CLAIMS

We claim:

1. An engineered deoxyribose-phosphate aldolase comprising a polypeptide sequence having at least 95% sequence identity to SEQ ID NO: 2 or a functional fragment thereof, wherein said engineered deoxyribose-phosphate aldolase comprises a substitution in said polypeptide sequence of X145C/R/K, and wherein said engineered deoxyribose-phosphate aldolase has at least 1.2 fold increased activity on (R)-2-ethynyl-glyceraldehyde as compared to the wild-type polypeptide sequence of SEQ ID NO:2, and wherein the amino acid positions of said polypeptide sequence are numbered with reference to SEQ ID NO: 2.

2. The engineered deoxyribose-phosphate aldolase of Claim 1, wherein said engineered deoxyribose-phosphate aldolase comprises a polypeptide sequence that is at least 95% identical to the sequence of at least one engineered deoxyribose-phosphate aldolase variant set forth in the even numbered sequences of SEQ ID NOS: 6, 12, 42, 104, or 140-478.

3. The engineered deoxyribose-phosphate aldolase of Claim 1, wherein said engineered deoxyribose-phosphate aldolase comprises a polypeptide sequence forth in the even numbered sequences of SEQ ID NOS: 6, 12, 42, 104, or 140-478.

4. The engineered deoxyribose-phosphate aldolase of Claim 1, wherein said engineered deoxyribose-phosphate aldolase is purified.

5. A composition comprising at least one engineered deoxyribose-phosphate aldolase provided in Claim 1.

6. A polynucleotide sequence encoding at least one engineered deoxyribose-phosphate aldolase of Claim 1.

7. An engineered polynucleotide sequence encoding at least one engineered deoxyribose-phosphate aldolase of Claim 1, wherein said polynucleotide sequence comprises at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to SEQ ID NO: 1, 5, and/or 465, wherein the polynucleotide sequence of said engineered deoxyribose-phosphate aldolase comprises at least one substitution at one or more positions.

8. A engineered polynucleotide sequence encoding at least one engineered deoxyribose-phosphate aldolase of Claim 1 comprising at least 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, 99%, or more sequence identity to SEQ ID NO: 1, 5, and/or 465, or a functional fragment thereof.

9. The engineered polynucleotide sequence of Claim 7, wherein said engineered polynucleotide sequence comprises a sequence forth in the odd numbered sequences of SEQ ID NOS: 1-477.

10. The engineered polynucleotide sequence of Claim 7, wherein said polynucleotide sequence is operably linked to a control sequence.

11. The engineered polynucleotide sequence of Claim 7, wherein said engineered polynucleotide sequence is codon optimized.

12. An expression vector comprising at least one polynucleotide sequence of Claim 6.

13. A host cell comprising at least one expression vector of Claim 12.

14. A host cell comprising at least one polynucleotide sequence of Claim 6.

15. A method of producing an engineered deoxyribose-phosphate aldolase in a host cell, comprising culturing the host cell of Claim 13, in a culture medium under suitable conditions, such that at least one engineered deoxyribose-phosphate aldolase is produced.

16. The method of Claim 15, further comprising recovering at least one engineered deoxyribose-phosphate aldolase from the culture medium and/or host cell.

17. The method of Claim 16, further comprising the step of purifying said at least one engineered deoxyribose-phosphate aldolase.