

pUNO1-SpikeV6

Expression vector encoding the SARS-CoV-2 New York variant (B.1.526 lineage) Spike gene

Catalog code: p1-spike-v6

<https://www.invivogen.com/ny-b1526-spike-expression-vectors>

For research use only

Version 21E11-ED

PRODUCT INFORMATION

Contents

- 20 µg of lyophilized pUNO1-SpikeV6 (plasmid DNA)
- 2 x 1 ml of **Blasticidin** (10 mg/ml)

Storage and Stability

- Product is shipped at room temperature.
- Lyophilized DNA should be stored at -20°C.
- Resuspended DNA is stable for 1 year at -20°C.
- Store Blasticidin at 4°C or -20°C. The expiry date is specified on the product label.

Quality control

- Plasmid construct is confirmed by restriction analysis and full-length open reading frame (ORF) sequencing.
- After purification by ion exchange chromatography, predominant supercoiled conformation is verified by electrophoresis.

PLASMID FEATURES

New York Variant SARS-CoV-2 Spike cassette

• **EF-1α/HTLV hybrid promoter** is a composite promoter comprised of the Elongation Factor-1α (EF-1α) core promoter¹ and the 5' untranslated region of the Human T-Cell Leukemia Virus (HTLV). EF-1α utilizes a type 2 promoter that encodes a "house-keeping" gene. It is expressed at high levels in all cell cycles and lower levels during the G0 phase. Additionally, since the promoter is not tissue-specific it is highly expressed in all cell types. The R segment and part of the U5 sequence (R-U5') of the HTLV Type 1 Long Terminal Repeat² has been coupled to the EF-1α promoter to enhance stability of DNA and RNA. This modification not only increases steady state transcription, but also significantly increases translation efficiency.

- **Codon-optimized Spike ORF**

pUNO1-SpikeV6 contains the Spike coding sequence from the New York (N.Y.) SARS-CoV-2 variant (B.1.526 lineage). This variant is characterized by a number of mutations within the the Spike coding sequence (see below)³. Additionally, to improve expression of the S protein in cell lines, the gene is codon-optimized and the last 19 amino acids, which contain an endoplasmic reticulum (ER)-retention motif (KxHxx), have been removed^{4,5}.

pUNO1-SpikeV6 includes the following sequence features:

- **S1 domain:** L5F, T95I, D253G, D614G
- **RBD:** E484K
- **S1/S2 boundary:** Functional furin cleavage site
- **S2 domain:** A701V

Spike (S) is a structural glycoprotein expressed on the surface of SARS-CoV-2. It mediates membrane fusion and viral entry into target cells upon binding to the host receptor ACE2 and the proteolytic activity of host proteases such as furin and TMPRSS2⁶.

For more information visit: <https://www.invivogen.com/sars2-spike>

- **SV40 pAn** is the Simian Virus 40 late polyadenylation (pAn) signal and it enables efficient cleavage and polyadenylation reactions resulting in high levels of steady-state mRNA⁷.

Antibiotic selection cassette

- **hCMV (human cytomegalovirus) enhancer & promoter** drive the expression of the blasticidin resistance gene (*bsr*) in mammalian cells.
- **EM7** is a bacterial promoter that enables the constitutive expression of the blasticidin resistance gene (*bsr*) in *E. coli*.
- **bsr (blasticidin resistance gene)** encodes a deaminase from *Bacillus cereus* that confers resistance to the antibiotic blasticidin. The expression of the *bsr* gene is driven by the CMV promoter/enhancer and the bacterial EM7 promoter. Therefore, **Blasticidin** can be used to select stable clones in mammalian cells and *E. coli* transformants.
- **Human β-Globin pAn** is a strong polyadenylation (pAn) signal placed downstream of *bsr*. The use of β-globin pAn minimizes interference and possible recombination events with the SV40 pAn signal⁸.

General features of pUNO1-SpikeV6

- **pMB1 ori** is a minimal *E. coli* origin of replication.

APPLICATIONS

Stable gene expression in mammalian cells.

pUNO1 plasmids are designed for both transient and stable transfection in mammalian cell lines by selection with **Blasticidin**. Furthermore, they facilitate high levels of expression of the gene of interest.

