WHAT IS CLAIMED IS:

1. A synthetic chimeric orthopoxvirus (scOPV), wherein the scOPV is replicated and reactivated from DNA derived from chemically synthesized DNA, wherein the wild type genome corresponding to said scOPV is selected from the group consisting of a horsepox virus, a vaccinia virus, a camelpox virus, a cowpox virus, an ectromelia virus, a monkeypox virus, a variola virus, a rabbitpox virus, a raccoonpox virus, a skunkpox virus, a Taterapox virus, and a volepox virus, wherein said scOPV comprises a right terminal hairpin loops and a left terminal hairpin loop, one or both of the loops being heterologous to the corresponding wild type genome, and wherein the scOPV comprises one or more modifications being selected from the group consisting of modifications that eliminate one or more restriction sites and modifications that introduce one or more unique restriction sites.

2. The scOPV of claim 1, wherein the one or both of the terminal hairpin loops are derived from a vaccinia virus.

3. The scOPV of claim 2, wherein the one or both of the terminal hairpin loops are independently selected from the group consisting of a slow form and a fast form of a vaccinia virus terminal hairpin loop.

4. The scOPV of claim 1, wherein the scOPV is replicated and reactivated from overlapping chemically synthesized DNA fragments corresponding to substantially all of the corresponding wild type genome and wherein one or both of the terminal hairpin loops are derived from a vaccinia virus, a camelpox virus, a cowpox virus, an ectromelia virus, a monkeypox virus, a variola virus, a rabbitpox virus, a raccoon poxvirus, a skunkpox virus, a Taterapox virus, or a volepox virus.

5. The scOPV of claim 4, wherein the scOPV is replicated and reactivated from DNA derived from 1-14 overlapping chemically synthesized DNA fragments.

6. The scOPV of any one of claims 1, 2, 3, 4, or 5, wherein the scOPV is reactivated using leporipox virus-catalyzed recombination and reactivation.

7. A synthetic chimeric horsepox virus (scHPXV), wherein the scHPXV is replicated and reactivated from DNA derived from chemically synthesized DNA, wherein the genome of said scHPXV corresponds to a wild type genome of HPXV, wherein the scHPXV comprises a right terminal hairpin loop and a left terminal hairpin loop, one or both of the loops being heterologous to the corresponding wild type genome, wherein the scHPXV comprises one or more modifications being selected from the group consisting of modifications that eliminate one or more restriction sites and modifications that introduce one or more unique restriction sites.

8. The scHPXV of claim 7, wherein the one or more modifications eliminate one or more of the AarI or BsaI restriction sites.

9. The scHPXV of claim 7, wherein one or both of the terminal hairpin loops are derived from a vaccinia virus, a camelpox virus, a cowpox virus, an ectromelia virus, a monkeypox virus, a variola virus, a rabbitpox virus, a raccoonpox virus, a skunkpox virus, a Taterapox virus, or a volepox virus.

10. The scHPXV of claim 9, wherein the one or both terminal hairpin loops comprise left and right terminal hairpin loops derived from a vaccinia virus.

11. The scHPXV of claim 10, wherein the one or more of the terminal hairpin loops are independently selected from the group consisting of a slow form and a fast form of a vaccinia virus terminal hairpin loop.

12. The scHPXV of claim 11, wherein the slow form comprises a nucleotide sequence that is at least 90% identical to the sequence of SEQ ID NO: 11 and the fast form comprises a nucleotide sequence that is at least 90% identical to the nucleotide sequence of SEQ ID NO: 12.

13. The scHPXV of claim 11, wherein the slow form consists of the nucleotide sequence of SEQ ID NO: 11 and the fast form consists of the nucleotide sequence of SEQ ID NO: 12.

14. The scHPXV of claim 7, wherein the scHPXV is replicated and assembled from overlapping chemically synthesized DNA fragments that correspond to substantially all of the corresponding wild type HPXV genome and wherein the one or both terminal hairpin loops are derived from one or more of a vaccinia virus, a camelpox virus, a cowpox virus, an ectromelia virus, a monkeypox virus, a variola virus, a rabbitpox virus, a racconpox virus, a skunkpox virus, a Taterapox virus, or a volepox virus.

15. The scHPXV of claim 14, wherein the scHPXV is replicated and reactivated from DNA derived from 1-14 overlapping chemically synthesized DNA fragments.

16. The scHPXV of claim 7, wherein the scHPXV is reactivated using leporipox virus-catalyzed recombination and reactivation.

17. A synthetic chimeric orthopox virus (scOPV) generated by a method comprising the steps of:

(i) chemically synthesizing overlapping DNA fragments that correspond to substantially all of a wild type genome selected from the group consisting of a horsepox virus, a vaccinia virus, a camelpox virus, a cowpox virus, an ectromelia virus, a monkeypox virus, a variola virus, a rabbitpox virus, a raccoonpox virus, a skunkpox virus, a Taterapox virus, and a volepox virus, wherein one or more of the overlapping DNA fragments are characterized by one or more modifications selected from the group consisting of modifications that eliminate one or more restriction sites sand modifications that introduce one or more unique restriction sites;
(ii) chemically synthesizing terminal hairpin loops of a poxvirus and ligating the terminal hairpin loops to the overlapping DNA fragments derived from the chemically synthesized DNA that comprise the left and right termini of the viral genome, wherein one or both the terminal hairpin loops are derived from one or more of a vaccinia

virus, a camelpox virus, a cowpox virus, an ectromelia virus, a monkeypox virus, a variola virus, a rabbitpox virus, a racconpox virus, a skunkpox virus, a Taterapox virus, or a volepox virus;
(iii) transfecting the overlapping DNA fragments derived from the overlapping chemically synthesized DNA fragments of steps (i) and (ii) into helper virus-infected cells;
(iv) culturing said cells to produce a mixture of helper virus and scOPV particles in said cells; and
(v) plating the mixture on OPV-specific host cells to recover the scOPV.

18. A synthetic chimeric horsepox virus (scHPXV) generated by a method comprising the steps of:

(i) chemically synthesizing overlapping DNA fragments that correspond to substantially all of a wild type HPXV genome, wherein one or more of the overlapping DNA fragments are characterized by one or more modification selected from the group consisting of modifications that eliminate one or more restriction sites and modifications that introduce one or more unique restriction sites;
(ii) chemically synthesizing one or more terminal hairpin loops of a poxvirus and ligating the terminal hairpin loops to the overlapping DNA fragments derived from the chemically synthesized DNA that comprise the left and right termini of the viral genome, wherein one or both of the terminal hairpin loops are derived from one or more of a vaccinia virus, a camelpox virus, a cowpox virus, an ectromelia virus, a monkeypox virus, a variola virus, a rabbitpox virus, a raccoonpox virus, a skunkpox virus, a Taterapox virus, or a volepox virus;
(iii) transfecting the overlapping DNA fragments derived from the overlapping chemically synthesized DNA fragments of steps (i) and (ii) into helper virus-infected cells;
(iv) culturing said cells to produce a mixture of helper virus and scHPXV particles in said cells; and
(v) plating the mixture on HPXV-specific host cells to recover the scHPXV.

19. A composition comprising the scOPV of claim 1 or 17 and a pharmaceutically acceptable carrier.

20. A composition comprising the scHPXV of claim 7 or 18 and a pharmaceutically acceptable carrier.