



PvuI (7)
SgfI (6) 1 GGATCTGGATCGCTCCGGTGCCCGTCAGTGGCAGAGCGCACATCGCCACAGTCCCGGAGAAGTTGGGGGAGGGGTGGCAATTGAACGGTGCCTA
MfeI (82)
101 GAGAAGGTGGCGCGGGTAAACTGGAAAGTGATGTCGTACTGGCTCCGCCTTTTCCGAGGGTGGGGGAGAACCCTATATAAGTGCAGTAGTCGCC

HindIII (245)
Psp1406I (203) 201 GTGAACGTTCTTTTTCGCAACGGGTTTGCCGCCAGAACACAGCTGAAGCTTCGAGGGCTCGCATCTCTCTTACAGCGCCGCCGCCCTACCTGAGGCC
PvuII (239)
301 GCCATCCACGCGGTTGAGTGCAGTCTGCCGCTCCCGCCTGTGGTGCTCTGAAGTGCCTCCGCCGTCTAGGTAAGTTTAAAGCTCAGGTCGAGACC

NgoMI (441)
NaeI (441) 401 GGGCCTTTGTCCGGCGCTCCCTTGAGCGCTACCTAGACTCAGCGGCTCTCCACGCTTTGCTGACCCTGCTTGTCTAACTCTACGTCTTTGTTTCGTTT

BspHI (560)
KasI (535) 501 TCTGTTCTGCGCCGTTACAGATCCAAGCTGTGACCGGGCCCTACTCGAGATCACCGGTCATCATGAAGGAGTCATCTTTGCAAAATAGCTCCTGCAGCCT
AgeI (552) 1▶Me tLysGI uSer Ser LeuGI nAsnSer Ser CysSer Le
601 GGGAAAGGAGACTAAAAAGGAAAACATGTTCCCTCAGTCGTCAATGCTGACCTGCATTTTCTGCTAAATCTGGTTCCTGTGAGTTATGCGCCGAAGAA
13▶uGI yLysGI uThr LysLysGI uAsnMetPheLeuGI nSer Ser Me tLeuThr CysI l ePheLeuLeuI l eSer GI ySer CysGI uLeuCysAl aGI uGI u

SalI (770)
701 AATTTTTCTAGAAGCTATCCTTGTGATGAGAAAAAGCAAAATGACTCAGTTATTGCAGAGTGCAGCAATCGTGCAGTACAGGAAGTCCCAAACGGTGG
47▶AsnPheSer ArgSer TyrP roCysAspGI uLysLysGI nAsnAspSer Val I l eAl aGI uCysSerAsnArgArgLeuGI nGI uVal P roGI nThr Val I G
801 GCAAAATATGTGACAGAAGTACACTGTCTGATAATTTTCATCACACACATAACGAATGAATCATTCAAGGGCTGCAAAATCTCACTAAAAATAAATCTAAA
80▶l yLysTyrVal Thr GI uLeuAspLeuSer AspAsnPheI l eThr Hi sI l eThrAsnGI uSer PheGI nGI yLeuGI nAsnLeuThr LysI l eAsnLeuAs

BsrGI (912) 901 CCACAACCCCAATGTACAGCACCAGAACGGAAATCCCGGTATACAATCAAAATGGCTTGAATATCACAGACGGGCATTCTCAACCTAAAAACCTAAGG
Bst1107I (938) 113▶nHi sAsnP roAsnVal I GI nHi sGI nAsnGI yAsnP roGI yI l eGI nSerAsnGI yLeuAsnI l eThrAspGI yAl aPheLeuAsnLeuLysAsnLeuArg
1001 GAGTTACTGCTTGAAGACAACCCAGTTACCCCAAATACCCCTCTGGTTTGCAGAGTCTTTGACAGAAGTCTAGTCTAATTCAAAACAATATATACAACATAA
147▶GI uLeuLeuLeuGI uAspAsnGI nLeuP roGI nI l eP roSer GI yLeuP roGI uSer LeuThr GI uLeuSer LeuI l eGI nAsnAsnI l eTyrAsnI l eT
1101 CTAAGAGGGCATTCAAGACTTATAAACTTAAAAATCTCTATTTGGCTGGAAGTCTATTTTAAACAAAGTTTGCAGAAAACCTAACATAGAGATGG
180▶hr LysGI uGI yI l eSer ArgLeuI l eAsnLeuLysAsnLeuTyrLeuAl aTrpAsnCysTyrPheAsnLysVal CysGI uLysThrAsnI l eGI uAspGI
1201 AGTATTTGAAACGCTGACAAATTTGGAGTTGCTATCATTCTTTCAATCTCTTTCACATGTCCACCCAACTGCCAAGCTCCCTACGCAAACTTTT
213▶yVal PheGI uThr LeuThrAsnLeuGI uLeuLeuSer PheAsnSer LeuSer Hi sVal I P roP roLysLeuP roSer Ser LeuArgLysLeuPhe
1301 CTGAGCAACCCAGATCAAATACATTAGTGAAGAAGATTTCAAGGGATTGATAAATTAACATTACTAGATTTAAGCGGGAAGTGTCCGAGGTGCTTCA
247▶LeuSerAsnThr GI nI l eLysTyrI l eSer GI uGI uAspPheLysGI yLeuI l eAsnLeuThr LeuLeuAspLeuSer GI yAsnCysP roArgCysPheA
1401 ATGCCCATTTCCATGCTGCTTGTGATGGTGGTCTCAATTAATATAGATCGTTTGTCTTTCAAACTTGACCCAACTTCGATACCTAAACCTCTC
280▶snAl aP roPheP roCysVal P roCysAspGI yGI yAl aSer I l eAsnI l eAspArgPheAl aPheGI nAsnLeuThrI nLeuArgTyrLeuAsnLeuSe

