

pVITRO2-neo-GFP/SEAP

An expression plasmid encoding the GFP and SEAP reporter genes

Catalog code: pvitro2-ngfppsp

<https://www.invivogen.com/pvitro2-gfpseap>

For research use only

Version 19L18-MM

PRODUCT INFORMATION

Contents

- 20 µg of pVITRO2-neo-GFP/SEAP provided as lyophilized DNA

Storage and stability

- Product is shipped at room temperature.
- Lyophilized DNA should be stored at -20°C
- Resuspended DNA should be stored at -20°C and is stable for at least 1 year at -20°C. Avoid repeated freeze-thaw cycles.

Quality control

- Plasmid construct has been confirmed by restriction analysis and sequencing.
- Plasmid DNA was purified by ion exchange chromatography and lyophilized.

GENERAL PRODUCT USE

pVITRO1 and pVITRO2 allow the co-expression of two or more genes from two different transcription units. pVITRO plasmids can be stably transfected in mammalian cells and yield high levels of expression.

pVITRO2-neo-GFP/SEAP contains the reporter genes GFP and SEAP and can be used as a control vector.

pVITRO2-neo-GFP/SEAP also can be used for cloning of open reading frames. Both reporter genes are flanked by unique sites (*Bsp*H I/*Avr* II for GFP and *Nco* I/*Nhe* I for SEAP) that allow for convenient cloning of open reading frames.

PLASMID FEATURES

• **hFerH and hFerL composite promoters:** Ferritin is a 24 subunit protein composed of two subunit types, termed H (heavy) and L (light), which perform complementary functions in the protein. Ferritin is ubiquitously expressed. Its synthesis is highly regulated by the iron status of the cell. The iron regulation is achieved at the translational level through the interaction between the iron-responsive element (IRE), located in the 5' untranslated region (5'UTR) of the ferritin mRNAs, and the iron regulatory protein¹. To eliminate the iron regulation of the ferritin promoters, the 5'UTR of FerH and FerL have been replaced by the 5'UTR of the mouse and chimpanzee elongation factor 1 (EF1) genes, respectively.

• **SV40 enhancer** which is comprised of a 72-base-pair repeat allows the enhancement of gene expression in a large host range. The enhancement varies from 2-fold in non-permissive cells to 20-fold in permissive cells. Furthermore, the SV40 enhancer is able to direct nuclear localization of plasmids².

• **CMV enhancer:** The major immediate early enhancer of the human cytomegalovirus (HCMV), located between nucleotides -118 and -524, is composed of unique and repeated sequence motifs. The HCMV enhancer can substitute for the 72-bp repeats of SV40 and is severalfold more active than the SV40 enhancer³.

• **pMB1 ori:** A minimal *E. coli* origin of replication to limit vector size, but with the same activity as the longer Ori.

• **GFP gene:** This red-shifted variant of the jellyfish GFP gene encodes a green fluorescent protein that absorbs blue light (major peak at 480 nm) and emits green light (major peak at 505 nm).

• **FMDV IRES:** The internal ribosome entry site of the Foot and Mouth Disease Virus enables the translation of two open reading frames from one mRNA with high levels of expression⁴.

• **EM7** is a bacterial promoter that enables the constitutive expression of the antibiotic resistance gene in *E. coli*.

• **Neo:** The *neo* gene from Tn5 confers resistance to Kanamycin in *E. coli* and G418 in mammalian cells. In bacteria, *neo* is expressed from the constitutive *E. coli* EM7 promoter. In mammalian cells, *neo* is transcribed from the human FerH composite promoter as a polycistronic mRNA and translated via the FMDV IRES.

• **EF1 pAn** is a strong polyadenylation signal. InvivoGen uses a sequence starting after the stop codon of the EF1 cDNA and finishing after a bent structure rich in GT.

• **SEAP** is a secreted form of human embryonic alkaline phosphatase. Unlike endogenous alkaline phosphatases, SEAP is extremely heat stable and resistant to the inhibitor L-homoarginine. It catalyses the hydrolysis of pNitrophenyl phosphate (pNpp) producing a yellow end product. SEAP expression can be readily quantified by collecting samples of culture medium and measuring the hydrolysis of pNpp with a spectrophotometer at 405 nm. SEAP activity that can be readily assessed qualitatively and quantitatively using HEK-Blue™ Detection or QUANTI-Blue™.

