(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
22 April 2021 (22.04.2021)

WIPO | PCT

(10) International Publication Number
WO 2021/076998 A1

(51) International Patent Classification:
A61K 35/76 (2015.01) *C12N 7/01* (2006.01)
A61K 35/768 (2015.01) *C12N 15/09* (2006.01)
C07K 14/005 (2006.01) *C12N 15/86* (2006.01)

(21) International Application Number:
PCT/US2020/056130

(22) International Filing Date:
16 October 2020 (16.10.2020)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
62/916,095 16 October 2019 (16.10.2019) US

(71) Applicant: **KALIVIR IMMUNOTHERAPEUTICS LLC** [US/US]; 240 Alpha Drive, Pittsburgh, Pennsylvania 15238 (US).

(72) Inventors: **THORNE, Stephen H.**; 240 Alpha Drive, Pittsburgh, Pennsylvania 15238 (US). **BYRD, Daniel J.**; 240 Alpha Drive, Pittsburgh, Pennsylvania 15238 (US).

(74) Agent: **DASGUPTA, Indrani**; Wilson Sonsini Goodrich & Rosati, 650 Page Mill Road, Palo Alto, California 94304-1050 (US).

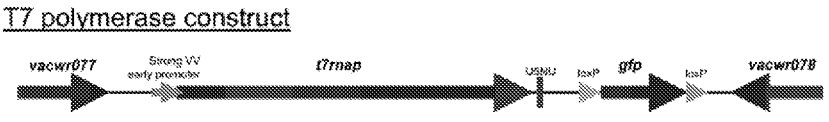
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report (Art. 21(3))*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(54) Title: PRODUCER VIRUSES FOR GENERATION OF RETROVIRUSES IN SITU

FIG. 8



(57) Abstract: This disclosure provides compositions comprising a modified oncolytic virus that can contain modifications in the viral genome and exogenous nucleic acids coding for proteins. The viral compositions and methods provided herein can be utilized for the treatment of cancer. One embodiment provides a virus that produces from its genome a non-replicating retrovirus, wherein the virus is an oncolytic virus.

WO 2021/076998 A1

PRODUCER VIRUSES FOR GENERATION OF RETROVIRUSES *IN SITU*

CROSS-REFERENCE

[0001] This application claims the benefit of U.S. Provisional Application No. 62/916,095 filed Oct 16, 2019, which is incorporated by reference herein in its entirety.

INCORPORATION BY REFERENCE

[0002] All publications, patents, patent applications, and NCBI accession numbers mentioned in this specification are herein incorporated by reference to the same extent as if each individual publication, patent, or patent application was specifically and individually indicated to be incorporated by reference, and as if set forth in their entireties. In the event of a conflict between a term as used herein and the term as defined in the incorporated reference, the definition of this disclosure controls.

SUMMARY

[0003] One embodiment provides a virus that produces from its genome a non-replicating retrovirus, wherein the virus is an oncolytic virus. In some embodiments, wherein the non-replicating retrovirus comprises a transgene that codes for a non-retroviral protein. One embodiment provides a virus that produces from its genome a non-replicating retrovirus, wherein the virus is an oncolytic virus, wherein the non-replicating retrovirus comprises a transgene that codes for a non-retroviral protein, and wherein the non-replicating retrovirus is capable of expressing the non-retroviral protein in cells that are infected by the oncolytic virus and in cells that are not infected by the oncolytic virus, in a tumor microenvironment.

[0004] One embodiments an oncolytic virus that produces from its genome a non-replicating retrovirus, wherein the non-replicating retrovirus comprises a transgene that codes for a non-lentiviral protein, and wherein the non-replicating retrovirus is capable of infecting and transducing both dividing and non-dividing cells in a target population of mammalian cells. One embodiment provides a virus comprising a transgene that codes for a non-retroviral protein, wherein the transgene is within an exogenous nucleic acid construct that further comprises a gene that codes for a protein of a non-replicating retrovirus, and wherein the virus is oncolytic. One embodiment provides a virus comprising a retroviral envelope construct, a retroviral packing construct, and a retroviral transfer construct, wherein at least one of the envelope construct, the packaging construct, or the transfer construct comprises a transgene that codes for a non-retroviral protein, and wherein the virus is an oncolytic virus.

[0005] In some embodiments, wherein the envelope construct, the packing construct, and the transfer construct are inserted at different locations within the genome of the oncolytic virus. In some embodiments, the envelope construct comprises a gene that codes for a retroviral envelope protein and the packaging construct comprises a gene that codes for a retroviral structural protein. In some embodiments, the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter and the gene that codes for the retroviral structural protein is under the control of a second early viral promoter. In some embodiments, the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter, a first early/late viral promoter or a first late viral promoter; and the gene that codes for a retroviral structural protein is under the control of a second early viral promoter, a second early/late viral promoter, or a second late viral promoter. In some embodiments, the envelope construct further comprises a termination sequence at its 5'-terminal region. In some embodiments, the packaging construct further comprises a termination sequence at its 3'-terminal region. In some embodiments, the transfer construct comprises a 3'-long terminal repeat region. In some embodiments, the transfer construct comprises a hybrid 5'-long terminal repeat region. In some embodiments, the hybrid 5'-long terminal repeat region comprises a third early viral promoter and a HIV-1 protein 5'-long terminal repeat region. In some embodiments, the hybrid 5'-long terminal repeat region comprises a HIV-1 protein 5'-long terminal repeat region and a viral promoter, wherein the viral promoter is a third early viral promoter, a third early/late viral promoter, or a third late viral promoter. In some embodiments, the transfer construct further comprises a gene that codes for a self-cleaving RNA ribozyme. In some embodiments, the gene that codes for the self-cleaving RNA ribozyme is positioned downstream to the 3'-long terminal repeat region of the transfer construct. In some embodiments, the self-cleaving ribozyme comprises a delta virus ribozyme or a hammerhead ribozyme. In some embodiments, the packaging construct comprises a 5'-long terminal repeat region and wherein the second early viral promoter is fused to the 5'-long terminal repeat region.

[0006] In some embodiments, the envelope construct comprises a termination sequence at its 5'-terminal region. In some embodiments, the packaging construct comprises a termination sequence at its 3'-terminal region. In some embodiments, the transfer construct comprises a termination sequence at its 3'-terminal region. In some embodiments, the termination sequence comprises a nucleotide sequence as set forth in SEQ ID No. 7. In some embodiments, the retroviral structural protein comprises a mature gag-pol protein. In some embodiments, the mature gag-pol protein comprises p55, p41, and p24. In some

embodiments, the retroviral envelope protein comprises a VSV-G protein. In some embodiments, the virus comprises an exogenous nucleic acid sequence that codes for a nucleic acid polymerase. In some embodiments, the nucleic acid polymerase is selected from the group consisting of: T7 RNA polymerase, T3 RNA polymerase and SP6 RNA polymerase, a RNA polymerase variant, and a DNA polymerase mutant. In some embodiments, the virus comprises an exogenous nucleic acid sequence that codes for a bacteriophage polymerase. In some embodiments, the bacteriophage is selected from the group consisting of a T3 bacteriophage, a T7 bacteriophage and an SP6 bacteriophage. In some embodiments, the T3 bacteriophage polymerase is expressed with a T3 bacteriophage promoter, a T7 bacteriophage polymerase is expressed with a T7 bacteriophage promoter, and an SP6 bacteriophage polymerase is expressed with an SP6 bacteriophage promoter. In some embodiments, the virus comprises an exogenous nucleic acid sequence that codes for a nucleic acid polymerase. In some embodiments, the nucleic acid polymerase is selected from the group consisting of: T7 RNA polymerase, T3 RNA polymerase and SP6 RNA polymerase, a RNA polymerase variant, and a DNA polymerase mutant. In some embodiments, the virus comprises an exogenous nucleic acid sequence that codes for a bacteriophage polymerase. In some embodiments, the bacteriophage is selected from the group consisting of a T3 bacteriophage, a T7 bacteriophage and an SP6 bacteriophage. In some embodiments, the T3 bacteriophage polymerase is expressed with a T3 bacteriophage promoter, a T7 bacteriophage polymerase is expressed with a T7 bacteriophage promoter, and an SP6 bacteriophage polymerase is expressed with an SP6 bacteriophage promoter.

[0007] One embodiment provides a virus comprising: (i) a retroviral envelope construct inserted at a first location within the genome of the virus; and (ii) a retroviral packaging construct inserted at a second location within the genome of the virus, wherein the first location and the second location are not contiguous, wherein the envelope construct comprises a nucleic acid that codes for a retroviral envelope protein, wherein the packaging construct comprises a nucleic acid that codes for a retroviral structural protein, and wherein the virus is an oncolytic virus. In some embodiments, the virus comprises (iii) a transfer construct inserted at a third location within the genome of the oncolytic virus. In some embodiments, the transfer construct comprises a transgene that codes for a non-retroviral protein. In some embodiments, the transfer construct is inserted near the 3' end of the genome of the oncolytic virus. In some embodiments, the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter and the gene that codes for the retroviral structural protein is under the control of a second early viral promoter. In some

embodiments, the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter, a first early/late viral promoter or a first late viral promoter; and the gene that codes for a retroviral structural protein is under the control of a second early viral promoter, a second early/late viral promoter, or a second late viral promoter. In some embodiments, the transfer construct comprises a hybrid 5'-long terminal repeat region. In some embodiments, the hybrid 5'-long terminal repeat region comprises a third early viral promoter and a HIV-1 protein 5'-long terminal repeat region. In some embodiments, the hybrid 5'-long terminal repeat region comprises a HIV-1 protein 5'-long terminal repeat region and a viral promoter, wherein the viral promoter is a third early viral promoter, a third early/late viral promoter, or a third late viral promoter. In some embodiments, the transfer construct further comprises a gene that codes for a self-cleaving RNA ribozyme. In some embodiments, the gene that codes for the self-cleaving RNA ribozyme is positioned downstream to the 3'-long terminal repeat region of the transfer construct. In some embodiments, the self-cleaving ribozyme comprises a delta virus ribozyme or a hammerhead ribozyme. In some embodiments, the packaging construct comprises a 5'-long terminal repeat region and wherein the second early viral promoter is fused to the 5'-long terminal repeat region. In some embodiments, the nucleic acid that codes for the retroviral envelope protein comprises a nucleotide sequence as set forth in SEQ ID No. 1, or a nucleotide sequence that is at least about 70% to at least about 99% identical to the sequence set forth as SEQ ID No. 1.

[0008] In some embodiments, the nucleic acid that codes for the retroviral structural protein comprises a nucleotide sequence as set forth in SEQ ID No. 2, or a nucleotide sequence that is at least about 70% to at least about 99% identical to the sequence set forth as SEQ ID No. 2. In some embodiments, the transfer construct comprises a 3'-long terminal repeat region. In some embodiments, the envelope construct comprises a termination sequence at its 5'-terminal region. In some embodiments, the packaging construct comprises a termination sequence at its 3'-terminal region. In some embodiments, the transfer construct comprises a termination sequence at its 3'-terminal region. In some embodiments, the termination sequence comprises nucleotide sequence as set forth in SEQ ID No. 5. In some embodiments, the first location and the second location are separated by at least about 10,000 bases. In some embodiments, the first location and the third location are separated by at least about 10,000 bases. In some embodiments, the second location and the third location are separated by at least about 10,000 bases. In some embodiments, the structural protein comprises a mature gag-pol protein. In some embodiments, the mature gag-pol protein comprises p55, p41, and

p24. In some embodiments, the envelope protein comprises a VSV-G protein. In some embodiments, the oncolytic virus is tumor selective in replication. In some embodiments, the non-replicating retrovirus is produced selectively within a tumor microenvironment. In some embodiments, the oncolytic virus in an oncolytic vaccinia virus. In some embodiments, the first, the second, and the third early viral promoters, wherein the first early viral promoter is a first vaccinia virus early promoter, the second early viral promoter is a second vaccinia virus early promoter, and the third early viral promoter is a third vaccinia virus early promoter. In some embodiments, the first vaccinia virus early promoter comprises a sequence as set forth in SEQ ID No. 9. In some embodiments, the second vaccinia virus early promoter comprises a sequence as set forth in SEQ ID No. 10. In some embodiments, the third vaccinia virus early promoter comprises a sequence set forth as SEQ ID No. 11. In some embodiments, the transfer construct comprises a human PGK promoter (SEQ ID No. 12). In some embodiments, the envelope construct is inserted between genes vacwr032 and vacwr033 of the oncolytic vaccinia virus. In some embodiments, the packaging construct is inserted between genes vacwr093 and vacwr095 of the oncolytic vaccinia virus. In some embodiments, the genome of the oncolytic vaccinia virus comprises a deletion of the vacwr094 gene, and wherein the packaging construct is inserted into the location of the vacwr094 gene. In some embodiments, the transfer construct is inserted between genes vacwr205 and vacwr206 of the oncolytic vaccinia virus. In some embodiments, the non-retroviral protein comprises a therapeutic protein or a diagnostic protein. In some embodiments, the non-retroviral protein comprises the therapeutic protein, and wherein the therapeutic protein comprises an immune checkpoint modulator, an antibody or portion thereof, a Fc fusion protein, an anticoagulant, a blood factor, a bone morphogenetic protein, an immunosuppressive agent, an immunostimulatory agent, an enzyme, a growth factor, a hormone, an interferon, an interleukin, a thrombolytic, an anti-angiogenic, a chemotherapeutic, an antibiotic, an antifungal, an antiviral, and any combination thereof.

[0009] In some embodiments, the retrovirus is an Alpharetrovirus, a Betaretrovirus, a Deltaretrovirus, an Epsilonretrovirus, a Gamma retrovirus, or a Lentivirus. In some embodiments, the retrovirus is the lentivirus. In some embodiments, the lentivirus is an HIV. In some embodiments, the retrovirus is the Gamma retrovirus. In some embodiments, the Gamma retrovirus is a Moloney murine leukemia virus. In some embodiments, the virus comprises an exogenous nucleic acid sequence that codes for a nucleic acid polymerase. In some embodiments, the nucleic acid polymerase is selected from the group consisting of: T7 RNA polymerase, T3 RNA polymerase and SP6 RNA polymerase, a RNA polymerase

variant, and a DNA polymerase mutant. In some embodiments, the virus comprises an exogenous nucleic acid sequence that codes for a bacteriophage polymerase. In some embodiments, the bacteriophage is selected from the group consisting of a T3 bacteriophage, a T7 bacteriophage and an SP6 bacteriophage. In some embodiments, the T3 bacteriophage polymerase is expressed with a T3 bacteriophage promoter, a T7 bacteriophage polymerase is expressed with a T7 bacteriophage promoter, and an SP6 bacteriophage polymerase is expressed with an SP6 bacteriophage promoter.

[0010] One embodiment a method of treating cancer, the method comprising: administering to a subject an oncolytic virus according to this disclosure, wherein the non-replicating retrovirus generated from the oncolytic virus is selectively targeted to a tumor tissue. In some embodiments, the tumor tissue comprises a malignant neoplastic tissue. One embodiment provides an engineered producer virus that generates a non-replicating retrovirus from its genome, wherein the engineered producer virus comprises at least one of the following modifications:

i. mutation or deletion of at least one viral gene;
ii. insertion of at least one exogenous nucleic acid;
iii. altered tropism; or
iv. any combinations thereof,

and wherein the non-replicating retrovirus comprises a transgene that codes for a non-retroviral protein. In some embodiments, the non-replicating lentivirus comprises a transgene that codes for a non-retroviral protein. In some embodiments, the producer virus is a vaccinia virus and the at least one viral gene is selected from the group consisting of: B5R, A52R (VACWR178), F13L, A36R, A34R, A33R, B8R, B18R, SPI-1, SPI-2, B15R, VGF, E3L, K3L, A41L, K7R, N1L, C12L, TK, and any combinations thereof. In some embodiments, the at least one exogenous nucleic acid codes for a protein selected from the group consisting of: CXCR4, CCR2, PH-20, HMGB1, PIAS3, IL15, IL15-Rα, LIGHT, ITAC, fractalkine, CCL5, a metabolic modulating protein, a cytokine, a fusion protein comprising any combinations of the above, and a functional domain or fragment or variant thereof, or any combinations thereof. In some embodiments, the at least one exogenous nucleic acid codes for the PIAS3.

[0011] In some embodiments, the producer virus comprises a retroviral envelope construct, a retroviral packaging construct and a retroviral transfer construct, wherein the envelope construct, the packing construct, and the transfer construct are inserted at different locations

within the genome of the producer virus. In some embodiments, the envelope construct comprises a gene that codes for a retroviral envelope protein and the packaging construct comprises a gene that codes for a retroviral structural protein. In some embodiments, the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter and the gene that codes for the retroviral structural protein is under the control of a second early viral promoter. In some embodiments, the envelope construct further comprises a termination sequence at its 5'-terminal region.

[0012] In some embodiments, the packaging construct further comprises a termination sequence at its 3'-terminal region. In some embodiments, the transfer construct comprises a termination sequence. In some embodiments, the transfer construct comprises a hybrid 5'-long terminal repeat region. In some embodiments, the hybrid 5'-long terminal repeat region comprises a third early viral promoter and a HIV-1 protein 5'-long terminal repeat region. In some embodiments, the packaging construct comprises a 5'-long terminal repeat region and wherein the second early viral promoter is fused to the 5'-long terminal repeat region. In some embodiments, the envelope construct comprises a termination sequence at its 5'-terminal region. In some embodiments, the packaging construct comprises a termination sequence at its 3'-terminal region. In some embodiments, the transfer construct comprises a termination sequence. In some embodiments, the termination sequence comprises a nucleotide sequence as set forth in SEQ ID No. 7. In some embodiments, the retroviral structural protein comprises a mature gag-pol protein. In some embodiments, the mature gag-pol protein comprises p55, p41, and p24. In some embodiments, the retroviral envelope protein comprises a VSV-G protein. In some embodiments, the producer virus in an oncolytic vaccinia virus.

[0013] In some embodiments, the envelope construct comprises a first early vaccinia promoter, the packaging construct comprises a second early vaccinia promoter, and the transfer construct comprises a third early vaccinia promoter. In some embodiments, the first vaccinia virus early promoter comprises a sequence as set forth in SEQ ID No. 9. In some embodiments, the second vaccinia virus early promoter comprises a sequence as set forth in SEQ ID No. 10. In some embodiments, the third vaccinia virus early promoter comprises a sequence set forth as SEQ ID No. 11. In some embodiments, the transfer construct comprises a human PGK promoter (SEQ ID No. 12). In some embodiments, the envelope construct is inserted between genes vacwr032 and vacwr033 of the oncolytic vaccinia virus. In some embodiments, the packaging construct is inserted between genes vacwr093 and vacwr095 of the oncolytic vaccinia virus. In some embodiments, the genome of the oncolytic vaccinia

virus comprises a deletion of the vacwr094 gene, and wherein the packaging construct is inserted into the location of the vacwr094 gene. In some embodiments, the transfer construct is inserted between genes vacwr205 and vacwr206 of the oncolytic vaccinia virus. In some embodiments, the non-retroviral protein comprises a therapeutic protein or a diagnostic protein. In some embodiments, the virus comprises the transgene that codes for the non-retroviral protein, wherein the non-retroviral protein comprises the therapeutic protein, and wherein the therapeutic protein comprises an immune checkpoint modulator, an antibody or portion thereof, a Fc fusion protein, an anticoagulant, a blood factor, a bone morphogenetic protein, an immunosuppressive agent, an immunostimulatory agent, an enzyme, a growth factor, a hormone, an interferon, an interleukin, a thrombolytic, an anti-angiogenic, a chemotherapeutic, an antibiotic, an antifungal, an antiviral, and any combination thereof. In some embodiments, the retrovirus is an Alpharetrovirus, a Betaretrovirus, a Deltaretrovirus, an Epsilonretrovirus, a Gamma retrovirus, or a Lentivirus. In some embodiments, the retrovirus is a lentivirus. In some embodiments, the lentivirus is an HIV. In some embodiments, the retrovirus is the Gamma retrovirus. In some embodiments, the Gamma retrovirus is a Moloney murine leukemia virus (MMLV).

[0014] One embodiment provides a method of treating cancer, the method comprising: administering to a subject an engineered producer virus according to this disclosure, wherein the non-replicating retrovirus generated from the engineered producer virus is selectively targeted to a tumor tissue. In some embodiments, the tumor tissue comprises a malignant neoplastic tissue.

[0015] One embodiment provides a process for generating an oncolytic virus that produces a non-replicating retrovirus, the process comprising: growing a population of the oncolytic virus in mammalian cells, followed by adding and selecting for, sequentially, a retroviral envelope construct, a retroviral packaging construct, and a retroviral transfer construct, wherein at least one of the envelope construct, the packaging construct, or the transfer construct comprises a transgene that codes for a non-retroviral protein. In some embodiments, the retrovirus is an Alpharetrovirus, a Betaretrovirus, a Deltaretrovirus, an Epsilonretrovirus, a Gamma retrovirus, or a Lentivirus. In some embodiments, the retrovirus is the Gamma retrovirus. In some embodiments, the Gamma retrovirus is a Moloney murine leukemia virus. In some embodiments, the retrovirus is the Lentivirus. In some embodiments, the Lentivirus is HIV.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The novel features of the disclosure are set forth with particularity in the appended claims. A better understanding of the features and advantages of this disclosure will be obtained by reference to the following detailed description that sets forth illustrative embodiments, in which the principles of this disclosure are utilized, and the accompanying drawings of which.

[0017] **FIG. 1** shows locations of insertions or insertion/deletions of each lentiviral construct within the vaccinia virus genome.

[0018] **FIG. 2** shows a map of the lentiviral *env* construct.

[0019] **FIG. 3** shows a map of the lentiviral packaging construct.

[0020] **FIG. 4** shows a map of the lentiviral transfer construct.

[0021] **FIG. 5** shows detection of *GAG* expression by Western blot.

[0022] **FIG. 6** shows detection of VSV-G expression by Western blot.

[0023] **FIG. 7** shows a fluorescent microscopy image of HEK293 cells infected with Lenti-Vac virus generating infectious lentivirus, as shown by the presence of TagRFP-T and sfGFP on the cells; indicating vaccinia virus infection and lentivirus transduction respectively.

[0024] **FIG. 8** shows an exemplary construct containing a T7 RNA polymerase sequence.

DETAILED DESCRIPTION

[0025] While preferred embodiments of this disclosure have been shown and described herein, it will be obvious to those skilled in the art that such embodiments are provided by way of example only. Numerous variations, changes, and substitutions will now occur to those skilled in the art without departing from this disclosure. It should be understood that various alternatives to the embodiments of this disclosure described herein may be employed in practicing the disclosure. It is intended that the following claims define the scope of the disclosure and that methods and structures within the scope of these claims and their equivalents be covered thereby.

Certain Definitions

[0026] The terminology used herein is for the purpose of describing particular cases only and is not intended to be limiting. As used herein, the singular forms “a”, “an” and “the” can include the plural forms as well, unless the context clearly indicates otherwise. Furthermore, to the extent that the terms “contains,” “containing,” “including”, “includes,” “having,” “has”, “with”, or variants thereof are used in either the detailed description and/or the claims, such terms are intended to be inclusive in a manner similar to the term “comprising.”

[0027] The term "about" or "approximately" can mean within an acceptable error range for the particular value as determined by one of ordinary skill in the art, which will depend in part on how the value is measured or determined, *e.g.*, the limitations of the measurement system. For example, "about" can mean within 1 or more than 1 standard deviation, per the practice in the given value. Where particular values are described in the application and claims, unless otherwise stated the term "about" should be assumed to mean an acceptable error range for the particular value, such as ±10% of the value modified by the term "about".

[0028] The terms "individual," "patient," or "subject" can be used interchangeably. None of the terms require or are limited to situation characterized by the supervision (*e.g.* constant or intermittent) of a health care worker (*e.g.* a doctor, a registered nurse, a nurse practitioner, a physician's assistant, an orderly, or a hospice worker). In some embodiments, patients, subjects, or individuals can be under the supervision of a health care worker.

[0029] The terms "heterologous nucleic acid sequence," or "exogenous nucleic acid sequence," or "transgenes," as used herein, in relation to a specific virus can refer to a nucleic acid sequence that originates from a source other than the specified virus.

[0030] The term "mutation," as used herein, can refer to a deletion, an insertion of a heterologous nucleic acid, an inversion or a substitution, including an open reading frame ablating mutations as commonly understood in the art.

[0031] The term "cancer" and its grammatical equivalents as used herein can refer to a hyperproliferation of cells whose unique trait—loss of normal controls—results in unregulated growth, lack of differentiation, local tissue invasion, and metastasis. With respect to the inventive methods, the cancer can be any cancer, including any of acute lymphocytic cancer, acute myeloid leukemia, alveolar rhabdomyosarcoma, bladder cancer, bone cancer, brain cancer, breast cancer, cancer of the anus, anal canal, rectum, cancer of the eye, cancer of the intrahepatic bile duct, cancer of the joints, cancer of the neck, gallbladder, or pleura, cancer of the nose, nasal cavity, or middle ear, cancer of the oral cavity, cancer of the vulva, chronic lymphocytic leukemia, chronic myeloid cancer, colon cancer, esophageal cancer, cervical cancer, fibrosarcoma, gastrointestinal carcinoid tumor, Hodgkin lymphoma, hypopharynx cancer, kidney cancer, larynx cancer, leukemia, liquid tumors, liver cancer, lung cancer, lymphoma, malignant mesothelioma, mastocytoma, melanoma, multiple myeloma, nasopharynx cancer, non-Hodgkin lymphoma, ovarian cancer, pancreatic cancer, peritoneum, omentum, and mesentery cancer, pharynx cancer, prostate cancer, rectal cancer, renal cancer, skin cancer, small intestine cancer, soft tissue cancer, solid tumors, stomach cancer, testicular cancer, thyroid cancer, ureter cancer, and/or urinary bladder cancer. As

used herein, the term "tumor" refers to an abnormal growth of cells or tissues, *e.g.*, of malignant type or benign type.

[0032] The term "gene," as used herein, can refer to a segment of nucleic acid that encodes an individual protein or RNA (also referred to as a "coding sequence" or "coding region"), optionally together with associated regulatory regions such as promoters, operators, terminators and the like, which may be located upstream or downstream of the coding sequence.

[0033] The terms "mutant virus" and "modified virus," as used interchangeably herein, can refer to a virus comprising one or more mutations in its genome, including but not limited to deletions, insertions of heterologous nucleic acids, inversions, substitutions or combinations thereof.

[0034] The term "naturally-occurring," as used herein with reference to a virus, can indicate that the virus can be found in nature, *i.e.*, it can be isolated from a source in nature and has not been intentionally modified.

[0035] The terms "inhibiting," "reducing" or "prevention," or any variation of these terms, referred to herein, can include any measurable decrease or complete inhibition to achieve a desired result.

[0036] A "promoter," as used herein, can be a control sequence that is a region of a nucleic acid sequence at which initiation and rate of transcription are controlled. In certain embodiments, a promoter may contain genetic elements at which regulatory proteins and molecules may bind such as RNA polymerase and other transcription factors. The terms "operatively positioned," "operatively linked," "under control" and "under transcriptional control" can mean that a promoter is in a correct functional location and/or orientation in relation to a nucleic acid sequence to control transcriptional initiation and/or expression of that sequence. In certain embodiments, a promoter may or may not be used in conjunction with an "enhancer," which refers to a cis-acting regulatory sequence involved in the transcriptional activation of a nucleic acid sequence.

[0037] The term "homology," as used herein, may be to calculations of "homology" or "percent homology" between two or more nucleotide or amino acid sequences that can be determined by aligning the sequences for optimal comparison purposes (*e.g.*, gaps can be introduced in the sequence of a first sequence). The nucleotides at corresponding positions may then be compared, and the percent identity between the two sequences may be a function of the number of identical positions shared by the sequences (*i.e.*, % homology = # of identical positions/total # of positions x 100). For example, a position in the first sequence

may be occupied by the same nucleotide as the corresponding position in the second sequence, then the molecules are identical at that position. The percent homology between the two sequences may be a function of the number of identical positions shared by the sequences, taking into account the number of gaps, and the length of each gap, which need to be introduced for optimal alignment of the two sequences. In some embodiments, the length of a sequence aligned for comparison purposes may be at least about: 30%, 40%, 50%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 95%, of the length of the reference sequence. A BLAST® search may determine homology between two sequences. The homology can be between the entire lengths of two sequences or between fractions of the entire lengths of two sequences. The two sequences can be genes, nucleotides sequences, protein sequences, peptide sequences, amino acid sequences, or fragments thereof. The actual comparison of the two sequences can be accomplished by well-known methods, for example, using a mathematical algorithm. A non-limiting example of such a mathematical algorithm may be described in Karlin, S. and Altschul, S., Proc. Natl. Acad. Sci. USA, 90-5873-5877 (1993). Such an algorithm may be incorporated into the NBLAST and XBLAST programs (version 2.0), as described in Altschul, S. et al., Nucleic Acids Res., 25:3389-3402 (1997). When utilizing BLAST and Gapped BLAST programs, any relevant parameters of the respective programs (*e.g.*, NBLAST) can be used. For example, parameters for sequence comparison can be set at score= 100, word length= 12, or can be varied (*e.g.*, W=5 or W=20). Other examples include the algorithm of Myers and Miller, CABIOS (1989), ADVANCE, ADAM, BLAT, and FASTA. In another embodiment, the percent identity between two amino acid sequences can be accomplished using, for example, the GAP program in the GCG software package (Accelrys, Cambridge, UK).

[0038] The term "subject" can refer to an animal, including, but not limited to, a primate (*e.g.*, human), cow, sheep, goat, horse, dog, cat, rabbit, rat, or mouse. The terms "subject" and "patient" are used interchangeably herein in reference, for example, to a mammalian subject, such as a human subject.

[0039] The terms "treat," "treating," and "treatment" can be meant to include alleviating or abrogating a disorder, disease, or condition; or one or more of the symptoms associated with the disorder, disease, or condition; or alleviating or eradicating the cause(s) of the disorder, disease, or condition itself. Desirable effects of treatment can include, but are not limited to, preventing occurrence or recurrence of disease, alleviation of symptoms, diminishing any direct or indirect pathological consequences of the disease, preventing metastasis,

decreasing the rate of disease progression, amelioration or palliation of the disease state and remission or improved prognosis.

[0040] The term "therapeutically effective amount" can refer to the amount of a compound that, when administered, can be sufficient to prevent development of, or alleviate to some extent, one or more of the symptoms of the disorder, disease, or condition being treated. The term "therapeutically effective amount" can also refer to the amount of a compound that is sufficient to elicit the biological or medical response of a cell, tissue, system, animal, or human that is being sought by a researcher, veterinarian, medical doctor, or clinician.

[0041] The term "pharmaceutically acceptable carrier," "pharmaceutically acceptable excipient," "physiologically acceptable carrier," or "physiologically acceptable excipient" can refer to a pharmaceutically-acceptable material, composition, or vehicle, such as a liquid or solid filler, diluent, excipient, solvent, or encapsulating material. A component can be "pharmaceutically acceptable" in the sense of being compatible with the other ingredients of a pharmaceutical formulation. It can also be suitable for use in contact with the tissue or organ of humans and animals without excessive toxicity, irritation, allergic response, immunogenicity, or other problems or complications, commensurate with a reasonable benefit/risk ratio. S*ee, Remington: The Science and Practice of Pharmacy*, 21st Edition; Lippincott Williams & Wilkins: Philadelphia, PA, 2005; *Handbook of Pharmaceutical Excipients*, 5th Edition; Rowe et al., Eds., The Pharmaceutical Press and the American Pharmaceutical Association: 2005; and *Handbook of Pharmaceutical Additives*, 3rd Edition; Ash and Ash Eds., Gower Publishing Company: 2007; *Pharmaceutical Preformulation and Formulation*, Gibson Ed., CRC Press LLC: Boca Raton, FL, 2004).

[0042] The term "pharmaceutical composition" can refer to a mixture of a compound disclosed herein with other chemical components, such as diluents or carriers. The pharmaceutical composition can facilitate administration of the compound to an organism. Multiple techniques of administering a compound exist in the art including, but not limited to, oral, injection, aerosol, parenteral, and topical administration. Pharmaceutical compositions can also be obtained by reacting compounds with inorganic or organic acids such as hydrochloric acid, hydrobromic acid, sulfuric acid, nitric acid, phosphoric acid, methanesulfonic acid, ethanesulfonic acid, p-toluenesulfonic acid, salicylic acid and the like.

[0043] An "anti-cancer agent," as used herein, can refer to an agent or therapy that is capable of negatively affecting cancer in a subject, for example, by killing cancer cells, inducing apoptosis in cancer cells, reducing the growth rate of cancer cells, reducing the incidence or number of metastases, reducing tumor size, inhibiting tumor growth,

reducing the blood supply to a tumor or cancer cells, promoting an immune response against cancer cells or a tumor, preventing or inhibiting the progression of cancer, or increasing the lifespan of a subject with cancer. Non-limiting examples of anti-cancer agents can include biological agents (biotherapy), chemotherapy agents, and radiotherapy agents.

[0044] The term "oncolytic," as used herein, can refer to killing of cancer or tumor cells by an agent, such as an oncolytic pox virus, such as an oncolytic vaccinia virus, *e.g.*, through the direct lysis of said cells, by stimulating immune response towards said cells, apoptosis, expression of toxic proteins, autophagy and shut-down of protein synthesis, induction of anti-tumoral immunity, or any combinations thereof. The direct lysis of the cancer or tumor cells infected by the agent, such as an oncolytic vaccinia virus, can be a result of replication of the virus within said cells. In certain examples, the term "oncolytic," can refer to killing of cancer or tumor cells without lysis of said cells.

[0045] The term "oncolytic virus" as used herein can refer to a virus that preferentially infects and kills tumor cells. Under certain non-limiting circumstances, it is understood that oncolytic viruses can promote anti-tumor responses through dual mechanisms dependent on not only the selective killing of tumor cells, but also the stimulation of host anti-tumor immune responses. In some embodiments, the oncolytic viruses can include, but are not limited to, (i) viruses that naturally replicate preferentially in cancer cells and are non-pathogenic in humans often due to elevated sensitivity to innate antiviral signaling or dependence on oncogenic signaling pathways; and (ii) viruses that are genetically-manipulated for use. In some embodiments, the oncolytic virus can be a measles virus, a poliovirus, a poxvirus, a vaccinia virus, an adenovirus, an adeno associated virus, a herpes simplex virus, a vesicular stomatitis virus, a reovirus, a Newcastle disease virus, a senecavirus, a lentivirus, a mengovirus, or a myxomavir. In certain embodiments, the oncolytic virus can be a pox virus. In certain embodiments, the oncolytic virus can be a vaccinia virus.

[0046] The term "modified oncolytic virus" as used herein can refer to an oncolytic virus that comprises a modification to its constituent, such as, but not limited to, a modification in the native genome ("backbone") of the virus like a mutation or a deletion of a viral gene, introduction of an exogenous nucleic acid, a chemical modification of a viral nucleic acid or a viral protein, and introduction of a exogenous protein or modified viral protein to the viral capsid. In general, oncolytic viruses may be modified (also known as "engineered") in order to gain improved therapeutic effects against tumor cells. In certain embodiments, the

modified oncolytic virus can be a modified pox virus. In certain embodiments, the modified oncolytic virus can be a modified pox virus.

[0047] The terms "systemic delivery," and "systemic administration," used interchangeably herein, in some cases can refer to a route of administration of medication, oncolytic virus or other substances into the circulatory system. The systemic administration may comprise oral administration, parenteral administration, intranasal administration, sublingual administration, rectal administration, transdermal administration, or any combinations thereof.

[0048] As used herein the terms "replication deficient virus" or "non-replicating virus," or "replication incompetent virus," have their ordinary meaning, such as, a virus that is propagation incompetent as a result of modifications to its genome. Thus, once such recombinant virus infects a cell, the only course it can follow is to express any viral and heterologous protein contained in its genome. In a specific embodiment, the replication defective vectors provided herein may contain genes encoding nonstructural proteins and are self-sufficient for RNA transcription and gene expression. However, these vectors lack genes encoding structural proteins, so that a helper genome is needed to allow them to be packaged into infectious particles. In addition to providing therapeutically safe vectors, the removal of the structural proteins increases the capacity of these vectors to incorporate more than 6 kb of heterologous sequences. In another embodiment, propagation incompetence of the adenovirus vectors of the invention is achieved indirectly, e.g., by removing the packaging signal which allows the structural proteins to be packaged in virions being released from the packaging cell line.

[0049] In an aspect, provided herein is a producer virus that can deliver a cargo that comprises a replication defective virus, for instance, a replication defective virus of a different family than the producer virus. In an aspect, the producer virus can be an oncolytic virus, for example a vaccinia virus that produces from its genome a non-replicating virus, such as a non-replicating lentivirus. In some cases, a cargo can be at least a portion of a non-replicating lentivirus (LV). In some cases, a non-replicating lentivirus can comprise a transgene such as a non-lentiviral protein. A non-lentiviral protein can be a therapeutic protein or functional fragment thereof and/or a diagnostic protein. In some cases, the non-replicating lentivirus is capable of expressing the non-lentiviral protein in cells that are infected by the oncolytic virus leading to lysis of the infected cell, such as a cancer cell. In some cases, the non-replicating virus can be produced by the producer virus *in situ*, such as within a tumor cell or in a tumor micro-environment. For example, the non-replicating virus

can be produced in a tumor cell that is infected by the oncolytic producer virus, and the non-replicating virus can express a therapeutic or a diagnostic protein *in situ*.

[0050] In some aspects, provided herein can be a vector system comprising a producer oncolytic virus. In some aspects, a vector system can comprise a disrupted viral genome. In some aspects, a single vector can comprise at least two viral genomes. In some aspects, a single vector can comprise at least 3 viral genomes. In an aspect, a producer oncolytic vaccinia virus genome can comprise a sequence from a foreign virus, such as an HIV virus. In some aspects, a 3-plasmid system can be provided herein in which the *env*, packaging, and transfer functions of a virus can be on 3 different plasmids. In some aspects, *env*, packaging and transfer may be on a single vector comprising at least 1 viral genome.

[0051] In some examples, a producer virus can be from a family of any one of: Myoviridae, Podoviridae, Siphoviridae, Alloherpesviridae, Herpesviridae, Malacoherpesviridae, Lipothrixviridae, Rudiviridae, Adenoviridae, Ampullaviridae , Ascoviridae, Asfaviridae, Baculoviridae , Bicaudaviridae, Clavaviridae, Corticoviridae, Fuselloviridae, Globuloviridae, Guttaviridae, Hytrosaviridae, Iridoviridae, Marseilleviridae, Mimiviridae, Nimaviridae, Pandoraviridae, Papillomaviridae, Phycodnaviridae, Plasmaviridae, Polydnaviruses, Polyomaviridae, Poxviridae, Sphaerolipoviridae, or Tectiviridae. In an aspect, provided herein a producer oncolytic virus can be a poxviridae virus, such as a vaccinia virus. In an aspect, a vaccinia virus can encode a virus from a different family. For example, a vaccinia virus genome can comprise a second genome for a virus selected from a virus of any of the following families: Myoviridae, Podoviridae, Retroviridae, Siphoviridae, Alloherpesviridae, Herpesviridae, Malacoherpesviridae, Lipothrixviridae, Rudiviridae, Adenoviridae, Ampullaviridae , Ascoviridae, Asfaviridae, Baculoviridae , Bicaudaviridae, Clavaviridae, Corticoviridae, Fuselloviridae, Globuloviridae, Guttaviridae, Hytrosaviridae, Iridoviridae, Marseilleviridae, Mimiviridae, Nimaviridae, Pandoraviridae, Papillomaviridae, Phycodnaviridae, Plasmaviridae, Polydnaviruses, Polyomaviridae, Sphaerolipoviridae, or Tectiviridae.

[0052] In some embodiments, a virus produced in situ can be a retrovirus (including lentiviruses), herpes viruses, alphavirus, adeno-associated viruses, vaccinia virus, papillomavirus, or Epstein Barr virus (EBV). In accordance with the present disclosure there may be employed conventional molecular biology, microbiology, and recombinant DNA techniques within the skill of the art. In certain embodiments, a virus produced by the producer virus of this disclosure is replication defective, that is, it may be unable to replicate autonomously in a target cell. Preferably, a replication defective virus is a minimal virus,

such that it retains only the sequences of its genome which are necessary for target cell recognition and encapsidating the viral genome. Replication defective virus may not be infective after introduction into a cell. Use of replication defective viral vectors may allow for administration to cells in a specific, localized area, without concern that the vector can infect other cells. Thus, a specific tissue can be specifically targeted, for example a cancer cell.

[0053] In an aspect, a virus produced from a producer virus provided herein can be from the family Retroviridae. In an aspect, a Retroviridae virus can be any one of: an Alpharetrovirus, a Betaretrovirus, a Deltaretrovirus, an Epsilonretrovirus, a Gamma retrovirus (e.g., a Moloney murine leukemia virus), or a Lentivirus. In some embodiments, further specific examples of a retrovirus can be any one of: HIV- 1, HIV-2, HTLV-1, HTLV-2, HTLV-3, HTLV-4, equine infectious anemia virus (EIAV) lentivirus, or a combination thereof.

[0054] The retroviruses produced by the producer viruses disclosed herein are, in some embodiments, integrating viruses which can infect dividing cells as well as non-dividing cells. The retrovirus genome can have two LTRs, an encapsidation sequence and three coding regions (*gag*, *pol* and *env*). Replication defective non-infectious retroviral vectors can be manipulated to destroy the viral packaging signal but can retain the structural genes required to package the co-introduced virus engineered to contain the heterologous gene and the packaging signals. Thus, in recombinant replication defective retroviral vectors, the *gag*, *pol* and *env* genes may generally be deleted, in whole or in part, and replaced with a heterologous nucleic acid sequence of interest. These vectors can be constructed from different types of retroviruses, such as HIV (human immuno-deficiency virus), MoMuLV (murine Moloney leukaemia virus), MSV (murine Moloney sarcoma virus), HaSV (Harvey sarcoma virus), SNV (spleen necrosis virus), RSV (Rous sarcoma virus), and Friend virus.

[0055] In a specific embodiment of the disclosure, replication defective lentiviruses produced from an oncolytic producer virus can be used as agents for the direct delivery and sustained expression of a transgene in several tissue types, including brain, retina, muscle, liver, and blood. This subtype of retroviral vectors can efficiently transduce dividing and nondividing cells in these tissues and maintain long-term expression of the gene of interest (for a review, see, Naldini, Curr. Opin. Biotechnol. 1998, 9:457-63; Zufferey, et al., J. Virol. 1998, 72:9873-80). Lentiviral packaging cell lines are available and known generally in the art (see, e.g., Kafri, et al., J. Virol., 1999, 73: 576-584).

[0056] In an aspect, a producer virus or a virus produced in situ can also be an adenovirus. Adenoviruses are eukaryotic DNA viruses that can be modified to efficiently deliver a nucleic acid of the disclosure to a variety of cell types. Various serotypes of adenovirus exist,

such as type 2 or type 5 human adenoviruses (Ad 2 or Ad 5) or adenoviruses of animal origin (see PCT Publication No. WO94/26914). Those adenoviruses of animal origin can include adenoviruses of canine, bovine, murine (e.g., Mav1 [Beard et al., Virology, 1990, 75:81]), ovine, porcine, avian, and simian (e.g., SAV) origin. Preferably, the adenovirus of animal origin is a canine adenovirus, more preferably a CAV2 adenovirus (e.g., Manhattan or A26/61 strain [ATCC Accession No. VR-800]). Various replication defective adenovirus and minimum adenovirus vectors have been described (PCT Publications No. WO94/26914, WO95/02697, WO94/28938, WO94/28152, WO94/12649, WO95/02697, WO96/22378). The replication defective recombinant adenoviruses according to the disclosure can be prepared by any technique known to the person skilled in the art (Levrero et al., Gene, 1991, 101:195; EP Publication No. 185 573; Graham, EMBO J., 1984, 3:2917; Graham et al., J. Gen. Virol., 1977, 36:59). Recombinant adenoviruses are recovered and purified using standard molecular biological techniques, which are well known to one of ordinary skill in the art. Adeno-associated virus-based vectors. The adeno-associated viruses (AAV) are DNA viruses of relatively small size which can integrate, in a stable and site-specific manner, into the genome of the cells which they infect. They are able to infect a wide spectrum of cells without inducing any effects on cellular growth, morphology or differentiation, and they do not appear to be involved in human pathologies. The AAV genome has been cloned, sequenced and characterized. The use of vectors derived from the AAVs for transferring genes *in vitro* and *in vivo* has been described (see PCT Publications No. WO 91/18088 and WO 93/09239; U.S. Pat. Nos. 4,797,368 and 5,139,941; EP Publication No. 488 528). The replication defective recombinant AAVs according to the disclosure can be prepared by cotransfecting a plasmid containing the nucleic acid sequence of interest flanked by two AAV inverted terminal repeat (ITR) regions, and a plasmid carrying the AAV encapsidation genes (rep and cap genes), into a cell line which is infected with producer virus (e.g., an oncolytic vaccinia virus). The AAV recombinants which are produced can then be purified by standard techniques.

Oncolytic Virus

[0057] Provided herein can be an oncolytic producer virus or portion thereof. An oncolytic virus can be a virus that can infect and lyse a cancer cell. In an aspect, an oncolytic virus may have at least one of the following functions in cancer therapy: (1) directly destroying the tumor cells by viral lysis, (2) serving as a vector for expressing heterologous proteins in the tumor site, and (3) the presentation of autologous tumor antigens to prime/activate the immune system. Oncolytic virus selectivity for cancer cells can occur either during infection

or during replication. Tumor-selective viruses can be engineered by altering viral surface proteins that recognize specific cellular receptors, allowing the virus to specifically enter cancer cells. Replication selectivity can be accomplished by modifying the viral genes that are required for efficient replication, so that the virus can only replicate in cells that have disruptions in normal homeostatic pathways, such as tumor-suppressor defects or activation of oncogenic pathways.

[0058] In an aspect, an oncolytic virus can be any one of: a vesicular stomatitis virus (VSV), a Newcastle disease virus (NDV), a retrovirus, a reovirus, a measles virus, a Sinbis virus, an influenza virus, a herpes simplex virus, vaccinia virus, and an adenovirus. In some cases, an oncolytic virus can comprise a poxvirus. In some cases the poxvirus can comprises a measles virus, a poliovirus, a poxvirus, a vaccinia virus, an adenovirus, an adeno associated virus, a herpes simplex virus, a vesicular stomatitis virus, a reovirus, a Newcastle disease virus, a senecavirus, a lentivirus, a mengovirus, a myxomavir, a betaentomopoxvirus, a yatapoxvirus, a cervidpoxvirus, a gammaentomopoxvirus, a leporipoxvirus, a suipoxvirus, a molluscipoxvirus, a crocodylidpoxvirus, a alphaentomopoxvirus, a capripoxvirus, a avipoxvirus, or a parapoxvirus. In some cases, the poxvirus can comprise a vaccinia virus.

[0059] In one embodiment, the oncolytic producer virus can be a vaccinia virus. Vaccinia virus can be a large, complex enveloped virus having a linear double-stranded DNA genome of about 190 kilobases and encodes approximately 250 genes. Vaccinia is well-known for its role as a vaccine that eradicated smallpox. Vaccinia virus is unique among DNA viruses as it replicates only in the cytoplasm of the host cell. Therefore, the large genome is required to code for various enzymes and proteins needed for viral DNA replication. During replication, vaccinia produces several infectious forms which differ in their outer membranes: the intracellular mature virion (IMV), the intracellular enveloped virion (IEV), the cell-associated enveloped virion (CEV) and the extracellular enveloped virion (EEV). IMV is the most abundant infectious form and is thought to be responsible for spread between hosts. A number of genes in vaccinia can be modified in order to improve its properties as an oncolytic virus.

[0060] In some cases, the oncolytic producer virus can be Vaccinia virus western reserve (WR), the genome sequence of which is provided in **Table 1**. In an aspect, a vaccinia virus genome, such as the genome sequence provided in **Table 1**, can be disrupted with at least 1, 2, 3, 4, 5, 6, 7, or up to 8 exogenous sequences, e.g., exogenous sequences that code for a replication defective virus produced from the vaccinia virus. In an aspect, a producer

oncolytic virus provided herein can comprise percent identity from about 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 95%, 98%, 99%, or up to about 100% to SEQ ID NO: 1.

[0061] **Table 1: Complete genome of Vaccinia Virus WR**

SEQ ID NO:	Sequence from GenBank: AY243312.1
1	ATTTAAAATATAATATTAATGTACTAAAACTTATATATTATTAATTTATCTAACTAAAGTTAGTAAATTA TATATATAATTTTATAATTAATTTAATTTTACTAATTTTATTTAGTGTCTAGAAAAAAATGTGTGACCCA TGACTGTAGGAAACTCTAGAGTGTAAGAAAGATCGATCGCTTTATAGAGACCATCAGAAAGAGGTTTAAT ATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAAT ATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAAT ATTTTTGTGAGACCATCGAAGGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATA TTTTTGTGAGACCATCGAAGGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATAT TTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATAT TTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATAT TTTTGTGAGACCATCGAAGGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATATT TTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATATT TTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATATT TTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATATT TTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATATT TTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTTACGACTCCATCAGAAAGAGGTTTAATATT TTTGTGAGACCATCGAAGAGAGAAAGAGAAAGAGATAGTTGATCTAGATATTTTTCTTAGTACAAAAGTC AATGTTTTAAAATATATGGACAAGAATTTGTCTGTATAAAAACTTGTGTGAAATTTTGTACCAAAGAAAA AATGTGAGCAGTATCCCCTACATGGATTTTACTAGATCATTTATATACCAAAAAATATTATACGATCTAC GTTTTATTATATGATTTTAACGTGTAAATTATAAACATTATTTTATGATATACAATTGTCTGGTAACCTA GATGGGCATAGGGGATGTTGATAAGCTCGACGAGTATATGTTGTTGGACGTTATTGTTTAAGAAATAGTT GATGCATCAGAAAGAGAATAAAAAATATTTTAGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGATAAAACTTTTTT ACGACTCCATCAGAAAGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGAATAAAAATATTT TATGACTCCATTGAAGAGAGAAAGAGAAAATGAGAATGAGAATAAAAATATTTTAGTGACACCATCAGAA AGAGGTTTAATATTTTTGTGAGACCATCGAAGAGAGAAAGAGAATAAAAATATTTTATGACTCCATTGAA GAGAGAAAGAGAAAATGAGAATGAGAATAAAAATATTTTAGTGACACCATCAGAAAGAGGTTTAATATTT TTTATGAGACCATCAAAGAGAGAAAGAGAATAAAAATATTTTTGTAAAACTTTTTTTATGAGACCATCAA AGAGAGAAAGAGAATAAAAATATTTTTGTAAAACTTTTTTTATGAGACCATCAAAGAGAGAAAGAGAATA AAAATATTTTTGTAAAACTTTTTTTATGAGACCATCAAAGAGAGAAAGAGAATAAAAATATTTTTGTAAA ACTTTTTTTATGAGACCATCAAAGAGAGAAAGAGAATAAAAATATTTTTGTAAAACTTTTTTTATGAGAC CATCAAAGAGAGAAAGAGAATAAAAATATTTTTGTAAAACTTTTTTTATGAGACCATCAAAGAGAGAAAG AGAATAAAAATATTTTTGTAAAACTTTTTTTATGAGACCATCAAAGAGAGAAAGAGAATAAAAATATTTT TGTAAAACTTTTTTTATGAGACCATCAGAAAGAGGTTTAATATTTTTGTGATACCCTGAAAGGAAATAGG AATAGGAATAGGAATAGTGTCATAATCGTATCACACTATTGAGACAGAAAAAGAAGAAGTCGCGAGAGGT AACTTTTTGTGAATGTAGTTAAGAACATTTTTGTTTTGCAAACCGGAATATAGTGTCCGGTACACTTTTT TAATTCGTGGTGTGCCTGAATCGTTCGATTAACCCTACTCATCCAATTTCAGATGAATAGAGTTATCGAT

	TCAGACACACGCTTTGAGTTTTGTTGAATCGATGAGTGAAGTATCATCGGTTGCACCTTCAGATGCCGAT CCGTCGACATACTTAAATCCATCCTTGACCTCAAGTTCAGATGATTCCTTGCACATGTCTCCGATACGAA CGCTAAACTCTAGATTCTTGACACATTTTGTATCGACGATCGTTGAACCGATGATATCTTCGTAACTCAC TTTCTTATGAGAGATGTTAGACCCGAGTACTGGATGGGTCTTGATGTCGCTGTCTTTCTCTTCTTCGCTA CATCTGATGTCGATAGACACCTCACAGTCTTTGATCATAGCCAGAGCTTCTTCATGAGTGATCGCGGGAG AGTCCTTACCTTGTCCTGGGGACACGCTGGACAATCTAGCATTCACTGTGTTTCCATCAGCGGATTCTGA GATGGATTTAATCTGAGGACATTTGGTGAATCCAAAGTTCATTCTCAGACCTCCACCGATGATGGAGTAA TAAGTGGTAGGAGGATCTACATCCTCGACTGATGTGGAATCATCTTCTGATTCCACCTCGGGATCTGGAT CTGACTCGGACTCTGTAATTTCCGTTACGGATTGGCAAATCTTATCATTGGTCGGTGTTTGGTCTTGCTT TGTGACTTTGATAATAACATCGATTCCCATATGATGTTTGTTTTCTTCTTCCGTACACGAGGAGGAGGAT GAGGATGATTGCTGAAGACTGGCAGGCACATGCATGCCAGGACGATATATTGTTTCATGATTGCTATTGA TTGAGTACTGTTCTTTATGATTCTACTTCCTTACCGTGCAATAAATTAGAATATATTTTCTACTTTTACG AGAAATTAATTATTGTATTTATTATTTATGGGTGAAAAACTTACTATAAAAAGCGGGTGGGTTTGGAATT AGTGATCAGTTTATGTATATCGCAACTACCGGGCATATGGCTATCGACATCGAGAACATTACCCACATGA TAAGAGATTGTATCAGTTTCGTAGTCTTGAGTATTGGTATTACTATATAGTATATAGATGTCGACGCTAG ATAGACAGTCTCCGAATGCGGCATGATACCGTCATCATTCTTTGCTTTCGTTAACTGTTTGGAGGAAAAA TTTTTGTTATTGCATTTAATCTCGAAATTCAGAGTGCACACCTTTCTCCTGTAAAGAAACCTGAAGTTGC TACCTTATTAAGGACGGAGAAGTATTCCTCACGAAATACGGGATTACAGTCTTTATGATTCATAGTAATA GTTAGTTCCGACGTTGAGATGGATTCGCTGAGACCGGTAGTGGTCGTTAACTGGATACAGATTAATTTCC ACATCGATATAGTTAAAGGTATTACTGGGTACGGGTTCGCATTTATCTGCGGAAGAGACGGTGTGAGAAT ATGTTCCGAGACCACACGGAGAACAGATGACGTCTCCGGATACTCCGTATCCTATTCCACATTTTGTTTG GGAAACACATGCCTTGCATCCGGATGATCCTTTGAGAAGACAATAATATCCGGGAGAGCATTCACAGATT CTATTGTGAGTCGTGTTACACGGTCGCGTCTTCCGTTACAACTTAGACAAGCGGGTAAATGATTATTGCG AGATGTGAAGGTACCCGAACCACACGGCGTACATTGTGTGTTAGTCTTGCTATCGCATAATCTGGAAGCG TATGTTCCCGGACACAAATTATGGCGTTTGTATTCGTTGTCTTTACACTTTCCATCGGATGGTGCATGCG GTGCTATATCTCTTCCGTTTATTATTATACATGAGAGAAACAATATATACGAGTATAATACGGACTTCAT GATTTAATAATGTAGTAATCGTCGTCTTGTTCCTGTTTCCTACTTCTCCAATCATATAGATATTTTCTTT CTATCATGGATAATATTTGTAATGGTTCTTTTCGTACAACATACTGTTTAGATGATATTGCGCATAATTT CCGGAGGCAAATACGATAGTCTAGATTGACCGATGGTAGACTCTAATTTATTGAGTGCTTTGTCGACGAG TTTACTTTTACGCTCCATCGATAGATGGCACTGTTCTATGAGATCGTCGTACATGGGAAATGAAATGTGA CTGTCTGAATGTATGGCTTTAAGATAGCTGTGATACCGTATACAGGTCGGTGTCGGAGATTCGAATCTCT TTAAGGCGACTTATGTCACGATGATGGAATCTATCTTATCGAATGATATATTTTTCATAAATACACTTTT ATAGTCCTCGTTTAAACAGAATTTACTATGTAGTTCCGCGAATGACTCGTCCCTTAATAGGCAGTAGGCT ATTATCTTCTTTACGTAGTAATCGTCGTAGGGAGAGACATCTTGTAGAACAACGATTTAATCATAGGTAG AGATACTTTCAGTCTGTGGTGGATGATGTCATTCACAACATCCGCCTTGTATATGATGTTTCTGTTTTCA AACACCAAGTCGAATACCGTCTTTAGTCGGAAGGTTGATGTCGTATCCGATGTATGAGGCAACATTGTTG TTACAATTTTGAAAGGCGGTATTATAGTATTCGTCTTTCTGAATGTCGAACCTATCTAGTAGATACCGTA GTATATTGAGAGTGTATCCTTGATTATGTTTTATGAATAGATAAAGTAGATGTTGTCCTTCTTCCTTTTG TTCGTGCCAATTGAGTAACATTATGAGAATATGACCTGTTGCACAATCGTTCCATGATGGGTGTACAATC AAGATTATTACGTATCCTCGTATCGGCTCCTCGAGATAAAAGAGCATACACCACACGAGGACTATGTTTG GTATACTGTTGAAGGTAAGTGTGTAACCGCGTTAATGTTTGCTCCATAATCTATTATCGCGTAGATGAAT CGCTTCTCGGCTCGCATCTTAGTGTGACTTAACTTGTAATAATTGCTTTTGTAGAACGTGGATATGTGTT TACAGTAGTAATGAAGAGAAGTGAGTTCATCCTCGTCGGATCCTTTGTACAGAACGTAATAGTTTAAGCT CCCATTGAATTTATATCTAAGATAACACAGCAATAGATCGGATGATTTACTAAAGTCATCAATGGTGTCC GTTAGTATATCAAAGATCTTGTTATCGATTGATAGTGGTGTCCTTTTTCATCCTTGCTATCAAAGTTACG CATGCCGTGGTGTAACAATATCTTTAATACAGATGGATTAAATCGTGTATTCATCGTATAGCAATGTAAT GGAGAGTTACCTCGTTTATTCAGATCGCAGTGTTTAATAACTAGCTTAAACAGATGAGACGATGTATCCA CATCAAAGAACGTGAAATACATATGACAGACATTGTTGACAGAAACGTGACCTTCATTCTTACCGTCGTC CATAAATACGTTAGGTATGTACCACATACTGTCGCGAACGATGCGTACAATCTCGTCCATCTCATAATGA TTTACTTTTTCATAATTAAAGATGTGAAAGAAAAACAGAACAATATATTTTTTTAGTAATGTTTATGCGA GACATATAAAATAAACTCCGTGTTTATGATCATTTTTAACAGCAACACATTCAATATTGTATTGTTATTT TTATATTATTTACACAATTAACAATATATTATTAGTTTATATTACTGAATTAATAATATAAAATTCCCAA TCTTGTCATAAACACACACTGAGAAACAGCATAAACACAAAATCCATCAAAAATGTCGATGAAATATCTG ATGTTGTTGTTCGCTGCTATGATAATCAGATCATTCGCCGATAGTGGTAACGCTATCGAAACGACATCGC CAGAAATTACAAACGCTACAACAGATATTCCAGCTATCAGATTATGCGGTCCAGAGGGAGATGGATATTG TTTACACGGTGACTGTATCCACGCTAGAGATATTGACGGTATGTATTGTAGATGCTCTCATGGTTATACA GGCATTAGATGTCAGCATGTAGTATTAGTAGACTATCAACGTTCAGAAAACCCAAACACTACAACGTCAT ATATCCCATCTCCCGGTATTATGCTTGTATTAGTAGGCATTATTATTATTACGTGTTGTCTATTATCTGT TTATAGGTTCACTCGACGAACTAAACTACCTATACAAGATATGGTTGTGCCATAATTTTTATAAATTTTT TTATGAGTATTTTTACAAAAAAAAATGTATAAAGTGTATGTCTTATGTATATTTATAAAAATGCTAAGTAT GCGATGTATCTATGTTATTTGTATTTATCTAAACAATACCTCTACCTCTAGATATTATACAAAAATTTTT

	TATTTCGGCATATTAAAGTAAAATCTAGTTACCTTGAAAATGAATACAGTGGGTGGTTCCGTATCACCAG
	TAAGAACATAATAGTCGAATACAGTATCCGATTGAGATTTTGCATACAATACTAGTCTAGAAAGAAATTT
	GTAATCATCTTCTGTGACGGGAGTCCATATATCTGTATCATCGTCTAGTTTATCAGTGTCCCATGCTATA
	TTCCTGTTATCATCATTAGTTAATGAAAATAACTCTCGTGCTTCAGAAAAGTCAAATATTGTATCCATAC
	ATACATCTCCAAAACTATCGCTTATACGTTTATCTTTAACGATACCTATACCTAGATGGTTATTTACTAA
	CAGACATTTTCCAGATCTATTGACTATAACTCCTATAGTTTCCACATCAACCAAGTAATGATCATCTATT
	GTTATATAACAATAACATAACTCTTTTCCATTTTTATCAGTATGTATATCTATATCAACGTCGTCGTTGT
	AGTGAATAGTAGTCATTGATCTATTATATGAAACGGATATGTCTAGAACGGCAATTGTTTTACGTCCAGT
	TAACACTTTCTTTGATTTAAAGTCTAGAGTCTTTGCAAACATAATATCCTTATCCGACTTTATATTTCCT
	GTAGGGTGGTATAATTTTATTTTGCCTCCACATATCGGTGTTTCCAAATATATTACTAGACAATATTCCA
	TATAGTTATTAGTTAAGGGTACCCAATTAGAACACGTACGCTTATTATCATCATTTGGATCGTATTTCAT
	AAAAGTTATTGTACTATCGATGTCAACACATTCTACATTTTTTAATCGTCTATATAGTATTTTTCTGATA
	TTTTCTATAATATCAGAATTGTCTTCCATCGGAAGTTGTATACTATCGGAATCAGTTACATGTTTAAATA
	ATTCTCTGATGTCATTCCTTATACAATCAAATTCATTATTAAACAGTTTAATAGTCTGTAGACCTTTATC
	GTCGTAAATATCCATTGTCTTATTAGTTACGCTTATTTTTATGTGTTTTACGTTGCTTTATTATATTTTA
	TAAGAATGATTGTTTGACGAATCACGAGAACTATTAAGACACATTATTAGGTATATATTATAAAAAAGTT
	TTTGATTACGATGTTATAAGAGGAAAGAGGACACATTAACATCATACATCAATTAACTACATTCTTATAA
	CATCGTAATCAAAAGAATTGCAATTTTGATGTATAACAACTGTCAATGGGTTATGGAATTGTATATTACA
	TATTATACGGTATGTTGGTAACGACAAATACCGATCGGTAATTGTCTGCCGGTGTAATAGAATTATATAT
	ATCTATCTATTACACCGGCTGAGTATGCATAATAATAAGTTGTGGTAGTATGATCTCCATATTTATAATT
	TAGGACTTTGTATTCAGTATTTTTGGAATCATAAAAAATAAAAAAAAGTTTTACTAATTTAAAATTTAAA
	AAGTATTTACATTTTTTTCACTGTTTAGTCGCGGATATGGAATTCGATCCTGCCAAAATCAATACATCAT
	CTATAGATCATGTAACAATATTACAATACATAGATGAACCAAATGATATAAGACTAACAGTATGCATTAT
	CCGAAATATTAATAACATTACATATTATATCAATATCACAAAAATAAATACACATTTGGCTAATCAATTT
	CGGGCTTGGAAAAAACGTATCGCCGGAAGGGACTATATGACTAACTTATCTAGAGATACAGGAATACAAC
	AATCAAAACTTACTGAAACTATACGTAACTGTCAAAAAAATAGAAACATATATGGTCTATATATACACTA
	CAATTTAGTTATTAATGTGGTTATTGATTGGATAACCGATGTGATTGTTCAATCAATATTAAGAGGGTTG
	GTAAATTGGTACATAGCTAATAATACCTATACACCCAATAATACAACAACCATTTCTGAGTTGGATATCA
	TCAAAATACTGGATAAATACGAGGACGTGTATAGAGTAAGTAAAGAAAAAGAATGTGGAATTTGCTATGA
	AGTTGTTTACTCAAAACGATAGATACTTTGGTTTATTGGATTCGTGTACTCATATATTTTGCATAACATG
	CATCAATATATGGCATAAAACACGAAGAGAAACCGGTGCGTCGGATAATTGTCCTATATGTCGTACCCGT
	TTTAGAAACATAACAATGAGCAAGTTCTATAAGCTAGTTAACTAATAAATAAAAAGTTTAATTTGTTGAC
	GACGTATGTCGTTATTTTTCTCGTATGAAAGATTAAATTCAATTCAATTCGTTGTTTCTAATATAATCTG
	CCGTATTGGATGGATTCTCAAGACAATTGCATTTAGATTATATTATCATGAATAAAAATAGTAGCACGCA
	CTACTTCAGCCAAATATTCTTTTTTGAAACGCCATCTATCGTAGTGAGGACACAAGTGAACCTATAATTA
	TCAAATTTATTAGTATCAGTCACATGAAGGACTTTCTGTAGAGTGACGATTCTACCATCTATGGTACTAA
	CGGTTTCATCCTCCTTGATACCCTCACCCAAATGTTCTATAAATTTAGCATCCTCGTCCGATCTCATATC
	CTTTGCCAACCAATACATGTAGCTAAAATTAGGCATAAATTTCACACATCCAGTGCAACGAAATTCTCCA
	GAAGATGTTACGATGTTTAGGTTAGGACATTTGATTTCGTCGGCATTAACATATGGGTGAACACACCCAT
	ACATGAAAGCGATGAGAAATAGGATTCTCATCTTGCCAAAATATCACTAGAAAAAATTTATTTATCAATT
	TTAAAGGTATAAAAAATACTTATTGTTGCTCGAATATTTTGTATTTGATGGTATACGGAAGATTAGAAAT
	GTAGGTATTATCATCAACTGATTCTATGGTTTTATGTATTCTATCATGTTTCACTATTGCGTCGGAAATA
	ATATCATATGCTTCCACATATATTTTATTTTGTTTTAACTCATAATACTCACGTAATTCTGGATTATTGG
	CATATCTATGAATAATTTTAGCTCCATGATCAGTAAATATTAATGAGAACATAGTATTACCACCTACCAT
	TATTTTTTTCATTTCGTTCAATTCTTGATTGCAAAGATCTATATAATCATTATAGCGTTGACTTATGGAC
	TCTGGAATCTTAGACGATGTACAGTCATCTATAATCATGGCATATTTAATACATTGTTTTATAGCATAGT
	AGTTATCTACGATGTTAGATATTTCTCTCAATGAATCAATCACACAATCTAATGTAGGTTTATGACATAA
	TAGCATTTTCAGCAGTTCAATGTTTCTAGATTCGTTGATGGCAATGGCTATACATGTATATCCGTTATTT
	GATCTAATGTTGACATCTGAACCGGATTCTAGCAGTAAAGATACTAGAGATTGTTTATTATATCTAACAG
	CCTTGTGAAGAAGTGTTTCTCCTCGTTTGTCAATCATGTTAATGTCTTTAAGATAAGGTAGGCAAATGTT
	TATAGTACTAAGAATTGGGCAAGCATAAGACATGTCACAAAGACCCTTTTTGTATGTATAAGTGTAAAAA
	TTATAACATTCATAGTTGGATTTACATAGGTGTCCAATCGGGATCTCTCCATCATCGAGATAATTGATGG
	CATCTCCCTTCCTTTTTTAGTAGATATTTCATCGTGTAAGAATCAATATTAATATTTCTAAAGTATTCGT
	GTATAGCCTCTTTATTTACCACAGTTCCATATTCCACTAGAGGGATATCGCCGAATGTCATATACTCAAT
	TAGTATATGTTGGAGGACATCCGAGTTCATTGTTTTCAATATCAAAAAGATGGTTTCCTTATCATTTCTC
	CATAGTGGTACAATACTACACATTATTCCGTGCGGCTTTCCATTTTCCAAAAACAATTTGACCAAATCTA
	AATCTACATCTTTATTGTATCTATAATCACTATTTAGATAATCAGCCATAATTACTCGAGTGCAACATGT
	TAGATCGTCTATATATGAATAAGCAGTGTTATCTATTCCTTTCATTAACAATTTAACGATGTCTATATCT
	ATATGAGATGACTTAATATAATATTGAAGAGCTGTACAATAGTTTTTATCTATAGAAGACGGCTTGATTC
	CGTGATTAATTAGACATTTAACAACTTCCGGACGCACATATGCTCTCGTATCCGACTTTGAATACAGATG
	AGAGATGATATACAGATGCAATACGGTACCGCAATTTCGTAGTTGATAATCATCATACGCGTATCAGTAC

TCGTCCTCATAAAGAACACTGCAGCCATTTTCTATGAACAAATCAATAATTTTAGGAACAGGATCATTGT
CATTACATAATTTTCTATAACTGAACGATGGTTTTCACATTTAACACTCAAGTCAAATCCATGTTCTACC
AACACCTTTATCAAGTCAACGTCTACATTTTTGGATTTCATATAGCTGAATATATTAAAGTCATTTATGT
TGCTAAATCCAGTGGCTTCTAGTAGAGCCATCGCTATATCCTTTAACTTTAACATGTCTACTATTTGTGT
ATTCTTCTAATGGGGTAGCTGTCTCCAATTTTTGCGTAATGGATTAGTGCCACTGTCTAGTAGTAGTTTG
ACGACCTCGACATTATTACAATGCTCATTAAAAAGGTATGCGTGTAAAGCATTATTCTTGAATTGGTTCC
TGGTATCATTAGGATCTCTGTCTCTCAACATCTGTTTAAGTTCATCGAGAGCCACCTCCTCATTTTCCAG
ATAGTCAAACATTTTGACTGAATGAGCTACTGTGAACTCTATACACCCACACAACTAATGTCATTAAATA
TTATTTTTTTGAATGTATTTATACCATGTCAAAAACTTGTACAATTATTAATAAAAATAATTTAGTGTTT
AAATTTTACCAGTTCCAGATTTTACACCTCCGTTAACCCCACTTTTTACACCACTGGACGATCCTCCTCC
CCACATTCCACCGCCACCAGATGTATAAGTTTTAGATCCTTTATTACTACCATCATGTCCATGGATAAAG
ACACTCCACATGCCGCCACTACTACCCCCTTTAGAAGACATATTAATAAGACTTAAGGACAAGTTTAACA
ATAAAATTAATCACGAGTACCCTACTACCAACCTACACTATTATATGATTATAGTTTCTATTTTTACAGT
ACCTTAACTAAAGTCTCTAGTCACAAGAGCAATACTACCAACCTACACTATTATATGATTATAGTTTCTA
TTTTTATAGGAACGCGTACGAGAAAATCAAATGTCTAATTTCTAACGGTAGTGTTGATAAACGATTATCG
TCAATGGATACCTCCTCTATCATGTCGTCTATTTTCTTACTTTGTTCTATTAACTTATTAGCATTATATA
TTATTTGATTATAAAACTTATATTGCTTATTAGCCCAATCTGTAAATATCGGATTATTAACATATCGTTT
CTTTGTAGGTTTATTTAACATGTACATCACTGTAAGCATGTCCGTACCATTTATTTTAATTTGACGCATA
TCCGCAATTTCTTTTTCGCAGTCGGTTATAAATTCTATATATGATGGATACATGCTACATGTGTACTTAT
AATCGACTAATATGAAGTACTTGATACATATTTTCAGTAACGATTTATTATTACCACCTATGAATAAGTA
CCTGTGATCGTCTAGGTAATCAACTGTTTTCTTAATACATTCGATGGTTGGTAATTTACTCAGAATAATT
TCCAATATCTTAATATATAATTCTGCTATTTCTGGGATATATTTATCTGCCAGTATAACACAAATAGTAA
TACATGTAAACCCATATTTTGTTATTATATTAATGTCTGCGCCATTATCTATTAACCATTCTACTAGGCT
GACACTATGCGACTTAATACAATGATAAAGTATACTACATCCATGTTTATCTATTTTGTTTATATCATCA
ATATACGGCTTACAAAGTTTTAGTATCGATAACACATCCAACTCACGCATAGAGAAGGTAGGGAATAATG
GCATAATATTTATTAGGTTATCATCATTGTCATTATCTACAACTAAGTTTCCATTTTTTAAAATATACTC
GACAACTTTAGGATCTCTATTGCCAAATTTTTGAAAATATTTATTTATATGCTTAAATCTATATAATGTA
GCTCCTTCATCAATCATACATTTAATAACATTGATGTATACTGTATGATAAGATACATATTCTAACAATA
GATCTTGTATAGAATCTGTATATCTTTTAAGAATTGTGGATATTAGGATATTATTACGTAAACTATTACA
CAATTCTAAAATATAAAACGTATCACGGTCGAATAATAGTTGATCAACTATATAATTATCGATTTTGTGA
TTTTTCTTCCTAAACTGTTTACGTAAATAGTTAGATAGAATATTCATTAGTTCATGACCACTATAGTTAC
TATCGAATAACGCGTCAAATATTTCCCGTTTAATATCGCATTTGTCAAGATAATAATAGAGTGTGGTATG
TTCACGATAAGTATAATAACGCATCTCTTTTTTGTGTGAAATTAAATAGTTTATCACGTCCAAAGATGTA
GCATAACCATCTTGTGACCTAGTAATAATATAATAATAGAGAACTGTTTTACCCATTCTATCATCATAAT
CAGTGGTGTAGTCGTAATCGTAATCGTCTAATTCATCATCCCAATTATAATATTCACCAGCACGTCTAAT
CTGTTCTATTTTGATCTTGTATCCATACTGTATGTTGCTACATGTAGGTATTCCTTTATCCAATAATAGT
TTAAACACATCTACATTGGGATTTGATGTTGTAGCGTATTTCTCTACAATATTAATACCATTTTTGATAC
TATTTATTTCTATACCTTTCGAAATTAGTAATTTCAATAAGTCTATATCGATGTTATCAGAACATAGATA
TTCGAATATATCAAAATCATTGATATTTTTATAGTCGACTGACGACAATAACAAAATCACAACATCGTTT
TTGATATTATTATTTTTCTTGGTAACGTATGCCTTTAATGGAGTTTCACCATCATACTCATATAATGGAT
TTGCACCACTTTCTATCAATGATTGTGCACTGCTGGCATCGATGTTAAATGTTTTACAACTATCATAGAG
TATCTTATCGTTAACCATGATTGGTTGTTGATGCTATCGCATTTTTTGGTTTCTTTCATTTCAGTTATGT
ATGGATTTAGCACGTTTGGGAAGCATGAGCTCATATGATTTCAGTACTGTAGTGTCAGTACTATTAGTTT
CGATCAGATCAATGTCTAGATCTATAGAATCAAAACACGATAGGTCAGAAGATAATGAATATCTGTACGC
TTCTTTTTGTACTGTAACTTCTGGTTTTGTTAGATGGTTGCATCGTGCTTTAACATCAATGGTACAAATT
TTATCCTCGCTTTGTGTATCATATTCGTCTCTAGTATAAAATTCTATATTCAGATTATCATGCGATGTGT
ATACGCTAACGGTATCAATAAACGGAGCACACCATTTAGTCATAACAGTAATCCAAAATTTTTTAAAGTA
TATCTTAACGAAAGAAGTTGTGTCATTGTCTACGGTGTATGGTACTAGATCCTCATAAGTGTATATATCT
AGAGTAATGTTTAATTTATTAAATGGTTGATAATATGGATCCTCATGACAATTTCCGAAGATGGAAATGA
GATATAGACATGCAATAAATCTAATCGAAGACATGGTTACTCCTTAAAAAAATACGAATAATCACCTTGG
CTATTTAGTAAGTGTCATTTAACACTATACTCATATTAATCCATGGACTCATAATCTCTATACGGGATTA
ACGGATGTTCTATATACGGGGATGAGTAGTTTTCTTCTTTAACTTTATACTTTTTACTAATCATATTTAG
ACTGATGTATGGGTAATAGTGTTTAAAGAGTTCGTTCTCATCATCAGAATAAATCAATATCTCTGTTTTT
TTGTTATACAGATGTATTACAGCCTCATATATTACGTAATAGAACGTGTCATCTACCTTATTAACTTTCA
CCGCATAGTTGTTTGCAAATACGGTTAATCCTTTGACCTCGTCGATTTCCGACCAATCTGGGCGTATAAT
GAATCTAAACTTTAATTTCTTGTAATCATTCGAAATAATTTTTAGTTTGCATCCGTAGTTATCCCCTTTA
TGTAACTGTAAATTTCTCAACGCGATATCTCCATTAATAATGATGTCGAATTCGTGCTGTATACCCATAC
TGAATGGATGAACTAACGAATATCAACGGCGTTAATAGTAATTTACTTTTTCATCTTTACATATTGGGTA
CTAGTTTTACTATCATAAGTTTATAAATTCCACAAGCTACTATGGAATAAGCCAACCATCTTAGTATACC
ACACATGTCTTAAAGTTTATTAATTAATTACATGTTGTTTTATATATATCGCTACGAATTTAAAGAGAAA
TCAGTTTAGGAAGAAAAAAATTATCTATCTACATCATCACGTCTCTGTATTCTACGATAGAGTGCTACTT

