



150

**PstI (6)**  
**SdaI (6) SpeI (13)**

1 CCTGCAGGGCCCACTAGTTTTGCTTCTAGGAAGCAGAAGACTGAGGAATGACTTGGGCGGGTGCATCAATGCGGCCAAAAAGACACGGACACGCTCCC

101 CTGGGACCTGAGCTGGTTCGACGTTTCCCAAAGTGCACGCAAGCGTCAGTTCCTCCAGCGCTCCAGGTTTCAGTGCCTTGTGCCGAGGGTCTCCGG

201 TGCCTTCTAGACTTCTCGGGACAGTCTGAAGGGTTCAGGAGCGGGGACAGCGCGGAAGAGCAGGCAAGGGGAGACAGCCGGACTGCGCCTCAGTCC

**AvrII (362)**

301 TCCGTGCCAAGAACCCTGCGGGAGGCGGGCCAGCTTCCTTGGATCGGATTTCCGCCCTAGGGCCAGGCGGGAGCTTCAGCCTTGTCCCTTCCC

401 CCAGTTTCGGGCGGCCCCAGAGCTGAGTAAGCCGGTGGAGGGAGTCTGCAAGGATTTCTTGAGCGGATGGCAGGAGGAGGGCAAGGGCAAGAGGG

501 CGCGGAGCAAAGACCTGAACTGCCGGGGCCGCGTCCCAGCGCCCGCTCCGAGCACCTCCCCACGCGCGTCCGGCCCGGGCCACCCGCCCTCGTCC

601 GCGCCCGCCCTCTCGTAGCCGAGGGAAGCGAGCTGGGAGGAAGAAAGGGTAGGTGGGAGGCGGATGAGGGTGGGGAGCCCTTGACGTACCACA

701 GAAGGAGGTGCCGGGTAGGAAGTGGGTGGGAAAGGTTATAAATCGCCCCGCCCTCGGCTGCTTTCATCGAGGTCGCGGGAGGCTCGGAGCGCGC

801 CAGGCGGACACTCTCTCGGCTCTCCCGGACGCGCGCGGCTCGGAGCGGGCTCCGGGCTCGGGTGCAGCGGCCAGCGGGCGCTGCGCGCGAGGA

901 TTACCCGGGAAGTGGTGTCTCTCGTGGAGCCGAGACGGCGCTCAGGGCGCGGGCCGCGCGCGGGAACAAGAGGACGGACTCTGGCGCGCGG

**NcoI (1054) NheI (1092)**

1001 GTCGTTGGCGCGGGGAGCGGGCACCGGGCAGCAGGCCGCTCGCGCTCACCTGGGGGTTCTCATCATCATCATCATGGTATGGCTAGCATG

1▶MetGl yGl ySer Hi sHi sHi sHi sHi sHi sGl yMetAl aSer Met

**Acc65I (1148)**

1101 ACTGGTGGACAGAAATGGGTGGGATCTGTACGACGATGACGATAAGGTACCTAAGGATCAGTTCGGGATTTGATCCCGTCTTTTACAACGTCGTGACT

16▶ Thr Gl yGl yGl nGl nMetGl yA rgAspLeuTyrAspAspAspLysVal P roLysAspGl nLeuGl yVal AspP roVal Val LeuGl nArgArgAspT

1201 GGGAAAACCTGGCGTTACCACTTAACTCGCTTCGACACATCCCCCTTCCGACGCTGGCGTAATAGCGAAGAGGCCCGCACCAGTCCGCTTCCCA

49▶ r pGl uAsnP roGl yVal Thr Gl nLeuAsnArgLeuAl aAl aHi sP roP roPheAl aSer T rpArgAsnSer Gl uGl uAl aArgThrAspArgP roSer Gl

1301 ACAGTTGCGCAGCTGAATGGCAATGGCGCTTGCCTGGTTCCGGCACCAGAAGCGGTGCCGAAAGCTGGCTGGAGTGCATCTTCTGAGCCGAT

82▶ nGl nLeuArgSer LeuAsnGl yGl uTrpArgPheAl aTrpPheP roAl aP roGl uAl aVal P roGl uSer T rpLeuGl uCysAspLeuP roGl uAl aAsp