• **SV40 pAn:** the Simian Virus 40 late polyadenylation signal enables efficient cleavage and polyadenylation reactions resulting in high levels of steady-state mRNA. The efficiency of this signal was first described by Carswell *et al.*⁵

1. Eisenstein RS. and Munro HN. 1990. Translational regulation of ferritin synthesis by iron. *Enzyme* 44(1-4):42-58. 2. Dean DA. *et al.* 1999. Sequence requirements for plasmid nuclear import. *Exp. Cell. Res.* 253:713-22. 3. Boshart M. *et al.* 1985. A very strong enhancer is located upstream of an immediate early gene of human cytomegalovirus. *Cell* 141(2):521-30. 4. Ramesh N *et al.* 1996. High-titer bicistronic retroviral vectors employing foot-and-mouth disease virus internal ribosome entry site. *Nucleic Acids Res.* 24(14):2697-700. 5. Carswell S., and Alwine JC. 1989. Efficiency of utilization of the simian virus 40 late polyadenylation site: effects of upstream sequences. *Mol. Cell Biol.* 10: 4248-4258.

METHODS

Plasmid resuspension

Quickly spin the tube containing the lyophilized plasmid to pellet the DNA. To obtain a plasmid solution at 1 µg/µl, resuspend the DNA in 20 µl of sterile H₂O. Store resuspended plasmid at -20°C.

Plasmid amplification and cloning:

Plasmid amplification and cloning can be performed in *E. coli* GT116 or other commonly used laboratory *E. coli* strains, such as DH5α.

Bacterial antibiotic selection

Kanamycin (not provided) is normally used for *E. coli* at a final concentration of 50 µg/ml in liquid or solid media.

Mammalian antibiotic selection

G418 is normally used at a concentration of 400 µg/ml. However, the optimal concentration needs to be determined for your cells.

RELATED PRODUCTS

| Product | Description | Cat. Code |
|-------------------------------|--|----------------------|
| ChemiComp GT116 cells G418 | Competent <i>E. coli</i> cells Selection antibiotic | gt116-11 ant-gn-1 |

TECHNICAL SUPPORT

InvivoGen USA (Toll-Free): 888-457-5873

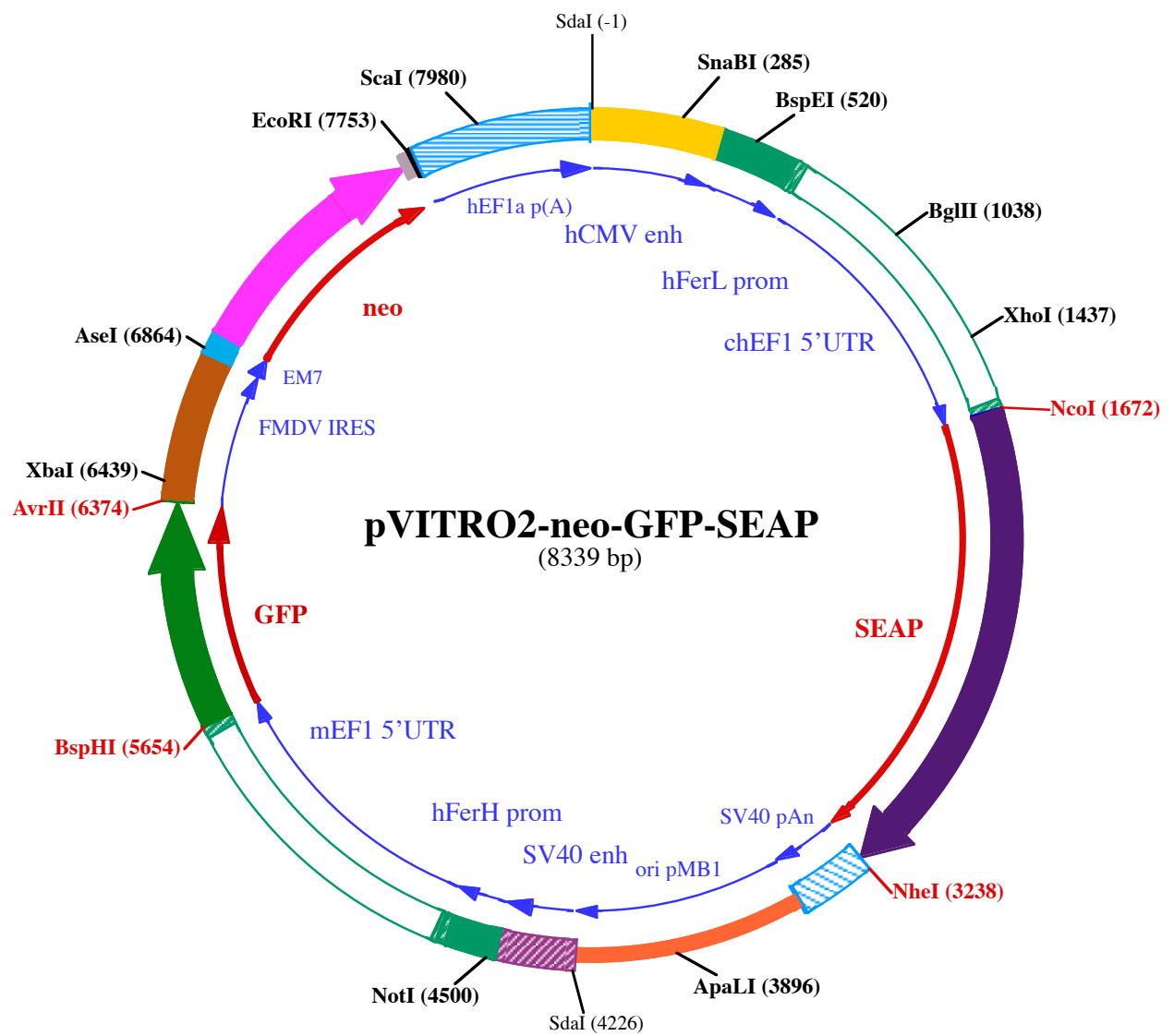
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www.invivogen.com