	TAAGATGAGACATATCCGTGTCATCAAAAATATACTCCATTAAAATGATTATTCCGGCAGCGAACTTGAT ATTGGATATATCACAACCTTTGTTAATATCTACGACAATAGACAGCAGTCCCATGGTTCCATAAACAGTG AGTTTATCTTTCTTTGAAGCGATAGTTTGTAGAGATCTTATAAAACCGTCAAACGACATCGCATTTATAT CTTTAGCTAATTCATATATGTTACCATCGTAATATCTAACCGCGTCTATCTTAAACGTTTCCATCGCTTT AAAGACGTTTCCGATAGATGGTCTCATTTCATCAGTCATACTGAGCCAACAAATATAATCGTGTATAACA TCTTTGATAGAATCAGACTCTAAAGAAAACGAATCGGCTTTATTATACGCATTCATGATAAACTTAATGA AAAATGTTTTTCGTTGTTTAAGTTGGATGAATAGTATGTCTTAATAATTGTTATTATTTCATTAATTAAT ATTTAGTAACGAGTACACTCTATAAAAACGAGAATGACATAACTAGTTATCAAAGTGTCTAGGACGCGTA ATTTTCATATGGTATAGATCCTGTAAGCATTGTCTGTATTCTGGAGCTATTTTCTTTATCGCATTAGTAA GTTCAGAATATGTTATAAATTTAAATCGAATAACGAACATGACTTTAGTAAAGTCGTCTATATTAACTCT TTTATTTTCTAGCCATCGTAATACCATGTTTAAGATAGTATATTCTCTAGTTACTACGATCTCATCGTTG TCTAGAATATCACATACTGAATCTACATCCAATTTTAGAAATTGGTCTGTGTTACATATCTCTTCTATAT TATTGTTGATGTATTGTCGTAGAAAACTATTACGTAGACCATTTTCTTTATAAAACGAATATATAGTACT CCAATTATCTTTACCGATATATTTGCACACATAATCCATTCTCTCAATCACTACATCTTTAAGATTTTCG TTGTTAAGATATTTGGCTAAACTATATAATTCTATTAGATCATCAACAGAATCAGTATATATTTTTCTAG ATCCAAAGACGAACTCTTTGGCGTCCTCTATAATATTCCCAGAAAAGATATTTTCGTGTTTTAGTTTATC GAGATCTGATCTGTTCATATACGCCATGATTGTACGGTACGTTATGATAACCGCATAAAATAAAAATCCA TTTTCATTTTTAACCAATACTATTCATAATTGAGATTGATGTAATACTTTGTTACTTTGAACGTAAAGAC AGTACACGGATCCGTATCTCCAACAAGCACGTAGTAATCAAATTTGGTGTTGTTAAACTTCGCAATATTC ATCAATTTAGATAGAAACTTATACTCATCATCTGTTTTAGGAATCCATGTATTATTACCACTTTCCAACT TATCATTATCCCAGGCTATGTTTCGTCCATCATCGTTGCGCAGAGTGAATAATTCTTTTGTATTCGGTAG TTCAAATATATGATCCATGCATAGATCGGCAAAGCTATTGTAGATGTGATTTTTCCTAAATCTAATATAA AACTCGTTTACTAGCAAACACTTTCCTGATTTATCGACCAAGACACATATGGTTTCTAAATCTATCAAGT GGTGGGGATCCATAGTTATGACGCAGTAACATAGATTATTACATTCTTGACTGTCGCTAATATCTAAATA TTTATTGTTATCGTATTGGATTCTGCATATAGATGGCTTGTATGTCAAAGATATAGAACACATAACCAAT TTATAGTCGCGCTTTACATTCTCGAATCTAAAGTTAAGAGATTTAGAAAACATTATATCCTCGGATGATG TTATCACTGTTTCTGGAGTAGGATATATTAAAGTCTTTACAGATTTCGTCCGATTCAAATAAATCACTAA ATAATATCCCACATTATCATCTGTTAGAGTAGTATCATTAAATCTATTATATTTTATGAAAGATATATCA CTGCTCACCTCTATATTTCGTACATTTTTAAACTGTTTGTATAATATCTCTCTGATACAATCAGATATAT CTATTGTGTCGGTAGACGATACCGTTACATTTGAATTAATGGTGTTCCATTTTACAACTTTTAACAAGTT GACCAATTCATTTCTAATAGTATCAAACTCTCCATGATTAAATATTTTAATAGTATCCATTTTATATCAC TACGGACACAAAGTAGCTGACATAAACCATTGTATAATTTTTATGTTTTATGTTTATTAGCGTACACATT TTGGAAGTTCCGGCTTCCATGTATTTCCTGGAGAGCAAGTAGATGATGAGGAACCAGATAGTTTATATCC GTACTTGCACTTAAAGTCTACATTGTCGTTGTATGAGTATGATCTTTTAAACCCGCTAGACAAGTATCCG TTTGATATTGTAGGATGTGGACATTTAACAATCTGACACGTGGGTGGATCGGACCATTCTCCTCCTGAAC ACAGGACACCAGAGTTACCAATCAACGAATATCCACTATTGCAACTATAAGTTACAACGCTCCCATCGGT ATAAAAATCCTCGTATCCGTTATGTCTTCCGTTGGATATAGATGGAGGGGATTGGCATTTAACAGATTCA CAAATAGGTGCCTCGGGATTCCATACCATAGATCCAGTAGATCCTAATTCACAATACGATTTAGATTCAC CGATCAAATGATATCCGCTATTACAAGAGTACGTTATACTAGAGCCAAAGTCTACTCCACCAATATCAAG TTGGCCATTATCGATATCTCGAGGCGATGGGCATCTCCGTTTAATACATTGATTAAAGAGTGTCCATCCA GTACCTGTACATTTAGCATATATAGGTCCCATTTTTTGCTTTCTGTATCCAGGTAGACATAGATATTCTA TAGTGTCTCCTATGTTGTAATTAGCATTAGCATCAGTCTCCACACTATTCTTAAATTTCATATTAATGGG TCGTGACGGAATAGTACAGCATGATAGAACGCATCCTATTCCCAACAATGTCAGGAACGTCACGCTCTCC ACCTTCATATTTATTTATCCGTAAAAATGTTATCCTGGACATCGTACAAATAATAAAAAGCCCATATATG TTCGCTATTGTAGAAATTGTTTTTCACAGTTGCTCAAAAACGATGGCAGTGACTTATGAGTTACGTTACA CTTTGGAGTCTCATCTTTAGTAAACATATCATAATATTCGATATTACGAGTTGACATATCGAACAAATTC CAAGTATTTGATTTTGGATAATATTCGTATTTTGCATCTGCTATAATTAAGATATAATCACCGCAAGAAC ACACGAACATCTTTCCTACATGGTTAAAGTACATGTATAATTCTATCCATTTGTCTTCCTTAACTATATA TTTGTATAGATAATTACGAGTCTCGTGAGTAATTCCAGTAATTACATAGATGTCGCCGTCGTACTCTACA GCATAAACTATACTATGATGTCTAGGCATGGGAGACTTTTTTATCCAACGATTTTTAGTGAAACATTCCA CATCGTTTAATACTACATATTTTTCATACGTGGTATAAACTCCACCCATTACATATATATCATCGTTTAC GAATACCGACGCGCCTGAATATCTAGGAGTAATTAAGTTTGGAAGTCTTATCCATTTCGAAGTGCCGTGT TTCAAATATTCTGCCACACCCGTTGAAATAGAAAATTCTAATCCTCCTATTACATATAACTTTCCATCGT TAACACAAGTACTAACTTCTGATTTTAACGACGACATATTAGTAACCGTTTTCCATTTTTTCGTTTCAAG ATCTACCCGCGATACGGAATAAACATGTCTATTGTTAATCATGCCGCCAATAATGTATAGACAATTATGT AAAACATTTGCATTATAGAATTGTCTATCTGTATTACCGACTATCGTCCAATATTCTGTTCTAGGAGAGT AATGGGTTATTGTGGATATATAATCAGAGTTTTTAATGACTACTATATTATGTTTTATACCATTTCGTGT CACTGGCTTTGTAGATTTGGATATAGTTAATCCCAACAATGATATAGCATTGCGCATAGTATTAGTCATA AACTTGGGATGTAAAATGTTGATGATATCTACATCGTTTGGATTTTTATGTATCCACTTTAATAATATCA TAGCTGTAACATCCTCATGATTTACGTTAACGTTTTCGTGGGATAAGATAGTTGTCAGTTCATCCTTTGA TAATTTTCCAAATTCTGGATCGGATGTCACCGCAGTAATATTGTTGATTATTTCTGACATCGACGCATTA

TATAGTTTTTTAATTCCATATCTTTTAGAAAAGTTAAACATCCTTATACAATTTGTGGAATTAATATTAT
GAATCATAGTTTTTACACATAGATCTACTACAGGCGGAACATCAATTATTATGGCAGCAACTAGTATCAT
TTCTACATTGTTTATGGTGATGTTTATCTTCTTCCAGCGTATATAGTCTAATAGCGATTCAAACGCGTGA
TAGTTTATACCATTCAATATAATCGCTTCATCCTTTAGATGGTGATCCTGAATTCGTTTAAAAAAATTAT
ACGGAGATGCCGTAATAATTTCCTTATTCACTTGTATAATTTCCCCATTGATAGAAAATATCACGCTTTC
CATTCTTGAAGTACTATAAGTAATTATAGTATAATGTAAAGGTTTATATATTCAATATTTTTTATAAAAA
AATCATTTTGACATTAATTCCTTTTTAAATTTCCGTCTATCATCTATAGAAACGTATTCTATGAATTTAT
AAAATGCTTTTACGTGTCCTATCGTAGGCGATAGAACCGCTAAAAAGCCTATCGAATTTCTACAAAAGAA
TCTGTTATATGGTATAGGGAGAGTATAAAACATTAAATGTCCGTACTTATTAAAGTATTCAGTAGCCAAT
CCTAACTCTTTCGAATACTTATTAATGGCTCTTGTTCTGTACGAATCTATTTTTTTGAACAACGGACCTA
GTGGTATATCTTGTTCTATGTATCTAAAATAATGTCTGACTAGATCCGTTAGTTTAATATCCTCAGTCAT
CTTGTCTAGAATGGCAAATCTAACTGCGGGTTTAGGCTTTAGTTTAGTTTTTATATCTACATCTATGTCT
TTATCTAACACCAAAAATATAATAGCTAATATTTTATTACAATCATCCGGATATTCTTCTACGATCTCAC
TAACTAATGTTTCTTTGGTTATACTAGTATAGTCACTATCGGACAAATAAAGAAAATCAGATGATCGATG
AATAATACATTTAAATTCATCATCTGTAAGATTTTTGAGATGTCTCATTAAAATATTATTAGGGTCAGTA
CTCATTATCATTCGGCAGCTATTACTTATTTTATTTTTCTGTATTTTATTATTTTTCACCATATAGATCA
ATCATTAGATCATCAAAATATGTTTCAATCATCCTAAAGAGTATGGTGAATGACTCTTCCCATCTAATTT
CTGAACGTTCACCAATGTCTCTAGCCACTTTGGCACTAATAGCGATCATTCGCTTAGCGTCTTCTATATT
ATTAACTGGTTGATTCAATCTATCTAGCAATGGACCGTCGGACAGCGTCATTCTCATGTTCTTAATCAAT
GTACATACATCGCCGTCATCTACCAATTCATCCAACAACATAAGCTTTTTAAAATCATCATTATAATAGG
TTTGATCGTTGTCATTTCTCCAAAGAATATATCTAATAAGTAGAGTCCTCATGCTTAGTAATTTAACTAT
TTTAGTTAACAACTATTTTTTATGTTAAATCAATTAGTACACCGCTATGTTTAATACTTATTCATATTTT
AGTTTTTAGGATTGAGAATCAATACAAAAAATTAATGCATCATTAATTTTAGAAATACTTAGTTTCCACG
TAGTTAATGAAACATTTGAACTCATCGTACAGGACGTTCTCGTACAGGACGTAACTATAAACCGGTTTAT
ATTTGTTCAAGATAGATACAAATCCGATAACTTTTTTTACGAATTCTACGGGATCCACTTTAAAAGTGTC
ATACCGGGTTCTTTTTATTCTTTTAAACAGATCAATGGTGTGATGTTGATTAGGTCTTTTACGAATTTGA
TATAGAATAGCGTTCACATATCCTCCATAATGGTCAATCGCCATTTGTTCGTATGTCATAAATTCTTTAA
TTATATGACACTGTGTATTATTTAGTTCATCCTTGTTCATCATTAGGAATCTATCCAAAATGGCAATTAT
ACTAGAACTATAGGTGCGTTGTATACACATATTGATGTGTCTGTTTATACAATCCATGATATTTGGATCC
ATGCTACTACCTTCGGGTAAAATTGTAGCATCATATACCATTTCTAGTACTTTAGGTTCATTATTATCCA
TTGCAGAGGACGTCATGATCGAATCCTAAAAAAATATATTATTTTTATGTTATTTTGTTAAAAATAATCA
TCGAATACTTCGTAAGATACTCCTTCATGAACATAATCAGTTACAAAACGTTTATATGAAGTAAAGTATC
TACGATTTTTACAAAAGTCCGGATGCATAAGTACAAAGTACGCGATAAACGGAATAATAATAGATTTATC
TAGTCTATCTTTTTCTATAGCTTTCATAGTTAGATACATGGTCTCAGAAGTAGGATTATGTAACATCAGC
TTCGATAAAATGACTGGGTTATTTAGTCTTACACATTCGCTCATACATGTATGACCGTTAACTACAAAGT
CTACACTAAAATGATTGAACAATAGATAGTCTACCATTGTTTCGTATTCAGATAGTACAGCGTAGTACAT
AGCATCTTCACAAATTATATCATTGTCTAATAGATATTTGACGCATCTTATGGATCCCACTTCAACAGCC
ATCTTAAAATCGGTAGAATCATATTGCTTTCCTTTATCATTAATAATTTCTAAAACATCATCTCTATCAT
AAAAGATACAAATATTAACTGTTTGATCCGTAATAACATTGCTAGTCGATAGCAATTTGTTAATAAGATG
CGCTGGGCTCAATGTCTTAATAAGAAGTGTAAGAGGACTATCTCCGAATTTGTTTTGTTTATTAACATCC
GTTGATGGAAGTAAAAGATCTATAATGTCTACATTCTTGACTGTTTTAGAGCATACAATATGGAGAGGTG
TATTTCCATCATGATCTGGTTTTGAGGGACTAATTCCTAGTTTCATCATCCATGAGATTGTAGAAGCTTT
TGGATTGTCTGACATAAGATGTCTATGAATATGATTTTTGCCAAATTTATCCACTATCCTGGCTTCGAAT
CCGATGGACATTATTTTTTTAAACACTCTTTCTGAAGGATCTGTACACGCCAACAACGGACCACATCCTT
CTTCATCAACCGAGTTGTTAATCTTGGCTCCATACTGTACCAATAAATTTATTCTCTCTATGACTTCATC
ATCTGTTCCCGAGAGATAATATAGAGGTGTTTTATTATGTTTATCACACGCGTTTGGATCTGCGCCGTGC
GTCAGCAGCATCGCGACTATTCTATTATTATTAATTTTAGAAGCTATATGCAATGGATAATTTCCATCAT
CATCCGTCTCATTTGGAGAGTATCCTCTATGAAGAAGTTCTTCGACAAATCGTTCATCTAGTCCTTTAAT
TCCACAATACGCATGTAGAATGTGATAATTATTTCCAGAAGGTTCGATAGCTTGTAGCATATTCCTAAAT
ACATCTAAATTTTTACTATTATATTTGGCATAAAGAGATAGATAATACTCGGCCGACATAATGTTGTCCA
TTGTAGTATAAAAATTAATATTTCTATTTCTATTTCTGTATATTTGCAACAATTTACTCTCTATAACAAA
TATCATAACTTAGTTCTTTTATGTCAAGAAGGCACTGGTTTAGTTCATCTATAAATGTCACGCCATAACT
ACCACGCATGCTATACTCAGAATTATGATAAAGATATTTATCCTTGGGGTGTAGGTAATGGGGATTAATC
TTTGTTGGATCAGTCTCTAAGTTAACACATGTCACACATGATCCATTTATAGTTATATCACACGATGATG
ATTTATGAATTGATTCCGGAAGATCGCTATCGTATTTTGTGGTTCCACAATTCATTTCCATACATGTTAT
TGTCACACTAATATTATGATGAACTTTATCTAGCCGCTGAGTGGTAAACAACAGAACAGATAGTTTATTA
TCTTTACCAACACCCTCAGCCGCTGCCACAAATCTCTGATCCGTATCCATGATGGTCATGTTTATTTCTA
GTCCGTATCCAGTCAACACTATGTTAGCATTTCTGTCGATATAGCTTTCACTCATATGACACTCACCAAT
AATAGTAGAATTAATGTCGTAATTTACACCAATAGTGAGTTCGGCGGCAAAGTACCAATACCGGTAATCT
TGTCGAGGAGGACATATAGTATTCTTGTATTCTACCGAATACCCGAGAGATGCGATACAAAAGAGTAAGA
CTAATTTGTAAACCATCTTACTCAAAATATGTAACAATAGTACGATGCAATGAGTAAGACAATAGGAAAT

	CTATCTTATATACACATAATTATTCTATCAATTTTACCAATTAGTTAGTGTAATGTTAACAAAAATGTGG GAGAATCTAATTAGTTTTTCTTTACACAATTGACGTACATGAGTCTGAGTTCCTTGTTTTTGCTAATTAT TTCATCCAATTTATTATTCTTGACTATATCGAGATCTTTTGTATAGGAGTCAGACTTGTATTCAACATGC TTTTCTATAATCATTTTAGCTATTTCGGCATCATCCAATAGTACATTTTCCAGATTAGCAGAATAGATAT TAATGTCGTATTTGAACAGAGCCTGTAACATCTCAATGTCTTTATTATCTATAGCCAATTTAATGTCCGG AATGAAGAGAAGGGAATTATTGGTGTTTGTCGACGTCATATAGTCGAGCAAGAGAATCATCATATCCACG TGTCCATTTTTTTATAGTGATGTGAATACAACTAAGGAGAATAGCCAGATCAAAAGTAGATGGTATCTCTG AAAGAAAGTAGGAAACAATACTTACATCATTAAGCATGACGGCATGATAAAATGAAGTTTTCCATCCAGT TTTCCCATAGAACATCAGTCTCCAATTTTTCTTAACAAACAGTTTTACCGTTTGCATGTTACCACTATCA ACCGCATAATACAATGCGGTGTTTCCCTTGTCATCAAATTGTGAATCATCCAGTCCACTGAATAGCAAAA TCTTTACTATTTTGGTATCTTCCAATGTGGCTGCCTGATGTAATGGAAATTCATTCTCTAGAAGATTTTT CAATGCTCCAGCGTTCAACAACGTACATACTAGACGCACGTTATTATCAGCTATTGCATAATACAAGGCA CTATGTCCATGGACATCCGCCTTAAATGCATCTTTGCTAGAGAGAAAGCTTTTCAGCTGCTTAGACTTCC AAGTATTAATTCGTGACAGATCCATGTCTGAAACGAGACGCTAATTAGTGTATATTTTTTCATTTTTTAT AATTTTGTCATATTGCACCAGAATTAATAATATCTCTAATAGATCTGATTAGTAGATACATGGCTATCGC AAAACAACATATACACATTTAATAAAAATAATATTTATTAAGAAAATTCAGATTTCACGTACCCATCAAT ATAAATAAAATAATGATTCCTTACACCGTACCCATATTAAGGAGATTCCACCTTACCCATAAACAATATA AATCCAGTAATATCATGTCTGATGATGAACACAAATGGTGTATTAAATTCCAGTTTTTCAGGAGATGATC TCGCCGTAGCTACCATAATAGTAGATGCCTCTGCTACAGTTCCTTGTTCGTCGACATCTATCTTTGCATT CTGAAACATTTTATAAATATATAATGGGTCCCTAGTCATATGTTTAAACGACGCATTATCTGGATTAAAC ATACTAGGAGCCATCATTTCGGCTATCGACTTAATATCCCTCTTATTTTCGATAGAAAATTTAGGGAGTT TAAGATTGTACACTTTATTCCCTAATTGAAACGACCAATAGTCTAATTTTGCAGCCGTAATAGAATCTGT GAAATGGGTCATATTATCACCTATTGCCAGGTACATACTAATATTAGCATCCTTATACGGAAGGCGTACC ATATCATATTCTTCGTCATCGATTGTGATTGTATTTCCTTGCAATTTAGTAACTACGTTCATCATGGGAA CCGTTTTCGTACCGTACTTATTAGTAAAACTAGCATTGCGTGTTTTAGTGATATCAAACGGATATTGCCA TATACCTTTAAAATATATAGTATTAATGATTGCCCATAGAGTATTATTGTCGAGCATATTAGAATCTACT ACATTAGACATACCGGATCTACGTTCTACTATAGAATTAATTTTATTAACCGCATCTCGTCTAAAGTTTA ATCTATATAGGCCGAATCTATGATATTGTTGATAATACGACGGTTTAATGCACACAGTATTATCTACGAA ACTTTGATAAGTTAGATCAGTGTACGTATATTTAGATGTTTTCAGCTTAGCTAATCCTGATATTAATTCT GTAAATGCTGGACCCAGATCTCTTTTTCTCAAATCCATAGTCTTCAATAATTCTATTCTAGTATTACCTG ATGCAGGCAATAGCGACATAAACATAGAAAACGAATAACCAAACGGTGAGAAGACAATATTATCATCTTG AATATTTTTATACGCTACTATACCGGCATTGGTAAATCCTTGCAGACGATAGGTAGACACTGAACACGTT AACGATAGTATCAATAACGCAATCATGATTTTATGGTATTAATAATTAACCTTATTTTTATGTTCGGTAT AAAAATTATTGATGTCTACACATCCTTTTGTAATTGACATCTATATATCCTTTTGTATAATCAACTCTAA TCACTTTAACTTTTACAGTTTTCCCTACCAGTTTATCCCTATATTCAACATATCTATCCATATGCATCTT AACACTCTCTGCCAAGATAGCTTCAAAGTGAGGATAGTCAAAAAGATAAATATATAGAGCATAATCCTTC TCGTATACTCTGCCCTTTATTACATCACCCGCATTGGGCAACGAATAACAAAATGCAAGCATCTTGTTAA CGGGCTCGTAAATTGGGATAAAAATTATGTTTTTATATCTATTTTATTCAAGAGAATATTCAGGAATTTC TTTTTCCGGTTGTATCTCATCGCAGTATATATCATTTGTACATTGTTTCATATTTTTTAATAGTCTACAC CTTTTAGTAGGACTAGTATCGTACAATTCATAGCTGTATTTTGAATTCCAATCACGCATAAAAATATCTT CCAATTGTTGACGAAGACCTAATCCATCATCCGGTGTAATATTAATAGATGCTCCACATGTATCCGTAAA GTAATTTCCTGTCCAATTTGAGGTACCTATATACGCCGTTTTATCGGTTACCATATATTTGGCATGGTTT ACCCTAGAATACGGAATGGGAGGATCAGCATCTGGTACAATAAATAGCTTTACTTCTATATTTATGTTTT TAGATTTTAGCATAGCGATAGATCTTAAAAAGTTTCTCATGATAAACGAAGATCGTTGCCAGCAACTAAT CAATAGCTTAACTGACACTTGTCTGTCTATAGCGGCTCTTCTTAATTCATCTTCTATATAAGGCCAAAAC AAAATATTGCCTGCCTTCGAATAAATAATAGGGATAAAGTTCATAACAGATACATAAACGAATTTACTCG CATTTCTGATACATGACAATAAAGCGGTTAAATCATTGGTTCTTTCCATAGTACATAGTTGTTGCGGTGC AGAAGCAATAAATACAGAGTGTGGAACGCCGCTTACGTTAATACTAAGAGGATGATCTGTATTATAATAC GACGGATAAAAGTTTTTCCAATTATATGGTAGATTGTTAACTCCAAGATACCAGTATACCTCAAAAATTT GAGTGAGATCCGCTGCCAAGTTCCTATTATTGAAGATCGCAATACCCAATTCTTTGACCTGAGTTAGTGA TCTCCAATCCATGTTAGCGCTTCCTAAATAAATATGTGTATTATCAGATATCCAAAATTTTGTATGAAGA ACTCCTCCTAGGATATTTGTAATATCTATGTATCGTACTTCAACTCCGGCCATTTGTAGTCTTTCAACAT CCTTTAATGGTTTGTTAGATTTATTGACGGCTACTCTAACTCGTACTCCTCTTTTGGGTAATTGTACAAT CTTGTTTAATATTATCGTGCCGAAATTCGTACCCACTTCATCCGATAAACTCCAATAAAAAGATGATATA TCTAGTGTTTTTGTGGTATTGGATAGAATTTCCCTCCACATGTTAAATGTAGACAAATATACTTTATCAA ATTGCATACCTATAGGAATAGTCTCTGTAATCACTGCGATTGTATTATCCGGATTCATTTTATTTGTTAA AAGAATAATCCTATATCACTTCACTCTATTAAAAATCCAAGTTTCTATTTCTTTCATGACTGATTTTTTA ACTTCATCCGTTTCCTTATGAAGATGATGTTTGGCACCTTCATAAATTTTTATTTCTCTATTACAATTTG CATGTTGCATGAAATAATATGCACCTAAAACATCGCTAATCTTATTGTTTGTTCCCTGGAGTATGAGAGT CGGGGGGTGTTAATCTTGGAAATTATTTTTCTAACCTTGTTGGTAGCCTTCAAGACCTGACTAGCAAATC CAGCCTTAATTTTTTCATGATTGATTAATGGGTCGTATTGGTATTTATAAACTTTATCCATATCTCTAGA

	TACTGATTCTGGACATAGCTTTCCGACTGGCGCATTTAGTGTGATGGTTCCCATAAGTTTGGCAGCTAGC AGATTCAGTTTTGAAACAGCATCTGCATTAACTAGAGGAGACATTAGAATCATTGCTGTAAACAAGTTTG GATTATCGTAAGAGGCTAGCTCCCATGGAATGACCCAATAAGTAGATTTAATAGTTACCACGTGCTGTAC CAAAGTCATCAATCATCATTTTTTCACCATTACTTCTTCCATGTCCAATATGATCATGTGAGAATACTAA AATTCCTAACGATGATATGTTTTCAGCTAGTTCGTCATAACGTCCAGAATGTTTACCAGCTCCATGACTT ATGAATACTAATGCCTTAGGATATGTAATAGGTTTCCAATATATGTAATCATTGTCCAGATTGAACATAC AGTTTGCACTCATGATTCACGTTATATAACTATCAATATTAACAGTTCGTTTGATGATCATATTATTTTT ATGTTTTATTGATAATTGTAAAAACATACAATTAAATCAATATAGAGGAAGGAGACGGCTACTGTCTTTT GTGAGATAGTCATGGCGACTAAATTAGATTATGAGGATGCTGTTTTTTACTTTGTGGATGATGATAAAAT ATGTAGTCGCGACTCCATCATCGATCTAATAGATGAATATATTACGTGGAGAAATCATGTTATAGTGTTT AACAAAGATATTACCAGTTGTGGAAGACTGTACAAGGAATTGATGAAGTTCGATGATGTCGCTATACGGT ACTATGGTATTGATAAAATTAATGAGATTGTCGAAGCTATGAGCGAAGGAGACCACTACATCAATTTTAC AAAAGTCCATGATCAGGAAAGTTTATTCGCTACCATAGGAATATGTGCTAAAATCACTGAACATTGGGGA TACAAAAAGATTTCAGAATCTAGATTCCAATCATTGGGAAACATTACAGATCTGATGACCGACGATAATA TAAACATCTTGATACTTTTTCTAGAAAAAAAAATTGAATTGATGATATAGGGGTCTTCATAACGCATAATT ATTACGTTAGCATTCTATATCCGTGTTAAAAAAAATTATCCTATCATGTATTTGAGAGTTTTATATGTAG CAAACATGATAGCTGTGATGCCAATAAGCTTTAGATATTCACGCGTGCTAGTGTTAGGGATGGTATTATC TGGTGGTGAAATGTCCGTTATATAATCTACAAAATAATCATCGCATATAGTATGCGATAGTAGAGTAAAC ATTTTTATCGTTTCTACTGGGTTCATACATCGTCTACCCAATTCGGTTATAAATGAAATTGTCGCCAATC TTACACCCAACCCCTTGTTATCCATTAGTATAGTATTAACTTCGTTATTTATGTCATAAACTGTAAATGA TTTTGTAGATGCCATATCATACATGATATTCATGTCCCTATTATAATCATTACTAACTTTATCACAATAT ATGTTGATAATATCTATATATGATCTAGTCTTTGTGGGCAACTGTCTATACAAGTCGTCTAAACGTTGTT TACTCATATAGTATCGAACAGCCATCATTACATGGTCCCGTTCCGTTGATAGATAATCGAGTATGTTAGT GGACTTGTCAAATCTATATACCATATTTTCTGGAAGTGGATATACATAGTCGTGATCAACATTATTGCTA GCCTCATCTTCTATATCCTGTACTATACCATTATCTATATCATCTACATAATCTACGATATTATTACACA TAAACATCGACAACATACTATTGTTTATTATCTAAGTCCTGTTGATCCAAACCCTTGATCTCCTCTATTT GTACTATCTAGAGATTGTACTTCTTCCAGTTCTGGATAATATATACGTTGATAGATTAGCTGAGCTATTC TATCTCCAGTATTTACATTAAACGTACATTTTCCATTATTAATAAGAATGACTCCTATGTTTCCCCTATA ATCTTCGTCTATTACACCGCCTCCTATATCAATGCCTTTTAGGGACAGACCAGACCTAGGAGCTATTCTA CCATAGCAGAACTTAGGCATGGACATACTAATATCTGTCTTAATTAACTGTCGTTCTCCTGGAGGGATAG TATAATCGTAAGCGCTATATAAATCATATCCGGCGGCGTAAGGTGATTGCCTAGTAGGAGATTTAGCTCT GTTAGTTTCCTTAACAAATCTAACTGGTGAGTTAATATTCATGTTGAACATAAAACTAATATTTTATTTC AAAATTATTTACCATCCCATATATTCCATGAATAAGTGTGATGATTGTACACTTCTATAGTATCTATATA CGATTCACGATAAAATCCTCCTATCAATAGCAGTTTATTATCCACTATGATCAATTCTGGATTATCCCTC GGATAAATAGGATCATCTATCAGAGTCCATGTATTGCTGGATTCACAATAAAATTCCGCATTTCTACCAA CCAAGAATAACCTTCTACCGAACACTAACGCGCATGATTTATAATGAGGATAATAAGTGGATGGTCCAAA CTGCCACTGATCATGATTGGGTAGCAAATATTCTGTAGTTGTATCAGTTTCAGAATGTCCTCCCATTACG TATATAACATTGTTTATGGATGCCACTGCTGGATTACATCTAGGTTTCAGAAGACTCGGCATATTAACCC AAGCAGCATCCCCGTGGAACCAACGCTCAACAGATGTGGGATTTGGTAGACCTCCTACTACGTATAATTT ATTGTTAGCGGGTATCCCGCTAGCATACAGTCTGGGGCTATTCATCGGAGGAATTGGAATCCAATTGTTT GATATATAATTTACCGCTATAGCATTGTTATGTATTTCATTGTTCATCCATCCACCGATGAGATATACTA CTTCTCCAACATGAGTACTTGTACACATATGGAATATATCTATAATTTGATCCATGTTCATAGGATACTC TATGAATGGATACTTGTATGATTTGCGTGGTTGTTTATCACAATGAAATATTTTGGTACAGTCTAGTATC CATTTTACATTATTTATACCTCTGGGAGAAAGATAATTTGACCTGATTACATTTTTGATAAGGAGTAGCA GATTTCCTAATTTATTTCTTCGCTTTATATACCACTTAATGACAAAATCAACTACATAATCCTCATCTGG AACATTTAGTTCATCGCTTTCTAGAATAAGTTTCATAGATAGATAATCAAAATTGTCTATGATGTCATCT TCCAGTTCCAAAAAGTGTTTGGCAATAAAGTTTTTAGTATGACATAAGAGATTGGATAGTCCGTATTCTA TACCCATCATGTAACACTCGACACAATATTCCTTTCTAAAATCTCGTAAGATAAAGTTTATACAAGTGTA GATGATAAATTCTACAGAGGTTAATATAGAAGCACGTAATAAATTGACGACGTTATGACTATCTATATAT ACCTTTCCAGTATACGAGTAAATAACTATAGAAGTTAAACTGTGAATGTCAAGGTCTAGACAAACCCTTG TAACTGGATCTTTATTTTTCGTGTATTTTTGACGTAAATGTGTGCGAAAGTAAGGAGATAACTTTTTCAA TATCGTAGAATTGACTATTATATTGCCACCTATAGCATCAATAATTGTTTTGAATTTCTTAGTCATAGAC AATGCTAATATATTCTTACAGTACACAGTATTAACAAATATCGGCATTTATGTTTCTTTAAAAGTCAACA TCTAAAGAAAAATGATTATCTTCTTGAGACATAACTCCCATTTTTTGGTATTCACCCACACGTTTTTCGA AAAAATTAGTTTTTCCTTCCAATGATATATTTTCCATGAAATCAAACGGATTGGTAACATTATAAATTTT TTTAAATCCCAATTCAGAAATCAATCTATCCGCGACGAATTCTATATATGTTTTCATCATTTCACAATTC ATTCCTATAAGTTTAACTGGAAGAGCCGCAGTAAGAAATTCTTGTTCAATGGATACCGCATCTGTTATAA TAGATCTAACGGTTTCTTCACTCGGTGGATGCAATAAATGTTTAAACATCAAACATGCGAAATCGCAGTG CAGACCCTCGTCTCTACTAATTAGTTCGTTGGAAAACGTGAGTCCGGGCATTAGGCCACGCTTTTTAAGC CAAAATATGGAAGCGAATGATCCAGAAAAGAAGATTCCTTCTACTGCAGCAAAGGCAATAAGTCTCTCTC CATAACCGGCGCTGTCATGTATCCACTTTTGAGCCCAATCGGCCTTCTTTTTTACACAAGGCATCGTTTC

TATGGCATTAAAGAGATAGTTTTTTTCATTACTATCTTTAACATAAGTATCGATCAAAAGACTATACATT
TCCGAATGAATGTTTTCAATGGCCATCTGAAATCCGTAGAAACATCTAGCCTCGGTAATCTGTACTTCTG
TACAAAATCGTTCCGCCAAATTTTCATTCACTATTCCGTCACTGGCTGCAAAAAACGCCAATACATGTTT
TATAAAATATTTTTCGTCTGGTGTTAGTTTATTCCAATCATTGATATCTTTAGATATATCTACTTCTTCC
ACTGTCCAAAATGATGCCTCTGCCTTTTTATACATGTTCCAGATGTCATAATATTGGATTGGGAAAATAA
CAAATCTATTTGGATTTGGTGCAAGGATGGGTTCCATAACTAAATTAACAATAACAATAAATTTTTTTTC
AGTTATCTATATGCCTGTACTTGGATCTTTTGTACATCGATATCGCCGCAATCACTACAATAATTACAAG
TATTATTGATAGCATTGTTATTAGTACTATCATAATTAAATTATCGACATTCATGGGTGCTGAATAATCG
TTATTATCATCATTATCATTTTGTAATTGTGACATCATACTAGATAAATCGTTTGCGAGATTGTTGTGGG
AAGCGGGCATGGAGGATGAATTATCGTTATTATTATTTAACGCCTCCCATTCGGATTCACAAATGTTACG
CACATTCAACATTTTATGGAAACTATAATTTTGTGAAAACAGATAACAAGAAAACTCGTCATCGTTCAAA
TTTTTAACGATAGTAAACCGATTAAACGTCGAGCTAATTTCTAACGCTAGCGACTCTGTTGGATATGGGT
TTCCAGATATATATCTTTTCAGTTCCCCTACGTATCTATAATCATCTGTAGGAAATGGAAGATATTTCCA
TTTATCTACTGTTCCTAATATCATATGTGGTGGTGTAGTAGAACCATTAAGCGCGAAAGATGTTATTTCG
CATCGTATTTTAACTTCGCAATAATTTCTGGTTAGATAACGCACTCTACCAGTCAAGTCAATGATATTAG
CCTTTACAGATATATTCATAGTAGTTGTAACGATGACTCCATCTTTTAGATGCGATACTCCTTTGTATGT
ACCAGAATCTTCGTACCGCAAACTCGATATATTTAAACAAGTTAATGAGATATTAACGCGTTTTATGAAT
GATGATATATAACCAGAAGTTTTATCCTCGGTGGCTAGCGCTATAACCTTATCATTATAATACCAACTAG
TGTGATTAATATGTGACACGTTAGTGTGGGTACAAATATGTACATTATCGTCTACGTCGTATTCGATACA
TCCGCATACAGCCAACAAATATAAAATGACAAATACTCTAACGCCGTTCGTACCCATCTTGATGCGGTTT
AATAAATGTTTTGATTTCAATTTATTGTAAAAAAAGATTCGGTTTTATACTGTTCGATATTCTCATTGCT
TATATTTTCATCTATCATCTCCACACAGTCAAATCCGTGGTTAGCATGCACCTCATCAACCGGTAAAAGA
CTATCGGACTCTTCTATCATTATAACTCTAGAATATTTAATTTGGTCATTATTAATCAAGTCAATTATCT
TATTTTTAACAAACGTGAGTATTTTACTCATTTTTTATAAAAACTTTTAGAAATATACAGACTCTATCGT
GTGTCTATATCTTCTTTTTATATCCAATGTATTTATGTCTGATTTTTCTTCATTTATCATATATAATGGT
CCAAATTCTACACGTGCTTCGGATTCATCCAGATCATTAAGGTTCTTATAATTGTAACATCCTTCTCTTC
CCTCTTCTACATCTTCCTTCTTATTCTTATTCTTAGCGTCACAGAATCTACCACAGCAGGATCCCATGAC
GAGCGTCATATTAAACTAATCCATTTTCAATTATAATATACGATTAGTAATGACCATTAAAATAAAAAAT
ATTCTTCATAACCGGCAAGAAAGTGAAAAGTTCACATTGAAACTATGTCAGTAGTATACATCATGAAATG
ATGATATATATATACTCTATTTTGGTGGAGGATTATATGATATAATTCGTGGATAATCATTCTTAAGACA
CATTTCTTCATTCGTAAATCTTTTCACGTTAAATGAGTGTCCATATTTTGCAATTTCTTCATATGATGGC
GGTGTACGTGGACGAAGCTGCTCCTGTTCTTGTTGTAGTCGCCGACTGTCGTGTTTGCGTTTAGATCCCT
CCATTATCGCGATTGCGTAGATGGAGTACTATTATATACCTTGTAATTAAATTTTTTTATTAATTAAACG
TATAAAAACGTTCCGTATCTGTATTTAAGAGCCAGATTTCGTCTAATAGAACAAATAGCTACAGTAAAAA
TAACTAGAATAATTGCTACACCCACTAGAAACCACGGATCGTAATACGGCAATCGGTTTTCGATAATAGG
TGGAACGTATATTTTATTTAAGGACTTAACAATTGTCTGTAAACCACAATTTGCTTCCGCGGATCCTGTA
TTAACTATCTGTAAAAGCATATGTTGACCGGGCGGAGCCGAACATTCTCCGATATCTAATTTCTGTATAT
CTATAATATTATTAACCTCCGCATACGCATTACAGTTCTTTTCTAGCTTGGATACCGCACTAGGTACATC
GTCTAGATCTATTCCTATTTCTTCAGCGATAGCTCTTCTATCCTTTTCCGGAAGCAATGAAATCACTTCA
ATAAATGATTCAACCATGAGTGTGAAACTAAGTCGAGAATTACTCATGCATTTGTTAGTTATTCGGAGCG
CGCAATTTTTAAACTGTCCTATAACCTCTCCTATATGAATAGCACAAGTGACATTAGTAGGGATAGAATG
TTGAGCTAATTTTTGTAAATAACTATCTATAAAAAGATTATACAAAGTTTTAAACTCTTTAGTTTCCGCC
ATTTATCCAGTCTGAGAAAATGTCTCTCATAATAAATTTTTCCAAGAAACTAATTGGGTGAAGAATGGAA
ACCTTTAATCTATATTTATCACAGTCTGTTTTGGTACACATGATGAATTCTTCTAATGCTGTACTAAATT
CGATATCTTTTTCGATTTCTGGATATGTTTTTAATAAAGTATGAACAAAGAAATGGAAATCGTAATACCA
GTTATGTTCAACTTTGAAATTGTTTTTTATTTTCTTGTTAATGATTCCAGCCACTTGGGAAAAGTCAAAG
TCGTTTAATGCCGATTTAATACGTTCATTAAAAACAAACTTTTTATCCTTTAGATGAATTATTATTGGTT
CATTGGAATCAAAAAGTAAGATATTATCGGGTTTAAGATCTGCGTGTAAAAAGTTGTCGCAACAGGGTAG
TTCGTAGATTTTAATGTATAACAGAGCCATCTGTAAAAAGATAAACTTTATGTATTGTACCAAAGATTTA
AATCCTAATTTGATAGCTAACTCGGTATCTACTTTATCTGCCGAATACAGTGCTAGGGGAAAAATTATAA
TATTTCCTCTTTCGTATTCGTAGTTAGTTCTCTTTTCATGTTCGAAAAAGTGAAACATGCGGTTAAAATA
GTTTATAACATTAATATTACTGTTAATAACTGCCGGATAAAAGTGGGATAGTAATTTCACGAATTTGATA
CTGTCCTTTCTCTCGTTAAACGCCTTTAAAAAAACTTTAGAAGAATATCTCAATGAGAGTTCCTGACCAT
CCATAGTTTGTATCAATAATAGCAACATATGAAGAACCCGTTTATACAGAGTATGTAAAAATGTTAATTT
ATAGTTTAATCCCATGGCCCACGCACACACGATTAATTTTTTTTCATCTCCCTTTAGATTGTTGTATAGA
AATTTGGGTACTGTGAACTCCGCCGTAGTTTCCATGGGACTATATAATTTTGTGGCCTCGAATACAAATT
TTACTACATAGTTATCTATCTTAAAGACTATACCATATCCTCCTGTAGATATGTGATAAAAATCGTCGTT
TATAGGATAAAATCGTTTATCCTTTTGTTGGAAAAAGGATGAATTAATGTAATCATTCTCTTCTATCTTT
AGTAGTGTTTCCTTATTAAAATTCTTAAAATAATTTAACAATCTAACTGACGGAGCCCAATTTTGGTGTA
AATCTAATTGGGACATTATGTTGTTAAAATACAAACAGTCTCCTAATATAACAGTATCTGATAATCTATG
GGGAGACATCCATTGATATTCAGGGGATGAATCATTGGCAACACCCATTTATTGTACAAAAAGCCCCAAT

TTACAAACGAAAGTCCAGGTTTGATAGAGACAAACAATTAACTATTTTGTCTCTGTTTTTAATTTCTTTG
GTAATGAAATTATTCACAATATCAGTATCTTCTTTATCTACCAGAGATTTTACTAACTTGATAACCTTGG
CTGTCTCATTCAATAGGGTAGTAATATTTGTATGTGTGATATTGATATCTTTTTTGAATTGTTTCTTTTAG
AAGTGATTCTTTGATGGTGCCAGCATACGAATTACAATAATGCAGAAACTCAGTTAACATGCAGGAATTA
TAGTAAGCCAATTCCAATTGTTGCCTGTATTGTATTAGAGTATTAATATGCGCAATGGTGTCCTTGCGTT
TCTCTGATAGAATGCGAGCAGCGATTTTGGCGTTATCATTTGACGATATTTCTGGAATGACGAATCCTGT
TTCTACTAACTTTTTTGGTAGGACAAAGTGAAACAATCAAGAAGATAGCTTCTCCTCCTATTTGTGGAAGA
AATTGAACTCCTCTAGATGATCTACTGACGATAGTATCTCCTTGACAGATATTGGACCGAATTACAGAAG
TACCTGGAATGTAAAGCCCTGAAACCCCCTCATTTTTTAAGCAGATTGTTGCCGTAAATCCTGCACTGTG
ACCAAGATAGAGAGCTCCTTTGGTGAATCCATCTCTATGTTTCAGTTTAACCAAGAAACAGTCAGCTGGT
CTAAAATTTCCATCTCTATCTAATACAGCATCTAACTTGATGTCAGGAACTATGACCGGTTTAATGTTAT
ATGTAACATTGAGTAAATCCTTAAGTTCATAATCATCACTGTCATCAGTTATGTACGATCCAAACAATGT
TTCTACTGGCATAGTGGATACGAAGATGCTATCCATCAGAATGTTTCCCTGATTAGTATTTTCTATATAG
CTATTCTTCTTTAAACGATTTTCCAAATCAGTAACTATGTTCATTTTTTTAGGAGTAGGACGCCTAGCCA
GTATGGAAGAGGATTTTCTAGATCCTCTCTTCAACATCTTTGATCTCGATGGAATGCAAAACCCCATAGT
GAAACAACCAACGATAAAAATAATATTGTTTTTCACTTTTTATAATTTTACCATCTGACTCATGGATTCA
TTAATATCTTTATAAGAGCTACTAACGTATAATTCTTTATAACTGAACTGAGATATATACACCGGATCTA
TGGTTTCCATAATTGAGTAAATGAATGCTCGGCAATAACTAATGGCAAATGTATAGAACAACGAAATTAT
ACTAGAGTTGTTAAAGTTAATATTTTCTATGAGCTGTTCCAATAAATTATTTGTTGTAACTGCGTTCAAG
TCATAAATCATCTTGATACTATCCAGTAAACCGTGTTTAAGTTCTGGAATATTATCATCCCATTGTAAAG
CCCCTAATTCGACTATCGAATATCCTGCTCTGATAGCAGTTTCAATATCGACGGACGTCAATACTGTAAT
AAAGGTGGTAGTATTGTCATCATCGTGATAAACTACGGGAATATGGTCGTTAGTAGGTACGGTGACTTTA
CACAACGCGATATATAACTTTCCTTTTGTACCATTTTTAACGTAGTTGGGACGTCCTGCAGGGTATTGTT
TTGAAGAAATGATATCGAGAACAGATTTGATACGATATTTGTTGGATTCCTGATTATTCACTATAATATA
ATCTAGACAGATAGATGATTCGATAAATAGAGAAGGTATATCGTTGGTAGGATAATACATCCCCATTCCA
GTATTCTCGGATACTCTATTGATGACACTAGTTAAGAACATGTCTTCTATTCTAGAAAACGAAAACATCC
TACATGGACTCATTAAAACTTCTAACGCTCCTGATTGTGTCTCGAATGCCTCGTACAAGGATTTCAAGGA
TGCCATAGATTCTTTGACCAACGATTTAGAATTGCGTTTAGCATCTGATTTTTTTATTAAATCGAATGGT
CGGCTCTCTGGTTTGCTACCCCAATGATAACAATAGTCTTGTAAAGATAAACCGCAAGAAAATTTATACG
CATCCATCCAAATAACCCTAGCACCATCGGATGATATTAATGTATTATTATAGATTTTCCATCCACAATT
ATTGGGCCAGTATACTGTTAGCAACGGTATATCGAATAGATTACTCATGTAACCTACTAGAATGATAGTT
CGTGTACTAGTCATAATATCTTTAATCCAATCTAAGAAATTTAAAATTAGATTTTTTACACTGTTAAAGT
TAACAAAGGTATTACCCGGATACGTGGATATCATATATGGCATTGGTCCATTATCAGTAATAGCTCCATA
AACTGATACGGCGATGGTTTTTATATGTGTTTGATCTAACGAGGAAGAAATTCGCGCCCACAATTCATCT
CTAGATATGTATTTAATATCAAACGGTAACACATCAATTTCGGGACGCGTATATGTTTCTAAATTTTTAA
TCCAAATATAATGATGACCTATATGCCCTATTATCATACTGTCAACTATAGTACACCTAGAGAACTTACG
ATACATCTGTTTCCTATAATCGTTAAATTTTACAAATCTATAACATGCTAAACCTTTTGACGACAGCCAT
TCATTAATTTCTGATATGGAATCTGTATTCTCGATACCGTATTGTTCTAAAGCCAGTGCTATATCTCCCT
GTTCGTGGGAACGCTTTCGTATAATATCGATCAACGGATAATCTGAAGTTTTTGGAGAATAATATGACTC
ATGATCTATTTCGTCCATAAACAATCTAGACATAGGAATTGGAGGCGATGATCTTAATTTTGTGCAATGA
GTCGTCAATCCTATAACTTCTAATCTTGTAATATTCATCATCGACATAATACTATCTATGTTATCATCGT
ATATTAGTATACCACGGCCTTCTTCATTTCGTGCCAAAATAATATACAGTCTTAAATAATTACGCAATAT
CTCAATAGTTTCATAATTGTTAGCTGTTTTCATCAAGATTTGTACCCTGTTTAACATGATGGCGTTCTAT
ACGTCTCTATTTTCTTTTTTTTTAAATTTTTAACGATTTACTGTGGCTAGATACCCAATCTCTCTCAAATA
TTTTTTTAGCCTCGCTTACAAGCTGTTTATCTATACTATTAAAACTGACGAATCCGTGATTTTGGTAATG
GGTTCCGTCGAAATTTGCCGAAGTGATATGAACATATTCGTCGTCGACTATCAACAATTTTGTATTATTC
TGAATAGTGAAAACCTTCACAGATAGATCATTTTGAACACACAACGCGTCTAGACTTCTGGCGGTTGCCA
TAGAATATACGTCGTTCTTATCCCAATTACCAACTAGAAGTCTGATCTTAACTCCTCTATTAATGGCTGC
TTCTATAATGGAGTTGTAAATGTCGGGCCAATAGTAGCTATTACCGTCGACACGTGTAGTGGGAACTATG
GCCAAATGTTCAATATCTATACTAGTCTTAGCCGACTTGAGTTTATCAATAACTACATCGGTATCTAGAT
CTCTAGAATATCCCAATAGGTGTTCCGGAGAATCAGTAAAGAACACTCCACCTATAGGATTCTTAATATG
ATACGCAGTGCTAACTGGCAAACAACAAGCCGCAGAGCATAAATTCAACCATGAATTTTTTGCGCTATTA
AAGGCTTTAAAAGTATCAAATCTTCTACGAAGATCTGTGGCCAGCGGGGGATAATCAGAATATACACCTA
ACGTTTTAATCGTATGTATAGATCCTCCAGTAAATGACGCGTTTCCTACATAACATCTTTCATCATCTGA
CACCCAAAAACAACCGAGTAGTAGTCCCACATTATTTTTTTTATCTATATTAACGGTTATAAAATTTATA
TCCGGGCAGTGACTTTGTAGCTCTCCCAGATTTCTTTTCCCTCGTTCATCTAGCAAAACTATTATTTTAA
TCCCTTTTTCAGATGCCTCTTTTAGTTTATCAAAAATAAGCGCTCCCCTAGTCGTACTCAGAGGATTACA
ACAAAAAGATGCTATGTATATATATTTCTTAGCTAGAGTGATAATTTCGTTAAAACATTCAAATGTTGTT
AAATGATCGGATCTAAAATCCATATTTTCTGGTAGTGTTTCTACCAGCCTACATTTTGCTCCCGCAGGTA
CCGATGCAAATGGCCACATTTAGTTAACATAAAAACTTATACATCCTGTTCTATCAACGATTCTAGAATA
TCATCGGCTATATCGCTAAAATTTTCATCAAAGTCGACATCACAACCTAACTCAGTCAATATATTAAGAA

GTTCCATGATGTCATCTTCGTCTATTTCTATATCCGTATCCATTGTAGATTGTTGACCGATTATCGAGTT
TAAATCATTACTAATACTCAATCCTTCAGAATACAATCTGTGTTTCATTGTAAATTTATAGGCGGTGTAT
TTAAGTTGGTAGATTTTCAATTATGTATCAATATAGCAACAGTAGTTCTTGCTCCTCCTTGATTCTAGCA
TCCTCTTCATTATTTTCTTCTACGTACATAAGCATGTCCAATACGTTAGACAACACACCGACGATGGCGG
CCGCCACAGACACGAATATGACTAGACCGATGACCATTTAAAAACCCCTCTCTAGCTTTCACTTAAACTG
TATCGATTATTCTTTTAGAACATGTATAATATAAAAACATTATTCTATTTCGAATTTAGGCTTCCAAAAA
TTTTTCATCCGTAAACCGATAATAATATATATAGACTTGTTAATAGTCGGAATAAATAGATTAATGCTTA
AACTATCATCATCTCCACGATTAGAGATACAATATTTACATTTTTTTTGCTGTTTCGAAACTTTATCAAT
ACACGTTAATACAAACCCAGGAAGGAGATATTGAAACTGAGGCTGTTGAAAATGAAACGGTGAATACAAT
AATTCAGATAATGTAAAATCATGATTCCGTATTCTGATGATATTAGAACTGCTAATGGATGTCGATGGTA
TGTATCTAGGAGTATCTATTTTAACAAAGCATCGATTTGCTAATATACAATTATCCTTTTGATTAATTGT
TATTTTATTCATATTCTTAAAAGGTTTCATATTTATCAATTCTTCTACATTAAAAATTTCCATTTTTAAT
TTATGTAGCCCCCGCAATACTCCTCATTACGTTTCATTTTTTGTCTATAATATCCATTTTGTTCATCTCG
GTACATAGATTATCCAATTGAGAAGCGCATTTAGTAGTTTTGTACATTTTAAGTTTATTGACGAATCGTC
GAAAACTAGTTATAGTTAACATTTTATTATTTGATACCCTGATATTAATACCCCTGCCGTTACTATTATT
TATAACTGATGTAATCCACGTAACATTAGAATTAATTATCGATAGTAATGCATCGACGCTTCCAAAATTG
TCTATTATAAACTCACCGATAATTTTTTTATTGCATGTTTTCATATTCATTAGGATTATCAAATCTTTAA
TCTTACTACGATTGTATGCGTTGATATTGCAAGACGTCATTCTAAAAGACGGAGGATCTCCATCAAATGC
CAGACAATCACGTACAAAGTACATGGAAATAGGTTTTGTTCTATTGCGCATCATAGATTTATATAGAACA
CCCGTAGAAATACTAATTTGTTTTACTCTATAAAATACTAATGCATCTATTTCATCGTTTTGTATAACGT
CTTTCCAAGTGTCAAATTCCAAATTTTTTTCATTGATAGTACCAAATTCTTCTATCTCTTTAACTACTTG
CATAGATAGGTAATTACAGTGATGCCTACATGCCGTTTTTTGAAACTGAATAGATGCGTCTAGAAGCGAT
GCTACGCTAGTCACAATCACCACTTTCATATTTAGAATATATGTATGTAAAAATATAGTAGAATTTCATT
TTGTTTTTTTCTATGCTATAAATGAATTCTCATTTTGCATCTGCTCATACTCCGTTTTATATCAATACCA
AAGAAGGAAGATATCTGGTTCTAAAAGCCGTTAAAGTATGCGATGTTAGAACTGTAGAATGCGAAGGAAG
TAAAGCTTCCTGCGTACTCAAAGTAGATAAACCCTCATCGCCCGCGTGTGAGAGAAGACCTTCGTCCCCG
TCCAGATGCGAGAGAATGAATAACCCTGGAAAACAAGTTCCGTTTATGAGGACGGACATGCTACAAAATA
TGTTCGCGGCTAATCGCGACAACGTGGCGTCGAGACTTTTGAACTAAAATACAATTATATCCTTTTCGAT
ATTAATAAATCCGTGTCGTCCAGGTTTTTTATCTCTTTCAGTATGTGAATAGATAGGTATTTTATCTCTA
TTCATCATCGAATTTAAGAGATCCGATAAACATTGTTTGTATTCTCCAGATGTCAGCATCTGATACAACA
ATATATGTGCACATAAACCTCTGGCACTTATTTCATGTACCTTCCCCTTATCACTAAGGAGAATAGTATT
TGAGAAATATGTATACATGATATTATCATGAATTAGATATACAGAATTTGTAACACTCTCGAAATCACAC
GATGTGTCGGCGTTAAGATCTAATATATCACTCGATAACACATTTTCATCTAGATACACTAGACATTTTT
TAAAGCTAAAATAGTCTTTAGTAGTGACAGTAACTATGCGATTATTTTCATCGATGATACATTTCATCGG
CATATTATTACGCTTACCATCAAAGACTATACCATGTGTATATCTAACGTATTCTAGCATGGTTGCCATA
CGCGCATTAAACTTTTCAGGATCTTTGGATAGATCTTCCAATCTATCTATTTGAGAAAACATTTTTATCA
TGTTCAATAGTTGAAACGTCGGATCCACTATATAGATATTATCTATAAAGATTTTAGGAACTACGTTCAT
GGTATCCTGGCGAATATTAAAACTATCAATGATATGATTATCGTTTTCATCTTTTATCACCATATAGTTT
CTAAGATATGGGATTTTACTTAATATAATATTATTTCCCGTGATAAATTTTATTAGAAAGGCCAAATCTA
TAAGAAAAGTTCTAGAATTAGTCTGAAGAATATCTATATCGCCGTACCGTATATTTGGATTAATTAGATA
TAGAGAATATGATCCGTAACATATACAACTTTTATTATGGCGTCTAAGATATTCTTCCATCAACTTATTA
ACATTTTTGACTAGGGAAGATACATTATGACGTCCCATTACTTTTGCCTTGTCTATTACTGCGACGTTCA
TAGAATTTAGCATATCTCTTGCCAATTCTTCCATTGATGTTACATTATAAGAAATTTTAGATGAAATTAC
ATTTGGAGCTTTAATAGTAAGAACTCCTAATATGTCCGTGTATGTGGTCACTAATACAGATTGTAGTTCT
ATAATCGTAAATAATTTACCTATATTATATGTTTGAGTCTGTTTAGAAAAGTAGCTAAGTATACGATCTT
TTATTTCTGATGCAGATGTATTAACATCGGAAAAAAATCTTTTTTTTATTCTTTTTTTACTAAAGATACAAA
TATGTCTTTGTTAAAAACAGTTATTTTTTGAATATTTCTAGCTTGTAATTTTAACATATGATATTCGTTC
ACACTAGGTACTCTGCCTAAATAGGTTTCTATAATCTTTAATGTAATATTAGGAAGAGTATTCTGATCAG
GATTCCTATTCATTTTGAGGATTTAAAACTCTGATTATTGTCTAATATGGTCTCTACGCAAACTTTTTCA
CAGAGCGATAGAGTTTTTGATAACTCGTTTTTCTTAAGAAATATAAAACTACTGTCTCCAGAGCTCGCTC
TATCTTTTATTTTATTTAATTCGATACAAACTCCTGATACTGGTTCAGAAAGTAATTCATTAATTTTCAG
TCCTTTATAGAAGATATTTAATATAGATAATACAAAATTTTCAGTTCTTGATATCGATCTGATTGATCCT
AGAACTAGATATATTAATAACGTGCTCATTAGGCAGTTTATGGCAGCTTGATAATTAGATATAGTATATT
CCAGTTCATATTTATTAGATACCGCATTGCCCAGATTTTGATATTCTATGAATTCCTCTGAAAATAAATC
CAAAATAACTAAACATTCTATTTTTTGTGGATTAGTGTACTCTCTTCCCTCTATCATGTTCACTACTGGT
GTCCACGATGATAAATATCTAGAGGGAATATAATATAGTCCATAGGATGCCAATCTAGCAATGTCGAATA
ACTGTAATTTGATTCTTCGTTCTTCATTATGAATTGATTCTTGAGGTATAAACCTAACACAAATTATATT
ATTAGACTTTTCGTATGTAATGTCTTTCATGTTATAAGTTTTTAATCCTGGAATAGAATCTATTTTAATG
AGGCTTTTAAACGCAGAGTTCTCCAACGAGTCAAAGCATAATACTCTGTTGTTTTTCTTATATACGATGT
TACGATTTTCTTCTTTGAATGGAATAGGTTTTTGAATTAGTTTATAATTACAACATAATAGATAAGGAAG
TGTGCAAATAGTACGCGGAAAAAACATAATAGCTCCCCTGTTTTCATCCATGGTTTTAAGTAAATGATCA

CTGGCTTCTTTAGTCAATGGATATTCGAACATTAACCGTTTCATCATCATTGGACAGAATCCATATTTCT
TAATGTAAAGAGTGATCAAATCATTGTGTTTATTGTACCATCTTGTTGTAAATGTGTATTCGGTTATCGG
ATCTGCTCCTTTTTTCTATTAAAGTATCGATGTCGATCTCGTCTAAGAATTCAACTATATCGACATATTTC
ATTTGTATACACATAACCATTACTAACGTAGAATGTATAGGAAGAGATGTAACGGGAACAGGGTTTGTTG
ATTCGCAAACTATTCTAATACATAATTCTTCTGTTAATACGTCTTGCACGTAATCTATTATAGATGCCAA
GATATCTATATAATTATTTTGTAAGATGATGTTAACTATGTGATCTATATAAGTAGTGTAATAATTCATG
TATTTCGATATATGTTCCAACTCTGTCTTTGTGATGTCTAGTTTCGTAATATCTATAGCATCCTCAAAAA
ATATATTCGCATATATTCCCAAGTCTTCAGTTCTATCTTCTAAAAAATCTTCAACGTATGGAATATAATA
ATCTATTTTACCTCTTCTGATATCATTAATGATATAGTTTTTGACACTATCTTCTGTCAATTGATTCTTA
TTCACTATATCTAAGAAACGGATAGCGTCCCTAGGACGAACTACTGCCATTAATATCTCTATTATAGCTT
CTGGACATAATTCATCTATTATACCAGAATTAATGGGAACTATTCCGTATCTATCTAACATAGTTTTAAG
AAAGTCAGAATCTAAGACCTGATGTTCATATATTGGTTCATACATGAAATGATCTCTATTGATGATAGTG
ACTATTTCATTCTCTGAAAATTGGTAACTCATTCTATATATGCTTTCCTTGTTGATGAAGGATAGAATAT
ACTCAATAGAATTTGTACCAACAAACTGTTCTCTTATGAATCGTATATCATCATCTGAAATAATCATGTA
AGGCATACATTTAACAATTAGAGACTTGTCTCCTGTTATCAATATACTATTCTTGTGATAATTTATGTGT
GAGGCAAATTTGTCCACGTTCTTTAATTTTGTTATAGTAGATATCAAATCCAATGGAGCTACAGTTCTTG
GCTTAAACAGATATAGTTTTTCTGGAACGAATTCTACAACATTATTATAAAGGACTTTGGGTAGATAAGT
GGGATGAAATCCTATTTTAATTAATGCGATAGCCTTGTCCTCGTGCAGATATCCAAACGCTTTTGTGATA
GTATGGCATTCATTGTCTAGAAACGCTCTACGAATATCTGTGACAGATATCATCTTTAGAGAATATACTA
GTCGCGTTAATAGTACTACAATTTGTATTTTTTAATCTATCTCAATAAAAAAATTAATATGTATGATTCA
ATGTATAACTAAACTACTAACTGTTATTGATAACTAGAATCAGAATCTAATGATGACGTAACCAAGAAGT
TTATCTACTGCCAATTTAGCTGCATTATTTTTAGCATCTCGTTTAGATTTTCCATCTGCCTTATCGAATA
CTCTTCCGTCGATGTCTACACAGGCATAAAATGTAGGAGAGTTACTAGGCCCCACTGATTCAATACGAAA
AGACCAATCTCTCCTAGTAATTTGGCAGTACTCATTAATAACGGTGACAGGGTTAGCACCTTTCCAATCA
ATAATTTTTTTAGCCGGAATAACATCATCAAAAGACTTATGATCCTCTCTCATTGATTTTTCGCGGGATA
CATCATCTATTATGACGTCAGCCATAGCATCAGCATCCGGCTTATCCGCCTCCGTTGTCATAAACCAACG
AGGAGGAATATCGTCGGAGCTGTACACCATAGCACTACGTTGAAGATCGTACAGAGCTTTATTAACTTCT
CGCTTCTCCATATTAAGTTGTCTAGTTAGTTGTGCAGCAGTAGCTCCTTCGATTCCAATGGTTTTAATAG
CCTCACACACAATCTCTGCGTTAGAACGCTCGTCGATATAGATTTTAGACATTTTTAGAGAGAACTAACG
CAATCAGTAATAAAACTAATTTATTTTATCATTTTTTTTTATTCATCATCCTCTGGTGGTTCGTCGTTTCT
ATCGAATGTAGCTCTGATTAACCCGTCATCTATAGGTGATGCTGGTTCTGGAGATTCTGGAGGAGATGGA
TTATTATCTGGAAGAATCTCTGTTATTTCCTTGTTTTCATGTATCGATTGCGTTGTAACATTAAGATTGC
GAAATGCTCTAAATTTGGGAGGCTTAAAGTGTTGTTTGCAATCTCTACACGCGTGTCTAACTAGTGGAGG
TTCGTCAGCGGCTCTAGTTTGAATCATCATCGGCGTAGTATTCCTACTTTTACAGTTAGGACACGGTGTA
TTGTATTTCTCGTCGAGAACGTTAAAATAATCGTTGTAACTCACATCCTTTATTTTATCTATATTGTATT
CTACTCCTTTCTTAATGCATTTTATACCGAATAAGAGATAGCGAAGGAATTCTTTTTCGGTGCCGCTAGT
ACCCTTAATCATATCACATAGTGTTTTATATTCCAAATTTGTGGCAATAGACGGTTTATTTCTATACGAT
AGTTTGTTTCTGGAATCCTTTGAGTATTCTATACCAATATTATTCTTTGATTCGAATTTAGTTTCTTCGA
TATTAGATTTTGTATTACCTATATTCTTGATGTAGTACTTTGATGATTTTTCCATGGCCCATTCTATTAA
GTCTTCCAAGTTGGCATCATCCACATATTGTGATAGTAATTCTCGGATATCAGTAGCGGTTACCGCCATT
GATGTTTGTTCATTGGATGAGTAACTACTAATGTATACATTTTCCATTTATAACACTTATGTATTAACTT
TGTTCATTTATATTTTTTCATTATTATGTTGATATTAACAAAAGTGAATATATATATGTTAATAATTGTA
TTGTGGTTATACGGCTACAATTTTATAATTAGTGAAAGTCAGTGTCCGATGATCAATGACGATAGCTTTA
CTCTGAAAAGAAAGTATCAAATCGATAGTGCGGAGTCAACAATAAAAATGGATAAGAAGAGGACAAAGTT
TCAGAATAGAGCCAAAATGGTAAAAGAAATAAATCAGACAATAAGAGCAGCACAAACTCATTACGAGACA
TTGAAACTAGGATACATAAAATTTAAGAGAATGATTAGGACTACTACTCTAGAAGATATAGCACCATCTA
TTCCAAATAATCAGAAAACTTATAAACTATTCTCGGACATTTCAGCCATCGGCAAAGCATCACGGAATCC
AAGTAAGATGGTATATGCTCTGCTGCTTTACATGTTTCCCAATTTGTTTGGAGATGATCATAGATTCATT
CGTTATAGAATGCATCCAATGAGTAAAATCAAACACAAGATCTTCTCTCCTTTCAAACTTAATCTTATTA
GAATATTAGTGGAAGAAAGATTCTATAATAATGAATGCAGATCTAATAAATGGAGAATAATTGGAACACA
AGTTGATAAAATGTTGATAGCTGAATCTGATAAATATACAATAGATGCAAGGTATAACCTAAAACCCATG
TATAGAATCAAGGGAAAATCTGAAGAAGATACCCTCTTTATCAAACAGATGGTAGAACAATGTGTGACAT
CCCAGGAATTGGTGGAAAAAGTGTTGAAGATACTGTTTAGAGATTTGTTCAAGAGTGGAGAATACAAAGC
GTACAGATACGATGATGATGTAGAAAATGGATTTATTGGATTGGATACACTAAAATTAAACATTGTTCAT
GATATAGTTGAACCATGTATGCCTGTTCGTAGGCCAGTGGCTAAGATACTGTGTAAAGAAATGGTAAATA
AATACTTTGAGAATCCGCTACATATTATTGGTAAAAATCTTCAAGAGTGCATTGACTTTGTTAGTGAATA
GGCATTTCATCTTTCTCCAATACTAATTCAAATTGTTAAATTAATAATGGATAGTATAAATAGTTATTAG
TGATAAAATAGTAAAAATAATTATTAGAATAAGAGTGTAGTATCATAGATAACTCTCTTCTATAAAAATG
GATTTTATTCGTAGAAAGTATCTTATATACACAGTAGAAAATAATATAGATTTTTTAAAGGATGATACAT
TAAGTAAAGTAAACAATTTTACCCTCAATCATGTACTAGCTCTCAAGTATCTAGTTAGCAATTTTCCTCA
ACATGTTATTACTAAGGATGTATTAGCTAATACCAATTTTTTTGTTTTCATACATATGGTACGATGTTGT

AAAGTGTACGAAGCGGTTTTACGACACGCATTTGATGCACCCACGTTGTACGTTAAAGCATTGACTAAGA
ATTATTTATCGTTTAGTAACACAATACAATCGTACAAGGAAACCGTGCATAAACTAACACAAGATGAAAA
ATTTTTAGAGGTTGCCAAATACATGGACGAATTAGGAGAACTTATAGGCGTAAATTATGACTTAGTTCTT
AATCCATTATTTCACGGAGGGGAACCCATCAAAGATATGGAAATCATTTTTTTAAAACTGTTTAAGAAAA
CAGACTTCAAAGTTGTTAAAAAATTAAGTGTTATAAGATTACTTATTTGGGCTTACCTAAGCAAGAAAGA
TACAGGCATAGAGTTTGCGGATAATGATAGACAAGATATATATACTCTATTTCAACAAACTGGTAGAATC
GTCCATAGCAATCTAACAGAAACGTTTAGAGATTATATCTTTCCCGGAGATAAGACTAGCTATTGGGTGT
GGTTAAACGAAAGTATAGCTAATGATGCGGATATTGTTCTTAATAGACACGCCATTACCATGTATGATAA
AATTCTTAGTTATATATACTCTGAGATAAAACAAGGACGCGTTAATAAAAACATGCTTAAGTTAGTTTAT
ATCTTTGAGCCTGAAAAAGATATCAGAGAACTTCTGCTAGAAATCATATATGATATTCCTGGAGATATCC
TATCTATTATTGATGCAAAAAACGACGATTGGAAAAAATATTTTATTAGTTTTTATAAAGCTAATTTTAT
TAACGGTAATACATTTATTAGTGATAGAACGTTTAACGAGGACTTATTCAGAGTTGTTGTTCAAATAGAT
CCCGAATATTTCGATAATGAACGAATTATGTCTTTATTCTCTACGAGTGCTGCGGACATTAAACGATTTG
ATGAGTTAGATATTAATAACAGTTATATATCTAATATAATTTATGAGGTGAACGATATCACATTAGATAC
AATGGATGATATGAAGAAGTGTCAAATCTTTAACGAGGATACGTCGTATTATGTTAAGGAATACAATACA
TACCTGTTTTTGCACGAGTCGGATCCCATGGTCATAGAGAACGGAATACTAAAGAAACTGTCATCTATAA
AATCCAAGAGTAGACGGCTGAACTTGTTTAGCAAAAACATTTTAAAATATTATTTAGACGGACAATTGGC
TCGTCTAGGTCTTGTGTTAGATGATTATAAAGGAGACTTGTTAGTTAAAATGATAAACCATCTTAAGTCT
GTGGAGGATGTATCCGCATTCGTTCGATTTTCTACAGATAAAAACCCTAGTATTCTTCCATCGCTAATCA
AAACTATTTTAGCTAGTTATAATATTTCCATCATCGTCTTATTTCAAAGGTTTTTAAGAGATAATCTATA
TCATGTAGAAGAATTCTTGGATAAAAGCATCCATCTAACCAAGACGGATAAGAAATATATACTTCAATTG
ATAAGACACGGTAGATCATAGAACAGACCAAATATATTATTAATAATTTGTATATACATAGATATAATTA
TCACATATTAAAAATTCACACATTTTTGATAAATGGGAACTGCTGCAACAATTCAGACTCCCACCAAATT
AATGAATAAAGAAAATGCAGAAATGATTTTGGAAAAAATTGTTGATCATATAGTTATGTATATTAGTGAC
GAATCAAGTGATTCAGAAAATAATCCTGAATATATTGATTTTCGTAACAGATACGAAGACTATAGATCTC
TCATTATAAAAAGTGATCACGAGTTTGTAAAGCTATGTAAAAATCATGCAGAGAAAAGTTCTCCAGAAAC
GCAACAAATGATTATCAAACACATATACGAACAATATCTTATTCCAGTATCTGAAGTACTATTAAAACCT
ATAATGTCCATGGGTGACATAATTACATATAACGGATGTAAAGACAATGAATGGATGCTAGAACAACTCT
CTACCCTAAACTTTAACAATCTCCGCACATGGAACTCATGTAGCATAGGCAATGTAACGCGTCTGTTTTA
TACATTTTTTAGTTATCTGATGAAAGATAAACTAAATATATAAGTATAATCCCATTCTAATACTTTAACC
TGATGTATTAGCATCTTATTAGAATATTAACCTAACTAAAAGACATAACATAAAAACTCATTACATAGTT
GATAAAAAGCGGTAGGATATAAATATTATGGCTGCCACCGTTCCGCGTTTTGACGACGTGTACAAAAATG
CACAAAGAAGAATTCTAGATCAAGAAACATTTTTTAGTAGAGGTCTAAGTAGACCGTTAATGAAAAACAC
ATATCTATTTGATAATTACGCGTATGGATGGATACCAGAAACTGCAATTTGGAGTAGTAGATACGCAAAC
TTAGATGCAAGTGACTATTATCCCATTTCGTTGGGATTACTTAAAAAGTTCGAGTTTCTCATGTCTCTAT
ATAAAGGTCCTATTCCAGTATACGAAGAAAAAGTAAATACTGAATTCATTGCTAATGGATCGTTCTCTGG
TAGATACGTATCATATCTTCGAAAGTTTTCTGCTCTTCCAACAAACGAGTTTATTAGTTTTTTGTTACTG
ACTTCCATTCCAATCTATAATATCTTGTTCTGGTTTAAAAATACTCAGTTTGATATTACTAAACACACAT
TATTCAGATACGTCTATACAGATAATGCCAAACACCTGGCGTTGGCTAGGTATATGCATCAAACAGGAGA
CTATAAGCCTTTGTTTAGTCGTCTCAAAGAGAATTATATATTTACCGGTCCCGTTCCAATAGGTATCAAA
GATATAAATCACCCTAATCTTAGTAGAGCAAGAAGTCCATCCGATTATGAGACATTAGCTAATATTAGTA
CTATATTGTACTTTACCAAGTATGATCCGGTATTAATGTTTTTATTGTTTTACGTACCTGGGTATTCAAT
TACTACAAAAATTACTCCAGCCGTAGAATATCTAATGGATAAACTGAATCTAACAAAGAGCGACGTACAA
CTGTTGTAAATTATTTTATGCTTCGTAAAATGTAGGTTTTGAACCAAACATTCTTTCAAAGAATGAGATG
CATAAAACTTTATTATCCAATAGATTGACTATTTCGGACGTCAATCGTTTAAAGTAAACTTCGTAAAATA
TTCTTTGATCACTGCCGAGTTTAAAACTTCTATCGATAATTGTTTCATATGTTTTAATATTTACAAGTTT
TTTGGTCCATGGTACATTAGCCGGACAAATATATGCAAAATAATATCGTTCTCCAAGTTCTATAGTTTCT
GGATTATTTTTATTATATTCAGTAACCAAATACATATTAGGGTTATCTGCGGATTTATAATTTGAGTGAT
GCATTCGACTCAACATAAATAATTCTAGAGGAGACGATCTACTATCAAATTCGGATCGTAAATCTGTTTC
TAAAGAACGGAGAATATCTATACATACCTGATTAGAATTCATCCGTCCTTCAGACAACATCTCAGACAGT
CTGGTCTTGTATGTCTTAATCATATTCTTATGAAACTTGGAAACATCTCTTCTAGTTTCACTAGTACCTT
TATTAATTCTCTCAGGTACAGATTTTGAATTCGACGATGCCGAGTATTTCATCGTTGTATATTTCTTCTT
CGATTGCATAATCAGATTCTTATATACCGCCTCAAACTCTATTTTAAAATTATTAAACAATACTCTATTA
TTAATCAGTCGTTCTAACTCCTTTGCTATTTCTATGGACTTATCTACATCTTGACTGTCTATCTCTGTAA
ACACGGAGTCGGTATCTCCATACACGCTACGAAAACGAAATCTGTAATCTATAGGCAACGATGTTTTCAC
AATCGGATTAATATCTCTATCGTCCATATAAAATGGATTACTTAATGGATTGGCAAACCGTAACATACCG
TTAGATAACTCTGCTCCATTTAGTACCGATTCTAGATACAAGATCATTCTACGTCCTATGGATGTGCAAC
TCTTAGCCGAAGCGTATGAGTATAGAGCACTATTTCTAAATCCCATCAGACCATATACTGAGTTGGCTAC
TATCTTGTACGTATATTGCATGGAATCATAGATGGCCTTTTCAGTTGAACTGGTAGCCTGTTTTAACATC
TTTTTATATCTGGCTCTCTCTGCCAAAAATGTTCTTAATAGTCTAGGAATGGTTCCTTCTATCGATCTAT
CGAAAATTGCTATTTCAGAGATGAGGTTCGGTAGTCTAGGTTCACAATGAACCGTAATATATCTAGGAGG