EcoRI (1570)
1501 TAGCACTTCCCTCAGGAAGATTAATGCTGCCTGGTTAAAAATATGCCTCATCTGAAGGTGCTGGATCTTGAATCAACTATTTAGTGGGAGAAATAGCC
313▶r Ser Thr Ser LeuArgLysI l eAsnAl aAl aTrpPheLysAsnMe tP roHi sLeuLysVal I LeuAspLeuGI uPheAsnTyrLeuVal I GI yGI uI l eAl a
1601 TCTGGGCAATTTTAAACGATGCTGCCCCGTTAGAAATACTTGACTTGTCTTTAACTATATAAAGGGGAGTTATCCACAGCATATTAATATTTCCAGAA
347▶Ser GI yAl aPheLeuThr Me tLeuP roArgLeuGI uI l eLeuAspLeuSer PheAsnTyrI l eLysGI ySer TyrP roGI nHi sI l eAsnI l eSer ArgA
1701 ACTTCTCTAACTTTTGTCTCTACGGCATTGCAATTAAGAGTTATGTGTTCCAGGAAGTCAAGAGAAGATGTTTCCAGCCCCTGATGCAGCTTCCAAA
380▶snPheSer LysLeuLeuSer LeuArgAl aLeuHi sLeuArgGI yTyrVal I PheGI nGI uLeuArgGI uAspAspPheGI nP roLeuMe tGI nLeuP roAs

ClaI (1840)
1801 CTTATCGACTATCAACTGGGTATTAATTTTATTAAGCAAATCGATTTCAAACCTTTCCAAAATTTCTCCAATCTGGAATATTTACTTGTGCAGAAAAC
413▶nLeuSer Thr I l eAsnLeuGI yI l eAsnPheI l eLysGI nI l eAspPheLysLeuPheGI nAsnPheSerAsnLeuGI uI l eI l eTyrLeuSer GI uAsn

BspEI (1967)
1901 AGAATATCACCGTTGGTAAAAGATACCCGGCAGAGTTATGCAAATAGTTCTCTTTTCAACGTCAATCCGGAACGACGCTCAACAGATTTTGGAGTTTG
447▶ArgI l eSer P roLeuVal LysAspThr ArgGI nSer TyrAl aAsnSer Ser Ser PheGI nArgHi sI l eArgLysArgArgSer Thr AspPheGI uPheA

BstBI (2007) 2001 ACCCACATTCGAACCTTTTATCATTTACCCGCTCTTAATAAAGCCACAAATGTGCTGCTATGGAAAAGCCTTAGATTTAAGCCTCAACAGTATTTTCTT
DraIII (2045) 480▶spP roHi sSerAsnPheTyrHi sPheThr ArgP roLeuI l eLysP roGI nCysAl aAl aTyrGI yLysAl aLeuAspLeuSer LeuAsnSer I l ePhePh
2101 CATTGGGCCAAACCAATTTGAAAATCTTCTGACATTGCTGTTAAATCTGTCTGCAAAATAGCAATGCTCAAGTGTTAAGTGGAACTGAATTTTCAGCC
513▶eI l eGI yP roAsnGI nPheGI uAsnLeuP roAspI l eAl aCysLeuAsnLeuSer Al aAsnSerAsnAl aGI nVal I LeuSer GI yThr GI uPheSer Al a

