WHAT IS CLAIMED IS:

1. An isolated polynucleotide comprising a first nucleic acid sequence of SEQ ID NO:75.

2. The polynucleotide of claim 1, further comprising a second nucleic acid sequence of SEQ ID NO:66.

3. A vector comprising the polynucleotide of claim 1, wherein the vector, upon uptake by a suitable host cell, expresses the amino acid sequences of SEQ ID NO:76.

4. A vector comprising the polynucleotide of claim 2, wherein the vector, upon uptake by a suitable host cell, expresses the amino acid sequences of SEQ ID NO:76 and SEQ ID NO:78.

5. The vector of claim 4, wherein said amino acid sequences are expressed as a fusion protein.

6. The vector of any one of claims 3-5, wherein the vector is a plasmid.

7. The vector of claim 7, which is plasmid VR4762 or plasmid VR4759.

8. A composition comprising the vector of claim 3 or claim 4, and a carrier.

9. The composition of claim 8, further comprising a component selected from the group consisting of an adjuvant and a transfection facilitating compound.

10. The composition of claim 9, wherein the component is a cationic lipid.

11. The composition of claim 9, wherein the adjuvant comprises (±)-N-(3-aminopropyl)-N,N-dimethyl-2,3-bis(syn-9-tetradeceneyloxy)-1-propanaminium bromide (GAP-DMORIE) and a neutral lipid, wherein the neutral lipid is selected from the group consisting of:

a) 1,2-dioleoyl-sn-glycero-3-phosphoethanolamine (DOPE);

b) 1,2-diphytanoyl-sn-glycero-3-phosphoethanolamine (DPyPE); and

c) 1,2-dimyristoyl-glycero-3-phosphoethanolamine (DMPE).

12. The composition of claim 9, wherein the transfection facilitating compound comprises (±)-N-(2-hydroxyethyl)-N,N-dimethyl-2,3-bis(tetradecyloxyl)-1-propanaminium bromide (DMRIE).

13. The composition of claim 12, wherein the transfection facilitating compound further comprises a neutral lipid.

14. The composition of claim 13, wherein the neutral lipid is DOPE.

15. The composition of claim 11, comprising a 1:1 molar ratio of GAP-DMORIE and DPyPE.

16. Use of the composition according to any one of claims 8-15, in the preparation of a medicament for the treatment of influenza in a vertebrate.

CLAIMS:

1. An isolated polypeptide produced by a polynucleotide comprising a nucleic acid fragment which encodes the amino acid sequence of SEQ ID NO:76, wherein the codons of said nucleic acid fragment are optimized for expression in humans.

2. The isolated polypeptide of claim 1, wherein said nucleic acid fragment encoding the isolated polypeptide comprises SEQ ID NO:75.

3. An isolated polypeptide comprising the amino acid sequence of SEQ ID NO 76, wherein said polypeptide, upon administration to a vertebrate elicits a detectable immune response against SEQ ID NO:76.

4. The isolated polypeptide of any one of the preceding claims further comprising a heterologous polypeptide fused to said polypeptide.

5. The isolated polypeptide of claim 4, wherein said heterologous polypeptide is hepatitis B core antigen.

6. The isolated polypeptide of claim 5, wherein said hepatitis core antigen comprises at least 50 amino acids of a polypeptide selected from the group consisting of SEQ ID NO:40 and SEQ ID NO:42.

7. The isolated polypeptide of claim 4, wherein said heterologous polypeptide comprises at least the extracellular domain of an influenza virus M2 protein.

8. A composition comprising the isolated polypeptide of any one of the preceding claims and an adjuvant.

9. An isolated polynucleotide comprising a first nucleic acid fragment, which encodes the amino acid sequence of SEQ ID NO:78 and a second nucleic acid fragment which encodes the amino acid sequence of SEQ ID NO:76, wherein the codons of said first and second nucleic acid fragments are optimized for expression in humans.

10. The isolated polynucleotide of claim 9, wherein the nucleotide sequences of said first nucleic acid fragment is SEQ ID NO:66 and wherein the nucleotide sequence of said second nucleic acid fragment is SEQ ID NO:75.

11. A vector comprising the isolated polynucleotide of claim 9, wherein said vector, upon uptake by a suitable host cell, expresses said amino acid sequences of SEQ ID NO:78 and SEQ ID NO:76.

12. The vector of claim 11, wherein said amino acid sequences of SEQ ID NO:78 and SEQ ID NO:76 are expressed as a fusion protein.

13. A vector comprising the polynucleotide of claim 9 or 10, wherein said vector is DNA and wherein said vector comprises a first expression cassette and second expression cassette, said first expression cassette comprises a first nucleic acid fragment, which encodes the amino acid sequence of SEQ ID NO:78 in operable association with a promoter, and said second expression cassette comprises a second nucleic acid fragment which encodes the amino acid sequence of SEQ ID NO:76 in operable association with a promoter.

14. The vector of claim 13, wherein said first expression cassette and said second expression cassette are associated with separate promoters.

15. The vector of claim 14, wherein said separate promoters are non-identical.

16. The vector of claim 13, wherein said first expression cassette and said second expression cassette are associated with a single promoter, and wherein said second expression cassette is in operable association with an internal ribosome entry site (IRES).

17. The vector of claim 14, wherein said first expression cassette and said second expression cassette are associated with a single promoter, and wherein said first expression cassette is in operable association with an internal ribosome entry site (IRES).

18. A composition comprising the vector of any one of claims 11 to 17 and a carrier.

19. A composition comprising at least two non-identical vectors, wherein one of said vectors comprises a nucleic acid fragment which encodes the amino acid sequence of SEQ ID NO:78 and wherein another of said vectors comprises a nucleic acid fragment which encodes the amino acid sequence of SEQ ID NO:76, wherein the codons of said nucleic acid fragments encoding SEQ ID NO:78 and SEQ ID NO:76 are optimized for expression in humans, and wherein said vectors, upon uptake by a suitable host cell, express said amino acid sequences.

20. The composition of claim 19, further comprising a carrier.

21. The composition of claim 19 or 20, further comprising a component selected from the group consisting of an adjuvant and a transfection facilitating compound.

22. The composition of claim 21, wherein said transfection facilitating compound is a cationic lipid.

23. The composition of claim 21 or 22, wherein said adjuvant comprises (±)-N-(3-aminopropyl)-N,N-dimethyl-2,3-bis(*syn*-9-tetradecenyloxy)-1-propanaminium bromide (GAP-DMORIE) and a neutral lipid, wherein said neutral lipid is selected from the group consisting of:

(a) 1,2-dioleoyl-*sn*-glycero-3-phosphoethanolamine (DOPE);

(b) 1,2-diphytanoyl-*sn*-glycero-3-phosphoethanolamine (DPyPE); and

(c) 1,2-dimyristoyl-glycero-3-phosphoethanolamine (DMPE).

24. The composition of claim 21 or 22, wherein said transfection facilitating compound comprises (±)-N-(2-hydroxyethyl)-N,N-dimethyl-2,3-bis(tetradecyloxy)-1-propanaminium bromide (DMRIE).

25. The composition of claim 24, wherein said transfection facilitating compound further comprises a neutral lipid.

26. The composition of claim 25, wherein the neutral lipid is DOPE.

27. The composition of claim 23 further comprising a 1:1 molar ratio of CAP-DMORIE and DPyPE.

28. Use of a composition according to claim 8 or any one of claims 18 to 27 for the preparation of a medicament for treating or preventing influenza infection in a vertebrate.