TGGATATTTCTGAAGCAAGAGCTGATTATTTATTTCTTCTTCCAATCTATTGGTACTAACAACGACACCG
ACTAATGTTTCCGGAGATAGATTTCCAAAGATACACACATTAGGATACAGACTGTTATAATCAAAGATTA
ATACATTATTACTAAACATTTTTTGTTTTGGAGCAAATACCTTACCGCCTTCATAAGGAAACTTTTGTTT
TGTTTCTGATCTAACTAAGATAGTTTTAGTTTCCAACAATAGCTTTAACAGTGGACCCTTGATGACTGTA
CTCGCTCTATATTCGAATACCATGGATTGAGGAAGCACATATGTTGACGCACCCGCGTCTGTTTTTGTTT
CTACTCCATAATACTCCCACAAATACTGACACAAACAAGCATCATGAATACAGTATCTAGCCATATCTAA
AGCTATGTTTAGATTATAATCCTTATACATCTGAGCTAAATCAACGTCATCCTTTCCGAAAGATAATTTA
TATGTATCATTAGGTAAAGTAGGACATAATAGTACGACTTTAAATCCATTTTCCCAAATATCTTTACGAA
TTACTTTACATATAATATCCTCATCAACAGTCACATAATTACCTGTGGTTAAAACCTTTGCAAATGCAGC
GGCTTTGCCTTTCGCGTCCGTAGTATCGTCACCGATGAACGTCATTTCTCTAACTCCTCTATTTAATACT
TTACCCATGCAACTGAACGCGTTCTTGGATATAGAATCCAATTTGTACGAATCCAATTTTTCAGATTTTT
GAATGAATGAATATAGATCGAAAAATATAGTTCCATTATTGTTATTAACGTGAAACGTAGTATTGGCCAT
GCCGCCTACTCCCTTATGACTAGACTGATTTCTCTCATAAATACAGAGATGTACAGCTTCCTTTTTGTCC
GGAGATCTAAAGATAATCTTCTCTCCTGTTAATAACTCTAGACGATTAGTAATATATCTCAGATCAAAGT
TATGTCCGTTAAAGGTAACGACATAGTCGAACGTTAGTTCCAACAATTGTTTAGCTATTCGTAACAAAAC
TATTTCAGAACATAAAACTAGTTCTCGTTCGTAATCCATTTCCATTAGTGACTGTATCCTCAAACATCCT
CTATCGACGGCTTCTTGTATTTCCTGTTCCGTTAACATCTCTTCATTAATGAGCGTAAACAATAATCGTT
TACCACTTAAATCGATATAACAGTAACTTGTATGCGAGATTGGGTTAATAAATACAGAAGGAAACTTCTT
ATCGAAGTGACACTCTATATCTAGAAATAAGTACGATCTTGGGATATCGAATCTAGGTATTTTTTTAGCG
AAACAGTTACGTGGATCGTCACAATGATAACATCCATTGTTAATCTTTGTCAAATATTGCTCGTCCAACG
AGTAACATCCGTCTGGAGATATCCCGTTAGAAATATAAAACCAACTAATATTGAGAAATTCATCCATGGT
GGCATTTTGTATGCTGCGTTTCTTTGGCTCTTCTATCAACCACATATCTGCGACGGAGCATTTTCTATCT
TTAATATCTAGATTATAACTTATTGTCTCGTCAATGTCTATAGTTCTCATCTTTCCCAACGGCCTCGCAT
TAAATGGAGGAGGAGACAATGACTGATATATTTCGTCCGTCACTACGTAATAAAAGTAATGAGGAAATCG
TATAAATACGGTCTCACCATTTCGACATCTGGATTTCAGATATAAAAATCTGTTTTCACCGTGACTTTCA
AACCAATTAATGCACCGAACATCCATTTATAGAATTTAGAAATATATTTTCATTTAAATGAATCCCAAAC
ATTGGGGAAGAGCCGTATGGACCATTATTTTTATAGTACTTTCGCAAGCGGGTTTAGACGGCAACATAGA
AGCGTGTAAACGAAAACTATATACTATAGTTAGCACTCTTCCATGTCCTGCATGTAGACGGCACGCGACT
ATCGCTATAGAGGACAATAATGTCATGTCTAGCGATGATCTGAATTATATTTATTATTTTTTCATCAGAT
TATTTAACAATTTGGCATCTGATCCCAAATACGCGATCGATGTGACAAAGGTTAACCCTTTATAAACTTA
ACCCATTATAAAACTTATGATTAGTCACGACTGAAATAACCGCGTGATTATTTTTTGGTATAATTCTACA
CGGCATGGTTTCTGTGACTATGAATTCAACCCCCGTTACATTAGTGAAATCTTTAACAAACAGCAAGGGT
TCGTCAAAGACATAAAACTCATTGTTTACAATCGAAATAGACCCCCTATCACACTTAAAATAAAAAATAT
CCTTATCCTTTACCACCAAATAAAATTCTGATTGGTCAATGTGAATGTATTCACTTAACAGTTCCACAAA
TTTATTTATTAACTCCGAGGCACATACATCGTCGGTATTTTTTATGGCAAACTTTACTCTTCCAGCATCC
GTTTCTAAAAAAATATTAACGAGTTCCATTTATATCATCCAATATTATTGAAATGACGTTGATGGACAAA
TGATACAAATAAGAAGGTACGGTACCTTTGTCCACCATCTCCTCCAATTCATGCTCTATTTTGTCATTAA
CTTTAATGTATGAAAACAGTACGCCACATGCTTCCATGACAGTGTGTAACACTTTGGATACAAAATGTTT
GACATTAGTATAATTGTTCAAGACTGTCAATCTATAATAGATAGTAGCTATAATATATTCTATGATGGTA
TTGAAGAAGATGACAACCTTGGCATATTGATCATTTAACACAGACATGGTATCAACAGATAGCTTGAATG
AAAGAGAATCAGTAATTGGAATAAGCGTCTTCTCGATGGAGTGTCCGTATACCAACATGTCTGATATTTT
GATGTATTCCATTAAATTATTTAGTTTTTTCTTTTTATTCTCGTTAAACAGCATTTCTGTCAACGGACCC
CAACATCGTTGACCGATTAAGTTTTGATTGATTTTTCCGTGTAAGGCGTATCTAGTCAGATCGTATAGCC
TATCCAATAATCCATCGTCTGTGTGTAGATCACATCGTACACTTTTTAATTCTCTATAGAAGAGCGACAG
ACATCTGGAGCAATTACAGACAGCAATTTCTTTATTCTCTACAGATGTAAGATACTTGAAGACATTCCTA
TGATGATGCAGAATTTTGGATAACACGGTATTGATGGTATCTGTTACCATAATTCCTTTGATGGCTGATA
GTGTCAGAGCACAAGATTTCCAATCTTTGACAATTTTTAGCACCATTATCTTTGTTTTGATATCTATATC
AGACAGCATGGTGCGTCTGACAACACAAGGATTAAGACGGAAAGATGAAATGATTCTCTCAACATCTTCA
ATGGATACCTTGCTATTTTTTTCTGGCATTATCTATATGTGCGAGAATATCCTCTAGAGAATCAGTATCCT
TTTTGATGATAGTGGATCTCAATGACATGGGACGTCTAAACCTTCTTATTCTATCACCAGATTGCATGGT
GATTTGTCTTCTTTCTTTTATCATAATGTAATCTCTAAATTCATCGGCAAATTGTCTATATCTAAAATCA
TAATATGAGATGTTTACCTCTACAAATATCTGTTCGTCCAATGTTAGAGTATTTACATCAGTTTTGTATT
CCAAATTAAACATGGCAACGGATTTAATTTTATATTCCTCTATTAAGTCCTCGTCGATAATAACAGAATG
TAGATAATCATTTAATCCATCGTACATGGTTGGAAGATGCTCGTTGACAAAATCTTTAATTGTCTTGATG
AAGGTGGGACTATATCTAACATCTTGATTAATAAAATTTATAACATTGTCCATAGGATACTTTGTAACTA
GTTTTATACACATCTCTTCATCGGTAAGTTTAGACAGAATATCGTGAACAGGTGGTATATTATATTCATC
AGATATACGAAGAACAATGTCCAAATCTATATTGTTTAATATATTATATAGATGTAGTGTAGCTCCTACA
GGAATATCTTTAACTAAGTCAATGATTTCATCAACCGTTAGATCTATTTTAAAGTTAATCATATAGGCAT
TGATTTTTAAAAGGTATGTAGCCTTGACTACATTCTCATTAATTAACCATTCCAAGTCACTGTGTGTAAG
AAGATTATATTCTATCATAAGCTTGACTACATTTGGTCCCGATACCATTAAAGAATTCTTATGATATAAG
GAAACAGATTTTAGGTACTCATCTACTCTACAAGAATTTTGGAGAGCCTTAACGATATCAGTGACGTTTA

TTATTTCAGGAGGAAAAAACCTAACATTGAGAATATCGGAATTAATAGCTTCCAGATACAGTGATTTTGG
CAATAGTCCGTGTAATCCATAATCCAGTAACACGAGCTGGTGCTTGCTAGACACCTTTTCAATGTTTAAT
TTTTTTGAAATAAGCTTTGATAAAGCCTTCCTCGCAAATTCCGGATACATGAACATGTCGGCGACATGAT
TAAGTATTGTTTTTTCATTATTTTTATATTTTCTCAACAAGTTCTCAATACCCCAATAGATGATAGAATA
TCACCCAATGCGTCCATGTTGTCTATTTCCAACAGGTCGCTATATCCACCAATAGAAGTTTTCCCAAAAA
AGATTCTAGGAACAGTTCTACCACCAGTAATTTGTTCAAAATAGTCACGCAATTCATTTTCGGGTTTAAA
TTCTTTAATATCGACAATTTCATACGCTCCTCTTTTGAAACTAAACTTATTTAGAATATCCAGTGCATTT
CTACAAAAAGGACATGTATACTTGACAAAAATTGTCACTTTGTTATTGGCCAACCTTTGTTGTACAAATT
CCTCGGCCATTTTAATATTTAAGTGATATAAAACTATCTCGACTTATTTAACTCTTTAGTCGAGATATAT
GGACGCAGATAGCTATATGATAGCCAACTACAGAAGGCAAACGCTATAAAAAACATAATTACGACGAGCA
TATTTATAAATATTTTTATTCAGCATTACTTGATATAGTAATATTAGGCACAGTCAAACATTCAACCACT
CTCGATACATTAACTCTCTCATTTTCTTTAACAAATTCTGCAATATCTTCGTAAAAAGATTCTTGAAACT
TTTTAGAATATCTATCGACTCTAGATGAAATAGCGTTCGTCAACATACTATGTTTTGTATACATAAAGGC
GCCCATTTTAACAGTTTCTAGTGACAAAATGCTAGCGATCCTAGGATCCTTTAGAATCACATAGATTGAC
GATTCGTCTCTCTTAGTAACTCTAGTAAAATAATCATACAATCTAGTACGCGAAATAATATTATCCTTGA
CTTGAGGAGATCTAAACAATCTAGTTTTGAGAACATCGATAAGTTCATCGGGAATGACATACATACTATC
TTTAATAGAACTCTTTTCATCCAGTTGAATGGATTCGTCCTTAACCAACTGATTAATGAGATCTTCTATT
TTATCATTTTCCAGATGATATGTATGTCCATTAAAGTTAAATTGTGTAGCGCTTCTTTTTAGTCTAGCAG
CCAATACTTTAACATCACTAATATCGATATACAAAGGAGATGATTTATCTATGGTATTAAGAATTCGTTT
TTCGACATCTGTCAAAACCAATTCCTTTTTGCCTGTATCATCCAGTTTTCCATCCTTTGTAAAGAAATTA
TTTTCTACTAGACTATTAATAAGACTGATAAGGATTCCTCCATAATTGCACAATCCAAACTTTTTCACAA
AACTAGACTTTACAAGATCTACAGGAATGCGTACTTCAGGTTTCTTAGCTTGTGATTTTTTCTTTTGTGG
ACATTTTCTTGTGACCAACTCATCTACCATTTCATTGATTTTAGCAGTGAAATAAGCTTTCAATGCACGG
GCACTGATACTATTGAAAACGAGTTGATCTTCAAATTCCGCCATTTAAGTTCACCAAACAACTTTTAAAT
ACAAATATATCAATAGTAGTAGAATAAGAACTATAAAAAAAAATAATAATTAACCAATACCAACCCCAACA
ACCGGTATTATTAGTTGATGTGACTGTTTTCTCATCACTTAGAACAGATTTAACAATTTCTATAAAGTCT
GTCAAATCATCTTCCGGAGACCCCATAAATACACCAAATATAGCGGCGTACAACTTATCCATTTATACAT
TGAATATTGGCTTTTCTTTATCGCTATCTTCATCATATTCATCATCAATATCAACAAGTCCCAGATTACG
AGCCAGATCTTCTTCTACATTTTCAGTCATTGATACACGTTCACTATCTCCAGAGAGTCCGATAACGTTA
GCCACCACTTCTCTATCAATGATTAGTTTCTTGAGTGCGAATGTAATTTTTGTTTCCGTTCCGGATCTAT
AGAAAACTACAGGTGTGATAATTGCCTTGGCCAATTGTCTTTCTCTTTTACTGAGTGATTCTAGTTCACC
TTCTATAGATCTGAGAATGGATGATTCTCCAGTCGAAACATATTCTACCATGGCTCCGTTTAATTTGTTG
ATGAAGATGGATTCATCCTTAAATGTTTTCTCTGTAATAGTTTCCACCGAAAGACTATGCAAAGAATTTG
GAATGCGTTCCTTGTGCTTAATGTTTCCATAGACGGCTTCTAGAAGTTGATACAACATAGGACTAGCCGC
GGTAACTTTTATTTTTAGAAAGTATCCATCGCTTCTATCTTGTTTAGATTTATTTTTATAAAGTTTAGTC
TCTCCTTCCAACATAATAAAAGTGGAAGTCATTTGACTAGATAAACTATCAGTAAGTTTTATAGAGATAG
ACGAACAATTAGCGTATTGAGAAGCATTTAGTGTAACGTATTCGATACATTTTGCATTAGATTTACTAAT
CGATTTTGCATACTCTATAACACCCGCACAAGTCTGTAGAGAATCGCTAGATGCAGTAGGTCTTGGTGAA
GTTTCAACTCTCTTCTTGATTACCTTACTCATGATTAAACCTAAATAATTGTACTTTGTAATATAATGAT
ATATATTTTCACTTTATCTCATTTGAGAATAAAAATGTTTTTGTTTAACCACTGCATGATGTACAGATTT
CGGAATCACAAACCACCGGTGGTTTTATTTTATCCTTGTCCAATGTGAATTGAATGGGAGCGGATGCGGG
TTTCGTACGTAGATAGTACATTCCCGTTTTTAGACCGAGACTCCATCCGTAAAAATGCATACTCGTTAGT
TTGGAATAACTCGGATCTGCTATATGGATATTCATAGATTGACTTTGATCGATGAAGGCTCCCCTGTCTG
CAGCCATTTTTATGATCGTCTTTTGTGGAATTTCCCAAATAGTTTTATAAACTCGCTTAATATCTTCTGG
AAGGTTTGTATTCTGAATGGATCCACCATCTGCCATAATCCTATTCTTGATCTCATCATTCCATAATTTT
CTCTCGGTTAAAACTCTAAGGAGATGCGGATTAACTACTTGAAATTCTCCAGACAATACTCTCCGAGTGT
AAATATTACTGGTATACGGTTCCACCGACTCATTATTTCCCAAAATTTGAGCAGTTGATGCAGTCGGCAT
AGGTGCCACCAATAAACTATTTCTAAGACCGTATGTTCTGATTTTATCTTTTAGAGGTTCCCAATTCCAA
AGATCCGACGGTACAACATTCCAAAGATCATATTGTAGAATACCGTTACTGGCGTACGATCCTACATATG
TATCGTATGGTCCTTCCTTCTCAGCTAGTTCACAACTCGCCTCTAATGCACCGTAATAAATGGTTTCGAA
GATCTTCTTATTTAGATCTTGTGCTTCCAGGCTATCAAATGGATAATTTAAGAGAATAAACGCGTCCGCT
AATCCTTGAACACCAATACCGATAGGTCTATGTCTCTTATTAGAGATTTCAGCTTCTGGAATAGGATAAT
AATTAATATCTATAATTTTATTGAGATTTCTGACAATTACTTTGACCACATCCTTCAGTTTGAGAAAATC
AAATCGCCCATCTATTACAAACATGTTCAAGGCAACAGATGCCAGATTACAAACGGCTACCTCATTAGCA
TCCGCATATTGTATTATCTCAGTGCAAAGATTACTACACTTGATAGTTCCTAAATTTTGTTGATTACTCT
TTTTGTTACACGCATCCTTATAAAGAATGAATGGAGTACCAGTTTCAATCTGAGATTCTATAATCGCTTT
CCAGACGACTCGAGCCTTTATTATAGATTTGTATCTCCTTTCTCTTTCGTATAGTGTATACAATCGTTCG
AACTCGTCTCCCCAAACATTGTCCAATCCAGGACATTCATCCGGACACATCAACGACCACTCTCCGTCAT
CCTTCACTCGTTTCATAAAGAGATCAGGAATCCAAAGAGCTATAAATAGATCTCTGGTTCTATGTTCCTC
GTTTCCTGTATTCTTTTTAAGATCGAGGAACGCCATAATATCAGAATGCCACGGTTCCAAGTATATGGCC
ATAACTCCAGGCCGTTTGTTTCCTCCCTGATCTATGTATCTAGCGGTGTTATTATAAACTCTCAACATTG

GAATAATACCGTTTGATATACCATTGGTACCGGAGATATAGCTTCCACTGGCACGAATATTACTAATTGA
TAGACCTATTCCCCCTGCCATTTTAGAGATTAATGCGCATCGTTTTAACGTGTCATAGATACCCTCTATG
CTATCATCGATCATGTTAAGTAGAAAACAGCTAGACATTTGGTGACGACTAGTTCCCGCATTAAATAAGG
TAGGAGAAGCGTGCGTAAACCATTTTTCAGAAAGTAGATTGTACGTCTCAATAGCTGAGTCTATATCCCA
TTGATGAATTCCTACTGCGACACGCATTAACATGTGCTGAGGTCTTTCAACGATCTTGTTGTTTATTTTC
AACAAGTAGGATTTTTCCAAAGTTTTAAAACCAAAATAGTTGTATGAAAAGTCTCGTTCGTAAATAATAA
CCGAGTTGAGTTTATCCTTATATTTGTTAACTATATCCATGGTGATACTTGAAATAATCGGAGAATGTTT
CCCATTTTTAGGATTAACATAGTTGAATAAATCCTCCATCACTTCACTAAATAGTTTTTTTGTTTCCTTG
TGTAGATTTGATACGGCTATTCTGGCGGCTAGAATGGCATAATCCGGATGTTGTGTAGTACAAGTGGCTG
CTATTTCGGCTGCCAGAGTGTCCAATTCTACCGTTGTTACTCCATTATATATTCCTTGAATAACCTTCAT
AGCTATTTTAATAGGATCTATATGATCCGTGTTTAAGCCATAACATAATTTTCTAATACGAGACGTGATT
TTATCAAACATGACATTTTCCTTGTATCCATTTCGTTTAATGACAAACATTTTTGTTGGTGTAATAAAAA
AATTATTTAACTTTTCATTAATAGGGATTTGACGTACGTAGCGTACAAAATGATTGTTCCTGGTATATAG
ATAAAGAGTCCTATATATTTGAAAATCGTTACGGCTCGATTAAACTTTAATGATTGCATAGTGAATATAT
CATTAGGATTTAACTCCTTGACTATCAGGGCGGCACCAGAAATTACCATCAAAAGCATTAATACAGTTAT
GCCTATCGCAGTTAGAACGGTTATAGCATCCACCATTTATATCTAAAAATTAGATCAAAGAATATGTGAC
AAAGTCCTAGTTGTATATTGAGAATTGACAAAACAATGTTTCTTACATATTTTTTTTTTATTAGTAACCG
ACTTAATAGTAGGAACTGGAAAACTAGACTTGATTATTCTATAAGTATAGATACCCTTCCAAATAATATT
CTCTTTGATAAAAGTTCCAGAAAATGTAGAATTTTTTAAAAAGTTATCTTTTGCTATTACCAAGATTGTG
TTTAGACGCTTATTATTAATATGAGTGATGAAATCCACACCGCCTCTAGATATCGCCTTTATTTCCACAT
TAGATGGTAAATCCAATAGTGAAACTATCTTTTTAGGAATGTATGGACTCGCGTTTAGAGGAGTGAACGT
CTTGGGCGTCGGAAAGGATGATTCGTCAAACGAATAAACAATTTCACAAATGGATGTTAATGTATTAGTA
GGAAATTTTTTGACGCTAGTGGAATTGAAAATTCTAATGGATGATGTTCTACCTATTTCATCCGATAACA
TGTTAATTTCCGACACCAACGGTTTTAATATTTCGATGATATACGGTAGTCTCTCTTTCGGACTTATATA
GCTTATTCCACAATACGAGTCATTATATACTCCAAAAAACAAAATAACTAGTATAAAATCTGTATCGAAT
GGGAAAAACGAAATTATCGACATAGGTATAGAATCCGGAACATTGAACGTATTAATACTTAATTCTTTTT
CTGTGGTAAGTACCGATAGGTTATTGACATTGTATGGTTTTAAATATTCTATAACTTGAGACTTGATAGA
TATTAGTGATGAATTGAAAATTATTTTTATCACCACGTGTGTTTCAGGATCATCGTCGACGCCCGTCAAC
CAACCGAACGGAGTAAAATAAATATCATTAATATATGCTCTAGATATTAGTATTTTTATCAATCCTTTGA
TTATCATCTTCTCGTAGGCGAATGATTCCATGATCAAGAGTGATTTAAGAACATCCTCCGGAGTATTAAT
GGGCTTAGTAAACAGTCCATCGTTGCAATAATAAAAGTTATCCAAGTTAAAGGATATTATGCATTCGTTT
AAAGATATCACCTCATCTGACGGAGACAATTTTTTGGTAGGTTTTAGAGACTTTGAAGCTACTTGTTTAA
CAAAGTTATTCATCGTCGTTTACTATTCTATTTAATTTTGTAGTTAATTTATCACATATCACATTAATTG
ACTTTTTGGTCCATTTTTCCATACGTTTATATTCTTTTAATCCTGCGTTATCCGTTTCCGTTATATCCAG
TGATAGATCGTGCAGGTTAAATAGAATGCTCTTAAATAATGTCATTTTTTTATCCGCTAAAAATTTAAAG
AATGTATAAACTTTTTTCAAAGATTTAAAACTTTTAGGTGGTGTCCTAGTACACAATATCATAAACAAAC
TAATAAACATCCCGCATTCAGATTCCAACAGCTGATTAACTTCCACATTAATACAGCCTATTTTCGCTCC
AAATGTACATTCGAAAAATCTGAATAAAACATCAATGTCGCAATTTGTATTATCCAATACAGAATGTTTG
TGATTCGTGTTAAAACCATCGGAGAAGGAATAGAAATAAAAATTATTATAGTGGTGGAATTCAGTTGGAA
TATTGCCTCCGGAGTCATAAAAGGATACTAAACATTGTTTTTTATCATAAATTACACATTTCCAATGAGA
CAAATAACAAAATCCAAACATTACAAATCTAGAGGTAGAACTTTTAATTTTGTCTTTAAGTATATACGAT
AAGATATGTTTATTCATAAACGCGTCAAATTTTTCATGAATCGCTAAGGAGTTTAAGAATCTCATGTCAA
ATTGTCCTATATAATCCACTTCGGATCCATAAGCAAACTGAGAGACTAAGTTCTTAATACTTCGATTGCT
CATCCAGGCTCCTCTCTCAGGCTCTATTTTCATCTTGACGACCTTTGGATTTTCACCAGTATGTATTCCT
TTACGTGATAAATCATCGATTTTCAAATCCATTTGTGAGAAGTCTATCGCCTTAGATACTTTTTCCCGTA
GTCGAGGTTTAAAGAAATACGCTAACGGTATACTAGTAGGTAACTCAAAAACATCATATATAGAATGGTA
ACGCGTCTTTAACTCGTCGGTTAACTCTTTCTTTTGATCGAGTTCGTCGCTACTATTGGGTCTGCTCAGG
TGCCCCGACTCTACTAGTTCCAACATCATACCGATAGGAATACAAGACACTTTGCCGGCGGTTGTAGATT
TATCATATTTTTCCACTACATATCCGTTACAATTTGTTAAAAATTTAGATACATCTATATTGCTACATAA
TCCAGCTAGTGAATATATATGACATAATAAATTGGTAAATCCTAGTTCTGGTATTTTACTAATTACTAAA
TCTGTATATCTTTCCATTTATCATGGAAAAGAATTTACCAGATATCTTCTTTTTTCCAAACTGCGTTAAT
GTATTCTCTTACAAATATTCACAAGATGAATTCAGTAATATGAGTAAAACGGAACGTGATAGTTTCTCAT
TGGCCGTGTTTCCAGTTATAAAACATAGATGGCATAACGCACACGTTGTAAAACATAAAGGAATATACAA
AGTTAGTACAGAAGCACGTGGAAAAAAAGTATCTCCTCCATCACTAGGAAAACCCGCACACATAAACCTA
ACCGCGAAGCAATATATATACAGTGAACACACAATAAGCTTTGAATGTTATAGTTTTCTAAAATGTATAA
CAAATACAGAAATCAATTCGTTCGATGAGTATATATTAAGAGGACTATTAGAAGCTGGTAATAGTTTACA
GATATTTTCCAATTCCGTAGGTAAACGAACAGATACTATAGGTGTACTAGGGAATAAGTATCCATTTAGC
AAAATTCCATTGGCCTCATTAACTCCTAAAGCACAACGAGAGATATTTTCAGCGTGGATTTCTCATAGAC
CTGTAGTTTTAACTGGAGGAACTGGAGTGGGTAAGACGTCACAGGTACCCAAGTTATTGCTTTGGTTTAA
TTATTTATTTGGTGGATTCTCTACTCTAGATAAAATCACTAACTTTCACGAAAGACCAGTCATTCTATCT
CTTCCTAGGATAGCTTTAGTTAGATTGCATAGCAATACCATTTTAAAATCATTGGGATTTAAGGTACTAG

	ATGGATCTCCTATTTCTTTACGGTACGGATCTATACCGGAAGAATTAATAAACAAACAACCAAAAAAATA
	TGGAATTGTATTTTCTACCCATAAGTTATCTCTAACAAAACTATTTAGTTATGGCACTCTTATTATAGAC
	GAAGTTCATGAGCATGATCAAATAGGAGATATTATTATAGCAGTAGCGAGAAAGCATCATACGAAAATAG
	ATTCTATGTTTTTAATGACTGCCACGTTAGAGGATGACCGAGAACGGCTAAAAGTATTTTTACCTAATCC
	CGCATTTATACATATTCCTGGAGATACACTGTTTAAAATTAGCGAGGTATTTATTCATAATAAGATAAAT
	CCATCTTCCAGAATGGCATACATAGAAGAAGAAAAGAGAAATTTAGTTACTGCTATACAGATGTATACTC
	CTCCTGATGGATCATCCGGTATAGTCTTTGTGGCATCCGTTGCACAGTGTCACGAATATAAATCATATTT
	AGAAAAAAGATTACCGTATGATATGTATATTATTCATGGTAAGGTCTTAGATATAGACGAAATATTAGAA
	AAAGTGTATTCATCACCTAATGTATCGATAATTATTTCTACTCCTTATTTGGAATCCAGCGTTACTATAC
	GCAATGTTACACACATTTATGATATGGGTAAAGTTTTTGTCCCCGCTCCTTTTGGAGGATCGCAAGAATT
	TATTTCTAAATCTATGAGAGATCAACGAAAAGGAAGAGTAGGAAGAGTTAATCCTGGTACATACGTCTAT
	TTCTATGATCTGTCTTATATGAAGTCTATACAGCGAATAGATTCAGAATTTCTACATAATTATATATTGT
	ACGCTAATAAGTTTAATCTAACACTCCCCGAAGATTTGTTTATAATCCCTACAAATTTGGATATTCTATG
	GCGTACAAAGGAATATATAGACTCGTTCGATATTAGTACAGAAACATGGAATAAATTATTATCCAATTAT
	TATATGAAGATGATAGAGTATGCTAAACTTTATGTACTAAGTCCTATTCTCGCTGAGGAGTTGGATAACT
	TTGAGAGGACGGGAGAATTAACTAGTATTGTACGAGAAGCCATTTTATCTCTAAATTTACGAATTAAGAT
	TTTAAATTTTAAACATAAAGATGATGATACGTATATACACTTTTGTAAAATATTATTCGGTGTCTATAAC
	GGAACAAACGCTACTATATATTATCATAGACCTCTAACGGGATATATGAATATGATTTCAGATACTATAT
	TTGTTCCTGTAGATAATAACTAAAAATCAAACTCTAATGACCACATCTTTTTTTAGAGATGAAAAATTTT
	CTACATCTCCTTTTGTAGACACGACTAAACATTTTGCAAAAAAAAGTTTATTAGTGTTTAGATAATCGTA
	TACTTCATCAGTGTAGATAGTAAATGTGAACAAATAAAAGGTATTCTTACTCAATAGATTGGTAAATTCC
	ATAGAATATATTAATCCTTTCTTCTTGAGATCCCACATCATTTCAACCAGAGACGTTTTATCCAATGATT
	TACCTCGTACTATACCACATACAAAACTAGATTTTGCAGTGACGTCGTACCTGGTATTCCTACCAAACAA
	AATTTTACTTTTAGTTCTTTTAGAAAATTCTAAGGTAGAATCTCTATTTGCCAATATGTCATCTATGGAA
	TTACCACTAGCAAAAAATGATAGAAATATATATTGATACATCGCAGCTGGTTTTGATCTACTATACTTTA
	AAAACGAATCAGATTCCATAATTGCCTGTATATCATCAGCTGAAAAACTATGTTTTACACGTATTCCTTC
	GGCATTTCTTTTTAATGATATATCTTGTTTAGACAATGATAAAGTTATCATGTCCATGAGAGACGCGTCT
	CCGTATCGTATAAATATTTCATTAGATGTTAGACGCTTCATTAGGGGTATACTTCTATAAGGTTTCTTAA
	TCAGTCCATCATTGGTTGCGTCAAGAACTACTATCGGATGTTGTTGGGTATCTCTAGTGTTACACATGGC
	CTTACTAAAGTTTGGGTAAATAACTATGATATCTCTATTAATTATAGATGCATATATTTCATTCGTCAAG
	GATATTAGTATCGACTTGCTATCGTCATTAATACGTGTAATGTAATCATATAAATCATGCGATAGCCAAG
	GAAAATTCAAATAGATGTTCATCATATAATCGTCGCTATAATTCATATTAATACGTTGACATTGACTAAT
	TTGTAATATAGCCTCGCCACGAAGAAAGCTCTCGTATTCAGTTTCATCGATAAAGGATACCGTTAAATAT
	AACTGGTTGCCGATAGTCTCATAGTCTATTAAGTGGTAAGTTTCGTACAAATACAGAATCCCTAAAATAT
	TATCTAATGTTGGATTAATCTTTACCATAACTGTATAAAATGGAGACGGAGTCATAACTATTTTACCGTT
	TGTACTTACTGGAATAGACGAAGGAATAATCTCCGGACATGCTGGTAAAGACCCAAATGTCTGTTTGAAG
	AAATCCAATGTTCCAGGTCCTAATCTCTTAACAAAAATTACGATATTCGATCCCGATATCCTTTGCATTC
	TATTTACCAGCATATCACGAACTATATTAAGATTATCTATCATGTCTATTCTCCCACCGTTATATAAATC
	GCCTCCGCTAAGAAACGTTAGTATATCCATACAATGGAATACTTCATTTCTAAAATAGTATTCGTTTTCT
	AATTCTTTAATGTGAAATCGTATACTAGAAAGGGAAAAATTATCTTTGAGTTTTCCGTTAGAAAAGAACC
	ACGAAACTAATGTTCTGATTGCGTCCGATTCCGTTGCTGAATTAATGGATTTACACCAAAAACTCATATA
	ACTTCTAGATGTAGAAGCATTCGCTAAAAAATTAGTAGAATCAAAGGATATAAGTAGATGTTCCAACAAG
	TGAGCAATTCCCAAGATTTCATCTATATCATTCTCGAATCCGAAATTAGAAATTCCCAAGTAGATATCCT
	TTTTCATCCGATCGTTGATGAAAATACGAACTTTATTCGGTAAGACAATCATTTACTAAGGAGTAAAATA
	GGAAGTAATGTTCGTATGTCGTTATCATCGTATAAATTAAAGGTGTGTTTTTTACCATTAAGTGACATTA
	TAATTTTACCAATATTGGAATTATAATATAGGTGTATTTGCGCACTCGCGACGGTTGATGCATCGGTAAA
	TATAGCTGTATCTAATGTTCTAGTCGGTATTTCATCATTTCGCTGTCTAATAATAGCGTTTTCTCTATCT
	GTTTCCATTACAGCTGCCTGAAGTTTATTGGTCGGATAATATGTAAAATAATAAGAAATACATACGAATA
	ACAAAAATAAAATAAGATATAATAAAGATGCCATTTAGAGATCTAATTTTGTTCAACTTGTCCAAATTCC
	TACTTACAGAAGATGAGGAATCGTTGGAGATAGTGTCTTCCTTATGTAGAGGATTTGAAATATCTTATGA
	TGACTTGATAACTTACTTTCCAGATAGGAAATACCATAAATATATTTCTAAAGTATTTGAACATGTAGAT
	TTATCGGAGGAATTAAGTATGGAATTCCATGATACAACTTTGCGAGATTTAGTCTATCTTAGATTGTACA
	AGTATTCCAAGTGTATACGGCCGTGTTATAAATTAGGAGATAATCTAAAAGGCATAGTTGTTATAAAGGA
	CAGGAATATTTATATTAGGGAAGCAAATGATGACTTGATAGAATATCTCCTCAAGGAATACACTCCTCAG
	ATTTATACATATTCTAATGAGCGCGTCCCCATAACTGGTTCAAAATTAATTCTTTGTGGATTTTCTCAAG
	TTACATTTATGGCGTATACAACGTCGCATATAACAACAAATAAAAAGGTAGATGTTCTCGTTTCCAAAAA
	ATGTATAGATGAACTAGTCGATCCAATAAATTATCAAATACTTCAAAATTTATTTGATAAAGGAAGCGGA
	ACAATAAACAAAATACTCAGGAAGATATTTTATTCGGTAACAGGTGGCCAAACTCCATAGGTAGCTTTTT
	CTATTTCGGATTTTAGAATTTCCAAATTCACCAGCGATTTATCTGTTTTGGTGAAATCCAAGGATTTATT
	AATGTCCACAAATGCCATTTGTTTTGTCTGTGGATTGTATTTGAAAATGGAAACGATGTAGTTAGATAGA
	TGCGCTGCGAAGTTTCCTATTAGGGTTCCGCGCTTCACGTCACCCAGCATACTTGAATCACCATCCTTTA

AAAAAAATGATAAGATATCAACATGGAGTATATCATACTCGGATTTTAATTCTTCTACTGCATCACTGAC
ATTTTCACAAATACTACAATACGGTTTACCGAAAATAATCAGTACGTTCTTCATTTATGGGTATCAAAAA
CTTAAAATCGTTACTGCTGGAAAATAAATCACTGACGATATTAGATGATAATTTATACAAAGTATACAAT
GGAATATTTGTGGATACAATGAGTATTTATATAGCCGTCGCCAATTGTGTCAGAAACTTAGAAGAGTTAA
CTACGGTATTCATAAAATACGTAAACGGATGGGTAAAAAAGGGAGGGCATGTAACCCTTTTTATCGATAG
AGGAAGTATAAAAATTAAACAAGACGTTAGAGACAAGAGACGTAAATATTCTAAATTAACCAAGGACAGA
AAAATGCTAGAATTAGAAAAGTGTACATCCGAAATACAAAATGTTACCGGATTTATGGAAGAAGAAATAA
AGGCAGAAATGCAATTAAAAATCGATAAACTCACATTTCAAATATATTTATCTGATTCTGATAACATAAA
AATATCATTGAATGAGATACTAACACATTTCAACAATAATGAGAATGTTACATTATTTTATTGTGATGAA
CGAGACGCAGAATTCGTTATGTGTCTCGAGGCTAAAACACATTTCTCTACCACAGGAGAATGGCCGTTGA
TAATAAGTACCGATCAGGATACTATGCTATTTGCATCTGCTGATAATCATCCTAAGATGATAAAAAACTT
AACTCAACTGTTTAAATATGTTCCATCTGCAGAGGATAACTATTTAGCAAAATTAACGGCGTTAGTGAAT
GGATGTGATTTCTTTCCTGGACTCTATGGGGCATCTATAACACCCAACAACTTAAACAAAATACAATTGT
TTAGTGATTTTACAATCGATAATATAGTCACTAGTTTGGCAATTAAAAATTATTATAGAAAGACTAACTC
TACCGTAGACGTGCGTAATATTGTTACGTTTATAAACGATTACGCTAATTTAGACGATGTCTACTCGTAT
ATTCCTCCTTGTCAATGCACTGTTCAAGAATTTATATTTTCCGCATTAGATGAAAAATGGAATGAATTTA
AATCATCTTATTTAGAAAGCGTGCCGTTACCCTGCCAATTAATGTATGCGTTAGAACCACGCAAGGAGAT
TGATGTTTCAGAAGTTAAAACTTTATCATCTTATATAGATTTCGAAAATACTAAATCAGATATCGATGTT
ATAAAATCTATATCCTCGATCTTCGGATATTCTAACGAAAACTGTAACACGATAGTATTCGGCATCTATA
AGGATAATTTACTACTGAGTATAAATAGTTCATTTTACTTTAACGATAGTCTGTTAATAACCAATACTAA
AAGTGATAATATAATAAATATAGGTTACTAGATTAAAAATGGTGTTCCAACTCGTGTGCTCTACGTGCGG
CAAAGATATTTCTCACGAACGATATAAATTGATTATACGAAAAAAATCATTAAAGGATGTACTCGTCAGT
GTAAAGAACGAATGTTGTAGGTTAAAATTATCTACACAAATAGAACCTCAACGTAACTTAACAGTGCAAC
CTCTATTGGATATAAACTAATATGGATCCGGTTAATTTTATCAAGACATATGCGCCTAGAGGTTCTATTA
TTTTTATTAATTATACCATGTCATTAACAAGTCATTTGAATCCATCGATAGAAAAACATGTGGGTATTTA
TTATGGTACGTTATTATCGGAACACTTGGTAGTTGAATCAACATATAGAAAAGGAGTTCGAATAGTCCCA
TTGGATAGTTTTTTTGAAGGATATCTTAGTGCAAAAGTATACATGTTAGAGAATATTCAAGTTATGAAAA
TAGCAGCTGATACGTCATTAACTTTATTGGGTATTCCGTATGGATTTGGTCATGATAGAATGTATTGTTT
TAAATTGGTAGCTGACTGTTATAAAAATGCCGGTATTGATACATCGTCTAAACGAATATTAGGTAAAGAT
ATTTTTCTGAGCCAAAACTTCACAGACGATAATAGATGGATAAAGATATATGATTCTAATAATTTAACAT
TTTGGCAAATTGATTACCTTAAAGGGTGAGTTAATATGCATAACTACTCCTCCGTTGTTTTTTCCCTCGT
TCTTTTTCTTAACGTTGTTTGCCATCACTCTCATAATGTAAAGATATTCTAAAATGGTAAACTTTTGCAT
ATCGGACGCAGAAATTGGTATAAATGTTGTAATTGTATTATTTCCCGTCAATGGACTAGTCACAGCTCCA
TCAGTTTTATATCCTTTAGAGTATTTCTCACTCGTGTCTAACATTCTAGAGCATTCCATGATCTGTTTAT
CGTTGATATTGGCCGGAAAGATAGATTTTTTATTTTTTATTATATTACTATTGGCAATTGTAGATATAAC
TTCTGGTAAATATTTTTCTACCTTTTCAATCTCTTCTATTTTCAAGCCGGCTATATATTCTGCTATATTG
TTGCTAGTATCAATACCTTTTCTGGCTAAGAAGTCATATGTGGTATTCACTATATCAGTTTTAACTGGTA
GTTCCATTAGCCTTTCCACTTCTGCAGAATAATCAGAAATTGGTTCTTTACCAGAAAATCCAGCTACTAT
AATAGGCTCACCGATGATCATTGGCAAAATCCTATATTGTACCAGATTAATGAGAGCATATTTCATTTCC
AATAATTCTGCTAGTTCTTGAGACATTGATTTATTTGATGAATCTAGTTGGTTCTCTAGATACTCTACCA
TTTCTGCCGCATACAATAACTTGTTAGATAAAATCAGGGTTATCAAAGTGTTTAGCGTGGCTAGAATAGT
GGGCTTGCATGTATTAAAGAATGCGGTAGTATGAGTAAACCGTTTTAACGAATTATATAGTCTCCAGAAA
TCTGTGGCGTTACATACATGAGCCGAATGACATCGAAGATTGTCCAATATTTTTAATAGCTGCTCTTTGT
CCATTATTTCTATATTTGACTCGCAACAATTGTAGATACCATTAATCACCGATTCCTTTTTCGATGCCGG
ACAATAGCACAATTGTTTAGCTTTGGACTCTATGTATTCAGAATTAATAGATATATCTCTTAATACAGAT
TGCACTATACATTTTGAAACTATGTCAAAAATTGTAGAACGACGCTGTTCTGCAGCCATTTAACTTTAAA
TAATTTACAAAAATTTAAAATGAGCATCCGTATAAAAATCGATAAACTGCGCCAAATTGTGGCATATTTT
TCAGAGTTCAGTGAAGAAGTATCTATAAATGTAGACTCGACGGATGAGTTAATGTATATTTTTGCCGCCT
TGGGCGGATCTGTAAACATTTGGGCCATTATACCTCTCAGTGCATCAGTGTTCTACCGCGGAGCCGAAAA
TATTGTGTTTAATCTTCCTGTGTCCAAGGTAAAATCGTGTTTGTGTAGTTTTCACAATGATGCCATCATA
GATATAGAACCTGATCTGGAAAATAATCTAGTAAAACTTTCTAGTTATCATGTAGTAAGTGTCGATTGTA
ATAAGGAACTGATGCCTATTAGGACAGATACTACTATTTGTCTAAGTATAGATCAAAAGAAATCTTACGT
GTTTAATTTTCACAAGTATGAAGAAAAATGTTGTGGTAGAACCGTCATTCATTTAGAATGGTTGTTGGGC
TTTATCAAGTGTATTAGTCAGCATCAGCATTTGGCTATTATGTTTAAAGATGACAATATTATTATGAAGA
CTCCTGGTAATACTGATGCATTTTCCAGGGAATATTCTATGACTGAATGTTCTCAAGAACTACAAAAGTT
TTCTTTCAAAATAGCTATCTCGTCTCTCAACAAACTACGAGGATTCAAAAAGAGAGTCAATGTTTTTGAA
ACTAGAATCGTAATGGATAATGACGATAACATTTTAGGAATGTTGTTTTCGGATAGAGTTCAATCCTTTA
AGATCAACATCTTTATGGCGTTTTTAGATTAATACTTTCAATGAGATAAATATGGGTGGCGGAGTAAGTG
TTGAGCTCCCTAAACGGGATCCGCCTCCGGGAGTACCCACTGATGAGATGTTATTAAACGTGGATAAAAT
GCATGACGTGATAGCTCCCGCTAAGCTTTTAGAATATGTGCATATAGGACCACTAGCAAAAGATAAAGAG
GATAAAGTAAAGAAAAGATATCCAGAGTTTAGATTAGTCAACACAGGACCCGGTGGTCTTTCGGCATTGT

	TAAGACAATCGTATAATGGAACCGCACCCAATTGCTGTCGCACTTTTAATCGTACTCATTATTGGAAGAA
	GGATGGAAAGATATCAGATAAGTATGAAGAGGGTGCAGTATTAGAATCGTGTTGGCCAGACGTTCACGAC
	ACCGGAAAATGCGATGTTGATTTATTCGACTGGTGTCAGGGGGATACGTTCGATAGAAACATATGCCATC
	AGTGGATCGGTTCAGCCTTTAATAGGAGTAATAGAACTGTAGAGGGTCAACAATCGTTAATAAATCTGTA
	TAATAAGATGCAAACATTATGTAGTAAAGATGCTAGTGTACCAATATGTGAATCATTTTTGCATCATTTA
	CGCGCACACAATACAGAAGATAGCAAAGAGATGATCGATTATATTCTAAGACAACAGTCTGCGGACTTTA
	AACAGAAATATATGAGATGTAGTTATCCCACTAGAGATAAGTTAGAAGAGTCATTAAAATATGCGGAACC
	TCGAGAATGTTGGGATCCAGAGTGTTCGAATGCCAATGTTAATTTCTTGCTAACACGTAATTATAATAAT
	TTAGGACTTTGCAATATTGTACGATGTAATACTAGCGTGAACAACTTACAGATGGATAAAACTTCCTCAT
	TAAGATTGTCATGTGGATTAAGCAATAGTGATAGATTTTCTACTGTTCCCGTCAATAGAGCAAAAGTAGT
	TCAACATAATATTAAACACTCGTTCGACCTAAAATTGCATTTGATCAGTTTATTATCTCTCTTGGTAATA
	TGGATACTAATTGTAGCTATTTAAATGGGTGCCGCGGCAAGCATACAGACGACGGTGAATACACTCAGCG
	AACGTATCTCGTCTAAATTAGAACAAGAAGCGAATGCTAGTGCTCAAACAAAATGTGATATAGAAATCGG
	AAATTTTTATATCCGACAAAACCATGGATGTAACCTCACTGTTAAAAATATGTGCTCTGCGGACGCGGAT
	GCTCAGTTGGATGCTGTGTTATCAGCCGCTACAGAAACATATAGTGGATTAACACCGGAACAAAAAGCAT
	ACGTGCCAGCTATGTTTACTGCTGCGTTAAACATTCAGACGAGTGTAAACACTGTTGTTAGAGATTTTGA
	AAATTATGTGAAACAGACTTGTAATTCTAGCGCGGTCGTCGATAACAAATTAAAGATACAAAACGTAATC
	ATAGATGAATGTTACGGAGCCCCAGGATCTCCAACAAATTTGGAATTTATTAATACAGGATCTAGCAAAG
	GAAATTGTGCCATTAAGGCGTTGATGCAATTGACGACTAAGGCCACTACTCAAATAGCACCTAAACAAGT
	TGCTGGTACAGGAGTTCAGTTTTATATGATTGTTATCGGTGTTATAATATTGGCAGCGTTGTTTATGTAC
	TATGCCAAGCGTATGTTGTTCACATCCACCAATGATAAAATCAAACTTATTTTAGCCAATAAGGAAAACG
	TCCATTGGACTACTTACATGGACACATTCTTTAGAACTTCTCCGATGGTTATTGCTACCACGGATATGCA
	AAACTGAAAATATATTGATAATATTTTAATAGATTAACATGGAAGTTATCACTGATCGTCTAGACGATAT
	AGTGAAACAAAATATAGCGGATGAAAAATTTGTAGATTTTGTTATACACGGTCTAGAGCATCAATGTCCT
	GCTATACTTCGACCATTAATTAGGTTGTTTATTGATATACTATTATTTGTTATAGTAATTTATATTTTTA
	CGGTACGTCTAGTAAGTAGAAATTATCAAATGTTGTTGGCGTTGGTGGCGCTAGTCATCACATTAACTAT
	TTTTTATTACTTTATACTATAATAGTACTAGACTGACTTCTAACAAACATCTCACCTGCCATAAATAAAT
	GCTTGATATTAAAGTCTTCTATTTCTAACACTATTCCATCTGTGGAAAATAATACTCTGACATTATCGCT
	AATTGACACATCGGTGAGTGATATGCCTATAAAGTAATAATCTTCTTTGGGCACATATACCAGTGTACCA
	GGTTCTAACAACCTATTTACTGGTGCTCCTATAGCATACTTTTTCTTTACCTTGAGAATATCCATCGTTT
	GCTTGGTCAATAGCGATATGTGATTTTTTATCAACCACTCGAAAAAGTAATTGGAGTGTTCATATCCTCT
	ACGGGCTATTGTCTCATGGCCGTGTATGAAATTTAAGTAACACGACTGTGGTAGATTTGTTCTATAGAGC
	CGGTTGCCGCAAATAGATAGAACTACCAATATGTCTGTACAAATGTTAAACATTAATTGATTAACAGAAA
	AAACAATGTTCGTTCTGGGAATAGAAACCAGATCAAAACAAAATTCGTTAGAATATATGCCACGTTTATA
	CATTGAATATAAAATAACTACAGTTTGAAAAATAACAGTATCATTTAAACATTTAACTTGCGGGGTTAAT
	CTCACAACTTTACTGTTTTTGAACTGTTCAAAATATAGCATAGATCCGTGAGAAATACGTTTAGCCGCCT
	TTAATAGAGGAAATCCCACCGCCTTTCTGGATCTCACCAACGACGATAGTTCTGACCAGCAACTCATTTC
	TTCATCATCCACCTGTTTTAACATATAATAGGCAGGAGATAGATATCCGTCATTGCAATATTCCTTCTCG
	TAGGCACACAATCTAATATTGATAAAATCTCCATTCTCTTCTCTGCATTTATTATCTTGTTTCGGTGGCT
	GATTAGGCTGTAGTCTTGGTTTAGGCTTTGGTATATCGTTGTTGAATCTATTTTGGTCATTAAATCTTTC
	ATTTCTTCCTGGTATATTTTTATCACCTCGTTTGGTTGGATTTTTGTCTATATTATCGTTTGTAACATCG
	GTACGGGTATTCATTTATCACAAAAAAAACTTCTCTAAATGAGTCTACTGCTAGAAAACCTCATCGAAGA
	AGATACCATATTTTTTGCAGGAAGTATATCTGAGTATGATGATTTACAAATGGTTATTGCCGGCGCAAAA
	TCCAAATTTCCAAGATCTATGCTTTCTATTTTTAATATAGTACCTAGAACGATGTCAAAATATGAGTTGG
	AGTTGATTCATAACGAAAATATCACAGGAGCAATGTTTACCACAATGTATAATATAAGAAACAATTTGGG
	TCTAGGAGATGATAAACTAACTATTGAAGCCATTGAAAACTATTTCTTGGATCCTAACAATGAAGTTATG
	CCTCTTATTATTAATAATACGGATATGACTGCCGTCATTCCTAAAAAAAGTGGTAGGAGAAAGAATAAGA
	ACATGGTTATCTTCCGTCAAGGATCATCACCTATCTTGTGTATTTTCGAAACTCGTAAAAAGATTAATAT
	TTATAAAGAAAATATGGAATCCGCGTCGACTGAGTATACACCTATCGGAGACAACAAGGCTTTGATATCT
	AAATATGCGGGAATTAATATCCTAAATGTGTATTCTCCTTCCACATCCATAAGATTGAATGCCATTTACG
	GATTCACCAATAAAAATAAACTAGAGAAACTTAGTACTAATAAGGAACTAGAATCGTATAGTTCTAGCCC
	TCTTCAAGAACCCATTAGGTTAAATGATTTTCTGGGACTATTGGAATGTGTTAAAAAGAATATTCCTCTA
	ACAGATATTCCGACAAAGGATTGATTACTATAAATGGAGAATGTTCCTAATGTATACTTTAATCCTGTGT
	TTATAGAGCCCACGTTTAAACATTCTTTATTAAGTGTTTATAAACACAGATTAATAGTTTTATTTGAAGT
	ATTCGTTGTATTCATTCTAATATATGTATTTTTTAGATCTGAATTAAATATGTTCTTCATGCCTAAACGA
	AAAATACCCGATCCTATTGATAGATTACGACGTGCTAATCTAGCGTGTGAAGACGATAAATTAATGATCT
	ATGGATTACCATGGATGACAACTCAAACATCTGCGTTATCAATAAATAGTAAACCGATAGTGTATAAAGA
	TTGTGCAAAGCTTTTGCGATCAATAAATGGATCACAACCAGTATCTCTTAACGATGTTCTTCGCAGATGA
	TGATTCATTTTTTAAGTATTTGGCTAGTCAAGATGATGAATCTTCATTATCTGATATATTGCAAATCACT
	CAATATCTAGACTTTCTGTTATTATTATTGATCCAATCAAAAAATAAATTAGAAGCCGTGGGTCATTGTT
	ATGAATCTCTTTCAGAGGAATACAGACAATTGACAAAATTCACAGACTTTCAAGATTTTAAAAAACTGTT

	TAACAAGGTCCCTATTGTTACAGATGGAAGGGTCAAACTTAATAAAGGATATTTGTTCGACTTTGTGATT AGTTTGATGCGATTCAAAAAAGAATCCTCTCTAGCTACCACCGCAATAGATCCTGTTAGATACATAGATC CTCGTCGCAATATCGCATTTTCTAACGTGATGGATATATTAAAGTCGAATAAAGTGAACAATAATTAATT CTTTATTGTCATCATGAACGGCGGACATATTCAGTTGATAATCGGCCCCATGTTTTCAGGTAAAAGTACA GAATTAATTAGACGAGTTAGACGTTATCAAATAGCTCAATATAAATGCGTGACTATAAAATATTCTAACG ATAATAGATACGGAACGGGACTATGGACGCATGATAAGAATAATTTTGAAGCATTGGAAGCAACTAAACT ATGTGATGTCTTGGAATCAATTACAGATTTCTCCGTGATAGGTATCGATGAAGGACAGTTCTTTCCAGAC ATTGTTGAATTCTGTGAGCGTATGGCAAACGAAGGAAAAATAGTTATAGTAGCCGCACTCGATGGGACAT TTCAACGTAAACCGTTTAATAATATTTTGAATCTTATTCCATTATCTGAAATGGTGGTAAAACTAACTGC TGTGTGTATGAAATGCTTTAAGGAGGCTTCCTTTTCTAAACGATTGGGTGAGGAAACCGAGATAGAAATA ATAGGAGGTAATGATATGTATCAATCGGTGTGTAGAAAGTGTTACATCGACTCATAATATTATATTTTTT ATCTAAAAAACTAAAAATAAACATTGATTAAATTTTAATATAATACTTAAAAATGGATGTTGTGTCGTTA GATAAACCGTTTATGTATTTTGAGGAAATTGATAATGAGTTAGATTACGAACCAGAAAGTGCAAATGAGG TCGCAAAAAAAACTGCCGTATCAAGGACAGTTAAAACTATTACTAGGAGAATTATTTTTTCTTAGTAAGTT ACAGCGACACGGTATATTAGATGGTGCCACCGTAGTGTATATAGGATCTGCTCCCGGTACACATATACGT TATTTGAGAGATCATTTCTATAATTTAGGAGTGATCATCAAATGGATGCTAATTGACGGCCGCCATCATG ATCCTATTTTAAATGGATTGCGTGATGTGACTCTAGTGACTCGGTTCGTTGATGAGGAATATCTACGATC CATCAAAAAACAACTGCATCCTTCTAAGATTATTTTAATTTCTGATGTGAGATCCAAACGAGGAGGAAAT GAACCTAGTACGGCGGATTTACTAAGTAATTACGCTCTACAAAATGTCATGATTAGTATTTTAAACCCCG TGGCGTCTAGTCTTAAATGGAGATGCCCGTTTCCAGATCAATGGATCAAGGACTTTTATATCCCACACGG TAATAAAATGTTACAACCTTTTGCTCCTTCATATTCAGCTGAAATGAGATTATTAAGTATTTATACCGGT GAGAACATGAGACTGACTCGAGTTACCAAATCAGACGCTGTAAATTATGAAAAAAAGATGTACTACCTTA ATAAGATCGTCCGTAACAAAGTAGTTGTTAACTTTGATTATCCTAATCAGGAATATGACTATTTTCACAT GTACTTTATGCTGAGGACCGTGTACTGCAATAAAACATTTCCTACTACTAAAGCAAAGGTACTATTTCTA CAACAATCTATATTTCGTTTCTTAAATATTCCAACAACATCAACTGAAAAAGTTAGTCATGAACCAATAC AACGTAAAATATCTAGCAAAAATTCTATGTCTAAAAACAGAAATAGCAAGAGATCCGTACGCAGTAATAA ATAGAAACGTACTACTGAGATATACTACCGATATAGAGTATAATGATTTAGTTACTTTAATAACCGTTAG ACATAAAATTGATTCTATGAAAACTGTGTTTCAGGTATTTAACGAATCATCCATAAATTATACTCCGGTT GATGATGATTATGGAGAACCAATCATTATAACATCGTATCTTCAAAAAGGTCATAACAAGTTTCCTGTAA ATTTTCTATACATAGATGTGGTAATATCTGACTTATTTCCTAGCTTTGTTAGACTAGATACTACAGAAAC TAATATAGTTAATAGTGTACTACAAACAGGCGATGGTAAAAAGACTCTTCGTCTTCCCAAAATGTTAGAG ACGGAAATAGTTGTCAAGATTCTCTATCGCCCTAATATACCATTAAAAATTGTTAGATTTTTCCGCAATA ACATGGTAACTGGAGTAGAGATAGCCGATAGATCTGTTATTTCAGTCGCTGATTAATCAATTAGTAGAGA TGAGATAAGAACATTATAATAATCAATAATATATCTTATATCTCGTTTAGAAAAATGCTAATATTAAAAT AGCTAACGCTAGTAATCCAATCGGAAGCCATTTGATATCTATAATAGGGTATCTAATTTCCTGATTCAGA TAGCGGACAGCTATATTCTCGGTAGCTACTCGTTTGGAATCACAAACATTATTTACATCTAATTTACTAT CTGTAATGGAAACGTTTCCCAATGAAATGGTACAATCCGATACATTGCATTTTGTTATATTTTTTTTTAA AGAGGCTGGTAACAACGCATCGCTTCGTTTACATGGCTCGTACCAACAATAATAGGGTAATCTTGTATCT ATTCCTATCCGTACTATGCTTTTATCAGGATAAATACATTTACATCGTATATCGTCTTTGTTAGCATCAC AGAATGCATAAATTTGTTCGTCCGTCATGATAAAAATTTAAAGTGTAAATATAACTATTATTTTTATAGT TGTAATAAAAAGGGAAATTTGATTGTATACCTTCGGTTCTTTAAAAGAAACTGACTTGATAAAAATGGCT GTAATCTCTAAGGTTACGTATAGTCTATATGATCAAAAAGAGATTAATGCTACAGATATTATCATTAGTC ATGTTAAAAATGACGACGATATCGGTACCGTTAAAGATGGTAGACTAGGTGCTATGGATGGGGCATTATG TAAGACTTGTGGGAAAACGGAATTGGAATGTTTCGGTCACTGGGGTAAAGTAAGTATTTATAAAACTCAT ATAGTTAAGCCTGAATTTATTTCAGAAATTATTCGTTTACTGAATCATATATGTATTCACTGCGGATTAT TGCGTTCACGAGAACCGTATTCCGACGATATTAACCTAAAAGAGTTATCGGGACACGCTCTTAGGAGATT AAAGGATAAAATATTATCCAAGAAAAAGTCATGTTGGAACAGTGAATGTATGCAACCGTATCAAAAAATT ACTTTTTCAAAGAAAAAGGTTTGTTTCGTCAACAAGTTGGATGATATTAACGTTCCTAATTCTCTCATCT ATCAAAAGTTAATTTCTATTCATGAAAAGTTTTGGCCATTATTAGAAATTCATCAATATCCAGCTAACTT ATTTTATACAGACTACTTTCCCATCCCTCCGTTGATTATTAGACCGGCTATTAGTTTTTGGATAGATAGT ATACCCAAAGAAACCAATGAATTAACTTACTTATTAGGTATGATCGTTAAGAATTGTAACTTGAATGCTG ATGAACAGGTTATCCAGAAGGCGGTAATAGAATACGATGATATTAAAATTATTTCTAATAACACTTCCAG TATCAATTTATCATATATTACATCCGGCAAAAATAATATGATTAGAAGTTATATCGTCGCCCGACGAAAA GATCAGACGGCTAGATCTGTAATTGGTCCCAGTACATCTATCACCGTTAATGAGGTAGGAATGCCCGCAT ATATTAGAAATACACTTACAGAAAAGATATTTGTTAATGCCTTTACAGTGGATAAAGTTAAACAACTATT AGCATCAAACCAAGTTAAATTTTACTTTAATAAACGATTAAACCAATTAACAAGAATACGCCAAGGAAAG TTTATCAAAAATAAAATACATTTATTGCCTGGTGATTGGGTAGAAGTAGCTGTTCAAGAATATACAAGTA TTATTTTTGGAAGACAGCCGTCTCTACATAGATACAACGTCATCGCTTCATCTATCAGAGCTACCGAAGG AGATACTATCAAAATATCTCCCGGAATTGCCAACTCTCAAAATGCTGATTTCGACGGAGATGAAGAATGG ATGATATTAGAACAAAATCCTAAAGCTGTAATTGAACAAAGTATTCTTATGTATCCGACGACGTTACTCA AACACGATATTCATGGAGCCCCCGTTTATGGATCTATTCAAGATGAAATCGTAGCAGCGTATTCATTGTT

TAGGATACAAGATCTTTGTTTAGATGAAGTATTGAACATCTTGGGGAAATATGGAAGAGAGTTCGATCCT
AAAGGTAAATGTAAATTCAGCGGTAAAGATATCTATACTTACTTGATAGGTGAAAAGATTAATTATCCGG
GTCTCTTAAAGGATGGTGAAATTATTGCAAACGACGTAGATAGTAATTTTGTTGTGGCTATGAGGCATCT
GTCATTGGCTGGACTCTTATCCGATCATAAGTCGAACGTGGAAGGTATCAACTTTATTATCAAGTCATCT
TATGTTTTTAAGAGATATCTATCTATTTACGGTTTTGGGGTGACATTCAAAGATCTGAGACCAAATTCGA
CGTTCACTAATAAATTGGAGGCCATCAACGTAGAAAAAATAGAACTTATCAAAGAAGCATACGCCAAATA
TCTCAACGATGTAAGAGACGGGAAAATAGTTCCATTATCTAAAGCTTTAGAGGCGGACTATGTGGAATCC
ATGTTATCCAACTTGACAAATCTTAATATCCGAGAGATAGAAGAACATATGAGACAAACGCTGATAGATG
ATCCAGATAATAACCTCCTGAAAATGGCCAAAGCGGGTTATAAAGTAAATCCTACAGAACTAATGTATAT
TCTAGGTACGTATGGACAACAAAGGATTGATGGTGAACCAGCAGAGACTCGAGTATTGGGTAGAGTCTTA
CCTTACTATCTTCCAGACTCTAAGGATCCAGAAGGAAGAGGTTACATTCTTAATTCTTTAACAAAAGGAT
TAACAGGTTCTCAATATTACTTTTCGATGCTGGTTGCAAGATCTCAATCTACTGATATCGTCTGTGAAAC
ATCACGTACCGGAACACTGGCTAGAAAAATCATTAAAAAGATGGAGGATATGGTGGTCGACGGATACGGA
CAAGTAGTTATAGGTAATACGCTCATCAAGTACGCCGCCAATTATACCAAAATTCTAGGCTCAGTATGTA
AACCTGTAGATCTTATCTATCCAGATGAGTCCATGACTTGGTATTTGGAAATTAGTGCTCTGTGGAATAA
AATAAAACAGGGATTCGTTTACTCTCAGAAACAGAAACTTGCAAAGAAGACATTGGCGCCGTTTAATTTC
CTAGTATTCGTCAAACCCACCACTGAGGATAATGCTATTAAGGTTAAGGATCTGTACGATATGATTCATA
ACGTCATTGATGATGTGAGAGAGAAATACTTCTTTACGGTATCTAATATAGATTTTATGGAGTATATATT
CTTGACGCATCTTAATCCTTCTAGAATTAGAATTACAAAAGAAACGGCTATCACTATCTTTGAAAAGTTC
TATGAAAAACTCAATTATACTCTAGGTGGTGGAACTCCTATTGGAATTATTTCTGCACAGGTATTGTCTG
AGAAGTTTACACAACAAGCCCTGTCCAGTTTTCACACTACTGAAAAAAGTGGTGCCGTCAAACAAAAACT
TGGTTTCAACGAGTTTAATAACTTGACTAATTTGAGTAAGAATAAGACCGAAATTATCACTCTGGTATCC
GATGATATCTCTAAACTTCAATCTGTTAAGATTAATTTCGAATTTGTATGTTTGGGAGAATTAAATCCAG
ACATCACTCTTCGAAAAGAAACAGATAGGTATGTAGTAGATATAATAGTCAATAGATTATACATCAAGAG
AGCAGAAATTACCGAATTAGTCGTCGAATATATGATTGAACGATTCATCTCCTTTAGCGTCATTGTAAAG
GAATGGGGTATGGAAACATTCATTGAGGACGAGGATAATATTAGATTTACTGTCTATCTAAATTTCGTTG
AACCAGAGGAATTGAATCTTAGTAAGTTTATGATGGTTCTTCCGGGGGCAGCCAACAAGGGAAAGATTAG
TAAATTCAAGATTCCTATCTCTGATTATACGGGTTATGACGACTTCAATCAAACAAAAAAGCTCAATAAG
ATGACTGTAGAACTCATGAATCTAAAAGAATTAGGTTCTTTCGATTTGGAAAACGTCAACGTGTATCCTG
GAGTATGGAATACATACGATATCTTCGGTATCGAGGCCGCTCGTGAATACTTGTGCGAAGCCATGTTAAA
CACCTATGGAGAAGGGTTCGATTATCTGTATCAGCCTTGTGATCTTCTCGCTAGTTTACTATGTGCTAGT
TACGAACCAGAATCAGTGAATAAATTCAAGTTCGGCGCAGCTAGTACTCTTAAGAGAGCTACGTTCGGAG
ACAATAAAGCATTGTTAAACGCGGCTCTTCATAAAAAGTCAGAACCTATTAACGATAATAGTAGCTGCCA
CTTTTTTAGCAAGGTCCCTAATATAGGAACTGGATATTACAAATACTTTATCGACTTGGGTCTTCTCATG
AGAATGGAAAGGAAACTATCTGATAAGATATCTTCTCAAAAGATCAAGGAAATGGAAGAAACAGAAGACT
TTTAATTCTTATCAATAACATATTTTTCTATGATCTGTCTTTTAAACGATGGATTTTCCACAAATGCGCC
TCTCAAGTCCCTCATAGAATGATACACGTATAAAAAATATAGCATAGGCAATGACTCCTTATTTTTAGAC
ATTAGATATGCCAAAATCATAGCCCCGCTTCTATTTACTCCCGCAGCACAATGAACCAACACGGGCTCGT
TTCGTTGATCACATTTAGATAAAAAGGCGGTTACGTCGTCAAAATATTTACTAATATCGGTAGTTGTATC
ATCTACCAACGGTATATGAATAATATTAATATTAGAGTTAGGTAATGTATATTTATCCATCGTCAAATTT
AAAACATATTTGAACTTAACTTCAGATGATGGTGCATCCATAGCATTTTTATAATTTCCCAAATACACAT
TATTGGTTACCCTTGTCATTATAGTGGGAGATTTGGCTCTGTGCATATCTCCAGTTGAACGTAGTAGTAA
GTATTTATACAAACTTTTCTTATCCATTTATAACGTACAAATGGATAAAACTACTTTATCGGTAAACGCG
TGTAATTTAGAATACGTTAGAGAAAAGGCTATAGTAGGCGTACAAGCAGCCAAAACATCAACACTTATAT
TCTTTGTTATTATATTGGCAATTAGTGCGCTATTACTCTGGTTTCAGACGTCTGATAATCCAGTCTTTAA
TGAATTAACGAGATATATGCGAATTAAAAATACGGTTAACGATTGGAAATCATTAACGGATAGCAAAACA
AAATTAGAAAGTGATAGAGGTAGACTTCTAGCCGCTGGTAAGGATGATATATTCGAATTCAAATGTGTGG
ATTTCGGCGCCTATTTTATAGCTATGCGATTGGATAAGAAAACATATCTGCCGCAAGCTATTAGGCGAGG
TACTGGAGACGCGTGGATGGTTAAAAAGGCGGCAAAGGTCGATCCATCTGCTCAACAATTTTGTCAGTAT
TTGATAAAACACAAGTCTAATAATGTTATTACTTGTGGTAATGAGATGTTAAATGAATTAGGTTATAGCG
GTTATTTTATGTCACCGCATTGGTGTTCCGATTTTAGTAATATGGAATAGTGTTAGATAAATGCGGTAAC
GAATGTTCCTGTAAGGAACCATAACAGTTTAGATTTAACGTTAAAGATGAGCATAAACATAATAAACAAA
ATTACAATCAAACCTATAACATTAATATCAAACAATCCAAAAAATGAAATCAGTGGAGTAGTAAACGCGT
ACATAACTCCTGGATAACGTTTAGTAGCTGCCGTTCCTATTCTAGACCAAAAATTCGGTTTCATGTTTTC
GAAACGGTGTTCTGCAACAAGTCGGGGATCGTGTTCTACATATTTGGCGGCATTATCCAGTATCTGCCTA
TTGATCTTCATTTCGTTTTCAATTCTGGCTATTTCAAAATAAAATCCCGATGATAGACCTCCAGACTTTA
TAATTTCATCTACGATGTTCAGCGCCGTAGTAACTCTAATAATATAGGCTGATAAGCTAACATCATACCC
TCCTGTATATGTGAATATGGCATGATTTTTGTCCATTACAAGCTCGGTTTTAACTTTATTGCCTGTAATA
ATTTCTCTCATCTGTAGGATATCTATTTTTTTTGTCATGCATTGCCTTCAAGACGGGACGAAGAAACGTAA
TATCCTCAATAACGTTATCGTTTTCTACAATAACTACATATTCTACCTTTTTATTTTCTAACTCGGTAAA
AAAATTAGAATCCCATAGGGCTAAATGTCTAGCGATATTTCTTTTCGTTTCCTCTGTACACATAGTGTTA