Cell fusion assays

pUNO1-SpikeV6 has been specifically designed for mammalian cell expression of the SARS-CoV-2 S protein. This plasmid features a functional furin cleavage site, and therefore when expressed by a host cell (e.g. 293T cells) it facilitates cell-cell fusion assays with ACE2-expressing cells (e.g. **HEK-Blue™ hACE2 Cells**)⁹.

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 water.
- Store the 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.

Blasticidin usage

Blasticidin should be used at 25-100 µg/ml in bacteria and 1-30 µg/ml in mammalian cells. Blasticidin is supplied as a 10 mg/ml colorless solution in HEPES buffer.

TECHNICAL SUPPORT

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REFERENCES

1. Kim D. *et al.*, 1990. Use of the human elongation factor 1 α promoter as a versatile and efficient expression system. *Gene* 91(2):217-23

2. Takebe Y. *et al.*, 1988. SR alpha promoter: an efficient and versatile mammalian cDNA expression system composed of the simian virus 40 early promoter and the R-U5 segment of human T-cell leukemia virus type 1 long terminal repeat. *Mol Cell Biol.* 8(1):466-72.

3. Annavajhala, M.K. *et al.* 2021. A Novel and Expanding SARS-CoV-2 Variant, B.1.526, Identified in New York. medRxiv doi: 10.1101/2021.02.23.21252259.

4. Johnson, M.C. *et al.* 2020. Optimized Pseudotyping Conditions for the SARS-COV-2 Spike Glycoprotein. *J Virol* 94.

5. Ou, X. *et al.* 2020. Characterization of spike glycoprotein of SARS-CoV-2 on virus entry and its immune cross-reactivity with SARS-CoV. *Nat Commun* 11, 1620.

6. Hoffmann M. *et al.*, 2020. SARS-CoV-2 cell entry depends on ACE2 and TMPRSS2 and is blocked by a clinically proven protease inhibitor. *Cell.* 181:1-16.

7. Carswell S. & Alwine J., 1989. Efficiency of utilization of the simian virus 40 late polyadenylation site: effects of upstream sequences. *Mol Cell Biol.* 9(10):4248-58.

8. Yu J. & Russell J., 2001. Structural and functional analysis of an mRNP complex that mediates the high stability of human β -globin mRNA. *Mol Cell Biol.* 21(17):5879-88.

9. Papa, G. *et al.* 2021. Furin cleavage of SARS-CoV-2 Spike promotes but is not essential for infection and cell-cell fusion. *PLoS Pathog* 17, e1009246.

