGGCCGAA
GCAGCGTGTGTGAGTGCACGGCAGATACACTTGCTGATGCGGTGCTGATTACGACCGCTCACGCGTGGCAGCATCAGGGGAAAAACCTTATTTATCAG
CCGAAAAACCTACCGGATTGATGAGTAGTGGTCAAATGGCGATTACCGTGTATGTTGAAGTGGCGAGCGATAACCCGATCCGGCGCGGATTGGCCTGA
ACTGCCAGCTGGCGGATGACGAGCGGTAACACTGGCTGGATTAGGGCCGCAAGAAAACTATCCGACCGCCTTACTGCCGCTGTTTGTACCCG
TGGGATCTGCCATTGTGACACATGTATACCCCGTACGTCTTCCCGAGCGAAAAACGGTCTGCGCTGCGGGACGCGCGAATTGAATTATGGCCACACCA
GTGGCGCGCGGACTTCCAGTTCAACATCAGCCGCTACAGTCAACAGCAACTGATGGAAACCAGCCATCGCCATCTGCTGCACGCGGAAGAAGGCACAT
GGCTGAATATCGACGGTTTCCATATGGGGATTGGTGGCGACGACTCCTGGAGCCCGCTCAGTATCGGCGGAAATCCAGCTGAGCGCGGCTCGCTACCATT
ACCAGTTGGTCTGCTGTCAAAAATAATAAACCGGGCAGGCCATGTCTGCCGTATTTCGCGTAAGGAAATCCATTATGTACTATTTAAAAAACACAA
ACTTTGGATTCTCGGTTTATCTTTTCTTTTACTTTTTTATCATGTGGGAGCTACTTCCCGATTTCGCGTATTTCCGATTGGCTACATGCTGACGATACGCA
AAAGTGATACGGGTATTATTTTTGCCGCTATTTCTCTGTCTCTGCTATTATTTCAACCGCTGTTTGGTCTGCTTTCTGACAAACTCGGAACCTGTATTG
CAGCTTATAATGGTTACAAATAAAGCAATAGCATCACAAATTTACAAATTTAATTAAGGCCGCGGGATCGATCCCGTCGAGCAGTGTGGTTTTCAAG
AGGAAGCAAAAAGCCTCTCCACCCAGGCCCTGGAATGTTTCCACCCAATGTGCGAGCAGTGTGGTTTTGCAAGAGGAAGCAAAAAGCCTCTCCACCCAGG
CCTGAAGTGTTCACCCCAATGTGAGCAAAACCCCGCAGCGTCTGCTGATTGGCGAATTCGAACACGCGAGTGCAGTCCGCGCGCTGCTGCCAG
GTCCACTTTCGATATTAAGGTGACGCGTGTGGCCTCGAACACCGAGCGACCTGCAGCCAATATGGGATCGGCCATTGAACAAGATGGATTGCACGCA
GGTTCTCCGGCCGCTTGGGTGGAGAGGCTATTCCGGCTATGACTGGGCAACAGACAATCGGCTGCTCTGATGCCGCCGTGTCCGGCTGTGACGCGA
GGGGCGCGCGGTTTGTGCAAGACCGACCTGTCGGGTGCCCTGAATGAAGTGCAGGACGAGGACGCGCGGCTATCGTGGCTGGCCACGACGCGGG
TTCTTTCGCGAGCTGTGCTGAGCTGTCTGACGAAGCCGGAAGCGTCTGCTGATTGGCGAATTCGAACCAAAATACTGCTTACGCTTGCAGTACGCTGCTG
CTCCTGCCGAGAAAGTATCCATCATGGCTGATGCAATGCGGCGGCTGCATACGCTTGATCCGGCTACCTGCCCATTCGACCACCAAGCGAAACATCGC
ATCGAGCGAGCACGTACTCGGATGGAAGCCGGTCTTGTGATCAGGATGATCTGGACGAAGAGCATCAGGGGCTCGCGCCAGCCGAACCTGTTCCGCCAG
