## CLAIMS

1. A recombinant DNA virus viral particle comprising a ribonucleotide (RNA) sequence packaged within the protein shell of a DNA virus viral particle, wherein the RNA sequence is capable of being packaged into the DNA virus viral particle, wherein said RNA sequence comprises:
   (1) an RNA sequence of interest (RSI); and,
   (2) an RNA-packaging signal (RPS) capable of binding directly or indirectly to an RPS-interacting molecule that facilitates packaging of the RNA sequence into the DNA virus viral particle.

2. The recombinant DNA virus viral particle of claim 1, wherein the DNA virus viral particle is an AAV, and the recombinant DNA virus viral particle is a recombinant RNA adeno-associated virus (rRAAV) viral particle, comprising:
   (1) an AAV capsid; and,
   (2) the RNA sequence packaged within said AAV capsid.

3. The recombinant DNA virus viral particle of claim 2, wherein the AAV capsid comprises a capsid from an AAV of the serotype AAV1, AAV2, AAV3A, AAV3B, AAV4, AAV5, AAV6, AAV7, AAV8, AAV9, AAV10, AAV11, AAV12, AAV13, AAV-DJ, AAV PHP.eB, Anc80L65, Anc80L65AAP, AAVrh74, or 7m8.

4. The recombinant DNA virus viral particle of claim 1, wherein the DNA virus viral particle is an AAV viral particle or an oncolytic viral particle.

5. The recombinant DNA virus viral particle of claim 1, wherein the RPS is located at or near the 5’ end of the RSI, at or near the 3’ end of the RSI, or internal to the RSI.

6. The recombinant DNA virus viral particle of claim 1, wherein the RNA sequence comprises more than one RPS that are identical or different, and wherein two or more of said more than one RPS are
   (1) adjacent to each other, or are in tandem, via the same or different linkers; or

(2) not adjacent to each other.

7. The recombinant DNA virus viral particle of claim 1, wherein the recombinant DNA virus viral particle is an AAV viral particle, and wherein the RPS comprises a transcribed modified AAV inverted terminal repeat (ITR), wherein said transcribed modified AAV ITR:

(a) comprises a transcribed functional Rep-Binding Element (RBE);

(b) lacks either a transcribed terminal resolution site (TRS), or a transcribed reverse complement TRS (rcTRS), or both; and

(c) comprises a transcribed D region sequence.

8. The recombinant DNA virus viral particle of claim 7, wherein the transcribed modified AAV ITR is modified from a transcribed wild-type flip or flop ITR.

9. The recombinant DNA virus viral particle of claim 8, wherein said wild-type flop ITR has the nucleotide sequence of SEQ ID NO: 1.

10. The recombinant DNA virus viral particle of claim 8, wherein the wild-type flip or flop ITR is from AAV1, AAV2, AAV3A, AAV3B, AAV4, AAV5, AAV6, AAV7, AAVrh74, AAV8, AAV9, AAV10, AAV11, AAV12, or AAV13.

11. The recombinant DNA virus viral particle of claim 7, wherein said transcribed modified AAV ITR has the nucleotide sequence of SEQ ID NO: 3.

12. The recombinant DNA virus viral particle of claim 1, wherein the RPS comprises an MS2 sequence, an PP7 binding site, or a com binding site, and the RPS-interacting molecule comprises an RPS-interacting protein (RPSIP) capable of binding directly or indirectly to the RPS.

13. The recombinant DNA virus viral particle of claim 12, wherein:

(a) the RPS comprises the MS2 sequence, and the RPSIP comprises a bacteriophage MS2 coat protein (MCP);

(b) the RPS comprises the PP7 binding site, and the RPSIP comprises a PP7 bacteriophage coat protein (PCP); or,

(c) The RPS comprises the com binding site, and the RPSIP comprises a phage COM protein (COM).

14. The recombinant DNA virus viral particle of claim 12, wherein the RPSIP is associated directly or indirectly with a protein component of the viral packaging system for the DNA virus viral particle.