RELATED PRODUCTS

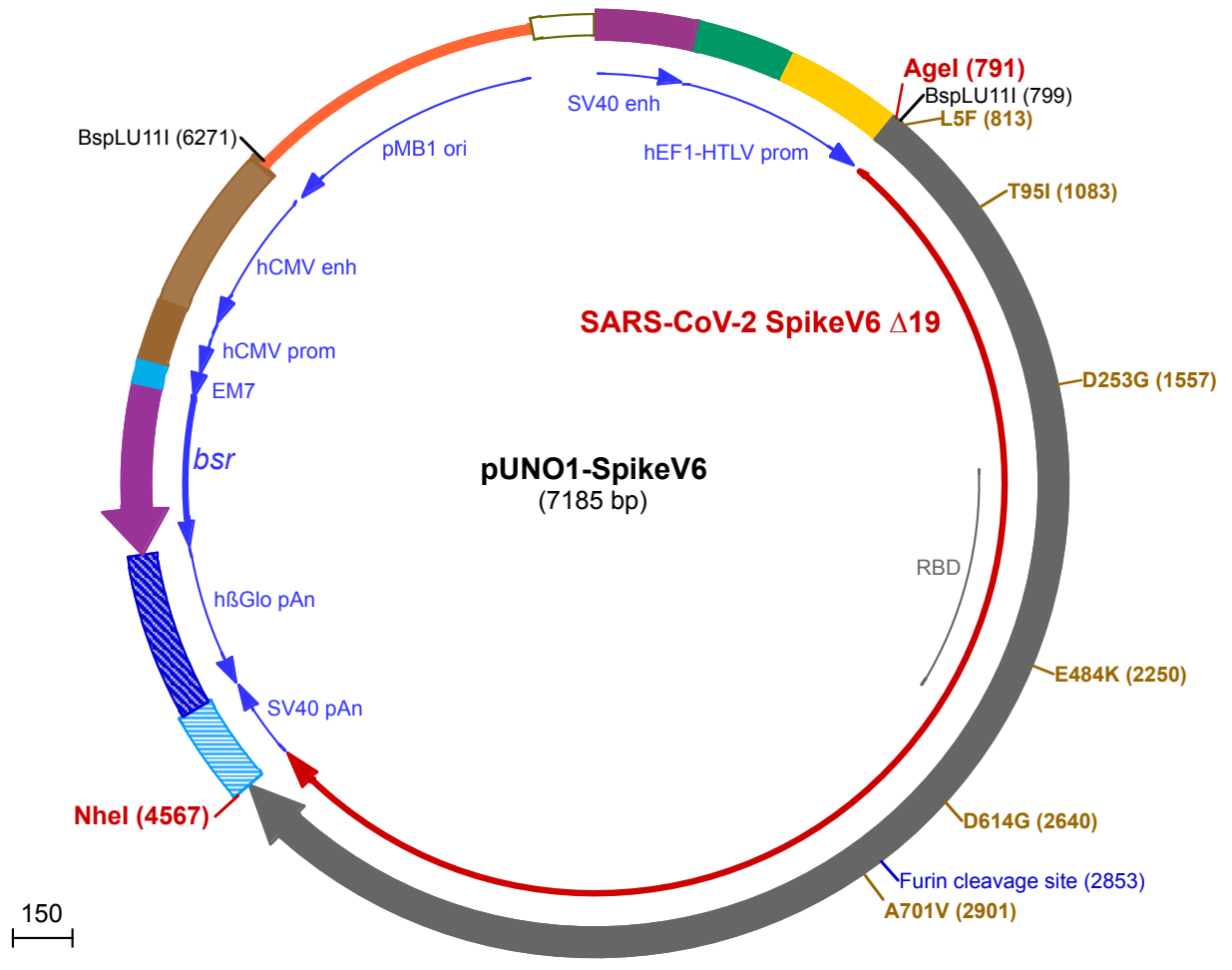
Product	Description	Cat. Code
Blasticidin	Selection antibiotic	ant-bl-1
ChemiComp GT116	Competent <i>E. coli</i>	gt116-11
COVID-19 Product Range		
293-hMyD88 Cells	Cell line	293-hmyd
HEK-Blue™ hACE2 Cells	Cell line	hkb-hace2
A549-hACE2-TMPRSS2 Cells	Cell Line	a549-hace2-tpsa
pUNO1-hACE2	Expression vector	puno1-hace2
pUNO1-hTMPRSS2a	Expression vector	puno1-htp2a
Anti-CoV2RBD-c1-hlgG1	Recombinant Antibody	cov2rbdc1-mab1

For a complete list of InvivoGen's COVID-19 related products visit:
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TECHNICAL SUPPORT

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1 GGACCTGCAGGGCCTGAAATAACCTCTGAAAGAGGAACTTGGTTAGGTACCTTCTGAGGCGGAAAGAACCAGCTGTGGAATGTGTGTAGTTAGGGTGTG
 101 GAAAGTCCCAGGCTCCCAGCAGGCAGAAGTATGCAAAGCATGCATCTCAATTAGTCAGCAACCAGGTGTGGAAAGTCCCAGGCTCCCAGCAGGCAG
 201 AAGTATGCAAAGCATGCATCTCAATTAGTCAGCAACCATAGTCCACTAGTCTCGGTGCCCGTCACTGGGCGAGCGCACATCGCCCACAGTCCC
 301 GAAGTTGGGGGGAGGGTTCGCAATTGAACGGGTGCCTAGAGAAGGTGGCGGGGTAACAGTGGGAAAGTGTGCTGTACTGGTCCGCTTTTCCC
 401 GAGGGTGGGGGAGAACCGTATATAAGTCAGTAGTCGCCGTGAACGTTCTTTTTCGCAACGGGTTTCCGCCAGAACAGCTGAAGCTTCGAGGGGCTC
 501 GCATCTCTCTTACGCGCCCGCCCTACCTGAGGCGCCATCCACGCCGGTTGAGTCGCGTTCTGCCGCTCCCGCTGTGGTGCCTCCTGAAGTGC
 601 GTCCGCCGTCTAGGTAAGTTTAAAGCTCAGGTCGAGACCGGGCTTTGTCCGGCGCTCCCTTGAGGCTACCTAGACTCAGCCGGCTCTCCACGCTTTC

