What is claimed is:

1. A recombinant AAV viral particle comprising (i) an AAV capsid comprising AAV VP1, VP2, and VP3 capsid proteins, and (ii) packaged within the AAV capsid, a nucleic acid sequence comprising an AAV Inverted Terminal Repeat (ITR) sequence,

wherein at least one of: the AAV VP1 capsid protein, the AAV VP2 capsid protein, and the AAV VP3 capsid protein, comprises an amino acid sequence having at least 95% identity to the amino acid sequence of a capsid protein of a non-primate animal AAV,

wherein the at least one of the AAV VP1 capsid protein, the AAV VP2 capsid protein, and the AAV VP3 capsid protein that comprises the amino acid sequence having at least 95% identity to the amino acid sequence of the capsid protein of the non-primate animal AAV further comprises a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle,

optionally wherein at least one of the AAV VP1, VP2, and VP3 capsid proteins further comprises a modification selected from the group consisting of:

(a) a detectable label,

(b) a point mutation, preferably wherein the point mutation reduces the natural tropism of the AAV viral particle and/or creates a detectable label,

(c) a chimeric amino acid sequence, and

(d) any combination of (a), (b), and (c),

optionally wherein the ITR sequence comprises a nucleic acid sequence having at least 95% identity to the ITR sequence of a second AAV, wherein the second AAV is not the same as the non-primate animal AAV, and

wherein the recombinant AAV viral particle is capable of infecting a mammalian host, preferably a primate host.

2. A recombinant AAV viral particle comprising (i) an AAV capsid comprising AAV VP1, VP2, and VP3 capsid proteins, and (ii) packaged within the AAV capsid, a nucleic acid sequence comprising an AAV Inverted Terminal Repeat (ITR) sequence,

wherein at least one of the AAV VP1 capsid protein, the AAV VP2 capsid protein, and the AAV VP3 capsid protein comprises an amino acid sequence having at least 95% identity to the amino acid sequence of a capsid protein of a non-primate animal AAV, and

wherein the at least one of the AAV VP1 capsid protein, the VP2 capsid protein, and the VP3 capsid protein that comprises the amino acid sequence having at least 95% identity to the amino acid sequence of the capsid protein of the non-primate animal AAV further comprises a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle,

optionally wherein at least one of the AAV VP1, VP2, and VP3 capsid proteins further comprises a modification selected from the group consisting of:

(a) a detectable label,

(b) a point mutation, preferably wherein the point mutation reduces the natural tropism of the AAV viral particle and/or creates a detectable label,

(c) a chimeric amino acid sequence, and

(d) any combination of (a), (b), and (c),

wherein the entire ITR sequence comprises a nucleic acid sequence having at least 95% identity to the ITR of the non-primate animal AAV, optionally wherein the ITR sequence comprises a chimeric nucleic acid sequence, and wherein a portion of the chimeric nucleic acid sequence having at least 95% identity to the ITR of the non-primate AAV is operably linked to a portion of the chimeric nucleic acid sequence having at least 95% identity to the ITR of a second AAV, wherein the second AAV is not the same as the non-primate animal AAV, and

wherein the recombinant AAV viral particle is capable of infecting a mammalian host preferably a primate host.

3. A recombinant AAV viral particle comprising (i) an AAV capsid comprising AAV VP1, VP2, and VP3 capsid proteins, and (ii) packaged within the AAV capsid, a nucleic acid sequence comprising an AAV Inverted Terminal Repeat (ITR) sequence,

wherein at least one of the AAV VP1 capsid protein, the AAV VP2 capsid protein, and the AAV VP3 capsid protein comprises an amino acid sequence having at least 95% identity to the amino acid sequence of a capsid protein of a non-primate animal AAV,

wherein the at least one of the AAV VP1 capsid protein, the AAV VP2 capsid protein, and the AAV VP3 capsid protein that comprises the amino acid sequence having at least 95% identity to the amino acid sequence of the capsid protein of the non-primate animal AAV further comprises a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle,

optionally wherein at least one of the AAV VP1, VP2, and VP3 capsid proteins further comprises a detectable label, and/or a point mutation, preferably wherein the point mutation reduces the natural tropism of the AAV viral particle and/or creates a detectable label,

wherein the ITR sequence comprises a nucleic acid sequence having at least 95% identity to the ITR sequence of a second AAV, wherein the second AAV is not the same as the non-primate animal AAV, and

wherein the recombinant AAV viral particle is capable of infecting a mammalian host preferably a primate host.

