



150

PvuI (7)
SgfI (6) 1 GGATCTGGATCGCTCCGGTGCCCGTCAGTGGGAGAGCGCACATCGCCACAGTCCCGGAGAAGTTGGGGGAGGGGTGGCAATTGAACGGGTGCCTA
MfeI (82)
101 GAGAAAGTGGCGCGGGTAAACTGGAAAGTGATGTCGTGACTGGTCCGCCTTTTCCGAGGGTGGGGGAGAACCCTATATAAGTGCAGTAGTCGCC

HindIII (245)
Psp1406I (203) 201 GTGAACGTTCTTTTTCGCAACGGGTTTGCCGCCAGAACACAGCTGAAGCTTCGAGGGGCTCGCATCTCTCTTACCGCGCCGCCGCCCTACCTGAGGGCC
PvuII (239)
Bsu36I (291)
301 GCCATCCACGCGGTTGAGTGCAGTCTGCCGCTCCCGCCTGTGGTGCCTCTGAAGTGCCTCCGCCGTCTAGGTAAGTTTAAAGCTCAGGTCGAGACC

NgoMIV (441)
NgoMI (441)
NaeI (441)
401 GGGCCTTTGTCCGGCGCTCCCTTGGAGCCTACCTAGACTCAGCCGGCTCTCCACGCTTTGCCTGACCCTGCTTGGCTCAACTCTACGCTTTTGTTCGTTT

NcoI (560)
BstEII (555)
KasI (535) 501 TCTGTTCTGCGCCGTTACAGATCCAAGCTGTGACCGGCGCTACCTGAGATCACCGGTCCACCATGGGAATGGCCTGCCTTACAATGACAGAAATGGAGGC
AgeI (552)
1 M G M A C L T M T E M E A

BsrGI (615)
601 AACCTCCACATCTCCTGTACATCAGAATGGTGATATTCCTGGAAGTGCTAATTCTGTGAAGCAGATAGAGCCAGTCTTCAAGTGTATCTGTACCATTCT
13 T S T S P V H Q N G D I P G S A N S V K Q I E P V L Q V Y L Y H S

HindIII (779)
701 CTTGGGCAAGCTGAAGGAGAGTATCTGAAGTTTCCAAGTGAGAGTATGTTGCAGAAGAAATTTGTGTGGCTGCTTCTAAAGCTTGTGGTATTACGCCTG
47 L G Q A E G E Y L K F P S G E Y V A E E I C V A A S K A C G I T P

Acc65I (845)
801 TGTATCATAATATGTTTGCGTAAATGAGTGAAACCGAAAGGATCTGGTACCCACCCAATCATGTCTTCCACATAGACGAGTCAACCAGGCATGACATACT
80 V Y H N M F A L M S E T E R I W Y P P N H V F H I D E S T R H D I L
901 CTACAGGATAAGGTTCTACTTCCCTCATTGGTACTGTAGTGGCAGCAGAGAACCTACAGATACGGAGTGTCCCGTGGGGCTGAAGCTCCTCTGTTGAT
113 Y R I R F Y F P H W Y C S G S S R T Y R Y G V S R G A E A P L L D

Tth111I (1000)
1001 GACTTTGTCATGCTTACCTTTTTGCTCAGTGGCGGCATGATTTTGTTCACGGATGGATAAAAAGTACCTGTGACTCATGAAACTCAGGAAGAGTGTCTTG
147 D F V M S Y L F A Q W R H D F V H G W I K V P V T H E T Q E E C L
1101 GGATGGCGGTGTTAGACATGATGAGAATAGCTAAGGAGAAAGACCAGACTCCACTGGCTGTCTATAACTCTGTGACTACAAGACATTCTTACCAAAGTG
180 G M A V L D M M R I A K E K D Q T P L A V Y N S V S Y K T F L P K C
1201 CGTTCGAGCGAAGATCCAAGACTATCACATTTTAAACCCGGAAGCAGATACAGATTTCGAGATTCAATCAGCAATTCAGTCAATGTAAGCCACT
213 V R A K I Q D Y H I L T R K R I R Y R F R R F I Q Q F S Q C K A T
1301 GCCAGGAACCTAAAACCTAAGTATCTTATAAACCTGGAACCCCTGCAGTCTGCCTTCTACACAGAACAGTTTGAAGTAAAAGAATCTGCAAGAGGTCCTT
247 A R N L K L K Y L I N L E T L Q S A F Y T E Q F E V K E S A R G P

