



150

Bsp120I (6)  
PstI (6)  
SdaI (6) SpeI (13)

1 CCTGCAGGGCCCACTAGTTTTGCTTCTAGGAAGCAGAAGACTGAGAAATGACTTGGCGGGTGCATCAATGCGGCCAAAAAGACACGGACACGCTCCC

101 CTGGGACCTGAGCTGGTTCGAGTCTTCCAAAGGTGCCAAGCAAGCGTCAGTCCCTCAGGCGCTCCAGGTTCAAGTGCCTTGTGCCGAGGGTCTCCGG

201 TGCCTTCTAGACTTCTCGGGACAGTCTGAAGGGGTGAGGAGCGGGGACAGCGCGGAAGAGCAGGCAAGGGGAGACAGCCGGACTGCGCCTCAGTCC

301 TCCGTGCCAAGAACCCTCGCGGAGGCGGGCAGCTTCCCTTGATCGGACTTTCGCCCTAGGGCCAGGCGGGAGCTTCAGCCTTGTCCCTTCC

401 CCAGTTTCGGGCGCCCCAGAGCTGAGTAAGCCGGTGGAGGGAGTCTGCAAGATTCTAGCGCGATGGCAGGAGGAGGGCAAGGGCAAGAGGG

501 CGCGGAGCAAAGACCCTGAACCTGCCGGGGCCGCTCCCGGGCCCGCTCGCCAGCACCTCCCCACGCGCTCGGCCCGGGCCACCCGCCCTCGTCC

601 GCCCCCGCCCTCTCCGTAGCCGAGGGAAGCGAGCCTGGGAGGAAGAAGAGGGTAGGTGGGAGGGGATGAGGGTGGGGACCCCTTGACGTCACCA

701 GAAGGAGGTGCCGGGTAGGAAGTGGGCTGGGAAAGTTATAAATCGCCCCGCCCTCGGTGCTTTCATCGAGGTCGCGGGAGGCTCGGAGCGCGC

801 CAGGCGGACTCTCTCGGCTCTCCCGGACGCGGGCGGCTCGGAGCGGCTCCGGGGCTCGGTGCAGCGCCAGCGGGCCTGGCGCGAGGA

901 TTACCCGGGAAGTGTTGTCTCTGGTGGAGCCGAGACGGCGCTCAGGGCGGGCCGGCGGCAACAAGAGGACGGACTCTGGCGCGCG

1001 GTCGTTGGCCGCGGGGAGCGGGGACCCGGGCGAGCAGCCGCGTCCGCTCACCATGGGGGTTCTCATCATCATCATCATGGTATGGCTAGCATG

1101 ACTGGTGAGCAGCAAATGGGTCGGGATCTGTACGACGATGACGATAAGGTACCTAAGGATCAGCTTGGAGTTGATCCCGTCTTTTACAACGTCGTGACT

1201 GGGAAAACCTGGCGTTACCCAACCTAATCGCCTTGACGACATCCCCCTTTCGCGAGCTGGCGTAATAGCGAAGAGGCCGACCCGATCGCCCTCCCA

1301 ACAGTTGCGCAGCCTGAATGGCGAATGGCGCTTTCGCTGGTTCCGGCACCAGAAGCGGTGCCGAAAAGCTGGCTGGAGTGCATCTTCTGAGGCGCGAT

1401 ACTGTCGTCGTCCTCCCAACTGGCAGATGCACGGTTACGATGCGCCATCTACACCAACGTAACCTATCCCATTACGGTCAATCCGCGTGTGTTCCCA

1501 CCGAGAATCCGACGGGTTGTACTCGCTCACATTAATGTTGATGAAAGCTGGCTACAGGAAGCCAGACGCGAATTATTTTATGGCGTTAACTCGGC