4. A recombinant AAV viral particle comprising (i) an AAV capsid comprising AAV VP1, VP2, and VP3 capsid proteins, and (ii) packaged within the AAV capsid, a nucleic acid sequence comprising an AAV Inverted Terminal Repeat (ITR) sequence,

wherein at least one of the AAV VP1 capsid protein, the AAV VP2 capsid protein, and the AAV VP3 capsid protein comprises a chimeric amino acid sequence comprising (A) an amino acid sequence having at least 95% identity to the amino acid sequence of a non-primate animal AAV capsid protein operably linked to (B) an amino acid sequence having at least 95% identity to the amino acid sequence of a second AAV capsid protein,

wherein the second AAV is not the same as the non-primate animal AAV,

wherein the recombinant AAV viral particle is capable of infecting a mammalian host, preferably a primate host, and

wherein the at least one of the AAV VP1 capsid protein, the AAV VP2 capsid protein, and the AAV VP3 capsid protein comprising a chimeric amino acid sequence further comprises a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle,

optionally wherein at least one of the AAV VP1 capsid protein, the AAV VP2 capsid protein, and the AAV VP3 capsid protein comprising a chimeric amino acid sequence further comprises a detectable label.

5. The recombinant AAV particle of any one of the preceding claims, wherein:

(a) the protein:protein binding pair is selected from SpyTag:SpyCatcher, SpyTag:KTag, Isopeptag:pilin-C, SnoopTag:SnoopCatcher, and SpyTag002:SpyCatcher002;

(b) the first member of a protein:protein binding pair comprises c-myc comprising a sequence set forth as SEQ ID NO:44;

(c) the detectable label comprises the B1 epitope comprising an amino acid sequence of IGTRYLTR (SEQ ID NO: 45);

(d) the capsid protein comprises an amino acid sequence having at least 95% identity to an amino acid sequence of a VP3 capsid protein of the non-primate animal AAV;

(e) the capsid protein comprises an amino acid sequence having at least 95% identity to an amino acid sequence of a VP2 capsid protein of the non-primate animal AAV;

(f) the capsid protein comprises an amino acid sequence having at least 95% identity to an amino acid sequence of a VP1 capsid protein of the non-primate animal AAV;

(g) (i) the VP1 capsid protein comprises either
a chimeric amino acid sequence, optionally wherein the VP1-unique region (VP1-u) of the chimeric AAV VP1 capsid protein comprises an amino acid sequence having at least 95% identity to the amino acid sequence of the VP1-u of a second AAV and wherein the VP1/VP2 common region and the VP3 region of the chimeric AAV VP1 capsid comprises an amino acid sequence having at least 95%

identity to the amino acid sequence of the VP1/VP2 common region and VP3 region of the non-primate animal AAV, or

an amino acid sequence having at least 95% identity to the VP1 capsid protein of the non-primate animal AAV,

(ii) the VP2 capsid protein comprises either

a chimeric amino acid sequence, optionally wherein the VP1/VP2 common region of the chimeric AAV VP2 capsid protein comprises an amino acid sequence having at least 95% identity to the amino acid sequence of the VP1/VP2 common region of a second AAV and wherein the VP3 region of the chimeric VP2 capsid protein comprises at least 95% identity to the VP3 region of the non-primate animal AAV, or

an amino acid sequence having at least 95% identity to the VP2 capsid protein of the non-primate animal AAV, and

(iii) the VP3 capsid protein comprises an amino acid sequence having at least 95% identity to an amino acid sequence of the VP3 capsid protein of the non-primate animal AAV;

(h)