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SdaI (-1)

1 CTGCAGGCGTTACATAACTACGGTAAATGGCCCGCTGGCTGACCGCCCAACGACCCCGCCATTGACGTCAATAATGACGTATGTTCCCATAGTAA
101 CGCCAATAGGGACTTTCCATTGACGTCAATGGTGGAGTATTTACGGTAAACTGCCACTTGGCAGTACATCAAGTGTATCATATGCCAAGTACGCCCC

SnaBI (285)

201 TATTGACGTCAATGACGGTAAATGGCCCGCTGGCATTATGCCAGTACATGACCTTATGGGACTTCTACTTGGCAGTACATCTACGTATTAGTCATC
301 GCTATTACCATGATGATGCGGTTTTGGCAGTACATCAATGGGCGTGGATAGCGGTTTACTCACGGGGATTCCAAGTCTCACCCCAATTGACGTCAATG
401 GGAGTTTGGTTTGACTAGTCAGGGCCCAACCCCAAGCCCATTTCAACACGCTGGCGCTACAGGCGGTGACTTCCCCTTGTCTTTGGGCGGG

BspEI (520)

501 GGGCTGAGACTCTATGTGCTCCGATTGGTCAAGGACGGCCTCGGCCCGCTCTGCCACCGCAGATTGGCCGCTAGGCCTCCCGAGCGCCCTGCC
601 TCCGAGGCGCGCCACATAAAGAAGCCCTAGCCACGTCCCTCGCAGTTCGGCGTCCCGGGTCTGTCTCAAGTTGCCCGACAACACAGg
701 taagtgcgctgtgtggttcccgcgggcctggcctctttacgggttatggccttgcgctgaattacttccatgcccctggctcagtcagtcagtcagtc
801 ttgatcccgagcttcgggttgaagtgggtggagagttcagggccttgcgcttaaggagcccttcgctcgtgcttgagtgaggcctggcttgggcg
901 ctggggcgcgctgctaactctggtggcaccttcgctcgtctcgtcgtcttcgctaagtctctagccatttataatgttataaccagctgcgagc

BglIII (1038)

1001 cttttttctggcgagatagcttgtaaatgcgggcaagatctgcacactggtatcttgggttttggggcgcgggcgacggggccctgctgctccc
1101 agcgcacatgttcggcgaggcggggcctgcgagcgcggccaccagagaatcgagcggggtagctcaaacctggcggcctgctctggtgctgcctgcg
1201 gccgctgtatcgccccgctggggcgcaaggctggcccggcggcaccagttcgctgagcggaaagatggcgcctcccgccctgctgcagggagc
1301 tcaaatggaggacgcggcgccgggagagcggggtgagtcaccacacaaaaggaaaggccttcttctcatcctgctgcttcatgtgactcca