GCTCAAGGCGCGCATGCCGACGGCGAGGATCTCGTCTGACCCATGGCGATGCCTGCTTGGCGAATATCATGGTGGAAAATGGCCGCTTTTCTGGATT
CATCGACTGTGGCCGGTGGGTGTGGCGGACCGCTATCAGGACATAGCGTTGGCTACCCCTGATATTGCTGAAGAGCTTGGCGGCGAATGGGCTGACC
GCTTCCCTCGTGTCTTACGGTATCGCCGCTCCCGATTGCGAGGCGATCGCCTTCTATCGCCTTCTTGACGAGTTCTCTGAGGGGATCGGCAATAAAAAAGA
CAGAATAAAACGCACGGGTGTGGGTGCTTTGTTCCGATCCGAATTCCTCGAGGGCGCGCCATTTAATGCCACGAGGCGCGGTACCCAATTCGCCCT
ATAGCGTTCACTTTTCTGGGCTGACGCAGCCCA

Targeted Locus:

AAGACTGACACTCGGCATTTCTCCTTAACTAAATCTACTTAGACCTCTGCCCTCTTACATACAGCCCTCTCATTGAGGAAAAATGTAGACAGCTTGCAA
CTGGCTGGCTGGATAGCCAACCTTATCTAAAGAATCCTTCTGATGTCTTACGCTTCAGGTCTAGGTAGGGGTTTGGGGGTGGGAGGAGTAGTCACAGT
AGGTGGGGAAGGGACCTTTGGTACTTCTGGCTTGTGGCTACATAACACTAGCCTCTGTTTTGGTCCCTTCTACCACCTTCTTAATTCTGTGTGTGTGA
TGTCCCATCTCTCTCCCTTTCTCTGATAATGACGAGAGCCATTGGATTAGGGCCCATCCAGATTCCAGGATGCTTTTACTCTTTTTTTTTTTTTTTTT
TTTTTTTTTCCATTTTTTATTAGGTATTTGCTCATTTACATCTGCAATGTCTATACCAAAAGTCCCCATAGCCACCCACCCCTGATGCTTTTACTCTTAA
CATCCTTGCTGACTTCTATCAGCAGAGAGCCCCACTTCTTACTCAGATCACATCTCTGAGGTTTCCCATGGAGGTGATTGTGGGTACCATCAGCTTATG
CAGGAGACAACCTTTGTAGAATCTGGCTACGAACCTATGAACAAGAGGAGGAGGAGGAGGAGGAGGAGGAGGAGGAGGAGGAGGAGGAGGAGGAGG
CTGGATGCTCTGGTTACAGAGCCCAACCCTAGGCTTCTGCTACCCACCTGCCGCTGATGTTGCAGATCTGAGAGCCGCCCCCCCCCCCCCCCCCAT
CTGACATCCCTGATCAGACGTCCCAGGTGCAGGGTGTCCCTGTAGGAAGTGCAGGGTTGGGGCTGAGGGACCCTAGAGTGTGTCAGCTCTGAGCTGT
ATCTCTAGACCTTCTTATTCTCTGTCTATGTTACTCTGTCTAGACAACCTAACATTTATGAGTGGCATAGCAAGTACTATGTTTCTATTCTGTATCT
CACCTTTTGGCTACTCCGAGGAGGGGCCATTCCAGCCTTTGCTTCTGCTGTGAAGGTAACCAAGTCCCATCGGCTGTGCTTGTGCTTACTAGATCTCGA
AGTTGATAATGTGGGATCCAGGGTCAGGCTGAGGTCTGTGTGACTGGGAGCACTCTTAGCTCTTATGTTATTTAGCAATAGTTTATATGTGTATGTACG

[illegible]

[illegible]

[illegible]

[illegible]

ATGATTTTCACTCTCGGGTGGTCTGACAAGCCTGAGCAAAGGCAAGGGCCAGTCTCACATGCTTCTGAGAACACTGTTTTCTACAGTATTGTTTTGTGTTT