CAAAACCCTGAAAAGAAGTGAGTATACTTGTCATCATTTCTAATGTTTCCTCCAGTCCACTGTATAAACG
CATAATCCTTGTAATGATCTGGATCATCCTTGACTACCACAACATTTCTTTTTTCTGGCATAACTTCGTT
GTCCTTTACATCATCGAACTTCTGATCATTAATATGCTCATGAACATTAGGAAATGTTTCTGATGGAAGT
CTATCAATAACTGGCACAACAATAACAGGAGTTTTCGCCGCCGCCATTTAGTTATTGAAATTAATCATAT
ACAACTCTTTAATACGAGTTATATTTTCGTCTATCCATTGTTTCACATTTACATATTTCGACAAAAAGAT
ATAAAATGCGTATTCCAATGCTTCTCTGTTTAATGAATTACTAAAATATACAAACACGTCACTGTCTGGC
AATAAATGATATCTTAGAATATTGTAACAATTTATTTTGTATTGCACATGTTCGTGATCTATGAGTTCTT
CTTCGAATGGCATAGGATCTCCGAATCTGAAAACGTATAAATAGGAGTTAGAATAATAATATTTGAGAGT
ATTGGTAATATATAAACTCTTTAGCGGTATAATTAGTTTTTTTCTCTCAATTTCTATTTTTAGATGTGAT
GGAAAAATGACTAATTTTGTAGCATTAGTATCATGAACTCTAATCAAAATCTTAATATCTTCGTCACACG
TTAGCTCTTTGAAGTTTTTAAGAGATGCATCAGTTGGTTCGACCGATGGAGTAGGTGCAACAATTTTTTG
TTCGATGTATGTATGTACTGGAGCCATTGTTTTAACTATAATGGTGCTTGTATCGAAAAACTTTAATGCA
GATAGCGGAAGCTCTTCGCCGCGACTTTCTACATCGTAATTGGGTTCTAACGCCGATCTCTGAATGGATA
CTAGTTTTCTAAGTTCTAATGTGATTCTCTGAAAATGTAAATCCAATTCCTCCGGCATTATAGATGTGTA
TACATCGGTAAATAAAACTATAGTATCCAACGATCCCTTCTCGCAAATTCTAGTCTTAACCAAAAAATCG
TATATAACCACGGAGATGGCGTATTTAAGAGTGGATTCTTCTACCGTTTTGTTCTTGGATGTCATATAGG
AAACTATAAAGTCCGCACTACTGTTAAGAATGATTACTAACGCAACTATATAGTTCAAATTAAGCATTTT
GGAAACATAAAATAACTCTGTAGACGATACTTGACTTTCGAATAAGTTTGCAGACAAACGAAGAAAGAAC
AGACCTCTCTTAATTTCAGAAGAAAACTTTTTTTCGTATTCCTGACGTCTAGAGTTTATATCAATAAGAA
AGTTAAGAATTAGTCGGTTAATGTTGTATTTCATTACCCAAGTTTGAGATTTCATAATATTATCAAAAGA
CATGATAATATTAAAGATAAAGCGCTGACTATGAACGAAATAGCTATATGGTTCGCTCAAAAATATAGTC
TTGTTAAACGTGGAAACGATAACTGTATTTTTAATCACGTCAGCGGCATCTAAATTAAATATAGGTATAT
TTATTCCACACACTCTACAATATGCCACACCATCTTCATAATAAATAAATTCGTTAGCAAAATTATTAAT
TTTAGTGAAATAGTTAGCGTCAACTTTCATAGCTTCCTTCAATCTAATTTGATGCTCACACGGTGCGAAT
TCCACTCTAACATCCCTTTTCCATGCCTCAGGTTCATCGATCTCTATAATATCTAGTTTTTTGCGTTTCA
CAAACACAGGCTCGTCTCTCGCGATGAGATCTGTATAGTAACTATGTAAATGATAACTAGATAGAAAGAT
GTAGCTATATAGATGACGATCCTTTAAGAGAGGTATAATAACTTTACCCCAATCAGATAGACTGTTGTTA
TGGTCTTCGGAAAAAGAATTTTTATAAATTTTTCCAGTATTTTCCAAATATACGTACTTAACATCTAAAA
AATCCTTAATGATAATAGGAATGGATAATCCGTCTATTTTATAAAGAAATACATATCGCACATTATACTT
TTTTTTGGAAATGGGAATACCGATGTGTCTACATAAATATGCAAAGTCTAAATATTTTTTAGAGAATCTT
AATTGGTCCAAATTCTTTTCCAAGTACGGTAATAGATTTTTCATATTGAACGGTATCTTCTTAATCTCTG
GTTCTAGTTCCGCATTAAATGATGAAACTAAGTCACTATTTTTATAACTAACGATTACATCACCTCTAAC
ATCATCATTTACCAGAATACTGATCTTCTTTTGTCGTAAATACATGTCTAATGTGTTAAAAAAAAGATCA
TACAAGTTATACGTCATTTCATCTGTGGTATTCTTGTCATTGAAGGATAAACTCGTACTAATCTCTTCTT
TAACAGCCTGTTCAAATTTATATCCTATATACGAAAAAATAGCAACCAGTGTTTGATCATCCGCGTCAAT
ATTCTGTTCTATCGTAGTGTATAACAATCGTATATCTTCTTCTGTGATAGTCGATACGTTATAAAGGTTG
ATAACGAAAATATTTTTATTTCGTGAAATAAAGTCATCGTAGGATTTTGGACTTATATTCGCGTCTAGTA
GATATGCTTTTATTTTTGGAATGATCTCAATTAGAATAGTCTCTTTAGAGTCCATTTAAAGTTACAAACA
ACTAGGAAATTGGTTTATGATGTATAATTTTTTTAGTTTTTATAGATTCTTTATTCTATACTTAAAAAAT
GAAAATAAATACAAAGGTTCTTGAGGGTTGTGTTAAATTGAAAGCGAGAAATAATCATAAATTATTTCAT
TATCGCGATATCCGTTAAGTTTGTATCGTAATGGCGTGGTCAATTACAAATAAAGCGGATACTAGTAGCT
TCACAAAGATGGCTGAAATCAGAGCTCATCTAAAAAATAGCGCTGAAAATAAAGATAAAAACGAGGATAT
TTTCCCGGAAGATGTAATAATTCCATCTACTAAGCCCAAAACCAAACGAGCCACTACTCCTCGTAAACCA
GCGGCTACTAAAAGATCAACCAAAAAGGAGGAAGTGGAAGAAGAAGTAGTTATAGAGGAATATCATCAAA
CAACTGAAAAAAATTCTCCATCTCCTGGAGTCAGCGACATTGTAGAAAGCGTGGCCGCTGTAGAGCTCGA
TGATAGCGACGGGGATGATGAACCTATGGTACAAGTTGAAGCTGGTAAAGTAAATCATAGTGCTAGAAGC
GATCTCTCTGACCTAAAGGTGGCTACCGACAATATCGTTAAAGATCTTAAGAAAATTATTACTAGAATCT
CTGCAGTATCGACGGTTCTAGAGGATGTTCAAGCAGCTGGTATCTCTAGACAATTTACTTCTATGACTAA
AGCTATTACAACACTATCTGATCTAGTCACCGAGGGAAAATCTAAAGTTGTTCGTAAAAAAGTTAAAACT
TGTAAGAAGTAAATGCGTGCACTTTTTTATAAAGATGGTAAACTCTTTACCGATAATAATTTTTTAAATC
CTGTATCAGACGATAATCCAGCGTATGAGGTTTTGCAACATGTTAAAATTCCTACTCATTTAACAGATGT
AGTAGTATATGAACAAACGTGGGAGGAGGCGTTAACTAGATTAATTTTTGTGGGAAGTGATTCAAAAGGA
CGTAGACAATACTTTTACGGAAAAATGCATGTACAGAATCGCAACGCTAAAAGAGATCGTATTTTTGTTA
GAGTATATAACGTTATGAAACGAATTAATTGTTTTATAAACAAAAATATAAAGAAATCGTCCACAGATTC
CAATTATCAGTTGGCGGTTTTTATGTTAATGGAAACTATGTTTTTTATTAGATTTGGTAAAATGAAATAT
CTTAAGGAGAATGAAACAGTAGGGTTATTAACACTAAAAAATAAACACATAGAAATAAGTCCCGATGAAA
TAGTTATCAAGTTTGTAGGAAAGGACAAAGTTTCACATGAATTTGTTGTTCATAAGTCTAATAGACTATA
TAAGCCGCTATTGAAACTGACGGATGATTCTAGTCCCGAAGAATTTCTGTTCAACAAACTAAGTGAACGA
AAGGTATATGAATGTATCAAACAGTTTGGTATTAGAATCAAGGATCTCCGAACGTATGGAGTCAATTATA
CGTTTTTATATAATTTTTGGACAAATGTAAAGTCCATATCTCCTCTTCCATCACCAAAAAAGTTAATAGC
GTTAACTATCAAACAAACTGCTGAAGTGGTAGGTCATACTCCATCAATTTCAAAAAGAGCTTATATGGCA

	ACGACTATTTTAGAAATGGTAAAGGATAAAAATTTTTTAGATGTAGTATCTAAAACTACGTTCGATGAAT
	TCCTATCTATAGTCGTAGATCACGTTAAATCATCTACGGATGGATGATATAGATCTTTACACAAATAATT
	ACAAAACCGATAAATGGAAATGGATAAGCGTATGAAATCTCTCGCAATGACCGCTTTCTTTGGGGAGCTA
	AGCACATTAGATATTATGGCATTGATAATGTCTATATTTAAACGCCATCCAAACAATACCATTTTTTCAG
	TGGATAAGGATGGTCAGTTTATGATTGATTTCGAATACGATAATTATAAGGCTTCTCAATATTTGGATCT
	GACCCTCACTCCGATATCTGGAGATGAATGCAAGACTCACGCATCGAGTATAGCCGAACAATTGGCGTGT
	GTGGATATTATTAAAGAGGATATTAGCGAATATATCAAAACTACTCCCCGTCTTAAACGATTTATAAAAA
	AATACCGCAATAGATCAGATACTCGCATCAGTCGAGATACAGAAAAGCTTAAAATAGCTCTAGCTAAAGG
	CATAGATTACGAATATATAAAAGACGCTTGTTAATAAGTAAATGAAAAAAAACTAGTCGTTTATAATAAA
	ACACGATATGGATGCCAACGTAGTATCATCTTCTACTATTGCGACGTATATAGACGCTTTAGCGAAGAAT
	GCTTCGGAATTAGAACAGAGGTCTACCGCATACGAAATAAATAATGAATTGGAACTAGTATTTATTAAGC
	CGCCATTGATTACTTTGACAAATGTAGTGAATATCTCTACGATTCAGGAATCGTTTATTCGATTTACCGT
	TACTAATAAGGAAGGTGTTAAAATTAGAACTAAGATTCCATTATCTAAGGTACATGGTCTAGATGTAAAA
	AATGTACAGTTAGTAGATGCTATAGATAACATAGTTTGGGAAAAGAAATCATTAGTGACGGAAAATCGTC
	TTCACAAAGAATGCTTGTTGAGACTATCGACAGAGGAACGTCATATATTTTTGGATTACAAGAAATATGG
	ATCCTCTATCCGACTAGAATTAGTCAATCTTATTCAAGCAAAAACAAAAAACTTTACGATAGACTTTAAG
	CTAAAATATTTTCTAGGATCCGGTGCCCAGTCTAAAAGTTCTTTATTACACGCTATTAATCATCCAAAGT
	CAAGGCCTAATACATCTCTGGAAATAGAATTTACACCTAGAGACAATGAAACAGTTCCATATGATGAACT
	AATAAAGGAATTGACGACTCTCTCGCGTCATATATTTATGGCTTCTCCAGAGAATGTAATTCTTTCTCCG
	CCTATTAACGCGCCTATAAAAACCTTTATGTTGCCTAAACAAGATATAGTAGGTTTGGATCTGGAAAATC
	TATATGCCGTAACTAAGACTGACGGCATTCCTATAACTATCAGAGTTACATCAAACGGGTTGTATTGTTA
	TTTTACACATCTTGGTTATATTATTAGATATCCTGTTAAGAGAATAATAGATTCCGAAGTAGTAGTCTTT
	GGTGAGGCAGTTAAGGATAAGAACTGGACCGTATATCTCATTAAGCTAATAGAGCCTGTGAATGCAATCA
	ATGATAGACTAGAAGAAAGTAAGTATGTTGAATCTAAACTAGTGGATATTTGTGATCGGATAGTATTCAA
	GTCAAAGAAATACGAAGGTCCGTTTACTACAACTAGTGAAGTCGTCGATATGTTATCTACATATTTACCA
	AAGCAACCAGAAGGTGTTATTCTGTTCTATTCAAAGGGACCTAAATCTAACATTGATTTTAAAATTAAAA
	AGGAAAATACTATAGACCAAACTGCAAATGTAGTATTTAGGTACATGTCCAGTGAACCAATTATCTTTGG
	AGAGTCGTCTATCTTTGTAGAGTATAAGAAATTTAGCAACGATAAAGGCTTTCCTAAAGAATATGGTTCT
	GGTAAGATTGTGTTATATAACGGCGTTAATTATCTAAATAATATCTATTGTTTGGAATATATTAATACAC
	ATAATGAAGTGGGTATTAAGTCCGTGGTTGTACCTATTAAGTTTATAGCAGAATTCTTAGTTAATGGAGA
	AATACTTAAACCTAGAATTGATAAAACCATGAAATATATTAACTCAGAAGATTATTATGGAAATCAACAT
	AATATCATAGTCGAACATTTAAGAGATCAAAGCATCAAAATAGGAGATATCTTTAACGAGGATAAACTAT
	CGGATGTGGGACATCAATACGCCAATAATGATAAATTTAGATTAAATCCAGAAGTTAGTTATTTTACGAA
	TAAACGAACTAGAGGACCGTTGGGAATTTTATCAAACTACGTCAAGACTCTTCTTATTTCTATGTATTGT
	TCCAAAACATTTTTAGACGATTCCAACAAACGAAAGGTATTGGCGATTGATTTTGGAAACGGTGCTGACC
	TGGAAAAATACTTTTATGGAGAGATTGCGTTATTGGTAGCGACGGATCCGGATGCTGATGCTATAGCTAG
	AGGAAATGAAAGATACAACAAATTAAACTCTGGAATTAAAACCAAGTACTACAAATTTGACTACATTCAG
	GAAACTATTCGATCCGATACATTTGTCTCTAGTGTCAGAGAAGTATTCTATTTTGGAAAGTTTAATATCA
	TCGACTGGCAGTTTGCTATCCATTATTCTTTTCATCCGAGACATTATGCTACCGTCATGAATAACTTATC
	CGAACTAACTGCTTCTGGAGGCAAGGTATTAATCACTACCATGGACGGAGACAAATTATCAAAATTAACA
	GATAAAAAGACTTTTATAATTCATAAGAATTTACCTAGTAGCGAAAACTATATGTCTGTAGAAAAAATAG
	CTGATGATAGAATAGTGGTATATAATCCATCAACAATGTCTACTCCAATGACTGAATACATTATCAAAAA
	GAACGATATAGTCAGAGTGTTTAACGAATACGGATTTGTTCTTGTAGATAACGTTGATTTCGCTACAATT
	ATAGAACGAAGTAAAAAGTTTATTAATGGCGCATCTACAATGGAAGATAGACCATCTACAAGAAACTTTT
	TCGAACTAAATAGAGGAGCCATTAAATGTGAAGGTTTAGATGTCGAAGACTTACTTAGTTACTATGTTGT
	TTATGTCTTTTCTAAGCGGTAAATAATAATATGGTATGGGTTCTGATCTCCCAGTTCTAAATGCATTAAA
	TAATTCCAATAGAGCGATTTTTGTTCCTATAGGACCTTCCAACTGTGGATACTCTGTATTGTTAATAGAT
	ATATTAATACTTTTGTCGGGTAACAGAGGTTCTACGTCTTTTAAAAATAAAAGTTTGATAACATCTGGCC
	TGTTCATAAATAAAAACTTGGCGATTCTATATATACTCTTATTATCAAATCTAGCCATTGTCTTATAGAT
	GTGAGCTACTGTAGGTGTACCATTTGATTTTCTTTCTAATACTATATATTTCTCTCGAAGAAGTTCTTGC
	ACATCATCTGGGAATAAAATACTACTGTTGAGTAAATCAGTTATTTTTTTTATATCGATATTGATGGACA
	TTTTTATAGTTAAGGATAATAAGTATCCCAAAGTAGATAACGACGATAACGAAGTATTTATACTTTTAGG
	AAATCACAATGACTTTATCAGATTAAAATTAACAAAATTAAAGGAGCATGTATTTTTTTCTGAATATATT
	GTGACTCCAGATACATATGGATCTTTATGCGTCGAATTAAATGGGTCTAGTTTTCAGCACGGCGGTAGAT
	ATATAGAGGTGGAGGAATTTATAGATGCTGGAAGACAAGTTAGATGGTGTTCTACATCCAATCATATATC
	TAAAGATATACCCGAAGATATGCACACTGATAAATTTGTCATTTATGATATATACACTTTTGACGCTTTC
	AAGAATAAACGATTGGTATTCGTACAGGTACCTCCGTCGTTAGGAGATGATAGTCATTTGACTAATCCGT
	TATTGTCTCCGTATTATCGTAATTCAGTAGCCAGACAAATGGTCAATGATATGATTTTTAATCAAGATTC
	ATTTTTAAAATATTTATTAGAACATCTGATTAGAAGCCACTATAGAGTTTCTAAACATATAACAATAGTT
	AGATACAAGGATACCGAAGAATTAAATCTAACGAGAATATGTTATAATAGAGATAAGTTTAAGGCGTTTG
	TATTCGCTTGGTTTAACGGCGTTTCGGAAAATGAAAAGGTACTAGATACGTATAAAAAGGTATCTAATTT

GATATAATGAATTCAGTGACTGTATCACACGCGCCATATACTATTACTTATCACGATGATTGGGAACCAG
TAATGAGTCAATTGGTAGAGTTTTATAACGAAGTAGCCAGTTGGCTGCTACGAGACGAGACGTCGCCTAT
TCCTGATAAGTTCTTTATACAGTTGAAACAACCGCTTAGAAATAAACGAGTATGTGTGTGCGGTATAGAT
CCGTATCCGAAAGATGGAACTGGTGTACCGTTCGAATCACCAAATTTTACAAAAAAATCAATTAAGGAGA
TAGCTTCATCTATATCTAGATTAACCGGAGTAATTGATTATAAAGGTTATAACCTTAATATAATAGACGG
GGTTATACCCTGGAATTATTACTTAAGTTGTAAATTAGGAGAAACAAAAAGTCACGCGATCTACTGGGAT
AAGATTTCCAAGTTACTGCTGCAGCATATAACTAAACACGTTAGTGTTCTTTATTGTTTGGGTAAAACAG
ATTTCTCGAATATACGGGCCAAGTTAGAATCCCCGGTAACTACCATAGTCGGATATCATCCAGCGGCTAG
AGACCGCCAATTCGAGAAAGATAGATCATTTGAAATTATCAACGTTTTACTGGAATTAGACAACAAGGCA
CCTATAAATTGGGCTCAAGGGTTTATTTATTAATGCTTTAGTGAAATTTTAACTTGTGTTCTAAATGGAT
GCGGCTATTAGAGGTAATGATGTTATCTTTGTTCTTAAGACTATAGGTGTCCCGTCAGCGTGCAGACAAA
ATGAAGATCCAAGATTTGTAGAAGCATTTAAATGCGACGAGTTAGAAAGATATATTGAGAATAATCCAGA
ATGTACACTATTCGAAAGTCTTAGGGATGAGGAAGCATACTCTATAGTCAGAATTTTCATGGATGTAGAT
TTAGACGCGTGTCTAGACGAAATAGATTATTTAACGGCTATTCAAGATTTTATTATCGAGGTGTCAAACT
GTGTAGCTAGATTCGCGTTTACAGAATGCGGCGCCATTCATGAAAATGTAATAAAATCCATGAGATCTAA
TTTTTCATTGACTAAGTCTACAAATAGAGATAAAACAAGTTTTCATATTATCTTTTTAGACACGTATACC
ACTATGGATACATTGATAGCTATGAAACGAACACTATTAGAATTAAGTAGATCATCTGAAAATCCACTAA
CAAGATCGATAGACACTGCCGTATATAGGAGAAAAACAACTCTTCGGGTTGTAGGTACTAGGAAAAATCC
AAATTGCGACACTATTCATGTAATGCAACCACCGCATGATAATATAGAAGATTACCTATTCACTTACGTG
GATATGAACAACAATAGTTATTACTTTTCTCTACAACAACGATTGGAGGATTTAGTTCCTGATAAGTTAT
GGGAACCAGGGTTTATTTCATTCGAAGACGCTATAAAAAGAGTTTCAAAAATATTCATTAATTCTATAAT
AAACTTTAATGATCTCGATGAAAATAATTTTACAACGGTACCACTGGTCATAGATTACGTAACACCTTGT
GCATTATGTAAAAAACGATCGCATAAACATCCGCATCAACTATCGTTGGAAAATGGTGCTATTAGAATTT
ACAAAACTGGTAATCCACATAGTTGTAAAGTTAAAATTGTTCCGTTGGATGGTAATAAACTGTTTAATAT
TGCACAAAGAATTTTAGACACTAACTCTGTTTTATTAACCGAACGAGGAGACCATATAGTTTGGATTAAT
AATTCATGGAAATTTAACAGCGAAGAACCCTTGATAACAAAACTAATTTTGTCAATAAGACATCAACTAC
CTAAGGAATATTCAAGCGAATTACTCTGTCCAAGAAAACGAAAGACTGTAGAAGCTAACATACGAGACAT
GTTAGTAGATTCAGTAGAGACCGATACCTATCCGGATAAACTTCCGTTTAAAAATGGTGTATTGGACCTG
GTAGACGGAATGTTTTACTCTGGAGATGATGCTAAAAAATATACGTGTACTGTATCAACCGGATTTAAAT
TTGACGATACAAAGTTCGTCGAAGACAGTCCAGAAATGGAAGAGTTAATGAATATCATTAACGATATCCA
ACCATTAACGGATGAAAATAAGAAAAATAGAGAGCTATATGAAAAAACATTATCTAGTTGTTTATGCGGT
GCTACCAAAGGATGTTTAACATTCTTTTTTGGAGAAACTGCAACTGGAAAGTCGACAACCAAACGTTTGT
TAAAGTCTGCTATCGGTGACCTGTTTGTTGAGACGGGTCAAACAATTTTAACAGATGTATTGGATAAAGG
ACCTAATCCATTTATCGCTAACATGCATTTGAAAAGATCTGTATTCTGTAGCGAACTACCTGATTTTGCC
TGTAGTGGATCAAAGAAAATTAGATCTGACAATATTAAAAAGTTGACAGAACCTTGTGTCATTGGAAGAC
CGTGTTTCTCCAATAAAATTAATAATAGAAACCATGCGACAATCATTATCGATACTAATTACAAACCTGT
TTTTGATAGGATAGATAACGCATTAATGAGAAGAATTGCCGTCGTGCGATTCAGAACACACTTTTCTCAA
CCTTCTGGTAGAGAGGCTGCTGAAAATAATGACGCGTACGATAAAGTCAAACTATTAGACGAGGGGTTAG
ATGGTAAAATACAAAATAATAGATATAGATTCGCATTTCTATACTTGTTGGTGAAATGGTACAGAAAATA
TCATGTTCCTATTATGAAACTATATCCTACACCCGAAGAGATTCCTGACTTTGCATTCTATCTCAAAATA
GGTACTCTGTTAGTATCTAGCTCTGTAAAGCATATTCCATTAATGACGGACCTCTCCAAAAAGGGATATA
TATTGTACGATAATGTGGTCACTCTTCCGTTGACTACTTTCCAACAGAAAATATCCAAGTATTTTAATTC
TAGACTATTTGGACACGATATAGAGAGCTTCATCAATAGACATAAGAAATTTGCCAATGTTAGTGATGAA
TATCTGCAATATATATTCATAGAGGATATTTCATCTCCGTAAATATATGCTCATATATTTATAGAAGATA
TCACATATCTAAATGAATACCGGAATCATAGATTTATTTGATAATCATGTTGATAGTATACCAACTATAT
TACCTCATCAGTTAGCTACTCTAGATTATCTAGTTAGAACTATCATAGATGAGAACAGAAGCGTGTTATT
GTTCCATATTATGGGATCAGGTAAAACAATAATCGCTTTGTTGTTCGCCTTGGTAGCTTCCAGATTTAAA
AAGGTTTACATTCTAGTGCCTAATATCAACATTTTGAAAATTTTTAATTATAATATGGGTGTAGCTATGA
ACTTGTTTAATGACGAATTCATAGCTGAGAATATCTTTATTCATTCCACAACAAGTTTTTATTCTCTTAA
TTATAACGATAACGTCATTAATTATAACGGATTATCTCGCTACAATAACTCTATTTTTATCGTTGATGAG
GCACATAATATCTTTGGGAATAATACTGGAGAACTTATGACCGTGATAAAAAATAAAAACAAGATTCCTT
TTCTACTATTGTCTGGATCTCCCATTACTAACACACCTAATACTCTGGGTCATATTATAGATTTAATGTC
CGAAGAGACGATAGATTTTGGTGAGATTATTAGTCGTGGTAAGAAAGTAATTCAGACACTTCTTAACGAA
CGCGGTGTGAATGTACTTAAGGATTTGCTTAAAGGAAGAATATCATATTACGAAATGCCTGATAAAGATC
TACCAACGATAAGATATCACGGACGTAAGTTTCTAGATACTAGAGTAGTATATTGTCACATGTCTAAACT
TCAAGAGAGAGATTATATGATTACTAGACGACAGCTATGTTATCATGAAATGTTTGATAAAAATATGTAT
AACGTGTCAATGGCAGTATTGGGACAACTTAATCTGATGAATAATTTAGATACTTTATTTCAGGAACAGG
ATAAGGAATTGTACCCAAATCTGAAAATAAATAATGGCGTGTTATACGGAGAAGAATTGGTAACGTTAAA
CATTAGTTCCAAATTTAAATACTTTATTAATCGGATACAGACACTCAACGGAAAACATTTTATATACTTT
TCTAATTCTACATATGGCGGATTGGTAATTAAATATATCATGCTCAGTAATGGATATTCTGAATATAATG
GTTCTCAGGGAACTAATCCACATATGATAAACGGCAAACCAAAAACATTTGCTATCGTTACTAGTAAAAT

GAAATCGTCTTTAGAGGATCTATTAGATGTGTATAATTCTCCTGAAAACGATGATGGTAGTCAATTGATG
TTTTTGTTTTCGTCAAACATTATGTCCGAATCCTATACTCTGAAAGAGGTAAGGCATATTTGGTTTATGA
CTATCCCAGATACTTTTTCTCAATACAACCAAATTCTTGGACGATCTATTAGAAAATTCTCTTACGCCGA
TATTTCTGAACCAGTTAATGTATATCTTTTAGCCGCCGTATATTCCGATTTCAATGACGAAGTAACGTCA
TTAAACGATTACACACAGGATGAATTGATTAATGTTTTACCATTTGACATCAAAAAGCTGTTATATCTAA
AATTTAAGACTAAAGAAACGAATAGAATATACTCTATTCTTCAAGAGATGTCTGAAACGTATTCTCTTCC
ACCACATCCATCAATTGTAAAAGTTTTATTGGGAGAATTGGTCAGACAATTTTTTTATAATAATTCTCGT
ATTAAGTATAACGACTCCAAGTTACTTAAAATGGTTACATCAGTTATAAAAAATAAAGAAGACGCTAGGA
ATTACATAGATGATATTGTAAACGGTCACTTCTTTGTATCGAATAAAGTATTTGATAAATCTCTTTTATA
CAAATACGAAAACGATATTATTACAGTACCGTTTAGACTTTCCTACGAACCATTTGTTTGGGGAGTTAAC
TTTCGTAAAGAATATAACGTGGTATCTTCTCCATAAAACTGATGAAATATATAAAGAAATAAATGTCGAG
CTTTGTTACCAATGGATACCTTCCAGTTACATTGGAACCACACGAGCTGACGTTAGACATAAAAACTAAT
ATTAGGAATGCCGTATATAAGACGTATCTCCATAGAGAAATTAGTGGTAAAATGGCCAAGAAAATAGAAA
TTCGTGAAGACGTGGAATTACCTCTCGGCGAAATAGTTAATAATTCTGTAGTTATAAACGTTCCGTGTGT
AATAACCTACGCGTATTATCACGTTGGGGATATAGTCAGAGGAACATTAAACATCGAAGATGAATCAAAT
GTAACTATTCAATGTGGAGATTTAATCTGTAAACTAAGTAGAGATTCGGGTACTGTATCATTTAGCGATT
CAAAGTACTGCTTTTTTCGAAATGGTAATGCGTATGACAATGGCAGCGAAGTCACTGCCGTTCTAATGGA
GGCTCAACAAGGTATCGAATCTAGTTTTGTTTTTCTCGCGAATATCGTCGACTCATAAAAAAGAGAATAG
CGGTAAGTATAAACACGAATACTATGGCAATAATTGCGAATGTTTTATTCTCTTCGATATATTTTTGATA
ATATGAAAAACATGTCTCTCTCAAATCGGACAACCATCTCATAAAATAGTTCTCGCGCGCTGGAGAGGTA
GTTGCTGCTCGTATAATCTCCCCAGAATAATATACTTGCGTGTCGTCGTTCAATTTATACGGATTTCTAT
AGTTCTCTGTTATATAATGCGGTTTTCCATCATGATTAGACGACGACAATAGTGTTCTGAATTTAGATAG
TTGATCAGAATGAATGTTTATTGGCGTTGGAAAAATTATCCATACAGCGTCTGCAGAGTGGTTGATAGTT
GTTCCTAGATATGTAAAATAATCCAACTTACTAGGCAGCAAATTGTCTAGATAAAATACTGAATCAAACG
GTGCAGACGTATTGGCGGATCTAATGGAATCCAATTGATTAACTATCTTTTGAAAATATACATTTTTATG
ATCCAATACTTGTAAGAATATAGAAATAATGATAAGTCCATCATCGTGTTTTTTTGCCTCTTCATAAGAA
CTATATTTTTTCTTATTCCAATGAACAAGATTAATCTCTCCAGAGTATTTGTACACATCTATCAAGTGAT
TGGATCCATAATCGTCTTCCTTTCCCCAATATATATGTAGTGATGATAACACATATTCATTGGGGAGAAA
CCCTCCACTTATATATCCTCCTTTAAAATTAATCCTTACTAGTTTTCCAGTGTTCTGGATAGTGGTTGGT
TTCGACTCATTATAATGTATGTCTAACGGCTTCAATCGCGCGTTAGAAATTGCTTTTTTAGTTTCTATAT
TAATAGGAGATAGTTGTTGCGGCATAGTAAAAATGAAATGATAACTGTTTAAAAATAGCTCTTAGTATGG
GAATTACAATGGATGAGGAAGTGATATTTGAAACTCCTAGAGAATTAATATCTATTAAACGAATAAAAGA
TATTCCAAGATCAAAAGACACGCACGTGTTTGCTGCGTGTATAACAAGTGACGGATATCCGTTAATAGGA
GCTAGAAGAACTTCATTCGCGTTCCAGGCGATATTATCTCAACAAAATTCAGATTCTATCTTTAGAGTAT
CCACTAAACTATTACGGTTTATGTACTACAATGAACTAAGAGAAATCTTTAGACGGTTGAGAAAAGGTTC
TATCAACAATATCGATCCTCACTTTGAAGAGTTAATATTATTGGGTGGTAAACTAGATAAAAAGGAATCT
ATTAAAGATTGTTTAAGAAGAGAATTAAAAGAGGAAAGTGATGAACGTATAACAGTAAAAGAATTCGGAA
ATGTAATTCTAAAACTTACAACGCGCGATAAATTATTTAATAAAGTATATATAGGTTATTGCATGGCGTG
TTTTATTAATCAATCGTTGGAGGATTTATCGCATACTAGTATTTACAATGTAGAAATTAGAAAGATTAAA
TCATTAAATGATTGTATTAACGACGATAAATACGAATATCTGTCTTATATTTATAATATGCTAGTTAATA
GTAAATGAACTTTTACAGATCTAGTATAATTAGTCAGATTATTAAGTATAATAGACGACTAGCTAAGTCT
ATTATTTGCGAGGATGACTCTCAAATTATTACACTCACGGCATTCGTTAACCAATGCCTATGGTGTCATA
AACGAGTATCCGTGTCCGCTATTTTATTAACTACTGATAACAAAATATTAGTATGTAACAGACGAGATAG
TTTTCTCTATTCTGAAATAATTAGAACTAGAAACATGTTTAGAAAGAAACGATTATTTCTGAATTATTCC
AATTATTTGAACAAACAGGAAAGAAGTATACTATCGTCATTTTTTTCTCTAGATCCAGCTACTGCTGATA
ATGATAGAATAGACGCTATTTATCCGGGTGGCATACCCAAAAGGGGTGAGAATGTTCCAGAGTGTTTATC
CAGGGAAATTAAAGAAGAAGTTAATATAGACAATTCTTTTGTATTCATAGACACTCGGTTTTTTATTCAT
GGCATCATAGAAGATACCATTATTAATAAATTTTTTGAGGTAATCTTCTTTGTCGGAAGAATATCTCTAA
CGAGTGATCAAATCATTGATACATTTAAAAGTAATCATGAAATCAAGGATCTAATATTTTTAGATCCGAA
TTCAGGTAATGGACTCCAATACGAAATTGCAAAATATGCTCTAGATACTGCAAAACTCAAATGTTATGGC
CATAGAGGATGTTATTACGAATCATTAAAAAAATTAACTGAGGATGATTGATTAGAAAATATAAATTAAT
TTACCATCGTGTATTTTTATAACGGGATTGTCCGGCATATCATGTAGATAGTTACCGTCTACATCGTATA
CTCGACCATCTACGCCTTTAAATCCTCTATTTATTGACATTAATCTATTAGAATTGGAATACCAAATATT
AGTACCCTCAATTAGTTTATTGGTAATATTTTTGTTAGACGATAGATCGATGGCTCTTGAAACCAAGGTT
TTCCAACCGGACTCATTGTCGATCGGTGAGAAGTCTTTTTCATTAGCATGAATCCATTCTAATGATGTAT
GTTTAAACACTCTAAACAATTGGACAAATTCTTTTGATTTGCTTTGAATGATTTCAAATAGGTCTTCGTC
TACAGTAGGCATACCATTAGATAATCTAGCCATTATAAAGTGCACGTTTACATATCTACGTTCTGGAGGA
GTAAGAACGTGACTATTGAGACGAATGGCTCTTCCTACTATCTGACGAAGAGACGCCTCGTTCCATGTCA
TATCTAAAATGAAGATATCATTGATTGAGAAGAAGCTAATACCCTCGCCTCCACTAGAAGAGAATACGCA
TGTTTTAATGCATTCTCCGTTAGTGTTTGATTCTTGGTTAAACTCAGCCACCGCCTTGATTCTAGTATCT
TTTGTTCTAGATGAGAACTCTATATTAGAGATACCAAAGACTTTGAAATATAGTAATAAGATTTCTATTC

CTGACTGATTAACAAATGGTTCAAAGACTAGACATTTACCATGGGATGCTAATATTCCCAAACATACATC
TATAAATTTGACGCTTTTCTCTTTTAATTCAGTAAATAGAGAGATATCAGCCGCACTAGCATCCCCTCCC
AATAGTTCTCCCCTTTTAAAGGTATCTAATGCAGATTTAGAAAATTCTCTATCTCTTAATGAATTTTTAA
AATCATTATATAGTGTTGCTATCTCTTGCGCGTATTCGCCCGGATCACGATTTTGTCTTTCAGGAAAGCT
ATCGAACGTAAACGTAGTAGCCATACGTCTCAGAATTCTAAATGATGATATACCTGTTTTTATTTCAGCG
AGTTTAGCCTTTTGATAAATTTCTTCTTGCTTTTTCGACATATTAACGTATCGCATTAATACTGTTTTCT
TAGCGAATGATGCAGACCCTTCTACGTCATCAAAAATAGAAAACTCGTTATTAACTATGTACGAACATAG
GCCTCCTAGTTTGGAGACTAATTCTTTTTCATCAACTAGACGTTTATTCTCAAATAGCGATTGGTGTTGT
AAGGATCCTGGTCGTAGTAAGTTAACCAACATGGTGAATTCTTGCACACTATTGACGATAGGTGTAGCCG
ATAAACAAATCATCTTATGGTTTTTTAATGCGATGGTCTTAGATAAAAAATTATATACTGAACGAGTAGG
ACGGATCTTACCATCTTCTTTGATTAATGATTTAGAAATGAAGTTATGACATTCATCAATAATGACGCAT
ATTCTACTCTTGGAATTAATAGTTTTGATATTAGTAAAAAATTTATTTCTAAAATTTTGATCATCGTAAT
TAATAAAAATACAATCCTTCGTTATCTCTGGAGCGTATCTGAGTATAGTGTTCATCCAAGGATCTTCTAT
CAAAGCCTTTTTCACCAATAAGATAATAGCCCAATTCGTATAAATATCCTTAAGATGTTTGAGAATATAT
ACAGTAGTCATTGTTTTACCGACACCCGTTTCATGGAACAATAAAAGAGAATGCATACTGTCTAATCCTA
AGAAAACTCTTGCTACAAAATGTTGATAATCCTTGAGGCGTACTACGTCCGACCCCATCATTTCAACAGG
CATATTAGTAGTTCTGCGCAATGCATAATCGATATAGGCCGCGTGTGATTTACTCATTTATGAGTGATAA
GTAATAACTATGTTTTAAAAATCACAGCAGTAGTTTAACTAGTCTTCTCTGATGTTTGTTTTCGATACTT
TTTGAATCAGAAGTCATACTAGAATAAAGCAACGAGTGAACGTAATAGAGAGCTTCGTATACTCTATTCG
AAAACTCTAAGAACTTATTAATGAATTCCGTATCCACTGGATTGTTTAAAATACTAAATTGAACACTGTT
CACATCCTTCCAAGAAGAAGACTTAGTGACGGACTTAACATGAGACATAAATAAATCCAAATTTTTTTTA
CAAACATCACTAGCCACCATAATGGCGCTATCTTTTAACCAGCTATCGCTTACGCATTTTAGCAGTCTAA
CATTTTTAAAGAGACTACAATATATTCTCATAGTATCGATTACACCTCTACCGAATAAAGTTGGAAGTTT
AATAATACAATATTTTTCGTTTACAAAATCAAATAATGGTCGAAACACGTCGAAGGTTAACATCTTATAA
TCGCTAATGTATAGATTGTTTTCAGTGAGATGATTATTAGATTTAATAGCATCTCGTTCACGTTTGAACA
GTTTATTGCGTGCGCTGAGGTCGGCAACTACGGCGTCCGCTTTAGTACTCCTCCCATAATACTTTACGCT
ATTAATCTTTAAAATTTCATAGACTTTATCTAGATCGCTTTCTGGTAACATGATATCATGTGTAAAAAGT
TTTAACATGTCGGTCGGCATTCTATTTAGATCATTAACTCTAGAAATCTGAAGAAAGTAATTAGCTCCGT
ATTCCAGACTAGGTAATGGGCTTTTACCTAGAGACAGATTAAGTTCTGGCAATGTTTCATAAAATGGAAG
AAGGACATGCGTTCCCTCCCGGATATTTTTTACAATTTCATCCATTTACAACTCTATAGTTTGTTTTCAT
TATTATTAGTTATTATCTCCCATAATCTTGGTAATACTTACCCCTTGATCGTAAGATACCTTATACAGGT
CATTACATACAACTACCAATTGTTTTTGTACATAATAGATTGGATGGTTGACATCCATGGTGGAATAAAC
TACTCGAACAGATAGTTTATCTTTCCCCCTAGATACATTAGCCGTAATAGTTGTCGGCCTAAAGAATATC
TTTGGTGTAAAGTTAAAAGTTAGGGTTCTTGTTCCATTATTGCTTTTTGTCAGTAGTTCATTATAAATTC
TCGAGATGGGTCCGTTCTCTGAATATAGAACATCATTTCCAAATCTAACTTCTAGTCTAGAAATAATATC
GGTCTTATTCTTAAAATCTATTCCCTTGATGAAGGGATCGTTAATGAACAAATCCTTGGCCTTTGATTCG
GCTGATCTATTATCTCCGTTATAGACGTTACGTTGACTAGTCCAAAGACTTACAGGAATAGATGTATCGA
TGATGTTGATACTATGTGATATGTGAGCAAAGATTGTTCTCTTAGTGGCATCACTATATGTTCCAGTAAT
GGCGGAAAACTTTTTAGAAATGTTATATATAAAAGAATTTTTTCGTGTTCCAAACATTAGCAGATTAGTA
TGAAGATAAACACTCATATTATCAGGAACATTATCAATTTTTACATACACATCAGCATCTTGAATAGAAA
CGATACCATCTTCTGGAACCTCTACGATCTCGGCAGACTCCGGATAACCAGTCGGTGGACCATCGCTAAC
AATAACTAGATCATCCAACAATCTACTCACATATGCATCTATATAATCTTTTTCATCTTGTGAGTACCCT
GGATACGAAATAAATTTATTATCCGTATTTCCATAATAAGGTTTAGTATAAACAGAGAGCGATGTTGCCG
CATGAACTTCAGTTACAGTCGCCGTTGGTTGGTTTATTTGACCTATTACTCTCCTAGGTTTCTCTATAAA
TGATGGTTTAATTTGTACATTCTTAACCATATATCCAATAAAGCTCAATTCAGGAACATAAACAAATTCT
TTGTTGAACGTTTCAAAGTCGAACGAAGAGTCACGAATAACGATATCGGATACTGGATTGAAGGTTACCG
TTACGGTAATTTTTGAATCGGATAGTTTAAGACTGCTGAATGTATCTTCCACATCAAACGGAGTTTTAAT
ATAAACGTATACTGTAGATGGTTCTTTAATAGTGTCATTAGGAGTTAGGCCAATAGAAATATCATTAAGT
TCACTAGAATATCCAGAGTGTTTCAAAGCAATTGTATTATTGATACAATTATTATATAATTCTTCGCCCT
CAATTTCCCAAATAACACCGTTACACGAAGAGATAGATACGTGATTAATACATTTATATCCAACATATGG
TACGTAACCGAATCTTCCCATACCTTTAACTTCTGGAAGTTCCAAACTCAGAACCAAATGATTAAGCGCA
GTAATATACTGATCCCTAATTTCGAAGCTAGCGATAGCCTGATTGTCTGGACCATCGTTTGTCATAACTC
CGGATAGAGAAATATATTGCGGCATATATAAAGTTGGAATTTGACTATCGACTGCGAAGACATTAGACCG
TTTAATAGAGTCATCCCCACCGATCAAAGAATTAATGATAGTATTATTCATTTTCTATTTAAAATGGAAA
AAGCTTACAATAAACTCCGTAGAGAAATATCTATAATTTGTGAGTTTTCCTTAAAGTAACAGCTTCCGTA
AACGCCGTCTTTATCTCTTAGTAAGTTTATTGTATTTATAACCTTTTCCTTATCTTCATAGAATACTAAA
GGCAACAAAGAAATTTTTGGTTCTTCTCTAAGAGCTACGTGAGACTTAACCATAGACGCCAACGAATCCC
TACATATTTTAGAACAGAAATACCCAACTTCACCACCCTTGAATGTCTCAATACTAATAGGTTTAAAAAC
CAAATCTTGATTACAAAACCAACACTTATCAATTACACTATTTGTCTTAATAGACACATCTGCCATAGAT
TTATAATACTTTGGTAGTATACAAGCGAGTGCTTCTTCTTTAGCGGGCTTAAAGACTGCTTTAGGTGCTG
AAATAACCACATCTGGAAGGCTTACTCGCTTAGCCATTTAATTACGGAACTATTTTTTTATACTTCTAAT

GAGCAAGTAGAAAACCTCTCATCTACAAAAACATACTCGTGTCCATAATCCTCTACCATAGTTACACGTT
TTTTAGATCTCATATGTGCTAAAAAGTTTTCCCATACTAATTGGTTACTATTATTTTTCGTATAATTTTT
AACAGTTTGAGGTTTTAGATTTTTAGTTACAGAAGTGATATCGAATATTTTATCCAAAAAGAATGAATAA
TTAATTGTCTTAGAAGGAGTGTTTTCTTGGCAAAAGAATACCAAGTGCTTAAATATTTCTACTACTTCAT
TAATCTTTTCTGTACTCAGATTCAGTTTCTCATCTTTTACTTGATTGATTATTTCAAAGACTAACTTATA
ATCCTTTTTTATTTATTCTCTCGTTAGCCTTAAGAAAACTAGATACAAAATTTGCATCTACATCATCCGTG
GATATTTGATTTTTTTTCCATGATATCCAAGAGTTCCGAGATAATTTCTCCAGAACATTGATGAGACAATA
ATCTCCGCAATACATTTCTCAAATGAATAAGTTTATTAGACACATGGAAGTTTGACTTTTTTTTGTACCTT
TGTACATTTTTGAAATACCGACTCGCAAAAAATACAATATTCATATCCTTGTTCAGATACTATACCGTTG
TGTCTACAACCGCTACATAATCGTAGATTCATGTTAACACTCTACGTATCTCGTCGTCCAATATTTTATA
TAAAAACATTTTATTTCTAGACGTTGCCAGAAAATCCTGTAATATTTTTAGTTTTTTGGGCTGTGAATAA
AGTATCGCCCTAATATTGTTACCGTCTTCCGCCAATATAGTAGTTAAATTATCCGCACATGCAAAAGAAC
ACCGCTTAGGCGGATTCAGTACAATGTTATATTTTTCGTACCAACTCATTTAAATATCATAATCTAAAAT
AGTTCTGTAATATGTCTAGCGCTAATATATTGATCATAATCCTGTGCATAAATTAAGATACAACAATGTC
TCGAAATCATCGACATGGCTTCTTCCATAGTTAGAAGATCGTCGTCAAAGTTAGCAACGTGATTCATCAA
CATTTGCTGTTTTGAGGCAGCAAATACTGAACCGTCGCCATTCAACCATTCATAAAAACCATCGTCTGAA
TCCATTGATAATTTCTTGTACTGGTTTTTGAGAGCTCGCATCAATCTAGCATTTCTAGCTCCCGGATTGA
AAACAGAAAGAGGATCGTACATCCAGGGTCCATTTTCTGTAAATAGAATCGTATAATGTCCCTTCAAGAA
GATATCAGACGATCCACAATCAAAGAATTGGTCTCCGAGTTTGTAACAAACTGCGGACTTTAACCTATAC
ATGATACCGTTTAGCATGATTTCTGGTGATACGTCAATCGGAGTATCATCTATTAGAGATCTAAAGCCGG
TGTAACATTCTCCACCAAACATATTCTTATTCTGACGTCGTTCTACATAAAACATCATTGCTCCATTAAC
GATAACAGGGGAATGAACAGCACTACCCATCACATTAGTTCCCAATGGATCAATGTGTGTAACTCCAGAA
CATCTTCCATATCCTATGTTAGGAGGAGCGAACACCACTCTTCCACTATTGCCATCGAATGCCATAGAAT
AAATATCCTTGGAATTGATAGAAATCGGACTGTCGGATGTTGTGATCATCTTCATAGGATTAACAACTAT
GTATGGTGCCGCCTGAAGTTTCATATCGTAACTGATGCCGTTTATAGGTCTAGCCACAGAAACCAACGTA
GGTCTAAATCCAACTATAGACAAAATAGAAGCCAATATCTGTTCCTCATCTGTCATAACTTGAGAGCATC
CAGTATGAATAATCTTCATTAGATGGGGATCTACCGCATCATCATCGTTACAATAAAAAATTCCCATTCT
AATGTTCATAATTGCTTTTCTAATCATGGTATGCATGTTTGCTCTCTGAATCTCTGTGGAAATTAGATCT
GATACACCTGTAATCACTATCGGATTATCCTCCGTAAGACGATTAACCAACAACATATAATTATAAGACT
TTACTTTTCTAAATTCATAAAGTTGCTGGATTAGGCTATAGGTGTCTCCATGTACATACGCGTTCTCGAG
CGCAGGAAGTTTAATACCGAATAGTGCCATCAGAATAGGATGAATATAGTAATTAGTTTCTGGTTTTCTA
TAAATAAAAGACAAATCTTGTGAACTAGACATATCGGTAAAATGCATGGATTGGAATCGTGTAGTCGACA
GAAGAATATGATGATTAGATGGAGAGTATATTTTATCTAACTCTTTGAGTTGGTCACCGATTCTAGGACT
AGCTCGAGAATGAATAAGTACTAAAGGATGAGTACATTTCACAGAAACACTAGCATTGTTCAATGTGCTC
TTTACATGGGTAAGGAGTTGAAATAGCTCGTTTCTATTTGTTCTGACAATATTTAGTTTATTCATAATGT
TAAGCATATCCTGAATAGTAAAGTTAGATGTGTCATACTTGTTAGTAGTTAGATATTTAGCAATTGCATT
CCCATCATTTCTCAATCTCGTACTCCAATCATGTGTAGATGCTACTTCGTCGATGGAAACCATACAATCC
TTTTTGATAGGCTGTTGAGATTGATTATTTCCTGCACGTTTAGGTTTGGTACGTTGATTTCTAGCCCCTG
CGGATATAAAGTCATCGTCTACAATTTGGGACAATGAATTGCATACACTACAAGACAAAGATTTATCAGA
AGTGTGAATATGATCTTCATCTACCAAAGAAAGAGTTTGATTAGTATAACTAGATTTTAGTCCTGCGTTA
GATGTTAAAAAAACATCGCTATTGACCACGGCTTCCATTATTTATATTCGTAGTTTTTACTCGAAAGCGT
GATTTTAATATCCAATCTTATTACTTTTGGAATCGTTCAAAACCTTTGACTAGTTGTAGAATTTGATCTA
TTGCCCTACGCGTATACTCCCTTGCATCATATACGTTCGTCACCAGATCGTTTGTTTCGGCCTGAAGTTG
GTGCATATCTCTTTCAACATTCGACATGAGATCCTTAAGGGCCATATCGTCTAGATTTTGTTGAGATGCT
GCTCCTGGATTTGGATTTTGTTGTGCTGTTGTACATACTGTACCACCAGTAGGTGTAGGAGTACATACAG
TGGCCACAATAGGAGGTTGAGGAGGTGTAACCGTTGGAGTAGTACAAGAAATATTTCCATCCGATTGTTG
TGTACATGTAGTTGTTGGTAACGTCTGAGAAGGTTGGGTAGATGGCGGTGTCGTCGTCTTTTGATCTTTA
TTAAATTTAGAGATAATATCCTGAACAGCATTGCTCGGCGTCAACGCTGGAAGGAGTGAACTCGCCGGCG
CATCAGTATCTTCAGACAGCCAATCAAAAAGATTAGACATATCAGATGATGTATTAGTTTGTTGTCGTGG
TTTTGGTGTAGGAACAGTACTACTAGGTAGAAGAATAGGAGCCGGTGTAGCTGTTGGAACCGGCTGTGGA
GTTATATGAATAGTTGGTTGTAGCGGTTGGATAGGCTGTCTGCTGGCGACCGTCATATTATCTCTAGCTA
GTTGTTCTCGCAACTGTCTTTGATAATACGACTCTTGAGACTTTAGTCCTATTTCAATCGCTTCATCCTT
TTTCGTATCCGGATCCTTTTCTTCAGAATAATAGATTGACGACTTTGGTGTAGAGGATTCTGCCAGCCCC
TGTGAGAACTTGTTAAAGAAGTCCATTTAAGGCTTTAAAATTGAATTGCGATTATAAGATTAAATGGCAG
ACACAGACGATATTATCGACTATGAATCCGATGATCTCACCGAATACGAGGATGATGAAGAAGAGGAAGA
AGATGGAGAGTCACTAGAAACTAGTGATATAGATCCCAAATCTTCTTATAAGATTGTAGAATCAGCATCC
ACTCATATAGAAGATGCGCATTCCAATCTTAAACATATAGGGAATCATATATCTGCTCTTAAACGACGCT
ATACTAGACGTATAAGTCTATTTGAAATAGCGGGTATAATAGCAGAAAGCTATAACTTGCTTCAACGAGG
AAGATTACCTCTAGTTTCAGAATTTTCTGACGAAACGATGAAGCAAAATATGCTACATGTAATTATACAA
GAGATAGAGGAGGGTTCTTGTCCTATAGTCATCGAAAAGAACGGAGAATTGTTGTCGGTAAACGATTTTG
ACAAAGATGGTCTAAAATTCCATCTAGACTATATTATCAAAATTTGGAAACTTCAAAAACGATATTAGAA

TTTATACGAATATCGTTCTCTAAATGTCACAATCAAGTCTCGCATGTTCAGCAATTTATTGTCGTACTTT
ATATCGTGTTCATTAACGATATCTTGCAAAATAGTAATGATTCTATCTTCCTTCGATAGATATTCTTCAG
AGATTATTGTCTTATATTTTTTCTTGTTATCCGATATGAATTTGATAAGACTTTGAACATTATTGATACC
CGTCTGTTTAATTTTTTCTACAGATATTTTAGTTTTGGCAGATTCTATCGTATCTGTCAATAGACATCCA
ACATCGACATTCGACGTCAATTGTCTATAAATCAACGTATAAATTTTAGAAATAACATTAGCGAATTGTT
GTGCATTGATGTCGTTATTCTGAAACAGTATGATTTTAGGTAGCATTTTCTTAACAAAGAGAACGTATTT
ATTGTTACTCAGTTGAACAGATGATATATCCAGATTACTAACGCATCTGATTCCGTATACCAAACTTTCA
GAAGAAATGGTGTACAATTGTTTGTATTCATTCAATGTCTCTTTTTCAGAAATTAGTTTAGAGTCGAATA
CTGCAATAATTTTCAAGAGATAGTTTTCATCAGATAAGATTTTATTTAGTGTAGATATGATAAAACTATT
GTTTTGTTGGAGAACTTGATACGCCGCGTTCTCTGTAGTCGACGCTCTCAAATGGGAAACAATCTCCATT
ATTTTTTTGGAATCGGATACTATATCTTCGGTATCTTGACGCAGTCTAGTATACATAGAGTTAAGAGAGA
TTAGAGTTTGTACATTAAGCAACATGTCTCTAAATGTGGCTACAAACTTTTCCTTTTTCACATAATCTAG
TTTATTATATACCGATTTCACAACGGCACCAGATTTAAGGAACCAGAATGAAAAACTCTGATAACTACAA
TATTTCATCATAGTTACGATTTTATCATCTTCTATAGTTGGTGTAATAGCGCATACCTTTTTCTCCAAGA
CTGGAACCAACGTCATAAAAATGTTTAAATCAAAATCCATATCAACATCTGATGCGCTAAGACCAGTCTC
GCGTTCAAGATTATCTTTACTAATGGTGACGAACTCATCATATAGAACTCTAAGTTTGTCCATTATTTAT
TTACAGATTTAGTTGTTTAATTTATTTGTGCTCTTCCAGAGTTGGGATAGTATTTTTCTAACGTCGGTAT
TATATTATTAGGATCTACGTTCATATGTATCATAATATTAATCATCCACGTTTTGATAAATCTATCTTTA
GCTTCTGAAATAACGTATTTAAACAAAGGAGAAAAATATTTAGCTACGGCATCAGACGCAATAACATTTT
TTGTAAATGTAACGTATTTAGACGACAGATCTTCGTTAAAAAGTTTTCCATCTATGTAGAATCCATCGGT
TGTTAACACCATTCCCGCGTCAGATTGAATAGGAGTTTGAATAGTTTGTTTTGGAAATAGATCCTTCAAT
AACTTATAGTTGGGTGGGAAAAAATCGATTTTATCACTAGACTCTTTCTTTTTTACTATCATTACCTCAT
GAACTATTTCTTGAATGAGTATATGTATTTTCTTTCCTATATCGGACGCGTTCATTGGAAAATATACCAT
GTCGTTAACTATAAGAATATTTTTATCCTCGTTTACAAACTGAATAATATCAGATGTAGTTCGTAAACGA
ACTATATCATCACCAGCACAACATCTAACTATATGATATCCACTAGTTTCCTTTAGCCGTTTATTATCTT
GTTCCATATTAGCAGTCATTCCATCATTTAAGAAGGCGTCAAAGATAATAGGGAGAAATGACATTTTGGA
TTCTGTTACGACTTTACCAAAATTAAGGATATACGGACTTACTATCTTTTTCTCAACGTCGATTTGATGA
ACACACGATGAAAATGTGCTTCTATGAGATTGATCATGTAGAAAACAACAAGGGATACAATATTTCCGCA
TATCATGAAATATATTAAGAAATCCCACCTTATTATATTTCCCCAAAGGATCCATGCATGTAAACATTAT
GCCGTTATCATTAATAAAGACTTCTTTCTCATCGGATTTGTAAAAGTTGTTACTGATTTTTTTCATTCCA
GGATCTAGATAATTAATAATGATGGGTTTTCTATTCTTATTCTTTGTATTTTGGCATATCCTAGACCAGT
AAACAGTTTCCACTTTGGTAAAATCAGCAGACTTTTGAACGCTATTAAACATGGCATTAATGGCAATAAC
TAAAAATGTAAAATATTTTTCTATGTTAGGAATATGGTTTTTCACTTTAATAGATATATGGTTTTTGGCC
AAAATGATAGATATTTTTTTATCCGAGGATAGTAAAATATTATTAGTCGCCGTCTCTATAAAAATGAAGC
TAGTCTCGATATCCAATTTTATTCTAGAATTGATAGGAGTCGCCAAATGTACCTTATACGTTATATCTCC
CTTGATGCGTTCCATTTGTGTATCTATATCGGACACAAGATCTGTAAATAGTTTTACGTTATTAATCATC
ACGGTATCGCCGTCGCTAGATAACGCTAATGTACCATCCAAGTCCCAAATGGAGAGATTTAACTGTTCAT
CGTTTAGAATAAAATGATTACCGGTCATATTAATAAAGTGTTCATCGTATCTAGATAACAACGACTTATA
ATTAATGTCCAAGTCTTGAACTCGCTGAATGATCTTTTTTTAACCCAGTTAGTTTTAGATTGGTACGAAAT
ATATTGTTAAACTTTGATTCTACAGTAATGTCCAAATCTAGTTGTGGAAATACTTCCATCAACATTGTTT
CAAACTTGATAATATTATTATCTACATCTTCATACGATCCAAATTCCGGAATAGATGTATCACATGCTCT
TGCCACCCAGATAACCAAAAAGTCACACGCTCCAGGATATACATTGTATAAAAAGCTATCGTTTTTTAGT
AGTGTTTTTTTCTGAGTATATACGAAGGGATTAAAAATAGTATTATCAACGTAACTATATTCCAAATTAT
TCTTATGAGAATAGATAATAATATCGTCCTTAATATCTAACAAATTTCCTAAATATCCCTTTAATTGAGT
CATTCGAAGCGTCAATAGAATATGTCTCTTAACTATTTCCGGCTGTTGTATATTTAAATGACTTCGTAAA
AAATAATATATGGGCGACTTCTCATCTATGTAATCATATGGAGTGAGATATAGGGCTCGTTCTACCTCCT
GCCCCTTACCCACCTGTAATACCAATTGCGGACTTACTATATATCGCATATTTATATCGTGGGGTAAAGT
GAAAATCTACTACCGATGATGTAAGTCTTACAATGTTCGAACCAGTACCAGATCTTAATTTGGAGGCCTC
CGTAGAACTAGGGGAGGTAAATATAGATCAAACAACACCTATGATAAAGGAAAATAGCGGTTTTATATCC
CGTAGTAGACGTCTATTCGCCCATAGATCTAAGGATGATGAGAGAAAACTAGCACTACGATTCTTTTTAC
AAAGACTTTATTTTTTAGATCATAGAGAGATTCATTATTTGTTCAGATGCGTTGACGCTGTAAAAGACGT
CACTATTACCAAAAAAAATAACATTATCGTGGCGCCTTATATAGCACTTTTAACTATCGCATCAAAAGGA
TGCAAACTTACAGAAACAATGATTGAAGCATTTTTTCCAGAACTATATAATGAACATAGTAAGAAATTTA
AATTCAACTCTCAAGTATCCATCATCCAAGAAAAACTCGGATACCAGTTTGGAAACTATCACGTTTATGA
TTTTGAACCGTATTACTCTACAGTAGCTCTGGCTATTCGAGATGAACATTCATCTGGCATTTTTAATATC
CGTCAAGAGAGTTATCTGGTAAGTTCATTATCTGAAATAACATATAGATTTTATCTAATTAATCTAAAAT
CTGATCTTGTTCAATGGAGTGCTAGTACGGGCGCTGTAATTAATCAAATGGTAAATACTGTATTGATTAC
AGTGTATGAAAAGTTACAACTGGTCATAGAAAATGATTCACAATTTACATGTTCATTGGCTGTGGAATCA
AAACTTCCAATAAAATTACTTAAAGATAGAAATGAATTATTTACAAAATTCATTAACGAGTTAAAAAAGA
CCAGTTCATTCAAGATAAGCAAACGCGATAAGGATACGCTACTAAAATATTTTACTTAGGACTGGAGTTA
GAATTTATAGACGACTCATTTCGTTTATCATTGTTACTATTATTACTATTACTATCATTATTAGTGTTGG

CATTATTAGTATTCTTCTTGTCATCTTGTTCAGAAATATACAGCAATGCTATACCTAATACTAAATACAT
TATCATGCTCGCAATGGCTCTAACAACAACGAACCAAAATGAATTTGGTCGTAGCTTTTGTTCACAAAAA
TACATAAAGAAATGTCTACATAAATCTATGGCGCCATTGGCTACTTGAAATAGCGCCAGTCCTCCTACAG
ATTTTAATATAGCTGTATAACATGACATTTATTCATCATCAAAAGAGACAGAGTCACCATCTGTCATATT
TAGATTTTTTTTCATGTGTTCAAAGTATCCTCTACTCATTTCATTATAATAGTTTATCATACTTAGAATT
TTAGGACGGATCAATGAGTAAGACTTGACTAGATCGTCAGTAGTAATTTGTGCATCGTCTATTCTGCATC
CGCTTCGTCGAATAATGTATAGCATCGCTTTGAGATTCTCCATAGCTATCAAGTCTTTATACAATGACAT
GGAAATATCTGTGAATACTTTATACTTCTCCAACATCGATGCCTTAACATCATCGCCTACTTTAGCATTG
AAAATACGTTCTATTGTGTAGATGGATGTAGCAAGATTTTTAAACAACAATGCCATCTTACACGATGATT
GCCTCAAGTCTCCAATCTTTTGTTTAGAACGATTAGCTACAGAGTTCAACGCTTGGCTGACTAGCATATT
ATTATCTTTAGAAATTGTATTCTTCAATGAGGCGTTTATCATATCTGTGATTTCGTTAGTCATATTACAG
TCTGACTGGGTTGTAATGTTATCCAACATATCACCTATGGATACGGTACACGTACCAGCATTTGTAATAA
TCCTATCTAAGATGTTGTATGGCATTGCGCAGAAAATATCTTCTCCTGTAATATCTCCACTCTCGATAAA
TCTACTCAGATTATTCTTAAATGCCTTATTCTCTGGAGAAAAGATATCAGTGTCCATCATTTCATTAATA
GTATACGCAGAAAAGATACCACGAGTATCAATTCTATCCAAGATACTTATCGGTTCCGAGTCACAGATAA
TGGTTTCCTCTCCTTCGGGAGATCCTGCATAGAAATATCTAGGACAATAGTTTCTATACTGTCTGTAACT
CTGATAATCTCTAAAGTCACTAACTGATACCATGAAATTGAGAAGATCAAACGCTGAAGTAATCAATTTT
TCTGCCTCGTTTTTACTACAACTAGTTTTCATCAATGTAGCGACGATGTATTGTTTAGTTACTCTTGGTC
TAATACTGATGATAGAGATATTATTGCTTCCCATAATGGATCTTCTAGTAGTCACCTTAAAGCCCATTGA
TGCGAATAGCAGATAGATAAAGTCTTGGTATGACTCCTTTCTAATATAGTACGGACTACCTTTGTCACCC
AACTTTATACCCACATAAGCCATAACAACCTCTTTAATAGCCGTTTCATGAGGTTTATCAGCCATGAGCC
TGAGTAGTTGGAAGAATCTCATGAATCCCGTCTCAGAAAGTCCTATATGCATGATAGATTTATCTTTCCT
GGGAAACTCTCGTATAGTCATAGATGAAATACTCTTCAAAGTTTCTGAAATAAGATTAGTAACAGTCTTA
CCTCCGACTACTCTGGGTAACAAACATACTCTAATAGGTGTTTTCTCTGCGGAGATAATATCAGAAAGGA
TAGAGCAATAAGTAGTATTATTGTGATTATAAAGACCGAATACATAACAGGTAGAATTTATAAACATCAT
GTCCTGAAGGTTTTTAGACTTGTATTCCTCGTAATCCATACCGTCCCAAAACATGGATTTGGTAACTTTG
ATAGCCGTAGATCTTTGTTCCTTCGCCAACAGGTTAAAGAAATTAATAAAGAATTTGTTGTTTCTATTTA
TGTCCACAAATTGCACGTTTGGAAGCGCCACGGTTACATTCACTGCAGCATTTTGAGGATCGCGAGTATG
AAGTACGATGTTATTGTTTACTGGTATATCTGGAAAGAAATCTACCAGTCTAGGAATAAGAGATTGATAT
CGCATAGAAATAGTAAAGTTTATAATCTCATCATCGAAGAGCATTTTGTTACCATTGTAATAAATATCCA
CTCTGTCATATGTATAAATGAAGTACTGTTCAAACATGATGAGATGTTTATATGTTGGCATAGTAGTGAG
ATCGACGTTTGGTAATGGCAATGTATTAAGATTAACTCCATAATGTCTAGCAGCATCTGCGATGTTATAA
GCGTCGTCAAAGCGGGGTCGATCTTGTATTGTTATATATTGTCTAACACCTATAAGATTATCAAAATCTT
GTCTGCTTAATACACCGTTAACAATTTTTGCCTTGAATTCTTTTATTGGTGCATTAATAACATCCTTATA
GAGGATGTTAAACAAATAAGTGTTATCAAAGTTAAGATCTGGATATTTCTTTTCTGCTAGAACATCCATT
GAGTCGGAGCCATCTGGTTTAATATAACCACCGATAAATCTAGCTCTGTATTCTGTATCCGTCAATCTAA
TATTAAGAAGGTGTTGAGTGAAAGGTGGAAGATCGTAAAAGCTGTGAGTATTAATGATAGGATTAGTTTC
CGAACTAATGTTAATTGGGGTATTAATAATATCTATATTTCCAGCGTTAAGTGTAACATTAAACAGTTTT
AATTCACGTGACGTGGTATCAATTAAATAATTAATGCCCAATTTGGATATAGCAGCCTGAAGCTCATCTT
GTTTAGTTACGGATCCTAATGAGTTATTAAGCAATATATCGAACGGATGAACGAAGGTTGTTTTAAGTTG
GTCACATACTTTGTAATCTAGACATAGATGCGGAAGAACGGTAGAAACTATACGAAATAAATATTCAGAG
TCCTCTAATTGATCAAGAGTAACTATTGACTTAATAGGCATCATTTATTTAGTATTAAATGACGACCGTA
CCAGTGACGGATATACAAAACGATTTAATTACAGAGTTTTCAGAAGATAATTATCCATCTAACAAAAATT
ATGAAATAACTCTTCGTCAAATGTCTATTCTAACTCACGTTAACAACGTGGTAGATAGAGAACATAATGC
CGCCGTAGTGTCATCTCCAGAGGAAATATCCTCACAACTTAATGAAGATCTATTTCCAGATGATGATTCA
CCGGCCACTATTATCGAACGAGTACAACCTCATACTACTATTATTGACGATACTCCACCTCCTACTTTTC
GTAGAGAGTTATTGATATCGGAACAACGTCAACAACGAGAAAAAAGATTTAATATTACAGTATCGAAAAA
TGCTGAAGCAATAATGGAATCTAGATCTATGATAACTTCTATGCCAACACAAACACCATCCTTGGGAGTA
GTTTATGATAAAGATAAAAGAATTCAGATGTTGGAGGATGAAGTGGTTAATCTTAGAAATCAACGATCTA
ATACAAAATCATCTGATAATTTAGATAATTTTACCAAAATACTATTTGGTAAGACTCCGTATAAATCAAC
AGAAGTTAATAAGCGTATAGCCATCGTTAATTATGCAAATTTGAACGGGTCTCCCTTATCAGTCGAGGAC
TTGGATGTTTGTTCAGAGGATGAAATAGATAGAATCTATAAAACGATTAAACAATATCACGAAAGTAGAA
AACAAAAAATTATCGTCACTAACGTGATTATTATTGTCATAAACATTATCGAGCAAGCATTGCTAAAACT
CGGATTTGAAGAAATCAAAGGACTGAGTACCGATATCACTTCAGAAATTATCGATGTGGAGATCGGAGAT
GACTGCGATGCTGTAGCATCAAAACTAGGAATCGGTAACAGTCCGGTTCTTAATATTGTATTGTTTATAC
TCAAGATATTCGTTAAACGAATTAAAATTATTTAATTTAATACATTCCCATATCCAGACAACAATCGTCT
GGATTAATCTGTTCCTGTCGTCTCATACCGGACGACATATTAATCTTTTTATTAGTAGGCATCTTTTTAG
ATGGTTTCTTTTTCCCAGCATTAACTGAGTCGATACCTAGAAGATCGTGATTGATCTCTCCGACCATTCC
ACGAACTTCTAATTGGCCGTCTCTAACGGTACCATAAACTATTTTACCAGCATTAGTAACAGCTTGGACA
ATCTGACCATCCATCGCATTGTACGATGTAGTAGTAACTGTTGTTCTACGTCTAGGAGCACCAGAAGTAT
TTTTGGAGCCCTTGGAGGCTGATGTAGAAGAAGACGAGGATTTTGATTTTGGTTTACATGTAATACATTT

	TGAACTCTTTGATTTTGTATCACATGCGCCGGCAGTCACATCTGTTTGAGAATTAAGATTATTGTTGCCT
	CCTTTGACGGCTGCATCTCCACCGATTTGCGCTAGTAGATTTTTAAGCTGTGGTGTAATCTTATTAACTG
	TTTCGATATAATCATCGTAACTGCTTCTAACGGCTAAATTTTTTTTTATCCGCCATTTAGAAGCTAAAAAT
	ATTTTTATTTATACAGAAGATTTAACTAGATTATACAATGAACTAATATGATCCTTTTCCAGATTATTTA
	CAAACTTGGTATTTTTTGGTTCTGGAGGAGGCGAATTTAAATTCGGACTTGGATTCGGATTTTGTGAGTT
	CTTGATCTTATTATACATCGAGTATAGGATGGCGACGGTAACTGCTACACAAATACCGATCAACAAAAGA
	ATACCAATCATTTATTGACAATAACTTCACTATTGATCAAGTATGCAATATATCATCTTTTCACTAAATA
	AGTAGTAATAATGATTCAACAATGTCGAGATATATGGACGATAATAATTTAGTTCATGGAAATATCGCTA
	TGATTGGTATGAATGACTCCGCTAACTCTGTGGGGCGCGCAGTGCTTTCCCCACATAGAATAAATTAGCA
	TTCCGACTGTGATAATAATACCAAGTATAAACGCCATAATACTCAATACTTTCCATGTACGAGTGGGACT
	GGTAGACTTACTAAAGTCAATAAAGGCGAAGATACACGAAAGAATCAAAAGAATGATTCCAGCGATTAGC
	ACGCCGGAAAAATAATTTCCAATCATAAGCATCATGTCCATTTAACTAATAAAAATTTTAAATCGCCGAA
	TGAACAAAGTGGAATATAAACCATATAAAAACAATAGTTTGTACTGCAAAAATAATATCTATTTTTGTTT
	TCGAAGATATGGTAAAATTAAATAGTAGTACACAGCATGTTATAACTAACAGCAGCAACGGCTCGTAATT
	ACTTATCATTTACTAGACGAAAAGGTGGTGGGATATTTTCTTGCTCAAATAATACGAATATATCACCCAT
	CCATTTTATGCGATGTTTATATACTCTAATCTTTAATAGATCTATAGACGACGGGTTTACCAACAATATA
	GATTTTATCGATTCATCTAATTTAAACCCTTCCTTAAACGTGAATGATCTATTATCTGGCATAACGATGA
	CCCTACCTGATGAATCGGACAATGTACTGGGCCATGTAGAATAAATTATCAACGAATTATCGTCTACGAA
	CATTTATATCATTTGTTTTAATTTTAGGACGCGAATAAATAGATATAAAATAGAAAATAACAGATATTAC
	AACCAGTGTTATGGCCGCGCCCAACCAGGTAGGCAGTTTTATTTTATCTTTTACTACAGGTTCTCCTGGA
	TGTACGTCACCAACGGCGGACGTAGTTCTAGTACAATTAGACGTAAGTTCCGCTTGGGAATTTTTTAACG
	CTAAAGAGTTAACGTTAATCGTGCACCCAACGTATTTACATCTAGTTCTTTGAACATCTTGATTATAATA
	TAACCATTTTCTATCTCTAGATTCGTCGGTGCACTCATGTAACCAACATACCCTAGGTCCTAAATATTTA
	TCTCCGGAATTAGATTTTGGATAATTCGCGCACCAACAATTTCTATTTCCTTTATGATCGTTACAAAAGA
	CGTATAATGCCGTATCCCCAAAAGTAAAATAATCAGGACGAATAATTCTAATAAACTCAGAACAATATCT
	CGCATCCATATGTTTGGAGCAAATATCGGAATAAGTAGACATAGCCGGTTTCCGTTTTGCACGTAACCAT
	TCTAAACAATTGGGGTTTCCAGGATCGTTTCTACAAAATCCAGTCATGAAATCGTCACAATGTTCTGTCT
	TGTAATTATTATTAAATATTTTTGGACAGTGTTTGGTATTTGTCTTAGAACAACATTTTGCCACGCTATC
	ACTATCGCCCAGGAGATAATCCTTTTTTTATAAAATGACATCGTTGCCCGGATGCTATATAATCAGTAGCG
	TGTTTTAAATCCTTAATATATTCAGGAGTTACCTCGTTCTGATAATAGATTAATGATCCAGGACGAAATT
	TGAAAGAACTACATGGTTCTCCATGAATTAATACATATTGTTTAGCAAATTCAGGAACTATAAAACTACT
	ACAATGATCTATCGACATACCATCTATCAAACAAAACTTGGGTTTAATTTCTCCCGGAGATGTTTCATAA
	TAGTACGTATAACTTTCTTCTGCAAACTTAACAGCTCTATTATATTCAGGATAATTAAAACCTAATTCCA
	TATATTTGTCTCGTATATCTGCTATTCCTGGTGCTATTTTGATTCTATTAAGAGTAACAGCTGCCCCCAT
	TCTTAATAATCGTCAGTATTTAAACTGTTAAATGTTGGTATATCAACATCTACCTTATTTCCCGCAGTAT
	AAGGTTTGTTGCAGGTATACTGTTCAGGAATGGTTACATTTATACTTCTTCTATAGTCCTGTCTTTCGAT
	GTTCATCACATATGCAAAGAACAGAATAAACAAAATAATGTAAGAAATAATATTAAATATCTGTGAATTC
	GTAAATACATTGATTGCCATAATAATTACAGCAGCTACAATACACACAATAGACATTCCCACAGTGTTGC
	CATTACCTCCACGATACATTTGAGTTACTAAGCAATAGGTAATAACTAAGCTAGTAAGAGGCAATAGAAA
	AGATGAGATAAATATCATCAATATAGAGATTAGAGGAGGGCTATATAGAGCCAAGACGAACAAAATCAAA
	CCGAGTAACGTTCTAACATCATTATTTTTGAAGATTCCCAAATAATCATTCATTCCTCCATAATCGTTTT
	GCATCATACCTCCATCTTTAGGCATAAACGATTGCTGCTGTTCCTCTGTAAATAAATCTTTATCAAGCAC
	TCCAGCACCCGCAGAGAAGTCGTCAAGCATATTGTAATATCTTAAATAACTCATTTATATATTAAAAAAT
	GTCACTATTAAAGATGGAGTATAATCTTTATGCCGAACTAAAAAAAAATGACTTGTGGTCAACCCCTAAGT
	CTTTTTAACGAAGACGGGGATTTCGTAGAAGTTGAACCGGGATCATCCTTTAAGTTTCTGATACCTAAGG
	GATTTTACGCCTCTCCTTCCGTAAAGACGAGTCTAGTATTTGAAACATTAACAACGACCGATAATAAAAT
	CACTAGTATCAATCCAACAAATGCGCCAAAGTTATATCCTCTTCAACGCAAAGTCGTATCTGAAGTAGTT
	TCTAATATGAGGAAAATGATCGAATCAAAACGTCCTCTATACATTACTCTTCACTTGGCGTGTGGATTTG
	GTAAGACTATTACCACGTGTTATCTTATGGCTACACACGGTAGAAAAACCGTCATTTGCGTACCCAATAA
	AATGTTAATACATCAATGGAAGACACAGGTAGAGGCAGTCGGATTGGAACATAAGATATCCATAGATGGA
	GTAAGTAGTCTATTAAAGGAACTAAAGACTCAAAGTCCGGATGTATTAATAGTAGTCAGTAGACATCTGA
	CAAACGATGCCTTTTGTAAATATATCAATAAGCATTATGATTTGTTCATCTTGGATGAATCACATACGTA
	TAATCTGATGAACAATACAGCAGTTACAAGATTTTTAGCGTATTATCCTCCGATGATGTGTTATTTTTTA
	ACTGCTACACCTAGACCAGCTAACCGAATTTATTGTAACAGTATTATTAATATTGCCAAGTTATCCGATC
	TAAAAAAAACTATCTATGCGGTAGATAGTTTTTTTGAGCCATATTCCACAGACAATATTAGACATATGGT
	AAAACGACTAGATGGACCATCTAATAAATATCATATATATACCGAGAAGTTATTATCTGTAGACGAGCCT
	AGAAATCAACTTATTCTTAATACCCTGGTAGAAGAATTCAAGTCAGGAACTATTAATCGCATTTTAGTTA
	TTACTAAACTACGTGAACATATGGTATTATTCTACAAACGATTATTAGATCTTTTCGGACCAGAGGTTGT
	ATTTATAGGAGACGCCCAAAATAGACGTACTCCAGATATGGTCAAATCAATCAAGGAACTAAATAGATTT
	ATATTCGTATCCACCTTATTTTATTCCGGTACTGGTTTAGATATTCCTAGTTTGGATTCGTTGTTCATTT
	GCTCGGCAGTAATCAACAATATGCAAATAGAGCAATTACTAGGGAGGGTATGTCGAGAAACAGAACTATT