(i) the VP1 capsid protein comprises a chimeric amino acid sequence, optionally wherein the VP1-unique region (VP1-u) of the chimeric AAV VP1 capsid protein comprises an amino acid sequence having at least 95% identity to the amino acid sequence of the VP1-u of a second AAV and wherein the VP1/VP2 common region and the VP3 region of the chimeric AAV VP1 capsid comprises an amino acid sequence having at least 95% identity to the amino acid sequence of the VP1/VP2 common region and VP3 region of the non-primate animal AAV,

(ii) the VP2 capsid protein comprises a chimeric amino acid sequence, optionally wherein the VP1/VP2 common region of the chimeric AAV VP2 capsid protein comprises an amino acid sequence having at least 95% identity to the amino acid sequence of the VP1/VP2 common region of a second AAV and wherein the VP3 region of the chimeric

VP2 capsid protein comprises at least 95% identity to the VP3 region of the non-primate animal AAV, and

(iii) the VP3 capsid protein comprises an amino acid sequence having at least 95% identity to an amino acid sequence of the VP3 capsid protein of the non-primate animal AAV;

(i)
(i) the AAV VP1 capsid protein comprises a chimeric amino acid sequence, optionally wherein the VP1-unique region (VP1-u) of the chimeric AAV VP1 capsid protein comprises an amino acid sequence having at least 95% identity to the amino acid sequence of the VP1-u of a second AAV and wherein the VP1/VP2 common region and the VP3 region of the chimeric AAV VP1 capsid comprises an amino acid sequence having at least 95% identity to the amino acid sequence of the VP1/VP2 common region and VP3 region of the non-primate animal AAV,

(ii) the VP2 capsid protein comprises an amino acid sequence having at least 95% identity to an amino acid sequence of the VP2 capsid protein of the non-primate animal AAV, and

(iii) the VP3 capsid protein comprises an amino acid sequence having at least 95% identity to the amino acid sequence of a VP3 capsid protein of the non-primate animal AAV; and/or

(j)
(i) the VP1 capsid protein comprises an amino acid sequence having at least 95% identity to an amino acid sequence of the VP1 capsid protein of the non-primate animal AAV,

(ii) the VP2 capsid protein comprises an amino acid sequence having at least 95% identity to an amino acid sequence of the VP2 capsid protein of the non-primate animal AAV, and

(iii) the VP3 capsid protein comprises an amino acid sequence having at least 95% identity to an amino acid sequence of the VP3 capsid protein of the non-primate animal AAV.

6. The recombinant AAV viral particle of any one of the preceding claims, wherein:

(a) the second AAV is a primate AAV or a combination of primate AAVs;

(b) the second AAV is a selected from the group consisting of AAV1, AAV2, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, AAV9, and a combination thereof;
(c) the non-primate animal AAV is a non-primate AAV selected from the group listed in Table 2; or

(d) the non-primate animal AAV is an avian AAV (AAAV), a sea lion AAV or a bearded dragon AAV; optionally wherein the first member of the protein:protein binding pair is:

(i) at position I444 or I580 of a VP1 capsid protein of AAAV;

(ii) at position I573 or I436 of a VP1 capsid protein of a bearded dragon AAV; or

(iii) at position selected from the group consisting of I429, I430, I431, I432, I433, I434, I436, I437, and A565 of a VP1 of a sea lion AAV.

7. The recombinant AAV viral particle of any one of the preceding claims, wherein the VP3 capsid protein:

(a) comprises the first member of a protein:protein binding pair, wherein the protein:protein binding pair is selected from the group consisting of SpyTag:SpyCatcher, SpyTag:KTag, Isopeptag:pilin-C, SnoopTag:SnoopCatcher, and SpyTag002:SpyCatcher002,

(b) comprises the detectable label, optionally wherein the detectable label comprises the amino acid sequence set forth as SEQ ID NO: 44 or the amino acid sequence set forth as SEQ ID NO:45,

(c) comprises the point mutation, or

(d) any combination of (a), (b), and (c).

