CLAIMS

1. An adeno-associated virus (AAV) comprising an AAV8 capsid having an amino acid sequence having the sequence of amino acids 1 to 738 of SEQ ID NO: 95 or a sequence having at least 95% identity therewith, wherein said AAV further comprises a minigene having AAV inverted terminal repeats (ITRs) and a heterologous gene operably linked to regulatory sequences which direct its expression in a host cell.

2. The AAV according to claim 1 wherein the ITRs are from AAV 2.

3. A recombinant capsid protein comprising an AAV8 protein selected from the group consisting of:

vp1 capsid protein, amino acids (aa) 1 to 738 of SEQ ID NO: 95
vp2 capsid protein, ~~amino acids (~~aa~~)~~ 138 to 738 of SEQ ID NO: 95;
vp3 capsid protein, aa 203 to 738 of SEQ ID NO: 95;
or a sequence having at least 95% identity with vp1, vp2 or vp3.

4. An adeno-associated virus (AAV) comprising an AAV8 vp3 capsid having an amino acid sequence having the sequence of amino acids 203 to 738 of SEQ ID NO: 95 or a sequence having at least 95% identity therewith, wherein said AAV further comprises a minigene having AAV inverted terminal repeats (ITRs) and a heterologous gene operably linked to regulatory sequences which direct its expression in a host cell.

5. An isolated or synthetic nucleic acid molecule encoding a protein according to claim 3.

6. An isolated or synthetic nucleic acid molecule encoding a novel adeno-associated virus (AAV) 8 capsid protein having an amino acid sequence 1 to 738 of SEQ ID NO: 95.

7. An isolated or synthetic nucleic acid molecule encoding a fragment of an

adeno-associated virus 8 capsid protein, said nucleic acid sequence selected from the group consisting of:

vpl, nt 2121 to 4335 of SEQ ID NO: 4;

vp2, nt 2532 to 4335 of SEQ ID NO: 4;

vp3, nt 2730 to 4335 of SEQ ID NO: 4;

and a sequence sharing at least 95% identity with vpl, vp2 or vp3.

8. A molecule according to any of claims 5 to 7, wherein said molecule is a plasmid.

9. A molecule according to any of claims 5 to 7, wherein said molecule further comprises a functional AAV *rep* gene.

10. A method of generating a recombinant adeno-associated virus (AAV) comprising an AAV serotype capsid comprising the steps of culturing a host cell containing: (a) a molecule according to any of claims 5 to 7 which encodes an adeno-associated virus capsid; (b) a functional rep gene; (c) a minigene comprising AAV inverted terminal repeats (ITRs) and a transgene; and (d) sufficient helper functions to permit packaging of the minigene into the AAV capsid protein.

11. An in vitro host cell transfected with an adeno-associated virus according to any of claims 1 to 2 or a molecule according to any of claims 5 to 9.

12. A composition comprising an AAV according to claim 1 or claim 4, and a physiologically compatible carrier.

13. A composition comprising a molecule according to any of claims 6 to 9 and a physiologically compatible carrier.

14. An adeno-associated virus (AAV) comprising an AAV8 vp2 capsid having an amino acid sequence having the sequence of amino acids 138 to 738 of SEQ ID NO: 95 or a sequence having at least 95% identity therewith, wherein said AAV further comprises a

minigene having AAV inverted terminal repeats (ITRs) and a heterologous gene operably linked to regulatory sequences which direct its expression in a host cell.

15. The AAV according to claim 1, 4 or 14, wherein the heterologous gene is an immunoglobulin.

16. The AAV according to claim 1, 4 or 14, wherein the heterologous gene is a Factor VIII.

17. The AAV according to claim 1, 4 or 14, wherein the heterologous gene is a Factor IX.

~~18. A recombinant adeno-associated virus (r AAV) comprising an AAV capsid having an amino acid sequence selected from the group consisting of:~~

