



**PvuI (7)**  
**SgfI (6)** 1 GGATCTGGATCGCTCCGGTGCCCGTCAGTGGGCAGAGCGCACATCGCCACAGTCCCGGAGAAGTTGGGGGAGGGGTGGCAATTGAACGGGTGCCTA  
**MfeI (82)** **EcoNI (96)**  
101 GAGAAGTGGCGCGGGTAAACTGGAAAGTGATGTCGTGACTGGCTCCGCCTTTTCCGAGGGTGGGGGAGAACCCTATATAAGTGCAGTAGTCGCC

**Psp1406I (203)** **HindIII (245)** **Bsu36I (291)**  
201 GTGAACGTTCTTTTTTCGCAACGGGTTTCCGCCAGAACACAGCTGAAGCTTCGAGGGCTCGCATCTCTCTTACCGCCGCCGCCCTACCTGAGGCC  
301 GCCATCCACGCGGTTGAGTGCCTTCTGCCGCTCCCGCCTGTGGTGCCTCCTGAAGTGCCTCCGCGTCTAGGTAAGTTTAAAGCTCAGGTCGAGACC

**NgoMIV (441)** **NaeI (441)**  
401 GGGCCTTTGTCCGGCGCTCCCTTGGAGCCTACCTAGACTCAGCCGGCTCTCCACGCTTTGCTGACCCTGCTTCTCAACTCTACGTCTTTGTTTCGTTT

**KasI (535)** **AgeI (552)** **BspLU11I (560)**  
501 TCTGTTCTGCGCCGTTACAGATCCAAGCTGTGACCGGGCGCTACTCTGAGATCACCGGTCAACATGTGCTGTTCTGTCAGAGGACAGCTTCAGGAA  
1▶MetSerIleValCysSerAlaGluAspSerPheArgAs

**BsrGI (632)**  
601 TCTCATCTTATTCTTTCAGGCCAGGCTGAAAATGTACATTTCAGGTGGAGCCAGTGTGGACCCTCATCTTTCTGTCTGCAGAAACCAAGAGCAGATT  
13▶nLeuIleLeuPhePheArgProArgLeuLysMetTyrIleGlnValGluProValLeuAspHisLeuIlePheLeuSerAlaGluThrLysGluGlnIle  
701 CTTAAAAAGATCAACACCTGTGGTAAACACCAGCGCGGAGAACTGCTGCTGAGCACCTTGGAGCAGGGACAATGGCCTCTGGGATGGACGAGATGTTTCG  
47▶LeuLysLysIleAsnThrCysGlyAsnThrSerAlaAlaGluLeuLeuSerThrLeuGluGlnGlyGlnTrpProLeuGlyTrpThrGlnMetPheV

**EcoO109I (803)** **BssHIII (835)** **PshAI (895)**  
801 TGGAGGCCCTAGAGCACAGTGGCAATCCCTAGCCGCGCTATGTCAAACCCACACTCACTGATCTGCCCTCTCTTCTCTGAGACTGCCCATGACGA  
80▶alGluAlaLeuGluuHisSerGlyAsnProLeuAlaAlaArgTyrValLysProThrLeuThrAspLeuProSerProSerSerGluThrAlaHisAspGlu  
901 GTGTCTCCACTTGTCTGACCTCTCCAGCCACTTTGGTGGACAACTTCTGATTAACGATGTCTGGACACTTGTTCGAGAAGGGACTATTGACAGTC  
113▶uCysLeuHisLeuLeuThrLeuLeuGlnProThrLeuValAspLysLeuLeuIleAsnAspValLeuAspThrCysPheGluLysGlyLeuLeuThrVal  
1001 GAAGACAGAAATCGGATTTCTGCTGCAGGAAACAGCGGAATGAGTCAGGTGTAAGAGAGCTGCTGAGAAGGATTGTGCAGAAGGAAAACCTGGTTTTCTA  
147▶GluAspArgAsnArgIleSerAlaAlaGlyAsnSerGlyAsnGluSerGlyValArgGluLeuLeuArgArgIleValGlnLysGluAsnTrpPheSerT  
1101 CCTTCTGGATGTTCTGCGCCAACTGGAAATGATGCACTATTCGAAGAACTAACAGTGGAGGCTGCCAGAAAGACAACACAGACTTGGCTAACTCGTC  
180▶hrPheLeuAspValLeuArgGlnThrGlyAsnAspAlaLeuPheGlnGluLeuThrGlyGlyCysProGluAspAsnThrAspLeuAlaAsnSerSe  
1201 TCACAGAGATGGGCTGCAGCTAATGAGTGTCTTCTGCTGCTGATGAGTCAAGTCTGGAGACAGAGGCCGGAACGTAGACGACATATTACCAGAG  
213▶rHisArgAspGlyProAlaAlaAsnGluCysLeuLeuProAlaValAspGluSerSerLeuGluThrGluAlaTrpAsnValAspAspIleLeuProGlu