1601 GTTTCATCTGTGGTCAACGGGCGCTGGTTCGGTACGGCCAGGACAGTCTGTTCCGCTGAATTTGACCTGAGCGCATTTTACGCGCCGGAGAAAAC

1701 CGCCTCGCGGTGATGGTGTGCTTGGAGTGACGGCAGTTATCTGGAAGATCAGGATATGTGGCGGATGAGCGGCATTTTCCGTGACGCTCTGTTGCTGC

1801 ATAAACCGACTACAAAAACAGCGATTTCATGTTGCCACTCGCTTAAATGATGATTTACGCGCGCTACTGGAGGCTGAAGTTAGATGCGCGCGA

1901 GTTGCGTGACTACCTACGGGTAACAGTTTCTTTATGGCAGGGTAAACGACAGTCCGACGCGCACCCGCGCTTTCGCGGGTAAATATCGATGAGCGT

2001 GGTGTTATGCGGATCGGTCACACTAGCTGAACCTGCAACCCGAAACCTGGAGCGCGGAAATCCCGAATCTCTACTGCGGTGGTTGAAGTGC

2101 ACACCGCCGACGCGACGCTGATTGAAGCAGAAGCTGCGATGTCGGTTCCGCGAGGTGCGGATTGAAATGGTCTGCTGCTGCTGAACGGCAAGCCGTT

2201 GCTGATTCGAGGCGTAAACCGTCACGAGCATCATCTCTGATGGTACGATGATGGATGAGCAGACGATGGTGCAGGATATCCTGCTGATGAAGCAGAAC

2301 AACTTTAAACCGCTGCGCTGTTCCGATTATCCGAACCTCCGCTGTGGTACACGCTGTGCGACCCTACGGCCTGTATGTTGGTGGATGAAGCCAATATTG

2401 AAACCCACGGCATGGTGCAATGAATCGTCTGACCGATGATCCGCGTGGCTACCGGCGATGAGCGAACGCGTAACCGCAATGGTGCAGCGGATCGTAA

2501 TCACCCGAGTGTGATCATCTGGTCGCTGGGAAATGAATCAGGCCACGGCGTAATCAGACGCGCTGTATCGCTGGATCAAATCTGCTGATCCTTCCCGC

2601 CCGGTGCAGTATGAAGGCGGGGAGCCGACACCACGGCCACCGATATTATTTGCCGATGTACGCGCGTGGATGAAGACCAGCCCTTCCCGCTGTGC

2701 CGAAATGGTCCATCAAAAATGGCTTTCGCTACCTGGAGAGACGCGCCGCTGATCCTTTGCGAATACGCCACGCGATGGGTAAACGCTTGGCGGTTT

2801 CGCTAAATACTGGCAGGCGTTTCTGCTAGTATCCCGTTTACAGGGCGGCTTCTGCTGGGATCGGTCGATGCTGCTGATTAATATGATGAAAACGGC

AvrII (362)

Bsp120I (540)

SandI (680) AatII (695)

SacII (782)

NaeI (963) EagI (994)

SacII (1012) NcoI (1054) NheI (1092)

Bsu36I (1153)

Acc65I (1148)

FspI (1308) Bsu36I (1390)

AatIII (1789)

ClaI (1990)

EcoRV (2279)

SspI (2396)

BsaBI (2492)

BssHIII (2664) BbsI (2683)