8. The recombinant AAV viral particle of any one of the preceding claims, comprising:

(a) a first and/or second linker operably linking the first member of a protein:protein binding pair and/or the detectable label to a capsid protein of the capsid of said AAV particle;

(b) the first member of a protein:protein binding pair and/or the detectable label operably linked to a variable region of a capsid protein of the capsid of said AAV particle; and/or

(c) a capsid protein comprising an amino acid sequence selected from the group consisting of:

(i) an amino acid sequence set forth as SEQ ID NO:2,
(ii) an amino acid sequence set forth as SEQ ID NO:4,
(iii) an amino acid sequence set forth as SEQ ID NO:6,
(iv) an amino acid sequence set forth as SEQ ID NO:8,
(v) an amino acid sequence set forth as SEQ ID NO:10,
(vi) an amino acid sequence set forth as SEQ ID NO:12,
(vii) an amino acid sequence set forth as SEQ ID NO:14,
(viii) an amino acid sequence set forth as SEQ ID NO:16,
(ix) an amino acid sequence set forth as SEQ ID NO:18,
(x) an amino acid sequence set forth as SEQ ID NO:20,
(xi) an amino acid sequence set forth as SEQ ID NO:22,
(xii) an amino acid sequence set forth as SEQ ID NO:24,
(xiii) an amino acid sequence set forth as SEQ ID NO:26,

(xiv) an amino acid sequence set forth as SEQ ID NO:28,

(xv) an amino acid sequence set forth as SEQ ID NO:30,

(xvi) an amino acid sequence set forth as SEQ ID NO:32,

(xvii) an amino acid sequence set forth as SEQ ID NO:34,

(xviii) an amino acid sequence set forth as SEQ ID NO:36,

(xix) the amino acid sequence set forth as SEQ ID NO:53,

(xx) the amino acid sequence set forth as SEQ ID NO:55,

(xxi) the amino acid sequence set forth as SEQ ID NO:57,

(xxii) the amino acid sequence set forth as SEQ ID NO:59,

(xxiii) the amino acid sequence set forth as SEQ ID NO:61,

(xxiv) the amino acid sequence set forth as SEQ ID NO:63,

(xxv) the amino acid sequence set forth as SEQ ID NO:65,

(xxvi) the amino acid sequence set forth as SEQ ID NO:67,

(xxvii) the amino acid sequence set forth as SEQ ID NO:69,

(xxviii) the amino acid sequence set forth as SEQ ID NO:71,

(xxix) an amino acid sequence having at least 95% identity to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18, SEQ ID NO:20, SEQ ID NO:22, SEQ ID NO:24, SEQ ID NO:26, SEQ ID NO:28, SEQ ID NO:30, SEQ ID NO:32, SEQ ID NO:34, SEQ ID NO:36, SEQ ID NO:53, SEQ ID NO:55, SEQ ID NO:57, SEQ ID NO:59, SEQ ID NO:61, SEQ ID NO:63, SEQ ID NO:65, SEQ ID NO:67, SEQ ID NO:69, or SEQ ID NO:71, and

(xxx) an amino acid sequence of any VP2 and/or VP3 portions of the amino acid sequences set forth in any of (i)-(xxix).

9. An adeno-associated virus (AAV) capsid protein comprising an amino acid sequence, wherein the amino acid sequence has at least 95% identity to an amino acid sequence of a capsid protein of a non-primate animal AAV,

wherein the AAV capsid protein is selected from the group consisting of

(a) a chimeric AAV VP1 capsid protein, wherein the chimeric AAV VP1 capsid protein comprises a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle comprising the chimeric AAV VP1 capsid protein, optionally wherein the chimeric AAV VP1 capsid protein further comprises a detectable label and/or a point mutation that reduces the natural tropism of the AAV viral particle and/or creates a detectable label,

(b) a non-chimeric AAV VP1 capsid protein of the non-primate animal AAV comprising a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle comprising the non-chimeric AAV VP1 capsid protein, optionally wherein the non-chimeric AAV VP1 capsid protein further comprises a detectable label and/or a point mutation that reduces the natural tropism of the AAV viral particle and/or creates a detectable label,