Agel (791)

701 CTGACCCTGCTTGCTCAACTCTACGCTTTTGTTCGTTTTCTGTTCTGCGCAGTTACAGATCCAAGCTGTGACCGCGCCTACCTGAGATCACCGGTCAA

L5F (813)

801 CATGTTTGTGTTCTTIGTGTGCTTCCACTGGTCAGTTCCTCAATGCGTTAATCTACCACCCGAACTCAACTCCCACCCGCATATACAAATTCCTTACC
 1 M F V F F V L L P L V S S Q C V N L T T R T Q L P P A Y T N S F T
 901 AGAGGAGTGTACTATCCTGACAAAGTGTTCGGTCAAGTGTCTCCACTCTACTCAGGACCTTTTCTGCCTTTCTTTCTAACGTTACATGGTTTCATG
 34 R G V Y Y P D K V F R S S V L H S T Q D L F L P F F S N V T W F H

T95I (1083)

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 67 A I H V S G T N G T K R F D N P V L P F N D G V Y F A S I E K S N I
 1101 CATTGAGGATGGATTTTCGGGACTACTCTGGACTCAAAGACACAGAGCCTGCTGATCGTTAAACAACGCCACAAACGTTGTCATCAAAGTGTGCGAATTC
 100 I R G W I F G T T L D S K T Q S L L I V N N A T N V V I K V C E F
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 134 Q F C N D P F L G V Y Y H K N N K S W M E S E F R V Y S S A N N C
 1301 CCTTCGAGTACGTGAGTCAACCTTTCTGATGGACCTGGAAGGAAACAGGGAAACTTCAAGAACCTGAGAGAGTTTGTCTTTAAGAACATCGACGGCTA
 167 T F E Y V S Q P F L M D L E G K Q G N F K N L R E F V F K A N I D G Y
 1401 TTTAAGATCTATAGTAAGCATACGCCATCAACCTGTAAGGGATCTTCCCAAGGCTTTTCAGCCCTGGAACCTTTGGTTGACTTGCCTATTGGTATC
 200 F K I Y S K H T P I N L V R D L P Q G F S A L E P L V D L P I G I

D253G (1557)

1501 AATATCACCAGATTTTACAGCCCTTCTGGCATTGCAICGGTCTTATCTTACTCCAGGTGGTTCCTCCTCGGGTGGACTGCCGGCGCCGCTGCCTACTATG
 234 N I T R F Q T L L A L H R S Y L T P G G S S S G W T A G A A A Y Y
 1601 TCGGCTATCTGCAACCAAGAAGCTTCTGCTCAAGTACAAGCAAAAACGGCACTATTACGGATGCTGTTGATTGTGCCCTGGACCCTGTCTGAGACTAA
 267 V G Y L Q P R T F L L K Y N E N G T I T D A V D C A L P L S E T K
 1701 ATGCACCTCAAGAGCTTTACCGTTGAGAAGGGGATTTACCAAAACAGTAATTTCCGGGTCCAACCCACGAAAGCATTGTGCGGTTCCCAAATATCACC
 300 C T L K S F T V E K G I Y Q T S N F R V Q P T E S I V R F P N I T

1801 AATCTGTGTCCCTTTGGCGAAGTGTTCATGCTACAAGTTTCTTCTGTGTACGCATGGAATAGGAAACGCATCTCCAATTGTGTGCTGATTACTCCG
 334 N L C P F G E V F N A T R F A S V Y A W N R K R I S N C V A D Y S