1401 ACTGTCGTCTCCCTCAAACCTGGCAGATGCACGGTACGATGCCCCATCTACACCAACGTAACCTATCCATTACGGTCAATCCGCCGTTTGTTC

116▶ Thr Val Val Val P roSerAsnTrpGl nMetHi sGl yTyrAspAl aP rol l eTyrThrAsnVal Thr TyrP rol l eThr Val AsnP roP roPheVal P roT

1501 CGGAGAATCCGACGGGTGTACTCGCTCACATTTAATGTTGATGAAAGCTGGCTACAGGAAGCCAGACGCGAATATTTTTGATGGCGTAACTCCGC

149▶ hr Gl uAsnP roThr Gl yCysTyrSer LeuThr PheAsnVal AspGl uSer T rpLeuGl nGl uGl yGl nThr ArgI l eI l ePheAspGl yVal AsnSerAl

1601 GTTTCATCTGTGGTGAACGGGCGTGGGTGGTACGGCCAGGACAGTCTGTTGCCGTCTGAATTTGACCTGAGCGCATTTCACGGCCGGAGAAAAC

182▶ aPheHi sLeuT rpCysAsnGl yA rgT rpVal Gl yTyrGl yGl nAspSer ArgLysLeuP roSer Gl uPheAspLeuSer Al aGl uAl aGl yGl uAsn

1701 CGCTCGCGGTGATGGTGTGCGTTGGAGTGACGGCAGTTATCTGGAAGATCAGGATATGTGGCGGATGAGCGGCATTTCCGTGACGCTCTGTTGCTGC

216▶ ArgLeuAl aVal MetVal LeuArgT rpSer AspGl ySer TyrLeuGl uAspGl nAspMetT rpArgMetSer Gl yI l ePheArgAspVal Ser LeuLeuH

1801 ATAACCAGTACTACAAATCAGCGATTTCCATGTTGCCACTCGCTTAAATGATGATTTACGCGCGCTGTACTGGAGGCTGAAGTTTCAGATGTCGGCGGA

249▶ i sLysP roThr TrAl nI l eSerAspPheHi sValAl aThr ArgPheAsnAspPheSer ArgAl aVal LeuGl uAl aGl yGl uAl aGl yGl uAsn

1901 GTTGGTACTACCTACGGTAAACAGTTTCTTTATGGCAGGGTAAACCGAGGTGCGCAGCGGCCCGCGCTTTCGGCGGTGAAATTATCGATGAGCGT

282▶ uLeuArgAspTyrLeuArgVal Thr Val Ser LeuT rpGl nGl yGl uThr Gl nValAl aSer Gl yThr Al aP roPheGl yGl yGl uI l eI l eAspGl uArg

2001 GGTGGTTATGCCGATCGGCTCACACTACGCTGAACGTGAAAACCCGAAACTGTTGGAGCGCCGAAATCCCGAATCTCTATCGTGGCGGTGGTGAACCTGC

316▶ Gl yGl yThrAl aAspArgVal Thr LeuArgLeuAsnVal Gl uAsnP roLysLeuP roSer Al aGl uI l eP roAsnLeuTyrArgAl aGl yGl uAl aGl y

2101 ACACCGCCGACGGCAGCGTATTGAAGCAGAAGCTGCGATGTCGGTTCCGCGAGGTGCGGATTGAAAATGGTCTGCTGCTGCTGCTGAAACGGCAAGCCGTT

349▶ i sThr Al aAspGl yThr LeuI l eGl uAl aGl uAl aCysAspVal Gl yPheArgGl uVal ArgI l eGl uAsnGl yLeuLeuLeuLeuAsnGl yLysP roLe

**EcoRV (2279)**

2201 GCTGATTCGAGCGTTAACCGTACGAGCATCATCCTCTGCATGGTCAGGTCATGGATGAGCAGACGATGGTGCAGGATATCTGCTGATGAAGCAGAAC

382▶ uLeuI l eArgGl yVal AsnArgHi sGl uHi sHi sP roLeuHi sGl yGl nVal l eMetAspGl uGl nThr MetVal Gl nAspI l eLeuLeuMetLysGl nAsn

2301 AACTTTAACCGCGTGGCTGTTTCGATTATCCGAACCATCCGCTGTTGACACGCTGTGCGACCGCTACGGCTGATGTGGTGGATGAAGCCAATATTG

416▶ AsnPheAsnAl aVal ArgCysSer Hi sTyrP roAsnHi sP roLeuT rpTyrThr LeuCysAspArgTyrGl yLeuTyrVal Val AspGl uAl aAsnI l eG