582▶eAl aLysTyrTrpGl nAl aPheArgGl nTyrP roArgLeuGl nGl yGl yPheVal T rpAspT rpVal AspGl nSer LeuI l eLysTyrAspGl uAsnGl y  
2901 AACCCGTGGTTCGGCTTACGGCGGTGATTTTGGCGATACGCCGAACGATCGCCAGTTCGTATGAACGGTCTGGTCTTTGCCGACCGCACGCCATCCAG  
616▶AsnProTrpSerAl aTyrGl yGl yAspPheGl yAspThr P roAsnAspArgGl nPheCysMetAsnGl yLeuVal PheAl aAspArgThr ProHi sP roA  
3001 CGCTGACGGAAAGCAAACACCAGCAGCAGTTCCTTCCAGTTCCTTTATCCGGGCAAACCATCGAAGTGACCAGCGAATACCTGTTCCGTCATAGCGATAA  
649▶l aLeuThr Gl uAl aLysHi sGl nGl nPhePheGl nPheArgLeuSer Gl yGl nThr l l eGl uVal Thr Ser Gl uTyrLeuPheArgHi sSerAspAs  
3101 CGAGCTCTGCACCTGGATGGTGGCGCTGGATGGTAAGCCGCTGCAACGCGTGAAGTGCCCTCTGGATGTCTCCACAAGGTAACAGTTGATTGAACCTG  
682▶nGl uLeuLeuHi sTrpMe tValAl aLeuAspGl yLysP roLeuAl aSer Gl yGl uVal P roLeuAspValAl aP roGl nGl yLysGl nLeuI l eGl uLeu  
3201 CCTGAACCTACCAGCCGAGAGCGCGGGCAACTCTGGCTCACAGTACGCGTAGTGCAACCGAACCGACCGCATGGTCAGAAGCCGGGCACATCAGCG  
716▶P roGl uLeuP roGl nP roGl uSerAl aGl yGl nLeuT rpLeuThr Val ArgVal Val Gl nP roAsnAl aThr Al aTrpSer Gl uAl aGl yHi s l l eSerA  
3301 CCTGGCAGCAGTGGCGCTGCGCGAAAACCTCAGTGTGACGCTCCCCCGCGCTCCCACGCCATCCCGCATCTGACCACCAGCGAAATGGATTTTTCAT  
749▶l aTrpGl nGl nTrpArgLeuAl aGl uAsnLeuSer Val Thr LeuP roAl aAl aSer Hi sAl a l l eP roHi sLeuThr Thr Ser Gl uMe tAspPheCys l l  
3401 CGAGCTGGTAATAAGCGTTGGCAATTAACCGCCAGTCAGGCTTCTTTACAGATGTGGATTGGCGATAAAAAACAACCTGCTGACGCCGCTGCGCGAT  
782▶eGl uLeuGl yAsnLysArgTrpGl nPheAsnArgGl nSer Gl yPheLeuSer Gl nMe tTrp l l eGl yAspLysLysGl nLeuLeuThr P roLeuArgAsp  
3501 CAGTTCACCCGTGCACCGCTGGATAACGACATTGGCGTAAGTGAAGCGACCCGATTGACCTAACGCCTGGGTGCAACGCTGGAAGCGCGGGCCATT  
816▶Gl nPheThr ArgAl aP roLeuAspAsnAsp l l eGl yVal Ser Gl uAl aThr Arg l l eAspP roAsnAl aTrpVal Gl uArgT rpLysAl aAl aGl yHi sT  
3601 ACCAGCCGAAGCAGCGTTGTTGACGTGCACGGCAGATACACTTGCTGATGCGGTGCTGATTACGACCGCTCACGCGTGGCAGCATCAGGGGAAAACCTT  
849▶yrGl nAl aGl uAl aLeuLeuGl nCysThr Al aAspThr LeuAl aAspAl aVal Leu l l eThr Thr Al aHi sAl aTrpGl nHi sGl nGl yLysThr Le  
3701 ATTTATCAGCCGAAAACCTACCGGATTGATGGTAGTGGTCAAATGGCGATTACCGTTGATGTTGAAGTGGCGAGCGATACACCGCATCCGGCGCGGATT  
882▶uPhe l l eSer ArgLysThr TyrArg l l eAspGl ySer Gl yGl nMe tAl a l l eThr Val AspVal Gl uValAl aSer AspThr P roHi sP roAl aArg l l e  
3801 GGCCTGAACCTGCCAGCTGGCGCAGGTAGCAGAGCGGGTAAACTGGCTCGGATTAGGGCCGAAGAAAACCTATCCGACCGCTTACTGCGCCTGTTTTCG  
916▶Gl yLeuAsnCysGl nLeuAl aGl nValAl aGl uArgVal AsnT rpLeuGl yLeuGl yP roGl nGl uAsnTyrP roAspArgLeuThr Al aAl aCysPheA

Eco47II

BbsI (3935)

Bst1107I (3928)

BspLU11I (3925) BsiWI (3936)

3901 ACCGCTGGGATCTGCCATTGTCAGACATGTATACCCCGTACGTTCCCGAGCGAAAACGGTCTGCGCTGCGGGACCGCGCAATTGAATTATGGCCACA  
949▶spArgTrpAspLeuP roLeuSer AspMe tTyrThr P roTyrVal l l eP roSer Gl uAsnGl yLeuArgCysGl yThr ArgGl uLeuAsnTyrGl yP roHi  
4001 CCAGTGGCGCGGCGACTTCCAGTTCACATCAGCCGCTACAGTCAACAGCAACTGATGGAAAACAGCCATCGCCATCTGCTGCACGGGAAGAGGCACA  
982▶sGl nTrpArgGl yAspPheGl nPheAsn l l eSer ArgTyrSer Gl nGl nLeuMe tGl uThr Ser Hi sArgHi sLeuLeuHi sAl aGl uGl uGl yThr

NdeI (4123)

4101 TGGCTGAATATCGACGGTTTCCATATGGGGATTGGTGGCAGACTCCTGGAGCCGTCAGTATCGGCGGAATACAGCTGAGCGCGGTGCTACCATT  
1016▶TrpLeuAsn l l eAspGl yPheHi sMe tGl y l l eGl yGl yAspAspSer T rpSer P roSer Val Ser Al aGl uLeuGl nLeuSer Al aGl yArgTyrHi sT

NheI (4245)

EcoRI (4239)