15. The RNA sequence of claim 14, wherein the protein component of the viral packaging system for the DNA virus viral particle comprises Rep78 and/or Rep68 of adeno-associated virus 2 (AAV2), or an assembly-activating protein (AAP).

16. The recombinant DNA virus viral particle of claim 1, wherein the RPS-interacting molecule is or comprises Rep78, Rep68, Rep52, and/or Rep40.

17. The recombinant DNA virus viral particle of claim 1, wherein the Rep78 and/or the Rep68 comprises a Y156F mutation.

18. The recombinant DNA virus viral particle of claim 1, wherein said RNA sequence is a single-stranded RNA less than about 8,900 nucleotides in length, less than about 8,000 nucleotides in length, less than about 7,000 nucleotides in length, less than about 6,000 nucleotides in length, less than about 5,200 nucleotides in length, less than about 4,000 nucleotides in length, less than about 3,000 nucleotides in length, less than about 2,000 nucleotides in length, about 4,700-5,200 nucleotides in length, about 4,700-5,000 nucleotide in length, about 4,700-4,800 nucleotides in length, or about 4,700 nucleotides in length.

19. The recombinant DNA virus viral particle of claim 1, wherein said RNA sequence of interest is an RNA coding sequence for a gene of interest (GOI), a protein-encoding RNA, a non-coding functional RNA, or a precursor thereof.

20. The recombinant DNA virus viral particle of claim 19, wherein the gene of interest (GOI) encodes a protein, an enzyme, a structural protein, an mRNA, a non-coding RNA (ncRNA), an siRNA, a piRNA, a short hairpin RNA or shRNA, a microRNA (miRNA) or a precursor thereof, a ribosomal RNA (rRNA), an antisense sequence or oligonucleotide (ASO), an RNA component of a CRISPR-Cas system, an rRNA, a tRNA, a snoRNA, a snRNA, an exRNA, a scaRNA, a lncRNA, an X inactive specific transcript (Xist), or a HOX transcript antisense RNA (HOTAIR).

21. The recombinant DNA virus viral particle of claim 20, wherein said protein is a fluorescent protein, a therapeutic protein, an antigen protein, or a gene-editing protein.

22. The recombinant DNA virus viral particle of claim 20, wherein said enzyme is a Cre protein, or a CRISPR/Cas effector enzyme.

23. The recombinant DNA virus viral particle of claim 20, wherein said RNA component of the CRISPR-Cas system includes a guide RNA (gRNA), a CRISPR RNA (crRNA), and/or a tracr RNA.

24. The recombinant DNA virus viral particle of claim 19, wherein the protein-encoding RNA encodes a therapeutic protein, an antigen protein, or a gene-editing protein.

25. The recombinant DNA virus viral particle of claim 24, wherein the gene-editing protein is a CRISPR/Cas effector enzyme, a ZFN protein, or a TALEN protein.

26. The recombinant DNA virus viral particle of claim 19, wherein the non-coding functional RNA is a transfer RNA (tRNA), a ribosomal RNA (rRNA), a small interfering RNA (siRNA), a short hairpin RNA (shRNA), an antisense RNA, an antisense oligonucleotide, a micro RNA (miRNA), or an RNA component of a CRISPR-Cas system.

27. The recombinant DNA virus viral particle of claim 26, wherein the CRISPR-Cas system comprises Cas9, Cas12, or Cas13.

28. The recombinant DNA virus viral particle of claim 26, wherein the RNA component of the CRISPR-Cas system comprises a guide RNA (gRNA), a CRISPR RNA (crRNA), and/or a tracr RNA.

29. The recombinant DNA virus viral particle of claim 1, wherein said RNA sequence further comprises:

(1) a transcribed transcription enhancer;

(2) a transcribed intron sequence or exon sequence;

(3) a 5’ UTR sequence;

(4) a 3’ UTR sequence;

(5) a polyA sequence, or a polyadenylation (polyA) signal sequence, and optionally a GU-rich region downstream of the polyA signal sequence;

(6) a posttranscriptional regulatory element or sequence; and/or,

(7) a transcription termination sequence.