1901 TGTGTACAATTCGCTCTTTCTCAACCTTCAAGTGTATGGCGTTTACCTACCAAACCTAACGACCTGTGCTTACTAATGTGTATGCCGACTCTTT
 367 V L Y N S A S F S T F K C Y G V S P T K L N D L C F T N V Y A D S F

2001 TGTGATACGAGGCGATGAAGTGAAGACAGATTGCACAGGGCAGACCGGCAAAATGCGGACTACAACCTACAAGCTTCCAGATGACTTTACCGGATGTGTT
 400 V I R G D E V R Q I A P G Q T G K I A D Y N Y K L P D D F T G C V

2101 ATTGCATGGAACCTCAACAATCTGGATTCCAAGGTGGGTGGCAACTATAACTACCTGTATAGACTGTTTCAGGAAATCCAACCTGAAACCTTCGAGCGAG
 434 I A W N S N N L D S K V G G N Y N Y L Y R L F R K S N L K P F E R

E484K (2250)

2201 ATATAAGCACAGAAATCTACCAGGCTGGAAGTACGCCCTGCAACGGCGTGAAGGGTTCAACTGCTACTTCCCATTGCAGAGTTACGGATTCCAGCCTAC
 467 D I S T E I Y Q A G S T P C N G V K G F N C Y F P L Q S Y G F Q P T

2301 AAACGGGGTGGTTACCAACCTATCGTGTGCTAGTCTGAGTTTTGAGCTCCTCCATGCCAGCCACAGCTGTGGCCCAAGAAAAGCACCAATCTG
 500 N G V G Y Q P Y R V V V L S F E L L H A P A T V C G P K K S T N L

2401 GTGAAGAACAATGCGTGAACCTTAACTTTAACGGACTCACAGGAACCGGCGTATTGACGGAGAGTAACAAGAAGTTCCTGCCATTCCAGCAGTTCGGTC
 534 V K N K C V N F N F N G L T G T G V L T E S N K K F L P F Q Q F G

2501 GCGATATTGCCGACACTACCGACGCTGTCCGAGATCCCAGACATTGGAGATTCTTGATATCACACCTGTAGTTTCCGGCGGAGTGAGCGTGATTACGCC
 567 R D I A D T T D A V R D P Q T L E I L D I T P C S F G G V S V I T P

D614G (2640)

2601 CGGAACCAATACCAGCAATCAGGTTGCCGCTGTATCAGGTTGTAATTGCACCGAGGTACCTGTCGCCATCCACGCTGACCAACTTACCCACATGG
 600 G T N T S N Q V A V L Y Q G V N C T E V P V A I H A D Q L T P T W

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634▶ R V Y S T G S N V F Q T R A G C L I G A E H V N N S Y E C D I P I

Furin cleavage site (2853)
CGTAGTGTAGCATCCAAAGTATCATTGCCTACACAATGAGCCTCGG

2801 GTGCTGGAATATGCGCCTCTTATCAAACCTCAAACCACTCTCCTAGCGGGCA
667▶ G A G I C A S Y Q T Q T N S P R R A R S V A S Q S I I A Y T M S L G
A701V (2901)

2901 TGTAAGAGAATTCTGTGCGCTACAGCAACAACCTCATTGCTATCCCTACTAACTTCACAATCAGTGTGACAACCTGAAATTTCTGCCCGTATCTATGACAAA
700▶ V E N S V A Y S N N S I A I P T N F T I S V T T E I L P V S M T K

3001 ACAAGCGTTGACTGCACCATGTACATCTGTGGCGATTCTACCGAATGTAGCAATCTCCTCCTGCAATACGGATCATTCTGCACTCAGCTGAATCGTGCCC
734▶ T S V D C T M Y I C G D S T E C S N L L L Q Y G S F C T Q L N R A

3101 TCACAGGTATTGCAGTTGAGCAGGACAAGAATACGCAGGAAGTGTTCGCCAGGTGAAGCAAATCTACAAAACCTCCACCCATAAAAAGACTTTGGCGGATT
767▶ L T G I A V E Q D K N T Q E V F A Q V K Q I Y K T P P I K D F G G F