BglII (2292)
2201 ATTCCTCATGTCAAATATTTGGATTTGACAAAACAATAGACTAGACTTTGATAATGCTAGTGCTTACTGAATGTCCGACTTGAAGTTCTAGATCTCA
547▶I l eP roHi sVal I yLysTyrLeuAspLeuThrAsnAsnArgLeuAspPheAspAsnAl aSer Al aLeuThr GI uLeuSer AspLeuGI uVal I LeuAspLeuS
2301 GCTATAATTCACACTATTTGAGAATAGCAGGCGTAAACACATCATCTAGAAATTTATCAAAATTTCACAAATCTAAAAGTTTTAAACTGAGCCACAACAA
580▶er TyrAsnSer Hi sTyrPheArgI l eAl aGI yVal I Thr Hi sHi sLeuGI uPheI l eGI nAsnPheThrAsnLeuLysVal I LeuAsnLeuSer Hi sAsnAs
2401 CATTATACTTTAACAGATAAGTATAACCTGAAAAGCAAGTCCCTGGTGAAGATTAAGTTTTCAGTGCAATCGCCTTGACATTTTGGAAATGATGATGAC
613▶nI l eTyrThr LeuThrAspLysTyrAsnLeuGI uSer LysSer LeuVal I GI uLeuVal I PheSer GI yAsnArgLeuAspI l eLeuTrpAsnAspAsp
2501 AACAGGTATATCTCCATTTCAAAGGTCTCAAGAACTGACACGTCTGGATTTATCCCTTAATAGGCTCAAGCACATCCCAAATGAAGCATTCTTAAT
647▶AsnArgTyrI l eSer I l ePheLysGI yLeuLysAsnLeuThr ArgLeuAspLeuSer LeuAsnArgLeuLysHi sI l eP roAsnGI uAl aPheLeuAsnL

XhoI (2683)
2601 TGCCAGCGAGTCTCACTGAACACTACATATAAATGATAATATGTTAAAGTTTTTAACTGGACATTACTCCAGCAGTTTCTCGTCTCGAGTTGCTTGACTT
680▶euP roAl aSer LeuThr GI uLeuHi sI l eAsnAspAsnMe tLeuLysPhePheAsnTrpThr LeuLeuGI nGI nPheP roArgLeuGI uLeuLeuAspLe
2701 ACGTGAACAAACTACTCTTTTAACTGATAGCTATCTGACTTTACATCTTCCCTTCGGACTGCTGCTGAGTCATAACAGGATTTCCACCTACCC
713▶uArgGI yAsnLysLeuLeuPheLeuThrAspSer LeuSerAspPheThr Ser Ser LeuArgThr LeuLeuLeuSer Hi sAsnArgI l eSer Hi sLeuP ro
2801 TCTGGCTTTCTTCTGAAGTCAGTAGTCTGAAGCACCTCGATTTAAGTTCCAATCTGTA AAAACAATAAACAATCCGCACTTGAACCTAAGACCACCA
747▶Ser GI yPheLeuSer GI uVal Ser Ser LeuLysHi sLeuAspLeuSer SerAsnLeuLeuLysThr I l eAsnLysSer Al aLeuGI uThr LysThr Thr T

BsaBI (2977)

2901 CCAAATTATCTATGTTGGAACACACGGAAACCCCTTTGAATGCACCTGTGACATTGGAGATTCCGAAGATGGATGGATGAACATCTGAATGTCAAAT
780▶hr LysLeuSer MetLeuGluLeuHisGlyAsnProPheGluCysThrCysAspIleGluAspPheArgArgTrpMetAspGluHisLeuAsnValLysIle
3001 TCCAGACTGGTAGATGTCATTTGTGCCAGTCCTGGGATCAAAGAGGGAAAGATATTGTGAGTCTGGAGCTAACACTTGTGTTTCAGATGTCACCTGCA
813▶eProArgLeuValAspValIleCysAlaSerProGlyAspGluArgGlyLysSerIleValSerLeuGluLeuThrThrCysValSerAspValThrAla

NcoI (3134)