~~C1, SEQ ID NO:60; C2, SEQ ID NO:61; C5, SEQ ID NO:62; A3-3, SEQ ID NO:66; A3-7, SEQ ID NO:67; A3-4, SEQ ID NO:68; A3-5, SEQ ID NO: 69; 3.3b, SEQ ID NO: 62; 223.4, SEQ ID NO: 73; 223-5, SEQ ID NO:74; 223-10, SEQ ID NO:75; 223-2, SEQ ID NO:76; 223-7, SEQ ID NO: 77; 223-6, SEQ ID NO: 78; 44-1, SEQ ID NO: 79; 44-5, SEQ ID NO:80; 44-2, SEQ ID NO:81; 42-15, SEQ ID NO: 84; 42-8, SEQ ID NO: 85; 42-13, SEQ ID NO:86; 42-3A, SEQ ID NO:87; 42-4, SEQ ID NO:88; 42-5A, SEQ ID NO:89; 42-1B, SEQ ID NO:90; 42-5B, SEQ ID NO:91; 43-1, SEQ ID NO: 92; 43-12, SEQ ID NO: 93; 43-5, SEQ ID NO:94; 43-21, SEQ ID NO:96; 43-25, SEQ ID NO: 97; 43-20, SEQ ID NO:99; 24.1, SEQ ID NO: 101; 42.2, SEQ ID NO:102; 7.2, SEQ ID NO: 103; 27.3, SEQ ID NO: 104; 16.3, SEQ ID NO: 105; 42.10, SEQ ID NO: 106; 42-3B, SEQ ID NO: 107; 42-11, SEQ ID NO: 108; F1, SEQ ID NO: 109; F5, SEQ ID NO: 110; F3, SEQ ID NO:111; 42-6B, SEQ ID NO: 112; and 42-12, SEQ ID NO: 113.~~

~~19. A recombinant protein comprising a fragment of an AAV capsid protein, said fragment selected from the group consisting of:~~

~~vp2 capsid protein, amino acids (aa) 138 to 738;~~

~~vp3 capsid protein, aa 203 to 738;~~

~~hypervariable region (HVR)1 through 12: aa 146 to 152; aa 182 to 187; aa 262 to 264; aa 263 to 266; aa 263 to 266; aa 381 to 383; aa 383 to 385; aa 450 to 474; aa 451 to 475; aa 490 to 495; aa 491 to 496; aa500 to 504; aa 501 to 505; aa 514 to 522; aa 533 to 554; aa~~

534 to 555; aa 581 to 594; aa 583 to 596; aa 658 to 667; aa 660 to 669; and aa 705 to 719; aa 707 to 772;

aa 24 - 42, aa 25 - 28; aa 81 - 85; aa133 to 165; aa 134 - 165; aa 137 to 143; aa 154 to 156; aa 194 to 208; aa 261 to 274; aa 262 to 274; aa 171 to 173; aa 413 to 417; aa 449 to 478; aa 494 to 525; aa 534 to 571; aa 581 to 601; aa 660 to 671; aa 709 to 723; and

aa 1 to 184, aa 199 to 259; aa 274 to 446; aa 603 to 659; aa 670 to 706; aa 724 to 736; aa 185 to 198; aa 260 to 273; aa 447 to 477; aa 495 to 602; aa 660 to 669; and aa 707 to 723,

wherein the amino acid numbers are those of the AAV7 capsid, SEQ ID NO:2, and refer to the corresponding regions in the capsid of Cl, SEQ ID NO:60; C2, SEQ ID NO:61; C5, SEQ ID NO:62; A3-3, SEQ ID NO:66; A3-7, SEQ ID NO:67; A3-4, SEQ ID NO:68; A3-5, SEQ ID NO: 69; 3.3b, SEQ ID NO: 62; 223.4, SEQ ID NO: 73; 223-5, SEQ ID NO:74; 223-10, SEQ ID NO:75; 223-2, SEQ ID NO:76; 223-7, SEQ ID NO: 77; 223-6, SEQ ID NO: 78; 44-1, SEQ ID NO: 79; 44-5, SEQ ID NO:80; 44-2, SEQ ID NO:81; 42-15, SEQ ID NO: 84; 42-8, SEQ ID NO: 85; 42-13, SEQ ID NO:86; 42-3A, SEQ ID NO:87; 42-4, SEQ ID NO:88; 42-5A, SEQ ID NO:89; 42-1B, SEQ ID NO:90; 42-5B, SEQ ID NO:91; 43-1, SEQ ID NO: 92; 43-12, SEQ ID NO: 93; 43-5, SEQ ID NO:94; 43-21, SEQ ID NO:96; 43-25, SEQ ID NO: 97; 43-20, SEQ ID NO:99; 24.1, SEQ ID NO: 101; 42.2, SEQ ID NO:102; 7.2, SEQ ID NO: 103; 27.3, SEQ ID NO: 104; 16.3, SEQ ID NO: 105; 42.10, SEQ ID NO: 106; 42-3B, SEQ ID NO: 107; 42-11, SEQ ID NO: 108; Fl, SEQ ID NO: 109; F5, SEQ ID NO: 110; F3, SEQ ID NO:111; 42-6B, SEQ ID NO: 112; and 42-12, SEQ ID NO: 113.