EcoRI (1445)
1401 CAGGTGAGGAGATTTTTGCAACCATTATAATAACTGGAACCGTGGAAATTCAGTGGTCAAGAGGGAAACATAAGGAAAGTGAAGACTGACAGAACAGGA
280 S G E E I F A T I I I T G N G G I Q W S R G K H K E S E T L T E Q D

XcmI (1593)
1501 CGTACAGTTATATTGTGATTTCCCTGATATTATTGATGTGAGTATTAAGCAAGCAAACCAGGAATGCTCAAATGAAAGTAGAATTGTAAGTGTCCATAAA
313 V Q L Y C D F P D I I D V S I K Q A N Q E C S N E S R I V T V H K

FspI (1695)
1601 CAAGATGGTAAAGTTTTGGAGATAGAAGTCTGATTAAGAAAGCCTTGTGATTCGTCATTAAATGACGGGTATTACAGACTAAGTCCGGATGCGC
347 Q D G K V L E I E L S S L K E A L S F V S L I D G Y Y R L T A D A

PvuII (1730)XhoI (1738)
1701 ACCATTACCTCTGCAAAGAGGTGGCTCCCGCAGCTGTGCTCGAGAACATACACAGCAACTGCCACGGCCCAATATCAATGGATTTTGGCATTAGCAAAC
380 H H Y L C K E V A P P A V L E N I H S N C H G P I S M D F A I S K L

BstEII (1810) **Bsu36I (1846)**
1801 AAAGAAGCGGGTAACAGACTGGACTATATGTGCTACGATGCAGCCCTAAGGACTTCAACAAACTTTCTGACCTTTGCTGTTGAGCGAGAAAATGTC
413 K K A G N Q T G L Y V L R C S P K D F N K Y F L T F A V E R E N V
1901 ATTGAATATAAACACTGTTTATTACGAAGAATGAGAATGGAGAATACAACTCAGCGGACTAAGAGGAACCTCAGTAACTTAAGGACCTTTTGAATT
447 I E Y K H C L I T K N E N G E Y N L S G T K R N F S N L K D L L N
2001 GCTACCAGATGAAAACCTGTGCGCTCAGACAGTATCATCTTCCAGTTTACCAAATGCTGCCCCCAAAGCCAAAAGATAAATCAAACCTTCTGCTTTCAG
480 C Y Q M E T V R S D S I I F Q F T K C C P P K P K D K S N L L V F R

BglII (2123)
2101 AACAAATGGTATTTCTGATGTTCCAGATCTCACCAACATTACAGAGGCATAATAATGTGAATCAAATGGTGTTCACAAAATCAGGAATGAAGATTTAATA
513 T N G I S D V Q I S P T L Q R H N N V N Q M V F H K I R N E D L I

MscI (2214)
2201 TTTAATGAAAGCTTGGCCAAGTACTTTTACAAAAATTTTTAAAGGTGAAGAAGAGAAGTTGGAGATTATGGTCAACTGCACAAAACGGAAGTTCTTT
547 F N E S L G Q G T F T K I F K G V R R E V G D Y G Q L H K T E V L

BstBI (2344)
Bsp119I (2344)
AsuII (2344)
2301 TGAAGTCTAGATAAAGCACATAGGAACATTCAGAGTCTTTCTCGAAGCAGCAAGCATGATGAGTCAAGTCTTCTCACAAAGCATTGGTTTTGAATTA
580 L K V L D K A H R N Y S E S F F E A A S M M S Q L S H K H L V L N Y
2401 TGGTGTCTGTGTCTGTGGAGAGGAGAACATTCTGGTTCAAGAATTTGAAAATTTGGATCACTGGATACATACCTGAAGAAGAACAAAATTCATAAAT
613 G V C V C G E E N I L V Q E F V K F G S L D T Y L K K N K N S I N