**BsrGI (1306)**  
1301 GCTTCTGTACAGATTCTGCTGTGACCACAGAATCAGACACAAGTTTGGCAGAAGGAAGTGCAGCTGCTTCGATGAAAGTCTTGGACATAACAGCAACA  
247▶AlaSerCysThrAspSerSerValThrGluSerAspThrSerLeuAlaGluGlySerValSerCysPheAspGluSerLeuGlyHisAsnSerAsnM

**NcoI (1418)**  
1401 TGGGCAGGGATTACGGCACCATGGGAAGTGATTCAGATGAAAGTGTATCCAGACAAAAAGATATCCCCGAGCCAGAACTGCAGCTCAGGCCTTACCA  
280▶etGlyArgAspSerGlyThrMetGlySerAspSerAspGluSerValIleGlnThrLysArgValSerProGluProGluLeuGlnLeuArgProTyrGlu

**XbaI (1521)**  
1501 AATGGAAGTGGCCCAACAGCTAGATGGGAAGAATATTATTATCTGCCTCCACGGGGAGTGGGAAAACAGAGTGGCTGTTTACATCACCAGAAAGT  
313▶nMetGluValAlaGluProAlaLeuAspGlyLysAsnIleIleIleCysLeuProThrGlySerGlyLysThrArgValAlaValTyrIleThrLysAsp  
1601 CACTTAGACAAGAAGAAGCAGGCATCTGAATCCGGGAAGTTATCGTTCTTGTCAATAAGGTAATGTTAGCAGAACAACCTTTCCGAAAAGAGTTCAACC  
347▶HisLeuAspLysLysLysGlnAlaSerGluSerGlyLysValIleValLeuValAsnLysValMetLeuAlaGluGlnLeuPheArgLysGluPheAsnP  
1701 CATATTTGAAGAAATGGTATCGAATTATTGGATTAAGTGGCGATACCCAGCTGAAAATATCATTTCCAGAAGTGTCAAATCTTACGATGTTATTATCAG  
380▶rOThrLeuLysLysTrpTyrArgIleIleGlyLeuSerGlyAspThrGlnLeuLysIleSerPheProGluValValLysSerTyrAspValIleIleSe  
1801 CACTGCTCAAATCCTTGAACCTCTTAAATCTGGAGAGTGGAGAGCTGACGGTGTGACGCTGTGACAGCTTCTCTCTATTATCATTGATGAGTGC  
413▶rThrAlaGlnIleLeuGluAsnSerLeuLeuAsnLeuGluSerGlyAspAspAspGlyValGlnLeuSerAspPheSerLeuIleIleIleAspGluCys  
1901 CATCACACCAACAAGGAGCAGTCTATAACAACATCATGAGACGATATTTGAAGCAGAAGCTGAGAAAACAAATGACCTCAAGAAAACAAAACAGCCCA  
447▶HisHisThrAsnLysGluAlaValTyrAsnAsnIleMetArgArgTyrLeuLysGlnLysLeuArgAsnAsnAspLeuLysLysGlnAsnLysProAla

