



GTCACGACGTTGTAAAAACGACGGCCAGTCTTAAGCTCGGGCCCCAAATAATGATTTTTATTTTGACTGATAGTGAC  
 CAGTGCTGCAACATTTTGTGCGGTCAGAATTCGAGCCCGGGTTTATTACTAAAATAAACTGACTATCACTG

600

M13 fwd

attP1

CTGTTTCGTTGCAACACATTGATGAGCAATGCTTTTTATAATGCCAACTTTGTACAAAAAGCTGAACGAGAAAC  
 GACAAGCAACGTTGTGTAAC TACTCGTTACGAAAAAATATTACGGTTGAAACATGTTTTTTCGACTTGCTCTTTG

675

attP1

GTA AATGATATAAATATCAATATATTA AATTAGATTTTTGCATAAAAAACAGACTACATAACTGTAAAACACA  
 CATT TACTATATTTATAGTTATATAATTTAATCTAAAACGATTTTTTGTCTGATGTATTATGACATTTTGTGT

750

attP1

ACATATCCAGTCACTATGAATCAACTACTTAGATGGTATTAGTGACCTGTAGTCGACCGACAGCCTTCCAATGT  
 TGTATAGGTCAGTGATACTTAGTTGATGAATCTACCATAATCACTGGACATCAGCTGGCTGTCGGAAGGTTTACA

825

attP1

TCTTCGGGTGATGCTGCCAACTTAGTCGACCGACAGCCTTCCAATGTTCTTCTCAAACGGAATCGTCGTATCCA  
 AGAAGCCCACTACGACGGTTGAATCAGCTGGCTGTCGGAAGGTTTACAAGAAGAGTTTGCCTTAGCAGCATAGGT

900

GCCTACTCGCTATTGTCCTCAATGCCGTATTAATCATAAAAAAGAAATAAGAAAAAGAGGTCGGAGCCTCTTTTT  
 CGGATGAGCGATAACAGGAGTTACGGCATAATTTAGTATTTTTCTTTATTCTTTTTCTCCACGCTCGGAGAAAAA

975

TGTGTGACAAAAATAAAACATCTACCTATTCATATACGCTAGTGTCATAGTCCTGAAAATCATCTGCATCAAGAA  
 ACACACTGTTTTATTTTTGTAGATGGATAAGTATATGCGATCACAGTATCAGGACTTTTAGTAGACGTAGTTCTT

1050

CAATTTACAACCTTTATACTTTTTCTTTACAAGTCGTTTCGGCTTCATCTGGATTTTCAGCCTCTATACTTACTA  
 GTTAAAGTGTTGAGAATATGAAAAGAGAATGTTTCAGCAAGCCGAAGTAGACCTAAAAGTCGGAGATATGAATGAT

1125

AACGTGATAAAGTTTCTGTAATTTCTACTGTATCGACCTGCAGACTGGCTGTGTATAAGGGAGCCTGACATTTAT  
TTGCACTATTTCAAAGACATTAAGATGACATAGCTGGACGTCTGACCGACACATATTCCTCGGACTGTAATA

1200



ATTCCCCAGAACATCAGGTTAATGGCGTTTTTGTATGTCATTTTCGCGGTGGCTGAGATCAGCCACTTCTTCCCCG  
TAAGGGGTCTTGTAGTCCAATTACCGCAAAAACCTACAGTAAAAGCGCCACCGACTCTAGTCGGTGAAGAAGGGGG

1275

Ile Gly Trp Phe Met Leu Asn Ile Ala Asn Lys Ile Asp Asn Glu Arg His Ser Leu Asp Ala Val Glu Glu Gly  
ccdB

ATAACGGAGACCGGCACACTGGCCATATCGGTGGTCATCATGCGCCAGCTTTCATCCCCGATATGCACCACCGGG  
TATTGCCTCTGGCCGTGTGACCGGTATAGCCACCAGTAGTACGCGGTGAAAAGTAGGGGCTATACGTGGTGGCCC

1350

Ile Val Ser Val Pro Val Ser Ala Met Asp Thr Thr Met Met Arg Trp Ser Glu Asp Gly Ile His Val Val Pro  
ccdB

TAAAGTTCACGGGAGACTTTATCTGACAGCAGACGTGCACTGGCCAGGGGGATCACCATCCGTCGCCCGGGCGTG  
ATTTCAAGTGCCTCTGAAATAGACTGTCTGCTGACAGTACCGGTCCCCCTAGTGGTAGGCAGCGGGCCCGCAC

1425

Tyr Leu Glu Arg Ser Val Lys Asp Ser Leu Leu Arg Ala Ser Ala Leu Pro Ile Val Met Arg Arg Gly Pro Thr  
ccdB