(c) a chimeric VP2 capsid protein, wherein the chimeric AAV VP2 capsid protein comprises a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle comprising the chimeric AAV VP2 capsid protein, optionally wherein the chimeric AAV VP2 capsid protein further comprises a detectable label and/or a point mutation that reduces the natural tropism of the AAV viral particle and/or creates a detectable label,

(d) a non-chimeric AAV VP2 capsid protein of the non-primate animal AAV comprising a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle comprising the non-chimeric AAV VP2 capsid protein, optionally wherein the non-chimeric AAV VP2 capsid protein further comprises a detectable label and/or a point mutation that reduces the natural tropism of the AAV viral particle and/or creates a detectable label,

(e) a chimeric AAV VP3 capsid protein comprising a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle comprising the chimeric AAV VP3 capsid protein, optionally wherein the chimeric AAV

VP3 capsid protein further comprises a detectable label and/or a point mutation that reduces the natural tropism of the AAV viral particle and/or creates a detectable label, and

(f) a non-chimeric AAV VP3 capsid protein of the non-human AAV comprising a first member of a protein:protein binding pair, wherein the protein:protein binding pair directs the tropism of the AAV viral particle comprising the non-chimeric AAV VP3 capsid protein, optionally wherein the non-chimeric AAV VP3 capsid further comprises a detectable label and/or a point mutation that reduces the natural tropism of the AAV viral particle and/or creates a detectable label.

10. The AAV capsid protein of claim 9, wherein:

(a) the first member of the protein:protein binding pair is flanked by a first and/or second linker that link(s) the first member of a protein:protein binding pair to the capsid protein, and wherein the first and/or second linker is each independently at least one amino acid in length; and/or

(b) the capsid protein further comprises a second cognate member of the protein:protein binding pair, optionally wherein the first and second members are bound by a covalent bond, optionally an isopeptide bond; further optionally:

(i) wherein the first member of a protein:protein binding pair comprises SpyTag and/or the second cognate member comprises SpyCatcher;
(ii) the second cognate member comprises KTag;

(iii) the first member is KTag and the second cognate member comprises SpyTag;

(iv) the first member is SnoopTag and the second cognate member comprises SnoopCatcher;

(v) the first member is isopeptag and the second cognate member comprises Pilin-C; or

(vi) the first member is SpyTag002 and the second cognate member comprises SpyCatcher002.

11. The AAV capsid protein of claim 10(b), wherein the second member is operably linked to a targeting ligand, optionally wherein the targeting ligand is a binding moiety further optionally wherein the binding moiety is an antibody, or a portion thereof.

12. The AAV capsid protein of any one of claims 9-11, wherein:

(a) the detectable label comprises a B1 epitope comprising an amino acid sequence set forth as SEQ ID NO:45;

(b) said non-primate animal AAV is a non-primate AAV listed in Table 2;

(c) the non-primate AAV is an avian AAV (AAAV), a sea lion AAV or a bearded dragon AAV; optionally wherein the first member of the protein:protein binding pair is:

(i) at position I444 or I580 of a VP1 capsid protein of AAAV;

(ii) at position I573 or I436 of a VP1 capsid protein of a bearded dragon AAV; or

(iii) is at position selected from the group consisting of I429, I430, I431, I432, I433, I434, I436, I437, and A565 of a VP1 of a sea lion AAV.

13. The AAV capsid protein of any one of claims 9-12, wherein:

(a) the AAV capsid protein comprises an amino acid sequence selected from the group consisting of:

(i) an amino acid sequence set forth as SEQ ID NO:2,

(ii) an amino acid sequence set forth as SEQ ID NO:4,
(iii) an amino acid sequence set forth as SEQ ID NO:6,
(iv) an amino acid sequence set forth as SEQ ID NO:8,
(v) an amino acid sequence set forth as SEQ ID NO:10,
(vi) an amino acid sequence set forth as SEQ ID NO:12,
(vii) an amino acid sequence set forth as SEQ ID NO:14,
(viii) an amino acid sequence set forth as SEQ ID NO:16,
(ix) an amino acid sequence set forth as SEQ ID NO:18,
(x) an amino acid sequence set forth as SEQ ID NO:20,
(xi) an amino acid sequence set forth as SEQ ID NO:22,
(xii) an amino acid sequence set forth as SEQ ID NO:24,
(xiii) an amino acid sequence set forth as SEQ ID NO:26,
(xiv) an amino acid sequence set forth as SEQ ID NO:28,
(xv) an amino acid sequence set forth as SEQ ID NO:30,
(xvi) an amino acid sequence set forth as SEQ ID NO:32,
(xvii) an amino acid sequence set forth as SEQ ID NO:34,
(xviii) an amino acid sequence set forth as SEQ ID NO:36,
(xix) the amino acid sequence set forth as SEQ ID NO:53,
(xx) the amino acid sequence set forth as SEQ ID NO:55,
(xxi) the amino acid sequence set forth as SEQ ID NO:57,
(xxii) the amino acid sequence set forth as SEQ ID NO:59,
(xxiii) the amino acid sequence set forth as SEQ ID NO:61,
(xxiv) the amino acid sequence set forth as SEQ ID NO:63,
(xxv) the amino acid sequence set forth as SEQ ID NO:65,
(xxvi) the amino acid sequence set forth as SEQ ID NO:67,
(xxvii) the amino acid sequence set forth as SEQ ID NO:69,
(xxviii) the amino acid sequence set forth as SEQ ID NO:71,
(xxix) an amino acid sequence having at least 95% identity, to SEQ ID NO:2, SEQ ID NO:4, SEQ ID NO:6, SEQ ID NO:8, SEQ ID NO:10, SEQ ID NO:12, SEQ ID NO:14, SEQ ID NO:16, SEQ ID NO:18, SEQ ID NO:20, SEQ ID NO:22, SEQ ID NO:24, SEQ ID NO:26, SEQ ID NO:28, SEQ ID NO:30, SEQ ID NO:32, SEQ ID NO:34, SEQ ID

NO:36, SEQ ID NO:53, SEQ ID NO:55, SEQ ID NO:57, SEQ ID NO:59, SEQ ID NO:61, SEQ ID NO:63, SEQ ID NO:65, SEQ ID NO:67, SEQ ID NO:69, or SEQ ID NO:71, and

(xxx) an amino acid sequence of any VP2 and/or VP3 portions of the amino acid sequences set forth in any of (i)-(xxx); and/or

(b) the first member of the protein:protein binding pair comprises a detectable label; optionally wherein the detectable label comprises c-myc (SEQ ID NO:44).

14. An AAV particle comprising the AAV capsid protein of any one of claims 9-13.

15. A nucleic acid molecule comprising a *cap* gene encoding the AAV capsid protein of any one of claims 9-13.

16. An AAV particle according to any one of claims 1-8 or 14, comprising a nucleotide of interest.

17. A pharmaceutical composition comprising (a) an AAV particle according to any one of claims 1-8, 14 or 16, an AAV particle comprising an AAV capsid protein according to any one of claims 9-13, and (b) a pharmaceutically acceptable carrier or excipient.

18. The AAV particle according to any one of claims 1-8, 14 or 16, the AAV particle comprising an AAV capsid protein according to any one of claims 9-13 or the composition according to claim 17, for use in a method of delivering a nucleotide of interest to a target cell comprising contacting the target cell with said AAV particle or said composition; optionally wherein:

(a) the capsid of the AAV particle comprises a targeting ligand that specifically binds a protein expressed on the surface the target cell; further optionally
wherein:

(i) the contacting is performed *ex vivo*; or

(ii) the target cell is in a subject; optionally wherein the subject is a primate animal, preferably a human;

(b)

(i) the target cell is a human cell; and/or

(ii) the nucleotide of interest encodes a therapeutic protein, a suicide gene, an antibody or a fragment thereof, a CRISPR/Cas system or a portion(s) thereof, an antisense oligonucleotide, a ribozyme, an RNAi molecule, or a shRNA molecule.