2401 AAACCCAGCGATGGTCCAATGAATCGTCTGACCGATATCCGCGCTGGCTACCGGATGAGCGAAGCGCTAACCGAATGGTGCAGCGCATCGTAA

449▶ l uThr Hi sGl yMetVal P roMetAsnArgLeuThrAspAspP roArgT rpLeuP roAl aMeT Ser Gl uArgVal Thr ArgMetVal Gl nArgAspArgAs

2501 TCACCCGAGTGTATCATCTGGTCGCTGGGAATGAATCAGGCCACGGCTAATCAGCACGGCTGTATCGTGGATCAAATCTGTCGATCTTCCCGC

482▶ nHi sP roSer Val I l eI l eT rpSer LeuGl yAsnGl uSer Gl yHi sGl yAl aAsnHi sAspAl aLeuTyrArgT rpI l eLysSer Val AspP roSer Arg

2601 CCGGTGACGATGAAGCGGGGAGCCGACACCAGGCCACCGATATTTTCCCGATGTACGCGCGCTGGATGAAGACCAGCCCTTCCCGCTGTGC

516▶ P roVal Gl nTyrGl uGl yGl yAl aAspThr ThrAl aThrAspI l eI l eCysP roMetTyrAl aArgVal AspGl uAspGl nP roPheP roAl aVal P

2701 CGAAATGGTCCATCAAAAATGGCTTTCCTACCTGGAGAGACGCGCCGCTGATCCTTTGCAATACGCCACCGGATGGGTAACAGTCTTGGCGGTTT

549▶ r oLysT rpSer I l eLysLysT rpLeuSer LeuP roGl yGl uThr ArgP roLeuI l eLeuCysGl uTyrAl aHi sAl aMeT Gl yAsnSer LeuGl yGl yPh

2801 CGCTAAACTGCGACGGCTTTCGTCAGTATCCCCGTTTACAGGGCGCTCGTGGGACTGGTGGATCAGTCGCTGATTAAATATGATGAAACCGG

582▶ eAl aLysT yrAl aLysArgGl nTyrP roArgLeuGl nGl yPheVal T rpAspT rpVal AspGl nSerLeuI l eLysT rpVal AspGl nSerAsnGl y

2901 AACCCGTGGTGGCTTACGGCGGTGATTTGGCGATACGCCAAGCATCCGAGTCTGTATGAACGGTCTGGTCTTTGCCAGCCGACGCGCATCCAG

616▶ AsnP roT rpSer Al aTyrGl yGl yAspPheGl yAspThr P roAsnAspArgGl nPheCysMetAsnGl yLeuVal PheAl aAspArgThr P roHi sP roA

3001 CGCTGACGGAAGCAAACACAGCAGCAGTTTTCCAGTTCGTTATCCGGCAACCATCGAAGTGACCAGCGAATACCTGTTCCGCTATAGCGATAA

649▶ l uLeuThr Gl uAl nGl nGl nGl nPhePheGl nPheAsnGl nPheAsnSer Gl yGl nThr I l eGl uVal Thr Ser Gl uPhePheArgHi sSerAspAs

3101 CGAGCTCTGCACTGGATGGTGGCGCTGGATGGTAAGCCGCTGGCAAGCGGTGAAGTGCCTCTGGATGTCGCTCCACAAGGTAAACAGTTGATTGAACTG

682▶ nGl uLeuLeuHi sT rpMetValAl aLeuAspGl yLysP roLeuAl aSer Gl yGl uVal P roLeuAspValAl aP roGl nGl yLysGl nLeuI l eGl uLeu

3201 CCTGAACTACCAGCCGGAGAGCGCGGCAACTCTGGCTCACAGTACGCGTAGTGAACCGAACCAGCGACCCGATGGTCAAGCCGGGCACATCAGCG

716▶ P roGl uLeuP roGl nP roGl nP roGl nP roGl nP roGl nP roGl nP roGl nP roGl nP roGl nP roGl nP roGl nP roAsnAl aThr Al aT rpSer Gl uAl aGl yHi sI l eSerA