XhoI (1437)

1401 cggagtagcggcgccgtccaggcacctcgattagttctcagctctttggagtagctcgtctttaggttggggggaggggttttatgcatggagtttcc
1501 ccacactgagtggtggagactgaagagtttagccagcttggcacttgatgtaattctccttggaaatttgcctttttgagtttggatcttgcctcattc

NcoI (1672)

1601 tcaagcctcagacagtggttcaagttttttcttccatttcagGTGTCGTGAAAACCTACCCCTAAAAGCCACCATGGTTCTGGGCCCTGCATGCTGCT
1701 GCTGCTGCTGCTGGCCTGAGGCTACAGCTCTCCCTGGGCATCATCCAGTTGAGGAGGAGAACCAGGACTTCTGGAACCGCAGGAGCCGAGGGCC

1 M V L G P C M L L

9 L L L L L G L R L Q L S L G I I P V E E E N P D F W N R E A A E A
1801 CTGGGTGCCCAAGAAGCTGCAGCTGCACAGACAGCCCAAGAACCTCATCATCTTCTGGCGATGGGATGGGGTGTCTACGGTACAGCTGCCA

43 L G A A K K L Q P A Q T A A K N L I I F L G D G M G V S T V T A A
1901 GGATCCTAAAAGGGCAGAAGAAGGACAACTGGGCGCTGAGATACCCTGGCTATGGACCGCTTCCCATATGTGGCTCTGTCCAAGACATACATGTAGA

76 R I L K G Q K K D K L G P E I P L A M D R F P Y V A L S K T Y N V D
2001 CAAACATGTGCCAGACAGTGGAGCCACAGCCAGGCCCTACTGTGCGGGTCAAGGGCAACTCCAGACCATTGGCTTGTGAGTGCAGCCGCCCTTTAAC

109 K H V P D S G A T A T A Y L C G V K G N F Q T I G L S A A A R F N
2101 CAGTGAACACGACAGCGGGCAACGAGGTATCTCCGTGATGAATCGGGCAAGAAAGCAGGGAAGTCAAGTGGGAGTGGTAACCACCACAGAGTGCAGC

143 Q C N T T R G N E V I S V M N R A K K A G K S V G V V T T T R V Q
2201 ACGCTCGCCAGCGCACCTACGCCACAGGTAACCGCAACTGTACTCGGACGCCGACGTGCTGCTGCGCCGCGAGGAGGGTGCAGGACAT

176 H A S P A G T Y A H T V N R N W Y S D A D V P A S A R Q E G C Q D I
2301 CGCTACGCAGCTCATCTCCAACATGGACATTGATGTATCTGGGTGGAGGCCAAAAGTACATGTTTCGCATGGGAACCCAGACCCTGAGTACCAGAT

209 A T Q L I S N M D I D V I L G G G R K Y M F R M G T P D P E Y P D
2401 GACTACAGCCAAGTGGGACCAGGCTGGACGGGAAGAATCTGGTGCAGGAATGGTGGCGAAGCGCCAGGTTGCCCGTATGTGTGAACCCGACTGAGC

243 D Y S Q G G T R L D G K N L V Q E W L A K R Q G A R Y V W N R T E
2501 TCATGAGGCTTCCCTGGACCCGTGTGACCCATCTCATGGTCTCTTTGAGCCTGGAGACATGAAATACGAGATCCACCGAGACTCCACTGAGCC

276 L M Q A S L D P S V T H L M G L F E P G D M K Y E I H R D S T L D P
2601 CTCCCTGATGGAGATGACAGAGGCTGCCCTGCGCTGCTGAGCAGGAACCCCGCGGCTTCTTCTTCTGTTGGAGGGTGGTGCATCGACCACGGTCA

309 S L M E M T E A A L R L L S R N P R G F F L F V E G G R I D H G H
2701 CACGAAAGCAGGCTTACCGGCACTGACTGAGACGATCATGTTCTGACGACGCCATTGAGAGGGCGGCCAGCTCACCAGCGAGGAGACGCTGAGCC