20. An artificial adeno-associated virus (AAV) capsid protein comprising one or more of the protein fragments according to claim 19.

21. A recombinant adeno-associated virus (rAAV) comprising an artificial capsid according to claim 20.

22. A recombinant molecule comprising a nucleic acid sequence encoding a protein according to claim 19 or 20.

23. A recombinant molecule comprising a nucleic acid sequence encoding a novel adeno-associated virus (AAV) serotype capsid protein having an amino acid sequence selected from the group consisting of: Cl, SEQ ID NO:60; C2, SEQ ID NO:61; C5, SEQ ID NO:62; A3-3, SEQ ID NO:66; A3-7, SEQ ID NO:67; A3-4, SEQ ID NO:68; A3-5, SEQ ID

~~NO: 69; 3.3b, SEQ ID NO: 62; 223.4, SEQ ID NO: 73; 223-5, SEQ ID NO:74; 223-10, SEQ ID NO:75; 223-2, SEQ ID NO:76; 223-7, SEQ ID NO: 77; 223-6, SEQ ID NO: 78; 44-1, SEQ ID NO: 79; 44-5, SEQ ID NO:80; 44-2, SEQ ID NO:81; 42-15, SEQ ID NO: 84; 42-8, SEQ ID NO: 85; 42-13, SEQ ID NO:86; 42-3A, SEQ ID NO:87; 42-4, SEQ ID NO:88; 42-5A, SEQ ID NO:89; 42-1B, SEQ ID NO:90; 42-5B, SEQ ID NO:91; 43-1, SEQ ID NO: 92; 43-12, SEQ ID NO: 93; 43-5, SEQ ID NO:94; 43-21, SEQ ID NO:96; 43-25, SEQ ID NO: 97; 43-20, SEQ ID NO:99; 24.1, SEQ ID NO: 101; 42.2, SEQ ID NO:102; 7.2, SEQ ID NO: 103; 27.3, SEQ ID NO: 104; 16.3, SEQ ID NO: 105; 42.10, SEQ ID NO: 106; 42-3B, SEQ ID NO: 107; 42-11, SEQ ID NO: 108; Fl, SEQ ID NO: 109; F5, SEQ ID NO: 110; F3, SEQ ID NO:111; 42-6B, SEQ ID NO: 112; and 42-12, SEQ ID NO: 113.~~

~~24. A recombinant molecule comprising a nucleic acid sequence encoding a novel adeno-associated virus (AAV) serotype capsid protein, said nucleic acid sequence selected from the group consisting of: AAV5, SEQ ID NO:2; 42-2 , SEQ ID NO:9; 42-8, SEQ ID NO:27; 42-15 , SEQ ID NO:28; 42-5b , SEQ ID NO: 29; 42-lb , SEQ ID NO:30; 42-13, SEQ ID NO: 31; 42-3a , SEQ ID NO: 32; 42-4 , SEQ ID NO:33; 42-5a , SEQ ID NO: 34; 42-10, SEQ ID NO:35; 42-3b, SEQ ID NO: 36; 42-11, SEQ ID NO: 37; 42-6b, SEQ ID NO:38; 43-1, SEQ ID NO: 39; 43-5, SEQ ID NO: 40; 43-12 , SEQ ID NO:41; 43-20, SEQ ID NO:42; 43-21, SEQ ID NO: 43; 43-23, SEQ ID NO:44; 43-25 , SEQ ID NO: 45; 44.1, SEQ ID NO:47; 44.5, SEQ ID NO:47; 223.10, SEQ ID NO:48;~~