Ppu10I (2542)

NsiI (2542) XbaI (2550)

2501 ATATTATGAAAACCTGGAGTGGCTAAGCAGTTGGCATGGGCCATGCATTTTCTAGAAGAAAAATCCCTTATTCATGGGAATGTGTGTGCTAAAAATATCC
647 I L W K L G V A K Q L A W A M H F L E E K S L I H G N V C A K N I
2601 TGCTTATCAGAGAAGAAGACAGGAGAACGGGAACCCACCTTTTCATCAAACCTAGTGATCCTGGCATTAGCATTACAGTTCTACCGAAGGACATTCTTCA
680 L L I R E E D R R T G N P P F I K L S D P G I S I T V L P K D I L Q

Acc65I (2715) Ppu10I (2727)
NcoI (2710) NsiI (2727)

DraIII (2784) BglII (2795)

2701 GGAGAGAATACCATGGGTACCTCCTGAATGCATTGAGAATCCTAAAAATCTCAATCTGGCAACAGACAAGTGGAGCTTCGGGACCACTCTGTGGGAGATC
713 E R I P W V P P E C I E N P K N L N L A T D K W S F G T T L W E I

BsiBI (2863)

2801 TGCAGTGGAGGAGATAAGCCCTGAGTGTCTGGATTCTCAAAGAAAGCTGCAGTTCTATGAAGATAAGCATCAGCTTCTGCACCCAAGTGGACAGAGT
747 C S G G D K P L S A L D S Q R K L Q F Y E D K H Q L P A P K W T E

StuI (2944)
Eco147I (2944)

2901 TAGCAAACCTTATAATAATTGCATGGACTATGAGCCAGATTTGAGCCGCTGCTTTCAGAGCTGTCTATCCGTGATCTTAACAGCCTGTTTACTCCAGATTA
780 L A N L I N N C M D Y E P D F R P A F R A V I R D L N S L F T P D Y

AvrII (3048) SandI (3077)

3001 TGAACACTAACGAAAAATGACATGCTACCAAAACATGAGAATAGGTGCCTAGGGTTTTCTGGTGTCTTTTGAAGACAGGGACCTACACAGTTTGAAGAG
813 E L L T E N D M L P N M R I G A L G F S G A F E D R D P T Q F E E
3101 AGACACTTGAAGTTTCTACAGCAGCTTGGCAAAGTAACTTCGGGAGTGTGGAGATGTGCCCGTATGACCCGCTGCAGGACAACACTGGCGAGGTGGTCG
847 R H L K F L Q Q L G K G N F G S V E M C R Y D P L Q D N T G E V V

BsiBI (3255)

3201 CTGTGAAGAACTCCAGCACAGCACTGAAGAGCACCTCCGAGACTTTGAGAGGGAGATCGAGATCCTGAAATCCTTGCAGCATGACAACATCGTCAAGTA
880 A V K K L Q H S T E E H L R D F E R E I E I L K S L Q H D N I V K Y

NdeI (3359)