3301 CCTGGCAGCAGTGGCGTCTGGCGAAAACCTCAGTGTGACGCTCCCGCCGCTCCACGCCATCCGCACTGACCACCAGCGAATGGATTTTGCAT

749▶ l aT rpGl nGl nT rpArgLeuAl aGl uAsnLeuSer Val Thr LeuP roAl aAl aSer Hi sAl aI l eP roHi sLeuThr Thr Ser Gl uMeT AspPheCysI l

3401 CGAGCTGGTAATAGCGTGGCAATTAACCGCCAGTCAGGCTTCTTTCACAGATGGGATGGCGATAAAAAACAACCTGCTGACGCCGCTCGCGAT

782▶ eGl uLeuGl yAsnLysArgT rpGl nPheAsnArgGl nSer Gl yPheLeuSer Gl nMeT rpI l eGl yAspLysLysGl nLeuLeuThr P roLeuArgAsp

3501 CAGTTCACCCGTGCACCGCTGGATAACGACATTGGCGTAAGTGAAGCGACCCGCATTGACCTAACGCCTGGGTCGAACGCTGGAAGCGGGCCATT  
816▶ Gl nPheThr ArgAl aP roLeuAspAsnAspI | eGl yVal Ser Gl uAl aThr ArgI | eAspP roAsnAl aTrpVal | Gl uArgT rpLysAl aAl aGl yHi sT  
3601 ACCAGGCCAAGCAGCGTTGTTGCAGTGCACGGCAGATACACTTGCTGATCGGGTCTGATTACGACCGCTCACGCGTGGCAGCATCAGGGGAAAACCTT  
849▶ y rGl nAl aGl uAl aAl aLeuLeuGl nCysThrAl aAspThr LeuAl aAspAl aVal | LeuI | eThr ThrAl aHi sAl aTrpGl nHi sGl nGl yLysThrLe  
3701 ATTTATCAGCCGAAAACCTACCGGATTGATGGTAGTGGTCAAATGGCGATTACCGTTGATGTTGAAGTGGCGAGCGATACACCGCATCCGGCGCGGATT  
882▶ uPheI | eSerArgLysThr TyrArgI | eAspGl ySer Gl yGl nMe tAl | eThr Val | AspVal | Gl uVal | Al aSerAspThr P roHi sP roAl aArgI | e  
3801 GGCTGAAGTCCAGCTGGCGCAGGTAGCAGAGCGGTAACCTGGCTCGATTAGGGCCGCAAGAAAACCTATCCGACCGCTTACTGCCGCTGTTTTG  
916▶ Gl yLeuAsnCysGl nLeuAl aGl nVal | Al aGl uArgVal | AsnT rpLeuGl yLeuGl yProGl nGl uAsnTyrP roAspArgLeuThr Al aAl aCysPheA

BspLU11I (3925)

3901 ACCGCTGGGATCTGCCATTGTGACAGATGTATACCCCGTACGTCTTCCGAGCGAAAACGGTCTGCGCTGCGGGACGCGGAATTGAATTATGGCCACA  
949▶ spArgT rpAspLeuP roLeuSerAspMe tTyrThr P roTyrVal PheP roSer Gl uAsnGl yLeuArgCysGl yThr ArgGl uLeuAsnTyrGl yProHi  
4001 CCAGTGGCGCGGCGACTTCCAGTTCAACATCAGCCGCTACAGTCAACAGCAACTGATGAAACCAGCCATCGCCATCTGCTGCACGCGGAAGGAGCACA  
982▶ sGl nT rpArgGl yAspPheGl nPheAsnI | eSer ArgTyrSer Gl nGl nGl nLeuMe tGl uThr Ser Hi sArgHi sLeuLeuHi sAl aGl uGl uGl yThr  
4101 TGGCTGAATATCGACGGTTTCCATATGGGGATTGGTGGCGACGACTCTGGAGCCGTCAGTATCGCGGAATTACAGCTGAGCGCGGTCTGCTACCATT  
1016▶ T rpLeuAsnI | eAspGl yPheHi sMe tGl yI | eGl yGl yAspAspSer T rpSer P roSer Val Ser Al aGl uLeuGl nLeuSer Al aGl yArgTyrHi sT

NheI (4245)

EcoRI (4239)