30. The recombinant DNA virus viral particle of claim 29, wherein said RNA sequence comprises, in 5’ to 3’ orientation, the RSI, an optional transcribed woodchuck hepatitis virus posttranscriptional regulatory element (WPRE) sequence, the RPS, and a polyA sequence or a polyA signal sequence.

31. The recombinant DNA virus viral particle of claim 29, wherein the RNA sequence comprises an RPS located 3’ to the posttranscriptional regulatory element or sequence, and 5’ to the polyA sequence or the polyA signal sequence.

32. The recombinant DNA virus viral particle of claim 1, wherein a DNA sequence encoding said RNA sequence, or a reverse complement of said DNA sequence, has reduced, diminished, or no capacity of being packaged into the DNA virus viral particle.

33. The recombinant DNA virus viral particle of claim 32, wherein the recombinant DNA virus viral particle is an AAV viral particle, and wherein said DNA sequence or the reverse complement thereof lacks a DNA packaging signal for AAV packaging.

34. The recombinant DNA virus viral particle of claim 33, wherein said DNA packaging signal comprises a functional AAV ITR.

35. A population of recombinant DNA virus viral particles comprising a plurality of the recombinant DNA virus viral particle of any one of claim 1-34, wherein at least about 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 95%, 96%, 97%, 98%, 99% or more of the recombinant DNA virus viral particles within said population have the RNA sequence packaged therein.

36. A method for producing the recombinant DNA virus viral particle of any one of claims 1-34 or the population of recombinant DNA virus viral particles of claim 35, the method comprising contacting the RPS-interacting molecule with the RNA sequence to facilitate the packaging of the RNA sequence into the protein shell of the DNA virus viral particle, thereby producing the recombinant DNA virus viral particle or the population of recombinant DNA virus viral particles.

37. A composition for generating the recombinant DNA virus viral particle of any one of claims 1-34 or the population of recombinant DNA virus viral particles of claim 35, the composition comprising:

(i) the RNA sequence, or a polynucleotide comprising a cassette encoding the RNA sequence; and

(ii) the RPS-interacting molecule, or a polynucleotide comprising a cassette encoding the RPS-interacting molecule.

38. A host cell comprising the recombinant DNA virus viral particle of any one of claims 1-34, the population of recombinant DNA virus viral particles of claim 35, or the composition of claim 37.

39. A method of delivering an RNA sequence of interest (RSI) into a cell, a plant, or an animal, the method comprising contacting the cell, the plant, or the animal with the recombinant DNA virus viral particle of any one of claims 1-34 or the population of the recombinant DNA virus viral particles of claim 35.

40. A method of diagnosing, preventing, or treating a disease or disorder in a subject in need thereof, comprising administrating to the subject a therapeutically effective amount or dose of the recombinant DNA virus viral particle of any one of claims 1-34 or the population of the recombinant DNA virus viral particles of claim 35, wherein the disease or disorder is diagnosed, prevented, or treated by the RNA sequence of interest (RSI) delivered to the subject by the recombinant DNA virus viral particle or the population of the recombinant DNA virus viral particles.

41. Use of the recombinant DNA virus viral particle of any one of claims 1-34 or the population of the recombinant DNA virus viral particles of claim 35 in the manufacture of a medicament for diagnosing, preventing, or treating a disease or disorder in a subject in need thereof.

42. A method of producing a ribonucleotide (RNA) sequence capable of being packaged into a DNA virus viral particle, the method comprising operably linking:

(1) an RNA sequence of interest (RSI); and,

(2) an RNA-packaging signal (RPS) capable of binding directly or indirectly to an RPS-interacting molecule that facilitates packaging of the RNA sequence into the DNA virus viral particle,

thereby producing the RNA sequence.