3301 CAAGGGAGTGTGCTACAGTGGGGTGGCGCAACCTAAGATTAATTATGGAATATTTACCATATGGAAGTTTACGAGACTATCTCCAAAAACATAAAGAA
913 K G V C Y S A G R R N L R L I M E Y L P Y G S L R D Y L Q K H K E
3401 CGGATAGATCACAAAAAATCTTCAATACACATCTCAGATATGCAAGGGCATGGAATATCTTGGTACAAAAAGGTATATCCACAGGGACCTGGCAACAA
947 R I D H K K L L Q Y T S Q I C K G M E Y L G T K R Y I H R D L A T
3501 GGAACATATTGGTGGAAAATGAGAACAGGGTTAAAATAGGAGACTTCGGATTAACCAAAAGCTTTCGCCGAGGACAAAGAACTACAAAAGTAAAGGAGCC
980 R N I L V E N E N R V K I G D F G L T K V L P Q D K E Y Y K V K E P
3601 AGGGGAAAGCCCCATATTCTGGTACGCACCTGAATCCTTGACGGAGAGCAAGTTTTCTGTGCCCTCAGATGTGTGGAGCTTTGGAGTGGTTCTATACGAA
1013 G E S P I F W Y A P E S L T E S K F S V A S D V W S F G V V L Y E
3701 CTTTTACATACATCGAAGAGTAAAAGTCCACCCGTTGAATTTATGCGAATGATTGGCAATGATAAACAAGGGCAAATGATTGTGTCCATTTGATAG
1047 L F T Y I E K S K S P P V E F F M R M I G N D K Q G Q M I V F H L I
3801 AGCTACTGAAGAGCAACGGAAAGATTGCCAAGGCCAGAAGGATGCCAGATGAGATTTATGTGATCATGACAGAGTGCTGGAACAACAATGTGAGCCAGCG
1080 E L L K S N G R L P R P E G C P D E I Y V I M T E C W N N N V S Q R

MscI (3966)

NheI (3960)

3901 TCCCTCCTCAGGGACCTTTTCGTTCCGGTGGATCAAATGCGGGACAGTATAGTGCCTGAGCTAGCTGGCCAGACATGATAAGATACATTGATGAGTTTG
1113 P S F R D L S F G W I K C G T V

HpaI (4098)

4001 GACAAACCACAACCTAGAATGCAGTGAAAAAATGCTTTATTTGTGAAATTTGTGATGCTATTGCTTTATTTGTAACCATTATAAGCTGCAATAAACAAGT

MfeI (4109)

EcoRI (4194)

4101 TAACAACAACAATTGCATTCATTTTATGTTTCAGGTTTCAGGGGAGGTGTGGGAGTTTTTTAAAGCAAGTAAAACCTCTACAAATGTGGTATGGAATTC

4201 TAAAATACAGCATAGCAAAAATTAACCTCAAATCAAGCCTCTACTGAATCCTTTTCTGAGGGATGAATAAGGCATAGGCATCAGGGGCTGTTGCCAA

4301 TGTGCATTAGCTGTTTGCAGCCTCACCTTCTTTCATGGAGTTAAGATATAGTGATTTTTCCCAAGGTTTGAAGTCTTTCATTTCTTTATGTTTTAA

SwaI (4447)

4401 ATGCACTGACCTCCACATTCCCTTTTTAGTAAAAATTCAGAAAATAATTTAAATACATCATTGCAATGAAAATAAATGTTTTTTATTAGGCAGAAATCCA

4501 GATGCTCAAGGCCCTTCATAATATCCCCAGTTTAGTAGTTGGACTTAGGGAACAAGGAACCTTTAATAGAATTGGACAGCAAGAAAGCGAGCTTCTA

4601 GCTTTAGTTCCTGGTGTACTTGAGGGGATGAGTTCTCAATGGTGGTTTTGACCAGCTTGCCATTCATCTCAATGAGCACAAAGCAGTCAGGAGCATAG
141 N R T Y K L P I L E E I T T K V L K G N M E I L V F C D P A Y

SacI (4708)

4701 TCAGAGATGAGCTCTCTGCACATGCCACAGGGGCTGACCACCTGATGGATCTGTCCACCTCATCAGAGTAGGGGTGCCTGACAGCCACAATGGTGTCAA
108 D S I L E R C M G C P S V V R I S R D V E D S Y P H R V A V I T D F

StuI (4872)
Eco147I (4872)

4801 AGTCCTTCTGCCGTTGCTCACAGCAGACCCAATGGCAATGGCTTCAGCACAGACAGTGACCCTGCCAATGTAGGCCTCAATGTGGACAGCAGAGATGAT
75 D K Q G N S V A S G I A I A E A C V T V R G I Y A E I H V A S I I

4901 CTCCCCAGTCTTGGTCTGATGGCCGCCCGACATGGTGTCTTGTCTCATAGAGCATGGTGTCTTCTCAGTGGCGACCTCCACCAGCTCCAGATCC
42 E G T K T R I A A G V H H K N D E Y L M T I K E T A V E V L E L D