3101 GTGATATTATTTTTCTTCACGTTCTTTATCACCACCATGGTTATGTTGGCTGCCCTGGCTCACCATTTGTTTTACTGGGATGTTTGGTTTATATATAATG
847▶ValIleLeuPhePhePheThrPhePheIleThrThrMetValMetLeuAlaLeuAlaHisHisLeuPheTyrTrpAspValTrpPheIleTyrAsnV
3201 TGTGTTTAGCTAAGGTAAAAGGCTACAGGTCTCTTTCCACATCCCAAACCTTCTATGATGCTTACATTCTTATGACACCAAAGATGCCCTGTACTGA
880▶alCysLeuAlaLysValLysGlyTyrArgSerLeuSerThrSerGlnThrPheTyrAspAlaTyrIleSerTyrAspThrLysAspAlaSerValThrAs

SmaI (3384)

SandI (3380)

3301 CTGGGTGATAAATGAGCTGCGCTACCACCTGAAGAGAGCCGAGACAAAAACGTTCTCCTTTGTCTAGAGGAGAGGGATTGGGACCCGGGATTGGCCATC
913▶pTrpValIleAsnGluLeuArgTyrHisLeuGluGluSerArgAspLysAsnValLeuLeuCysLeuGluGluArgAspTrpAspProGlyLeuAlaIle
3401 ATCGACAACCTCATGAGAGCATCAACCAAAGCAAGAAAAACAGTATTTGTTTTAACAAAAATATGCAAAAAGCTGGAACTTAAAAACGCTTTTTACT
947▶IleAspAsnLeuMetGlnSerIleAsnGlnSerLysLysThrValPheValLeuThrLysLysTyrAlaLysSerTrpAsnPheLysThrAlaPheTyrL
3501 TGGCTTTCAGAGGCTAATGGATGAGAACATGGATGTGATTATTTATCCTGCTGGAGCCAGTGTACAGCATTCTCAGTATTTGAGGCTACGGCAGCG
980▶euAlaLeuGluArgLeuMetAspGluAsnMetAspValIleIlePheIleLeuLeuGluProValLeuGluHisSerGlnTyrLeuArgLeuArgGluAr
3601 GATCTGTAAGAGCTCCATCCTCCAGTGGCTGACAACCGAAGGCAGAAGGCTTGTGTTGGCAAACCTGAGAAATGGTCTTACTGAAATGATTCA
1013▶gIleCysLysSerSerIleLeuGlnTrpProAspAsnProLysAlaGluGlyLeuPheTrpGlnThrLeuArgAsnValValLeuThrGluAsnAspSer

MscI (3763)

NheI (3757)

3701 CGGTATAACAATATGTATGTCGATTCCATTAAGCAATACTAACTGACGTTAAGTCATGCTAGCTGGCCAGACATGATAAGATACATTGATGAGTTGGAC
1047▶ArgTyrAsnAsnMetTyrValAspSerIleLysGlnTyr●●

HpaI (3895)

3801 AAACCACAAC TAGAATGCAGTGA AAAAAATGCTTTATTTGTGAAATTTGTGATGCTATTGCTTTATTTGTAACCATTATAAGCTGCAATAAACAAAGTTAA

MfeI (3906)

EcoRI (3991)

3901 CAACAACAATTGCATTCATTTTATGTTTCAGGTTACAGGGGAGGTGTGGGAGGTTTTTAAAGCAAGTAAAACCTCTACAAATGTGGTATGGAATCTAA

4001 AATACAGCATAGCAAACCTTAACTCCAAATCAAGCCTCTACTTGAATCCTTTTCTGAGGGATGAATAAGGCATAGGCATCAGGGGCTGTTGCCAATGT

4101 GCATTAGCTGTTTGCAGCCTCACCTTCTTCATGGAGTTAAGATATAGTGTATTTTCCCAAGGTTTGAAGTACTGCTCTTCATTTCTTTATGTTTTAAATG

SwaI (4244)

4201 CACTGACCTCCACATTCCTTTTTAGTAAATATTCAGAAATAATTTAAATACATCATTGCAATGAAAATAAATGTTTTTTATTAGGCAGAATCCAGAT

EcoO109I (4305)

4301 GCTCAAGGCCCTTCATAATATCCCCAGTTTAGTAGTGGACTTAGGGAACAAAGGAACCTTTAATAGAAATTGGACAGCAAGAAAGCGAGCTTCTAGCT

4401 TTAGTTCTGGTGTACTTGAGGGGATGAGTTCCTCAATGGTGGTTTTGACCAGCTTGCCATTCATCTCAATGAGCACAAAGCAGTCAGGAGCATAGTCA
141▶●●AsnArgThrTyrLysLeuProIleLeuGluGluIleThrThrLysValLeuLysGlyAsnMetGluIleLeuValPheCysAspProAlaTyrAspS