	AGATAGGACGGTATATGTATTTCCTAACACATCCATCAAAGAAATAAAGTACATGATAGGAAATTTCATG CAACGAATTATTAGTCTGTCTGTAGATAAACTAGGATTTAAACAAGAAAGTTATCGGAAACATCAAGAAT CCGATCCCACTTCTGTATGTACAACATCCTCCAGAGAAGAACGTGTATTAAATAGAATATTTAACTCGCA AAATCGTTAAGAAGTTTAAGCGACGATCCGCATGCTGCGCAGGCCAGTGTATTACCCCTCATAGTATTAA TATAATCCAATGATACTTTTGTGATGTCGGAAATCTTAACCAATTTAGACTGACAGGCAGAACACGTCAT GCAATCATCATCGTCATCGATAACTGTAGTCTTGGGCTTCTTTTTGCGGCTCTTCATTCCGGAACGCACA TTGGTGCTATCCATTTAGGTAGTAAAAAATAAGTCAGAATATGCCCTATAACACGATCGTGCAAAACCTG GTATATCGTCTCTATCTTTATCACAATATAGTGTATCGACATCTTTATTATTATTGACCTCGTTTATCTT GGAACATGGAATGGGAACATTTTTGTTATCAACGGCCACCTTTGCCTTAATTCCAGATGTTGTAAAATTA TAACTAAACAGTCTATCATCGACACAAATGAAATTCTTGTTTAGACGTTTGTAGTTTACGTATGCGGCTC GTTCGCGTCTCATTTTTTCAGATATTGCAGGTACTATAATATTAAAAATAAGAATGAAATAACATAGGAT TAAAAATAAAGTTATCATGACTTCTAGCGCTGATTTAACTAACTTAAAAGAATTACTTAGTCTGTACAAA AGTTTGAAATTTTCAGATTCTGCGGCTATAGAAAAGTATAATTCTTTGGTAGAATGGGGAACATCTACTT ACTGGAAAATAGGCGTGCAAAAGGTAGCTAATGTCGAGACGTCAATATCTGATTATTATGATGAGGTAAA AAATAAACCGTTTAATATTGATCCGGGCTATTACATTTTCTTACCGGTATATTTTGGGAGCGTCTTTATT TATTCGAAGGGTAAAAATATGGTAGAACTTGGATCTGGAAACTCTTTTCAAATACCAGATGATATGCGAA GTGCGTGTAACAAAGTATTAGACAGCGATAACGGAATAGACTTTCTGAGATTTGTTTTGTTAAACAATAG ATGGATAATGGAAGATGCTATATCAAAATATCAGTCTCCAGTTAATATATTTAAACTAGCTAGTGAGTAC GGATTAAACATACCCAAATATTTAGAAATTGAAATAGAGGAAGACACATTATTTGACGACGAGTTATACT CTATTATAGAACGCTCTTTTGATGATAAATTTCCAAAAATATCCATATCGTATATTAAGTTGGGAGAACT TAGGCGGCAAGTTGTAGACTTTTTCAAATTCTCGTTCATGTATATTGAGTCCATCAAGGTAGATCGTATA GGAGATAATATTTTTATTCCTAGCGTTATAACAAAATCAGGAAAAAAGATATTAGTAAAAGATGTAGACC ATTTAATACGATCTAAGGTTAGAGAACATACATTTGTAAAAGTAAAAAAGAAAAACACATTTTCCATTTT ATACGACTATGATGGGAACGGAACAGAAACTAGAGGAGAAGTAATAAAACGAATTATAGACACTATAGGA CGAGACTATTATGTTAACGGAAAGTATTTCTCTAAGGTTGGTAGTGCAGGCTTAAAGCAATTGACTAATA AATTAGATATTAATGAGTGCGCAACTGTCGATGAGTTAGTTGATGAGATTAATAAATCCGGAACTGTAAA ACGAAAAATAAAAAACCAATCAGCATTTGATTTAAGCAGAGAATGTTTGGGATATCCAGAAGCAGATTTT ATAACGTTAGTTAATAACATGCGGTTCAAAATAGAAAATTGTAAGGTTGTAAATTTCAATATTGAAAATA CTAATTGTTTAAATAACCCGAGTATTGAAACTATATATGGAAACTTTAACCAGTTCGTCTCAATCTTTAA TATCGTCACCGATGTCAAAAAAAGATTATTCGAGTGAAATAATATGCGCCTTTGATATAGGTGCAAAAAA TCCTGCCAGAACTGTTTTAGAAGTCAAGGATAACTCCGTTAGGGTATTGGATATATCAAAATTAGACTGG AGTTCTGATTGGGAAAGGCGCATAGCTAAAGATTTGTCACAATATGAATACACTACAGTTCTTCTAGAAC GTCAGCCTAGAAGGTCGCCGTATGTTAAATTTATCTATTTTATTAAAGGCTTTTTATATCATACATCGGC TGCCAAAGTTATTTGCGTCTCGCCTGTCATGTCTGGTAATTCATATAGAGATCGAAAAAAGAGATCGGTC GAAGCATTTCTTGATTGGATGGACACATTCGGATTGCGAGACTCCGTTCCGGATAGACGCAAATTAGACG ATGTAGCGGATAGTTTCAATTTGGCTATGAGATACGTATTAGATAAATGGAATACTAATTATACACCTTA TAATAGGTGTAAATCTAGAAATTACATAAAAAAAATGTAATAACGTTAGTAACGCCATTATGGATAATCT ATTTACCTTTCTACATGAAATAGAAGATAGATATGCCAGAACTATTTTTAACTTTCATCTAATAAGTTGC GATGAAATAGGAGATATATATGGTCTTATGAAAGAACGCATTTCCTCAGAGGATATGTTTGATAATATAG TATATAATAAAGATATACATCCTGCCATTAAGAAACTAGTGTATTGCGACATCCAACTTACTAAACACAT TATTAATCAGAATACGTATCCGGTATTTAACGATTCTTCACAAGTGAAATGTTGTCATTATTTCGACATA AACTCAGATAATAGCAATATTAGCTCTCGTACAGTAGAGATATTTGAGAGGGAAAAGTCATCTCTTGTAT CATATATTAAAACTACCAATAAGAAGAGAAAGGTCAATTACGGCGAAATAAAGAAAACTGTTCATGGAGG CACTAATGCAAATTACTTTTCCGGTAAAAAGTCTGACGAGTATCTGAGTACTACAGTTAGATCCAACATT AATCAACCTTGGATCAAAACCATTTCTAAGAGAATGAGAGTAGATATCATTAATCACTCTATAGTAACGC GTGGAAAAAGCTCTATATTACAAACTATAGAAATTATTTTTACTAATAGAACATGTGTGAAAATATTCAA GGATTCTACTATGCACATTATTCTATCCAAGGACAAGGATGAAAAGGGGTGTATACACATGATTGACAAA TTATTCTATGTCTATTATAATTTATTTCTGTTGTTCGAAGATATCATCCAAAACGAGTACTTTAAAGAAG TAGCTAATGTTGTAAACCACGTACTTACGGCTACGGCATTAGATGAGAAATTATTCCTAATTAAGAAAAT GGCTGAACACGATGTTTATGGAGTTAGCAATTTCAAAATAGGGATGTTTAACCTGACATTTATTAAGTCG TTGGATCATACCGTTTTCCCCTCTCTGTTAGATGAGGATAGCAAAATAAAGTTTTTTAAGGGGAAAAAGC TCAATATTGTAGCATTACGATCTCTGGAGGATTGTATAAATTACGTGACTAAATCCGAGAATATGATAGA AATGATGAAGGAAAGATCGACTATTTTAAATAGCATAGATATAGAAACGGAATCGGTAGATCGTCTAAAA GAATTGCTTCTAAAATGAAAAAAAACACTGATTCAGAAATGGATCAACGACTAGGGTATAAGTTTTTGGT GCCTGATCCTAAAGCCGGAGTTTTTTATAGACCGTTACATTTCCAATATGTATCGTATTCTAATTTTATA TTGCATCGATTGCATGAAATCTTGACCGTCAAGCGGCCACTCTTATCGTTTAAGAATAATACAGAACGAA TTATGATAGAAATTAGCAATGTTAAAGTGACTCCTCCAGATTACTCACCTATAATCGCGAGTATTAAAGG TAAGAGTTATGATGCATTAGCCACGTTCACTGTAAATATCTTTAAAGAGGTAATGACCAAAGAGGGTATA TCCATCACTAAAATAAGTAGTTATGAGGGAAAAGATTCTCATTTGATAAAAATTCCGCTACTAATAGGAT ACGGGAATAAAAATCCACTTGATACAGCCAAGTATCTTGTTCCTAATGTCATAGGTGGAGTCTTTATCAA TAAACAATCTGTCGAAAAAGTAGGAATTAATCTAGTAGAAAAGATTACAACATGGCCAAAATTTAGGGTT

GTTAAGCCAAACTCATTCACTTTCTCGTTTTCCTCCGTATCCCCTCCTAATGTATTACCGACAAGATATC
GCCATTACAAGATATCTCTGGATATATCACAATTGGAAGCGTTGAATATATCATCGACAAAGACATTTAT
AACGGTCAATATTGTTTTGCTGTCTCAATATTTATCTAGAGTGAGTCTAGAATTCATTAGACGTAGTTTA
TCATACGATATGCCTCCAGAAGTTGTCTATCTAGTAAACGCGATAATAGATAGTGCTAAACGAATTACTG
AATCTATTACTGACTTTAATATTGATACATACATTAATGACCTGGTGGAAGCTGAACACATTAAACAAAA
ATCTCAGTTAACGATCAACGAGTTCAAATATGAAATGCTGCATAACTTTTTACCTCATATGAACTATACA
CCCGATCAACTAAAGGGATTTTATATGATATCTTTACTAAGAAAGTTTCTCTACTGTATCTACCACACTT
CTAGATATCCAGATAGAGATTCGATGGTTTGTCATCGCATCCTAACGTACGGCAAATATTTTGAGACGTT
GGCACATGATGAATTAGAGAATTACATAGGCAACATCCGAAACGATATCATGAACAATCACAAGAACAGA
GGCACTTACGCGGTAAACATTCATGTACTAACAACTCCCGGACTTAATCACGCGTTTTCTAGCTTATTGA
GTGGAAAGTTCAAAAAGTCAGACGGTAGTTATCGAACACATCCTCACTATTCATGGATGCAGAATATTTC
TATTCCTAGGAGTGTTGGATTTTATCCGGATCAAGTAAAGATTTCAAAGATGTTTTCTGTCAGAAAATAC
CATCCAAGTCAATATCTTTACTTTTGTTCATCGGACGTTCCGGAAAGAGGTCCTCAGGTAGGTTTAGTAT
CTCAATTGTCTGTCTTGAGTTCCATTACAAATATACTAACGTCTGAGTATTTGGATTTGGAAAAGAAAAT
TTGTGAGTATATCAGATCATATTATAAAGATGATATAAGTTACTTTGAAACAGGATTTCCAATCACTATA
GAAAATGCTCTAGTCGCATCTCTTAATCCAAATATGATATGTGATTTTGTAACTGACTTTAGACGTAGAA
AACGGATGGGATTCTTCGGTAACTTGGAGGTAGGTATTACTTTAGTTAGGGATCACATGAATGAAATTCG
CATTAATATTGGAGCGGGAAGATTAGTCAGACCATTCTTGGTTGTGGATAACGGAGAGCTCATGATGGAT
GTGTGTCCGGAGTTAGAAAGCAGATTAGACGACATGACATTCTCTGACATTCAGAAAGAGTTTCCGCATG
TCATCGAAATGGTAGATATAGAACAATTTACTTTTAGTAACGTATGTGAATCGGTTCAAAAATTTAGAAT
GATGTCAAAGGATGAAAGAAAGCAATACGATTTATGTGACTTTCCTGCCGAATTTAGAGATGGATATGTG
GCATCTTCATTAGTGGGAATCAATCACAATTCTGGACCCAGAGCTATTCTTGGATGTGCTCAAGCTAAAC
AAGCTATCTCTTGTCTGAGTTCGGATATACGAAATAAAATAGACAATGGAATTCATTTGATGTATCCAGA
GAGGCCAATCGTGATTAGTAAGGCTTTAGAAACTTCAAAGATTGCGGCTAATTGCTTCGGCCAACATGTT
ACTATAGCATTAATGTCGTACAAAGGTATCAATCAAGAGGATGGAATTATCATCAAAAAACAATTTATTC
AGAGAGGCGGTCTCGATATAGTTACCGCAAAGAAACATCAAGTAGAAATTCCGTTGGAAAACTTTAATAA
CAAAGAAAGAGATAGGTCTAACGCCTATTCAAAATTAGAAAGTAATGGATTAGTTAGACTGAATGCTTTC
TTGGAATCCGGAGACGCTATGGCACGAAATATCTCATCAAGAACTCTTGAAGATGATTTTGCTAGAGATA
ATCAGATTAGCTTCGATGTTTCCGAGAAATATACCGATATGTACAAATCTCGCGTTGAACGAGTACAAGT
AGAACTTACTGACAAAGTTAAGGTACGAGTATTAACCATGAAAGAAAGAAGACCCATTCTAGGAGATAAA
TTTACCACTAGAACGAGTCAAAAGGGAACAGTCGCGTATGTCGCGGATGAAACGGAACTTCCATACGACG
AAAATGGTATCACACCAGATGTCATTATTAATTCTACATCCATCTTCTCTAGAAAAACTATATCTATGTT
GATAGAGGTTATTTTAACAGCCGCATATTCTGCTAAGCCGTACAACAATAAGGGAGAAAACCGACCTGTC
TGTTTTCCTAGTAGTAACGAAACATCCATCGATACATATATGCAATTCGCTAAACAATGTTATGAGCATT
CAAATCCGAAATTGTCCGATGAAGAATTATCGGATAAAATCTTTTGTGAAAAGATTCTCTATGATCCTGA
AACGGATAAGCCTTATGCATCCAAAGTATTTTTTGGACCAATTTATTACTTGCGTCTGAGGCATTTAACT
CAGGACAAGGCAACCGTTAGATGTAGAGGTAAAAAGACGAAGCTCATTAGACAGGCGAATGAGGGACGAA
AACGTGGAGGAGGTATCAAGTTCGGAGAAATGGAGAGAGACTGTTTAATAGCGCATGGCGCAGCCAATAC
TATTACAGAAGTTTTAAAAGACTCAGAAGAGGATTATCAAGATGTGTATGTTTGTGAAAATTGTGGAGAC
ATAGCAGCACAAATCAAGGGTATTAATACATGTCTTAGATGTTCAAAACTTAATCTCTCTCCTCTCTTAA
CAAAAATTGATACCACGCACGTATCTAAAGTATTTCTTACTCAAATGAACGCCAGAGGCGTAAAAGTCAA
ATTAGATTTCGAACGAAGGCCTCCTTCGTTTTATAAACCATTAGATAAAGTTGATCTCAAGCCGTCTTTT
CTGGTGTAATATTCTAGTTTGGTAGTAGATACATATCAATATCATCAAATTCGAGATCCGAATTATAAAA
TGGGCGTGGATTGTTAACTATAGAATCGGACGTCTGATATTCGAAAATCTGTGGAGTTTTAGGTTTTGGT
GGAGGTGTAACTGCTACTTGGGATACTGAAGTCTGATATTCAGAAAGCTGGGGGATGTTCTGGTTCGACA
TCCACCGATGGTGTCACATCACTAATCGGTTCGGTAACGTCTGTGGATGGAGGTGCTACTTCTACAGAAC
CTGTAGCCTCAGTTGTCAACGGAGATACATTTTTAATGCGAGGAAATGTATAATTTGGTAATGGTTTCTC
ATGTGGATCTGAAGAAGAGGTAAGATATCTACTAGAAAGATACCGATCACGTTCTAGTTCTCTTTTGTAG
AACTTAACTTTTTCTTTCTCAGCATCTAGTTGATATTCCAACCTCTTCACGTTACTACGTTCAGATTCCA
ATTCACGTTCGCATGGGTTACCTCCGCAGTTTTTACGAGCGATTTCACGTTCAGCCTTCATGCGTCTCTC
CTTCTCTCTATCGAGTTTATCAGAGCAGTCTTTCTGAAGGCGATCGAACTCCATAAATTTCTCCAACGCT
TTGATTGTTTCCATAGATTTCCGAAGTTCAGCTTTTAGGACTGTGATTCTTTTTCTTTCGAATTCACAGC
TGGATGTGCAACCGTTTCCATTACCGCCATCTCTAAGTTTCTTTTCTAGATCGGCAACATTTCATCCCCA
TGCCTTTTACATTCCTCGAGTCTACTGTCGTCGAAATATCGTTCCAGCTCCTTTTCGACATCAATAACTT
TAGCACGTTGTCTCTCAAGCTCTCTTTTGTAGTTATCTGATTCCCTGGCACGTTTAAGATCTTCATGCAA
TTGAGTCAGCTCTTAACACAATCTCTTGCTTCTTCGTCATAGTACTTACAATCACTATGGGATCCATTGT
TACCACGTCTACACTCGGCGAGCTCGCGTTTAAGAGATTCAATTTCCCGTTTGTATTGGTCCATGTTTCC
ATTGCTACCACCATTAGATTTACAGGCTGCTAGTTGTCGTTCGAGATCAGAAATACGGGTTTTCTTGGAA
TTGATTTCGTCGATGTACTTGGCATCGAAACACTTATTAAGTTCTTTTTCCAATTCTACGATTTTATTTC
TTTCGCGAGTCAATTCCCTCCTGTAGTAACTATCTGTTTTGTCAGATTCACGCTCTCTACGTAGACTTTC
TTGCAAGTTACTAATTTGTTCCCTAGCACGTCCGAGTTTAGTTTTATATGCTGAATAGAGTTCTGATTCA

TCCTTTGAGCAGATCTCTAGCGATCGTTTAAGATTCCTGATTCTAGTCTTTAGCCTATTTACCTCCTCAG
AAGATGTTCCGTTACCGTTGCGTTTACACTCGTTAAGCTGTCTATCAAGATCCATGATTCTATCTCTAAG
ACGTTGCATCTCTCTTTCCATATCAGCATTGCTTTCATTATTACGTCTGCAGTCACTCAACTGTCTTTCA
ATATCTGAGATTCTATCTCTAAGACGTCGCATCTCTCTCTGTTTCGGCATTGGTTTCATTATTACGTCTA
CAGTCGTTCAACTGTCTTTCAAGATCTGATATTCTAGATTGGAGTCTGCTAATCTCTGTAGCATTTTCAC
GGCATTCACTCAGTTGTCTTTCAAGATCTGAGATTTTAGATTGGAGTCTGCTAATCTCTGTAAGATTTCC
TCCTCCGCTCTCGATGCAGTCGGTCAACTTATTCTCTAGTTCTCTAATACGCGAACGCAGTGCATCAACT
TCTTGCGTGTCTTCCTGGTTGCGTGTACATTCATCGAGTCTAGATTCGAGATCTCTAACGCGTCGTCGTT
CTTCCTCAAGTTCTCTGCGTACTACAGAAAGCGTGTCCCTATCTTGTTGATATTTAGCAATTTCTGATTC
TAGAGTACTGATTTTGCTTACGTAGTTACTAATAGTTGTCTTGGCCTTATCAAGATCCTCCTTGTATTTG
TCGCATTCCTTGATATCCCTACGAAGTCTGGACAGTTCCCATTCGACATTACGACGTTTATCGATTTCAG
CTCGGAGATCGTCATCGCGTTGTTTTAGCCACATACGACTGAGTTCAAGTTCTCGTTGACAAGATCCATC
TACTTTTCCATTCCTAATAGTATCCAGTTCCTTTTCTAGTTCTGAACGCATTTCTCGTTCCCTATCAAGC
GATTCTCTCAATTCTCGGATAGTCTTCTTATCAATTTCTAATAAATCTGAACCATCATCTGTCCCATTTT
GAATATCCCTGTGTTCTTTGATCTCTTTTGTAAGTCGGTCGATTCTTTCGGTTTTATAAACAGAATCCCT
TTCCAAAGTCCTAATCTTACTGAGTTTATCACTAAGTTCTGCATTCAATTCGGTGAGTTTTCTCTTGGCT
TCTTCCAACTCTGTTTTAAACTCTCCACTATTTCCGCATTCTTCCTCGCATTTATCTAACCATTCAATTA
GTTTATTAATAACTAGTTGGTAATCAGCGATTCCTATAGCCGTTCTTGTAATTGTGGGAACATAATTAGG
ATCTTCTAATGGATTGTATGGCTTGATAGCATCATCTTTATCATTATTAGGGGGATGGACAACCTTAATT
GGTTGGTCCTCATCTCCTCCAGTAGCGTGTGGTTCTTCAATACCAGTGTTAGTAATAGGCTTAGGCAAAT
GCTTGTCGTACGCGGGCACTTCCTCATCCATCAAGTATTTATAATCGGGTTCTACGTCTGAATATTCTTT
TCTAAGAGACGCGACTTCGGGAGTTAGTAGAAGAACTCTGTTTCTGTATCTATCAACGCTGGAATCAATA
CTCAAGTTAAGGATAGCGAATACCTCATCGTCATCATCCGTATCTTCTGAAACACCATCATATGACATTT
CATGAAGTCTAACGTATTGATAAATAGAATCAGATTTAGTATTAAACAGATCCTTAACCTTTTTAGTAAA
CGCATATGTATATTTTAGATCTCCAGATTTCATAATATGATCACATGCCTTAAATGTCAGTGCTTCCATG
ATATAATCTGGAACACTAATGGGTGACGAAAAAGATACAGCACCATATGCTACGTTGATAAATAAATCTG
AACCACTAAGTAGATAATGATTAATGTTAAGGAAGAGGAAATATTCAGTATATAGATATGCCTTAGCATC
ATATCTTGTACTAAACACGCTAAACAGTTTATTGATGTGATCAATTTCCAACAGAATAATTAGAGCAGCG
GGAATACCAACAAACATATTACCACATCCGTATTTTCTATGAATATCACATATCATGTTAAAAAATCTTG
ATAGAAGAGCGAATATCTCGTCTGACTTAATGAGTCGTAGTTCAGCAGCAACATAAGTCATAACTGTAAA
TAGAACATACTTTCCTGTAGTGTTGATTCTAGACTCCACATCAACACCATTATTAAAAATAGTTTTATAT
ACATCTTTAATCTGCTCTCCGTTAATCGTCGAACGTTCTAGTATACGGAAACACTTTGATTTCTTATCTG
TAGTTAATGACTTAGTGATATCACGAAGAATATTACGAATTACATTTCTTGTTTTTCTTGAGAGACCTGA
TTCAGAACTCAACTCATCGTTCCATAGTTTTTTTACCTCAGTGGCGAAATCTTTGGAGTGCTTGGTACAT
TTTTCAATAAGGTTCGTGACCTCCATTTATTATAAAAAATTTTATTCAAAACTTAACTACAATCGGGTAA
TTATAAAATCGTAGATCTCCCATGTGGTGGAATACTACCATCTATCGCATGTGGATGGACAGTAGGTAAT
GGCCATGGGAACAGTAATGTTTGCATATTTATCTTTCTTGCCAGTATTACTGCATATTGTCCCAATGTTT
CGATGTGATGTTCTAACCTATCAACTGCCGCTGTATCACAACAATAGTGTCCGATGAAATTAAGATTATG
ATCCAATGTGTTTAATATATGATTATCAAGTCTTATACGATCCGCGTCTTTTTTTGACAGGATCAGGTTCT
TCTACAGGAAGAAGTTTCGGCCTCTTATGATATTCATGTCTGGGAAACGGTGGTCTAGGGTGAGGCTCCG
GTATCGGAGTGGGTTTTGGATTATAATCATCATCGTCTATGACATCATCTTCGACTTCGATATTTATTTT
GCTATCTTGATGATGTCCTGTATCAGTTGCATTTTCAGCACTCGACTGAATATTAGCGCATTCATTGTCT
ATTATTACCATATTTCTAAACCCAAAATGTATGTGTTGAACATCAGTACTATCGTTGATGAGTCTTATAG
CATGAATTCGCTTATCGTTATCGGGTTTATCTTCTGTCACCTTAGCAATTCCTTTTTTTATTAAACTCTAC
ATAATCATATCCATTTCTATTGTTTGTTCTAATATAAACGAGTATAGCATCATTGCTAAATTTTTCAATA
GTATCGAAAACAGAATATCCTAAACCATATAATATATATTCAGGGACACTCAAACTAAATGTCCAGGATT
CTCCTAAATACGTAAACTTTAATAGTGCGAAATCATTCAAAAATCTACCACTTATAGATAGATAGTACAT
AAATGCGTATAGTAGTCTACCTATCTCTTTATTATGAAAACCGGCATTACGATCATATATGTCGTGATAT
ACCTGTGATCCGTTTACGTTAAACCATAAATACATGGGTGATCCTATAAACATGAATTTATTTCTAATTC
TCAGAGCTATAGTTAATTGACCGTGTAATATTTGCTTACATGCATACTTGATACGCTCATTAATAAAATT
TTTATCATTGCTCGTTATCTCAGAATCGTATATATAAGGAGTACCATCGTGATTCTTACCAGATATTATA
CAAAATACTATATATAAAATATATTGACCAACGTTAGTAATCATATAAATGTTTAACGTTTTAAATTTTG
TATTCAATGATCCATTATCATACGCTAGCATGGTCTTATGATATTCATTCTTTAAAATATAATATTGTGT
TAGCCATTGCATTGGGGCTCCTAATGGAGATTTTTTATTCTCATCCATTTTAGGATAGGCTTTCATAAAG
TCCCTAATAACTTCGTGAATAATGTTTCTATGTTTTCTACTGATGCATGTATTTGCTTCGATTTTTTTAT
CCCATGTTTCATCTATCATAGATTTAAACGCAGTAATGCTCGCAACATTAACATCTTGAACCGTTGGTAC
AATTCCGTTCCATAAATTTATAATGTTCGCCATTTATATAACTCATTTTTTGAATATACTTTTAATTAAC
AAAAGAGTTAAGTTACTCATATGGGCGCCGTCCAGTCTGAACATCAATCTTTTTAGCCAGAGATATCATA
GCCGCTCTTAGAGTTTCAGCGTGATTTTCCAACCTAAATAGAACTTCATCGTTGCGTTTACAACACTTTT
CTATTTGTTCAAACTTTGTTGTTACATTAGTAATCTTTTTTTCCAAATTAGTTAGCCGTTGTTTGAGAGT
TTCCTCATTGTCGTCTTCATCGGCTTTAACAATTGCTTCGCGTTTAGCCTCTGGCTTTTTAGCAGCCTTT

GTAGAAAAAAATTCAGTTGCTGGAATTGCAAGATCGTCATCTCCGGGGAAAAGAGTTCCGTCCATTTAAA
GTACAGATTTTAGAAACTGACACTCTGCGTTATTTATATTTGGTACAACACATGGATTATAAATATCGAT
GTTAATAACATCAGAAAATGTAAAGTCTATACATTGTTGCATCGTGTTAAATTTTCTAATGGATCTAGTA
TTATTGGGTCCAACTTCTGCCTGAAATCCAAATATGGAAGCGGATACAAAACCGTTTCCTGGATAAACCA
CACATCTCCACTTTTGCTTTACATCAGAAATTGTGTCGTTGACATCTTGAACTCTCCTATCTAATGCCGG
TGTTCCACCTATAGATTTTGAATATTCGAATGCTGCATGAGTAGCATTAAATTCCTTAATATTGCCATAA
TTTTCATATATTGAGTAACCCTGGATAAAAAGTAAACACACCGCAGCCGTCGCTACCACAATAAAAAAAA
TTGATAGAGAGTTCATTTATAATCTATTAGAAGCTGACAAAATTTTTTTACACGCATCAGACAATGCTTT
AATAAATAGTTCAACATCTACTTTTGTCATATCGAACCGATGGTATGATTCTAACCTAGAATTACATCCG
AAAAAGTTGACTATGTTCATAGTCATTAAGTCATTAACAAACAACATTCCAGACTCTGGATTATAAGACG
ATACTGTTTCGTCACAATTACCTACCTTAATCATGTGATTATGAATATTGGCTATTAGAGCACCTTCTAA
GAAATCTATAATATCTTTGAAACACGATTTAAAATCAAACCACGAATATACTTCTACGAAGAAAGTTAGT
TTACCCATAGGAGAAATAACTATAAATGGAGATCTAAATACAAAATCCGGATCTATGATAGTTTTAACAT
TATTATATTCTCTATTAAATACCTCCACATCTAAAAATGTTAATTTTGAAACTATGTCTTCGTTTATTAC
CGTACCTGAACTAAACGCTATAAGCTCTATTGTTTGAGAACTCTTTAAACGATATTCTTGAAATACATGT
AACAAAGTTTCCTTTAACTCGGTCGGTTTATCTACCATAGTTACAGAATTTGTATCCTTATCTATAATAT
AATAATCAAAATCGTATAAAGTTATATAATTATCGCGTTCAGATTGGGATCTTTTCAAATAGACTAAAAA
CCCCATTTCTCTAGTAAGTATCTTATGTATATGTTTGTAAAATATCTTCATGGTGGGAATATGCTCTACC
GCAGTTAGCCATTCCTCATTGACAGCGGTAGATGTATTAGACAAAACTATTCCAATGTTTAACAAGGGCC
ATTTTACGAGATTATTAAATCCTTGTTTGATAAATGTAGCCAATGAGGGTTCGAGTTCAACGACGATTGA
ATTCTCTTCCCGCGGATGCTGCATGATGAACGACGGGATGTTGTTCGATTGATTTGGAATTCTTTTTCGA
CTTTTTGTTTATATTAAATATTTTAAAATTTATAGCGGATAGCAATTCATGTACCACGGATAATGTAGAC
GCGTATTGCGCATCGATATCTTTATTATTAGATAAATTTATCAATAAATGTGAGAAGTTTGCCTCGTTAA
GGTCTTCCATTTAAATATTATATAAACATTTGTGTTTGTATCTTATTCGTCTTTTATGGAATAGTTTTTT
ACTAGTAAAGCTGCAATTACACACTTTGTCCGTAAAACATAAATATAAACACCAGCTTTTATCAATCGTT
CCAAAAAGTCGACGGCGGACATTTTTAACATGGCATCTATTTTAAATACACTTAGGTTTTTGGAAAAAAC
ATCATTTTATAATTGTAACGATTCAATAACTAAAGAAAAGATTAAGATTAAACATAAGGGAATGTCATTT
GTATTTTATAAGCCAAAGCATTCTACCGTTGTTAAATACTTGTCTGGAGGAGGTATATATCATGATGATT
TGGTTGTATTGGGGAAGGTAACAATTAATAATCTAAAGATGATGCTATTTTACATGGATTTATCATATCA
TGGAGTGACAAGTAGTGGAGCAATTTACAAATTGGGATCGTCTATCGATAGACTTTCTCTAAATAGGACT
ATTGTTACAAAAGTTAATAATTATGATGATACATTTTTTGACGACGATGATTGATCGCTATTGCACAATT
TTGTTTTTTTTACTTTCTAATATAGCGTTTAGATTCTTTTTCATGTGCGAATATTGATTTACTAAAATATC
GATGTTTAACTTTTGTTCTATGACGTCCTTATCAGCGGTATCGGTACATATACGTAATTCACCTTCACAA
AATACGGAGTCTTCGATAATAATAGCCAATCGATTATTGGATCTAGCTGTCTGTATCATATTCAACATGT
TTAATATATCCTTTCGTTTCCCCTTTACAGGCATCGATCGTAGCATATTTTCCGCGTCTGAGATGGAAAT
GTTAAAACTACAAAAATGCGTAATGTTAGCCCGTCCTAATATTGGTACGTGTCTATAAGTTTGGCATAGT
AGAATAATAGACGTGTTTAAATGCCTTCCAAAGTTTAAGAATTCTATTAGAGTATTGCATTTTGATAGTT
TATCACCTACATCATCAAAAATAAGTAAAAAGTGTGCTGATTTTTTATGATTTTGTGCGACAGCAATACA
TTTTTCTATGTTACTTTTAGTTCGTATCAGATTATATTCTAGAGATTCCTGACTACTAACGAAATTAATA
TGATTTGGCCAAATGTATCCATCATAATCTGGGTTATAAACGGGTGTAAACAAGAATATATGTTTATATT
TTTTAACTAGTGTAGAAAACAGAGATAGTAAATAGATAGTTTTTCCAGATCCAGATCCTCCCGTTAAAAC
CATTCTAAACGGCATTTTTAATAAATTTTCTCTTGAAAATTGTTTTTCTTGGAAACAATTCATAATTATA
TTTACAGTTACTAAATTAATTTGATAATAAATCAAAATATGGAAAACTAAGGTCGTTAGTAGGGAGGAGA
ACAAAGAAGGCACATCGTGACATAAATAACATTTATTATCATGATGACACCAGAAAACGACGAAGAGCAG
ACATCTGTGTTCTCCGCTACTGTTTACGGAGACAAAATTCAAGGAAAGAATAAACGCAAACGCGTGATTG
GTCTATGTATTAGAATATCTATGGTTATTTCACTACTATCTATGATTACCATGTCCGCGTTTCTCATAGT
GCGCCTAAATCAATGCATGTCTGCTAACGAGGCTGCTATTACTGACGCCGCTGTTGCCGTTGCTGCTGCA
TCATCTACTCATAGAAAGGTTGCGTCTAGCACTACACAATATGATCACAAAGAAAGCTGTAATGGTTTAT
ATTACCAGGGTTCTTGTTATATATTACATTCAGACTACCAGTTATTCTCGGATGCTAAAGCAAATTGCAC
TGCGGAATCATCAACACTACCCAATAAATCCGATGTCTTGATTACCTGGCTCATTGATTATGTTGAGGAT
ACATGGGGATCTGATGGTAATCCAATTACAAAAACTACATCCGATTATCAAGATTCTGATGTATCACAAG
AAGTTAGAAAGTATTTTTGTGTTAAAACAATGAACTAATATTTATTTTTGTACATTAATAAATGAAATCG
CTTAATAGACAAACTGTAAGTAGGTTTAAGAAGTTGTCGGTGCCGGCCGCTATAATGATGATACTCTCAA
CCATTATTAGTGGCATAGGAACATTTCTGCATTACAAAGAAGAACTGATGCCTAGTGCTTGCGCCAATGG
ATGGATACAATACGATAAACATTGTTATTTAGATACTAACATTAAAATGTCTACAGATAATGCGGTTTAT
CAGTGTCGTAAATTACGAGCCAGATTGCCTAGACCGGATACTAGACATCTGAGAGTATTGTTTAGTATTT
TTTATAAAGATTATTGGGTAAGTTTAAAAAAGACCAATGATAAATGGTTAGATATTAATAATGATAAAGA
TATAGATATTAGTAAATTAACAAATTTTAAACAACTAAACAGTACGACGGATGCTGAAGCGTGTTATATA
TACAAGTCTGGAAAACTGGTTAAAACAGTATGTAAAAGTACTCAATCTGTACTATGTGTTAAAAAATTCT
ACAAGTGACAACAAAAAATGAATTAATAATAAGTCGTTAACGTACGCCGCCATGGACGCCGCGTTTGTTA
TTACTCCAATGGGTGTGTTGACTATAACAGATACATTGTATGATGATCTCGATATCTCAATCATGGACTT

	TATAGGACCATACATTATAGGTAACATAAAAACTGTCCAAATAGATGTACGGGATATAAAATATTCCGAC ATGCAAAAATGCTACTTTAGCTATAAGGGTAAAATAGTTCCTCAGGATTCTAATGATTTGGCTAGATTCA ACATTTATAGCATTTGTGCCGCATACAGATCAAAAAATACCATCATCATAGCATGCGACTATGATATCAT GTTAGATATAGAAGATAAACATCAGCCATTTTATCTATTCCCATCTATTGATGTTTTTAACGCTACAATC ATAGAAGCGTATAACCTGTATACAGCTGGAGATTATCATCTAATCATCAATCCTTCAGATAATCTGAAAA TGAAATTGTTGTTTAATTCTTCATTCTGCATATCAGACGGCAATGGATGGATCATAATTGATGGGAAATG CAATAGTAATTTTTTATCATAAAAGTTGTAAAGTAAATAATAAAACAATAAATATTGAACTAGTAGTACG TATATTGAGCAATCAGAAATGATGCTGGTACCTCTTATCACGGTGACCGTAGTTGCGGGAACAATATTAG TATGTTATATATTATATATTTGTAGGAAAAAGATACGTACTGTCTATAATGACAATAAAATTATCATGAC AAAATTAAAAAAGATAAAGAGTTCTAATTCCAGCAAATCTAGTAAATCAACTGATAGCGAATCAGACTGG GAGGATCACTGTAGTGCTATGGAACAAAACAATGACGTAGATAATATTTCTAGGAATGAGATATTGGACG ATGATAGCTTCGCTGGTAGTTTAATATGGGATAACGAATCCAATGTCATGGCGCCTAGCACAGAACACAT TTACGATAGTGTTGCTGGAAGCACGCTGCTAATAAATAATGATCGTAATGAACAGACTATTTATCAGAAC ACTACAGTAGTAATTAATGAGACGGAGACTGTTGAAGTACTTAATGAAGATACCAAACAGAATCCTAACT ATTCATCCAATCCTTTCGTAAATTATAATAAAACCAGTATTTGTAGCAAGTCAAATCCGTTCATTACAGA ACTCAACAATAAATTTAGTGAGAATAATCCGTTTAGACGAGCACATAGCGATGATTATCTTAATAAGCAA GAACAAGATCATGAACACGATGATATAGAATCATCGGTCGTATCATTGGTGTGATTAGTTTCCTTTTTAT AAAATTGAAGTAATATTTAGTATTATTGCTGCCGTCACGTTGTACAAATGGAGATATTCCCTGTATTCGG CATTTCTAAAATTAGCAATTTTATTGCTAATAATGACTGTAGATATTATATAGATACAGAACATCAAAAA ATTATATCTGATGAGATCAATAGACAGATGGATGAAACGGTACTTCTTACCAACATCTTAAGCGTAGAAG TTGTAAATGACAATGAGATGTACCATCTTATTCCCCATAGACTATCGACTATTATACTCTGTATTAGTTC TGTCGGAGGATGTGTTATCTCTATAGATAATGACATCAATGACAAAAATATTCTAACATTTCCCATTGAT CATGCTGTAATCATATCCCCACTGAGTAAATGTGTCGTAGTTAGCAAGGGTCCTACAACCATATTGGTTG TTAAAGCGGATATACCCAGCAAACGATTGGTAACATCGTTTACAAACGACATACTGTATGTAAACAATCT GTCACTGATTAATTATTTGCCGTTGTCTGTATTCATTATTAGACGAGTCACCGACTATTTGGATAGACAC ATATGCGATCAGATATTTGCGAATAATAAGTGGTATTCCATTATAACCATCGACGATAAGCAATATCCTA TTCCATCAAACTGTATAGGTATGTCCTCTGCCAAGTACATAAATTCTAGCATCGAGCAAGATACTTTAAT ACATGTTTGTAACCTCGAGCATCCATTCGACTTAGTATACAAAAAAATGCAGTCGTACAATTCTGTACCT ATCAAGGAACAAATATTGTACGGTAGAATTGATAATATAAATATGAGCATTAGTATTTCTGTGGATTAAT AGATTTCTAGTATGGGGATCATTAATCATCTCTAATCTCTAAATACCTCATAAAACGAAAAAAAAGCTAT TATCAAATACTGTACGGAATGGATTCATTCTCTTCTCTTTTTATGAAACTCTGTTGTATATCTACTGATA AAACTGGAAGCAAAAAATCTGATAAAAAGAATAAGAATAAGATCAAGGATTATATGGAACACGATTATTA TAAAATAACAATAGTTCCTGGTTCCTCTTCCACGTCTACTAGCTCGTGGTATTATACACATGCCTAGTAA TAGTCTCTTTGCGTTGACGGAAAGCAGACTAGAAATAACAGGCTAAAATGTTCAGACACCATAATAGTTC CCAACCCAGATAATAACAGAGTACCATCAACACATTCCTTTAAACTCAATCCCAAACCCAAAACCGTTAA AATGTATCCGGCCAATTGATAGTAGATAATGAGGTGTACAGCGCATGATAATTTACACAGTAACCAAAAT GAAAATACTTTAGTAATTATAAGAAATATAGATGGTAACGTCATCATCAACAATCCAATAATATGCCGGA GAGTAAACATTGACGGATAAAACAAAAATGCTCCGCATAACTCTATCATGGCAATAACACAACCAAATAC TTGTAAGATTCCTAAATTAGTAGAAAATACAACGGATATCGATGTATAAGTGATCTCGAGAAATAATAAG AATAAAGTAATGCCCGTAAAGATAAACATCAACATTGTTTGGTAATCATTAAACCAATTAGTATGAAGTT GAACTAATTTCACAGTAGATTTTATTCCAGTGTTATCCTCGCATGTATACGTACCTGGTAAGATATCTTT ATATTCTATAATCAATGAGACATCACTATCCGATAACGAATGAAGTCTAGCACTAGTATGCCATTTACTT AATATGGTCGTCTTGGAAGTTTTATTATAAGTTAAAATATCATGGTTGTCCAATTTCCATCTAATATACT TTGTCGGATTATCTATAGTACACGGAATAATGATGGTATTATTACATGCTGTATACTCTATAGTCTTTGT AGATGTTATAATCATAAAAGTACAGAGGTATATCAACGATATTCTAACTCTTGACATTTTTTATTTATTT AAAATGATACCTTTGTTATTTATTTTATTCTATTTTGCTAACGGTATCGAATGGCATAAGTTTGAAACGA GTGAAGAAATAATTTCTACTTACTTATTAGACGACGTATTATACACGGGTGTTAATGGGGCGGTATACAC ATTTTCAAATAATAAACTAAACAAAACTGGTTTAGCTAATACTAATTATATCACAACATCTATAAAAGTA GAGGATGCGGATAAGGATACATTAGTATGCGGAACCAATAACGGAAATCCCAAATGTTGGAAAATAGACG GTTCAGACGACCCAAAACATAGAGGTAGAGGATACGCTCCTTATCAAAATAGCAAAGTAACGATAATCAG TCACAACGGATGTGTACTATCTGACATAAACATATCAAAAGAAGGAATTAAACGATGGAGAAGATTTGAC GGACCATGTGGTTATGATTTATACACGGCGGATAACGTAATTCCAAAAGATGGTTTACGAGGAGCATTCG TCGATAAAGATGGTACTTATGACAAAGTTTACATTCTTTTCACTGATACTATCGGCTCAAAGAGAATTGT CAAAATTCCGTATATAGCACAAATGTGCCTAAACGACGAAGGTGGTCCATCATCATTGTCTAGTCATAGA TGGTCGACGTTTCTCAAAGTCGAATTAGAATGTGATATCGACGGAAGAAGTTATAGACAAATTATTCATT CTAGAACTATAAAAACAGATAATGATACGATACTATATGTATTCTTCGATAGTCCGCATTATGTACCTAT TCTATGAATACCATTAAACAATCTTTTTCTACGTCAAAATTGGAAGGATATACAAAGCAATTGCCGTCTC CAGCTCCTGGTATATGTCTACCAGCTGGAAAAGTTGTTCCACATACCACGTTTGAAGTCATAGAAAAATA TAATGTACTAGATGATATTATAAAGCCTTTATCTAACCAACCTATCTTCGAAGGACCGTCTGGTGTTAAA TGGTTCGATATAAAGGAGAAGGAAAATGAACATCGGGAATATAGAATATACTTCATAAAAGAAAATTCTA TATATTCGTTCGATACAAAATCTAAACAAACTCGTAGCTCGCAAGTCGATGCGCGACTATTTTCAGTAAT

GGTAACTTCGAAACCGTTATTTATAGCAGATATAGGGATAGGAGTAGGAATGCCACAAATGAAAAAAATA
CTTAAAATGTAATCTTAATCGAGTACACCACACGACAATGAACAAACATAAGACAGATTATGCTGGTTAT
GCTTGCTGCGTAATATGCGGTCTAATTGTTGGAATTATTTTTACAGCGACACTATTAAAAGTTGTAGAAC
GTAAATTAGTTCATACACCATCAATAGATAAAACGATAAAAGATGCATATATTAGAGAAGATTGTCCTAC
TGACTGGATAAGCTATAATAATAAATGTATCCATTTATCTACTGATCGAAAAACCTGGGAGGAAGGACGT
AATGCATGCAAAGCTCTAAATCCAAATTCGGATCTAATTAAGATAGAGACTCCAAACGAGTTAAGTTTTT
TAAGAAGCATTAGACGCGGATATTGGGTAGGAGAATCCGAAATATTAAACCAGACAACCCCATATAATTT
TATAGCTAAGAATGCCACGAAGAATGGAACTAAAAAACGGAAATATATTTGTAGCACAACGAATACTCCC
AAACTGCATTCGTGTTACACTATATAACAATTACACTACATTTTTATCATACCACTACTTCGGTTAGATG
TTTTAGAAAAAAATAAATATCGCCGTACCGTTCTTGTTTTTATAAAAATAACAATTAACAATTATCAAAT
TTTTTCTTTAATATTTTACGTGGTTGACCATTCTTGGTGGTAAAATAATCTCTTAGTGTTGGAATGGAAT
GCTGTTTAATGTTTCCACACTCATCGTATATTTTGACGTATGTAGTCACATCGTTTACGCAATAGTCAGA
CTGTAGTTCTATCATGCTTCCTACATTAGAAGGAGGAACAGTTTTAAAGTCTCTTGGTTTTAATCTATTA
CCGTTAGTTTTCATGAAATCCTTTGTTTTATCCACTTCACATTTTAAATAAATGTCCACTATACATTCTT
CTGTTAATTTTACTAGATCGTCATGGGTCATAGAATTTATAGGTTCCGTAGTCCATGGATCCAAACTAGC
AAACTTCGCGTATACGGTATCGCGATTAGTGTATACACCAACTGTATGAAAATTAAGAAAACAGTTTAAT
AGATCAACAGAAATATTTAATCCTCCGTTTGATACAGATGCACCATATTTATGGATTTTGGATTCACACG
TTGTTTGTCTGAGGGGTTCGTCTAGCGTTGCTTCTACATAAACTTCTATTCCCATATATTCTTTATTGTC
AGAATCGCATACCGATTTATCATCATACACTGTTTGAAAACTAAATGGTATACACATCAAAATAACAAAT
ACTAACGAGTACATTCTGCAATATTGTTATCGTAATTGGAAAAATAGTGTTCGAGTGAGTTGGATTATGT
GAGTATTGGATTGTATATTTTATTTTATATTTTGTAATAAGAATAAAATGCTAATGTCAAGTTTATTCCA
ATAGATGTCTTATTAAAAACATATATAATAAATAACAATGGCTGAATGGCATAAAATTATCGAGGATATC
TCAAAAAATAATAAGTTCGAGGATGCCGCCATCGTTGATTACAAGACTACAAAGAATGTTCTAGCTGCTA
TTCCTAACAGAACATTTGCCAAGATTAATCCGGGTGAAATTATTCCTCTCATCACTAATCGTAATATTCT
AAAACCTCTTATTGGTCAGAAATATTGTATTGTATATACTAACTCTCTAATGGATGAGAACACGTATGCT
ATGGAGTTGCTTACTGGGTACGCCCCTGTATCTCCGATCGTTATAGCGAGAACTCATACCGCACTTATAT
TTTTGATGGGTAAGCCAACAACATCCAGACGTGACGTGTATAGAACGTGTAGAGATCACGCTACCCGTGT
ACGCGCAACTGGTAATTAAAATAAAAAGTAATATTCATATGTAGTGTCAATTTTAAATGATGATGATGAA
ATGGATAATATCCATATTGACGATGTCAATAATGCCGGTATTGGCATACAGCTCATCGATTTTTAGATTT
CATTCAGAGGATGTGGAATTATGTTATGGGCATTTGTATTTTGATAGGATCTATAATGTAGTAAATATAA
AATATAATCCGCATATTCCATATAGATATAATTTTATTAATCGCACGTTAACCGTAGATGAACTAGACGA
TAATGTCTTTTTTTACACATGGTTATTTTTTAAAACACAAATATGGTTCACTTAATCCTAGTTTGATTGTC
TCATTATCAGGAAACTTAAAATATAATGATATACAATGCTCAGTAAATGTATCGTGTCTCATTAAAAATT
TGGCAACGAGTACATCTACTATATTAACATCTAAACATAAGACTTATTCTCTACATCGGTCCACGTGTAT
TACTATAATAGGATACGATTCTATTATATGGTATAAAGATATAAATGACAAGTATAATGGCATCTATGAT
TTTACTGCAATATGTATGCTAATAGCGTCTACATTGATAGTGACCATATACGTGTTTAAAAAAATAAAAA
TGAACTCTTAATTATGCTATGCTATTAGAAATGGATAAAATCAAAATTACGGTTGATTCAAAAATTGGTA
ATGTTGTTACCATATCGTATAACTTGGAAAAGATAACTATTGATGTCACACCTAAAAAGAAAAAAGAAAA
GGATGTATTATTAGCGCAATCAGTTGCTGTCGAAGAGGCAAAAGATGTCAAGGTAGAAGAAAAAAATATT
ATCGATATTGAAGATGACGATGATATGGATGTAGAAAGCGCATAATACGATCTATAAAAATAAGTATATA
AATACTTTTTATTTACTGTACTCTTACTGTGTAGTGGTGATACCCTACTCGATTATTTTTTTAAAAAAAT
ACTTATTCTGATTCTTCTAGCCATTTCCGTGTTCGTTCGAATGCCACATCGACGTTAAAGATAGGGGAGT
AGTTGAAATCTAGTTCTGCATTGTTGGTACGCACCTCAAATGTAGTGTTGGATATCTTCAACGTATAGTT
GTTGAGTAGTGATGGTTTTCTAAATAGAATTCTCTTCATATCATTCTTGCACGCGTACATTTTTAGCATC
CATCTTGGAATTCTAGATCCTTGTTCTATTCCCAATGGTTTCATCAATAGAAGATTAAACATATCGTACG
AACACGATGGAGAGTAATCGTAGCAAAAGTAAGCATTTCCTTTAATCTCAGATCCCGGATACTGGATATA
TTTTGCAGCCAACACGTGCATCCATGCAACATTTCCTACATATACCCGGCTATGCACCGCGTCATCATCG
ACTGTACGATACATAATGTTACCGTGTTGCTTACATTGCTCGTAAAAGACTTTCGTCAATTTGTCTCCTT
CTCCGTAAATTCCAGTGGGTCTTAGGCAACAAGTATACAATTTTGCTCCATTCATGATTACGGAATTATT
GGCTTTCATAACCAGTTGCTCGGCCATACGTTTACTTTTTGCGTATACATGTCCTGGTGATATATCATAA
AGGGTATGCTCATGGCCGATGAATGGATCACCGTGTTTATTTGGTCCTATTGCTTCCATGCTACTAGTAT
AGATCAAATACTTGATTCCTAGGTCCACACAAGCTGCCAATATAGTCTGTGTTCCATAATAGTTTACTTT
CATGATTTCATTATCGGTGTATTTTCCAAATACATCCACTAGAGCAGCCGTATGAATAATCAGATTTACC
CCATCTAGCGCTTCTCTCACCTTATCAAAGTCGTTTATATCACATTGTATATAGTTTATAACCTTAACTT
TCGAGGTTATTGGTTGTGGATCTTCTACAATATCTATGACTCTGATTTCTTGAACATCATCTGCACTAAT
TAACAGTTTTACTATATACCTGCCTAGAAATCCGGCACCACCAGTAACCGCGTACACGGCCATTGCTGCC
ACTCATAATATCAGACTACTTATTCTATTTTACTAAATAATGGCTGTTTGTATAATAGACCACGATAATA
TCAGAGGAGTTATTTACTTTGAACCAGTCCATGGAAAAGATAAAGTTTTAGGATCAGTTATTGGATTAAA
ATCCGGAACGTATAGTTTGATAATTCATCGTTACGGAGATATTAGTCAAGGATGTGATTCCATAGGCAGT
CCAGAAATATTTATCGGTAACATCTTTGTAAACAGATATGGTGTAGCATATGTTTATTTAGATACAGATG
TAAATATATCTACAATTATTGGAAAGGCGTTATCTATTTCAAAAAATGATCAGAGATTAGCGTGTGGAGT

TATTGGTATTTCTTACATAAATGAAAAGATAATACATTTTCTTACAATTAACGAGAATGGCGTTTGATAT
ATCAGTTAATGCGTCTAAAACAATAAATGCATTAGTTTACTTTTCTACTCAGCAAAATAAATTAGTCATA
CGTAATGAAGTTAATGATACACACTACACTGTCGAATTTGATAGGGACAAAGTAGTTGACACGTTTATTT
CATATAATAGACATAATGACACCATAGAGATAAGAGGGGTGCTTCCAGAGGAAACTAATATTGGTTGCGC
GGTTAATACGCCGGTTAGTATGACTTACTTGTATAATAAGTATAGTTTTAAACTGATTTTAGCAGAATAT
ATAAGACACAGAAATACTATATCCGGCAATATTTATTCGGCATTGATGACACTAGATGATTTGGCTATTA
AACAGTATGGAGACATTGATCTATTATTTAATGAGAAACTTAAAGTAGACTCCGATTCGGGACTATTTGA
CTTTGTCAACTTTGTAAAGGATATGATATGTTGTGATTCTAGAATAGTAGTAGCTCTATCTAGTCTAGTA
TCTAAACATTGGGAATTGACAAATAAAAAGTATAGGTGTATGGCATTAGCCGAACATATATCTGATAGTA
TTCCAATATCTGAGCTATCTAGACTACGATACAATCTATGTAAGTATCTACGCGGACACACTGAGAGCAT
AGAGGATAAATTTGATTATTTTGAAGACGATGATTCGTCTACATGTTCTGCCGTAACCGACAGGGAAACG
GATGTATAATTTTTTTTTATAGCGTGAAGGATATGATAAAAAATATAATTGTTGTATTTATCCCATTCCAA
TCACCTTATATGATTCTGTAACACAATGAAGGAGTCTCATAGATGTATAGAGGTCAGATACTGGTTTGAT
AAACTGTTTATTCCACATGAGTATGTTTGACTTTATGGTTAGACCCGCATACTTTAACAAATCACTGAAA
ATTGGAGTTAGGTATTGACCTCTCAGAATCAGTTGCCGTTCTGGAACATTAAATGTATTTTTTATGATAT
ACTCCAACGCATTTATGTGGGCATACAACAAGTCATTACTAATGGAGTATTCCAAGAGTTTTAGTTGTCT
AGTATTTAACAAGAGAAGAGATTTCAACAGACTGTTTATGAACTCGAATGCCGCCTCATTGTCGCTTATA
TTGATGATGTCGAATTCTCCCAATATCATCACCGATGAGTAGCTCATCTTGTTATCGGGATCCAAGTTTT
CTAAAGATGTCATTAAACCCTCGATCATGAATGGATTTATCATCATCGTTTTTATGTTGGACATGAGCTT
AGTCCGTTTGTCCACATCTATAGACGACGATTTCTGAATTATTTTATATATCCCTCTCTTTAACTCCAGG
AACTTGTCAGGATGGTCTACTTTAATATGTTCTCGTCTAAGAGATGAAAATCTTTGGATGGTTGCACGCG
ACTTTTCTCTAAAGGATGACGTTGCCCAAGATCCTCTCTTAAATGAATCCATCTTATCCTTGGACAAGAT
GGACAGTCTATTTTCCTTAGATGGTTTAATATTTTTGTTACCCATGATCTATAAAGGTAGACCTAATCGT
CTCGGATGACCTATATATTTATTTTCAGTTTTATTATACGCATAAATTGTAAAAAATATGTTAGGTTTAC
AAAAATGTCTCGTGGGGCATTAATCGTTTTTGAAGGATTGGACAAATCTGGAAAAACAACACAATGTATG
AACATCATGGAATCTATACCGGCAAACACGATAAAATATCTTAACTTTCCTCAGAGATCCACTGTCACTG
GAAAGATGATAGATGACTATCTAACTCGTAAAAAAACCTATAATGATCATATAGTTAATCTATTATTTTG
TGCAAATAGATGGGAGTTTGCATCTTTTATACAAGAACAACTAGAACAGGGAATTACTTTAATAGTTGAT
AGATACGCGTTCTCTGGAGTAGCGTATGCCGCCGCTAAAGGCGCGTCAATGACTCTCAGTAAGAGTTATG
AATCTGGATTGCCTAAACCCGACTTAGTTATATTCTTGGAATCTGGTAGCAAAGAAATTAATAGAAACGT
CGGCGAGGAAATTTATGAAGATGTTACATTCCAACAAAAGGTATTACAAGAATATAAAAAAATGATTGAA
GAAGGAGATATTCATTGGCAAATTATTTCTTCTGAATTCGAGGAAGATGTAAAGAAGGAGTTGATTAAGA
ATATAGTTATAGAGGCTATACACACGGTTACTGGACCAGTGGGGCAACTGTGGATGTAATAGTGAAATTA
CATTTTTTATAAATAGATGTTAGTACAGTGTTATAAATGGATGAAGCATATTACTCTGGCAACTTGGAAT
CAGTACTCGGATACGTGTCCGATATGCATACCGAACTCGCATCAATATCTCAATTAGTTATTGCCAAGAT
AGAAACTATAGATAATGATATATTAAACAAGGACATTGTAAATTTTATCATGTGTAGATCAAACTTGGAT
AATCCATTTATCTCTTTCCTAGATACTGTATATACTATTATAGATCAAGAGAACTATCAGACCGAATTGA
TTAATTCATTAGACGACAATGAAATTATCGATTGTATAGTTAATAAGTTTATGAGCTTTTATAAGGATAA
CCTAGAAAATATAGTAGATGCTATCATTACTCTAAAATATATAATGAATAATCCAGATTTTAAAACTACG
TATGCCGAAGTACTCGGTTCCAGAATAGCCGATATAGATATTAAACAAGTGATACGTGAGAATATACTAC
AATTGTCTAATGATATCCGCGAACGATATTTGTGAAAAATATTAAAAAAAAATACTTTTTTTTATTAAATG
ACGTCGCTTCGCGAATTTAGAAAATTATGCTGTGATATATATCACGCATCAGGATATAAAGAAAAATCTA
AATTAATTAGAGACTTTATAACAGATAGGGATGATAAATATTTGATCATTAAGCTATTGCTTCCCGGATT
AGACGATAGAATTTATAACATGAACGATAAACAAATTATAAAATTATATAGTATAATATTTAAACAATCT
CAGGAAGATATGCTACAAGATTTAGGATACGGATATATAGGAGACACTATTAGGACTTTCTTCAAAGAGA
ACACAGAAATCCGTCCACGAGATAAAAGCATTTTAACTTTAGAAGACGTGGATAGTTTCTTAACTACGTT
ATCATCCGTAACTAAAGAATCGCATCAAATAAAATTATTGACTGATATCGCATCCGTTTGTACATGTAAT
GATTTAAAATGTGTAGTCATGCTTATTGATAAAGATCTAAAAATTAAAGCGGGTCCTCGGTACGTACTTA
ACGCTATTAGTCCTAATGCCTATGATGTGTTTAGAAAATCTAATAACTTGAAAGAGATAATAGAAAATGC
ATCTAAACAAAATCTAGACTCTATATCTATTTCTGTTATGACTCCAATTAATCCCATGTTAGCGGAATCG
TGTGATTCTGTCAATAAGGCGTTTAAAAAATTTCCATCAGGAATGTTTGCGGAAGTCAAATACGATGGTG
AAAGAGTACAAGTTCATAAAAATAATAACGAGTTTGCCTTCTTTAGTAGAAACATGAAACCAGTACTCTC
TCATAAAGTGGATTATCTCAAAGAATACATACCGAAAGCATTTAAAAAAGCTACGTCTATCGTATTGGAT
TCTGAAATTGTTCTTGTAGACGAACATAATGTACCGCTCCCGTTTGGAAGTTTAGGAATACACAAAAAGA
AAGAATATAAAAACTCTAACATGTGTTTGTTCGTGTTTGACTGTTTGTACTTTGATGGATTCGATATGAC
GGACATTCCATTGTACGAACGAAGATCTTTTCTCAAAGATGTTATGGTTGAAATACCCAATAGAATAGTA
TTCTCAGAGTTGACGAATATTAGTAACGAGTCTCAGTTAACTGACGTATTGGATGATGCACTAACGAGAA
AATTAGAAGGATTGGTCTTAAAAGATATTAATGGAGTATACGAACCGGGAAAGAGAAGATGGTTAAAAAT
AAAGCGAGACTATTTGAACGAGGGTTCCATGGCAGATTCTGCCGATTTAGTAGTACTAGGTGCTTACTAT
GGTAAAGGAGCAAAGGGTGGTATCATGGCAGTCTTTCTAATGGGTTGTTACGACGATGAATCCGGTAAAT
GGAAGACGGTTACCAAGTGTTCAGGACACGATGATAATACGTTAAGGGTTTTGCAAGACCAATTAACGAT

GGTTAAAATTAACAAGGATCCCAAAAAAATTCCAGAGTGGTTGGTAGTTAATAAAATCTATATTCCCGAT
TTTGTAGTAGAGGATCCGAAACAATCTCAGATATGGGAAATTTCAGGAGCAGAGTTTACATCTTCCAAGT
CCCATACCGCAAATGGAATATCCATTAGATTTCCTAGATTTACTAGGATTAGAGAAGATAAAACGTGGAA
AGAATCTACTCATCTAAACGATTTAGTAAACTTGACTAAATCTTAATAGTTACATACAAACTGAAAATTA
AAATAACACTATTTAGTTGGTGGTCGCCATGGATGGTGTTATTGTATACTGTCTAAACGCGTTAGTAAAA
CATGGCGAGGAAATAAATCATATAAAAAATGATTTCATGATTAAACCATGTTGTGAAAGAGTTTGTGAAA
AAGTCAAGAACGTTCACATTGGCGGACAATCTAAAAACAATACAGTGATTGCAGATTTGCCATATATGGA
TAATGCGGTATCCGATGTATGCAATTCACTGTATAAAAAGAATGTATCAAGAATATCCAGATTTGCTAAT
TTGATAAAGATAGATGACGATGACAAGACTCCTACTGGTGTATATAATTATTTTAAACCTAAAGATGTTA
TTCCTGTTATCATATCTATAGGAAAGGATAAAGATGTCTGTGAACTATTAATCTCATCAGACATATCGTG
TGCATGCGTGGAGTTAAATTCATATCACGTAGCCATTCTTCCCATGGATGTTTCCTTTTTTACCAAAGGA
AATGCATCATTGATTATTCTCCTGTTTGATTTCTCTATCGATGCAGCACCTCTCTTAAGAAGTGTAACCG
ATAATAATGTTATTATATCTAGACACCAGCGTCTACATGACGAGCTTCCGAGTTCCAATTGGTTCAAGTT
TTACATAAGTATAAAGTCCGACTATTGTTCTATATTATATATGGTTGTTGATGGATCTGTGATGCATGCG
ATAGCTGATAATAGAACTCACGCAATTATTAGCAAAAATATATTAGACAATACTACGATTAACGATGAGT
GTAGATGCTGTTATTTTGAACCACAGATTAGGATTCTTGATAGAGATGAGATGCTCAATGGATCATCGTG
TGATATGAACAGACATTGTATTATGATGAATTTACCTGATGTAGGCAAATTTGGATCTAGTATGTTGGGG
AAATATGAACCTGACATGATTAAGATTGCTCTTTCGGTGGCTGGTAATTTAATAAGAAATCGAGACTACA
TTCCCGGGAGACGAGGATATAGCTACTACGTTTACGGTATAGCCTCTAGATAATTTTTTTAAGCACGAAA
TAAAAAACATAATTTTAAACCAATCTATTTCATACTATTTTGTGTGATCACCATGGACATAAAGATAGAT
ATTAGTATTTCTGGTGATAAATTTACGGTGACTACTAGGAGGGAAAATGAAGAAAGAAAAAAATATCTAC
CTCTCCAAAAAGAAAAAACTACTGATGTTATCAAACCTGATTATCTTGAGTACGATGACTTGTTAGATAG
AGATGAGATGTTTACTATTCTAGAGGAATATTTTATGTACAGAGGTCTATTAGGCCTCAGAATAAAATAT
GGACGACTCTTTAACGAAATTAAAAAATTCGACAATGATGCGGAAGAACAATTCGGTACTATAGAAGAAC
TCAAGCAGAAACTTAGATTAAATTCTGAAGAGGGAGCAGATAACTTTATAGATTATATAAAGGTACAAAA
ACAGGATATCGTCAAACTTACTGTATACGATTGCATATCTATGATAGGATTGTGTGCATGCGTGGTAGAT
GTTTGGAGAAATGAGAAACTGTTTTCTAGATGGAAATATTGTTTACGAGCTATTAAACTGTTTATTAATG
ATCACATGCTTGATAAGATAAAATCTATACTGCAGAATAGACTAGTATATGTGGAAATGTCATAGAAAGT
TAAAAGTTAATGAGAGCAAAAATATATAAGGTTGTATTCCATATTTGTTATTTTTTCTGTAATAGTTAGA
AAAATACATTCGATGGTCTATCTACCAGATTATTATGTGTTATAAGGTACTTTTTCTCATAATAAACTAG
AGTATGAGTAAGATAGTGTTTTTCAAAACATATAAATCTAAAATTGATGGATGAGATATACAGCTATTAA
TTTCGAAAATATATTTTAATCTGATAACTTTAAACATGGATTTTTGATGGTGGTTTAACGTTTTAAAAAA
AGATTTTGTTATTGTAGTATATGATAATATTAAAAGATGGATATAAAGAATTTGCTGACTGCATGTACTA
TTTTTTACATTACTACATTGGCTACGGCAGATATACCTACTCCGCCACCAACGGGTCATGTGACAAGGGA
GAATATCTTGATAAGAGGCATAATCAATGTTGTAATCGGTGTCCACCTGGAGAATTTGCCAAGGTTAGAT
GTAATGGTAACGATAACACAAAATGTGAACGCTGCCCACCTCATACATATACCACAATCCCAATTATTCT
AATGGATGTCATCAATGTAGAAAATGCCCAACCGGATCATTTGATAAGGTAAAGTGTACCGGAACACAGA
ACAGTAAATGTTCGTGTCTTCCTGGTTGGTATTGTGCTACTGATTCTTCACAGACTGAAGATTGTTGAAA
TTGTGTACCAAAAAGGAGATGTCCATGCGGATACTTTGGTGGAATAGATGAACAAGGAAATCCTATTTGT
AAATCGTGTTGTGTTGGTGAATATTGCGACTACCTACGTAATTATAGACTTGATCCATTTCCTCCATGCA
AACTATCTAAATGTAATTAATTATGATTTTGATGATAATGTTACCATACATTATATCGCTACTTGGTTAG
TGTATTATTCAGTATGAAGACCTATTAATAATTACTTATCTTTTGACGATCTTGTTATAATTATAATATA
AAAATACTTATGGCATAGTAACTCATAATTGCTGACGCGATAAATTCGTAATAATCTGTTTTGTTCAAAT
TTTTATAAGGAATCTACAGGCATAAAAATAAAAATATAATTTATAATATACTCTTACAGCGCGCCATCAT
GAATAACAGCAGTGAATTGATTGCTGTTATTAATGGATTTAGAAATAGTGGACGATTTTGTGATATTAGT
ATAGTTATTAATGATGAAAGGATAAACGCTCATAAACTCATCCTATCTGGAGCCTCCGAATATTTTTCCA
TTCTGTTTTCCAATAATTTTATCGATTCTAATGAATACGAAGTTAATCTAAGTCATTTAGATTATCAAAG
CGTTAACGATTTGATCGATTACATTTATGGGATACCTTTGAGCCTAACTAACGATAACGTGAAATATATT
CTTTCAACCGCTGATTTTTTACAAATTGGATCTGCTATTACGGAGTGTGAAAATTACATACTTAAAAATC
TTTGTTCTAAAAACTGTATCGATTTCTACATATACGCTGATAAATATAATAACAAGAAAATAGAATCAGC
GTCGTTTAACACAATATTACAAAATATTTTGAGACTCATCAACGATGAAAACTTTAAATACTTAACAGAG
GAATCAATGATAAAAATTTTAAGCGATGATATGTTAAATATAAAAAATGAGGATTTTGCACCACTAATTC
TCATTAAATGGTTAGAGAGTACTCAACAATCATGCACCGTCGAGTTACTTAGATGCCTCAGAATATCATT
GCTTTCCCCACAAGTTATAAAATCACTTTATAGTCATCAACTGGTTAGTTCAATCTACGAATGTATAACA
TTCTTAAACAATATAGCATTCTTGGATGAATCATTTCCTAGATACCATAGCATCGAGTTGATATCTATCG
GTATAAGTAATTCGCATGATAAGATTTCCATAAACTGCTACAATCATAAAAAAAATACATGGGAAATGAT
ATCTTCACGTAGATATAGGTGTAGTTTCGCAGTGGCCGTCCTGGATAATATTATCTATATGATGGGTGGA
TATGATCAGTCCCCGTATAGAAGTTCAAAGGTTATAGCGTACAATACATGTACAAATTCTTGGATATATG
ATATACCAGAGCTAAAATATCCTCGTTCTAATTGTGGGGGACTGGCTGATGACGAATACATTTATTGTAT
AGGCGGCATACGCGATCAGGATTCATCGTTGACATCTAGTATTGATAAATGGAAGCCATCAAAACCATAT
TGGCAGAAGTATGCTAAAATGCGCGAACCAAAATGTGATATGGGGGTTGCGATGTTAAACGGATTAATAT

	ATGTCATGGGTGGAATCGTTAAAGGTGACACGTGTACCGACGCACTAGAGAGTTTATCAGAAGATGGATG
	GATGAAGCATCAACGTCTTCCAATAAAAATGTCCAATATGTCGACGATTGTTCATGATGGCAAGATTTAT
	ATATCTGGAGGTTACAACAATAGTAGTGTAGTTAATGTAATATCGAATCTAGTCCTTAGCTATAATCCGA
	TATATGATGAATGGACCAAATTATCATCATTAAACATTCCTAGAATTAATCCCGCTCTATGGTCAGCGCA
	TAATAAATTATATGTAGGAGGAGGAATATCTGATGATGTTCGAACTAATACATCTGAAACATACGATAAA
	GAAAAAGATTGTTGGACATTGGATAATGGTCACGTGTTACCACGCAATTATATAATGTATAAATGCGAAC
	CGATTAAACATAAATATCCATTGGAAAAAACACAGTACACGAATGATTTTCTAAAGTATTTGGAAAGTTT
	TATAGGTAGTTGATAGAACAAAATACATAATTTTGTAAAAATAAATCACTTTTTATACTAATATGACACG
	ATTACCAATACTTTTGTTACTAATATCATTAGTATACGCTACACCTTTTCCTCAGACATCTAAAAAAATA
	GGTGATGATGCAACTCTATCATGTAATCGAAATAATACAAATGACTACGTTGTTATGAGTGCTTGGTATA
	AGGAGCCCAATTCCATTATTCTTTTAGCTGCTAAAAGCGACGTCTTGTATTTTGATAATTATACCAAGGA
	TAAAATATCTTACGACTCTCCATACGATGATCTAGTTACAACTATCACAATTAAATCATTGACTGCTAGA
	GATGCCGGTACTTATGTATGTGCATTCTTTATGACATCAACTACAAATGACACTGATAAAGTAGATTATG
	AAGAATACTCCACAGAGTTGATTGTAAATACAGATAGTGAATCGACTATAGACATAATACTATCTGGATC
	TACACATTCACCGGAAACTAGTTCTAAGAAACCTGATTATATAGATAATTCTAATTGCTCGTCGGTATTC
	GAAATCGCGACTCCGGAACCAATTACTGATAATGTAGAAGATCATACAGACACCGTCACATACACTAGTG
	ATAGCATTAATACAGTAAGTGCATCATCTGGAGAATCCACAACAGACGAGACTCCGGAACCAATTACTGA
	TAAAGAAGATCATACAGTTACAGACACTGTCTCATACACTACAGTAAGTACATCATCTGGAATTGTCACT
	ACTAAATCAACCACCGATGATGCGGATCTTTATGATACGTACAATGATAATGATACAGTACCACCAACTA
	CTGTAGGCGGTAGTACAACCTCTATTAGCAATTATAAAACCAAGGACTTTGTAGAAATATTTGGTATTAC
	CGCATTAATTATATTGTCGGCCGTGGCAATTTTCTGTATTACATATTATATATATAATAAACGTTCACGT
	AAATACAAAACAGAGAACAAAGTCTAGATTTTTGACTTACATAAATGTCTGGGATAGTAAAATCTATCAT
	ATTGAGCGGACCATCTGGTTTAGGAAAGACAGCCATAGCCAAAAGACTATGGGAATATATTTGGATTTGT
	GGTGTCCCATACCACTAGATTTCCTCGTCCTATGGAACGAGAAGGTGTTGATTACCATTACGTTAACAGA
	GAGGCCATCTGGAAGGGAATAGCCGCCGGAAACTTTCTAGAACATACTGAGTTTTTAGGAAATATTTACG
	GAACTTCTAAAACAGCTGTGAATACAGCGGCTATTAATAATCGTATTTGTGTGATGGATCTAAACATCGA
	CGGTGTTAGAAGTCTTAAAAATACGTACCTAATGCCTTACTCGGTGTATATAAGACCTACCTCTCTTAAA
	ATGGTTGAGACCAAGCTTCGTTGTAGAAACACTGAAGCTAACGATGAGATTCATCGTCGCGTGATATTGG
	CAAAAACGGATATGGATGAGGCCAACGAAGCAGGTCTATTCGACACTATTATCATTGAAGATGATGTGAA
	TTTAGCATATAGTAAGTTAATTCAGATACTACAGGACCGTATTAGAATGTATTTTAACACTAATTAGAGA
	CTTAAGACTTAAAACTTGATAATTAATAATATAACTCGTTTTTATATGTGGCTATTTCAACGTCTAATGT
	ATTAGTTAAATATTAAAACTTACCACGTAAAACTTAAAATTTAAAATGATATTTCATTGACAGATAGATC
	ACACATTATGAACTTTCAAGGACTTGTGTTAACTGACAATTGCAAAAATCAATGGGTCGTTGGACCATTA
	ATAGGAAAAGGTGGATTCGGTAGTATTTATACTACTAATGACAATAATTATGTAGTAAAAATAGAGCCCA
	AAGCTAACGGATCATTATTTACCGAACAGGCATTTTATACTAGAGTACTTAAACCATCCGTTATCGAAGA
	ATGGAAAAAATCTCACAATATAAAGCACGTAGGTCTTATCACGTGCAAGGCATTTGGTCTATACAAATCC
	ATTAATGTGGAATATCGATTCTTGGTAATTAATAGATTAGGTGCAGATCTAGATGCGGTGATCAGAGCCA
	ATAATAATAGATTACCAAAAAGGTCGGTGATGTTGATCGGAATCGAAATCTTAAATACCATACAATTTAT
	GCACGAGCAAGGATATTCTCACGGAGATATTAAAGCGAGTAATATAGTCTTGGATCAAATAGATAAGAAT
	AAATTATATCTAGTGGATTACGGATTGGTTTCTAAATTCATGTCTAATGGAGAACATGTTCCATTTATAA
	GAAATCCAAATAAAATGGATAACGGTACTCTAGAATTTACACCTATAGATTCGCATAAAGGATACGTTGT
	ATCTAGACGTGGAGATCTAGAAACACTTGGATATTGTATGATTAGATGGTTGGGAGGTATCTTGCCATGG
	ACTAAGATATCTGAAACAAAGAATTGTGCATTAGTAAGTGCCACAAAACAGAAATATGTTAACAATACTG
	CGACTTTGTTAATGACCAGTTTGCAATATGCACCTAGAGAATTGCTGCAATATATTACCATGGTAAACTC
	TTTGACATATTTTGAGGAACCCAATTATGACGAGTTTCGGCACATATTAATGCAGGGTGTATATTATTAA
	GTGTGGTGTTTGGTCGATGTAAAATTTTTGTCGATAAAAATTAAAAAATAACTTAATTTATTATTGATCT
	CGTGTGTACAACCGAAATCATGGCGATGTTTTACGCACACGCTCTCGGTGGGTACGACGAGAATCTTCAT
	GCCTTTCCTGGAATATCATCGACTGTTGCCAATGATGTCAGGAAATATTCTGTTGTGTCAGTTTATAATA
	ACAAGTATGACATTGTAAAAGACAAATATATGTGGTGTTACAGTCAGGTGAACAAGAGATATATTGGAGC
	ACTGCTGCCTATGTTTGAGTGCAATGAATATCTACAAATTGGAGATCCGATCCATGATCAAGAAGGAAAT
	CAAATCTCTATCATCACATATCGCCACAAAAACTACTATGCTCTAAGCGGAATCGGGTACGAGAGTCTAG
	ACTTGTGTTTGGAAGGAGTAGGGATTCATCATCACGTACTTGAAACAGGAAACGCTGTATATGGAAAAGT
	TCAACATGATTATTCTACTATCAAAGAGAAGGCCAAAGAAATGAATGCACTTAGTCCAGGACCTATCATT
	GATTACCACGTCTGGATAGGAGATTGTATCTGTCAAGTTACTGCTGTGGACGTACATGGAAAGGAAATTA
	TGAGAATGAGATTCAAAAAGGGTGCGGTGCTTCCGATCCCAAATCTGGTAAAAGTTAAACTTGGGGAGAA
	TGATACAGAAAATCTTTCTTCTACTATATCGGCGGCACCATCGAGGTAACCACCTCTCTGGAAGACAGCG
	TGAATAATGTACTCATGAAACGTTTGGAAACTATACGCCATATGTGGTCTGTCGTATATGATCATTTTGA
	TATTGTGAATGGTAAAGAATGCTGTTATGTGCATACGCATTTGTCTAATCAAAATCTTATACCGAGTACT
	GTAAAAACAAATTTGTACATGAAGACTATGGGATCATGCATTCAAATGGATTCCATGGAAGCTCTAGAGT
	ATCTTAGCGAACTGAAGGAATCAGGTGGATGGAGTCCCAGACCAGAAATGCAGGAATTTGAATATCCAGA
	TGGAGTGGAAGACACTGAATCAATTGAGAGATTGGTAGAGGAGTTCTTCAATAGATCAGAACTTCAGGCT