XmnI (5014)

5001 TGCTGAGAGATGTTGAAGTCTTCATGATGGCCCTCTATAGTGAGTCGATTATACTATGCCGATATACTATGCCGATGATTAATTGTCAAACAGCGT
8 Q Q S I N F T K M

SacI (5137)

5101 GGATGGCCTCCAGCTTATCTGACGGTTCACTAAACGAGCTCTGCTTATATAGACCTCCACCGTACACGCCTACCGCCCAATTTGCGTCAATGGGGCGG

5201 AGTTGTTACGACATTTTGGAAAGTCCCGTTGATTTACTAGTCAAAAACAACTCCCATTGACGTCAATGGGGTGGAGACTTGAAAATCCCGTGAGTCAA
SpeI (5235)
←

5300 ACCGCTATCCACGCCATTGATGTACTGCCAAAACCGCATCATCATGGTAATAGCGTAGTAATACTAGTACTGCCAAGTAGGAAAGTCCATAA
SnaBI (5363)
Eco105I (5363)

5400 GGTCATGTACTGGGCATAATGCCAGGCGGGCCATTTACCGTCATTGACGTCAATAGGGGGCGTACTTGGCATATGATACACTTGATGTACTGCCAAGTGG
NdeI (5468)

5500 GCAGTTTACCGTAAATACTCCACCCATTGACGTCAATGGAAAGTCCCTATTGGCGTTACTATGGGAACATACGTCATTATTGACGTCAATGGGCGGGGT

5600 CGTTGGGCGGTCAGCCAGGCGGGCCATTTACCGTAAGTTATGTAACGCC T G C A G G T T A A T T A A G A A C A T G T G A G C A A A A G G C C A G C A A A A G G C C A G G A
SdaI (5646)PacI (5654)PciI (5664)BspLU11I (5664)
←

5698 ACCGTAAAAGGCCGCGTTGCTGGCGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAAATCGACGCTCAAGTCAGAGGTGGCGAAACCCGAC

5798 AGGACTATAAAGATACCAGGCGTTTCCCCTGGAAGCTCCCTCGTGCGCTCTCTGTCCGACCCTGCCGTTACCGGATACCTGTCCGCTTTCTCCCT

5898 TCGGGAAGCGTGGCGTTTTCTCATAGCTCACGCTGTAGGTATCTCAGTTCGGTGTAGGTCGTTTCGCTCCAAGCTGGGCTGTGTGCACGAACCCCGTTC
ApaLI (5978)

5998 AGCCGACCCTGCGCCTTATCCGGTAACTATCGTCTTGAGTCCAACCCGGTAAGACACGACTTATCGCCACTGGCAGCAGCCACTGGTAACAGGATTAG

6098 CAGAGCGAGGTATGTAGGCGGTGCTACAGAGTTCTTGAAGTGGTGGCCTAACTACGGCTACACTAGAAGAACAGTATTTGGTATCTGCGCTCTGCTGAAG

6198 CCAGTTACCTTCGGAAAAAGAGTTGGTAGCTCTTGATCCGGCAAACAAACCACCGCTGGTAGCGGTGGTTTTTTTGTGGAAGCAGCAGATTACGCGCA

6298 GAAAAAAGGATCTCAAGAAGATCCTTTGATCTTTTCTACGGGTCTGACGCTCAGTGAACGAAAACACGTTAAGGGATTTTGGTCATGGCTAGTTA
PacI (6394)

EagI (6414)
SwaI (6403) NotI (6413)

6398 ATTAACATTTAAATC AGCGGCCGCAATAAAATATCTTTATTTTTCATTACATCTGTGTGGTTTTTTTGTGGAATCGTAACTAACATACGCTCTCCATC
 6498 AAAACAAAACGAAACAAAACAACTAGCAAAATAGGCTGTCCCAGTGCAAGTGCAAGTGCCAGAACATTTCTCTATCGAA