343 H E S R A Y R A L T E T I M F D D A I E R A G Q L T S E E D T L S
2801 TCGTCACTGCCAGCACTCCACGCTTCTCCTTCCGAGGCTACCCCTGCGAGGGAGCTCCATCTTGGGCTGGCCCTGGCAAGGCCCGGACAGGAA

376 L V T A D H S H V F S F G G Y P L R G S S I F G L A P G K A R D R K

2901 GGCCTACACGGTCTCTATACGAAACGGTCCAGGCTATGTGCTCAAGGACGGCCCGCCGGATGTTACCGAGAGCGAGAGCGGGAGCCCCGAGTAT

409▶ A Y T V L L Y G N G P G Y V L K D G A R P D V T E S E S G S P E Y
3001 CGGCAGCAGTCAGCAGTGCCTTGGACGAAGAGACCCACGCAGGCAGGACGTGGCGGTGTTCCGCGCGGCCCGCAGGGCCACCTGGTTCACGGCGTGC

443▶ R Q Q S A V P L D E E T H A G E D V A V F A R G P Q A H L V H G V
3101 AGGAGCAGACCTTCATAGCGACGTCATGGCCTTCGCCCTGCCTGGAGCCCTACACCGCTGCACCTGGCGCCCCCGCCGGACACCACCGACGCCG

476▶ Q E Q T F I A H V M A F A A C L E P Y T A C D L A P P A G T T D A A

NheI (3238)

3201 GCACCCGGGGCGTCCCGTCCAAGCGTCTGGATTGAAGCTAGCTGGCCAGACATGATAAGATACATTGATGAGTTTGGACAAACCACAACCTAGAATGCA

509▶ H P G R S R S K R L D •
3301 GTGAAAAAATGCTTTATTTGTGAAATTTGTGATGCTATTGCTTTATTTGTAACCATTATAAGCTGCAATAAACAAGTTAACACAACAATTGCATTTCAT

3401 TTTATGTTTCAGGTTTCAGGGGGAGGTGTGGGAGGTTTTTAAAGCAAGTAAAACCTCTACAAATGGTATGAAATGTTAATTAACCTAGCCATGACCAA

3501 AATCCCTTAACGTGAGTTTTCTGTTCCACTGAGCGTCAGACCCCGTAGAAAAGATCAAAGGATCTTCTTGAGATCCTTTTTTCTGCGCGTAATCTGCTGC

3601 TTGCAAAACAAAAAACCCCGCTACCAGCGGTGTTTTGTTGCCGGATCAAGAGCTACCAACTCTTTTTCCGAAGGTAACCTGGCTTCAGCAGAGCGCAGA

3701 TACCAAACTACTGTTCTTCTAGTGTAGCGGTAGTTAGGCCACCACCTCAAGAACTCTGTAGCACCCGCTACATACCTCGCTCTGCTAATCTGTTACCAGT

ApaI (3896)

3801 GGCTGCTGCCAGTGGCGATAAGTCGTGTCTTACCGGGTTGGACTCAAGACGATAGTTACCGGATAAGGCGCAGCGGTCGGGCTGAACGGGGGTTCTGTGC

3901 ACACAGCCCAGCTTGGAGCGAACGACCTACACCGAACTGAGATACCTACAGCGTGAGCTATGAGAAAGCGCCACGCTTCCCGAAGGAGAAAGGCGGACA

4001 GGTATCCGGTAAGCGGCAGGGTCGGAACAGGAGAGCGCACGAGGAGCTTCCAGGGGAAACGCCTGGTATCTTTATAGTCTGTCGGGTTTCGCCACCT

4101 CTGACTTGAGCGTCGATTTTTGTGATGCTCGTCAGGGGGCGGAGCCTATGAAAAACGCCAGCAACGCGGCTTTTTACGGTTCCTGGCTTTTGTCTGG

SdaI (4226)

4201 CCTTTTCTCACATGTTCTTAATTAACCTGCAGGCCTGAAATAACCTCTGAAAGAGGAACTTGGTTAGTACCTTCTGAGGCTGAAAGAACCAGCTGTG

4301 GAATGTGTGTCAGTTAGGGTGTGAAAGTCCCAGGCTCCCAGCAGGCAGAAGTATGCAAAGCATGCATCTCAATTAGTCAGCAACCAGGTGTGAAAG

4401 TCCCAGGCTCCCAGCAGGCAGAAGTATGCAAAGCATGCATCTCAATTAGTCAGCAACCATAGTCCCCTAGTTCGCGCAGAGCGCGGAGGGCTCCA

NotI (4500)