BstXI (4534)

4501 GAGATGAGCTCTCTGCACATGCCACAGGGGCTGACCACCTGATGGATGTCCACCTCATCAGAGTAGGGTGCCTGACAGCCACAATGGTGTCAAAGT
107▶erIleLeuGluArgCysMetGlyCysProSerValValArgIleSerArgAspValGluAspSerTyrProHisArgValAlaValIleThrAspPheAs

StuI (4669)

4601 CCTTCTGCCGTTGCTCAGCAGACCAATGGCAATGGCTTCAGCACAGACAGTACCCTGCCAATGTAGGCCCTCAATGTGGACAGCAGAGATGATCTC
74▶pLysGlnGlyAsnSerValAlaSerGlyIleAlaIleAlaGluAlaCysValThrValArgGlyIleTyrAlaGluIleHisValAlaSerIleIleGlu
4701 CCCAGTCTGGTCTGATGGCCGCCGACATGGTCTTGTCTCATAGACATGGTGTATCTCTCAGTGGCGACCTCCACAGCTCCAGATCTCGC
41▶GlyThrLysThrArgIleAlaAlaGlyValHisHisLysAsnAspGluTyrLeuMetThrIleLysGluThrAlaValGluValLeuGluLeuAspGluNg

BspHI (4819)

4801 TGAGAGATGTTGAAGTCTTCATGATGGCCCTCTATAGTGCATGATTATACTATGCGCATATACTATGCCGATGATTAATTGTCAAACAGCGTGGGA
7▶InSerIleAsnPheThrLysMet

4901 TGGCGTCTCCAGCTTATCTGACGGTCACTAAACGAGCTCTGCTTATATAGACCTCCACCGTACACGCCTACCGCCATTTGCGTCAATGGGGCGGAGT

SpeI (5032)

5001 TGTTACGACATTTTGAAAGTCCCCTTGATTTACTAGTCAAACAAACTCCCATTGACGTCAATGGGGTGGAGACTTGAAATCCCCGTGAGTCAAACC

SnaBI (5160)

5100 GCTATCCACGCCATTGATGACTGCCAAAACCGCATCATCATGGTAATAGCGATGACTAATACGTAGATGACTGCCAAGTAGGAAAGTCCCATAAGGT

NdeI (5265)

5200 CATGTAAGTGGCATAATGCCAGGCGGGCCATTTACCGTATTGACGTCAATAGGGGGCTACTTGGCATATGATACACTTGATGACTGCCAAGTGGGCA

5300 GTTTACCCTAAATACTCCACCCATTGACGTCAATGAAAGTCCCTATTGGCGTACTATGGAAACATACGTCAATATTGACGTCAATGGGCGGGGTCGT

SdaI (5443)PacI (5451)

5400 TGGGCGGTGAGCCAGGCGGGCCATTTACCGTAAGTTATGTAACGCCCTGCAGGTTAA TTAAGAACATGTGAGCAAAGGCCAGCAAAGGCCAGGAACC

5498 GTAAAAAGGCCGCTTGTCTGGCGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGG

5598 ACTATAAAGATACCAGGCTTTCCCTGGAAGCTCCCTGCTGCGCTCTCTGTTCCGACCCTGCGCTTACCGGATACCTGTCCGCCTTTCTCCCTTCG

ApaI (5775)

5698 GGAAGCGTGGCGCTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTTGCTCCAAGCTGGGCTGTGTGCACGAACCCCGTTTCAGC
5798 CCGACCGCTGCGCCTTATCCGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAG
5898 AGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGGCCTAACTACGGCTACACTAGAAGAACAGTATTTGGTATCTGCGCTCTGCTGAAGCCA
5998 GTTACCTTCGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAACAACCACCGCTGGTAGCGGTGGTTTTTTTTGTTTGCAAGCAGCAGATTACGCGCAGAA

PacI (6191)

6098 AAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGGTCTGACGCTCAGTGAACGAAAACCTCACGTTAAGGGATTTTGGTCATGGCTAGTTAATT

EagI (6211)

Swal (6200) **NotI (6210)**

6198 AACATTTAAATC AGCGGCCGCAATAAAATATCTTTATTTTATTACATCTGTGTGTTGGTTTTTTGTGTGAATCGTAACTAACATACGCTCTCCATCAA
6298 ACAAACGAAACAAACAAACTAGCAAATAGGCTGTCCCAAGTGCAAGTGCCAGTGCCAGAACATTTCTCTATCGAA