CTAGGTGGAGCAATTGTGATGTCTGTTAAATGAATCATGTCTCTCCCTGCTCCACGCCCCCTACCCCCCAAAAAAGTCTGACCTGCGATGAGTGGCCAC
TACCTCAAGCTTAGGTCTAATGAGTCTGTGCTCTGTAGTCCCGCCCTACCTTACGTGGCTCGCTCTTCACTTTTTTCCCAGGGTGACCTCTTCTCCACGAAG
AGCTGGCCTGCAAGCAGGGTTTCTTAAACATTGGCCCTCTGGTCTTCTAGAGCCGAGGCTAGAGCAGCCCTTAAGGCGCGTGTGCTCTTAAACTGC
AGGAAGAGAAATGTTTTGCCCTGAAGTCACTTGGGGTCTCTCTTCAGGAGGGTTAGCTCTTGTCTCTGCTCTTCCCAAGAGACCTGGAGTATATTTTT
GGAGATAGCCTCACCTCATGGGTTTAGACTTGTGTCTTCTGTGCTCCGTCTCCCAAGTACTGGAATTGAGCCTGTTTTCTGTTAGAAACGACACAAAC
AGGTCAATTGGATACTTGGCACCATAAAACAGGAGGCCAGACTTAGGCACAGCTCTCTGGCTACTCCCATCTCTTTTACCCTTCTCTACTTAAGTGAAATTT
CCAGAAAGAAGCTCAGAGCAGCATACCCCCAGTCCATTCTTTCAAAATATTTTTATTTTTGTTCTAGAGAAATGGAACCTTTGCTGGGCAGGCTGGCC
TTAGAGTCCTGGGGTCTCCACCTCTCCCTCTGAGTTTGGGAAACTGCAGCTTGTGGAATAGGCTAGGCCCTGGCTTTTATCCACCCCAAGATGCCTGCGAG
GGACAGAGCCTGCTTTTTTGGTGTGTTGGTCTTTCAAGATTCTGTGGTCAGGACGATGCTGCAATCTTGTCTGTGGAAGTGAATGGATTTTCTCTTTT
AGCAATCGTAACTAAGCCATCTCCGTTGTGTTTACGGGCAGATGAACCGAGGACAGTAGATGAGGCCAAAAATAAACGACAGGTGGCCTCCCTTTATAC
TGGAATTTGTGACTAAGTCTTTTGTGGCTAAGCATAACAGAGATTAAAGACAGCGTCTCATTTAAAGGAGACAAACCACCTTTTAAATCCCCAGATC
TGGGGAGGTAGAGGCAGGCTGACCTCTGTGAGTCTGAGGACAGCTTGGTCTATGTAGTAGAGACTAGTCAAAAAAGAAAAAGAAAAAGCAAGCAAA
GCCAAGTGGCCATGGTAGTCTCTGCTATCATGCGACCCAGAATGCTTGCCGCTCTTCCCGCTCTTCCCGAGGCCAGGGTTTGGCTCCCAGCGTGCAC
ATGGCTCCCGGGTGGGTGTCTACAGCTCCAGGTTCAAGTGAAGTGGCAGCCCTCTCTGGCCTCTCAGCCACCTACATGCATATTTGCAAACGCACACA
TTACCGTACACATAAAATAAAAGTTAAGTAAATGTAAATACATATAATAAAACCCCTAAGAGCTGGAGTGTAGTCTAGTGGAAGGTTAGTTCATGCA
AAACCAAAGGTCCTGGATGCCAAATGCCAGGATGAGAAAAAGCTAAAGACAGCCTGCGCTTTTGATCCAAAGAGAAATGCAAGGCACCGAGCTAGTGC
TGGCGAGTCAGGGGAATGCAGAGGCTAGGTTTCTGCTGGCAGGAGAATGGGCAGCCAGCAGACTGCCCGTCTCCAGAGTGGAGAGTGGTAAGCAGA
TGAGAGCCGCTGAAGGCTTATGTTTGTAAACTATTCTGTTTCTGTGCCCATAGGCTTTTGGCTCAACCCTCAGGACAATTACGTCTCCAAGTCTGC