3201 CAATTTCTCAGATCCTGCCGATCCCTCAAACCTCCTCAAGCGTAGCTTTATCGAGGATCTGCTCTTCAACAAGGTAACCTCGCAGATGCCGGTTTC
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3301 ATCAAGCAGTATGGCGATTGTCTGGGAGACATCGCCGCTCGGGACCTGATCTGTGCACAGAAGTTCAATGGACTGACCGTGTGCCTCCCTTGCTGACCG
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3401 ACGAGATGATAGCCCAATACACTAGCGCCCTGCTGGCCGGCACCATCACTTCTGGTGGACATTGGAGCTGGCGTGCCTTCAGATTCCTTTTGTAT
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900▶ Q M A Y R F N G I G V T Q N V L Y E N Q K L I A N Q F N S A I G K

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3901 CTGGGTCACTAAGAGAGTGGACTTTTGGCGGAAGGGGTATCACCTGATGTCTTTTCTCAGTCTGCACCCCATGGTGTGGTCTTTCTGCACGTGACTT
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4101 TCATTGGTTCTGCACTCAGAGAAATTTCTACGAGCCCCAGATTATAACCACTGACAATACATTTGTATCCGGCAATTTGTATGTGGTTATCGGGATTGTG
1100▶ H W F V T Q R N F Y E P Q I I T T D N T F V S G N C D V V I G I V

4201 AATAACTGTTTACGATCCTTTGACCCAGAGCTGGACTCCTTCAAGGAGGAGCTTGACAAATATTTAAGAATCACACATCACCTGACGTGACCTCG
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1167▶ G D I S G I N A S V V N I Q K E I D R L N E V A K N L N E S L I D L

4401 GCAGGAGTTGGGCAAGTACGAACAGTATATCAAATGGCCATGTACATTTGGCTTGGGTTTATTGCTGGGCTGATAGCTATCGTCATGGTGAACATATG
1200▶ Q E L G K Y E Q Y I K W P W Y I W L G F I A G L I A I V M V T I M

NheI (4567)

4501 TTGTGTTGCATGACATCCTGCTGTAGTTGTCTGAAGGGCTGCTGCTCATGCGGCAGCTGTTGCTAAAGCTAGCTGGCCAGACATGATAAGATACATTGAT
1234▶ L C C M T S C C S C L K G C C S C G S C C •

4601 GAGTTTGACAAACCACAACTAGAATGCAGTGAAAAAATGCTTTATTTGTGAAATTTGTGATGCTATTGCTTTATTTGTAACCATTATAAGCTGCAATA

4701 AACAAAGTTAACAAACAACAAATTGCATTCATTTTATGTTTCAGGTTTCAGGGGAGGTGTGGGAGGTTTTTTAAAGCAAGTAAACCTCTACAAATGTGGTAT

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▶ ◀

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5101 GAATCCAGATGCTCAAGGCCCTCATAATATCCCCAGTTTAGTAGTTGACTTAGGGAACAAAGGAACCTTAAATAGAAATTTGACAGCAAGAAAGCGA

5201 GCTTCTAGCTTTAGTTCTGCTGACTGAGGGGATGAGTTCTCAATGGTGGTTTTGACCAGCTTGCATTCTCAATGAGCACAAAGCAGTCAGG
—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

5301 AGCATAGTCAGAGATGAGCTCTGACATGCCACAGGGGCTGACCACCTGATGGATCTGTCACCTCATCAGAGTAGGGTGCCTGACAGCCACAATG
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6001 CCATAAGGTCATGTA CTGGGCATAATGCCAGGCGGGCCATTTACCGTCATTGACGTCAATAGGGGGCGTACTTGGCATATGATACACTTGATGTA CTGCC
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6201 GGGGGTCGTTGGGCGGTCAGCCAGGCGGGCCATTTACCGTAAAGTTATGTAACGCCTGCAGTTAATTAAGAACATGTGAGCAAAAGGCCAGCAAAAGGCC
6301 AGGAACCGTAAAAGGCCGCGTTGCTGGCGTTTTTCCATAGGCTCCGCCCCCTGACGAGCATCACAAAAATCGACGCTCAAGTCAGAGGTGGCGAAACC
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