**DraIII (2033)**  
2001 TTCCCTGCCGAGATACTAGGACTGACAGCTTCACTGGTGTGGAGCAGCCAAAAAGCAGTCTGAGGCTGAAAAACATATTTTAAATATATGTGCCAA  
480▶IleProLeuProGlnIleLeuGlyLeuThrAlaSerProGlyValGlyAlaAlaLysLysGlnSerGluAlaGluLysHisIleLeuAsnIleCysAlaAs  
2101 TCTTGATGCTTTTACCATTAAAAACAGTGAAGAGAATCTTGGTCAACTCAAACCAAATAAAGGAACCATGCAAGAAATTTGTGATTGCTGATGACACC  
513▶nLeuAspAlaPheThrIleLysThrValLysGluAsnLeuGlyGlnLeuLysHisGlnIleLysGluProCysLysLysPheValIleAlaAspAspThr

**XbaI (2226)**  
2201 AGAGAAAAATCCATTTAAAGAGAACTTCTAGAAAATATGGCAAGCATTGACACTTACTGCCAAAAAAGTCCAATGTCAGATTTTGAACCCCAACATTATG  
547▶ArgGluAsnProPheLysGluLysLeuLeuGluIleMetAlaSerIleGlnThrTyrCysGlnLysSerProMetSerAspPheGlyThrGlnHisTyrG  
2301 AGCAGTGGGCCATTCAAATGGAGAAAAAGCTGCTAAAGACGGAATCGCAAAGATCGCGTCTGTGCAGAACATTTGAGGAAAGTACAACGAAGCCCTACA  
580▶IuGlnTrpAlaIleGlnMetGluLysLysAlaAlaLysAspGlyAsnArgLysAspArgValCysAlaGluHisLeuArgLysTyrAsnGluAlaLeuGlu

**Ppu10I (2426)** **NsiI (2426)**  
2401 AATCAACGACACGATCCGAATGATTGATGCATATAGCCACCTGGAGACATTCTACACTGATGAGAAAAGAAAAGATTTCGAGTCTCAATGACAGCGAC  
613▶nIleAsnAspThrIleArgMetIleAspAlaTyrSerHisLeuGluuThrPheThrAspGluLysGluLysLysPheAlaValLeuAsnAspSerAsp  
2501 AAGAGTGATGACGAGGCGACGATTTGCAATGACCAACTTAAGGCGGATGTAAGAAAATCTTTGAAACTGGACGAAACGGATGAATTTCTCAATGAATTTGT  
647▶LysSerAspAspGluAlaSerSerCysAsnAspGlnLeuLysGlyAspValLysLysSerLeuLysLeuAspGluuThrAspGluPheLeuMetAsnLeuP  
2601 TCTTTGATAACAAGAAAATGTTGAAAAAAGCTGAAAAACCAAAATACGAGAATGAAAAACTCATTAAATTAAGAAACACGATACTGGAACAATTCAC  
680▶hePheAspAsnLysLysMetLeuLysLysLeuAlaGluAsnProLysTyrGluAsnGluLysLeuIleLysLeuArgAsnThrIleLeuGluGlnPheTh  
2701 AAGGTCTGAGGAGTCTCCCGAGGAATATTTTCAAAAAACACGACAGACACCTACGCACTTTCCAGTGGATCATGGAAAATGCAAAAGTTTGGCGAA  
713▶rArgSerGluGluSerSerArgGlyIleIlePheThrLysThrArgGlnSerThrTyrAlaLeuSerGlnTrpIleMetGluAsnAlaLysPheAlaGlu  
2801 GTTGAGTCAAAGCGCATCACCTGATTTGGCGGGGCACAGCAGTGAAGTCAAGCCATGACTCAGACTGAACAAAAAGAAAGTCAATGATAAATTTTCGCA  
747▶ValGluValIleValHisHisIleIleGluValAlaGluHisSerSerGluValIleProMetThrGlnThrGluGlnValIleSerIlePheArgT