AGTGGTGTGTTTTGGGGTTTTACCTTTTTCTTTTTACAGAAAAAGATCTGAAGATGCTCTTGAAGCAGAAAAAGGAGTGGGCCAGTTGTTAATGATG
ACCTATCCAGTGGAAAAACCTTAACCTCGAAAGAAAGTGTGACGTGGGTGGTGGGTGTAGCAGCGCGTGCAGGCGCTGCAGAGCAAGCCTGG
CAATTCTCTCTATAGAGGACAGTAAAGAGTTTGGTTTACAAGCATCCAGGAACAGCTCTGACTGGTGTAGTCTCTGTATAAGAGGCCCTCTGTGCTGGC
ATGGGGTCACTGCCTGTTAGAGTTGAATGAAGTGGCCATCTTAAAGAGCAACCTAAGAACTTAGAGTAGTGGTCACTCACTGATTGGGTGACAGC
AGGAGACTCTTTGCTACTAGAAAGTCCCTGCTTTGTATGTGTGGCACCAGGCTATACCAATTTCTTACGTCCCTGTGTGTGACCTGCTCAGTTTCTCT
TGGATATAGGAATAAGCTCTTCCCCAGCCTTGGCGTCTTCCCTCAAGTGTGGCGCGCGCTGGCGTGGGCTGGGCTGGGCTGGGCTGGGCTGGGCTGGG
TGGGCTGGGCTGGGCTGGGCTGGGCTGGGCTTTGATCAGTAACTGCTCACTCTCTTCTACCCTAGCACCATCAGGGCATAACCTTTTACCTCCG
AGACACTTCTTCCAAGAAGGACCAGGAGGAGGGTGTGACCGAGAAGCTACAGAACGGGGACCTGGATCACATGATCCCTCAGCACTGCAACAGCGA
GCTGGATGGCAAGGCGCTGGCAGGACGAGAAGGTCATTGTCAACTCCATGCTGTGTCAGGTGAGCAGCCCTGAGTGCCCCCGGGGAAGCCTCGACA
CAGAAGCCAGCCTTTGTGAGTCAAGCTCTCCGAGGTCACCTGTGAACCTGAAGTCCACTGGTGTGCTCTTCTCATAGGACCTGCGGCATCCGAGA
GTGCTTGCTACTGGCTCAAGGGGTCCGCTACTCTGATATCGGACCTTGGCCTGGATGATCACTGAGCAGTGGGCTCCACAATTTCACTCATGATGGCC
TGGCTATTGGTGCCTCTTCACTGTGTCTGTCTTCCAAGGCATCAGCACGTGAGTGGCCATTCTCTGTGAGGAATCCCTCATGAGCTGGGTGAGTGTCT
AGTCCCTGTCCCGTGTTCAGCTGTCTCAGTTTTTGTCTGAGACACCGAGACACCTTCTTGCATCACATCCCTGCTGCTCTCCACCTCCACCACA
GCACTCACTGAATTAACGCCCTGTCTCGCTAACTCTGGAATTAACAGTGGAGCTAGCTTAGAAGTATAGAGTTCTTACAGGGAGATTTTTATCCC
ATGAGCCCTGTGCTGTGGCTTAATTTTTCCCACTGTATAGCATGATTAACTACCTACACTGCTCTTTAGAATCATCAAGGGATTATAGGCAACAA
ATGTTGAAAAGGACTTGGCAGGTGCCACACAGTATTGTGGCTACTAGCTAAGAACTCCCTCTTTATGTCTGCTATCCTGTAGAAGCTAGAAAGCATGTC
ATGTGAATGAAGCAGAAAAAGCCAGCGCCTAGGGGTGCGTGTAGTTTTATCAAGGGAGTCTAAGAAGCCATGACTCAGGACCCAGTGACAACACGGGC
TCCTAATTTGGCATTATTATGGCTTGAGCATATAATTTCTCCCTCTCTCAAGTCTGGTCTGACCGTGCCATCCGTTAGGAGACAGGGAGCTATTTTCATT
CCCATCAGTCAAAAGAAAGTGAAGTGTGGTGTGGTTATAGACATTTAAAGTCTGTGGATTATTTTCAAGCTCTGTGTGGGGAGCGATGAGGC