~~223.2 , SEQ ID NO:49; 223.4, SEQ ID NO:50; 223.5, SEQ ID NO: 51; 223.6, SEQ ID NO: 52; 223.7, SEQ ID NO: 53; A3.4, SEQ ID NO: 54; A3.5, SEQ ID NO:55; A3.7 , SEQ ID NO: 56; A3.3 , SEQ ID NO:57; 42.12, SEQ ID NO: 58; 44.2, SEQ ID NO: 59; AAV10 , SEQ ID NO: 117; AAV11, SEQ ID NO: 118; AAV12 , SEQ ID NO:119; A3.1, SEQ ID NO:120; and H6, SEQ ID NO: 25.~~

~~25. A recombinant molecule comprising a nucleic acid sequence encoding a fragment of an adeno-associated virus capsid protein, said nucleic acid sequence selected from the group consisting of:~~

~~vpl, nt 825 to 3049;~~

~~vp2, nt 1234 to 3049;~~

~~vp 3, nt 1434 to 3049;~~

~~nt 468 to 3090; and~~

~~nt 725 to 3090,~~

wherein the nucleotides numbers are of AAV7, SEQ ID NO:1 and correspond to sequences in 42-2 , SEQ ID NO:9; 42-8 , SEQ ID NO:27; 42-15 , SEQ ID NO:28; 42-5b , SEQ ID NO: 29; 42-1b , SEQ ID NO:30; 42-13, SEQ ID NO: 31; 42-3a , SEQ ID NO: 32; 42-4 , SEQ ID NO:33; 42-5a , SEQ ID NO: 34; 42-10, SEQ ID NO:35; 42-3b, SEQ ID NO: 36; 42-11, SEQ ID NO: 37; 42-6b, SEQ ID NO:38; 43-1, SEQ ID NO: 39; 43-5, SEQ ID NO: 40; 43-12, SEQ ID NO:41; 43-20, SEQ ID NO:42; 43-21, SEQ ID NO: 43; 43-23, SEQ ID NO:44; 43-25, SEQ ID NO: 45; 44.1, SEQ ID NO:47; 44.5, SEQ ID NO:47; 223.10, SEQ ID NO:48; 223.2 , SEQ ID NO:49; 223.4, SEQ ID NO:50; 223.5, SEQ ID NO: 51; 223.6, SEQ ID NO: 52; 223.7, SEQ ID NO: 53; A3.4, SEQ ID NO: 54; A3.5, SEQ ID NO:55; A3.7 , SEQ ID NO: 56; A3.3 , SEQ ID NO:57; 42.12, SEQ ID NO: 58; 44.2, SEQ ID NO: 59; AAV10 , SEQ ID NO: 117; AAV11, SEQ ID NO: 118; AAV12 , SEQ ID NO:119; A3.1, SEQ ID NO:120; and H6, SEQ ID NO: 25.

26. The recombinant molecule according to any one of claims 22-25, wherein said molecule is a plasmid.

27. The recombinant molecule according to any one of claims 22-25, wherein said molecule further comprises a functional AAV *rep* gene.

28. A method of generating a recombinant adeno-associated virus (AAV) comprising an AAV serotype capsid comprising the steps of culturing a host cell containing: (a) a molecule according to any one of claims 22-25 which encodes an adeno-associated virus capsid; (b) a functional rep gene; (c) a minigene comprising AAV inverted terminal repeats (ITRs) and a transgene; and (d) sufficient helper functions to permit packaging of the minigene into the AAV capsid protein.

29. A host cell transfected with an adeno-associated virus according to claim 28 or a molecule according to any one of claims 22-25.

30. A composition comprising an AAV according to claim 18 or claim 21, and a physiologically compatible carrier.

31. A composition comprising a molecule according to any one of claims 22-25and a physiologically compatible carrier.

~~32. A method of delivering a transgene to a cell, said method comprising the step of contacting the cell with an AAV according to claim 18 or claim 21, wherein said rAAV comprises the transgene.~~