4201 ACCAGTTGGTCTGGTGTCAAAAAATAAATCTAGTCGAGAATTCGCTAGCTCGACATGATAAGATACATTGATGAGTTTGACAAAACCACAAC TAGAATG  
1049▶yrGl nLeuVal T rpCysGl nLys ●●●  
4301 CAGTGA AAAAATGCTTTATTTGGAAATTTGTGATGCTATTGCTTTATTTGTGAAATTTGTGATGCTATTGCTTTATTTGTAACATTATAAGCTGCAA

MfeI (4419)

DraI (4468)

4401 TAAACAAGTTAACAAACAATTGCATTCAATTTATGTTTCAGGTTTCAGGGGGAGGTGTGGGAGGTTTTTAAAGCAAGTAAAACCTCTACAAATGTGGT

DraI (4507)  
SwaI (4510)

4501 AGATCCATTTAAATGTTAATTAAGTCCATGACCAAAATCCCTTAACGTGAGTTTTTCGTTCCACTGAGCGTCAGACCCCGTAGAAAAGATCAAAGGATC  
▶  
4601 TTCTTGAGATCCTTTTTTCTGCGGTAATCTGCTGCTTGCAAACAAAAAACACCAGCTACCAGCGGTGTTTGTGTTGCCGGATCAAGAGCTACCAACT  
4701 CTTTTTCCGAAGGTAAGTGGCTTACGAGAGCGCAGATACAAATACTGTTCTTCTAGTGTAGCCGATGTTAGGCCACCACCTCAAGAACTCTGTAGCAC  
4801 CGCCTACATACCTCGCTCTGCTAATCCTGTTACCAGTGGCTGCTGCCAGTGGCGATAAGTCGTGCTTACC GGGTTGGACTCAAGACGATAGTTACCGGA  
4901 TAAGCGCAGCGGTGGGCTGAACGGGGGTTCTGTGCACACAGCCAGCTTGGAGCGAACGACCTACACCGAACTGAGATACCTACAGCGTGAGCTATGA  
5001 GAAAGCGCCACGCTTCCGAAAGGGAGAAAGCGGCAGGATATCCGGTAAGCGGCGAGGTCGGAACAGGAGAGCGCACGAGGGAGCTTCCAGGGGAAACG  
5101 CCTGGTATCTTTATAGTCTGTGCGGTTTCGCCACCTCTGACTTGAGCGTCGATTTTTGTGATGCTCTGACGGGGGGGAGCGCTATGAAAAACGCCAG

BspLU11I (5248)

AseI (5286)

5201 CAACGCGGCCTTTTACGGTTCCTGGCCTTTTCTGCTGGCCTTTTCTCATGTTCTTAATTAATTTTTCAAAGTAGTTGACAATTAATCATCGGCATA

SfiI (5337) MscI (5348)

5301 GTATATCGGCATAGTATAATACGACTCACTATAGGAGGGCCATCATGGCCAAGTTGACCAGTGTGTCCAGTGTCTCACAGCCAGGGATGTGGCTGGAG  
▶  
5400 CTGTTGAGTCTGGACTGACAGGTTGGGTTCTCCAGAGATTTGTGGAGGATGACTTTGACGGTGTGGTCAGAGATGATGTACCCTGTTTCATCTCAGC  
19▶l aVal Gl uPheT rpThr AspArgLeuGl yPheSer ArgAspPheVal Gl uAspAspPheAl aGl yVal Val ArgAspAspVal Thr LeuPhe l l eSer Al  
5500 AGTCCAGGACCGGTTGGCTGACAACACCCTGGCTTGGGTGTGGGTGAGAGGACTGGATGAGCTGTATGCTGAGTGGAGTGGTGGTCTCCACCAAC  
52▶aVal Gl nAspGl nVal l l eP roAspAsnThr LeuAl aTrpVal T rpVal ArgGl yLeuAspGl uLeuTyrAl aGl uT rpSer Gl uVal Val Ser ThrAsn  
5600 TTCAGGGATGCCAGTGGCCCTGCCATGACAGAGATTGGAGAGCAGCCCTGGGGAGAGAGTTTCCCTGAGAGACCCAGCAGGCAACTGTGTGCACTTTG  
86▶PheArgAspAl aSer Gl yP roAl aMe tThr Gl u l l eGl yGl uGl nP roT rpGl yArgGl uPheAl aLeuArgAspP roAl aGl yAsnCysVal Hi sPheV

SfiI (5746)

5700 TGGCAGAGGAGCAGGACTGAGGATAAGAATTGAGTTTCAGAAAAGGGGCGCTGAGTGGCCCTTTTTTCAACTTAATTA  
119▶a l l eAl aGl uGl uGl nAsp●●●