CGGTGCTGGTGTCTTATGTTCTTCCAGAAAGTCTATGAGGGCTTTGACGCTCTGTGCTGCGAGGTGATGGCCAGGATTGGAAGATGGGTGTGCTTTAT
CCCAATACCACCTGAGAATGAGATTTTACCCCGCACATGCTTACCCCGTAGCTGAAGCAGTCCCATTCATTAGTGTGCTGCGTCTGACTCAGCCCGCT
TCCTGTTCTCATGCCATTGACAGGAGACTTCGTCATCCTGCTCAATGCTGGCATGAGCATCCAGCAGGCTCTCTTCTTCAACTTCTCTCTGCTGCTGCT
GCTATTTTGGGTCTGGCCTTTGGCATCTGGCTGGCAGCCACTTCTTGCAAACTGGATTTTGTGACTGGCTGGAGGAATGTTCTTGATATTTGCCCTAGC
CGATATGGTAAGTGTGCTGGTTTCTGTTTGGCTTTGGACAGGAGGGCAGCTAAAGGCCACAGCTTCCGGTGTGTTTGGTTTAAATCTTTTCACTTATGAT
ATGTGTGTAGATGCGTGTATAATTTCTCATGGGAAACAACTTGTGGGACTTGGTTCTCTTTATGTCATGGGTTCTTAAGATGGGACTAGGCACCTAATGCT
CTGTACACGGAGCCATCTGTGAGCCCAAGATTTTGTTTTTGTATTGGCTTTATGAAGTCTCTTTCACACTCAACCCAATTCAGTATTTAAGAAGT
AACAATTCAGGGTTAGAGAGATGGCTCAGCTGTTAAGAGCACTGGCTGCTTGAAGAGAACCCAGGTTTATTCTAGCTACAGTCCCAGGGGATCC
TACTTCTTGTGTTCCCAAGGGCCCAAGCATCCATGTGGTACACAGACATACAGGCAGCTAAGGCACCTACATATAGCATACGCATCGAATAAAATTT
TTTAAATCTAAAATGATATAATAATCTGACCTTTTCAATGCGACACTCGGGTGTTTTTGTTTGGGTTTGCATGAGACAAGATCTCACTCTGTAGACCAAGG
CTGGTCTCAAAGTCAATTGCAGCCCTGCCCCACCCACAGATGTTGGGCAGACAGGTGTAAACTACTATACCCAGAAGTCAATTGGGTTTTAAAGGGAG
AACTTTGGTCTCTCTATTAGCAATTTCACTATAGAAAATTGACCATCACTCAGGCTAGGTCCTTATTTCAAGTTTGTGAAAAGGCTGTGCTGTGTAGACAG
AAAGAAAAGAGGGAGTGAGAAAAGGAAGGCATCACTTAGACTTTTGTCTACCACAAGTAAATAGTCAACCTTATGGATGCTCTTTTAAAGTTTAAATTAAT
AAGTTTCATATATAAGTGTGTTATTTATATCACTTTTACCTTCCCCCCAACTCTGTGGCCCCAACCCACCTTGTCTCTCTCAAAATGCAGAGTCTTTTCTCT
CTAATTATTATTGAGAGATATAAGAATACACATATAGGGCTGGCAAGATGGCTCAGCAAGTAAAGAGCACTAAGTGTCTTCTGAAGGTCCTGAGTTCA
AATCCAGCAACCCATGAGTGGCTCACAACCACCTGTAATGAGACCTGAGCCCTTTTCTGGTGTGCTGAAGACAGCTACGGTGACTTATGTAATATA
TATAATAATAATATAATAATAATAATAAGTAAACCTTAGGGTCAGAGCAAGCAGGAGTGAAGTACGGGAGTTGACCGAGATGAGCAGAGGTTCC
TAAAAAATCAATTTCCCGACAACCATAGAAGGCTACATCCATCTGTACAGTACAGTGTACTCATATAGCATAGAGTAAATATAATAAAAAATCTTTT
