CLAIMS

1. A ribonucleotide (RNA) sequence capable of being packaged into a 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 RNA sequence 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.

3. The RNA sequence of claim 1, comprising 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.

4. The RNA sequence of claim 1, wherein the 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) and,
   (b) lacks either a transcribed terminal resolution site (TRS), or a transcribed reverse complement TRS (rcTRS), or both.

5. The RNA sequence of claim 4, wherein the transcribed modified AAV ITR is modified from a transcribed wild-type flip or flop ITR.

6. The RNA sequence of claim 4, wherein the transcribed modified AAV ITR comprises the transcribed D region sequence, or wherein the transcribed modified AAV ITR lacks the transcribed D region sequence.

7. The RNA sequence of claim 4, further comprising a second transcribed modified AAV ITR having a second transcribed functional RBE sequence but lacking either a second transcribed terminal resolution site (TRS) or a second transcribed reverse complement TRS

(rcTRS) or both.

8. The RNA sequence of claim 7, wherein the second transcribed modified AAV ITR is within 5' end 1000 nucleotides, 800 nucleotides, 500 nucleotides, 250 nucleotides, or 150 nucleotides of the RNA sequence.

9. The RNA sequence 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.

10. The RNA sequence of claim 1, which 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.

11. A polynucleotide comprising a cassette encoding the RNA sequence of claim 1.

12. The polynucleotide of claim 11, further comprising a promoter operably linked to and driving the transcription of the RNA sequence encoded by the cassette.

13. An isolated host cell comprising the RNA sequence of claim 1.

14. The RNA sequence 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.

15. The RNA sequence of claim 14, 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).

16. The RNA sequence of claim 14, wherein the protein-encoding RNA encodes a therapeutic protein, an antigen protein, or a gene-editing protein.

17. The RNA sequence of claim 16, wherein the gene-editing protein is a CRISPR/Cas effector enzyme, a ZFN protein, or a TALEN protein.

18. The RNA sequence of claim 14, 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.

19. The RNA sequence of claim 18, wherein the CRISPR-Cas system comprises Cas9, Cas12, or Cas13.

20. The RNA sequence of claim 18, wherein the RNA component of the CRISPR-Cas system comprises a guide RNA (gRNA), a CRISPR RNA (crRNA), and/or a tracr RNA.

21. The RNA sequence of claim 5, wherein said wild-type flop ITR has the nucleotide sequence of SEQ ID NO: 1.

22. The RNA sequence of claim 6, wherein said transcribed modified AAV ITR has the nucleotide sequence of SEQ ID NO: 2.

23. The RNA sequence of claim 6, wherein said transcribed modified AAV ITR has the nucleotide sequence of SEQ ID NO: 3.

24. The RNA sequence of claim 9, 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).

25. The RNA sequence of claim 15, wherein said protein is a fluorescent protein, a therapeutic protein, an antigen protein, or a gene-editing protein.

26. The RNA sequence of claim 15, wherein said enzyme is a Cre protein, or a CRISPR/Cas effector enzyme.

27. The RNA sequence of claim 15, wherein said RNA component of the CRISPR-Cas system includes a guide RNA (gRNA), a CRISPR RNA (crRNA), and/or a tracr RNA.

28. The RNA sequence of claim 1, wherein the DNA virus viral particle is an AAV viral particle or an oncolytic viral particle.

29. The RNA sequence of claim 28, wherein the AAV viral particle comprises a capsid from an AAV of the serotype AAV1, AAV2, AAV3A, AAV3B, AAV4, AAV5, AAV6, AAV7, AAVrh74, AAV8, AAV9, AAV10, AAV11, AAV12, AAV13, AAV-DJ, AAV PHP.eB, Anc80L65, Anc80L65AAP, or 7m8.

30. The RNA sequence of claim 1, further comprising:
    (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.

31. The RNA sequence of claim 30, comprising, in 5' to 3' orientation, the RSI, an optional transcribed woodchuck hepatitis virus posttranscriptional regulatory element (WPRE) sequence, the RPS, and the polyA sequence or the polyA signal sequence.

32. The RNA sequence 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 RNA sequence of claim 32, wherein the 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 RNA sequence of claim 33, wherein said DNA packaging signal comprises a functional AAV ITR.

35. The RNA sequence of claim 4, wherein said transcribed modified AAV ITR further comprises a transcribed functional RBE'.

36. The RNA sequence of claim 35, 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).

37. The RNA sequence of claim 4, wherein said transcribed modified AAV ITR further comprises a transcribed D region sequence.

38. The RNA sequence of claim 4, wherein the RPS-interacting molecule is Rep78, Rep68, Rep52, and/or Rep40.

39. The RNA sequence of claim 5, 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.

40. The RNA sequence of claim 7, wherein the second transcribed modified AAV ITR further comprises a second transcribed D region sequence.

41. The RNA sequence of claim 9, wherein the RPSIP is associated directly or indirectly with a protein component of the viral packaging system for the DNA virus viral particle.

42. The RNA sequence of claim 11, wherein the polynucleotide is a DNA sequence.

43. The RNA sequence of claim 11, wherein the polynucleotide is a DNA plasmid comprising a stuffer sequence in the backbone of the DNA plasmid.

44. The RNA sequence of claim 11, wherein the polynucleotide is a DNA sequence comprising

no functional DNA packaging signal.

45. The RNA sequence of claim 30, 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.