**EcoRV (2950)**  
**Eco32I (2950)**

2901 CTGGCGAAATAAATCTGCTTATCGCTACGACGGTGGCAGAGGAAGGCCTGGATATCAAAGAGTGCAATATTGTTATTCGTTATGGCCTTGTACGAACGA  
780▶hr Gl y Gl u l e Asn Leu Leu l e Al a Thr Thr Val Al a Gl u Gl u Gl y Leu Asp l e Lys Gl u Cys Asn l e Val l l e Arg Tyr Gl y Leu Val Thr Asn Gl

**XmaI (3017)**  
**SmaI (3017)**      **BstEII (3057)**

3001 GATAGCCATGGTCCAGGCCCGGGTCCGAGCCAGAGCTGATGAAAGCACGTATGTCCTGGTCCACCAGCTGGCTCAGGAGTTACCGAACGGGAGATTGTT  
813▶ul l e Al a Me t Val Gl n Al a Arg Gl y Arg Al a Asp Gl u Ser Thr Tyr Val l Leu Val l Thr Ser Ser Gl y Ser Gl y Val Thr Gl u Arg Gl u l l e Val l

3101 AATGATTTCCGAGAGAAGATGATGTATAAAGCTATTAACCGTGTTCAAAACATGAAACCAGAGGAGTATGCACATAAGATTTTGAATTGCAGGTGCAAA  
847▶Asn Asp Phe Arg Gl u Lys Me t Me t Tyr Lys Al a l l e Asn Arg Val Gl n Asn Me t Lys Pro Gl u Gl u Tyr Al a Hi s Lys l l e Leu Gl u Leu Gl n Val Gl n S

**SphI (3293)**

3201 GTATCCTGGAAAAGAAAATGAAAGTCAAAGAAGCATTGCAAAGCAATACAACGACAATCCATCGTTAATAACACTTCTCTGCAAAAAATGTAGCATGCT  
880▶er l l e Leu Gl u Lys Lys Me t Lys Val Lys Arg Ser l l e Al a Lys Gl n Tyr Asn Asp Asn Pro Ser Leu l l e Thr Leu Leu Cys Lys Asn Cys Ser Me t Le

**Ppu10I (3337)**  
**NsiI (3337)**      **EcoRI (3361)**

3301 GGTCTGCTCGGGAGAAAACATCCATGTCTATTGAGAAGATGCATCATGTCAATATGACACCAGAATCAAGGGACTCTACATTGTAAGAGAAAACAAAGCA  
913▶u Val Cys Ser Gl y Gl u Asn l l e Hi s Val l l e Gl u Lys Me t Hi s Hi s Val Asn Me t Thr Pro Gl u Phe Lys Gl y Leu Tyr l l e Val l Arg Gl u Asn Lys Al a

**MscI (3453)**  
**BalI (3453)**      **ApaLI (3478)**

3401 CTGCAAAAGAAATTTGCTGATTATCAGACCAATGGAGAGATTATCTGCAAGTGTGGCCAGGCTTGGGGAACAATGATGGTGCACAAAGTTTAGATTGTC  
947▶Leu Gl n Lys Lys Phe Al a Asp Tyr Gl n Thr Asn Gl y Gl u l l e l l e Cys Lys Cys Gl y Gl n Al a Trp Gl y Thr Me t Me t Val l Hi s Lys Gl y Leu Asp Leu P

3501 CTTGTCTTAAAATAAGGAATTTGTAGTCAATTTCAAATAACTCACCGAAGAAACAGTACAAGAAGTGGGTGGAATTGCCTATCAGATTTCTCTGATCT  
980▶r o Cys Leu Lys l l e Arg Asn Phe Val l Val Asn Phe Lys Asn Asn Ser Pro Lys Lys Gl n Tyr Lys Lys Trp Val l Gl u Leu Pro l l e Arg Phe Pro Asp Le