AAAAAAAAGAATGCACATACACACACATATATATAATATACAACTTCCAAGTCCATTGTGATGTTGCTGCTGTACATATGTACTGGATTCCCAAT
CAGGGAGCTTATCCCTGAGGAAGACTGGCTTCTGTGCATCTGAGTAGTCACTAACTAATTGTCTATAACTCTTCAATTTAGGGGGCGGGCTTTGTGAGGT
TTCCCCAGCCCAGCTGACACATCATCTGGTGTCTGCAATTGTTTGGGCTTGTGTTAAGGCAGCCATATTGTTGAGAGCTACAGAGAATGGTCAAAGATAA
CACCTTCCCCCCAGTGACCTCTTAACCTCAGAAAAGTCCCCAGAACTACCAAAAAACATCTTCCAAAAATACGGTCCACCACCTTGAAGACAGCA
TCACAGTGAATTGGGACAATGTTAAAGAACTGTGAATCTATTTTTCTCTCTCTCAGTTCCTGAGATGAATGAAGTCTGCCAGGAGGATGAGAA
GAACGACAGCTTTCTGGTCCCTTTGTATCCAGAATCTTGGCCTCCTAACCAGGCTTCTCCATTATGCTGGTCTCACAATGTATTACAGGGCAGATTGAG
ATCGGGTAGGACCCCTGCCATTGGGGAGCCAGTGGCATTTGGACATCGGGCTCTGGGCCCCATCTGGTCCCGGCCCGAGGACTACGATCCACGAAGC
ATCATGGAAGAGCGAGCTCTTTAAAAAACTGGCAGACTTGTCTGCTGCAATCTCAGATGTCATCTGTTTCAATAGCTCTGCTCTAGGAAGAAGCTGCCC
TGGGAATCTCTAGGTAGTGCCTCGAACCCTTGTCTCCGACCTTTCCACTGATGATTCTGGAGTGAAGCCACCATGTAGGACACGCTCCCTTTTCC
TTCTGGCCACCCTCTCCCTTTCTCTTGAAGAAGCACTGAGAGATGTGGAATCTTTTACAATGTAAAAATGAAGCCAGTGGTCTAGGTTTGGTTAGAA
GTATCAGTGTGGCTTCCAGCTTTGGGGCCTGTGATTCTAAATGTGTGTACCCAGGATTTACAGTTCGGTCCATTTTGGCATGGGTTCTCATGTTTTACAG
AGAAGAGGGCAGAGAAGACTCTGTGTTTTTCAAGTCTGTTAACTGTTCTGTAAGAGGCTGACTTTCCGATGAGTATGGCAGGCAGAGGGGCGAGG
GATTGCTGTAGTGAGGAGGGGTGAAGACTGATGAGTGTCTGCTCTCTTGGTGTGCTGGTTTCCACAGGATGCTGCGTGCAGGTTGCTGTCAGCA
TCTGGAGTCACATAATCATCCAGGCGAGCAGCTGTGGGCAATCTCTGGCGTGGCAAGAGGTCTGCTAAATCAGTTGTTTTTGGCCTGATCCTCAGCCTT
CCTATTGCTTTCTTTTCTAGTTAACTTTGTAGATGCCTCAGGGGAGCAGGTCAGAGCACATTTAAAGTTTTTTGCATAGGAGGGAACTGCACAAA
TCAGTCTCCCTTGGTCAAGACCTCTGCCAGTAGAACCTGACTCATAGAATCAGGCACAGATTGTTTATGCCTTTTTGTACCAAGGTGATTTGGGAATGG
AGTCATTGCAAGGCAGACTTAGGACTTGCTAATTGCAGAAATAATGTAATACCATGGGACTCTGGACCTTGAGGTCAATTTGAGTGCAGGACTG
CAGAGCTCATTGCTGCCAATGGGTTTTAAAGGACACCATCTAGCTACCAATCTCTCCCGGTCCAGACAAAGATTGAATACTGAATTGAATCGAGT

[illegible]