TCAATAATATCACTCTGTACATCCACAAACAGACGATAACGGCTCTCTTTTTATAGGTGTAACCTTAAACTGC  
AGTTATTATAGTGAGACATGTAGGTGTTTGTCTGCTATTGCCGAGAGAGAAAATATCCACATTTGGAATTTGACG

1500

Asp Ile Ile Asp Ser Gln Val Asp Val Phe Leu Arg Tyr Arg Ser Glu Arg Lys Tyr Thr Tyr Val Lys Phe Gln  
ccdB

ATTTACCAGCCCCTGTTCTCGTCAGCAAAAGAGCCGTTTCATTTCAATAAACCGGGCGACCTCAGCCATCCCTTC  
TAAAGTGGTCGGGGACAAGAGCAGTCGTTTTCTCGGCAAGTAAAGTTATTTGGCCCGCTGGAGTCGGTAGGGAAG

1575

1  
Met  
ccdB

CTGATTTTCCGCTTTCCAGCGTTTCGGCACGCAGACGACGGGCTTCATTCTGCATGGTTGTGCTTACCAGACCGGA  
GACTAAAAGGCGAAAAGGTCGCAAGCCGTGCGTCTGCTGCCCGAAGTAAGACGTACCAACACGAATGGTCTGGCCT

1650

GATATTGACATCATATATGCCTTGAGCAACTGATAGCTGTGCTGTCAGTGTCACTGTAATACGCTGCTTCATA  
CTATAACTGTAGTATATACGGAACCTCGTTGACTATCGACAGCGACAGTTGACAGTGACATTATGCGACGAAGTAT

1725

GCATACCTCTTTTTGACATACTTCGGGTATACATATCAGTATATATTCTTATACCGCAAAAATCAGCGCGCAAAT  
CGTATGGAGAAAAACTGTATGAAGCCCATATGTATAGTCATATATAAGAATATGGCGTTTTTAGTCGCGCGTTTA

1800

ACGCATACTGTTATCTGGCTTTTTAGTAAGCCGGATCCACGCGGCGTTTACGCCCCCTGCCACTCATCGCAGTA  
TGCGTATGACAATAGACCGAAAATCATTGGCCCTAGGTGCGCCGCAAATGCGGGGGGGACGGTGAGTAGCGTCAT

1875

Tyr Ala Pro Asp Val Arg Arg Lys Arg Gly Gly Gln Trp Glu Asp Cys Tyr  
(in frame with CmR) CmR

CTGTTGTAATTCATTAAGCATTCTGCCGACATGGAAGCCATCACAAACGGCATGATGAACCTGAATCGCCAGCGG  
GACAACATTAAGTAATTCGTAAGACGGCTGTACCTTCGGTAGTGTTCGCGTACTACTTGGACTTAGCGGTGCGC

1950

Gln Gln Leu Glu Asn Leu Met Arg Gly Val His Phe Gly Asp Cys Val Ala His His Val Gln Ile Ala Leu Pro  
CmR

2025

2100

2175

2250

2325

2400

2475

2550

2625

2700

2775

CATCAGCACCTTGTGCGCTTGGCTATAATATTTGCCCATGGTGAAAACGGGGGCGAAGAAGTTGTCCATATTGGC  
GTAGTCGTGGAACAGCGGAACGCATATTATAAACGGGTACCACCTTTTGCCCCCGCTTCTTCAACAGGTATAACCG

185 Met Leu Val Lys Asp Gly Gln Thr Tyr Tyr Lys Gly Met Thr Phe Val Pro Ala Phe Phe Asn Asp Met Asn Ala

CmR

CACGTTTAAATCAAACTGGTGAACTCACCCAGGGATTGGCTGAGACGAAAAACATATTCTCAATAAACCTTT  
GTGCAAATTTAGTTTTGACCACTTTGAGTGGGTCCCTAACCGACTCTGCTTTTTGTATAAGAGTTATTTGGGAAA

160 Val Asn Leu Asp Phe Ser Thr Phe Ser Val Trp Pro Asn Ala Ser Val Phe Phe Met Asn Glu Ile Phe Gly Lys

CmR

AGGGAAATAGGCCAGGTTTTTACCAGTAACACGCCACATCTTGCGAATATATGTGTAGAACTGCCGGAAATCGTC  
TCCCTTTATCCGGTCCAAAAGTGGCATTGTGCGGTGTAGAACGCTTATATACACATCTTTGACGGCCTTTAGCAG

135 Pro Phe Tyr Ala Leu Asn Glu Gly Tyr Cys Ala Val Asp Gln Ser Tyr Ile His Leu Phe Gln Arg Phe Asp Asp

CmR

GTGGTATTCCTCCAGAGCGATGAAAACGTTTTAGTTTTGCTCATGGAAAACGGTGTAAACAAGGGTGAACACTATC  
CACCATAAGTGAGGTCTCGCTACTTTTGCAAAGTCAAACGAGTACCTTTTGCCACATTGTTCCCACTTGTGATAG