**MscI (3660)**  
**BalI (3660)**

**NheI (3654)**

3601 TGACTACTCAGAATACTGCTTGTATAGTATGATGAAGATTAGCATTGATTCATGAGCTAGCTGGCCAGACATGATAAGATACATTGATGAGTTGGACAAA  
1013▶u Asp Tyr Ser Gl u Tyr Cys Leu Tyr Ser Asp Gl u Asp ●●●

**HpaI (3792)**

3701 CCACAAC TAGAATGCAGT GAAAAAATGCTTTATTTGTGAAATTTGTGATGCTATTGCTTTATTTGTAACCATTATAAGCTGCAATAAACAAGTTAACAA

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**MfeI (3803)**      **EcoRI (3888)**

3801 CAACAATTGCATTCATTTATGTTTCAGGTTCCAGGGGAGGTGTGGGAGGTTTTTAAAGCAAGTAAACCTCTACAAATGTGGTATGGAAATCTAAAT

3901 ACAGCATAGCAAAACTTTAACCTCAAATCAAGCCTCTACTTGAATCCTTTTCTGAGGGATGAATAAGGCATAGGCATCAGGGGCTGTTGCCAATGTGCA

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4001 TTAGCTGTTGCAGCCTCACCTCTTTTCATGGAGTTTAAAGATATAGTGTATTTTCCCAAGTTTGAAGTACTCTTCATTTCTTTATGTTTTAAATGCAC

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**SwaI (4141)**

4101 TGACCTCCACATTCCTTTTTAGTAAATATTAGAAAATAATTTAAATACATCATTGCAATGAAAATAAATGTTTTTTATTAGGCAGAAATCCAGATGCT

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**EcoO109I (4202)**

4201 CAAGGCCCTTCATAATATCCCCAGTTTAGTAGTTGGACTTAGGGAACAAAGGAACCTTTAATAGAAATTGGACAGCAAGAAAGCGACTTCTAGCTTTA  
141▶●●●

4301 GTTCTGGTGTACTTGAGGGGATGAGTTCCTCAATGGTGGTTTTGACCAGCTTGCCATTCTCAATGAGCACAAAGCAGTCAGGAGCATAGTCAGAG  
140▶Asn Arg Thr Tyr Lys Leu P ro l l e Leu Gl u Gl u l l e Thr Thr Lys Val Leu Lys Gl y Asn Me t Gl u l l e Leu Val l Phe Cys Asp P ro Al a Tyr Asp Ser l

**SacI (4402)**

4401 ATGAGCTCTCTGCACATGCCACAGGGGCTGACCACCCTGATGGATCTGTCCACCTCATCAGAGTAGGGGTGCCTGACAGCCCAATGGTGTCAAAGTCTT  
106▶l e Leu Gl u Arg Cys Me t Gl y Cys Pro Ser Val Val Arg l l e Ser Arg Asp Val l Gl u Asp Ser Tyr Pro Hi s Arg Val Al a Val l l e Thr Asp Phe Asp Ly

4501 TCTGCCGTTGCTCACAGCAGACCAATGGCAATGGCTTCCAGCACAGACAGTACCCTGCAATGTAGGCTCAATGTGGACAGCAGAGATGATCTCCCC  
73▶s Gl n Gl y Asn Ser Val Al a Ser Gl y l l e Al a l l e Al a Gl u Al a Cys Val Thr Val Arg Gl y l l e Tyr Al a Gl u l l e Hi s Val Al a Ser l l e l l e Gl u Gl y

4601 AGTCTTGGTCTGATGGCCGCCCGACATGGTCTGTTGTCCTCATAGAGCATGGTGTCTCTCAGTGGCGACCTCCACCAGCTCCAGATCCTGCTGA  
40▶Thr Lys Thr Arg l l e Al a Al a Gl y Val Hi s Hi s Lys Asn Asp Gl u Tyr Leu Me t Thr l l e Lys Gl u Thr Al a Val l Gl u Val l Leu Gl u Leu Asp Gl n Gl n S