4501 GCGGCCGCCCTCCCCACAGCAGGGGGGGTCCCGGCCACCGGAAGGAGCGGGCTCGGGCGGGCGCGCTGATTGGCCGGGGCGGCTGACGCC

4601 GACGCGCTATAAGAGACCACAAGCGACCCGAGGGCCAGACGTTCTTCGCCGAAGCTTGCCGTCAGAACGCAGGTGAGGGGGGGTGTGGCTTCCGCGG

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4801 AGGCAGAGTGGAGGCTAGCGGCAACCCGTAGCCTCGCTCGTGTCCGGCTTAGGCGCTAGCGTGGTGTCCGCGCCGCCCGCGTGTACTCCGGCC

4901 GCACTCTGCTTTTTTTTTTTTGTGTTGTTGCTGCTGCTCGATTGCCGTTAGGCGTAAAGGGGCTAACAAGGAGGGTGCGGGCTTGTCTCGCC

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5201 TTGCCCTGCTCCCTAACTAGGTGAGGCCATCCCGTCCGACCAAGTTCGCTGCGTGGAAAGATGGCCGCTCCGGGCCCTGTGCAAGGAGCTCAAAA

5301 TGGAGGACGCGCAGCCCGTGGAGCGGGCGGGTGTGAGTACCCACAAAGGAAGAGGGCTGGTCCCTCACCGGCTGCTGCTTCTGTGACCCCGTGGT

5401 CCTATCGGCCCAATAGTCACCTCGGGCTTTTGTGACGCGGCTAGTCGCGCGGGGGAGGGGATGTAATGGCGTTGGAGTTTGTTCACATTTGGTGGGTG

5501 GAGACTAGTCAGGCCAGCTGGCGTGAAGTCATTTTTGGAATTTGTCCCCTGAGTTTTGAGCGGAGCTAATTTCTGGGCTTCTTAGCGGTTCAAAGG

BspHI (5654)

5601 TATCTTTAAACCTTTTTTGTGTTGTTGAAACACCGCTAATCAAAGCAATCATGAGCAAGGGAGAAAGAACTCTTTACTGGTGTGCCAAATCT

1▶ M S K G E E L F T G V V P I L

5701 GGTGAGCTGGATGGTGTGATGTAATGGCCACAATTTCTGTGTCTGGTGAAGGTGAAGGAGATGCAACTTATGAAAGCTGACTCTGAAGTTCAATTTGT

15▶ V E L D G D V N G H K F S V S G E G E G D A T Y G K L T L K F I C
5801 ACAACAGGAAAGTGCAGTGCCTTGGCAACTCTGGTACCACCTGACTTATGGTGTCAATGTTTCAGCAGGTACCCTGACCACATGAAGCAGCATG

49▶ T T G K L P V P W P T L V T T L T Y G V Q C F S R Y P D H M K Q H
5901 ACTTCTTTAAATCTGCAATGCCAGAAGTTATGTTTCAGGAGAGACAATCTTTTAAAGGATGATGGAATTTATAAGACAAGGGCAGAAGTGAAGTTTGA

82▶ D F F K S A M P E G Y V Q E R T I F F K D D G N Y K T R A E V K F E
6001 AGGTGATACACTGGTTAACAGAATTGAGCTGAAAGGCATTGATTTTAAAGGAGATGGAACATTTCTGGGTCAAGCTGGAGTACAATAATTCTCAC