110 His Tyr Glu Ser Trp Leu Ser Ser Phe Thr Glu Thr Gln Glu His Phe Val Thr Tyr Cys Pro His Val Ser Asp

CmR

CCATATCACCAGCTCACCGTCTTTTCATTGCCATACGGAAATCCGGATGAGCATTTCATCAGGCGGGCAAGAATGTG  
GGTATAGTGGTTCGAGTGGCAGAAAAGTAACGGTATGCCTTAAGGCCTACTCGTAAGTAGTCCGCCGTTCTTACAC

85 Trp Ile Val Leu Glu Gly Asp Lys Met Ala Met Arg Phe Glu Pro His Ala Asn Met Leu Arg Ala Leu Ile His

CmR

AATAAAGGCCGGATAAAACTTGTGCTTATTTTTCTTTACGGTCTTTAAAAAGGCCGTAATATCCAGCTGAACGGT  
TTATTTCCGGCCTATTTTGAACACGAATAAAAAGAAATGCCAGAAATTTTTCCGGCATTATAGGTCGACTTGCCA

60 Ile Phe Ala Pro Tyr Phe Lys His Lys Asn Lys Lys Val Thr Lys Leu Phe Ala Thr Ile Asp Leu Gln Val Thr

CmR

CTGGTTATAGGTACATTGAGCAACTGACTGAAATGCCTCAAAATGTTCTTTACGATGCCATTGGGATATATCAAC  
GACCAATATCCATGTAACCTCGTTGACTGACTTTACGGAGTTTTACAAGAAATGCTACGGTAACCCTATATAGTTG

35 Gln Asn Tyr Thr Cys Gln Ala Val Ser Gln Phe Ala Glu Phe His Glu Lys Arg His Trp Gln Ser Ile Asp Val

CmR

GGTGGTATATCCAGTGATTTTTTTCTCCATTTTAGCTTCCTTAGCTCCTGAAAATCTCGATAACTCAAAAATAC  
CCACCATATAGGTCACTAAAAAAGAGGTAATAATCGAAGGAATCGAGGACTTTTAGAGCTATTGAGTTTTTTATG

10 Thr Thr Tyr Gly Thr Ile Lys Lys Glu Met

CmR

cat promoter

GCCCCGTAGTGATCTTATTTTATTATGGTGAAAGTTGGAACCTCTTACGTGCCGATCAACGTCTCATTTCGCCA  
CGGGCCATCACTAGAATAAAGTAATACCACTTTCAACCTTTGGAGAATGCACGGCTAGTTGCAGAGTAAAAGCGGT

cat promoter

AAAGTTGGCCAGGGCTTCCCGGTATCAACAGGGACACCAGGATTTATTTATTCTGCGAAGTGATCTTCCGTCAC  
TTTCAACCGGGTCCCGAAGGGCCATAGTTGTCCCTGTGGTCTAAATAAATAAGACGCTTCACTAGAAGGCAGTG

AGGTATTTATTCGGCGCAAAGTGCCTCGGGTGATGCTGCCAAGTGTGCGACTACAGGTCACATAATACCATCTAA  
TCCATAAATAAGCCGCTTTACGCAGCCCACTACGACGGTTGAATCAGCTGATGTCCAGTGATTATGGTAGATT

attP2

GTAGTTGATTCATAGTACTGGATATGTTGTGTTTTACAGTATTATGTAGTCTGTTTTTTATGCAAAATCTAATT  
+ + + + +  
CATCAACTAAGTATCACTGACCTATACAACACAAAATGTCATAATACATCAGACAAAAAATACGTTTTAGATTAA

2850



TAATATATTGATATTTATATCATTTCAGTTTTCTCGTTTCAGCTTTCTTGTACAAAGTTGGCATTATAAGAAAGCA  
+ + + + +  
ATTATATAACTATAAATATAGTAAAATGCAAAGAGCAAGTCGAAAGAACATGTTTCAACCGTAATATTCTTTCGT

2925



TTGCTTATCAATTTGTTGCAACGAACAGGTCCTATCAGTCAAAATAAATCATTATTTGCCATCCAGCTGATAT  
+ + + + +  
AACGAATAGTTAAACAACGTTGCTTGTCCAGTGATAGTCAGTTTTATTTTAGTAATAAACGGTAGGTCGACTATA

3000



CCCCTATAGTGAGTCGTATTACATGGTCATAGCTGTTTCCTGGCAGCTCTGGCCCGTGTCTCAAATCTCTGATG  
+ + + + +  
GGGGATATCACTCAGCATAATGTACCAGTATCGACAAAGGACCGTCGAGACCGGGCACAGAGTTTTAGAGACTAC

3075