**VspI (4774)**  
**AseI (4774)**

4701 GAGATGTTGAAGTCTTCATGATGGCCCTCTATAGTGAAGTCTATTATACTATGCCGATATACTATGCCGATGATTAATTGTCAAACAGCGTGGATGG  
6▶er l l e Asn Phe Thr Lys Me t

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**SacI (4831)**

4801 CGTCTCCAGCTTATCTGACGGTTCCTAAACGAGCTCTGCTTATATAGACCTCCCACCGTACACGCCCTACCGCCATTTGCGTCAATGGGGCGGAGTTGT

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**SpeI (4929)**

4901 TACGACATTTTGGAAAGTCCCGTTGATTTACTAGTCAAAACAACTCCATTGACGTCAATGGGGTGGAGACTTGGAAATCCCCGTGAGTCAAACCGCT

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**SnaBI (5057)**  
**Eco105I (5057)**

5000 ATCCACGCCATTGATGTAAGTCTGCAAAAACGCATCATCATGGTAATAGCGATGACTAATACGTAGATGTAAGTCAAGTAGGAAAGTCCATAAGGTCAT

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**NdeI (5162)**

5100 GTACTGGGCATAATGCCAGCGGGCCATTTACCGTCATTGACGTCAATAGGGGGCGTACTTGGCATATGATACACTTGTACTGCAAGTGGGCAGTT

5200 TACCATAAATACTCCACCATTTGACGTCAATGGAAAGTCCCTATTGGCGTTACTATGGGAACATACGTCAATTATTGACGTCAATGGGGGGGGTCTGTTGG

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**SdaI (5340)** **PacI (5348)**      **BspLU11I (5358)**

5300 GCGGTCAGCCAGCGGGCCATTTACCGTAAAGTTATGTAACGCCCTGCAGGTTAA TTAAGAACATGTGAGCAAAGGCCAGCAAAGGCCAGGAACCGTA

5398 AAAAGGCCGCTTGTGGCGTTTTTCCATAGGCTCCGCCCTGACGAGCATCAAAAACTGACGCTCAAGTCAGAGGTGGCGAAACCCGACAGGACT

5498 ATAAAGATACCAGGCGTTTCCCCCTGGAAGCTCCCTCGTGGCTCTCCTGTTCCGACCCTGCCGCTTACCGGATACCTGTCCGCCTTTCTCCCTTCGGGA

ApaLI (5672)

5598 AGCGTGGCGCTTTTCATAGCTCAGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTTCCGCTCCAAGCTGGGCTGTGTGCACGAACCCCCGTTACGCCG

5698 ACCGCTGCGCCTTATCCGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAGCAGAGC

5798 GAGGTATGTAGCGGTGCTACAGAGTTCTTGAAGTGGTGGCTAACTACGGCTACACTAGAAGAACAGTATTTGGTATCTGCGCTCTGCTGAAGCCAGTT

5898 ACCTTGGAAGAGTTGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCGGTGGTTTTTTGTTTGAAGCAGCAGATTACGCGCAGAAAAA

PacI (6088)

5998 AAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGTCTGACGCTCAGTGGAACGAAAACACGTTAAGGGATTTTGGTCATGGCTAGTTAATTAAC

**EagI (6108)**

SwaI (6097) **NotI (6107)**

6098 ATTTAAATC AGCGGCCGAATAAAATATCTTTATTTTCATTACATCTGTGTGTTGGTTTTTTGTGTGAATCGTAACTAACATACGCTCTCCATCAAACA

6198 AAACGAAACAAAACAACTAGCAAAATAGGCTGTCCCCAGTCAAGTGCAGGTGCCAGAACATTTCTCTATCGAA