115▶ G D T L V N R I E L K G I D F K E D G N I L G H K L E Y N Y N S H

6101 AATGTTTACATTATGGCAGATAAGCAGAAGATGGAATTAAGGTTAATTTCAAGATTAGACACAACATTGAGGATGGATCTGTCCAACCTGGCAGACCATT
149▶ N V Y I M A D K Q K N G I K V N F K I R H N I E D G S V Q L A D H
6201 ACCAGCAGAACACCCCTATTGGTGATGGCCAGTTCTCTCCAGATAATCACTATCTCCGCACTCAATCTGCTCTGTCCAAGACCCTAATGAGAAAAG
182▶ Y Q Q N T P I G D G P V L L P D N H Y L R T Q S A L S K D P N E K R
AvrII (6374)
6301 AGACCACATGGTCTCTGGAGTTTGTGACAGCAGCAGGAATTACTCTGGGAATGGATGAGCTGTACAAGTAAACCTAGGAGCAGGTTTCCCAATGACA
215▶ D H M V L L E F V T A A G I T L G M D E L Y K •
XbaI (6439)
6401 CAAAACGTGCAACTTGAACCTCCGCTGGTCTTCCAGGCTAGAGGGTAACACTTTGACTGCGTTTGGCTCCACGCTCGATCCACTGGCGAGTGTA
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6701 TCAGGTACCCCGAGGTAACACGCGCACTCGGGATCTGAGAAGGGGACTGGGGCTTCTATAAAAGCGCTCGGTTTAAAAAGCTTCTATGCTGAATAGGT
AseI (6864)
6801 GACCGGAGGTGGCACCTTTCCTTTGCAATTACTGACCTATGAATACAACTGACTGTTTGACAATTAATCATCGGCATAGTATATCGGCATAGTATAAT
6901 ACGACTCACTATAGGAGGGCCACATGATTGAACAAGATGGATTGCACGAGGTTCTCCGGCCGCTTGGTGGAGAGGCTATTCGGCTATGACTGGGCAC
1▶ M I E Q D G L H A G S P A A W V E R L F G Y D W A
7001 AACAGACAATCGGCTGCTGATGCCCGCTGTCGGCTGTGAGCGAGGGCGCCCGTCTTTTGTCAAGACCACCTGTCGGTGCCTGAATGA
26▶ Q Q T I G C S D A A V F R L S A Q G R P V L F V K T D L S G A L N E
7101 ACTGCAAGACGAGGCAGCGCGCTATCGTGGCTGGCCACGACGGCGTTCCTTGCCGAGCTGTGCTCGACGTTGTCCTGAAGCGGAAGGGACTGGCTG
59▶ L Q D E A A R L S W L A T T G V P C A A V L D V V T E A G R D W L
7201 CTATTGGGCAAGTGCCGGGGCAGGATCTCCTGTCATCTCACCTTGCTCTGCCGAGAAAGTATCCATCATGGCTGATGCAATGCGGGCGCTGATACCG
93▶ L L G E V P G Q D L L S S H L A P A E K V S I M A D A M R R L H T
7301 TTGATCCGGCTACTGCCCATTCGACCACCAAGCGAAACATCGCATCGAGCGAGCAGTACTCGGATGGAAGCCGGTCTTGTGATGAGGATGATCTGGA
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159▶ E E H Q G L A P A E L F A R L K A S M P D G E D L V V T H G D A C
7501 TTGCCAATATCATGGTGAAAATGGCCGCTTTCTGGATTGATGACTGTGCCGGCTGGGTGTGGCGACCGCTATCAGGACATAGCGTTGGTACC
193▶ L P N I M V E N G R F S G F I D C G R L G V A D R Y Q D I A L A T
7601 GTGATATTGCTGAAGAGCTTGGCGCGAATGGCTGACCGCTTCTCGTCTTACGGTATCGCCGCTCCCGATTGCGAGCGCATGCGCTTCTATCGCT
226▶ R D I A E E L G G E W A D R F L V L Y G I A A P D S Q R I A F Y R L
EcoRI (7753)
7701 TCTTGACGAGTTCTTCTGAGCGGGACTCTGGGTTTCAAATGACCGACCAAGCGAATTCGCTAGGATTATCCCTAATACCTGCCACCCACTCTTAATCA
259▶ L D E F F •
7801 GTGGTGAAGAAGGCTCAGAAGTGTGTTTCAATTGGCCATTTAAGTTTAGTAGTAAAAGACTGGTTAATGATAACAATGCATCGTAAAACCTCAG
ScaI (7980)
7901 AAGGAAAGGAGAATGTTTTGTGACCACCTTTGGTTTTCTTTTTGCGTGTGGAGTTTTAAGTTATTAGTTTTTAAATCAGTACTTTTTAATGAAACA
8001 ACTTGACCAAAAATTTGTACAGAATTTTGTAGACCCATTAATAAGTAAATGAGAAACCTGTGTTCCTTTGGTCAACACCGAGACATTTAGGTGAAA
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