GGTGAATCAGTCAAATTTGGTAATTCTATTAATGTTAAACATACATCTGTTTCAGCTAAGCAACTAAGAA
CACGTATACGGCAGCAGCTTCCTTTATACTCTCATCTTTTACCAACACAAAGGGTGGATATTTGTTCATT
GGAGTTGATAATAATACACACAAAGTAATTGGATTCACGGTGGGTCATGACTACCTCAGACTGGTAGAGA
ATGATATAGAAAAGCATATCAAAAGACTTCGTGTTGTGCATTTCTGTGAGAAGAAAGAGGACATCAAGTA
CACGTGTCGATTCATCAAGGTATATAAACCTGGGGATGAGGCTACCTCGACATACGTGTGCGCTATCAAA
GTGGAAAGATGCTGTTGTGCTGTGTTTGCAGATTGGCCAGAATCATGGTATATGGATACTAATGGTATCA
AGAAGTATTCTCCAGATGAATGGGTGTCACATATAAAATTTTAATTAATGTAATAGAGAACAAATAATAA
GGTTGTAATATCATATAGACAATAACTAACAATTAATTAGTAACTGTTATCTCTTTTTTAACTAACCAAC
TAACTATATACCTATTAATACATCGTAATTATAGTTCTTAACATCTATTAATCATTAATTCGCTTCTTTA
ATTTTTTATAAACTAACATTGTTAATTGAAAAGGGATAACATGTTACAGAATATAAATTATATATGGATT
TTTTTAAAAAGGAAATACTTGACTGGAGTATATATTTATCTCTTCATTATATAGCACGCGTGTTTTCCAA
TTTTTCCACATCCCATATAATACAGGATTATAATCTCGTTCGAACATACGAGAAAGTGGATAAAACAATA
GTTGATTTTTTATCTAGGTTGCCAAATTTATTCCATATTTTAGAATATGGGGAAAATATTCTACATATTT
ATTCTATGGATGATGCTAATACGAATATTATAATTTTTTTTCTAGATAGAGTATTAAATATTAATAAGAA
CGGGTCATTTATACACAATCTCAGGTTATCATCATCCATTAATATAAAAGAATATGTATATCAATTAGTT
AATAATGATCATCCAGATAATAGGATAAGACTAATGCTTGAAAATGGACGTAGAACAAGACATTTTTTGT
CCTATATATCAGATACAGTTAATATCTATATATGTATTTTAATAAATCATGGATTTTATATAGATGCCGA
AGACAGTTACGGTTGTACATTATTACATAGATGTATATATCACTATAAGAAATCAGAATCAGAATCATAC
AATGAATTAATTAAGATATTGTTAAATAATGGATCAGATGTAGATAAAAAAGATACGTACGGAAACACAC
CTTTTATCCTATTATGTAAACACGATATCAACAACGTGGAATTGTTTGAGATATGTTTAGAGAATGCTAA
TATAGACTCTGTAGACTTTAATAGATATACACCTCTTCATTATGTCTCATGTCGTAATAAATATGATTTT
GTAAAGTTATTAATTTCTAAAGGAGCAAATGTTAATGCGCGTAATAGATTCGGAACTACTCCATTTTATT
GTGGAATTATACACGGTATCTCGCTTATAAAACTATATTTGGAATCAGACACAGAGTTAGAAATAGATAA
TGAACATATAGTTCGTCATTTAATAATTTTTGATGCTGTTGAATCTTTAGATTATCTATTATCCAGAGGA
GTTATTGATATTAACTATCGTACTATATACAACGAAACATCTATTTACGACGCTGTCAGTTATAATGCGT
ATAATACGTTGGTCTATCTATTAAACAGAAATGGTGATTTTGAGACGATTACTACTAGTGGATGTACATG
TATTTCGGAAGCAGTCGCAAACAACAACAAAATAATAATGGAAGTACTATTGTCTAAACGACCATCTTTG
AAAATTATGATACAGTCTATGATAGCAATTACTAAACATAAACAGCATAATGCAGATTTATTGAAAATGT
GTATAAAATATACTGCGTGTATGACCGATTATGATACTCTTATAGATGTACAGTCGCTACAGCAATATAA
ATGGTATATTTTAAAATGTTTCGATGAAATAGATATCATGAAGAGATGTTATATAAAAAATAAAACTGTA
TTCCAATTAGTTTTTTGTATCAAAGACATTAATACTTTAATGAGATACGGTAAACATCCTTCTTTCGTGA
AATGCACTAGTCTCGACGTATACGGAAGTCGTGTACGTAATATCATAGCATCTATTAGATATCGTCAGAG
ATTAATTAGTCTATTATCCAAGAAGCTGGATCCTGGAGATAAATGGTCGTGTTTTCCTAACGAAATAAAA
TATAAAATATTGGAAAACTTTAACGATAACGAACTATCCACATATCTAAAAATCTTATAAACACTATTAA
AATATAAAATCTAAGTAGGATAAAATCACACTACATCATTGTTTCCTTTTAGTGCTCGACAGTGTATACT
ATTTTTAACACTCATAAATAAAAATGAAAACGATTTCCGTTGTTACGTTGTTATGCGTACTACCTGCTGT
TGTTTATTCAACATGTACTGTACCCACTATGAATAACGCTAAATTAACGTCTACCGAAACATCGTTTAAT
GATAAACAGAAAGTTACGTTTACATGTGATCAGGGATATCATTCTTCGGATCCAAATGCTGTCTGCGAAA
CAGATAAATGGAAATACGAAAATCCATGCAAAAAAATGTGCACAGTTTCTGATTACATCTCTGAATTATA
TAATAAACCGCTATACGAAGTGAATTCCACCATGACACTAAGTTGCAACGGCGAAACAAAATATTTTCGT
TGCGAAGAAAAAAATGGAAATACTTCTTGGAATGATACTGTTACGTGTCCTAATGCGGAATGTCAACCTC
TTCAATTAGAACACGGATCGTGTCAACCAGTTAAAGAAAAATACTCATTTGGGGAATATATGACTATCAA
CTGTGATGTTGGATATGAGGTTATTGGTGCTTCGTACATAAGTTGTACAGCTAATTCTTGGAATGTTATT
CCATCATGTCAACAAAAATGTGATATGCCGTCTCTATCTAATGGATTAATTTCCGGATCTACATTTTCTA
TCGGTGGCGTTATACATCTTAGTTGTAAAAGTGGTTTTACACTAACGGGGTCTCCATCATCCACATGTAT
CGACGGTAAATGGAATCCCGTACTCCCAATATGTGTACGAACTAACGAAGAATTTGATCCAGTGGATGAT
GGTCCCGACGATGAGACAGATTTGAGCAAACTCTCGAAAGACGTTGTACAATATGAACAAGAAATAGAAT
CGTTAGAAGCAACTTATCATATAATCATAGTGGCGTTAACAATTATGGGCGTCATATTTTTAATCTCCGT
TATAGTATTAGTTTGTTCCTGTGACAAAAATAATGACCAATATAAGTTCCATAAATTGCTACCGTAAATA
TAAATCCGTTAAAATAATGAATAATTAATAACGAACAAGTATCAAAAGATTAAAGAATTATAGCTAGAAT
CAATTGAGATGTCTTCTTCAGTGGATGTTGATATCTACGATGCCGTTAGAGCATTTTTACTCAGGCACTA
TTATAACAAGAGATTTATTGTGTATGGAAGAAGTAACGCCATATTACATAATATATACAGGCTATTTACA
AGATGCGCCGTTATACCGTTCGATGATATAGTACGTACTATGCCAAATGAATCACGTGTTAAACAATGGG
TGATGGATACACTTAATGGTATAATGATGAATGAACGCGATGTTTCTGTAAGCGTTGGCACCGGAATACT
ATTCATGGAAATGTTTTTCGATTACAATAAAAATAGTATCAACAATCAACTAATGTATGATATAATTAAT
AGCGTATCTATAATTCTAGCTAATGAGAGATATAGAAGCGCTTTTAACGACGATGGTATATACATCCGTA
GAAATATGATTAACAAGTTGTACGGATACGCATCTCTAACTACTATTGGCACGATCGCTGGAGGTGTTTG
TTATTATCTGTTGATGCATCTAGTTAGTTTGTATAAATAATTATTTCAATATACTAGTTAAAATTTTAAG
ATTTTAAATGTATAAAAAACTAATAACGTTTTTATTTGTAATAGGTGCATTAGCATCCTATTCGAATAAT
GAGTACACTCCGTTTAATAAACTGAGTGTAAAACTCTATATAGATGGAGTAGATAATATAGAAAATTCAT
ATACTGATGATAATAATGAATTGGTGTTAAATTTTAAAGAGTACACAATTTCTATTATTACAGAGTCATG

	CGACGTCGGATTTGATTCCATAGATATAGATGTTATAAACGACTATAAAATTATTGATATGTATACCATT
	GACTCGTCTACTATTCAACGCAGAGGTCACACGTGTAGAATATCTACCAAATTATCATGCCATTATGATA
	AGTACCCTTATATTCACAAATATGATGGTGATGAGCGACAATATTCTATTACTGCAGAGGGAAAATGCTA
	TAAAGGAATAAAATATGAAATAAGTATGATCAACGATGATACTCTATTGAGAAAACATACTCTTAAAATT
	GGATCTACTTATATATTTGATCGTCATGGACATAGTAATACATATTATTCAAAATATGATTTTTAAAAAT
	TTAAAATATATTATCACTTCAGTGACAGTAGTCAAATAACAAACAACACCATGAGATATATTATAATTCT
	CGCAGTTTTGTTCATTAATAGTATACACGCTAAAATAACTAGTTATAAGTTTGAATCCGTCAATTTTGAT
	TCCAAAATTGAATGGACTGGGGATGGTCTATACAATATATCCCTTAAAAATTATGGCATCAAGACGTGGC
	AAACAATGTATACAAATGTACCAGAAGGAACATACGACATATCCGCATTTCCAAAGAATGATTTCGTATC
	TTTCTGGGTTAAATTTGAACAAGGCGATTATAAAGTGGAAGAGTATTGTACGGGACTATGCGTCGAAGTA
	AAAATTGGACCACCGACTGTAACATTGACTGAATACGACGACCATATCAATTTGTACATCGAGCATCCGT
	ATGCTACTAGAGGTAGCAAAAAGATTCCTATTTACAAACGCGGTGACATGTGTGATATCTACTTGTTGTA
	TACGGCTAACTTCACATTCGGAGATTCTAAAGAACCAGTACCATATGATATCGATGACTACGATTGCACG
	TCTACAGGTTGCAGCATAGACTTTGTCACAACAGAAAAAGTGTGCGTGACAGCACAGGGAGCCACAGAAG
	GGTTTCTCGAAAAAATTACTCCATGGAGTTCGAAAGTATGTCTGACACCTAAAAAGAGTGTATATACATG
	CGCAATTAGATCCAAAGAAGATGTTCCCAATTTCAAGGACAAAATGGCCAGAGTTATCAAGAGAAAATTT
	AATAAACAGTCTCAATCTTATTTAACTAAATTTCTCGGTAGCACATCAAATGATGTTACCACTTTTCTTA
	GCATGCTTAACTTGACTAAATATTCATAACTAATTTTTATTAATGATACAAAAACGAAATAAAACTGCAT
	ATTATACACTGGTTAACGCCCTTATAGGCTCTAACCATTTTCAAGATGAGGTCCCTGATTATAGTCCTTC
	TGTTCCCCTCTATCATCTACTCCATGTCTATTAGACAATGTGAGAAGACTGAAGAGGAAACATGGGGATT
	GAAAATAGGGTTGTGTATAATTGCCAAAGATTTCTATCCCGAAAGAACTGATTGCAGTGTTCATCTCCCA
	ACTGCAAGTGAAGGATTGATAACTGAAGGCAATGGATTCAGGGATATACGAAACACCGATAAATTATAAA
	AAAAGCAATGTGTCCGCTGTTTCCGTTAATAATACTATTTTCGTAACTGGCGGATTATTCATAAATAACT
	CTAATAGCACGATCGTGGTTAACAATATGGAAAAACTTGACATTTATAAAGACAAACAATGGTCGATTAT
	AGAAATGCCTATGGCTAGGGTATATCACGGCATCGACTCGACATTTGGAATGTTATATTTTGCCGGAGGT
	CTATCCGTTACCGAACAATATGGTAATTTAGAGAAAAACAACGAGATATCTTGTTACAATCCTAGAACGA
	ATAAGTGGTTTGATATTTCATATACTATTTATAAGATATCCATATCATCATTGTGTAAACTAAATAACGT
	CTTCTATGTATTTAGTAAGGACATTGGATATGTGGAAAAGTATGATGGTGCATGGAAGTTAGTACATGAT
	CGTCTCCCCGCTATAAAGGCATTATCAACTTCTCCTTATTGATTGAAAATGAAAATATAAATAGTTTTTA
	TGTATAGCAGTATTACCCTATAGTTTTATTGCTTACTACTAACATGGATACAGATGTTACAAATGTAGAA
	GATATCATAAATGAAATAGATAGAGAGAAAGAAGAAATACTAAAAAATGTAGAAATTGAAAATAATAAAA
	ACATTAACAAGAATCATCCAAGTGGATATATTAGAGAAGCACTCGTTATTAATACCAGTAGTAATAGTGA
	TTCCATTGATAAAGAAGTTATAGAATGTATCTGTCACGATGTAGGAATATAGATCATATCTACTAATTTT
	TATAATCGATACAAAACATAAAAAACAACTCGTTATTACATAGCAGGCATGGAATCCTTCAAGTATTGTT
	TTGATAACGATGGCAAGAAATGGATTATCGGAAATACTTTATATTCTGGTAATTCAATACTATATAAGGT
	CAGAAAAAATTTCACTAGTTCGTTCTACAATTACGTAATGAAGATAGATCACAAATCACACAAGCCATTG
	TTGTCTGAAATACGATTCTATATATCTGTATTGGATCCTTTGACTATCGACAACTGGACACGGGAACGTG
	GTATAAAGTATTTGGCTATTCCAGATCTGTATGGAATTGGAGAAACCGATGATTATATGTTCTTCGTTAT
	AAAGAATTTGGGAAGAGTATTCGCCCCAAAGGATACTGAATCAGTCTTCGAAGCATGCGTCACTATGATA
	AACACGTTAGAGTTTATACACTCTCAAGGATTTACCCATGGAAAAATAGAACCGAGGAATATACTGATTA
	GAAATAAACGTCTTTCACTAATTGACTATTCTAGAACTAACAAACTATACAAGAGTGGAAACTCACATAT
	AGATTACAACGAGGACATGATAACTTCAGGAAATATCAATTATATGTGTGTAGACAATCATCTTGGAGCA
	ACAGTTTCAAGACGAGGAGATTTAGAAATGTTGGGATATTGCATGATAGAATGGTTCGGTGGCAAACTTC
	CATGGAAAAACGAAAGTAGTATAAAAGTAATAAAACAAAAAAAAGAATATAAAAAATTTATAGCTACTTT
	CTTTGAGGACTGTTTTCCTGAAGGAAATGAACCTCTGGAATTAGTTAGATATATAGAATTAGTATACACG
	TTAGATTATTCTCAAACTCCTAATTATGACAGACTACGTAAACTGTTTATACAAGATTGAAATTATATTC
	TTTTTTTTATAGAGTGTGGTAGTGTTACGGATATTTAATATTAGACTATCTCTATCGCGCTACACGACCA
	ATATCGATTACTATGGATATCTTCAGGGAAATCGCATCTTCTATGAAAGGAGAGAATGTATTCATTTCTC
	CAGCGTCAATCTCGTCAGTATTGACAATACTGTATTATGGAGCTAATGGATCCACTGCTGAACAGCTATC
	AAAATATGTAGAAAAGGAGGAGAACATGGATAAGGTTAGCGCTCAAAATATCTCATTCAAATCCATAAAT
	AAAGTATATGGGCGATATTCTGCCGTGTTTAAAGATTCCTTTTTGAGAAAAATTGGCGATAAGTTTCAAA
	CTGTTGACTTCACTGATTGTCGCACTATAGATGCAATCAACAAGTGTGTAGATATCTTTACTGAGGGGAA
	AATCAATCCACTATTGGATGAACCATTGTCTCCTGATACCTGTCTCCTAGCAATTAGTGCCGTATACTTT
	AAAGCAAAATGGTTGACGCCATTCGAAAAGGAATTTACCAGTGATTATCCCTTTTACGTATCTCCGACGG
	AAATGGTAGATGTAAGTATGATGTCTATGTACGGCAAGGCATTTAATCACGCATCTGTAAAGGAATCATT
	CGGCAACTTTTCAATCATAGAACTGCCATATGTTGGAGATACTAGTATGATGGTCATTCTTCCAGACAAG
	ATTGATGGATTAGAATCCATAGAACAAAATCTAACAGATACAAATTTTAAGAAATGGTGTAACTCTCTGG
	AAGCTACGTTTATCGATGTTCACATTCCCAAGTTTAAGGTAACAGGCTCGTATAATCTGGTGGATACTCT
	AGTAAAGTCAGGACTGACAGAGGTGTTCGGTTCAACTGGAGATTATAGCAATATGTGTAATTCAGATGTG
	AGTGTCGACGCTATGATCCACAAAACGTATATAGATGTCAATGAAGAGTATACAGAAGCAGCTGCAGCAA
	CTTGTGCACTGGTGTCAGACTGTGCATCAACAATTACAAATGAGTTCTGTGTAGATCATCCGTTCATCTA

TGTGATTAGGCATGTTGATGGAAAAATTCTTTTCGTTGGTAGATATTGCTCTCCGACAACTAATTGTTAA
CCATTTTTTTTAAAAAATAGAAAAAACATGTGGTATTAGTGCAGGTCGTTATTCTTCCAATTGCAATTGG
TAAGATGACGGCCAACTTTAGTACCCACGTCTTTTCACCACAGCACTGTGGATGTGACAGACTGACCAGT
ATTGATGACGTCAGACAATGTTTGACTGAATATATTTATTGGTCGTCCTATGCATACCGCAACAGGCAAT
GCGCTGGACAATTGTATTCCACACTCCTCTCTTTTAGAGATGATGCGGAATTAGTGTTCATCGACATTCG
CGAGCTGGTAAAAAATATGCCGTGGGATGATGTCAAAGATTGTGCAGAAATCATCCGTTGTTATATACCG
GATGAGCAAAAAACCATCAGAGAGATTTCGGCCATCATCGGACTTTGTGCATATGCTGCTACTTACTGGG
GAGGTGAAGACCATCCCACTAGTAACAGTCTGAACGCATTGTTTGTGATGCTTGAGATGCTCAATTACGT
GGATTATAACATCATATTCCGGCGTATGAATTGATGAGTTGTACATCTTGACATTTTCTTCTTTCTTCTC
TTCTCCCTTTCCCAGAAACAAACTTTTTTTACCCACTATAAAATAAAATGAGTATACTACCTGTTATATT
TCTTTCTATATTTTTTTATTCTTCATTCGTTCAGACTTTTAACGCGCCTGAATGTATCGACAAAGGGCAA
TATTTTGCATCATTCATGGAGTTAGAAAACGAGCCAGTAATCTTACCATGTCCTCAAATAAATACGCTAT
CATCCGGATATAATATATTAGATATTTTATGGGAAAAACGAGGAGCGGATAATGATAGAATTATACCGAT
AGATAATGGTAGCAATATGCTAATTCTGAACCCGACACAATCAGACTCTGGTATTTATATATGCATTACC
ACGAACGAAACCTACTGTGACATGATGTCGTTAAATTTGACAATCGTGTCTGTCTCAGAATCAAATATAG
ATCTTATCTCGTATCCACAAATAGTAAATGAGAGATCTACTGGCGAAATGGTATGTCCCAATATTAATGC
ATTTATTGCTAGTAACGTAAACGCAGATATTATATGGAGCGGGCATCGACGCCTTAGAAATAAGAGACTT
AAACAACGGACACCTGGAATTATTACCATAGAAGATGTTAGAAAAAATGATGCTGGTTATTATACATGTG
TTTTAGAATATATATACGGTGGCAAAACATATAACGTAACCAGAATTGTAAAATTAGAGGTACGGGATAA
AATAATACCTTCTACTATGCAATTACCAGATGGCATTGTAACTTCAATAGGTAGTAATTTGACTATTGCA
TGCAGAGTATCGTTGAGACCTCCCACAACGGATGCAGACGTCTTTTGGATAAGTAATGGTATGTATTACG
AAGAAGATGATGGGGACGGAAACGGTAGAATAAGTGTAGCAAATAAAATCTATATGACCGATAAGAGACG
TGTTATTACATCCCGGTTAAACATTAATCCTGTCAAGGAAGAAGATGCTACAACGTTTACGTGTATGGCG
TTTACTATTCCTAGCATCAGTAAAACAGTTACTGTTAGTATAACGTGAATGTATGTTGTTACATTTCCAT
GTCAATTGAGTTTATAAGAATTTTTATACATTATCTTCCAACAAGCAATTGACGAACGTATTGCTATGAT
TAACTCCCACGATACTATGCATATTATTAATCATTAACTTGCAGACTATACCTAGAGCTATTTTGACATA
CTCGTGTTCTTGTGTAATTGCAGTATCTATATTATTAAAGTACGTAAATCTAGCTATAGTTTTATTATTT
AATTTTAGATAATATACCGTCTCCTTATTTTTAAAAATTGCCACATCCTTTATTAAATCATGAATGGGAA
TTTCTATGTCATAGTTAATATATTGTGAACAACAAGAGCAGATATCTATAGGAAAGGGTGGAATGCGATA
CATTGATCTATGTAGTTTTAAAACACACGCAAACTTTGAAGAATTTATATAAATCATTCCATCGATACAT
CCTTCTATGTTGAGATGTATATATCCAGGAATTCGTTTATTAATATCGGGAAATGTATAAACTAAAACAT
TGCCCGGAAGCGGAGCTTCTACCGGAGTTATATCAGTTTTTAACTTACAAAATGTAACCAATACCTTTGC
ATGACTTGTTTTGTTCGGCAACGTTAGTTTAAACTTGACGAATGGATTAATTACAATAGCATGATCCGCG
CATCTATTAAGTTTTTTTACTTTAACGCCCTTGTATGTTTTTACAGAGACTTTATCTAAATTTCTAGTGC
TTGTATGTGTTATAAATATAACGGGATATAGAACTGAATCACCTACCTTAGATACCCAATTACATTTTAT
CAGATCCAGATAATAAACAAATTTTGTCGCCCTAACTAATTCTATATTGTTATATATTTTACAATTGGTT
ATGATATCATGTAATAACTTGGAATCTAACGCACATCGTCGTACGTTTATACAATTGTGATTTAGTGTAG
TATATCTACACATGTATTTTTCCGCGCTATAGTATTCTGGACTAGTGATAAAACTATCGTTATATCTGTC
TTCAATGAACTCATCGAGATATTGCTCTCTGTCATATTCATACACCTGCATAAACTTTCTAGACATCTTA
CAATCCGTGTTATTTTAGGATCATATTTACATATTTACGGGTATATCAAAGATGTTAGATTAGTTAATGG
GAATCGTCTATAATAATGAATATTAAACAATTATATGAGGACTTTTACCACAAAGCATCATAAAAATGAG
TCGTCGTCTGATTTATGTTTTAAATATCAACCGCGAATCAACTCATAAAATACAAGAGAATGAAATATAT
ACATATTTTAGTCATTGCAATATAGACCATACTTCTACAGAACTTGATTTTGTAGTTAAAAACTATGATC
TAAACAGACGACAACCTGTAACTGGGTATACTGCACTACACTGCTATTTGTATAATAATTACTTTACAAA
CGATGTACTGAAGATATTATTAAATCATGGAGTGGATGTAACGATGAAAACCAGTAGCGGACGTATGCCT
GTTTATATATTGCTTACTAGATGTTGCAATATTTCACATGATGTAGTGATAGATATGATAGACAAAGATA
AAAACCACTTATTACATAGAGACTATTCCAACCTATTACTAGAGTATATAAAATCTCGTTACATGTTATT
AAAGGAAGAGGATATCGATGAGAACATAGTATCCACTTTATTAGATAAGGGAATCGATCCTAACTTTAAA
CAAGACGGATATACAGCGTTACATTATTATTATTTGTGTCTCGCACACGTTTATAAACCAGGTGAGTGTA
GAAAACCGATAACGATAAAAAAGGCCAAGCGAATTATTTCTTTGTTTATACAACATGGAGCTAATCTAAA
CGCGTTAGATAATTGTGGTAATACACCATTCCATTTGTATCTTAGTATTGAAATGTGTAATAATATTCAT
ATGACTAAAATGCTGTTGACTTTTAATCCGAATTTCGAAATATGTAATAATCATGGATTAACGCCTATAC
TATGTTATATAACTTCCGACTACATACAACACGATATTCTTGTTATGTTAATACATCACTATGAAACAAA
TGTTGGAGAAATGCCGATAGATGAGCGTCGTATAATCGTATTCGAGTTTATCAAAACATATTCTACACGT
CCTGCAGATTCGATAACTTATTTGATGAATAGGTTTAAAAATATAGATATTTATACCCGCTATGAAGGAA
AGACATTATTACACGTAGCATGTGAATATAATAATACACACGTAATAGATTATCTTATACGTATCAACGG
AGATATAAATGCGTTAACCGACAATAACAAACACGCTACACAACTCATTATAGATAACAAAGAAAATTCC
CCATATACCATTAATTGTTTACTGTATATACTTAGATATATTGTAGATAAGAATGTGATAAGATCGTTGG
TGGATCAACTTCCATCTCTACCTATCTTCGATATAAAATCATTTGAGAAATTCATATCCTACTGTATACT
TTTAGATGACACATTTTACAATAGACACGTTAGGAATCGCGATTCTAAAACGTATCGATACGCATTTTCA
AAATACATGTCGTTTGATAAATACGATGGTATAATAACTAAATGTCATAAAGAAACAATATTGCTCAAAC

	TATCCACTGTTCTAGACACTACACTATATGCAGTTTTAAGATGCCATAATTCGAAAAAGTTAAGAAGATA
	CCTCACCGAGTTAAAAAAATATAATAACGATAAGTCCTTTAAAATATATTCTAATATTATGAATGAGAGA
	TACCTTAATGTATATTATAAAGATATGTACGTGTCAAAGGTATATGATAAACTATTTCCTGTTTTCACAG
	ATAAAAATTGTCTACTAACATTACTACCTTCAGAAATTATATACGAAATATTATACATGCTGACAATTAA
	CGATCTTTATAATATATCGTATCCACCTACCAAAGTATAGTTGTATTTTTCTCATGCGATGTGTGTAAAA
	AAACTGATATTATATAAATATTTTAGTGCCGTATAATAAAGATGACGATGAAAATGATGGTACATATATA
	TTTCGTATCATTATTGTTATTGCTATTCCACAGTTACGCCATAGACATCGAAAATGAAATCACAGAATTC
	TTCAATAAAATGAGAGATACTCTACCAGCTAAAGACTCTAAATGGTTGAATCCAGCATGTATGTTCGGAG
	GCACAATGAATGATATAGCCGCTCTAGGAGAGCCATTCAGCGCAAAGTGTCCTCCTATTGAAGACAGTCT
	TTTATCGCACAGATATAAAGACTATGTGGTTAAATGGGAAAGGCTAGAAAAAAATAGACGGCGACAGGTT
	TCTAATAAACGTGTTAAACATGGTGATTTATGGATAGCCAACTATACATCTAAATTCAGTAACCGTAGGT
	ATTTGTGCACCGTAACTACAAAGAATGGTGACTGTGTTCAGGGTATAGTTAGATCTCATATTAGAAAACC
	TCCTTCATGCATTCCAAAAACATATGAACTAGGTACTCATGATAAGTATGGCATAGACTTATACTGTGGA
	ATTCTTTACGCAAAACATTATAATAATATAACTTGGTATAAAGATAATAAGGAAATTAATATCGACGACA
	TTAAGTATTCACAAACGGGAAAGGAATTAATTATTCATAATCCAGAGTTAGAAGATAGCGGAAGATACGA
	CTGTTACGTTCATTACGACGACGTTAGAATCAAGAATGATATCGTAGTATCAAGATGTAAAATACTTACG
	GTTATACCGTCACAAGACCACAGGTTTAAACTAATACTAGATCCAAAAATCAACGTAACGATAGGAGAAC
	CTGCCAATATAACATGCACTGCTGTGTCAACGTCATTATTGATTGACGATGTACTGATTGAATGGGAAAA
	TCCATCCGGATGGCTTATAGGATTCGATTTTGATGTATACTCTGTTTTAACTAGTAGAGGCGGTATTACC
	GAGGCGACCTTGTACTTTGAAAATGTTACTGAAGAATATATAGGTAATACATATAAATGTCGTGGACACA
	ACTATTATTTTGAAAAAACCCTTACAACTACAGTAGTATTGGAGTAAATATACAATGCATTTTTATATAC
	ATTACTGAATAATTATTATTATTATTTATATCGTATTTGTGCTATAACGCGACTATCTAGGTATTTGTAT
	CTCACCGATAGAGAACATATAAATGTAGACTCTATTAAACAGTTGTGTAAAATATCAGATCCTAATGCAT
	GTTATAGATGTGGATGTACGGCTTTACATGAGTACTTTTATAATTATAGATCAGTCAACGGAAAATACAA
	GTATAGATACAACGGTTACTATCAATATTATTTATCTAGCGATTATGAAAATTATAATGAATATTATTAT
	GATGATTATGATAGAACTGGTATGAACAGTGAGAGTGATAATATATCAATCAAAACAGAATATGAATTCT
	ATGATGAAACACAAGATCAAAGTACACAACTAGTAGGTTACGACATTAAACTCAAAACCAATGAGGATGA
	TTTTATGGCTATGATAGATCAGTGGGTGTCCATGATTATATAGATGAATCAATTAATAAAGTAGTATATG
	GAAGAGAGTCTCACGTAAGATGGCGGGATATATGGCAAGAACATAATGATGGCGTATACAGTATAGGAAA
	GGAGTGCATAGATAATATATACGAAGACAACCATACCGTAGACGAATTCTACAAGATAGACAGCGTATCA
	GATGTAGATGACGCGGAACACATATCTCCGATAACTAATGATGTATCTACACAAACATGGGAAAAGAAAT
	CAGAGTTAGATAGATACATGGAAATGTATCCTCGTCATAGATATAGTAAGCATTCTGTCTTTAAGGGATT
	TTCTGACAAAGTTAGAAAAAATGATTTAGACATGAATGTGGTAAAAGAATTACTTTCTAACGGTGCATCT
	CTAACAATTAAGGATAGCAGTAATAAGGATCCAATAACCGTTTATTTTCGAAGAACGATAATGAATTTAG
	AAATGATTGATGAACGAAAGTATATAGTACACTCCTATCTAAAAAATTATAAAAATTTCGATTATCCATT
	TTTCAGGAAGTTAGTTTTGACTAATAAACATTGTCTCAACAATTATTATAATATAAGCGACAGCAAATAT
	GGAACACCGCTACATATATTGGCGTCTAATAAAAAATTAATAACTCCTAATTACATGAAGTTATTAGTGT
	ATAACGGAAATGATATAAACGCACGAGGTGAAGATACACAAATGCGAACTCCATTACACAAATATTTGTG
	TAAATTTGTATATCATAATATTGAATATGGTATCCGATACTATAATGAAAAGATTATAGACGCATTTATA
	GAGTTAGGAGCCGATCTAACTATTCCAAATGACGATGGAATGATACCAGTAGTTTACTGTATACACTCAA
	ATGCCGAATATGGTTATAACAATATTACTAACATAAAGATAATACGTAAACTACTTAATCTTAGTAGACG
	TGCGTCACATAATCTATTTAGAGATCGAGTCATGCACGATTATATAAGTAATACATATATTGATCTTGAG
	TGTTTAGATATTATTAGATCGTTGGATGGATTCGATATCAATGGTTACTTTGAAGGACGTACACCACTTC
	ATTGCGCTATACAACATAACTTCACTCAGATTGCTAAGTACTTATTAGATCGAGGAGCTGATATAGTCGT
	ACCCAACACATTGATTATACATCAGTACATACAGTAAATAGCATAGATATGGAGGAGGATACAAATATTT
	CAAATAAAGTTATAAGGTACAACACTGTCAATAATATATGGGAAACATTACCTAACTTCTGGACTGGAAC
	TATAAATCCAGGCGTGGTCTCGCATAAAGATGATATATATGTTGTATGCGACATCAAAGATGAAAAAAAT
	GTTAAAACTTGTATATTTAGATATAACACGAATACGTATAACGGATGGGAATTGGTCACGACGACAGAAA
	GCAGATTATCAGCTCTGCATACTATTCTTTATAACAATACCATAATGATGTTACATTGTTATGAATCGTA
	TATGTTACAAGATACATTTAATGTGTACACTCGCGAATGGAATCATATGTGTCATCAACATTCGAATAGT
	TATATCATGTACAATATACTACCCATCTACTAAATATAATAGAATAAAATAAATGAGTATGATCATTTTA
	GATAACGATTGATTTTATCATTACCGCTTCATTCTTATATTCTTTGCTTACGGAACCTATATTTAGAAAC
	ATCTACTAACGATTTTTTATGCTTGCATTATTAATGGTATGTAATATGATTGATTGTGTACGCAATACCA
	ATTTGTTAAGTATGAATACGGGGTACAAACATAAACTGAAGTTTAACATTATTTATTTATGATATATATC
	GTTATTGTTTGGTCTATACCATGGATATCTTTAAAGAACTAATCTTAAAACACACGGATGAAAATGTTTT
	GATTTCTCCAGTTTCTATTTTATCTACTTTATCTATTCTAAATCATGGAGCAGCTGGTTCTACAGCTGAA
	CAACTATCAAAATATATAGAGAATATGAATGAGAATACACCCGATGACAATAATGACATGGACGTAGATA
	TTCCGTATTGTGCGACACTAGCTACCGCAAATAAAATATACGGTAGCGATAGTATCGAGTTCCACGCCTC
	CTTCCTACAAAAAATAAAAGACGATTTTCAAACTGTAAACTTTAATAATGCTAACCAAACAAAGGAACTA
	ATCAACGAATGGGTTAAGACAATGACAAATGGTAAAATTAATTCCTTATTGACTAGTCCGCTATCCATTA
	ATACTCGTATGACAGTTGTTAGCGCCGTCCATTTTAAAGCAATGTGGAAATATCCATTTTCTAAACATCT

	TACATATACAGACAAGTTTTATATTTCTAAGAATATAGTTACCAGTGTTGATATGATGGTGAGCACTGAG
	AATAACTTGCAATATGTACATATTAATGAATTATTCGGAGGATTCTCTATTATCGATATTCCATACGAGG
	GAAACTCTAGTATGGTAATTATACTACCGGACGACATAGAAGGTATATATAACATAGAAAAAAATATAAC
	AGATGAAAAATTTAAAAAATGGTGTGGTATGTTATCTACTAAAAGTATAGACTTGTATATGCCAAAGTTT
	AAAGTGGAAATGACAGAACCGTATAATCTGGTACCGATTTTAGAAAATTTAGGACTTACTAATATATTCG
	GATATTATGCAGATTTTAGCAAGATGTGTAATGAAACTATCACTGTAGAAAAATTTCTACATACGACGTT
	TATAGATGTTAATGAGGAGTATACAGAAGCATCGGCCGTTACAGGAGTATTTATGACTAACTTTTCGATG
	GTATATCGTACGAAGGTCTACATAAACCATCCATTCATGTACATGATTAAAGACAACACAGGACGTATAC
	TTTTTATAGGGAAATACTGCTATCCGCAATAAATATAAACAAATAGACTTTTATCACGTTTATCTATGTC
	TAAATATTACAAATAGTAATAGTATAAACTAAAGCTGATAATACTTAAAAAAATAATAATATCATTTACA
	ATTAATAGTATAAACTAAAAATTAAACAAATCGTTATTATAAGTAATATCAAAATGATGATATACGGATT
	AATAGCGTGTCTTATATTCGTGACTTCATCCATCGCTAGTCCACTTTATATTCCCGTTATTCCACCCATT
	TCGGAAGATAAATCGTTCAATAGTGTAGAGGTATTAGTTTCCTTGTTTAGAGATGACCAAAAAGACTATA
	CGGTAACTTCTCAGTTCAATAACTACACTATCGATACCAAAGACTGGACTATCGGCGTACTATCCACACC
	TGATGGTTTGGATATACCATTGACTAATATAACTTATTGGTCACGGTTTACTATAGGTCGTGCATTGTTC
	AAATCAGAGTCTGAGGATATTTTCCAAAAGAAAATGAGTATTCTAGGTGTTTCTATAGAATGTAAGAAGT
	CGTCGACATTACTTACTTTTTTGACCGTGCGTAAAATGACTCGAGTATTTAATAAATTTCCAGATATGGC
	TTATTATCGAGGAGACTGTTTAAAAGCCGTTTATGTAACAATGACTTATAAAAATACTAAAACTGGAGAG
	ACTGATTACACGTACCTCTCTAATGGGGGGTTGCCTGCATACTATCGTAATGGGGTCGATGGTTGATTAT
	TGATTAGTATATTCCTTATTCTTTTTATTCACACAAAAAGAACATTTTTATAAACATGAAACCACTGTCT
	AAATGTAATTATGATCTTGATTTATAGATGAAGATCAGCCTTTAGAGGATTTTAACCAGTATGTTTAATA
	TGAAAAAAATAAACATAACATATTTTGAGATTAAGCGCTATTGTGCAAGATTATATTAGAATCAAATTAA
	TCTTTCATACGAGAAAAATAACGACATACGTCGTCAACAAATTAAACTTTTTATTTATTAGTTAACTAGC
	TTATAGAACTTGCTCATTGTTATGTTTCTAAAACGGGTACGACATATAGGACAATTATCCGACGCACCGG
	TTTCTCTTCGTGTTTTATGCCATATATTGATGCATGTTATGCAAAATATATGAGTACACGAATCCAATAA
	ACCAAAGTATCTATCGTTTTGAGTAAACAACTTCATAGCAAATTCCACATTCTTTTTCTTTACTTACTCT
	ATACACGTCCTCGTATTTATCCAGTATTTTGATGATATCCAACTCAGAAATGGTTGTTGTATTATTGGGT
	GTATTGGGAGTATAGGTATTATTAGCTATGTACCAATTTACCAACCCTCTTAATATTGATTGAACAATCA
	CATCGGTTATCCAATCAATAACCACATTAATAACTAAATTGTAGTGTATATATAGACCATATATGTTTCT
	ATTTTTTTGACAGTTACGTATAGTTTCAGTAAGTTTTGATTGTTGTATTCCTGTATCTCTAGATAAGTTA
	GTCATATAGTCCCTTCCGGCGATACGTTTTTTCCAAGCCCGAAATTGATTAGCCAAATGTGTATTTATTT
	TTGTGATATTGATATAATATGTAATGTTATTAATATTTCGGATAATGCATACTGTTAGTCTTATATCATT
	TGGTTCATCTATGTATTGTAATATTGTTACATGATCTATAGATGATGTATTGATTTTGGCAGGATCGAAT
	TCCATATCCGCGACTAAACAGTGAAAAAAATGTAAATACTTTTTAAATTTTAAATTAGTAAAACTTTTTT
	TTATTTTTTATGATTCCAAAAATACTGAATACAAAGTCCTAAATTATAAATATGGAGATCATACTACCAC
	AACTTATTATTATGCATACTCAGCCGGTGTAATAGATAGATATATATAATTCTATTACACCGGCAGACAA
	TTACCGATCGGTATTTGTCGTTACCAACATACCGTATAATATGTAATATACAATTCCATAACCCATTGAC
	AGTTGTTATACATCAAAATTGCAATTCTTTTGATTACGATGTTATAAGAATGTAGTTAATTGATGTATGA
	TGTTAATGTGTCCTCTTTCCTCTTATAACATCGTAATCAAAAACTTTTTTTATAATATATACCTAATAATG
	TGTCTTAATAGTTCTCGTGATTCGTCAAACAATCATTCTTATAAAATATAATAAAGCAACGTAAAACACA
	TAAAAATAAGCGTAACTAATAAGACAATGGATATTTACGACGATAAAGGTCTACAGACTATTAAACTGTT
	TAATAATGAATTTGATTGTATAAGGAATGACATCAGAGAATTATTTAAACATGTAACTGATTCCGATAGT
	ATACAACTTCCGATGGAAGACAATTCTGATATTATAGAAAATATCAGAAAAATACTATATAGACGATTAA
	AAAATGTAGAATGTGTTGACATCGATAGTACAATAACTTTTATGAAATACGATCCAAATGATGATAATAA
	GCGTACGTGTTCTAATTGGGTACCCTTAACTAATAACTATATGGAATATTGTCTAGTAATATATTTGGAA
	ACACCGATATGTGGAGGCAAAATAAAATTATACCACCCTACAGGAAATATAAAGTCGGATAAGGATATTA
	TGTTTGCAAAGACTCTAGACTTTAAATCAAAGAAAGTGTTAACTGGACGTAAAACAATTGCCGTTCTAGA
	CATATCCGTTTCATATAATAGATCAATGACTACTATTCACTACAACGACGACGTTGATATAGATATACAT
	ACTGATAAAAATGGAAAAGAGTTATGTTATTGTTATATAACAATAGATGATCATTACTTGGTTGATGTGG
	AAACTATAGGAGTTATAGTCAATAGATCTGGAAAATGTCTGTTAGTAAATAACCATCTAGGTATAGGTAT
	CGTTAAAGATAAACGTATAAGCGATAGTTTTGGAGATGTATGTATGGATACAATATTTGACTTTTCTGAA
	GCACGAGAGTTATTTTCATTAACTAATGATGATAACAGGAATATAGCATGGGACACTGATAAACTAGACG
	ATGATACAGATATATGGACTCCCGTCACAGAAGATGATTACAAATTTCTTTCTAGACTAGTATTGTATGC
	AAAATCTCAATCGGATACTGTATTCGACTATTATGTTCTTACTGGTGATACGGAACCACCCACTGTATTC
	ATTTTCAAGGTAACTAGATTTTACTTTAATATGCCGAAATAAAAAATTTTTGTATAATATCTAGAGGTAG
	AGGTATTGTTTAGATAAATACAAATAACATAGATACATCGCATACTTAGCATTTTTATAAATATACATAA
	GACATACACTTTATACATTTTTTTTGTAAAAATACTCATAAAAAAATTTATAAAAATTATGGCACAACCA
	TATCTTGTATAGGTAGTTTAGTTCGTCGAGTGAACCTATAAACAGATAATAGACAACACGTAATAATAAT
	AATGCCTACTAATACAAGCATAATACCGGGAGATGGGATATATGACGTTGTAGTGTTTGGGTTTTCTGAA
	CGTTGATAGTCTACTAATACTACATGCTGACATCTAATGCCTGTATAACCATGAGAGCATCTACAATACA
	TACCGTCAATATCTCTAGCGTGGATACAGTCACCGTGTAAACAATATCCATCTCCCTCTGGACCGCATAA

	TCTGATAGCTGGAATATCTGTTGTAGCGTTTGTAATTTCTGGCGATGTCGTTTCGATAGCGTTACCACTA
	TCGGCGAATGATCTGATTATCATAGCAGCGAACAACAACATCAGATATTTCATCGACATTTTTGATGGAT
	TTTGTGTTTATGCTGTTTCTCAGTGTGTGTTTATGACAAGATTGGGAATTTTATATTATTAATTCAGTAA
	TATAAACTAATAATATATTGTTAATTGTGTAAATAATATAAAAATAACAATACAATATTGAATGTGTTGC
	TGTTAAAAATGATCATAAACACGGAGTTTATTTTATATGTCTCGCATAAACATTACTAAAAAAATATATT
	GTTCTGTTTTTCTTTCACATCTTTAATTATGAAAAAGTAAATCATTATGAGATGGACGAGATTGTACGCA
	TCGTTCGCGACAGTATGTGGTACATACCTAACGTATTTATGGACGACGGTAAGAATGAAGGTCACGTTTC
	TGTCAACAATGTCTGTCATATGTATTTCACGTTCTTTGATGTGGATACATCGTCTCATCTGTTTAAGCTA
	GTTATTAAACACTGCGATCTGAATAAACGAGGTAACTCTCCATTACATTGCTATACGATGAATACACGAT
	TTAATCCATCTGTATTAAAGATATTGTTACACCACGGCATGCGTAACTTTGATAGCAAGGATGAAAAAGG
	ACACCACTATCAATCGATAACAAGATCTTTGATATACTAACGGACACCATTGATGACTTTAGTAAATCAT
	CCGATCTATTGCTGTGTTATCTTAGATATAAATTCAATGGGAGCTTAAACTATTACGTTCTGTACAAAGG
	ATCCGACGAGGATGAACTCACTTCTCTTCATTACTACTGTAAACACATATCCACGTTCTACAAAAGCAAT
	TATTACAAGTTAAGTCACACTAAGATGCGAGCCGAGAAGCGATTCATCTACGCGATAATAGATTATGGAG
	CAAACATTAACGCGGTTACACACTTACCTTCAACAGTATACCAAACATAGTCCTCGTGTGGTGTATGCTC
	TTTTATCTCGAGGAGCCGATACGAGGATACGTAATAATCTTGATTGTACACCCATCATGGAACGATTGTG
	CAACAGGTCATATTCTCATAATGTTACTCAATTGGCACGAACAAAAGGAAGAAGGACAACATCTACTTTA
	TCTATTCATAAAACATAATCAAGGATACACTCTCAATATACTACGGTATCTACTAGATAGGTTCGACATT
	CAGAAAGACGAATACTATAATACCGCCTTTCAAAATTGTAACAACAATGTTGCCTCATACATCGGATACG
	ACATCAACCTTCCGACTAAAGACGGTATTCGACTTGGTGTTTGAAAACAGAAACATCATATACAAGGCGG
	ATGTTGTGAATGACATCATCCACCACAGACTGAAAGTATCTCTACCTATGATTAAATCGTTGTTCTACAA
	GATGTCTCTCCCTACGACGATTACTACGTAAAGAAGATAATAGCCTACTGCCTATTAAGGGACGAGTCAT
	TCGCGGAACTACATAGTAAATTCTGTTTAAACGAGGACTATAAAAGTGTATTTATGAAAAATATATCATT
	CGATAAGATAGATTCCATCATCGTGACATAAGTCGCCTTAAAGAGATTCGAATCTCCGACACCGACCTGT
	ATACGGTATCACAGCTATCTTAAAGCCATACATTCAGACAGTCACATTTCATTTCCCATGTACGACGATC
	TCATAGAACAGTGCCATCTATCGATGGAGCGTAAAAGTAAACTCGTCGACAAAGCACTCAATAAATTAGA
	GTCTACCATCGGTCAATCTAGACTATCGTATTTGCCTCCGGAAATTATGCGCAATATCATCTAAACAGTA
	TGTTGTACGAAAAGAACCATTACAAATATTATCCATGATAGAAAGAAAATATCTATATGATTGGAGAAGT
	AGGAAACAGGAACAAGACGACGATTACTACATTATTAAATCATGAAGTCCGTATTATACTCGTATATATT
	GTTTCTCTCATGTATAATAATAAACGGAAGAGATATAGCACCGCATGCACCATCCGATGGAAAGTGTAAA
	GACAACGAATACAAACGCCATAATTTGTGTCCGGGAACATACGCTTCCAGATTATGCGATAGCAAGACTA
	ACACACAATGTACGCCGTGTGGTTCGGGTACCTTCACATCTCGCAATAATCATTTACCCGCTTGTCTAAG
	TTGTAACGGAAGACGCGACCGTGTAACACGACTCACAATAGAATCTGTGAATGCTCTCCCGGATATTATT
	GTCTTCTCAAAGGATCATCCGGATGCAAGGCATGTGTTTCCCAAACAAAATGTGGAATAGGATACGGAGT
	ATCCGGAGACGTCATCTGTTCTCCGTGTGGTCTCGGAACATATTCTCACACCGTCTCTTCCGCAGATAAA
	TGCGAACCCGTACCCAGTAATACCTTTAACTATATCGATGTGGAAATTAATCTGTATCCAGTTAACGACC
	ACTACCGGTCTCAGCGAATCCATCTCAACGTCGGAACTAACTATTACTATGAATCATAAAGACTGTAATC
	CCGTATTTCGTGAGGAATACTTCTCCGTCCTTAATAAGGTAGCAACTTCAGGTTTCTTTACAGGAGAAAG
	GTGTGCACTCTGAATTTCGAGATTAAATGCAATAACAAAAATTTTTCCTCCAAACAGTTAACGAAAGCAA
	AGAATGATGACGGTATCATGCCGCATTCGGAGACTGTCTATCTAGCGTCGACATCTATATACTATATAGT
	AATACCAATACTCAAGACTACGAAACTGATACAATCTCTTATCATGTGGGTAATGTTCTCGATGTCGATA
	GCCATATGCCCGGTAGTTGCGATATACATAAACTGATCACTAATTCCAAACCCACCCGCTTTTTATAGTA
	AGTTTTTCACCCATAAATAATAAATACAATAATTAATTTCTCGTAAAAGTAGAAAATATATTCTAATTTA
	TTGCACGGTAAGGAAGTAGAATCATAAAGAACAGTACTCAATCAATAGCAATCATGAAACAATATATCGT
	CCTGGCATGCATGTGCCTGCCAGTCTTCAGCAATCATCCTCATCCTCCTCCTCGTGTACGGAAGAAGAAA
	ACAAACATCATATGGGAATCGATGTTATTATCAAAGTCACAAAGCAAGACCAAACACCGACCAATGATAA
	GATTTGCCAATCCGTAACGGAAATTACAGAGTCCGAGTCAGATCCAGATCCCGAGGTGGAATCAGAAGAT
	GATTCCACATCAGTCGAGGATGTAGATCCTCCTACCACTTATTACTCCATCATCGGTGGAGGTCTGAGAA
	TGAACTTTGGATTCACCAAATGTCCTCAGATTAAATCCATCTCAGAATCCGCTGATGGAAACACAGTGAA
	TGCTAGATTGTCCAGCGTGTCCCCAGGACAAGGTAAGGACTCTCCCGCGATCACTCATGAAGAAGCTCTG
	GCTATGATCAAAGACTGTGAGGTGTCTATCGACATCAGATGTAGCGAAGAAGAGAAAGACAGCGACATCA
	AGACCCATCCAGTACTCGGGTCTAACATCTCTCATAAGAAAGTGAGTTACGAAGATATCATCGGTTCAAC
	GATCGTCGATACAAAATGTGTCAAGAATCTAGAGTTTAGCGTTCGTATCGGAGACATGTGCAAGGAATCA
	TCTGAACTTGAGGTCAAGGATGGATTTAAGTATGTCGACGGATCGGCATCTGAAGGTGCAACCGATGATA
	CTTCACTCATCGATTCAACAAAACTCAAAGCGTGTGTCTGAATCGATAACTCTATTCATCTGAAATTGGA
	TGAGTAGGGTTAATCGAACGATTCAGGCACACCACGAATTAAAAAAGTGTACCGGACACTATATTCCGGT
	TTGCAAAACAAAAATGTTCTTAACTACATTCACAAAAAGTTACCTCTCGCGACTTCTTCTTTTTCTGTCT
	CAATAGTGTGATACGATTATGACACTATTCCTATTCCTATTCCTATTTCCTTTCAGGGTATCACAAAAAT
	ATTAAACCTCTTTCTGATGGTCTCATAAAAAAAGTTTTACAAAAATATTTTTATTCTCTTTCTCTCTTTG
	ATGGTCTCATAAAAAAAGTTTTACAAAAATATTTTTATTCTCTTTCTCTCTTTGATGGTCTCATAAAAAA
	AGTTTTACAAAAATATTTTTATTCTCTTTCTCTCTTTGATGGTCTCATAAAAAAAGTTTTACAAAAATAT

	TTTTATTCTCTTTCTCTCTTTGATGGTCTCATAAAAAAAGTTTTACAAAAATATTTTTATTCTCTTTCTC TCTTTGATGGTCTCATAAAAAAAGTTTTACAAAAATATTTTTATTCTCTTTCTCTCTTTGATGGTCTCAT AAAAAAAGTTTTACAAAAATATTTTTATTCTCTTTCTCTCTTTGATGGTCTCATAAAAAAAGTTTTACAA AAATATTTTTATTCTCTTTCTCTCTTTGATGGTCTCATAAAAAATATTAAACCTCTTTCTGATGGTGTCA CTAAAATATTTTTATTCTCATTCTCATTTTCTCTTTCTCTCTTCAATGGAGTCATAAAATATTTTTATTC TCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGTGTCACTAAAATATTTTTAT TCTCATTCTCATTTTCTCTTTCTCTCTTCAATGGAGTCATAAAATATTTTTATTCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAAAAAGTTTTATCTCTTTCTCTCTTCGA TGGTCTCACTAAAATATTTTTATTCTCTTTCTGATGCATCAACTATTTCTTAAACAATAACGTCCAACA ACATATACTCGTCGAGCTTATCAACATCCCCTATGCCCATCTAGGTTACCAGACAATTGTATATCATAAA ATAATGTTTATAATTTACACGTTAAAATCATATAATAAAACGTAGATCGTATAATATTTTTTGGTATATA AATGATCTAGTAAAATCCATGTAGGGGATACTGCTCACATTTTTTCTTTGGTACAAAATTTCACACAAGT TTTTATACAGACAAATTCTTGTCCATATATTTTAAAACATTGACTTTTGTACTAAGAAAAATATCTAGAT CAACTATCTCTTTCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGT AAAAAAGTTTTATCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGT AAAAAAGTTTTATCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGT AAAAAAGTTTTATCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGT AAAAAAGTTTTATCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGT AAAAAAGTTTTATCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGT AAAAAAGTTTTATCTCTTTCTCCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTA AAAAAGTTTTATCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTA AAAAAGTTTTATCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTA AAAAAGTTTTATCTCTTTCTCCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAA AAAAGTTTTATCTCTTTCTCCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAA AAAGTTTTATCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGAGTCGTAAA AAAGTTTTATCTCTTTCTCTCTTCGATGGTCTCACAAAAATATTAAACCTCTTTCTGATGGTCTCTATAA AGCGATCGATCTTTCTTACACTCTAGAGTTTCCTACAGTCATGGGTCACACATTTTTTTCTAGACACTAA ATAAAATTAGTAAAATTAAATTAATTATAAAATTATATATATAATTTACTAACTTTAGTTAGATAAATTA ATAATATATAAGTTTTAGTACATTAATATTATATTTTAAAT

[0062] In some embodiments, the oncolytic virus (e.g., a producer virus, engineered producer virus as described herein) can comprises various exogenous nucleic acids, alone, or in combination with viral gene modifications, such as mutation or deletion (complete or partial deletion) or viral genes. Non-limiting examples of viral genes can include: B5R, A52R (VACWR178), F13L, A36R, A34R, A33R, B8R, B18R, SPI-1, SPI-2, B15R, VGF, E3L, K3L, A41L, K7R, N1L, C12L, TK, and any combinations thereof. Non-limiting examples of exogenous nucleic acids can include nucleic acid sequences coding for: CXCR4, CCR2, PH-

20, HMGB1, PIAS3, IL15, IL15-Rα, LIGHT, ITAC, fractalkine, CCL5, a metabolic modulating protein, a cytokine, a fusion protein comprising any combinations of the above, and a functional domain or fragment or variant thereof, or any combinations thereof

[0063] Hyaluronan (HA) is an important structural element of ECM and a high molecular weight linear glycosaminoglycan consisting of repeating disaccharide units. It can be distributed widely throughout connective, epithelial, and neural tissues, and its expression level can be significantly elevated in many types of tumors. Hyaluronidases are a family of enzymes that catalyze the degradation of HA. There are at least five functional hyaluronidases identified so far in human: HYAL1, HYAL2, HYAL3, HYAL4 and HYAL5 (also known as PH-20 or SPAM1), among which PH-20 is the only one known so far to be functional at relatively neutral pH. In some embodiments of the present disclosure, combining hyaluronidase with other tumor-targeting therapeutic agents (such as transgenes, also referred to herein as exogenous nucleic acid) can promote the therapeutic effect of the modified oncolytic viruses that can be used as producer viruses as described herein, at least by diminishing the ECM and enhancing the transportation of the therapeutic agent inside and between the tumors.

[0064] Some embodiments herein disclose a modified oncolytic virus that can be used as a producer virus as described herein, that can comprise an exogenous nucleic acid coding for a membrane associated protein that is capable of degrading hyaluronan, such as a hyaluronidase. It should be noted that the term "hyaluronidase" as used herein can refer to any enzyme or a fragment thereof that catalyzes the degradation of HA in a tumor, including, but not limited to, PH-20 and its homologs from other species, as well as other engineered/design proteins with similar enzymatic function. As used herein, hyaluronidase can refer to a class of hyaluronan degrading enzymes.

[0065] In some embodiments, the modified oncolytic virus that can be used as a producer virus as described herein can comprises an exogenous nucleic acid that can code for a chemokine receptor that is a chimeric protein. At least part of its extracellular domain can be from a chemokine receptor that promotes the tumor-targeted delivery of the virus, and at least part of its intracellular domain can be from a chemokine receptor that promotes the tumor-specific replication, inhibits immunosuppressive activity, or conveys some other beneficial effects, or vice versa. For instance, the modified oncolytic virus can comprise a nucleic acid that codes for a protein having an intracellular GTPase domain of CCR5, and an extracellular chemokine-binding domain of CXCR4 or CCR2. In some case, by combining domains with different functionalities one may achieve further improvement in therapeutic performance of

the modified oncolytic virus. It is one embodiment of this disclosure that the modified oncolytic virus can comprise exogenous nucleic acids that can code for at least one chemokine receptor. In some cases, the modified oncolytic virus can comprise exogenous nucleic acids that can code for two or more different chemokine receptors, which may be expressed simultaneously by the virus. Exemplary chemokine receptors that can be expressed simultaneously from the modified oncolytic viruses described herein can include CXCR4 and CCR2. In modified oncolytic viruses expressing more than one chemokine receptors, a combinatorial or synergistic effect against tumor cells may be achieved as to the therapeutic application of the oncolytic virus.

[0066] In certain embodiments, the modified oncolytic virus comprises an exogenous CXCR4-expressing nucleic acid. In certain embodiments, the modified oncolytic virus comprises an exogenous CCR2-expressing nucleic acid. Certain embodiments disclose a modified oncolytic virus comprising an exogenous nucleic acid that codes for both CXCR4 and CCR2, and both chemokines are expressed form the same virus. Under certain circumstances, CXCL12 and/or CCL2 typically expressed in the tumor microenvironment may attract the CXCR4 and/or CCR2-expressing lymphocytes or other migrating cells that are infected by the modified oncolytic virus, thereby enhancing the tumor-targeted delivery of the modified oncolytic virus.

[0067] In certain embodiments, producer viruses described herein can comprise one or more exogenous nucleic acid sequences, alternatively referred to as transgenes, which can generate mRNAs coding for an agent that can modulate the activity of STAT3 and as a result can also modulate the activation of genes regulated by STAT3. Thus, certain examples provided herein provide oncolytic vaccinia viruses containing exogenous nucleic acid sequences that can encode an agent that can modulate STAT-3 mediated gene-activation. The phrase "modulates STAT 3 -mediated gene activation," as used herein, can refer to a process wherein STAT3 activity is modulated and as a consequence the activation of one or more genes that are regulated by STAT3 is also modulated.

[0068] In certain embodiments, the agent that can modulate STAT3-mediated gene activation can be a protein or a fragment thereof. In certain embodiments, the protein or the fragment thereof can inhibit, reduce, or minimize STAT3 activity and STAT3-mediated gene activation. A protein or a fragment thereof that inhibits, reduces and/or minimizes STAT3 activity and STAT3 -mediated gene activation can, for example, block the binding of STAT3 to a DNA binding sequence in the promoter regions of STAT3 responsive genes. In additional examples, the protein or a fragment thereof that inhibits, reduces, or minimizes

STAT3 activity and STAT3 -mediated gene activation can directly bind the STAT3 protein, for example, at the SH2 domain. In certain embodiments, a protein that inhibits, reduces and/or minimizes STAT3 activity blocks, prevents, reduces and/or minimizes the phosphorylation of STAT3 and/or dephosphorylates STAT3. In certain non-limiting embodiments, the proteins that modulate STAT3 activity can include phosphotyrosine phosphatases (PTPs), protein inhibitor of activated STAT (PIAS, e.g., PIAS3) and suppressor of cytokine signaling (SOCS) proteins (e.g., SOC3).

[0069] For example, in some aspects, a vaccinia virus genome can comprise an exogenous *env*, packaging construct, and a transfer construct of a lentivirus. Exogenous sequences can be inserted at any portion of a vaccinia virus genome. In an aspect, an exogenous sequence can be inserted in proximity to a 5' or 3' end. In an aspect, an exogenous sequence is inserted adjacent to another exogenous sequence. In an aspect, an exogenous sequence is inserted from about 0.5 kb to about 1000 kb away from the next nearest exogenous sequence. In some instances, the exogenous sequences coding for the lentivirus proteins can be under the control of early vaccinia virus promoters. In some embodiments, the producer virus can be an oncolytic vaccinia virus which expresses a bacteriophage regulatory sequence, such as a bacteriophage promoter, a bacteriophage termination sequence, or combinations thereof. Bacteriophage promoters or termination sequences can be from T3 bacteriophage, T7 bacteriophage and SP6 bacteriophage. The bacteriophage regulatory sequences can be cloned using standard methods for cloning and manipulating. In some embodiments, the producer virus can be an oncolytic vaccinia virus which expresses a bacteriophage polymerase. The term "bacteriophage polymerase" can refer to any bacteriophage polymerase, including those compatible with T3 bacteriophage, T7 bacteriophage and SP6 bacteriophage promoters. In some embodiments, the producer virus can be an oncolytic vaccinia virus which expresses a bacteriophage polymerase and the bacteriophage polymerase can be cloned using standard methods of cloning and manipulating.

Env element

[0070] In some aspects, an exogenous sequence can be an *env* element. In some aspects, an *env* element can be from a *vsvg*-containing *env* construct. In some aspects, a *vsvg*-containing *env* construct may recombine with the vaccinia virus genome at a point between the *vacwr032* (*k1l*) and *vacwr033* (*k2l*) genes. In an aspect, a *vsvg*-containing *env* construct can be designed to recombine with a vaccinia virus genome at a point between the *vacwr032* (*k1l*) and *vacwr033* (*k2l*) genes. This genomic location can offer a few advantages: (1) it provides adequate space between genes, (2) an identifiable promoter could be found for *vacwr032*, and

(3) this positions the construct at the 5' end of the genome which is the furthest away from any other exogenous sequences that can disrupt an endogenous vaccinia virus genome. In an aspect, the *vsvg* gene and its promoter can be positioned 3' to 5' to match the direction of the adjacent VV genes. In some cases, an *env* is inserted at position bp 26041 of a vaccinia genome. In an aspect, an envelope construct can be inserted between genes vacwr032 and vacwr033 of an oncolytic vaccinia virus. In an aspect, an envelope construct can be inserted between genes vacwr032 or a portion thereof and vacwr033 or a portion thereof of the oncolytic vaccinia virus.

[0071] In an aspect, an *env* element comprises a sequence with at least about 50%, 60%, 70%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or 100% identity to SEQ ID NO: 2. In an aspect, an *env* element comprises a vsvg sequence with at least about 50%, 60%, 70%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or 100% identity to SEQ ID NO: 3.

Packaging construct

[0072] In an aspect, an exogenous sequence can be a packaging construct sequence. In an aspect, a packaging construct can be designed to recombine with a vaccinia virus genome to replace the coding sequence for a gene, for example *vacwr094* (*j2r*) between the *vacwr093* (*j1r*) and *vacwr033* (*j3r*) genes. In an aspect, a genomic disruption caused by an insertion of an exogenous sequence can be performed. In an aspect, a genomic disruption can attenuate a function of a virus. For example, a packaging construct can be designed to recombine with a vaccinia virus genome to replace or disrupt the coding sequence for a gene because a disruption, for example a*j2r*-deletion, creates an attenuated virus that preferentially infects tumor cells. Also, this disruption/insertion positions the exogenous packaging construct near the center of the vaccinia virus genome which is the relatively distant from the other exogenous sequences, such as *env*. In some cases, a packaging construct is inserted or deleted at position bp 80724-81257 of a vaccinia virus genome. In an aspect, a packaging construct can be inserted between genes vacwr093 and vacwr095 of an oncolytic vaccinia virus. In an aspect, a genome of an oncolytic vaccinia virus comprises a deletion of the vacwr094 gene or portion thereof. In an aspect, a packaging construct can be inserted into the location of the vacwr094 gene or portion thereof. In an aspect, a packaging construct can be inserted between genes vacwr093 or a portion thereof and vacwr095 or a portion thereof of an oncolytic vaccinia virus. In an aspect, a genome of an oncolytic vaccinia virus comprises a deletion of a vacwr094 gene or portion thereof. In an aspect, a packaging construct can be inserted into the location of the vacwr094 gene or portion thereof.

[0073] In an aspect, an packaging element comprises a sequence with at least about 50%, 60%, 70%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or 100% identity to SEQ ID NO: 4. In an aspect, an packaging element comprises a *gag/pol* sequence with at least about 50%, 60%, 70%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or 100% identity to SEQ ID NO: 5. In an aspect, the nucleic acid that codes for the lentiviral structural protein comprises a nucleotide sequence as set forth in SEQ ID No. 4, or a nucleotide sequence that is at least about 70% to at least about 99% identical to the sequence set forth as SEQ ID No. 5

Transfer construct

[0074] In an aspect, an exogenous sequence can be a transfer construct sequence. In an aspect, vaccinia virus late genes may not be transcribed into single gene-containing mRNA, but instead from large 10-20 kb mRNA that may have been initiated using promoters several genes away before terminating. In an aspect, a disrupted vaccinia virus genome may comprise a transfer construct between *vacwr205* and *vacwr206*, a region with no late gene transcripts near the far 3' end of the VV genome. In some cases, a transfer construct is inserted at bp 183645 of a vaccinia virus genome. In an aspect, a transfer construct can be inserted between genes vacwr205 or portion thereof and vacwr206 or portion thereof of an oncolytic vaccinia virus.

[0075] In an aspect, a vaccinia virus provided herein can comprise at least 1 promoter. In an aspect, a vaccinia virus provided herein can comprise from about 1 promoter to about 3 promoters. In an aspect, a vaccinia virus provided herein can comprise from about 1, 2, 3, 4, 5, 6, 7, 8, 9, or up to about 10 promoters. In an aspect, a promoter can be an early promoter. In an aspect, a promoter can be an early/late promoter or a later promoter. In some cases, the transfer construct can further comprise a gene that codes for a self-cleaving RNA ribozyme, such as a hepatitis delta virus ribozyme or a hammerhead ribozyme. Without being bound by any particular theory, it is contemplated that when a self-cleaving RNA sequences are transcribed, they can cleave themselves rapidly and during transcription. Thus, the system may not have to rely on early expression to terminate the RNA as they would likely rapidly cleave themselves at the correct spot. As such, using a late promoter (*e.g.*, a vaccinia virus late promoter) can be advantageous, because now all of the retroviral (*e.g.*, lentiviral) components can be expressed with the late promoters, such as the VV late promoters, which have magnitudes higher expression, and can produce markedly more retrovirus (e.g., lentivirus). The gene that codes for the self-cleaving ribozyme, can, in some instances be positioned 3' of the termination sequence (*e.g.*, U5NU in Fig. 4) of the transfer construct.

[0076] In an aspect, a transfer construct can be inserted between genes vacwr205 or a portion thereof and vacwr206 or a portion thereof of the oncolytic vaccinia virus. In an aspect, a transfer element comprises sequence with at least about 50%, 60%, 70%, 80%, 85%, 90%, 95%, 96%, 97%, 98%, 99%, or 100% identity to SEQ ID NO: 6.

Lentivirus

[0077] In an aspect, provided herein can be an oncolytic virus, such as a vaccinia virus, that produces from its genome a non-replicating lentivirus or portion thereof. In some embodiments, a non-replicating lentivirus comprises a transgene that codes for a non-lentiviral protein or functional fragment thereof. In an aspect, a non-replicating lentivirus is capable of infecting and transducing both dividing and non-dividing cells in a target population of mammalian cells. In an aspect, mammalian cells can be human.

[0078] In an aspect, provided herein can be a second-generation lentivirus. A second-generation lentivirus may comprise a transfer plasmid that may utilize a tat element for packaging. In an aspect, a second-generation lentivirus may comprise packaging elements in a single plasmid, for example: *Gag*, *pol*, *rev*, and tat. In an aspect, a second-generation lentivirus may comprise an *env* element that can encode for VSV-G. A second-generation lentivirus may be a 3-plasmid system. In an aspect, a second-generation lentivirus may utilize a wild type LTR. Second generation lentiviruses can be replication incompetent and may utilize 3 plasmids to encode various HIV genes.

[0079] In an aspect, provided herein can be a third-generation lentivirus. A third-generation lentivirus may utilize a second generation or third generation packaging system to package a transfer element. In an aspect, a third-generation lentivirus utilizes at most 2 plasmids to package, for example one plasmid encoding *gag* and *pol* and a second plasmid encoding *rev*. In an aspect, a third-generation lentivirus may comprise an *env* element that can encode for VSV-G. In an aspect, a third-generation lentivirus uses up to 4 plasmids, and may eliminate the use of a tat element. In an aspect, a third-generation lentivirus may be safer than a second-generation lentivirus. A third-generation lentivirus may comprise a hybrid LTR viral promoter, for example a 5'LTR can be deleted or partially deleted and can be fused to an exogenous promoter, for example a vaccinia virus, CMV or RSV promoter.

[0080] In some cases, provided herein can be a lentivirus or a portion thereof. In some cases, a lentivirus can be derived from an HIV-1 virus. In some aspects, a lentivirus can be derived from a non-HIV-1 virus, for example: HIV-2, simian immunodeficiency virus, feline immunodeficiency virus, bovine immunodeficiency virus, or caprine arthritis-encephalitis virus, equine infectious anemia virus (EIAV), and any combination thereof.

[0081] In some cases, provided herein can be a lentivirus from an HIV-1 virus. In some aspects, multiple plasmids coding for different components of an HIV-1 virus can be delivered on multiple plasmids. A lentiviral vector system can comprise at least two plasmids that comprise portions of the lentivirus. In some aspects, at least 2, 3, 4, 5, 6, 7, or up to about 8 plasmids can comprise portions of the lentivirus. In some aspects, an LV vector can be a 3-plasmid system. In some cases, a 3-plasmid system comprises two helper plasmids coding for *gag-pol* and the *env* functions as well as the TV plasmid. In some aspects, an LV vector can be a 4-plasmid system. 4 plasmid LV systems can comprise accessory genes of HIV-1 (for example: vif, vpr, vpu, and nef), may be present only in a first generation of LV. In some aspects, they have been removed because they may not be necessary. Similarly, the regulatory tat gene, present in the second-generation LV, has been eliminated in some cases because its transacting function is dispensable as the U3 promoter of the 5' long terminal repeat (LTR) in the TV has been replaced by a constitutively active promoter sequence. In some aspects, a vaccinia virus may be absent a gene from a foreign virus, such as an HIV-1 *rev* gene. In some aspects, a vector provided herein may contain a hybrid 5' LTR region. A hybrid 5' LTR region may contain at least one component from a vaccinia virus and at least one component from an HIV-1. In some aspects, a component from an HIV-1 is a 5' LTR. In some aspects, a component from an HIV-1 is a 3' LTR. A hybrid construct may be absent tat. In some aspects, a hybrid construct may utilize a vaccinia virus transcription factor in place of tat.

[0082] In some embodiments, a constitutively active promoter sequence can be any one of: cytomegalovirus (promoter) or Rous Sarcoma Virus (promoter). In some cases, an optional enhancer or an inducible/repressible promoter sequence, such as 7tetO may be included (pRRL (lentivirus transfer vector construct containing chimeric Rous sarcoma virus (RSV)-HIV 5' LTRs) design or the pCCL design ((CMV)-HIV 5' LTR). These modifications can lead to a LV vector system with the helper functions based on the use of *gag-pol* (encoding for the structural proteins and viral enzymes) and *rev* (encoding for a post-transcriptional regulator) derived from HIV-1 and *env*. In some aspects, a vector provided herein is absent *rev*. In some aspects, LV vectors can be pseudotyped with different heterologous envelope glycoproteins. In some aspects, a glycoprotein of the vesicular stomatitis virus (VSV-g) envelope can be utilized due to improved stability during downstream processing as well as its large transduction spectrum. In some aspects, a TV plasmid is genetic material transferred to the target cells and can comprise the LV backbone containing the transgene expression cassette flanked by cis-acting elements required for encapsidation, reverse transcription, and

integration. In some aspects, a transfected cell comprises at least a portion of a TV plasmid after infection. In some aspects, provided herein can be a self-inactivating (SIN)-LV vector. A SIN-LV vector comprises a deletion at the U3 element of the 2'LTR. In some aspects, a SIN-LV vector loses the transcriptional capacity of the viral LTR once transferred to the target cells; this can minimize the risk of emergence of replication competent recombinants and avoiding problems linked to promoter interference. In some aspects, provided herein can be a third-generation plasmid system in which tat has been removed from the system. In some aspects, a third-generation vector may replace the activity of the HIV-1 protein TAT by using a chimeric 5' LTR fused to a heterologous promoter.