4201 ACCAGTTGGTCTGGTGTCAAAAATAATAATCTAGTCGAGAATTCGCTAGCTCGACATGATAAGATACATTGATGAGTTTGGACAAACCACAACCTAGAATG  
1049▶ y rGl nLeuVal T rpCysGl nLys ●●●  
4301 CAGTGAAAAAATGCTTTATTTGTGAAATTTGTGATGCTATTGCTTTATTTGTGAAATTTGTGATGCTATTGCTTTATTTGTAACCATTATAAGCTGCAA

4401 TAAACAAGTTAAACAACAACAAATTGCATTCAATTTATGTTTCAGGTTTCAGGGGAGGTGTGGGAGGTTTTTAAAGCAAGTAAAACCTCTACAAATGTGGT

SwaI (4510)

4501 AGATCCATTTAAATGTTAATTAAGTACGCATGACAAAAATCCCTAACGTGAGTTTTCTGTTCCACTGAGCGTACAGCCCGTAGAAAAGATCAAAGGATC

4601 TTCTTGAGATCCTTTTTTCTGCGGTAATCTGCTGCTTGAACAACAAAAACCACCGCTACCAGCGGTGTTTTGTTTCCGGATCAAGAGCTACCAACT

4701 CTTTTCCGAAGGTAAGTGGCTTCCAGAGCGCAGATACCAATACTGTTCTTCTAGTGTAGCCGTAGTTAGGCCACCACCTCAAGAAGCTGTAGCAC

4801 CGCCTACATACCTCGCTCTGCTAATCCTGTTACCAGTGGCTGCTGCCAGTGGCGATAAGTCTGTCTTACCGGTTGGACTCAAGACGATAGTTACCGGA

4901 TAAGGCGCAGCGGTGGGCTGAACGGGGGTTCTGTGCACACAGCCAGCTTGGAGCGAACGACCTACACCGAAGTACAGCTACAGCGTGAGCTATGA

5001 GAAAGCGCCACGCTTCCGAAGGGAGAAAGCGGACAGGTATCCGGTAAGCGGAGGGTCCGAACAGGAGAGCGCACGAGGGAGCTTCCAGGGGAAACG

5101 CCTGGTATCTTTATAGTCTGCTGGGTTTCCGACCTCTGACTTGAGCGTCGATTTTTGTGATGCTCGTCAGGGGGCGGAGCCTATGAAAAACGCCAG

BspLU11I (5248)

AseI (5286)

5201 CAACGCGGCCTTTTACGGTTCCTGGCCTTTTGTGCTCACATGTTCTTAATTAATTTTCAAAGTAGTTGACAATTAATCATCGGCATA

5301 GTATATCGGCATAGTATAATACGACTCACTATAGGAGGGCCATCATGGCAAAGTTGACCAAGTGTGCTGCCAGTGTGCCAGTGTCCAGTGTCTCACAGCCAGGGATGTGGCTGGAGC

5401 TGTGAGTCTGACTGACAGGTTGGGGTCTCCAGAGATTTTGTGGAGGATGACTTTGCAGGTGGTTCAGAGATGATGTCACCTGTTTCATCTCAGCA  
19▶ aVal Gl uPheT rpThr AspArgLeuGl yPheSer ArgAspPheVal Gl uAspAspPheAl aGl yVal Val ArgAspAspVal Thr LeuPheI | eSerAl a

5501 GTCCAGGACCAGGTGGTGCCTGACAACACCTGGCTTGGGTGTGGGTGAGAGACTGGATGAGCTGTATGCTGAGTGGAGTGGTGGTCTCCACCAACT

53▶ Val Gl nAspGl nVal Val P roAspAsnThr LeuAl aT rpVal T rpVal ArgGl yLeuAspGl uLeuTyrAl aGl uT rpSer Gl uVal Val Ser ThrAsnP

5601 TCAGGGATGCCAGTGGCCCTGCCATGACAGAGATTGGAGAGCAGCCCTGGGGGAGAGATTTGCCCTGAGAGCCAGCAGGCACTGTGTGCACTTTGT

86▶ heArgAspAl aSer Gl yProAl aMetThr Gl uI | eGl yGl uGl nP roT rpGl yArgGl uPheAl aLeuArgAspP roAl aGl yAsnCysVal Hi sPheVa

5701 GCAGAGGAGCAGGACTGAGGATAAGAATTGAGTTTCAGAAAAGGGGCTGAGTGGCCCTTTTTTCAACTTAATTA

119▶ IAl aGl uGl uGl nAsp ●●●