

Description of Additional Supplementary Files:

Supplementary Data 1: Oligonucleotides used in this study.

Supplementary Data 2: Composition of CPS biosynthesis operons, gene annotation.

Supplementary Data 3: Tsr regions in the *B. fragilis* genome.

Supplementary Data 4: Differentially expressed *B. fragilis* genes per pseudotime bin.

Supplementary Data 5: Genomic variants identified with Snippy v 5.2 in the WGS data for the ancestral *B. fragilis* wt strain, resistant isolates and "phase-locked" CPS strains.

Supplementary Data 6: Antiphage defense systems and their gene composition predicted with DefenseFinder v 1.2.2 in the *B. fragilis* NCTC 9343 genome.

Supplementary Data 7: Functional annotation of phage genes, their functional and temporal categories, and their median pseudotime expression values.

Supplementary Data 8: Modelling of phage early genes products structures with AlphaFold 3 and similarity search with Dali. Modelling of early genes products complexes with defense systems proteins

Supplementary Data 9: NGS datasets generated in this study.