[0083] In some cases, the termination of vaccinia virus early gene transcription can utilize the termination sequence UUUUUNU (U5NU) (SEQ ID NO: 7) to attract vaccinia virus-specific factors to halt transcription and generate poly (A) tails to protect viral mRNA. In an aspect, a vector provided herein may comprise the ATTTTTAT (SEQ ID NO: 8) sequence adjacent to the desired terminal region of a construct. In some embodiments, the termination sequence comprises a nucleotide sequence with percent identity from about 60%, 70%, 80%, 90%, 95%, or up to about 100% to a sequence as set forth in SEQ ID No. 7.

[0084] In certain embodiments, the retroviral vectors provided herein can be replication defective, that is, they are unable to replicate autonomously in a target cell. In some aspects, a replication defective virus is a minimal virus, such that it retains only the sequences of its genome which are necessary for target cell recognition and encapsidating the viral genome. In some cases, a replication defective virus is not infective after introduction into a cell. Use of replication defective viral vectors allows for administration to cells in a specific, localized area, without concern that the vector can infect other cells. Thus, a specific tissue can be specifically targeted.

[0085] In an aspect, a lentivirus construct provided herein, for expression from a producer oncolytic virus, may comprise a promoter. In an aspect, expression of a lentiviral element may be expressed early. In an aspect, expression of a lentiviral element may be robust. For example, a vaccinia virus may generate short, single gene mRNA with poly (A) tails during an early phase of infection, for example within 2 hr. post-infection. After that period, viral mRNA from the intermediate and late phases of infection may not be specifically terminated or polyadenylated. To form functional lentivirus transfer RNA, transcription can be initiated and terminated at specific sites adjacent to lentiviral long terminal repeats (LTRs), therefore, lentiviral elements may be expressed robustly in the first 2 hr. post vaccinia virus infection. Therefore, in some cases a vector provided herein can have strong early promoters for each

element and fused a strong early promoter to a 5' LTR of the transfer construct. In an aspect, there are from about 1-10 viral elements with preceding strong early promoters. In an aspect, there are from about 1-5 viral elements with preceding strong early promoters. In an aspect, there are from about 1-3 viral elements with preceding strong early promoters. In some instances, the components of the lentiviral construct can be under the control of early/late, or late viral promoters. For example, the packaging construct, the transfer construct, and the envelope construct each independently comprises an early/late viral promoter or a late viral promoter.

[0086] Promoters are sequences of nucleic acid that control the binding of RNA polymerase and transcription factors, and can have a major effect on the efficiency of gene transcription, where a gene may be expressed in the cell, and/or what cell types a gene may be expressed in. Non limiting examples of promoters include a vaccinia virus promoter, cytomegalovirus (CMV) promoter, an elongation factor 1 alpha (EF1α) promoter, a simian vacuolating virus (SV40) promoter, a phosphoglycerate kinase (PGK1) promoter, a ubiquitin C (Ubc) promoter, a human beta actin promoter, a CAG promoter, a Tetracycline response element (TRE) promoter, a UAS promoter, an Actin 5c (Ac5) promoter, a polyhedron promoter, Ca2+/calmodulin-dependent protein kinase II (CaMKIIa) promoter, a GAL1 promoter, a GAL 10 promoter, a TEF1 promoter, a glyceraldehyde 3-phosphage dehydrogenase (GDS) promoter, an ADH1 promoter, a CaMV35S promoter, a Ubi promoter, a human polymerase III RNA (H1) promoter, a U6 promoter, or a combination thereof.

[0087] In some embodiments, the disclosure provides a method of eliciting an antitumor immune response in a subject presenting with, or at risk of developing a cancer. In some aspects, a cancer can be metastatic. In an aspect, an oncolytic virus (e.g., HSV, vaccinia virus, or adenovirus), a retrovirus produced from the oncolytic virus, or both can express a therapeutic protein or a diagnostic protein. In an aspect, a therapeutic protein can be a PD-1 binding agent, such as a single chain anti-PD-1 antibody, that antagonizes the activity of PD-1. In other embodiments, the therapeutic protein an agent that antagonizes the binding of the PD-1 ligands to the receptor, e.g., anti-PD-L1 and/or PD-L2 antibodies, PD-L1 and/or PD-L2 decoys, or a soluble PD-1 receptor. In an aspect, PD-1 blockade may also stimulate the anti-tumor immune response by blocking the inactivation of T-cells (CTLs and helper) and B-cells thereby leading to increased cancer killing.

Packaging cell lines

[0088] In an aspect, provided herein can be a packaging cell line. The production of replication defective virus can be accomplished through trans-complementation in which

packaging cells may be cotransfected with multiple plasmids (for example from about 2, 3, 4, 5 or more plasmids) that together express all of the viral proteins necessary to generate infectious particles, as well as the nucleic acid sequence of interest that will be packaged within them for delivery, for example a viral sequences. While many lentiviral vector systems are based on transduction of two helper plasmids (second generation) with the transfer plasmid, some newer systems (third generation) have the packaging and envelope constructs on three plasmids which are combined with the transfer plasmid and utilized to transfect a packaging cell line. In an aspect, provided herein can be a packaging cell line for use with a retrovirus. In an aspect, a first-generation retroviral packaging cell line can be utilized. First generation retroviral packaging cell lines can be derived from mouse 3T3 cell. In an aspect, a second-generation retroviral vector packaging cell line can be utilized. Non-limiting examples of second-generation retroviral vector packaging cell lines include: human cells like HEK293 (embryonic kidney), TE671 (rhabdomyosarcoma) and HT1080 (fibrosarcoma). Third generation packaging cell lines may be absent unnecessary viral sequences present in second generation packaging plasmids as well as in transfer vectors have been deleted to improve safety.

Non-lentiviral proteins

Therapeutic protein or portion thereof

[0089] In some embodiments, a non-lentiviral protein can be a therapeutic protein or portion thereof. In an aspect, a therapeutic protein or portion thereof can be any one of: immune checkpoint modulator, antibody or portion thereof, Fc fusion protein, anticoagulant, blood factor, bone morphogenetic protein, immunosuppressive agents, immunostimulatory agents, enzyme, growth factor, hormone, interferon, interleukin, thrombolytic, anti-angiogenic, chemotherapeutic, antibiotic, antifungal, antiviral, and any combination thereof.

[0090] In an aspect, a therapeutic protein or portion thereof can be an immune checkpoint modulator. In an aspect, an immune checkpoint modulator can inhibit an immune checkpoint. In an aspect, an immune checkpoint modulator can activate an immune checkpoint. An immune checkpoint inhibitor can be a drug that blocks a protein made by some types of immune system cells, such as T cells, and some cancer cells. These immune checkpoint proteins help keep immune responses in check and can keep T cells from killing cancer cells. When these proteins are inhibited, the "brakes" on the immune system are released and T cells are able to kill cancer cells. Examples of checkpoint proteins found on T cells or cancer cells include but are not limited to: PD-1/PD-L1 and CTLA-4/B7-1/B7-2. In an aspect, an immune checkpoint inhibitor can be delivered by a virus provided herein.

[0091] There are a variety of immune checkpoints that can be targeted by an immune checkpoint modulator and/or any therapeutic protein, **Table 2**.

[0092] **Table 2: Genes coding for immune checkpoints that are targeted by immune checkpoint modulators**

Gene Symbol	Abbreviation	Name	NCBI number (GRCh38.p2) *AC010327.8 ** GRCh38.p7	Location in genome
ADORA 2A	A2aR; RDC8; ADORA2	adenosineA2a receptor	135	22q11.23
CD276	B7H3; B7-H3; B7RP-2; 4Ig-B7-H3	CD276 molecule	80381	15q23-q24
VTCN1	B7X; B7H4; B7S1; B7-H4; B7h.5; VCTN1; PRO1291	V-set domain containing T cell activation inhibitor 1	79679	1p13.1
BTLA	BTLA1; CD272	B and T lymphocyte associated	151888	3q13.2
CTLA4	GSE; GRD4; ALPS5; CD152; CTLA-4; IDDM12; CELIAC3	cytotoxic T-lymphocyte-associated protein 4	1493	2q33
IDO1	IDO; INDO; IDO-1	indoleamine 2,3-dioxygenase 1	3620	8p12-p11
KIR3DL 1	KIR; NKB1; NKAT3; NKB1B; NKAT-3; CD158E1; KIR3DL2; KIR3DL1/S1	killer cell immunoglobulin-like receptor, three domains, long cytoplasmic tail, 1	3811	19q13.4
LAG3	LAG3;CD223	lymphocyte-activation gene 3	3902	12p13.32
PDCD1	PD1; PD-1; CD279; SLEB2; hPD-1; hPD-l; hSLE1	programmed cell death 1	5133	2q37.3
HAVCR 2	TIM3; CD366; KIM-3; TIMD3; Tim-3; TIMD-3; HAVcr-2	hepatitis A virus cellular receptor 2	84868	5q33.3
VISTA	C10orf54, differentiation of ESC-1 (Dies1); platelet receptor Gi24 precursor; PD1 homolog (PD1H) B7H5; GI24; B7-H5; SISP1; PP2135	V-domain immunoglobulin suppressor of T-cell activation	64115	10q22.1
CD244	2B4; 2B4; NAIL; Nmrk; NKR2B4; SLAMF4	CD244 molecule, natural killer cell receptor 2B4	51744	1q23.3

CISH	CIS; G18; SOCS; CIS-1; BACTS2	Cytokine Inducible SH2-Containing protein	1154	3p21.3
HPRT1	HPRT; HGPRT	hypoxanthine phosphoribosyltransferase 1	3251	Xq26.1
AAV*S1	AAV	adeno-associated virus integration site 1	14	19q13
CCR5	CKR5; CCR-5; CD195; CKR-5; CCCKR5; CMKBR5; IDDM22; CC-CKR-5	chemokine (C-C motif) receptor 5 (gene/pseudogene)	1234	3p21.31
CD160	NK1; BY55; NK28	CD160 molecule	11126	1q21.1
TIGIT	VSIG9; VSTM3; WUCAM	T-cell immunoreceptor with Ig and ITIM domains	201633	3q13.31
CD96	TACTILE	CD96 molecule	10225	3q13.13-q13.2
CRTAM	CD355	cytotoxic and regulatory T-cell molecule	56253	11q24.1
LAIR1	CD305; LAIR-1	leukocyte associated immunoglobulin like receptor 1	3903	19q13.4
SIGLEC 7	p75; QA79; AIRM1; CD328; CDw328; D-siglec; SIGLEC-7; SIGLECP2; SIGLEC19P; p75/AIRM1	sialic acid binding Ig like lectin 7	27036	19q13.3
SIGLEC 9	CD329; CDw329; FOAP-9; siglec-9; OBBP-LIKE	sialic acid binding Ig like lectin 9	27180	19q13.41
TNFRSF 10B	DR5; CD262; KILLER; TRICK2; TRICKB; ZTNFR9; TRAILR2; TRICK2A; TRICK2B; TRAIL-R2; KILLER/DR5	tumor necrosis factor receptor superfamily member 10b	8795	8p22-p21
TNFRSF 10A	DR4; APO2; CD261; TRAILR1; TRAILR-1	tumor necrosis factor receptor superfamily member 10a	8797	8p21
CASP8	CAP4; MACH; MCH5; FLICE; ALPS2B; Casp-8	caspase 8	841	2q33-q34
CASP10	MCH4; ALPS2;	caspase 10	843	2q33-q34

	FLICE2			
CASP3	CPP32; SCA-1; CPP32B	caspase 3	836	4q34
CASP6	MCH2	caspase 6	839	4q25
CASP7	MCH3; CMH-1; LICE2; CASP-7; ICE-LAP3	caspase 7	840	10q25
FADD	GIG3; MORT1	Fas associated via death domain	8772	11q13.3
FAS	APT1; CD95; FAS1; APO-1; FASTM; ALPS1A; TNFRSF6	Fas cell surface death receptor	355	10q24.1
TGFBRII	AAT3; FAA3; LDS2; MFS2; RIIC; LDS1B; LDS2B; TAAD2; TGFR-2; TGFbeta-RII	transforming growth factor beta receptor II	7048	3p22
TGFBR1	AAT5; ALK5; ESS1; LDS1; MSSE; SKR4; ALK-5; LDS1A; LDS2A; TGFR-1; ACVRLK4; tbetaR-I	transforming growth factor beta receptor I	7046	9q22
SMAD2	JV18; MADH2; MADR2; JV18-1; hMAD-2; hSMAD2	SMAD family member 2	4087	18q21.1
SMAD3	LDS3; LDS1C; MADH3; JV15-2; HSPC193; HsT17436	SMAD family member 3	4088	15q22.33
SMAD4	JIP; DPC4; MADH4; MYHRS	SMAD family member 4	4089	18q21.1
SKI	SGS; SKV	SKI proto-oncogene	6497	1p36.33
SKIL	SNO; SnoA; SnoI; SnoN	SKI-like proto-oncogene	6498	3q26
TGIF1	HPE4; TGIF	TGFB induced factor homeobox 1	7050	18p11.3
IL10RA	CD210; IL10R; CD210a; CDW210A; HIL-10R; IL-10R1	interleukin 10 receptor subunit alpha	3587	11q23
IL10RB	CRFB4; CRF2-4; D21S58; D21S66; CDW210B; IL-10R2	interleukin 10 receptor subunit beta	3588	21q22.11
HMOX2	HO-2	heme oxygenase 2	3163	16p13.3
IL6R	IL6Q; gp80; CD126; IL6RA; IL6RQ; IL-6RA; IL-6R-1	interleukin 6 receptor	3570	1q21
IL6ST	CD130; GP130; CDW130; IL-6RB	interleukin 6 signal transducer	3572	5q11.2
CSK	CSK	c-src tyrosine kinase	1445	15q24.1
PAG1	CBP; PAG	phosphoprotein membrane anchor	55824	8q21.13

		with glycosphingolipid microdomains 1		
SIT1	SIT1	signaling threshold regulating transmembrane adaptor 1	27240	9p13-p12
FOXP3	JM2; AIID; IPEX; PIDX; XPID; DIETER	forkhead box P3	50943	Xp11.23
PRDM1	BLIMP1; PRDI-BF1	PR domain 1	639	6q21
BATF	SFA2; B-ATF; BATF1; SFA-2	basic leucine zipper transcription factor, ATF-like	10538	14q24.3
GUCY1A2	GC-SA2; GUC1A2	guanylate cyclase 1, soluble, alpha 2	2977	11q21-q22
GUCY1A3	GUCA3; MYMY6; GC-SA3; GUC1A3; GUCSA3; GUCY1A1	guanylate cyclase 1, soluble, alpha 3	2982	4q32.1
GUCY1B2	GUCY1B2	guanylate cyclase 1, soluble, beta 2 (pseudogene)	2974	13q14.3
GUCY1B3	GUCB3; GC-SB3; GUC1B3; GUCSB3; GUCY1B1; GC-S-beta-1	guanylate cyclase 1, soluble, beta 3	2983	4q31.3-q33
TRA	IMD7; TCRA; TCRD; TRAalpha; TRAC	T-cell receptor alpha locus	6955	14q11.2
TRB	TCRB; TRBbeta	T cell receptor beta locus	6957	7q34
EGLN1	HPH2; PHD2; SM20; ECYT3; HALAH; HPH-2; HIFPH2; ZMYND6; C1orf12; HIF-PH2	egl-9 family hypoxia-inducible factor 1	54583	1q42.1
EGLN2	EIT6; PHD1; HPH-1; HPH-3; HIFPH1; HIF-PH1	egl-9 family hypoxia-inducible factor 2	112398	19q13.2
EGLN3	PHD3; HIFPH3; HIFP4H3	egl-9 family hypoxia-inducible factor 3	112399	14q13.1
PPP1R12C**	p84; p85; LENG3; MBS85	protein phosphatase 1 regulatory subunit 12C	54776	19q13.42

[0093] The therapeutic protein, in some cases, can be a humanized anti-CD20 monoclonal antibody (*e.g.*, Gazyva), a VEGFR Fc-fusion (*e.g.*, Eylea), a CTLA-4 Fc-fusion (*e.g.*, Nulojix), a glucagon-like peptide-1 receptor agonist Fc-fusion (*e.g.*, Trulicity), VEGFR Fc-

fusion (e.g., Zaltrap), a recombinant factor IX Fc fusion (e.g., Alprolix), a recombinant factor VIII Fc-fusion (*e.g.*, Eloctate), a GLP-1 receptor agonist-albumin fusion (*e.g.*, Tanzeum), a recombinant factor IX albumin fusion (*e.g.*, Idelvion), a PEGylated IFNβ-1a (*e.g.*, Plegridy), a recombinant factor VIII PEGylated (*e.g.*, Adynovate), a humanized anti-HER2/neu conjugated to emtansine (*e.g.*, Kadcyla), a mouse/human chimeric anti-CD30 (*e.g.*, Adcetris), an anti-human epidermal growth factor receptor 2 (HER2) (*e.g.*, Perjeta), Anti-IL-6 receptor (Actemra), an anti-CD20 (*e.g.*, obinutuzumab; Gazyva), an anti-integrin a4b7 (LPAM-1) (*e.g.*, Entyvio), an anti-PD-1 (e.g., Keytruda), an anti-dabigatran (*e.g.*, Praxbind), an anti-IL-5 (*e.g.*, Nucala), an Anti-CD319 (SLAMF7) (*e.g.*, Empliciti), an anti-IL-17a (*e.g.*, Taltz), an anti-IL-5 (*e.g.*, Cinqair), an anti-PD-L1 (*e.g.*, Tecentriq), an anti-CD25 (*e.g.*, Zinbryta), an anti-CD30 (*e.g.*, Adcetris), an anti-IL-6 (*e.g.*, Sylvant), an anti-GD2 (*e.g.*, Unituxin), an anti-*Bacillus anthracis* (*e.g.*, Anthim), an anti-TNFα (*e.g.*, Inflectra), a human anti-B-cell activating factor (BAFF) (*e.g.*, belimumab), a human anti-CTLA-4 (*e.g.*, ipilimumab), a CTLA-4 Fc-fusion (*e.g.*, belatacept), humanized anti-human epidermal growth factor receptor 2 (HER2) (*e.g.*, pertuzumab), a VEGFR Fc fusion (*e.g.*, ziv-afilbercept), a G-CSF (*e.g.*, tbo-filgrastim), human anti-VEGFR2 (KDR) (*e.g.*, ramucirumab), a mouse/human chimeric anti-IL-6 (*e.g.*, siltuximab), pembrolizumab, mouse bispecific anti-CD19/anti-CD3 (*e.g.*, blintumomab), nivolumab, a parathyroid hormone, a mouse/human chimeric anti-GD2 (*e.g.*, dinutuximab), a human anti-CD38 (*e.g.*, daratumumab), a human anti-epidermal growth factor receptor (EGFR)(*e.g.*, necitumumab), humanized anti-CD319(SLAMF7) (*e.g.*, elotuzumab), atezolizumab.

[0094] In an aspect, a therapeutic protein can be a cytokine. A cytokine can be a pro-inflammatory cytokine. In an aspect, a cytokine can be: IL-2, IL-7, IL-12, IL-15, IL-21, and combinations thereof. Additionally, pro-inflammatory cytokines can also be introduced with a virus provided herein. Non-limiting examples of pro-inflammatory cytokines include interleukin 6 (IL-6), interferon alpha (IFNα), interferon beta (IFNβ), C-C motif ligand 4 (CCL4), C-C motif ligand 5 (CCL5), C-X-C motif ligand 10 (CXCL10), interleukin 1 beta (IL-1β), IL-18 and IL-33.

[0095] In an aspect, a therapeutic protein can be a growth factor. In some aspects, a growth factor can be an interleukin. Non-limiting examples of interleukins include: interleukin-2 (IL-2), insulin, IFN-γ, IL-4, IL-7, GM-CSF, IL-10, IL-21, IL-15, TGF beta, and TNF alpha or any other additives for the growth of cells, such as immune cells.

[0096] In an aspect, a therapeutic protein can be a chemotherapeutic. A chemotherapeutic agent or compound can be a chemical compound useful in the treatment of cancer. The

chemotherapeutic cancer agents that can be used in combination with the disclosed viruses include, but are not limited to, mitotic inhibitors (vinca alkaloids). These include vincristine, vinblastine, vindesine and Navelbine™ (vinorelbine, 5'-noranhydroblastine). In yet other cases, chemotherapeutic cancer agents include topoisomerase I inhibitors, such as camptothecin compounds. As used herein, "camptothecin compounds" include Camptosar™ (irinotecan HCL), Hycamtin™ (topotecan HCL) and other compounds derived from camptothecin and its analogues. Another category of chemotherapeutic cancer agents that can be used in the methods and compositions disclosed herein are podophyllotoxin derivatives, such as etoposide, teniposide and mitopodozide. The present disclosure further encompasses other chemotherapeutic cancer agents known as alkylating agents, which alkylate the genetic material in tumor cells. These include without limitation cisplatin, cyclophosphamide, nitrogen mustard, trimethylene thiophosphoramide, carmustine, busulfan, chlorambucil, belustine, uracil mustard, chlomaphazin, and dacarbazine. The disclosure encompasses antimetabolites as chemotherapeutic agents. Examples of these types of agents include cytosine arabinoside, fluorouracil, methotrexate, mercaptopurine, azathioprime, and procarbazine.

[0097] In an aspect, a therapeutic agent can be an antibiotic. In some cases, an antibiotic can be a bacterial wall targeting agent, a cell membrane targeting agent, a bacterial enzyme interfering agent, a bactericidal agent, a protein synthesis inhibitor, or a bacteriostatic agent. A bacterial wall targeting agent can be a penicillin derivatives (penams), cephalosporins (cephems), monobactams, and carbapenems. β-Lactam antibiotics are bactericidal or bacteriostatic and act by inhibiting the synthesis of the peptidoglycan layer of bacterial cell walls. In some cases, an antibiotic may be a protein synthesis inhibitor. A protein synthesis inhibitor can be ampicillin which acts as an irreversible inhibitor of the enzyme transpeptidase, which is needed by bacteria to make the cell wall. It inhibits the third and final stage of bacterial cell wall synthesis in binary fission, which ultimately leads to cell lysis; therefore, ampicillin is usually bacteriolytic. In some cases, a bactericidal agent can be cephalosporin or quinolone. In other cases, a bacteriostatic agent is trimethoprim, sulfamethoxazole, or pentamidine. Additional examples of antibiotics include without limitation doxorubicin, bleomycin, dactinomycin, daunorubicin, mithramycin, mitomycin, mytomycin C, and daunomycin.

[0098] In an aspect, a therapeutic agent can also be an antibody or portion thereof. An antibody can be a polyclonal antibody or a monoclonal antibody. A polyclonal antibody that can be administered can be an antilymphocyte or antithymocyte antigen. A monoclonal

antibody can be an anti-IL-2 receptor antibody, an anti-CD25 antibody, or an anti-CD3 antibody. An anti-CD20 antibody can also be used. B-cell ablative therapy such as agents that react with CD20, *e.g.*, Rituxan can also be used as immunosuppressive agents. Exemplary anti-cancer antibodies include but are not limited to: dacarbazine, azacytidine, amsacrine, melphalan, ifosfamide and mitoxantrone.

[0099] In an aspect, a therapeutic agent can also be an anti-fungal. In some cases, an antifungal agent can be from a class of polyene, azole, allylamine, or echinocandin. In some embodiments, a polyene antifungal is amphotericin B, candicidin, filipin, hamycin, natamycin, nystatin, or rimocidin. In some cases, an antifungal can be from an azole family. Azole antifungals can inhibit lanosterol 14 α-demethylase. An azole antifungal can be an imidazole such as bifonazole, butoconazole, clotrimazole, econazole, fenticonazole, isoconazole, ketoconazole, luliconazole, miconazole, omoconazole, oxiconazole, sertaconazole, sulcoazole, or tioconazole. An azole antifungal can be a triazole such as albaconazole, efinaconazole, epoxiconazole, fluconazole, isavuvonazole, itraconazole, posaconazole, propiconazole, ravuconazole, terconazole, or voriconazole. In some cases, an azole can be a thiazole such as abafungin. An antifungal can be an allylamine such as amorolfin, butenafine, naftifine, or terbinafine. An antifungal can also be an echinocandin such as anidulafungin, caspofungin, or micafungin. Additional agents that can be antifungals can be aurones, benzoic acid, ciclopirox, flucytosine, griseofulvin, haloprogin, tolnaftate, undecylenic acid, crystal violet or balsam of Peru.

Pharmaceutical Compositions

[00100] Provided herein is a pharmaceutically acceptable viral therapeutic. In an aspect, provided herein are also methods of implementing pharmaceutically acceptable viral therapeutics comprising oncolytic viruses. Compositions and methods provided herein can be used for the treatment of a disease, such as a cancer.

[00101] Cancer can include, but is not limited to, melanoma, hepatocellular carcinoma, breast cancer, lung cancer, peritoneal cancer, prostate cancer, bladder cancer, ovarian cancer, leukemia, lymphoma, renal carcinoma, pancreatic cancer, epithelial carcinoma, gastric cancer, colon carcinoma, duodenal cancer, pancreatic adenocarcinoma, mesothelioma, glioblastoma multiforme, astrocytoma, multiple myeloma, prostate carcinoma, hepatocellular carcinoma, cholangiosarcoma, pancreatic adenocarcinoma, head and neck squamous cell carcinoma, colorectal cancer, intestinal-type gastric adenocarcinoma, cervical squamous-cell carcinoma, osteosarcoma, epithelial ovarian carcinoma, acute lymphoblastic lymphoma, myeloproliferative neoplasms, and sarcoma.

[00102] In an aspect, an oncolytic virus can amplify a therapeutic agent selectively within a cancer. In an aspect, an oncolytic virus can also carry a therapeutic protein or a diagnostic protein and express the protein or a functional fragment thereof in proximity to a cancer. In an aspect, a therapeutic protein or a diagnostic protein can enhance an endogenous immune response. In an aspect, an oncolytic virus and/or a retrovirus provided herein coupled with a therapeutic protein provided herein can have greater anti-cancer effects as compared to a comparable virus absent the coupling with the therapeutic agent. In an aspect, the oncolytic virus and/or a retrovirus provided herein coupled with a therapeutic protein provided herein can have from about 1 fold, 2 fold, 3 fold, 4 fold, 5 fold, 6 fold, 7 fold, 8 fold, 9 fold, or up to about 10 fold greater anti-cancer effects as compared to a comparable a virus absent the coupling with the therapeutic agent. In an aspect, the oncolytic virus and/or a retrovirus provided herein coupled with a therapeutic protein provided herein can reduce a cancer by about 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, or up to 100% more as compared to a comparable virus absent the coupling with the therapeutic agent.

[00103] In an aspect, provided herein can also be methods of reducing toxicity of cells contacted with nucleic acids, polypeptides, vectors, and plasmids provided herein. For example, a vector encoding for a virus provided herein can be polycistronic, thereby introducing multiple elements, such as a virus, in a single vector construct and reducing toxicity associated with a vector. In an aspect, a bicistronic vector coding for an oncolytic virus provided herein and a therapeutic protein provided herein can have from about 1 fold, 2 fold, 3 fold, 4 fold, 5 fold, 6 fold, 7 fold, 8 fold, 9 fold, or up to about 10 fold less toxicity as compared to introducing two monocistronic vectors the first one coding for the oncolytic virus provided herein and the second one coding for the therapeutic agent. In some cases, cell toxicity is reduced by about, at least about, or at most about 1%, 2%, 3%, 4%, 5%, 6%, 7%, 8%, 9%, 10%, 12%, 15%, 17%, 18%, 19%, 20%, 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 80%, 82%, 85%, 88%, 90%, 92%, 95%, 97%, 98%, 99% or 100% when at least a bicistronic vector provided herein is used as compared to introducing each element alone in a dual vector system.

[00104] As described herein, viral particles provided herein, can be used to deliver a viral vector comprising a transgene comprising at least a portion of a replication defective virus into a cell *ex vivo* or *in vivo*. In some embodiments, a virus provided herein can be measured as pfu (plaque forming units). In some cases, the pfu of a viral dosage of the compositions and methods of the disclosure can be about 10^8 to about 5×10^{10} pfu. In some cases, a dosage of a virus provided herein is at least about 1×10^8, 2×10^8, 3×10^8, 4×10^8, 5×10^8, 6×10^8, 7×10^8,

8×10^8, 9×10^8, 1×10^9, 2×10^9, 3×10^9, 4×10^9, 5×10^9, 6×10^9, 7×10^9, 8×10^9, 9×10^9, 1×10^{10}, 2×10^{10}, 3×10^{10}, 4×10^{10}, and 5×10^{10} pfu. In some cases, a viral of this disclosure is at most about 1×10^8, 2×10^8, 3×10^8, 4×10^8, 5×10^8, 6×10^8, 7×10^8, 8×10^8, 9×10^8, 1×10^9, 2×10^9, 3×10^9, 4×10^9, 5×10^9, 6×10^9, 7×10^9, 8×10^9, 9×10^9, 1×10^{10}, 2×10^{10}, 3×10^{10}, 4×10^{10}, 5×10^{10} , 1×10^{11}, 2×10^{11}, 3×10^{11}, 4×10^{11}, 5×10^{11}, 6×10^{11} , 7×10^{11}, 8×10^{11}, 9×10^{11} , 1×10^{12}, 2×10^{12}, 3×10^{12}, 4×10^{12}, 5×10^{12}, 6×10^{12}, 7×10^{12}, 8×10^{12}, 9×10^{12}, 1×10^{13}, 2×10^{13}, 3×10^{13}, 4×10^{13}, 5×10^{13}, 6×10^{13}, 7×10^{13}, 8×10^{13}, 9×10^{13}, 1×10^{14}, 2×10^{14}, 3×10^{14}, 4×10^{14}, 5×10^{14} , 1×10^{15}, 2×10^{15}, 3×10^{15}, 4×10^{15}, 5×10^{15}, 6×10^{15} , 7×10^{15}, 8×10^{15}, 9×10^{15} pfu. In some aspects, a viral vector of the disclosure can be measured as vector genomes. In some cases, viruses of this disclosure are 1×10^{10} to 3×10^{12} vector genomes, or 1×10^9 to 3×10^{13} vector genomes, or 1×10^8 to 3×10^{14} vector genomes, or at least about 1×10^1, 1×10^2, 1×10^3, 1×10^4, 1×10^5, 1×10^6, 1×10^7, 1×10^8, 1×10^9, 1×10^{10}, 1×10^{11}, 1×10^{12}, 1×10^{13}, 1×10^{14}, 1×10^{15}, 1×10^{16}, 1×10^{17}, and 1×10^{18} vector genomes, or are 1×10^8 to 3×10^{14} vector genomes, or are at most about 1×10^1, 1×10^2, 1×10^3, 1×10^4, 1×10^5, 1×10^6, 1×10^7, 1×10^8, 1×10^9, 1×10^{10}, 1×10^{11}, 1×10^{12}, 1×10^{13}, 1×10^{14}, 1×10^{15}, 1×10^{16}, 1×10^{17}, and 1×10^{18} vector genomes.

[00105] In some cases, the dosage of a virus or a viral vector of the disclosure can be measured using multiplicity of infection (MOI). In some cases, MOI can refer to the ratio, or multiple of vector or viral genomes to the cells to which the nucleic can be delivered. In some cases, the MOI can be 1×10^6 GC/mL (genome copies/mL). In some cases, the MOI can be 1×10^5 GC/mL to 1×10^7 GC/mL. In some cases, the MOI can be 1×10^4 GC/mL to 1×10^8 GC/mL. In some cases, recombinant viruses of the disclosure are at least about 1×10^1 GC/mL, 1×10^2 GC/mL, 1×10^3 GC/mL, 1×10^4 GC/mL, 1×10^5 GC/mL, 1×10^6 GC/mL, 1×10^7 GC/mL, 1×10^8 GC/mL, 1×10^9 GC/mL, 1×10^{10} GC/mL, 1×10^{11} GC/mL, 1×10^{12} GC/mL, 1×10^{13} GC/mL, 1×10^{14} GC/mL, 1×10^{15} GC/mL, 1×10^{16} GC/mL, 1×10^{17} GC/mL, and 1×10^{18} GC/mL MOI. In some cases, a virus of this disclosure are from about 1×10^8 GC/mL to about 3×10^{14} GC/mL MOI, or are at most about 1×10^1 GC/mL, 1×10^2 GC/mL, 1×10^3 GC/mL, 1×10^4 GC/mL, 1×10^5 GC/mL, 1×10^6 GC/mL, 1×10^7 GC/mL, 1×10^8 GC/mL, 1×10^9 GC/mL, 1×10^{10} GC/mL, 1×10^{11} GC/mL, 1×10^{12} GC/mL, 1×10^{13} GC/mL, 1×10^{14} GC/mL, 1×10^{15} GC/mL, 1×10^{16} GC/mL, 1×10^{17} GC/mL, and 1×10^{18} GC/mL MOI.

[00106] Vectors described herein, can be delivered by any suitable method, including transfection, electroporation, liposome delivery, membrane fusion techniques, high velocity DNA-coated pellets, viral infection and protoplast fusion. Electroporation using, for example, the Neon® Transfection System (ThermoFisher Scientific) or the AMAXA® Nucleofector (AMAXA® Biosystems) can also be used for delivery of nucleic acids into a cell.

[00107] The transfection efficiency of cells, such as producer cells, with any of the vectors and plasmids provided herein can be or can be about 20%, 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, 99.5%, 99.9%, or more than 99.9%. In some embodiments, the transfection efficiency can be or can be about 20%, 25%, 30%, 35%, 40%, 45%, 50%, 55%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, 99.5%, 99.9%, or more than 99.9% than the transfection efficiency of comparable cells using a control delivery platform (e.g., a virus engineered absent the methods provided herein). In some cases, transfection or transduction efficiency can be quantified absent a cellular selection, sorting, or the like.

[00108] In an aspect, a vector provided herein can be delivered *in vivo* by administration to an individual subject, typically by systemic administration (*e.g.*, intravenous, intraperitoneal, intramuscular, subdermal, or intracranial infusion).

Kits

[00109] Disclosed herein can be kits comprising viral compositions. Disclosed herein can also be kits for the treatment or prevention of a cancer, pathogen infection, and/or immune disorder. In one embodiment, a kit can include a therapeutic or prophylactic composition containing an effective amount of a viral composition in unit dosage form. In some embodiments, a kit comprises a sterile container which can contain a therapeutic composition of virus; such containers can be boxes, ampules, bottles, vials, tubes, bags, pouches, blister-packs, or other suitable container forms known in the art. Such containers can be made of plastic, glass, laminated paper, metal foil, or other materials suitable for holding medicaments. In some cases, a virus provided herein, can be provided together with instructions for administering the virus to a subject having or at risk of developing a cancer, pathogen infection, immune disorder or that will undergo transplant. Instructions can generally include information about the use of the composition for the treatment or prevention of cancer, pathogen infection, immune disorder or transplant.

EXAMPLES

[00110] The examples below further illustrate the described embodiments without limiting the scope of this disclosure.

EXAMPLE 1: VECTOR DESIGN AND SEQUENCES OF A VIRAL CONSTRUCT COMPRISING A NON-REPLICATING LENTIVIRUS

[00111] A viral vector comprising a non-replicating lentivirus was generated as follows. The *env*, packaging, and transfer elements were integrated into the wild type vaccinia virus (VV) genome, vaccinia virus Western Reserve strain with GenBank accession number

AY243312.1 (**Table 1** and **SEQ ID NO: 1**), separated by tens of thousands of bases all, as shown in **FIG. 1**. The viral vector contains a hybrid 5' LTR region that is a fusion between a vaccinia virus promoter and an HIV-1 5' LTR that functions absent TAT for transcription by utilizing vaccinia virus transcription factors. Vaccinia virus strong early promoters were added for each component and a strong early promoter was fused to the 5' LTR of the transfer construct. The termination of vaccinia virus early gene transcription utilizes the termination sequence UUUUUNU (U5NU) (SEQ ID NO: 7) to attract vaccinia virus -specific factors to halt transcription and generate poly(A) tails to protect viral mRNA. The sequence ATTTTTAT (SEQ ID NO: 8) was added to the desired terminal regions of each construct.

env construct

[00112] The *vsvg*-containing *env* construct was designed to recombine with the vaccinia virus genome at a point between the *vacwr032* (*k1l*) and *vacwr033* (*k2l*) genes. A strong vaccinia virus early promoter was used:

TATTTATATTCCAAAAAAAAAAAATAAAATTTCAATTTTT (SEQ ID NO: 9)

[00113] A map and sequence with elements marked in similar colors as the map is shown below in **FIG. 2** and **Table 2**.

Table 2: Map of a lentiviral *env* construct: Vacwr032 (1-790); U5NU (906-914 and 917-925); VSVG (926-2461); vaccinia virus promoter (2470-2509); loxP (2529-2562 and 3343-3376); GFP (2606-3322); Vacwr033 (3503-4416)

SEQ ID	ID	Sequence
2	Lenti viral *env* const ruct	CACAATTGACGTACATGAGTCTGAGTTCCTTGTTTTTGCTAATTATTTCATCCAATTT ATTATTCTTGACTATATCGAGATCTTTTGTATAGGAGTCAGACTTGTATTCAACATGC TTTTCTATAATCATTTTAGCTATTTCGGCATCATCCAATAGTACATTTTCCAGATTAG CAGAATAGATATTAATGTCGTATTTGAACAGAGCCTGTAACATCTCAATGTCTTTATT ATCTATAGCCAATTTAATGTCCGGAATGAAGAGAAGGGAATTATTGGTGTTTGTCGAC GTCATATAGTCGAGCAAGAGAATCATCATATCCACGTGTCCATTTTTTATAGTGATGT GAATACAACTAAGGAGAATAGCCAGATCAAAAGTAGATGGTATCTCTGAAAGAAAGTA GGAAACAATACTTACATCATTAAGCATGACGGCATGATAAAATGAAGTTTTCCATCCA GTTTTCCCATAGAACATCAGTCTCCAATTTTTCTTAACAAACAGTTTTACCGTTTGCA TGTTACCACTATCAACCGCATAATACAATGCGGTGTTTCCCTTGTCATCAAATTGTGA ATCATCCAGTCCACTGAATAGCAAAATCTTTACTATTTTGGTATCTTCCAATGTGGCT GCCTGATGTAATGGAAATTCATTCTCTAGAAGATTTTTCAATGCTCCAGCGTTCAACA ACGTACATACTAGACGCACGTTATTATCAGCTATTGCATAATACAAGGCACTATGTCC ATGGACATCCGCCTTAAATGCATCTTTGCTAGAGAGGTCTGAAACGAGACGCTAATTA GTGTATATTTTTTCATTTTTTATAATTTTGTCATATTGCACCAGAATTAATAATATCT CTAATAGATCTGATTAGTAGATACATGGCTATCGCATAAAAATTGCATAAAAATTTTA CTTTCCAAGTCGGTTCATCTCTATGTCTGTATAAATCTGTCTTTTCTTGGTGTGCTTT AATTTAATGCAAAGATGGATACCAACTCGGAGAACCAAGAATAGTCCAATGATTAACC CTATGATAAAGAAGAAAGAGGCAATAGAGCTTTTCCAACTACTGAACCAACCTTCTAC AAGCTCGATTGGATTTTTGGATAGCCCAGTATCACCAAAGAATAAACTCTCATCATCA GGAAGTTGCGAAGCAGCGTCTTGAATGTGAGGATGTTCGAACACCTGAGCCTTTGAGC TAAGATGAAGATCGGAGTCCAACATACCATGTCCAATCATGTATAAAGGAAACTTATA TCCTGAACTGGTCCTCAGAACTCCATTGGGTCCAATTTCCACGTCTTCATATGGTGCC CAGTCATCCCACAGTTCCCTTTCTGTGGTAGTTCCACTGATCATTCCGACCATTCTTG

		AGAGGATTGGAGCAGCAATATCGACTCTGATGTATCTGGTCTCAAAGTATTTTAGGGT ACCATTGATTATGGTGAAAGCAGGACCGGTTCCTGGGTTTTTAGGAGCAAGATAGCTG AGATCCACTGGAGAGATTGGAAGACCCGCTCTGATTTTGCTCCAGGTTTCTTGGCAGA GGGAATAATCCAAGATCCTCTCAACGTCCTGAATTAGACTTACATCCACTGAGGTCTG AGATGGAGCAGAGATACTTGACCCTTCTGGGCATTCAGGGAATCTGGCTGCAGCAAAG AGATCCTTATCAGCCATCTCGAACCAGACACCTGATGGGAGTCTGACTCCCCAATGCT TGCAGTATTGCATTTTGCAGGCCTTGCCTCCAGTTTCATAAGCAAAGTAGTTACTTCT GAACCCTGTGCCCTCCTTTCCCAGGGATGATAGCTCTCCGTCCTCTGAGAAGAAGGTG ATGTCCATGGAAATGAGGTTAGAATCACATAGCCCTTTGACCTTATAGTCAGAATGCC AGGTTGTAGAGTTATGGACAGTGGGGCATATGTAATTGCTGCATTTTCCGTTGATGAA CTGTGAATCAACCCATTCTCCTGTGTATTCATCAACCAGCACATGGTGAGGAGTCACC TGGACAATCACTGCTTCGGCATCCGTCACAGTTGCATATCCACAACTTTGAGGAGGGA AGCCTGGATTCAGCCAAGTTCCTTGTTTCGTTTGTTCAATGCTTTCCTTGCATTGTTC TACAGATGGAGTGAAGGATCGGATGGACTGTGTTATATACTTCGGTCCATACCAGCGG AAATCACAAGTAGTGACCCATTTGGAAGCATGACACATCCAACCGTCTGCTTGAATAG CCTTGTGACTCTTGGGCATTTTGACTTGTATGGCTGTGCCTATTAAGTCATTATGCCA ATTTAAATCTGAGCTTGACGGGCAATAATGGTAATTAGAAGGAACATTTTTCCAGTTT CCTTTTTGGTTGTGTGGGAAAACTATGGTGAACTTGCAATTCACCCCAATGAATAAGA AGGCTAAGTACAAAAGGCACTTCATTAGAACGTTATTTATATTCCAAAAAAAAAAAAT AAAATTTCAATTTTTGCTAGCGGGCCCTAAGGCCATAACTTCGTATAGCATACATTAT ACGAAGTTATAATTCTGCAGATGAATTTCATTTTGTTTTTTTCTATGCTATAAATGCG TAAAGGCGAAGAGCTGTTCACTGGTGTCGTCCCTATTCTGGTGGAACTGGATGGTGAT GTCAACGGTCATAAGTTTTCCGTGCGTGGCGAGGGTGAAGGTGACGCAACTAATGGTA AACTGACGCTGAAGTTCATCTGTACTACTGGTAAACTGCCGGTACCTTGGCCGACTCT GGTAACGACGCTGACTTATGGTGTTCAGTGCTTTGCTCGTTATCCGGACCATATGAAG CAGCATGACTTCTTCAAGTCCGCCATGCCGGAAGGCTATGTGCAGGAACGCACGATTT CCTTTAAGGATGACGGCACGTACAAAACGCGTGCGGAAGTGAAATTTGAAGGCGATAC CCTGGTAAACCGCATTGAGCTGAAAGGCATTGACTTTAAAGAAGACGGCAATATCCTG GGCCATAAGCTGGAATACAATTTTAACAGCCACAATGTTTACATCACCGCCGATAAAC AAAAAAATGGCATTAAAGCGAATTTTAAAATTCGCCACAACGTGGAGGATGGCAGCGT GCAGCTGGCTGATCACTACCAGCAAAACACTCCAATCGGTGATGGTCCTGTTCTGCTG CCAGACAATCACTATCTGAGCACGCAAAGCGTTCTGTCTAAAGATCCGAACGAGAAAC GCGATCATATGGTTCTGCTGGAGTTCGTAACCGCAGCGGGCATCACGCATGGTATGGA TGAACTGTACAAATAATTAATTAAAAGGCCGCTCGAATAACTTCGTATAGCATACATT ATACGAAGTTATGCTAGCACGATGCTCTTAGAATAACAACATATACACATTTAATAAA AATAATATTTATTAAGAAAATTCAGATTTCACGTACCCATCAATATAAATAAAATAAT GATTCCTTACACCGTACCCATATTAAGGAGATTCCACCTTACCCATAAACAATATAAA TCCAGTAATATCATGTCTGATGATGAACACAAATGGTGTATTAAATTCCAGTTTTTCA GGAGATGATCTCGCCGTAGCTACCATAATAGTAGATGCCTCTGCTACAGTTCCTTGTT CGTCGACATCTATCTTTGCATTCTGAAACATTTTATAAATATATAATGGGTCCCTAGT CATATGTTTAAACGACGCATTATCTGGATTAAACATACTAGGAGCCATCATTTCGGCT ATCGACTTAATATCCCTCTTATTTTCGATAGAAAATTTAGGGAGTTTAAGATTGTACA CTTTATTCCCTAATTGAAACGACCAATAGTCTAATTTTGCAGCCGTAATAGAATCTGT GAAATGGGTCATATTATCACCTATTGCCAGGTACATACTAATATTAGCATCCTTATAC GGAAGGCGTACCATATCATATTCTTCGTCATCGATTGTGATTGTATTTCCTTGCAATT TAGTAACTACGTTCATCATGGGAACCGTTTTCGTACCGTACTTATTAGTAAAACTAGC ATTGCGTGTTTTAGTGATATCAAACGGATATTGCCATATACCTTTAAAATATATAGTA TTAATGATTGCCCATAGAGTATTATTGTCGAGCATATTAGAATCTACTACATTAGACA TACCGGATCTACGTTCTACTATAGAATTAATTTTATTAACCGCATCTCGTCTAAAGTT TAATCTATATAGGCCGAATCTATGATATTGTTGATAATACGACGGTTTAATGCACACA GTATTATCTACGAAACTTTGATAAGTTAGATCAGTGTACGTATATTTAGATGTTTTCA GCTTAGCTAATCCTGATATTAATTCTGTAAATGCTGGACCCAGATCTCTTTTTCTCAA ATCCATAG
3	vsvg	TTACTTTCCAAGTCGGTTCATCTCTATGTCTGTATAAATCTGTCTTTTCTTGGTGTGC TTTAATTTAATGCAAAGATGGATACCAACTCGGAGAACCAAGAATAGTCCAATGATTA ACCCTATGATAAAGAAGAAAGAGGCAATAGAGCTTTTCCAACTACTGAACCAACCTTC TACAAGCTCGATTGGATTTTTGGATAGCCCAGTATCACCAAAGAATAAACTCTCATCA TCAGGAAGTTGCGAAGCAGCGTCTTGAATGTGAGGATGTTCGAACACCTGAGCCTTTG AGCTAAGATGAAGATCGGAGTCCAACATACCATGTCCAATCATGTATAAAGGAAACTT ATATCCTGAACTGGTCCTCAGAACTCCATTGGGTCCAATTTCCACGTCTTCATATGGT GCCCAGTCATCCCACAGTTCCCTTTCTGTGGTAGTTCCACTGATCATTCCGACCATTC

		TTGAGAGGATTGGAGCAGCAATATCGACTCTGATGTATCTGGTCTCAAAGTATTTTAG GGTACCATTGATTATGGTGAAAGCAGGACCGGTTCCTGGGTTTTTAGGAGCAAGATAG CTGAGATCCACTGGAGAGATTGGAAGACCCGCTCTGATTTTGCTCCAGGTTTCTTGGC AGAGGGAATAATCCAAGATCCTCTCAACGTCCTGAATTAGACTTACATCCACTGAGGT CTGAGATGGAGCAGAGATACTTGACCCTTCTGGGCATTCAGGGAATCTGGCTGCAGCA AAGAGATCCTTATCAGCCATCTCGAACCAGACACCTGATGGGAGTCTGACTCCCCAAT GCTTGCAGTATTGCATTTTGCAGGCCTTGCCTCCAGTTTCATAAGCAAAGTAGTTACT TCTGAACCCTGTGCCCTCCTTTCCCAGGGATGATAGCTCTCCGTCCTCTGAGAAGAAG GTGATGTCCATGGAAATGAGGTTAGAATCACATAGCCCTTTGACCTTATAGTCAGAAT GCCAGGTTGTAGAGTTATGGACAGTGGGGCATATGTAATTGCTGCATTTTCCGTTGAT GAACTGTGAATCAACCCATTCTCCTGTGTATTCATCAACCAGCACATGGTGAGGAGTC ACCTGGACAATCACTGCTTCGGCATCCGTCACAGTTGCATATCCACAACTTTGAGGAG GGAAGCCTGGATTCAGCCAAGTTCCTTGTTTCGTTTGTTCAATGCTTTCCTTGCATTG TTCTACAGATGGAGTGAAGGATCGGATGGACTGTGTTATATACTTCGGTCCATACCAG CGGAAATCACAAGTAGTGACCCATTTGGAAGCATGACACATCCAACCGTCTGCTTGAA TAGCCTTGTGACTCTTGGGCATTTTGACTTGTATGGCTGTGCCTATTAAGTCATTATG CCAATTTAAATCTGAGCTTGACGGGCAATAATGGTAATTAGAAGGAACATTTTTCCAG TTTCCTTTTTGGTTGTGTGGGAAAACTATGGTGAACTTGCAATTCACCCCAATGAATA AGAAGGCTAAGTACAAAAGGCACTTCAT

Packaging construct

[00114] The packaging construct was designed to recombine with the vaccinia virus genome to replace the coding sequence for *vacwr094* (*j2r*) between the *vacwr093* (*j1r*) and *vacwr033* (*j3r*) genes. This deletion was chosen because *j2r*-deletion creates an attenuated virus that preferentially infects tumor cells. Also, this insertion positions the construct near the center of the vaccinia virus genome which is relatively distant from the other constructs. An annotated map and sequence with elements marked in similar colors as the map is shown in **FIG. 3** and **Table 3**. The packaging construct utilizes a strong vaccinia virus early promoter: AAAAATTGAAATTTTATTTTTTTTTTTGGAATATAAATA (SEQ ID NO: 10)

Table 3: Map of the lentiviral packaging construct: vacwr093 (524-985); Vaccinia virus promoter (1000-1039); gagpol (1040-5346); U5NU (5750-5757 and 5773-5780); loxP (5869-5902 and 6699-6732); GFP (5979-6698); vacwr095 (6798-7729)

SEQ ID	ID	Sequence
4	Lenti viral packa ging const ruct	CACAATTGACGTACATGAGTCTGAGTTCCTTGTTTTTGCTAATTATTTCATCCAATTTAT TATTCTTGACTATATCGAGATCTTTTGTATAGGAGTCAGACTTGTATTCAACATGCTTTT CTATAATCATTTTAGCTATTTCGGCATCATCCAATAGTACATTTTCCAGATTAGCAGAAT AGATATTAATGTCGTATTTGAACAGAGCCTGTAACATCTCAATGTCTTTATTATCTATAG CCAATTTAATGTCCGGAATGAAGAGAAGGGAATTATTGGTGTTTGTCGACGTCATATAGT CGAGCAAGAGAATCATCATATCCACGTGTCCATTTTTTATAGTGATGTGAATACAACTAA GGAGAATAGCCAGATCAAAAGTAGATGGTATCTCTGAAAGAAAGTAGGAAACAATACTTA CATCATTAAGCATGACGGCATGATAAAATGAAGTTTTCCATCCAGTTTTCCCATAGAACA TCAGTCTCCAATTTTTCTTAACAAACAGTTTTACCGTTTGCATGTTACCACTATCAACCG CATAATACAATGCGGTGTTTCCCTTGTCATCAAATTGTGAATCATCCAGTCCACTGAATA GCAAAATCTTTACTATTTTGGTATCTTCCAATGTGGCTGCCTGATGTAATGGAAATTCAT TCTCTAGAAGATTTTTCAATGCTCCAGCGTTCAACAACGTACATACTAGACGCACGTTAT TATCAGCTATTGCATAATACAAGGCACTATGTCCATGGACATCCGCCTTAAATGCATCTT TGCTAGAGAGGTCTGAAACGAGACGCTAATTAGTGTATATTTTTTCATTTTTTATAATTT TGTCATATTGCACCAGAATTAATAATATCTCTAATAGATCTGATTAGTAGATACATGGCT ATCGCATAAAAATTGCATAAAAATTTTACTTTCCAAGTCGGTTCATCTCTATGTCTGTAT

		AAATCTGTCTTTTCTTGGTGTGCTTTAATTTAATGCAAAGATGGATACCAACTCGGAGAA CCAAGAATAGTCCAATGATTAACCCTATGATAAAGAAGAAAGAGGCAATAGAGCTTTTCC AACTACTGAACCAACCTTCTACAAGCTCGATTGGATTTTTGGATAGCCCAGTATCACCAA AGAATAAACTCTCATCATCAGGAAGTTGCGAAGCAGCGTCTTGAATGTGAGGATGTTCGA ACACCTGAGCCTTTGAGCTAAGATGAAGATCGGAGTCCAACATACCATGTCCAATCATGT ATAAAGGAAACTTATATCCTGAACTGGTCCTCAGAACTCCATTGGGTCCAATTTCCACGT CTTCATATGGTGCCCAGTCATCCCACAGTTCCCTTTCTGTGGTAGTTCCACTGATCATTC CGACCATTCTTGAGAGGATTGGAGCAGCAATATCGACTCTGATGTATCTGGTCTCAAAGT ATTTTAGGGTACCATTGATTATGGTGAAAGCAGGACCGGTTCCTGGGTTTTTAGGAGCAA GATAGCTGAGATCCACTGGAGAGATTGGAAGACCCGCTCTGATTTTGCTCCAGGTTTCTT GGCAGAGGGAATAATCCAAGATCCTCTCAACGTCCTGAATTAGACTTACATCCACTGAGG TCTGAGATGGAGCAGAGATACTTGACCCTTCTGGGCATTCAGGGAATCTGGCTGCAGCAA AGAGATCCTTATCAGCCATCTCGAACCAGACACCTGATGGGAGTCTGACTCCCCAATGCT TGCAGTATTGCATTTTGCAGGCCTTGCCTCCAGTTTCATAAGCAAAGTAGTTACTTCTGA ACCCTGTGCCCTCCTTTCCCAGGGATGATAGCTCTCCGTCCTCTGAGAAGAAGGTGATGT CCATGGAAATGAGGTTAGAATCACATAGCCCTTTGACCTTATAGTCAGAATGCCAGGTTG TAGAGTTATGGACAGTGGGGCATATGTAATTGCTGCATTTTCCGTTGATGAACTGTGAAT CAACCCATTCTCCTGTGTATTCATCAACCAGCACATGGTGAGGAGTCACCTGGACAATCA CTGCTTCGGCATCCGTCACAGTTGCATATCCACAACTTTGAGGAGGGAAGCCTGGATTCA GCCAAGTTCCTTGTTTCGTTTGTTCAATGCTTTCCTTGCATTGTTCTACAGATGGAGTGA AGGATCGGATGGACTGTGTTATATACTTCGGTCCATACCAGCGGAAATCACAAGTAGTGA CCCATTTGGAAGCATGACACATCCAACCGTCTGCTTGAATAGCCTTGTGACTCTTGGGCA TTTTGACTTGTATGGCTGTGCCTATTAAGTCATTATGCCAATTTAAATCTGAGCTTGACG GGCAATAATGGTAATTAGAAGGAACATTTTTCCAGTTTCCTTTTTGGTTGTGTGGGAAAA CTATGGTGAACTTGCAATTCACCCCAATGAATAAGAAGGCTAAGTACAAAAGGCACTTCA TTAGAACGTTATTTATATTCCAAAAAAAAAAAAATAAAATTTCAATTTTTGCTAGCGGGCC CTAAGGCCATAACTTCGTATAGCATACATTATACGAAGTTATAATTCTGCAGATGAATTT CATTTTGTTTTTTTTCTATGCTATAAATGCGTAAAGGCGAAGAGCTGTTCACTGGTGTCGT CCCTATTCTGGTGGAACTGGATGGTGATGTCAACGGTCATAAGTTTTCCGTGCGTGGCGA GGGTGAAGGTGACGCAACTAATGGTAAACTGACGCTGAAGTTCATCTGTACTACTGGTAA ACTGCCGGTACCTTGGCCGACTCTGGTAACGACGCTGACTTATGGTGTTCAGTGCTTTGC TCGTTATCCGGACCATATGAAGCAGCATGACTTCTTCAAGTCCGCCATGCCGGAAGGCTA TGTGCAGGAACGCACGATTTCCTTTAAGGATGACGGCACGTACAAAACGCGTGCGGAAGT GAAATTTGAAGGCGATACCCTGGTAAACCGCATTGAGCTGAAAGGCATTGACTTTAAAGA AGACGGCAATATCCTGGGCCATAAGCTGGAATACAATTTTAACAGCCACAATGTTTACAT CACCGCCGATAAACAAAAAAATGGCATTAAAGCGAATTTTAAAATTCGCCACAACGTGGA GGATGGCAGCGTGCAGCTGGCTGATCACTACCAGCAAAACACTCCAATCGGTGATGGTCC TGTTCTGCTGCCAGACAATCACTATCTGAGCACGCAAAGCGTTCTGTCTAAAGATCCGAA CGAGAAACGCGATCATATGGTTCTGCTGGAGTTCGTAACCGCAGCGGGCATCACGCATGG TATGGATGAACTGTACAAATAATTAATTAAAAGGCCGCTCGAATAACTTCGTATAGCATA CATTATACGAAGTTATGCTAGCACGATGCTCTTAGAATAACAACATATACACATTTAATA AAAATAATATTTATTAAGAAAATTCAGATTTCACGTACCCATCAATATAAATAAAATAAT GATTCCTTACACCGTACCCATATTAAGGAGATTCCACCTTACCCATAAACAATATAAATC CAGTAATATCATGTCTGATGATGAACACAAATGGTGTATTAAATTCCAGTTTTTCAGGAG ATGATCTCGCCGTAGCTACCATAATAGTAGATGCCTCTGCTACAGTTCCTTGTTCGTCGA CATCTATCTTTGCATTCTGAAACATTTTATAAATATATAATGGGTCCCTAGTCATATGTT TAAACGACGCATTATCTGGATTAAACATACTAGGAGCCATCATTTCGGCTATCGACTTAA TATCCCTCTTATTTTCGATAGAAAATTTAGGGAGTTTAAGATTGTACACTTTATTCCCTA ATTGAAACGACCAATAGTCTAATTTTGCAGCCGTAATAGAATCTGTGAAATGGGTCATAT TATCACCTATTGCCAGGTACATACTAATATTAGCATCCTTATACGGAAGGCGTACCATAT CATATTCTTCGTCATCGATTGTGATTGTATTTCCTTGCAATTTAGTAACTACGTTCATCA TGGGAACCGTTTTCGTACCGTACTTATTAGTAAAACTAGCATTGCGTGTTTTAGTGATAT CAAACGGATATTGCCATATACCTTTAAAATATATAGTATTAATGATTGCCCATAGAGTAT TATTGTCGAGCATATTAGAATCTACTACATTAGACATACCGGATCTACGTTCTACTATAG AATTAATTTTATTAACCGCATCTCGTCTAAAGTTTAATCTATATAGGCCGAATCTATGAT ATTGTTGATAATACGACGGTTTAATGCACACAGTATTATCTACGAAACTTTGATAAGTTA GATCAGTGTACGTATATTTAGATGTTTTCAGCTTAGCTAATCCTGATATTAATTCTGTAA ATGCTGGACCCAGATCTCTTTTTCTCAAATCCATAG
5	Gagpol	ATGGGTGCGAGAGCGTCAGTATTAAGCGGGGGAGAATTAGATCGATGGGAAAAAATTCGG TTAAGGCCAGGGGGAAAGAAAAAATATAAATTAAAACATATAGTATGGGCAAGCAGGGAG CTAGAACGATTCGCAGTTAATCCTGGCCTGTTAGAAACATCAGAAGGCTGTAGACAAATA

		CTGGGACAGCTACAACCATCCCTTCAGACAGGATCAGAAGAACTTAGATCATTATATAAT ACAGTAGCAACCCTCTATTGTGTGCATCAAAGGATAGAGATAAAAGACACCAAGGAAGCT TTAGACAAGATAGAGGAAGAGCAAAACAAAAGTAAGAAAAAAGCACAGCAAGCAGCAGCT GACACAGGACACAGCAATCAGGTCAGCCAAAATTACCCTATAGTGCAGAACATCCAGGGG CAAATGGTACATCAGGCCATATCACCTAGAACTTTAAATGCATGGGTAAAAGTAGTAGAA GAGAAGGCTTTCAGCCCAGAAGTGATACCCATGTTTTCAGCATTATCAGAAGGAGCCACC CCACAAGATTTAAACACCATGCTAAACACAGTGGGGGGACATCAAGCAGCCATGCAAATG TTAAAAGAGACCATCAATGAGGAAGCTGCAGAATGGGATAGAGTGCATCCAGTGCATGCA GGGCCTATTGCACCAGGCCAGATGAGAGAACCAAGGGGAAGTGACATAGCAGGAACTACT AGTACCCTTCAGGAACAAATAGGATGGATGACACATAATCCACCTATCCCAGTAGGAGAA ATCTATAAAAGATGGATAATCCTGGGATTAAATAAAATAGTAAGAATGTATAGCCCTACC AGCATTCTGGACATAAGACAAGGACCAAAGGAACCCTTTAGAGACTATGTAGACCGATTC TATAAAACTCTAAGAGCCGAGCAAGCTTCACAAGAGGTAAAAAATTGGATGACAGAAACC TTGTTGGTCCAAAATGCGAACCCAGATTGTAAGACTATTTTAAAAGCATTGGGACCAGGA GCGACACTAGAAGAAATGATGACAGCATGTCAGGGAGTGGGGGGACCCGGCCATAAAGCA AGAGTTTTGGCTGAAGCAATGAGCCAAGTAACAAATCCAGCTACCATAATGATACAGAAA GGCAATTTTAGGAACCAAAGAAAGACTGTTAAGTGTTTCAATTGTGGCAAAGAAGGGCAC ATAGCCAAAAATTGCAGGGCCCCTAGGAAAAAGGGCTGTTGGAAATGTGGAAAGGAAGGA CACCAAATGAAAGATTGTACTGAGAGACAGGCTAATTTCTTAGGGAAGATCTGGCCTTCC CACAAGGGAAGGCCAGGGAATTTTCTTCAGAGCAGACCAGAGCCAACAGCCCCACCAGAA GAGAGCTTCAGGTTTGGGGAAGAGACAACAACTCCCTCTCAGAAGCAGGAGCCGATAGAC AAGGAACTGTATCCTTTAGCTTCCCTCAGATCACTCTTTGGCAGCGACCCCTCGTCACAA TAAAGATAGGGGGGCAATTAAAGGAAGCTCTATTAGATACAGGAGCAGATGATACAGTAT TAGAAGAAATGAATTTGCCAGGAAGATGGAAACCAAAAATGATAGGGGGAATTGGAGGTT TTATCAAAGTAAGACAGTATGATCAGATACTCATAGAAATCTGCGGACATAAAGCTATAG GTACAGTATTAGTAGGACCTACACCTGTCAACATAATTGGAAGAAATCTGTTGACTCAGA TTGGCTGCACTTTAAATTTTCCCATTAGTCCTATTGAGACTGTACCAGTAAAATTAAAGC CAGGAATGGATGGCCCAAAAGTTAAACAATGGCCATTGACAGAAGAAAAAATAAAAGCAT TAGTAGAAATTTGTACAGAAATGGAAAAGGAAGGAAAAATTTCAAAAATTGGGCCTGAAA ATCCATACAATACTCCAGTATTTGCCATAAAGAAAAAAGACAGTACTAAATGGAGAAAAT TAGTAGATTTCAGAGAACTTAATAAGAGAACTCAAGATTTCTGGGAAGTTCAATTAGGAA TACCACATCCTGCAGGGTTAAAACAGAAAAAATCAGTAACAGTACTGGATGTGGGCGATG CATATTTCTCAGTTCCCTTAGATAAAGACTTCAGGAAGTATACTGCATTTACCATACCTA GTATAAACAATGAGACACCAGGGATTAGATATCAGTACAATGTGCTTCCACAGGGATGGA AAGGATCACCAGCAATATTCCAGTGTAGCATGACAAAAATCTTAGAGCCTTTTAGAAAAC AAAATCCAGACATAGTCATCTATCAATACATGGATGATTTGTATGTAGGATCTGACTTAG AAATAGGGCAGCATAGAACAAAAATAGAGGAACTGAGACAACATCTGTTGAGGTGGGGAT TTACCACACCAGACAAAAAACATCAGAAAGAACCTCCATTCCTTTGGATGGGTTATGAAC TCCATCCTGATAAATGGACAGTACAGCCTATAGTGCTGCCAGAAAAGGACAGCTGGACTG TCAATGACATACAGAAATTAGTGGGAAAATTGAATTGGGCAAGTCAGATTTATGCAGGGA TTAAAGTAAGGCAATTATGTAAACTTCTTAGGGGAACCAAAGCACTAACAGAAGTAGTAC CACTAACAGAAGAAGCAGAGCTAGAACTGGCAGAAAACAGGGAGATTCTAAAAGAACCGG TACATGGAGTGTATTATGACCCATCAAAAGACTTAATAGCAGAAATACAGAAGCAGGGGC AAGGCCAATGGACATATCAAATTTATCAAGAGCCATTTAAAAATCTGAAAACAGGAAAGT ATGCAAGAATGAAGGGTGCCCACACTAATGATGTGAAACAATTAACAGAGGCAGTACAAA AAATAGCCACAGAAAGCATAGTAATATGGGGAAAGACTCCTAAATTTAAATTACCCATAC AAAAGGAAACATGGGAAGCATGGTGGACAGAGTATTGGCAAGCCACCTGGATTCCTGAGT GGGAGTTTGTCAATACCCCTCCCTTAGTGAAGTTATGGTACCAGTTAGAGAAAGAACCCA TAATAGGAGCAGAAACTTTCTATGTAGATGGGGCAGCCAATAGGGAAACTAAATTAGGAA AAGCAGGATATGTAACTGACAGAGGAAGACAAAAAGTTGTCCCCCTAACGGACACAACAA ATCAGAAGACTGAGTTACAAGCAATTCATCTAGCTTTGCAGGATTCGGGATTAGAAGTAA ACATAGTGACAGACTCACAATATGCATTGGGAATCATTCAAGCACAACCAGATAAGAGTG AATCAGAGTTAGTCAGTCAAATAATAGAGCAGTTAATAAAAAAGGAAAAAGTCTACCTGG CATGGGTACCAGCACACAAAGGAATTGGAGGAAATGAACAAGTAGATAAATTGGTCAGTG CTGGAATCAGGAAAGTACTATTCTTAGATGGAATAGATAAGGCCCAAGAAGAACATGAGA AATATCACAGTAATTGGAGAGCAATGGCTAGTGATTTTAACCTACCACCTGTAGTAGCAA AAGAAATAGTAGCCAGCTGTGATAAATGTCAGCTAAAAGGGGAAGCCATGCATGGACAAG TAGACTGTAGCCCAGGAATATGGCAGCTAGATTGTACACATTTAGAAGGAAAAGTTATCT TGGTAGCAGTTCATGTAGCCAGTGGATATATAGAAGCAGAAGTAATTCCAGCAGAGACAG GGCAAGAAACAGCATACTTCCTCTTAAAATTAGCAGGAAGATGGCCAGTAAAAACAGTAC ATACAGACAATGGCAGCAATTTCACCAGTACTACAGTTAAGGCCGCCTGTTGGTGGGCGG

		GGATCAAGCAGGAATTTGGCATTCCCTACAATCCCCAAAGTCAAGGAGTAATAGAATCTA TGAATAAAGAATTAAAGAAAATTATAGGACAGGTAAGAGATCAGGCTGAACATCTTAAGA CAGCAGTACAAATGGCAGTATTCATCCACAATTTTAAAAGAAAAGGGGGGATTGGGGGGT ACAGTGCAGGGGAAAGAATAGTAGACATAATAGCAACAGACATACAAACTAAAGAATTAC AAAAACAAATTACAAAAATTCAAAATTTTCGGGTTTATTACAGGGACAGCAGAGATCCAG TTTGGAAAGGACCAGCAAAGCTCCTCTGGAAAGGTGAAGGGGCAGTAGTAATACAAGATA ATAGTGACATAAAAGTAGTGCCAAGAAGAAAAGCAAAGATCATCAGGGATTATGGAAAAC AGATGGCAGGTGATGATTGTGTGGCAAGTAGACAGGATGAGGATTAA

Transfer construct

[00115] The transfer element was inserted between *vacwr205* and *vacwr206*, a region with no late gene transcripts near the far 3' end of the vaccinia virus genome, **Table 1**. A map and sequence with elements marked in similar colors as the map is shown in **FIG. 4** and **Table 4**. The transfer construct utilizes a strong vaccinia virus early promoter:

GTGATGCGGTTTTGGCAGTACATCAATGGGCGTGGATAGCGGTTTGACTCACGGG
GATTTCCAAGTCTCCACCCCATTGACGTCAATGGGAGTTTGTTTTGGCACCAAAA
TCAACGGGACTTTCCAAAATGTCGTAACAACTCCGCCCCATTGACGCAAATGGGC
GGTAGGCGTGTACGGTGGGAGGTCTATATAAGCAGAGCT (SEQ ID NO: 11) and the human PGK promoter:

GGGGTTGGGGTTGCGCCTTTTCCAAGGCAGCCCTGGGTTTGCGCAGGGACGCGGC
TGCTCTGGGCGTGGTTCCGGGAAACGCAGCGGCGCCGACCCTGGGTCTCGCACA
TTCTTCACGTCCGTTCGCAGCGTCACCCGGATCTTCGCCGCTACCCTTGTGGGCCC
CCCGGCGACGCTTCCTGCTCCGCCCCTAAGTCGGGAAGGTTCCTTGCGGTTCGCG
GCGTGCCGGACGTGACAAACGGAAGCCGCACGTCTCACTAGTACCCTCGCAGAC
GGACAGCGCCAGGGAGCAATGGCAGCGCGCCGACCGCGATGGGCTGTGGCCAAT
AGCGGCTGCTCAGCAGGGCGCGCCGAGAGCAGCGGCCGGGAAGGGGCGGTGCG
GGAGGCGGGGTGTGGGGCGGTAGTGTGGGCCCTGTTCCTGCCCGCGCGGTGTTCC
GCATTCTGCAAGCCTCCGGAGCGCACGTCGGCAGTCGGCTCCCTCGTTGACCGAA
TCACCGACCTCTCTCCCCAG (SEQ ID NO: 12)

Table 4: Map of the lentiviral transfer construct: vacwr205 (1-905); 5'LTR (1012-1192); ψ (1239-1364); RRE (1857-2090); CMV promoter (2926-3129); GFP (3174-3890); cPPT/CTS (4584-4701); hPGK promoter (4750-5260); PAC (5282-5881); 3'LTR (6009-6242); U5NU (6243-6251); SV40poly(a) (6323-6331); LoxP (6469-6502 and 7332-7369); rfp (6579-7313); vacwr206 (7455-8158)

SEQ ID	ID	Sequence
6	LV transfer	CACCCGATGACAATAATGACATGGACGTAGATATTCCGTATTGTGCGACACTAGCTACCG CAAATAAAATATACGGTAGCGATAGTATCGAGTTCCACGCCTCCTTCCTACAAAAAATAA AAGACGATTTTCAAACTGTAAACTTTAATAATGCTAACCAAACAAAGGAACTAATCAACG

		AATGGGTTAAGACAATGACAAATGGTAAAATTAATTCCTTATTGACTAGTCCGCTATCCA TTAATACTCGTATGACAGTTGTTAGCGCCGTCCATTTTAAAGCAATGTGGAAATATCCAT TTTCTAAACATCTTACATATACAGACAAGTTTTATATTTCTAAGAATATAGTTACCAGTG TTGATATGATGGTGAGCACTGAGAATAACTTGCAATATGTACATATTAATGAATTATTCG GAGGATTCTCTATTATCGATATTCCATACGAGGGAAACTCTAGTATGGTAATTATACTAC CGGACGACATAGAAGGTATATATAACATAGAAAAAAATATAACAGATGAAAAATTTAAAA AATGGTGTGGTATGTTATCTACTAAAAGTATAGACTTGTATATGCCAAAGTTTAAAGTGG AAATGACAGAACCGTATAATCTGGTACCGATTTTAGAAAATTTAGGACTTACTAATATAT TCGGATATTATGCAGATTTTAGCAAGATGTGTAATGAAACTATCACTGTAGAAAAATTTC TACATACGACGTTTATAGATGTTAATGAGGAGTATACAGAAGCATCGGCCGTTACAGGAG TATTTATGACTAACTTTTCGATGGTATATCGTACGAAGGTCTACATAAACCATCCATTCA TGTACATGATTAAAGACAACACAGGACGTATACTTTTTATAGGGAAATACTGCTATCCGC AATAAATATAAACAAATAGACTTTTTATCACGTTTATCTATGTCTAAATATTACAAATAG TAATAGTATAAACTAAAGCCTAGGAAAAATTGAAACATTATATTAATCAGCGGGTCTCTC TGGTTAGACCAGATCTGAGCCTGGGAGCTCTCTGGCTAACTAGGGAACCCACTGCTTAAG CCTCAATAAAGCTTGCCTTGAGTGCTTCAAGTAGTGTGTGCCCGTCTGTTGTGTGACTCT GGTAACTAGAGATCCCTCAGACCCTTTTAGTCAGTGTGGAAAATCTCTAGCAGTGGCGCC CGAACAGGGACTTGAAAGCGAAAGGGAAACCAGAGGAGCTCTCTCGACGCAGGACTCGGC TTGCTGAAGCGCGCACGGCAAGAGGCGAGGGGCGGCGACTGGTGAGTACGCCAAAAATTT TGACTAGCGGAGGCTAGAAGGAGAGAGATGGGTGCGAGAGCGTCAGTATTAAGCGGGGGA GAATTAGATCGCGATGGGAAAAAATTCGGTTAAGGCCAGGGGGAAAGAAAAAATATAAAT TAAAACATATAGTATGGGCAAGCAGGGAGCTAGAACGATTCGCAGTTAATCCTGGCCTGT TAGAAACATCAGAAGGCTGTAGACAAATACTGGGACAGCTACAACCATCCCTTCAGACAG GATCAGAAGAACTTAGATCATTATATAATACAGTAGCAACCCTCTATTGTGTGCATCAAA GGATAGAGATAAAAGACACCAAGGAAGCTTTAGACAAGATAGAGGAAGAGCAAAACAAAA GTAAGACCACCGCACAGCAAGCGGCCGCTGATCTTCAGACCTGGAGGAGGAGATATGAGG GACAATTGGAGAAGTGAATTATATAAATATAAAGTAGTAAAAATTGAACCATTAGGAGTA GCACCCACCAAGGCAAAGAGAAGAGTGGTGCAGAGAGAAAAAAGAGCAGTGGGAATAGGA GCTTTGTTCCTTGGGTTCTTGGGAGCAGCAGGAAGCACTATGGGCGCAGCGTCAATGACG CTGACGGTACAGGCCAGACAATTATTGTCTGGTATAGTGCAGCAGCAGAACAATTTGCTG AGGGCTATTGAGGCGCAACAGCATCTGTTGCAACTCACAGTCTGGGGCATCAAGCAGCTC CAGGCAAGAATCCTGGCTGTGGAAAGATACCTAAAGGATCAACAGCTCCTGGGGATTTGG GGTTGCTCTGGAAAACTCATTTGCACCACTGCTGTGCCTTGGAATGCTAGTTGGAGTAAT AAATCTCTGGAACAGATTTGGAATCACACGACCTGGATGGAGTGGGACAGAGAAATTAAC AATTACACAAGCTTAATACACTCCTTAATTGAAGAATCGCAAAACCAGCAAGAAAAGAAT GAACAAGAATTATTGGAATTAGATAAATGGGCAAGTTTGTGGAATTGGTTTAACATAACA AATTGGCTGTGGTATATAAAATTATTCATAATGATAGTAGGAGGCTTGGTAGGTTTAAGA ATAGTTCTTGCTGTACTTTCTATAGTGAATAGAGTTAGGCAGGGATATTCACCATTATCG TTTCAGACCCACCTCCCAACCCCGAGGGGACCCGACAGGCCCGAAGGAATAGAAGAAGAA GGTGGAGAGAGAGACAGAGACAGATCCATTCGATTAGTGAACGGATCTCGACGGTATCGA TCACGAGACTAGCCTCGAGCGGCCGCCCCCTTCACCGAGGGCCTATTTCCCATGATTCCT TCATATTTGCATATACGATACAAGGCTGTTAGAGAGATAATTGGAATTAATTTGACTGTA AACACAAAGATATTAGTACAAAATACGTGACGTAGAAAGTAATAATTTCTTGGGTAGTTT GCAGTTTTAAAATTATGTTTTAAAATGGACTATCATATGCCAAGTACGCCCCCTATTGAC GTCAATGACGGTAAATGGCCCGCCTGGCATTATGCCCAGTACATGACCTTATGGGACTTT CCTACTTGGCAGTACATCTACGTATTAGTCATCGCTATTACCATGGTGATGCGGTTTTGG CAGTACATCAATGGGCGTGGATAGCGGTTTGACTCACGGGGATTTCCAAGTCTCCACCCC ATTGACGTCAATGGGAGTTTGTTTTGGCACCAAAATCAACGGGACTTTCCAAAATGTCGT AACAACTCCGCCCCATTGACGCAAATGGGCGGTAGGCGTGTACGGTGGGAGGTCTATATA AGCAGAGCTGGTTTAGTGAACCGTCAGATCCGCTAGCGCTACCGGTCGCCACCATGCGTA AAGGCGAAGAGCTGTTCACTGGTGTCGTCCCTATTCTGGTGGAACTGGATGGTGATGTCA ACGGTCATAAGTTTTCCGTGCGTGGCGAGGGTGAAGGTGACGCAACTAATGGTAAACTGA CGCTGAAGTTCATCTGTACTACTGGTAAACTGCCGGTCCCTTGGCCGACTCTGGTAACGA CGCTGACTTATGGTGTTCAGTGCTTTGCTCGTTATCCGGACCATATGAAGCAGCATGACT TCTTCAAGTCCGCCATGCCGGAAGGCTATGTGCAGGAACGCACGATTTCCTTTAAGGATG ACGGCACGTACAAAACGCGTGCGGAAGTGAAATTTGAAGGCGATACCCTGGTAAACCGCA TTGAGCTGAAAGGCATTGACTTTAAAGAAGACGGCAATATCCTGGGCCATAAGCTGGAAT ACAATTTTAACAGCCACAATGTTTACATCACCGCCGATAAACAAAAAAATGGCATTAAAG CGAATTTTAAAATTCGCCACAACGTGGAGGATGGCAGCGTGCAGCTGGCTGATCACTACC AGCAAAACACTCCAATCGGTGATGGTCCTGTTCTGCTGCCAGACAATCACTATCTGAGCA CGCAAAGCGTTCTGTCTAAAGATCCGAACGAGAAACGCGATCATATGGTTCTGCTGGAGT

		TCGTAACCGCAGCGGGCATCACGCATGGTATGGATGAACTGTACAAATAAGAATTCGATA TCAAGCTTATCGATAATCAACCTCTGGATTACAAAATTTGTGAAAGATTGACTGGTATTC TTAACTATGTTGCTCCTTTTACGCTATGTGGATACGCTGCTTTAATGCCTTTGTATCATG CTATTGCTTCCCGTATGGCTTTCATTTTCTCCTCCTTGTATAAATCCTGGTTGCTGTCTC TTTATGAGGAGTTGTGGCCCGTTGTCAGGCAACGTGGCGTGGTGTGCACTGTGTTTGCTG ACGCAACCCCCACTGGTTGGGGCATTGCCACCACCTGTCAGCTCCTTTCCGGGACTTTCG CTTTCCCCCTCCCTATTGCCACGGCGGAACTCATCGCCGCCTGCCTTGCCCGCTGCTGGA CAGGGGCTCGGCTGTTGGGCACTGACAATTCCGTGGTGTTGTCGGGGAAATCATCGTCCT TTCCTTGGCTGCTCGCCTGTGTTGCCACCTGGATTCTGCGCGGGACGTCCTTCTGCTACG TCCCTTCGGCCCTCAATCCAGCGGACCTTCCTTCCCGCGGCCTGCTGCCGGCTCTGCGGC CTCTTCCGCGTCTTCGCCTTCGCCCTCAGACGAGTCGGATCTCCCTTTGGGCCGCCTCCC CGCATCGATACCGTCCGGACTCAGATCTCGAGCTCAAGCTTCGAATTCTCGACCTCGAGA CAAATGGCAGTATTCATCCACAATTTTAAAAGAAAAGGGGGGATTGGGGGGTACAGTGCA GGGGAAAGAATAGTAGACATAATAGCAACAGACATACAAACTAAAGAATTACAAAAACAA ATTACAAAAATTCAAAATTTTCGGGTTTATTACAGGGACAGCAGAGATCCACTTTGGCCG CGGCTCGAGGGGGTTGGGGTTGCGCCTTTTCCAAGGCAGCCCTGGGTTTGCGCAGGGACG CGGCTGCTCTGGGCGTGGTTCCGGGAAACGCAGCGGCGCCGACCCTGGGTCTCGCACATT CTTCACGTCCGTTCGCAGCGTCACCCGGATCTTCGCCGCTACCCTTGTGGGCCCCCCGGC GACGCTTCCTGCTCCGCCCCTAAGTCGGGAAGGTTCCTTGCGGTTCGCGGCGTGCCGGAC GTGACAAACGGAAGCCGCACGTCTCACTAGTACCCTCGCAGACGGACAGCGCCAGGGAGC AATGGCAGCGCGCCGACCGCGATGGGCTGTGGCCAATAGCGGCTGCTCAGCAGGGCGCGC CGAGAGCAGCGGCCGGGAAGGGGCGGTGCGGGAGGCGGGGTGTGGGGCGGTAGTGTGGGC CCTGTTCCTGCCCGCGCGGTGTTCCGCATTCTGCAAGCCTCCGGAGCGCACGTCGGCAGT CGGCTCCCTCGTTGACCGAATCACCGACCTCTCTCCCCAGGGGGATCCACCGGAGCTTAC CATGACCGAGTACAAGCCCACGGTGCGCCTCGCCACCCGCGACGACGTCCCCAGGGCCGT ACGCACCCTCGCCGCCGCGTTCGCCGACTACCCCGCCACGCGCCACACCGTCGATCCGGA CCGCCACATCGAGCGGGTCACCGAGCTGCAAGAACTCTTCCTCACGCGCGTCGGGCTCGA CATCGGCAAGGTGTGGGTCGCGGACGACGGCGCCGCGGTGGCGGTCTGGACCACGCCGGA GAGCGTCGAAGCGGGGGCGGTGTTCGCCGAGATCGGCCCGCGCATGGCCGAGTTGAGCGG TTCCCGGCTGGCCGCGCAGCAACAGATGGAAGGCCTCCTGGCGCCGCACCGGCCCAAGGA GCCCGCGTGGTTCCTGGCCACCGTCGGCGTCTCGCCCGACCACCAGGGCAAGGGTCTGGG CAGCGCCGTCGTGCTCCCCGGAGTGGAGGCGGCCGAGCGCGCCGGGGTGCCCGCCTTCCT GGAGACCTCCGCGCCCCGCAACCTCCCCTTCTACGAGCGGCTCGGCTTCACCGTCACCGC CGACGTCGAGGTGCCCGAAGGACCGCGCACCTGGTGCATGACCCGCAAGCCCGGTGCCTG ACGCCCGCCCCACGACCCGCAGCGCCCGACCGAAAGGAGCGCACGACCCCATGCATCGGT ACCTTTAAGACCAATGACTTACAAGGCAGCTGTAGATCTTAGCCACTTCTTAAAAGAAAA GGGGGGACTGGAAGGGCTAATTCACTCCCAACGAAGACAAGATCTGCTTTTTGCTTGTAC TGGGTCTCTCTGGTTAGACCAGATCTGAGCCTGGGAGCTCTCTGGCTAACTAGGGAACCC ACTGCTTAAGCCTCAATAAAGCTTGCCTTGAGTGCTTCAAGTAGTGTGTGCCCGTCTGTT GTGTGACTCTGGTAACTAGAGATCCCTCAGACCCTTTTAGTCAGTGTGGAAAATCTCTAG CAAATTTTTATGTAGTAGTTCATGTCATCTTATTATTCAGTATTTATAACTTGCAAAGAA ATGAATATCAGAGAGTGAGAGGAATTTTTATAACTTGTTTATTGCAGCTTATAATGGTTA CAAATAAAGCAATAGCATCACAAATTTCACAAATAAAGCATTTTTTTCACTGCATTCTAG TTGTGGTTTGTCCAAACTCATCAATGTATCTTAGGTATAGCCTCTAGAATAACTTCGTAT AGCATACATTATACGAAGTTATAATTCTGCAGATGGATCATAAAAATATAGTAGAATTTC ATTTTGTTTTTTTTCTATGCTATAAATAGCTTCTCGAGCATGGTGTCTAAGGGCGAAGAGC TGATTAAGGAGAACATGCACATGAAGCTGTACATGGAGGGCACCGTGAACAACCACCACT TCAAGTGCACATCCGAGGGCGAAGGCAAGCCCTACGAGGGCACCCAGACCATGAGAATCA AGGTGGTCGAGGGCGGCCCTCTCCCCTTCGCCTTCGACATCCTGGCTACCAGCTTCATGT ACGGCAGCAGAACCTTCATCAACCACACCCAGGGCATCCCCGATTTCTTTAAGCAGTCCT TCCCTGAGGGCTTCACATGGGAGAGAGTCACCACATACGAAGACGGGGGCGTGCTGACCG CTACCCAGGACACCAGCCTCCAGGACGGCTGCCTCATCTACAACGTCAAGATCAGAGGGG TGAACTTCCCATCCAACGGCCCTGTGATGCAGAAGAAAACACTCGGCTGGGAGGCCAACA CCGAGATGCTGTACCCCGCTGACGGCGGCCTGGAAGGCAGAACCGACATGGCCCTGAAGC TCGTGGGCGGGGGCCACCTGATCTGCAACTTCAAGACCACATACAGATCCAAGAAACCCG CTAAGAACCTCAAGATGCCCGGCGTCTACTATGTGGACCACAGACTGGAAAGAATCAAGG AGGCCGACAAAGAGACCTACGTCGAGCAGCACGAGGTGGCTGTGGCCAGATACTGCGACC TCCCTAGCAAACTGGGGCACAAACTTAATGGCATGGACGAGCTGTACAAGTAATTAATTA AGGCCGCTCGAATAACTTCGTATAGCATACATTATACGAAGTTATCTGATAATACTTAAA AAAATAATAATATCATTTACAATTAATAGTATAAACTAAAAATTAAACAAATCGTTATTA TAAGTAATATCAAAATGATGATATACGGATTAATAGCGTGTCTTATATTCGTGACTTCAT

		CCATCGCTAGTCCACTTTATATTCCCGTTATTCCACCCATTTCGGAAGATAAATCGTTCA ATAGTGTAGAGGTATTAGTTTCCTTGTTTAGAGATGACCAAAAAGACTATACGGTAACTT CTCAGTTCAATAACTACACTATCGATACCAAAGACTGGACTATCGGCGTACTATCCACAC CTGATGGTTTGGATATACCATTGACTAATATAACTTATTGGTCACGGTTTACTATAGGTC GTGCATTGTTCAAATCAGAGTCTGAGGATATTTTCCAAAAGAAAATGAGTATTCTAGGTG TTTCTATAGAATGTAAGAAGTCGTCGACATTACTTACTTTTTTGACCGTGCGTAAAATGA CTCGAGTATTTAATAAATTTCCAGATATGGCTTATTATCGAGGAGACTGTTTAAAAGCCG TTTATGTAACAATGACTTATAAAAATACTAAAACTGGAGAGACTGATTACACGTACCTCT CTAATGGGGGGTTGCCTGCATACTATCGTAATGGGGTCGATGGTTGATTATTGATTAGTA TATTCCTTATTCTTTTTATTCACACAAAAAGAACATTTTTATAAACATGAAACCACTGTC TAAATGTAATTATGATCTTGATTTATAGATGAAGATCAGCCTTTAGAGGATTTTAACC

EXAMPLE 2: GENERATION OF A VIRAL CONSTRUCT COMPRISING A NON-REPLICATING LENTIVIRUS

[00116] Viral constructs were created by combining short DNA fragment "gBlocks" synthesized by Integrated DNA Technologies, primer extensions, and/or by full plasmid synthesis products from GenScript. BS-C-1 cells were transfected with the completed plasmids and then infected with wildtype vaccinia virus of the Western Reserve strain obtained from ATCC. Constructs were added and selected for sequentially starting with the *env* construct, followed by packaging construct, and finally the transfer construct. In between each addition, the vaccinia virus reporters were removed by growing on Cre+ cells to remove sfGFP or TagRFP-T, and then reporter-negative virus plaques were selected.

Expression of *Gag/Pol*

[00117] Detection of *GAG* expression was performed by Western blot. BS-C-1 cells were infected with the indicated viruses at 5 multiplicity of infection (MOI). After 24 h, cells were processed for Western blot and *Gag* was visualized using the HRP-Conjugated Anti-HIV-1 *Gag* antibody from ViroLabs (Cat# HIVGAG-HRP, Lot# 0516P4). The expression of *gagpol* from Retro-Vac resulted in a fully mature and processed *Gag* protein, including p55, p41, and p24 as shown in **FIG. 5**. This indicated that the HIV protease (N-terminal of *pol*) was expressed and active because a successful -1 frameshift induced by the HIV-1 ribosomal frameshift signal near the beginning of the *pol* sequence. It is possible that host factors that assist this frameshift such as eukaryotic release factor 1 (eRF1) may be present in the cytoplasm and vaccinia virus factory. The frameshift is thought to occur in HIV-1 at 5% of total transcription events, and it is important that this ratio stay near 5% to create competent virus.

Expression of VSV-G

[00118] Successful expression of VSV-G from Retro-Vac was detected on Western blot. BS-C-1 cells were infected with the indicated viruses at 5 MOI. After 24 h, cells were processed

for Western blot and VSV-G was visualized using anti-VSV-G antibody (clone poly29039) from Bio legend (Cat# 903901, Lot# B232548) as shown in **FIG. 6**. VSV-G is predicted to be 57.4 kDa.

Reporter genes indicate successful retrovirus production

[00119] Once all lentiviral constructs were included in the same vaccinia virus lineage, the final product was grown on the common lentiviral growth cell line HEK293. After 24 h of infection, TagRFP-T reporter from the vaccinia virus was visualized within viral plaques using fluorescence microscopy as shown in **FIG. 7**. In addition, sfGFP reporter within the retroviral transfer construct was detected on cells scattered within viral plaques. This indicated that retrovirus was being created from vaccinia virus-infected cells and was transducing neighboring cells.

EXAMPLE 3: COLLECTION OF VIRAL PARTICLES

[00120] To isolate viral particles, about 12 x 10^6 293T cells are plated in 20 ml on a 15 cm2 plate 24 hours before transfection. In general, two 15cm plates are used. Cells should be well-maintained and of relatively low passage number. The following steps are done 1 plate at a time. 2 ml of 2X HBS is added dropwise to the DNA mixture while bubbling with a Pasteur pipette. Upon completion, allow the mixture to bubble for 12-15 seconds. Take plate of 293T out of the incubator (plate remains in incubator for as long as possible) and add transfection mixture dropwise all over the plate. Gently swirl plate from front to back and return immediately to incubator. 3.5 to 4 hours later, remove media, wash 2x with 10ml warm PBS, and add 20 ml warm D10 onto plate and place in incubator. 36-48 hours after transfection, harvest viral supernatant and spin at 2000 rpm, 7 min at 4°C in a 50ml tube. Filter viral SN through .45 um filter. Add 35ml of filtered supernatant to an ultracentrifuge tube. Balance tubes with additional media. Cover tubes with small piece of parafilm. (It is useful to titer some of the leftover supernatant to determine if there is loss of virus during concentration.) Spin tubes using a SW-28 rotor at 25,000 rpm, 90 min, 4°C. Decant liquid and leave tube upside down on Kimwipe for 10 min. Aspirate remaining media being careful not to touch bottom of tube. Add 15µl cold PBS (for embryo infections, or any volume you wish) and leave tube at 4°C O/N with no shaking. To resuspend, hold tube at angle and pipet fluid over pellet 20 times, being careful not to touch pellet with tip. It is expected that the pellet not be resuspended after this is complete. This pellet does not contain virus and can be discarded. Aliquot or use virus. Virus should be aliquoted, flash-frozen in liquid nitrogen and

stored at -80. There should be no change in titer with freezing concentrated virus. Avoid multiple freeze-thaws.

[00121] In another experiment cells are infected with virus generated from vectors described herein. To preferentially select production-enhanced mutants, medium from flasks infected with the virus pool is added to non-infected flasks. Clonal plaques are isolated after several rounds of serial infection.

EXAMPLE 4: CELL VIABILITY ASSAYS

[00122] In one experiment HeLa cells are grown to confluency in 6-well plates and infected with 1 MOI of Retro-Vac. After 24h, 1 mL of supernatant is removed and centrifuged at 800g, 500 ul of supernatant is then removed and used for viral plaque assay. During the serial dilution, samples are treated with anti-L1 NR-45114 antibody or VIG then incubated for 1h at 37°C. Dilutions are then added to confluent 6 well plates of BS-C-40 cells for plaque assay. After 1.5h, media was replaced with CM10 with 3% CMC. After 48h, cells are stained with crystal violet to count viral plaques to determine the titer of virus in the HeLa cell supernatant and the blocking ability of neutralizing antibodies.

[00123] In another experiment, HCT116 or MC38 cell lines are seeded in 96-well plates and allowed to grow until 90% confluent. Cells are then infected with 1 MOI of virus generated from viral vectors provided herein, for example comprising sequences provided herein. Each day, at 24h intervals, cell viability is tested with the CellTiter 96 Aqueous Non-radioactive Cell Proliferation Kit from Promega. Relative viability is calculated by removing the blank value average from all wells, calculating the average value of the uninfected control group, then calculating the relative value of each infected well as (A490 / average of uninfected wells).

EXAMPLE 5: TESTING OF ONCOLYTIC POTENTIAL OF A VIRAL VECTOR IN MICE

[00124] The aim of this study is to explore the effects of provided viral vectors in a murine mouse model of cancer, in comparison with other vectors, such as control vectors.

[00125] In one experiment, a viral vector that produces a non-replicating lentivirus is compared with a vehicle (buffered saline) control, and another modified vaccinia virus that does not generate lentiviral vector. A single dose of either one of the two viruses (1×10^7 PFU) or the saline control is administered to treat BALB/c mice implanted subcutaneously with pre-established RENCA tumors. Tumor volumes are monitored by caliper measurement.

[00126] In another experiment, a different mouse tumor model, C57/BL6 mice bearing subcutaneous B16 tumors, are used to test the effects of the Retro-Vac virus. A single

intravenous injection of either virus is given to the mice (1×10^8 PFU/mouse, n = 5 per group/time point) 96 hours after the tumor implantation, and then the mice are sacrificed 1 day or 2 days after the injection. Tumors are collected for quantification of the number of viral genomes per gram of tumor by qPCR.

[00127] In one experiment, the Retro-Vac vector is tested in mice bearing orthotopic (mammary fat pad) 4T1 tumors subcutaneously. Each mouse is treated with a single injection of the Retro-Vac vector at a dose of 1×10^8 PFU. The number of viruses in the tumors is quantified by bioluminescence imaging and measurement of the luciferase activity *in vivo*, every day after the injection for three days. The therapeutic effects of the viruses are also examined. Tumor volume is monitored along with mouse survival percentage.

[00128] In another experiment, the same viruses are tested in a different tumor model, C57/BL6 mice bearing B16 tumors subcutaneously.

[00129] In another experiment, viral replication capability for virus comprising a non-replicating lentivirus in different cancer cell lines *in vitro* is examined with plaque assays. Plaque-forming are quantified every 24 hours after addition of the viruses to the cell line. Results will be monitored to determine whether an enhanced effect *in vivo* can be detected.

[00130] In an effort to start to understand the mechanisms underlying the enhanced therapeutic effects conferred by CXCR4 expression, experiments are conducted using transgenic mice with B-cells depleted (referred to herein as JH). Viruses as described above are administered to Balb/C mice having B-Cells and JH mice without B-cells, both of which are implanted subcutaneously with pre-established 4T1 tumors. Bioluminescence imaging radiance is used to determine whether the Retro-Vac virus displays increased accumulation in the tumors. Flow cytometry experiments are also performed to determine whether there is entry of B cells into the tumors, but not other organs, like spleen or lymph nodes (LN), in BALB/c mice bearing 4T1 tumor subcutaneously.

[00131] In another experiment T cells are collected from the mice that have been implanted with 4T1 tumors subcutaneously and subsequently treated as described above, and their immune activity is examined by ELISpot assays that test their interferon-γ (IFNgamma) release in response to different immunogens. The tested T cells are recovered from spleens 14 days after the virus injection.

[00132] In one experiment, BALB/c mice bearing RENCA tumors subcutaneously are treated with a single intravenous injection (1×10^7 PFU) of Retro-Vac. Tumors are harvested 24 hours later, and the number of viral genomes per milligram of tissue quantified by qPCR.

[00133] In another experiment, BALB/c mice bearing RENCA tumors subcutaneously are treated with intravenous injections (1 x 10^7 PFU) of one of the same four modified viruses on day 1 and 4, and tumor volume is monitored as described above.

[00134] In another experiment lentivirus expression is assayed in tumor samples for 14 days after the virus injection as described above. It is expected that long term expression of the PD1 checkpoint inhibitor is modulated using this system.

EXAMPLE 6: RETRO-VAC WITH GAMMARETROVIRUS COMPONENTS

[00135] An exemplary Retro-Vac of this disclosure is designed, where the lentiviral components of the packaging and transfer constructs are replaced with those of a gamma retrovirus (*e.g.*, a moloney murine leukemia virus (MMLV)). Relative to lentiviral systems, gammaretroviruses like MMLV have selective infection and integration only with actively dividing cells. Thus, this approach can be expected to increase the safety profile and specificity of retroviral targeting by restricting infection to only actively dividing neoplastic cells.

EXAMPLE 7: RETRO-VAC WITH A T7 POLYMERASE EXPRESSION SYSTEM

[00136] In poxvirus systems, early gene transcription can produce low copy, shorter-lived, and less stable viral mRNA, while intermediate and late gene transcription can produce the most abundant, high copy, and stable viral mRNA. mRNA from early genes have clean transcription start sites (TSS) and end at a specific viral termination site. Intermediate and late genes, however, are modified to include a 5' poly(A) cap and can have unregulated and highly variable termination. Thus, to craft RNA suitable as retroviral gRNA from a lentiviral transfer construct, only the early gene transcription can usually be relied upon considering a precise TSS and termination are essential to retroviral RNA packaging. This limits transcription of the transfer construct to a low copy, low stability system. To circumvent these restrictions, a vaccinia virus is generated with an expression system based on the DNA-dependent RNA polymerase from T7 bacteriophage. This version of the retro-vac system can also express the T7 polymerase (SEQ ID No. 8 provides sequence of T7 RNA polymerase gene) which binds with high specificity to an 18 bp promoter upstream of the lentiviral transfer construct. Transcription can continue until stopping at a highly efficient termination site. This system generates much higher RNA copies relative to early-only VV transcription, and can also allow for greater control of RNA ends. Since transcription of the transfer construct can be a rate-limiting step in lentiviral production, the addition of this T7 polymerase system to retro-vac is contemplated to significantly increase lentiviral titers. An

example of such a construct is provided in **FIG. 8**. Example sequences for T7 RNA polymerase containing construct is provided as SEQ ID No. 7.

SEQ ID	ID	Sequence
7	T7RNA polymerase plasmid	CATTTATACATATTCCTGGAGATACACTGTTTAAAATTAGCGAGGTATTTATTCATAATA AGATAAATCCATCTTCCAGAATGGCATACATAGAAGAAGAAAAGAGAAATTTAGTTACTG CTATACAGATGTATACTCCTCCTGATGGATCATCCGGTATAGTCTTTGTGGCATCCGTTG CACAGTGTCACGAATATAAATCATATTTAGAAAAAAGATTACCGTATGATATGTATATTA TTCATGGTAAGGTCTTAGATATAGACGAAATATTAGAAAAAGTGTATTCATCACCTAATG TATCGATAATTATTTCTACTCCTTATTTGGAATCCAGCGTTACTATACGCAATGTTACAC ACATTTATGATATGGGTAAAGTTTTTGTCCCCGCTCCTTTTGGAGGATCGCAAGAATTTA TTTCTAAATCTATGAGAGATCAACGAAAAGGAAGAGTAGGAAGAGTTAATCCTGGTACAT ACGTCTATTTCTATGATCTGTCTTATATGAAGTCTATACAGCGAATAGATTCAGAATTTC TACATAATTATATATTGTACGCTAATAAGTTTAATCTAACACTCCCCGAAGATTTGTTTA TAATCCCTACAAATTTGGATATTCTATGGCGTACAAAGGAATATATAGACTCGTTCGATA TTAGTACAGAAACATGGAATAAATTATTATCCAATTATTATATGAAGATGATAGAGTATG CTAAACTTTATGTACTAAGTCCTATTCTCGCTGAGGAGTTGGATAACTTTGAGAGGACGG GAGAATTAACTAGTATTGTACGAGAAGCCATTTTATCTCTAAATTTACGAATTAAGATTT TAAATTTTAAACATAAAGATGATGATACGTATATACACTTTTGTAAAATATTATTCGGTG TCTATAACGGAACAAACGCTACTATATATTATCATAGACCTCTAACGGGATATATGAATA TGATTTCAGATACTATATTTGTTCCTGTAGATAATAACTAAAAGGCCGGCCGCTAGCTCA CTAATTCCAAACCCACCCGCTTTTTATAGTAAGTTTTTCACCCATAAATAATAAATACAA TAATTAATTTCTCGTAAAAGTAGAAAATATATTCTAATTTATTGCACGGTAAGGAAGTAG ATCATAAGGATCCATGAACACAATTAACATAGCCAAGAACGACTTCAGTGACATTGAGTT GGCTGCCATCCCGTTTAATACCTTAGCAGATCACTACGGAGAGCGACTTGCGAGAGAGCA ATTGGCCCTTGAGCATGAATCCTACGAAATGGGAGAAGCGCGATTCCGTAAGATGTTCGA GAGACAATTAAAAGCCGGTGAAGTAGCGGACAACGCCGCAGCAAAGCCACTTATCACAAC ACTACTTCCGAAGATGATAGCACGTATTAACGATTGGTTTGAGGAAGTAAAGGCCAAGAG AGGTAAGAGACCGACGGCTTTCCAATTCCTACAAGAGATCAAGCCTGAAGCGGTGGCGTA TATAACTATCAAAACGACCCTAGCGTGCCTAACTTCTGCCGATAACACGACGGTACAGGC TGTCGCTTCAGCGATTGGAAGAGCGATAGAAGATGAAGCACGTTTCGGACGAATCCGTGA TCTAGAAGCTAAACATTTTAAAAAGAACGTTGAGGAGCAGTTGAACAAACGAGTAGGTCA CGTGTACAAAAAGGCATTCATGCAAGTGGTAGAAGCCGACATGCTATCCAAGGGATTGCT TGGAGGTGAGGCCTGGTCGAGTTGGCACAAAGAGGACTCTATCCACGTCGGTGTTAGATG CATAGAGATGCTAATAGAGTCGACAGGTATGGTTTCCCTACATCGTCAAAATGCTGGAGT TGTAGGTCAGGATAGTGAAACGATCGAGCTAGCGCCGGAATACGCAGAGGCGATTGCGAC GCGAGCTGGTGCCCTTGCTGGAATTTCACCGATGTTCCAACCGTGCGTGGTACCGCCAAA ACCCTGGACAGGAATTACGGGTGGTGGTTATTGGGCCAACGGACGTCGACCACTTGCATT GGTACGAACACATTCGAAGAAAGCATTAATGCGTTACGAAGACGTATACATGCCGGAAGT ATACAAAGCAATTAATATCGCTCAGAATACCGCATGGAAAATCAACAAAAAGGTATTGGC AGTGGCTAACGTAATAACCAAGTGGAAACATTGTCCTGTTGAAGACATTCCTGCTATTGA ACGAGAAGAACTACCTATGAAGCCTGAGGACATAGACATGAATCCGGAAGCATTGACCGC GTGGAAACGAGCTGCGGCTGCTGTCTACCGAAAGGACAAGGCACGAAAATCCAGACGAAT ATCGCTAGAATTTATGTTGGAACAAGCCAATAAGTTTGCAAACCACAAGGCGATATGGTT TCCATACAATATGGATTGGCGAGGAAGAGTTTACGCTGTGTCTATGTTCAACCCACAGGG AAACGACATGACAAAAGGACTATTAACATTAGCAAAAGGAAAGCCTATCGGAAAAGAAGG TTACTATTGGTTGAAGATACACGGAGCTAATTGCGCAGGTGTCGATAAAGTCCCCTTCCC GGAACGTATAAAATTCATAGAGGAGAACCACGAAAACATCATGGCGTGCGCCAAATCCCC GCTAGAAAATACTTGGTGGGCGGAACAAGATTCTCCATTTTGCTTCTTAGCATTCTGCTT TGAATACGCAGGAGTCCAGCACCACGGACTAAGTTACAATTGTTCGCTTCCTCTAGCATT TGACGGTTCGTGCAGTGGAATACAACATTTCTCAGCCATGCTAAGAGATGAGGTGGGAGG TCGTGCGGTAAACCTATTGCCATCGGAGACCGTGCAGGATATATATGGTATCGTCGCCAA GAAAGTAAACGAGATTCTACAGGCGGATGCCATTAACGGAACCGACAATGAAGTTGTCAC TGTTACCGACGAGAACACAGGTGAAATTTCAGAAAAGGTGAAGCTTGGAACTAAAGCATT AGCCGGACAGTGGCTAGCGTATGGTGTCACTCGTAGTGTCACCAAACGTAGTGTCATGAC GCTTGCATATGGTTCCAAAGAATTCGGTTTTAGACAGCAGGTCTTGGAGGACACGATTCA ACCCGCCATAGATTCGGGTAAAGGATTGATGTTCACACAGCCTAATCAGGCTGCCGGTTA

		TATGGCCAAACTAATTTGGGAGTCTGTTAGTGTTACAGTCGTTGCCGCTGTCGAAGCCAT GAATTGGTTGAAAAGTGCCGCAAAACTACTTGCGGCCGAAGTGAAGGATAAGAAGACTGG TGAGATCCTACGAAAGAGATGCGCTGTGCATTGGGTCACTCCGGATGGTTTTCCGGTCTG GCAAGAATATAAAAAGCCGATACAAACGCGTTTGAACTTAATGTTTTTAGGACAATTCAG ATTACAACCCACCATTAACACGAATAAAGATTCGGAAATTGACGCACACAAGCAAGAATC AGGTATTGCACCAAACTTCGTGCACTCACAAGATGGTTCTCACTTAAGAAAAACGGTTGT CTGGGCTCATGAGAAGTATGGTATAGAGAGTTTTGCATTGATTCATGACTCCTTCGGTAC TATACCAGCCGACGCCGCCAATTTGTTCAAAGCGGTCCGAGAAACCATGGTAGACACTTA CGAATCTTGCGACGTCCTTGCGGACTTTTATGATCAATTCGCTGATCAGTTACATGAGTC GCAATTAGACAAGATGCCGGCATTACCGGCGAAGGGAAACTTGAACTTGAGAGATATTTT AGAATCTGATTTCGCCTTTGCCTAAAAGCTTATAACTTCGTATAGCATACATTATACGAA GTTATAATTCTGCAGATGGATCATAAAAATATAGTAGAATTTCATTTTGTTTTTTTCTAT GCTATAAATAGCTTCTCGAGCATGCGTAAAGGCGAAGAGCTGTTCACTGGTGTCGTCCCT ATTCTGGTGGAACTGGATGGTGATGTCAACGGTCATAAGTTTTCCGTGCGTGGCGAGGGT GAAGGTGACGCAACTAATGGTAAACTGACGCTGAAGTTCATCTGTACTACTGGTAAACTG CCGGTCCCTTGGCCGACTCTGGTAACGACGCTGACTTATGGTGTTCAGTGCTTTGCTCGT TATCCGGACCATATGAAGCAGCATGACTTCTTCAAGTCCGCCATGCCGGAAGGCTATGTG CAGGAACGCACGATTTCCTTTAAGGATGACGGCACGTACAAAACGCGTGCGGAAGTGAAA TTTGAAGGCGATACCCTGGTAAACCGCATTGAGCTGAAAGGCATTGACTTTAAAGAAGAC GGCAATATCCTGGGCCATAAGCTGGAATACAATTTTAACAGCCACAATGTTTACATCACC GCCGATAAACAAAAAAATGGCATTAAAGCGAATTTTAAAATTCGCCACAACGTGGAGGAT GGCAGCGTGCAGCTGGCTGATCACTACCAGCAAAACACTCCAATCGGTGATGGTCCTGTT CTGCTGCCAGACAATCACTATCTGAGCACGCAAAGCGTTCTGTCTAAAGATCCGAACGAG AAACGCGATCATATGGTTCTGCTGGAGTTCGTAACCGCAGCGGGCATCACGCATGGTATG GATGAACTGTACAAATAATAAATAACTTCGTATAGCATACATTATACGAAGTTATATCAA ACTCTAATGACCACATCTTTTTTTAGAGATGAAAAATTTTCTACATCTCCTTTTGTAGAC ACGACTAAACATTTTGCAAAAAAAAGTTTATTAGTGTTTAGATAATCGTATACTTCATCA GTGTAGATAGTAAATGTGAACAAATAAAAGGTATTCTTACTCAATAGATTGGTAAATTCC ATAGAATATATTAATCCTTTCTTCTTGAGATCCCACATCATTTCAACCAGAGACGTTTTA TCCAATGATTTACCTCGTACTATACCACATACAAAACTAGATTTTGCAGTGACGTCGTAC CTGGTATTCCTACCAAACAAAATTTTACTTTTAGTTCTTTTAGAAAATTCTAAGGTAGAA TCTCTATTTGCCAATATGTCATCTATGGAATTACCACTAGCAAAAAATGATAGAAATATA TATTGATACATCGCAGCTGGTTTTGATCTACTATACTTTAAAAACGAATCAGATTCCATA ATTGCCTGTATATCATCAGCTGAAAAACTATGTTTTACACGTATTCCTTCGGCATTTCTT TTTAATGATATATCTTGTTTAGACAATGATAAAGTTATCATGTCCATGAGAGACGCGTCT CCGTATCGTATAAATATTTCATTAGATGTTAGACGCTTCATTAGGGGTATACTTCTATAA GGTTTCTTAATCAGTCCATCATTGGTTGCGTCAAGAACTACTATCGGATGTTGTTGGGTA TCTCTAGTGTTACACATGGCCTTACTAAAGTTTGGGTAAATAACTATGATATCTCTATTA ATTATAGATGCATATATTTCATTCGTCAAGGATATTAGTATCGACTTGCTATCGTCATTA ATACGTGTAATGTAATCATATAAATCATGCGATAGCCAAGGAAAATTCAAATAGATGTTC ATCATATAATCGTCGCTATAATTCATATTAATACGTTGACATTGACTAATTTGTAATATA GCCTCGCCACGAAGAAAGCTCTCGTATTCAGTTTCATC
8	T7RNA polymerase gene	ATGAACACAATTAACATAGCCAAGAACGACTTCAGTGACATTGAGTTGGCTGCCATCCCG TTTAATACCTTAGCAGATCACTACGGAGAGCGACTTGCGAGAGAGCAATTGGCCCTTGAG CATGAATCCTACGAAATGGGAGAAGCGCGATTCCGTAAGATGTTCGAGAGACAATTAAAA GCCGGTGAAGTAGCGGACAACGCCGCAGCAAAGCCACTTATCACAACACTACTTCCGAAG ATGATAGCACGTATTAACGATTGGTTTGAGGAAGTAAAGGCCAAGAGAGGTAAGAGACCG ACGGCTTTCCAATTCCTACAAGAGATCAAGCCTGAAGCGGTGGCGTATATAACTATCAAA ACGACCCTAGCGTGCCTAACTTCTGCCGATAACACGACGGTACAGGCTGTCGCTTCAGCG ATTGGAAGAGCGATAGAAGATGAAGCACGTTTCGGACGAATCCGTGATCTAGAAGCTAAA CATTTTAAAAAGAACGTTGAGGAGCAGTTGAACAAACGAGTAGGTCACGTGTACAAAAAG GCATTCATGCAAGTGGTAGAAGCCGACATGCTATCCAAGGGATTGCTTGGAGGTGAGGCC TGGTCGAGTTGGCACAAAGAGGACTCTATCCACGTCGGTGTTAGATGCATAGAGATGCTA ATAGAGTCGACAGGTATGGTTTCCCTACATCGTCAAAATGCTGGAGTTGTAGGTCAGGAT AGTGAAACGATCGAGCTAGCGCCGGAATACGCAGAGGCGATTGCGACGCGAGCTGGTGCC CTTGCTGGAATTTCACCGATGTTCCAACCGTGCGTGGTACCGCCAAAACCCTGGACAGGA ATTACGGGTGGTGGTTATTGGGCCAACGGACGTCGACCACTTGCATTGGTACGAACACAT TCGAAGAAAGCATTAATGCGTTACGAAGACGTATACATGCCGGAAGTATACAAAGCAATT AATATCGCTCAGAATACCGCATGGAAAATCAACAAAAAGGTATTGGCAGTGGCTAACGTA ATAACCAAGTGGAAACATTGTCCTGTTGAAGACATTCCTGCTATTGAACGAGAAGAACTA CCTATGAAGCCTGAGGACATAGACATGAATCCGGAAGCATTGACCGCGTGGAAACGAGCT

		GCGGCTGCTGTCTACCGAAAGGACAAGGCACGAAAATCCAGACGAATATCGCTAGAATTT ATGTTGGAACAAGCCAATAAGTTTGCAAACCACAAGGCGATATGGTTTCCATACAATATG GATTGGCGAGGAAGAGTTTACGCTGTGTCTATGTTCAACCCACAGGGAAACGACATGACA AAAGGACTATTAACATTAGCAAAAGGAAAGCCTATCGGAAAAGAAGGTTACTATTGGTTG AAGATACACGGAGCTAATTGCGCAGGTGTCGATAAAGTCCCCTTCCCGGAACGTATAAAA TTCATAGAGGAGAACCACGAAAACATCATGGCGTGCGCCAAATCCCCGCTAGAAAATACT TGGTGGGCGGAACAAGATTCTCCATTTTGCTTCTTAGCATTCTGCTTTGAATACGCAGGA GTCCAGCACCACGGACTAAGTTACAATTGTTCGCTTCCTCTAGCATTTGACGGTTCGTGC AGTGGAATACAACATTTCTCAGCCATGCTAAGAGATGAGGTGGGAGGTCGTGCGGTAAAC CTATTGCCATCGGAGACCGTGCAGGATATATATGGTATCGTCGCCAAGAAAGTAAACGAG ATTCTACAGGCGGATGCCATTAACGGAACCGACAATGAAGTTGTCACTGTTACCGACGAG AACACAGGTGAAATTTCAGAAAAGGTGAAGCTTGGAACTAAAGCATTAGCCGGACAGTGG CTAGCGTATGGTGTCACTCGTAGTGTCACCAAACGTAGTGTCATGACGCTTGCATATGGT TCCAAAGAATTCGGTTTTAGACAGCAGGTCTTGGAGGACACGATTCAACCCGCCATAGAT TCGGGTAAAGGATTGATGTTCACACAGCCTAATCAGGCTGCCGGTTATATGGCCAAACTA ATTTGGGAGTCTGTTAGTGTTACAGTCGTTGCCGCTGTCGAAGCCATGAATTGGTTGAAA AGTGCCGCAAAACTACTTGCGGCCGAAGTGAAGGATAAGAAGACTGGTGAGATCCTACGA AAGAGATGCGCTGTGCATTGGGTCACTCCGGATGGTTTTCCGGTCTGGCAAGAATATAAA AAGCCGATACAAACGCGTTTGAACTTAATGTTTTTAGGACAATTCAGATTACAACCCACC ATTAACACGAATAAAGATTCGGAAATTGACGCACACAAGCAAGAATCAGGTATTGCACCA AACTTCGTGCACTCACAAGATGGTTCTCACTTAAGAAAAACGGTTGTCTGGGCTCATGAG AAGTATGGTATAGAGAGTTTTGCATTGATTCATGACTCCTTCGGTACTATACCAGCCGAC GCCGCCAATTTGTTCAAAGCGGTCCGAGAAACCATGGTAGACACTTACGAATCTTGCGAC GTCCTTGCGGACTTTTATGATCAATTCGCTGATCAGTTACATGAGTCGCAATTAGACAAG ATGCCGGCATTACCGGCGAAGGGAAACTTGAACTTGAGAGATATTTTAGAATCTGATTTC GCCTTTGCCTAA

CLAIMS

1. A virus that produces from its genome a non-replicating retrovirus, wherein the virus is an oncolytic virus.

2. The virus of claim 1, wherein the non-replicating retrovirus comprises a transgene that codes for a non-retroviral protein.

3. A virus that produces from its genome a non-replicating retrovirus, wherein the virus is an oncolytic virus, wherein the non-replicating retrovirus comprises a transgene that codes for a non-retroviral protein, and wherein the non-replicating retrovirus is capable of expressing the non-retroviral protein in cells that are infected by the oncolytic virus and in cells that are not infected by the oncolytic virus, in a tumor microenvironment.

4. An oncolytic virus that produces from its genome a non-replicating retrovirus, wherein the non-replicating retrovirus comprises a transgene that codes for a non-lentiviral protein, and wherein the non-replicating retrovirus is capable of infecting and transducing both dividing and non-dividing cells in a target population of mammalian cells.

5. A virus comprising a transgene that codes for a non-retroviral protein, wherein the transgene is within an exogenous nucleic acid construct that further comprises a gene that codes for a protein of a non-replicating retrovirus, and wherein the virus is oncolytic.

6. A virus comprising a retroviral envelope construct, a retroviral packing construct, and a retroviral transfer construct, wherein at least one of the envelope construct, the packaging construct, or the transfer construct comprises a transgene that codes for a non-retroviral protein, and wherein the virus is an oncolytic virus.

7. The virus of claim 6, wherein the envelope construct, the packing construct, and the transfer construct are inserted at different locations within the genome of the oncolytic virus.

8. The virus of claim 6 or 7, wherein the envelope construct comprises a gene that codes for a retroviral envelope protein and the packaging construct comprises a gene that codes for a retroviral structural protein.

9. The virus of claim 8, wherein the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter and the gene that codes for the retroviral structural protein is under the control of a second early viral promoter.

10. The virus of claim 8, wherein the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter, a first early/late viral promoter or a

first late viral promoter; and the gene that codes for a retroviral structural protein is under the control of a second early viral promoter, a second early/late viral promoter, or a second late viral promoter.

11. The virus of any one of claims 6-10, wherein the envelope construct further comprises a termination sequence at its 5'-terminal region.

12. The virus of any one of claims 6-11, wherein the packaging construct further comprises a termination sequence at its 3'-terminal region.

13. The virus of any one of claims 6-12, wherein the transfer construct comprises a 3'-long terminal repeat region.

14. The virus of any one of claims 6-13, wherein the transfer construct comprises a hybrid 5'-long terminal repeat region.

15. The virus of claim 14, wherein the hybrid 5'-long terminal repeat region comprises a third early viral promoter and a HIV-1 protein 5'-long terminal repeat region.

16. The virus of claim 14, wherein the hybrid 5'-long terminal repeat region comprises a HIV-1 protein 5'-long terminal repeat region and a viral promoter, wherein the viral promoter is a third early viral promoter, a third early/late viral promoter, or a third late viral promoter.

17. The virus of any one of claims 6-16, wherein the transfer construct further comprises a gene that codes for a self-cleaving RNA ribozyme.

18. The virus of claim 17, wherein the gene that codes for the self-cleaving RNA ribozyme is positioned downstream to the 3'-long terminal repeat region of the transfer construct.

19. The virus of claim 18, wherein the self-cleaving ribozyme comprises a delta virus ribozyme or a hammerhead ribozyme.

20. The virus of any one of claims 9-19, wherein the packaging construct comprises a 5'-long terminal repeat region and wherein the second early viral promoter is fused to the 5'-long terminal repeat region.

21. The virus of any one of claims 6-20, wherein the envelope construct comprises a termination sequence at its 5'-terminal region.

22. The virus of any one of claims 6-21, wherein the packaging construct comprises a termination sequence at its 3'-terminal region.

23. The virus of any one of claims 6-22, wherein the transfer construct comprises a termination sequence at its 3'-terminal region.

24. The virus of any one of claims 11-23, wherein the termination sequence comprises a nucleotide sequence as set forth in SEQ ID No. 7.

25. The virus of any one of claims 8-24, wherein the retroviral structural protein comprises a mature gag-pol protein.

26. The virus of claim 25, wherein the mature gag-pol protein comprises p55, p41, and p24.

27. The virus of any one of claims 8-26, wherein the retroviral envelope protein comprises a VSV-G protein.

28. The virus of any one of claims 1-3 and 5-27, comprising an exogenous nucleic acid sequence that codes for a nucleic acid polymerase.

29. The virus of claim 28, wherein the nucleic acid polymerase is selected from the group consisting of: T7 RNA polymerase, T3 RNA polymerase and SP6 RNA polymerase, a RNA polymerase variant, and a DNA polymerase mutant.

30. The virus of any one of claims 1-3 and 5-27, comprising an exogenous nucleic acid sequence that codes for a bacteriophage polymerase.

31. The virus of claim 30, wherein the bacteriophage is selected from the group consisting of a T3 bacteriophage, a T7 bacteriophage and an SP6 bacteriophage.

32. The virus of claim 31, wherein a T3 bacteriophage polymerase is expressed with a T3 bacteriophage promoter, a T7 bacteriophage polymerase is expressed with a T7 bacteriophage promoter, and an SP6 bacteriophage polymerase is expressed with an SP6 bacteriophage promoter.

33. The oncolytic virus of claim 4, comprising an exogenous nucleic acid sequence that codes for a nucleic acid polymerase.

34. The oncolytic virus of claim 33, wherein the nucleic acid polymerase is selected from the group consisting of: T7 RNA polymerase, T3 RNA polymerase and SP6 RNA polymerase, a RNA polymerase variant, and a DNA polymerase mutant.

35. The oncolytic virus of claim 4, comprising an exogenous nucleic acid sequence that codes for a bacteriophage polymerase.

36. The oncolytic virus of claim 35, wherein the bacteriophage is selected from the group consisting of a T3 bacteriophage, a T7 bacteriophage and an SP6 bacteriophage.

37. The oncolytic virus of claim 36, wherein a T3 bacteriophage polymerase is expressed with a T3 bacteriophage promoter, a T7 bacteriophage polymerase is expressed with a T7 bacteriophage promoter, and an SP6 bacteriophage polymerase is expressed with an SP6 bacteriophage promoter.

38. A virus comprising: (i) a retroviral envelope construct inserted at a first location within the genome of the virus; and (ii) a retroviral packaging construct inserted at a second location within the genome of the virus, wherein the first location and the second location are not contiguous, wherein the envelope construct comprises a nucleic acid that codes for a retroviral envelope protein, wherein the packaging construct comprises a nucleic acid that codes for a retroviral structural protein, and wherein the virus is an oncolytic virus.

39. The virus of claim 38, further comprising (iii) a transfer construct inserted at a third location within the genome of the oncolytic virus.

40. The virus of claim 39, wherein the transfer construct comprises a transgene that codes for a non-retroviral protein.

41. The virus of claim 39 or 40, wherein the transfer construct is inserted near the 3' end of the genome of the oncolytic virus.

42. The virus of any one of claims 38-41, wherein the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter and the gene that codes for the retroviral structural protein is under the control of a second early viral promoter.

43. The virus of any one of claims 38-41, wherein the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter, a first early/late viral promoter or a first late viral promoter; and the gene that codes for a retroviral structural protein is under the control of a second early viral promoter, a second early/late viral promoter, or a second late viral promoter.

44. The virus of any one of claims 38-42, wherein the transfer construct comprises a hybrid 5'-long terminal repeat region.

45. The virus of claim 44, wherein the hybrid 5'-long terminal repeat region comprises a third early viral promoter and a HIV-1 protein 5'-long terminal repeat region.

46. The virus of claim 44, wherein the hybrid 5'-long terminal repeat region comprises a HIV-1 protein 5'-long terminal repeat region and a viral promoter, wherein the viral promoter is a third early viral promoter, a third early/late viral promoter, or a third late viral promoter.

47. The virus of any one of claims 39-46, wherein the transfer construct further comprises a gene that codes for a self-cleaving RNA ribozyme.

48. The virus of claim 47, wherein the gene that codes for the self-cleaving RNA ribozyme is positioned downstream to the 3'-long terminal repeat region of the transfer construct.

49. The virus of claim 48, wherein the self-cleaving ribozyme comprises a delta virus ribozyme or a hammerhead ribozyme.

50. The virus of any one of claims 42-49, wherein the packaging construct comprises a 5'-long terminal repeat region and wherein the second early viral promoter is fused to the 5'-long terminal repeat region.

51. The virus of any one of claims 38-50, wherein the nucleic acid that codes for the retroviral envelope protein comprises a nucleotide sequence as set forth in SEQ ID No. 1, or a nucleotide sequence that is at least about 70% to at least about 99% identical to the sequence set forth as SEQ ID No. 1.

52. The virus of any one of claims 38-51, wherein the nucleic acid that codes for the retroviral structural protein comprises a nucleotide sequence as set forth in SEQ ID No. 2, or a nucleotide sequence that is at least about 70% to at least about 99% identical to the sequence set forth as SEQ ID No. 2.

53. The virus of any one of claims 38-52, wherein the transfer construct comprises a 3'-long terminal repeat region.

54. The virus of any one of claims 38-53, wherein the envelope construct comprises a termination sequence at its 5'-terminal region.

55. The virus of any one of claims 38-54, wherein the packaging construct comprises a termination sequence at its 3'-terminal region.

56. The virus of any one of claims 39-55, wherein the transfer construct comprises a termination sequence at its 3'-terminal region.

57. The virus of any one of claims 53-56, wherein the termination sequence comprises nucleotide sequence as set forth in SEQ ID No. 5.

58. The virus of any one of claims 38-57, wherein the first location and the second location are separated by at least about 10,000 bases.

59. The virus of any one of claims 39-58, wherein the first location and the third location are separated by at least about 10,000 bases.

60. The virus of any one of claims 39-59, wherein the second location and the third location are separated by at least about 10,000 bases.

61. The virus of any one of claims 38-60, wherein the structural protein comprises a mature gag-pol protein.

62. The virus of claim 61, wherein the mature gag-pol protein comprises p55, p41, and p24.

63. The virus of any one of claims 38-62, wherein the envelope protein comprises a VSV-G protein.

64. The virus of any one of claims 1-63, wherein the oncolytic virus is tumor selective in replication.

65. The virus of claim 64, wherein the non-replicating retrovirus is produced selectively within a tumor microenvironment.

66. The virus of any one of claims 1-65, wherein the oncolytic virus in an oncolytic vaccinia virus.

67. The virus of claim 66, comprising the first, the second, and the third early viral promoters, wherein the first early viral promoter is a first vaccinia virus early promoter, the second early viral promoter is a second vaccinia virus early promoter, and the third early viral promoter is a third vaccinia virus early promoter.

68. The virus of claim 67, wherein the first vaccinia virus early promoter comprises a sequence as set forth in SEQ ID No. 9.

69. The virus of claim 67 or 68, wherein the second vaccinia virus early promoter comprises a sequence as set forth in SEQ ID No. 10.

70. The virus of any one of claims 67-69, wherein the third vaccinia virus early promoter comprises a sequence set forth as SEQ ID No. 11.

71. The virus of any one of claims 6-37 and 39-70, wherein the transfer construct comprises a human PGK promoter (SEQ ID No. 12).

72. The virus of claim any one of claims 66-71, wherein the envelope construct is inserted between genes vacwr032 and vacwr033 of the oncolytic vaccinia virus.

73. The virus of any one of claims 66-72, wherein the packaging construct is inserted between genes vacwr093 and vacwr095 of the oncolytic vaccinia virus.

74. The virus of any one of claims 6-73, wherein the genome of the oncolytic vaccinia virus comprises a deletion of the vacwr094 gene, and wherein the packaging construct is inserted into the location of the vacwr094 gene.

75. The virus of any one of claims 66-74, wherein the transfer construct is inserted between genes vacwr205 and vacwr206 of the oncolytic vaccinia virus.

76. The virus of any one of claims 1-75, wherein the non-retroviral protein comprises a therapeutic protein or a diagnostic protein.

77. The virus of claim 76, wherein the non-retroviral protein comprises the therapeutic protein, and wherein the therapeutic protein comprises an immune checkpoint modulator, an antibody or portion thereof, a Fc fusion protein, an anticoagulant, a blood

factor, a bone morphogenetic protein, an immunosuppressive agent, an immunostimulatory agent, an enzyme, a growth factor, a hormone, an interferon, an interleukin, a thrombolytic, an anti-angiogenic, a chemotherapeutic, an antibiotic, an antifungal, an antiviral, and any combination thereof.

78. The virus of any one of claims 1-77, wherein the retrovirus is an Alpharetrovirus, a Betaretrovirus, a Deltaretrovirus, an Epsilonretrovirus, a Gamma retrovirus, or a Lentivirus.

79. The virus of claim 78, wherein the retrovirus is the lentivirus.

80. The virus of claim 79, wherein the lentivirus is an HIV.

81. The virus of claim 78, wherein the retrovirus is the Gamma retrovirus.

82. The virus of claim 81, wherein the Gamma retrovirus is a Moloney murine leukemia virus.

83. The virus of any one of claims 78-80, comprising an exogenous nucleic acid sequence that codes for a nucleic acid polymerase.

84. The virus of claim 83, wherein the nucleic acid polymerase is selected from the group consisting of: T7 RNA polymerase, T3 RNA polymerase and SP6 RNA polymerase, a RNA polymerase variant, and a DNA polymerase mutant.

85. The virus of any one of claims 78-80, comprising an exogenous nucleic acid sequence that codes for a bacteriophage polymerase.

86. The virus of claim 85, wherein the bacteriophage is selected from the group consisting of a T3 bacteriophage, a T7 bacteriophage and an SP6 bacteriophage.

87. The virus of claim 86, wherein a T3 bacteriophage polymerase is expressed with a T3 bacteriophage promoter, a T7 bacteriophage polymerase is expressed with a T7 bacteriophage promoter, and an SP6 bacteriophage polymerase is expressed with an SP6 bacteriophage promoter.

88. A method of treating cancer, the method comprising: administering to a subject an oncolytic virus according to any one of claims 1-87, wherein the non-replicating retrovirus generated from the oncolytic virus is selectively targeted to a tumor tissue.

89. The method of claim 88, wherein the tumor tissue comprises a malignant neoplastic tissue.

90. An engineered producer virus that generates a non-replicating retrovirus from its genome, wherein the engineered producer virus comprises at least one of the following modifications:

i. mutation or deletion of at least one viral gene;

ii. insertion of at least one exogenous nucleic acid;

iii. altered tropism; or

iv. any combinations thereof.

91. The engineered producer virus of claim 90, wherein the non-replicating retrovirus comprises a transgene that codes for a non-retroviral protein.

92. The engineered producer virus of claim 90 or 91, wherein the producer virus is a vaccinia virus and the at least one viral gene is selected from the group consisting of: B5R, A52R (VACWR178), F13L, A36R, A34R, A33R, B8R, B18R, SPI-1, SPI-2, B15R, VGF, E3L, K3L, A41L, K7R, N1L, C12L, TK, and any combinations thereof.

93. The engineered producer virus of any one of claims 90-92, wherein the at least one exogenous nucleic acid codes for a protein selected from the group consisting of: CXCR4, CCR2, PH-20, HMGB1, PIAS3, IL15, IL15-Rα, LIGHT, ITAC, fractalkine, CCL5, a metabolic modulating protein, a cytokine, a fusion protein comprising any combinations of the above, and a functional domain or fragment or variant thereof, or any combinations thereof.

94. The engineered producer virus of claim 93, wherein the at least one exogenous nucleic acid codes for the PIAS3.

95. The engineered producer virus of any one of claims 90-94, wherein the producer virus comprises a retroviral envelope construct, a retroviral packaging construct and a retroviral transfer construct, wherein the envelope construct, the packing construct, and the transfer construct are inserted at different locations within the genome of the producer virus.

96. The engineered producer virus of claim 95, wherein the envelope construct comprises a gene that codes for a retroviral envelope protein and the packaging construct comprises a gene that codes for a retroviral structural protein.

97. The engineered producer virus of claim 96, wherein the gene that codes for the retroviral envelope protein is under the control of a first early viral promoter and the gene that codes for the retroviral structural protein is under the control of a second early viral promoter.

98. The engineered producer virus of any one of claims 95-97, wherein the envelope construct further comprises a termination sequence at its 5'-terminal region.

99. The engineered producer virus of any one of claims 95-98, wherein the packaging construct further comprises a termination sequence at its 3'-terminal region.

100. The engineered producer virus of any one of claims 95-99, wherein the transfer construct comprises a termination sequence.

101. The engineered producer virus of any one of claims 95-100, wherein the transfer construct comprises a hybrid 5'-long terminal repeat region.

102. The engineered producer virus of claim 101, wherein the hybrid 5'-long terminal repeat region comprises a third early viral promoter and a HIV-1 protein 5'-long terminal repeat region.

103. The engineered producer virus of any one of claims 95-102, wherein the packaging construct comprises a 5'-long terminal repeat region and wherein the second early viral promoter is fused to the 5'-long terminal repeat region.

104. The engineered producer virus of any one of claims 95-103, wherein the envelope construct comprises a termination sequence at its 5'-terminal region.

105. The engineered producer virus of any one of claims 95-104, wherein the packaging construct comprises a termination sequence at its 3'-terminal region.

106. The engineered producer virus of any one of claims 95-105, wherein the transfer construct comprises a termination sequence.

107. The engineered producer virus of any one of claims 104-106, wherein the termination sequence comprises a nucleotide sequence as set forth in SEQ ID No. 7.

108. The engineered producer virus of any one of claims 96-107, wherein the retroviral structural protein comprises a mature gag-pol protein.

109. The engineered producer virus of claim 108, wherein the mature gag-pol protein comprises p55, p41, and p24.

110. The engineered producer virus of any one of claims 96-109, wherein the retroviral envelope protein comprises a VSV-G protein.

111. The engineered producer virus of any one of claims 95-110, wherein the producer virus in an oncolytic vaccinia virus.

112. The engineered producer virus of claim 111, wherein the envelope construct comprises a first early vaccinia promoter, the packaging construct comprises a second early vaccinia promoter, and the transfer construct comprises a third early vaccinia promoter.

113. The engineered producer virus of claim 112, wherein the first vaccinia virus early promoter comprises a sequence as set forth in SEQ ID No. 9.

114. The engineered producer virus of claim 112 or 113, wherein the second vaccinia virus early promoter comprises a sequence as set forth in SEQ ID No. 10.

115. The engineered producer virus of any one of claims 112-114, wherein the third vaccinia virus early promoter comprises a sequence set forth as SEQ ID No. 11.

116. The engineered producer virus of any one of claims 95-115, wherein the transfer construct comprises a human PGK promoter (SEQ ID No. 12).

117. The engineered producer virus of claim any one of claims 95-116, wherein the envelope construct is inserted between genes vacwr032 and vacwr033 of the oncolytic vaccinia virus.

118. The engineered producer virus of any one of claims 95-116, wherein the packaging construct is inserted between genes vacwr093 and vacwr095 of the oncolytic vaccinia virus.

119. The engineered producer virus of any one of claims 95-118, wherein the genome of the oncolytic vaccinia virus comprises a deletion of the vacwr094 gene, and wherein the packaging construct is inserted into the location of the vacwr094 gene.

120. The engineered producer virus of any one of claims 95-119, wherein the transfer construct is inserted between genes vacwr205 and vacwr206 of the oncolytic vaccinia virus.

121. The engineered producer virus of any one of claims 90-120, wherein the non-retroviral protein comprises a therapeutic protein or a diagnostic protein.

122. The engineered producer virus of claim 121, comprising the transgene that codes for the non-retroviral protein, wherein the non-retroviral protein comprises the therapeutic protein, and wherein the therapeutic protein comprises an immune checkpoint modulator, an antibody or portion thereof, a Fc fusion protein, an anticoagulant, a blood factor, a bone morphogenetic protein, an immunosuppressive agent, an immunostimulatory agent, an enzyme, a growth factor, a hormone, an interferon, an interleukin, a thrombolytic, an anti-angiogenic, a chemotherapeutic, an antibiotic, an antifungal, an antiviral, and any combination thereof.

123. The engineered producer virus of any one of claims 90-122, wherein the retrovirus is an Alpharetrovirus, a Betaretrovirus, a Deltaretrovirus, an Epsilonretrovirus, a Gamma retrovirus, or a Lentivirus.

124. The engineered producer virus of claim 123, wherein the retrovirus is a lentivirus.

125. The engineered producer virus of claim 124, wherein the lentivirus is an HIV.

126. The engineered producer virus of claim 123, wherein the retrovirus is the Gamma retrovirus.

127. The engineered producer virus of claim 126, wherein the Gamma retrovirus is a Moloney murine leukemia virus (MMLV).

128. A method of treating cancer, the method comprising: administering to a subject an engineered producer virus according to any one of claims 90-127, wherein the non-replicating retrovirus generated from the engineered producer virus is selectively targeted to a tumor tissue.

129. The method of claim 128, wherein the tumor tissue comprises a malignant neoplastic tissue.

130. A process for generating an oncolytic virus that produces a non-replicating retrovirus, the process comprising: growing a population of the oncolytic virus in mammalian cells, followed by adding and selecting for, sequentially, a retroviral envelope construct, a retroviral packaging construct, and a retroviral transfer construct, wherein at least one of the envelope construct, the packaging construct, or the transfer construct comprises a transgene that codes for a non-retroviral protein.

131. The process of claim 130, wherein the retrovirus is an Alpharetrovirus, a Betaretrovirus, a Deltaretrovirus, an Epsilonretrovirus, a Gamma retrovirus, or a Lentivirus.

132. The process of claim 131, wherein the retrovirus is the lentivirus.

133. The process of claim 132, wherein the lentivirus is an HIV.

134. The process of claim 131, wherein the retrovirus is the Gamma retrovirus.

135. The process of claim 134, wherein the Gamma retrovirus is a Moloney murine leukemia virus.

FIG. 1

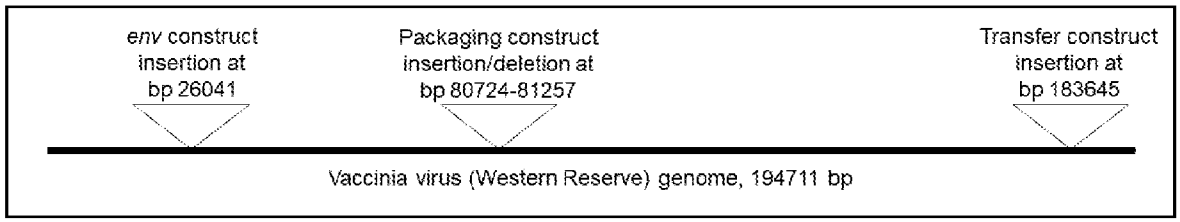

env construct insertion at bp 26041
Packaging construct insertion/deletion at bp 80724-81257
Transfer construct insertion at bp 183645
Vaccinia virus (Western Reserve) genome, 194711 bp

FIG. 2

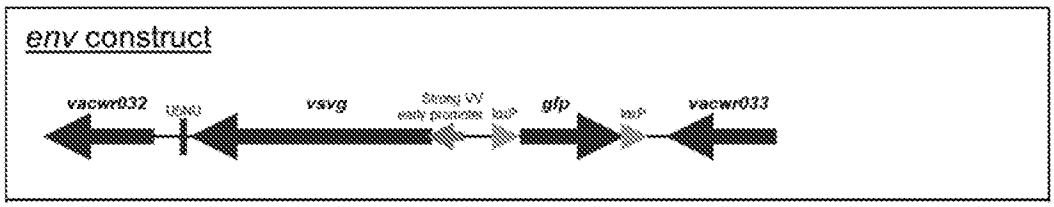


FIG. 3

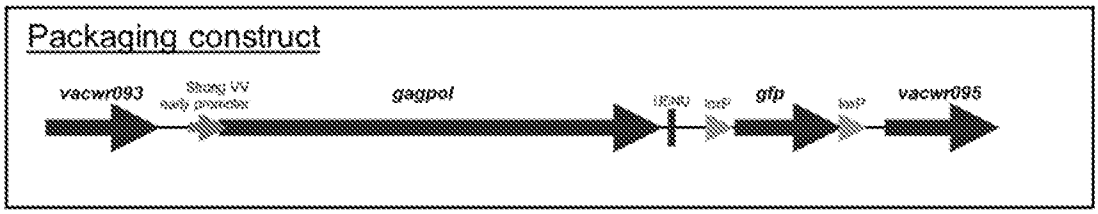


FIG. 4

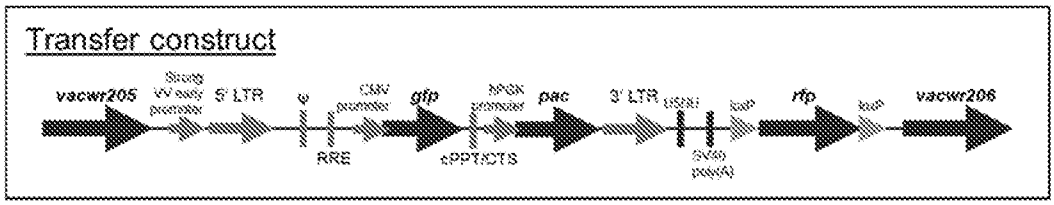

Transfer construct
vacwr205
5' LTR
ψ
RRE
gfp
cPPT/CTS
pac
3' LTR
rfp
vacwr206

FIG. 5

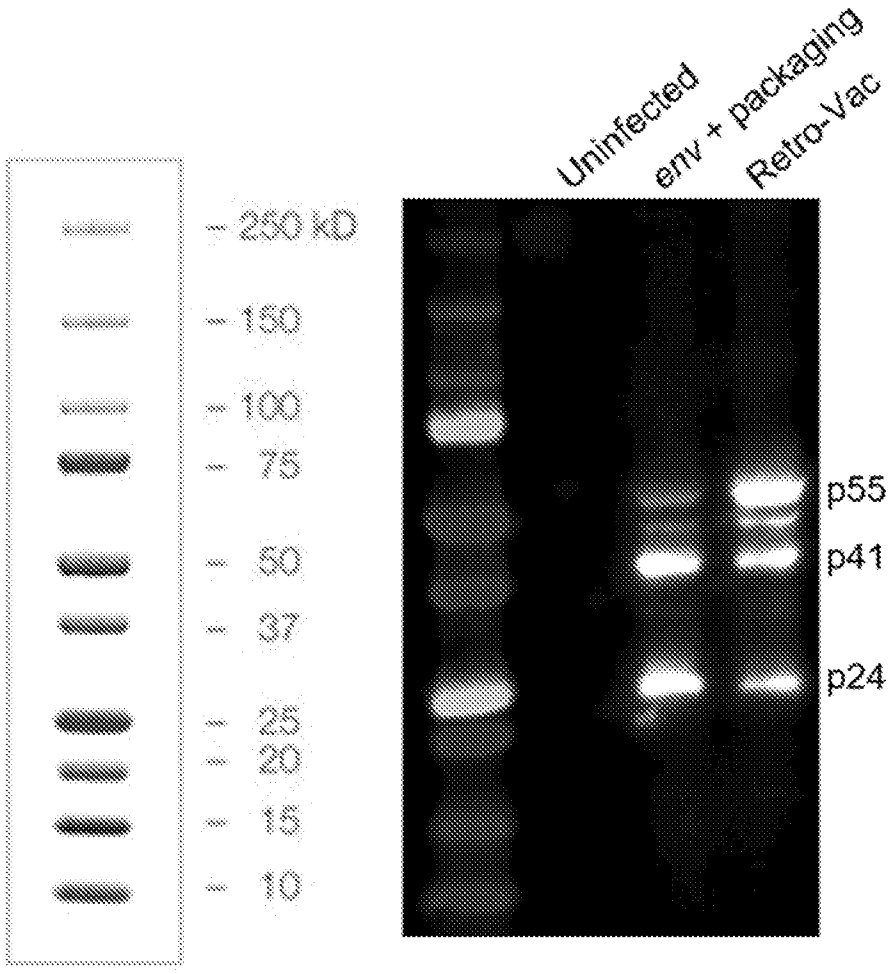

Uninfected
env + packaging
Retro-Vac
250 kD
150
100
75
50
37
25
20
15
10
p55
p41
p24

FIG. 6

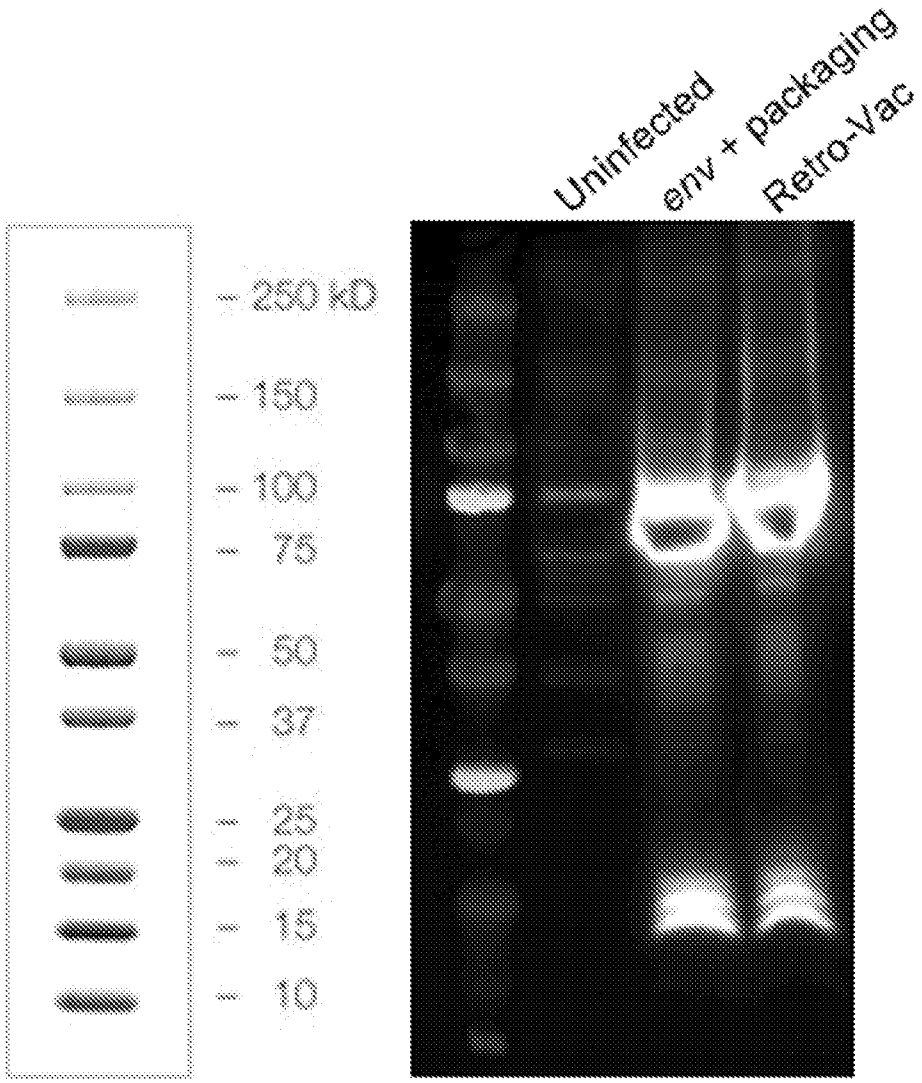

Uninfected
env + packaging
Retro-Vac
250 kD
150
100
75
50
37
25
20
15
10

FIG. 7

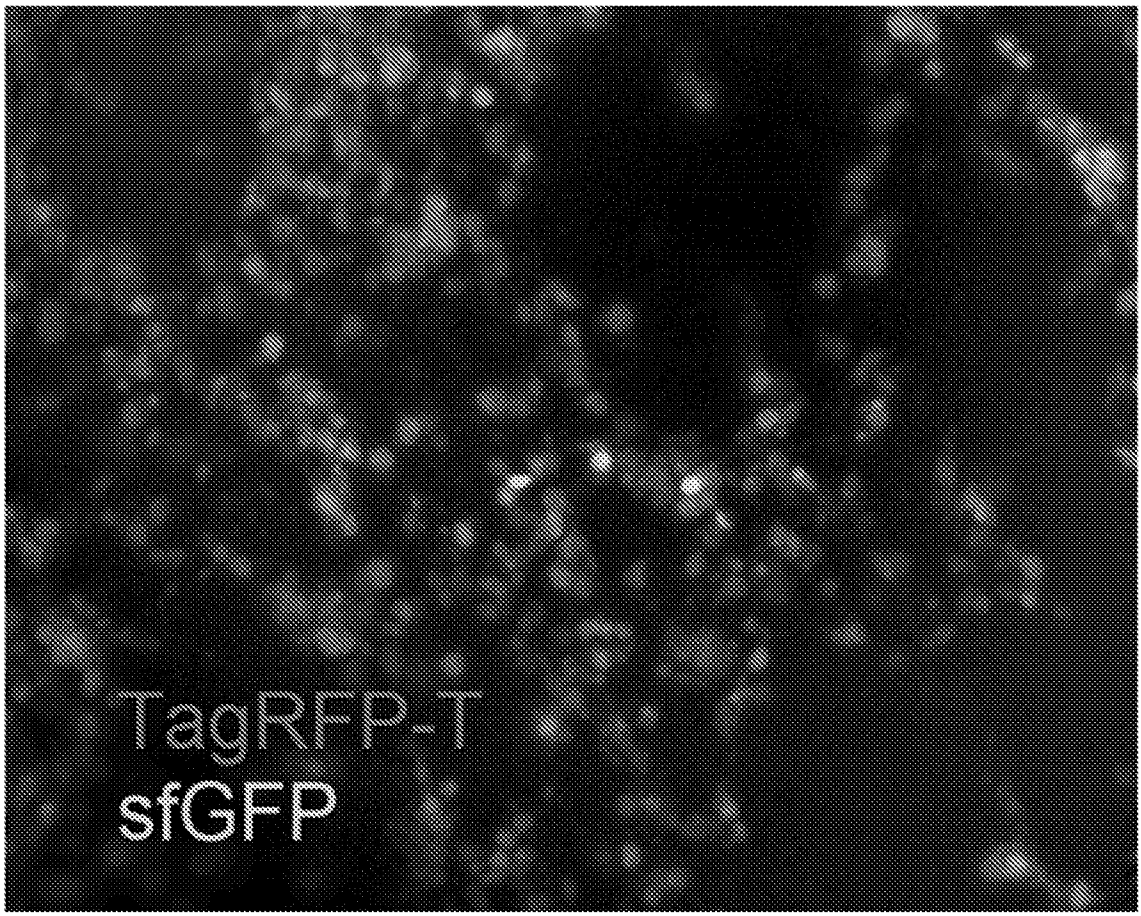
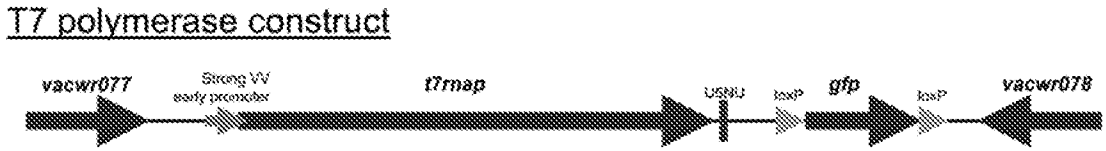


FIG. 8


T7 polymerase construct
vacwr077
Strong VV early promoter
t7rnap
USNU
loxP
gfp
loxP
vacwr078