

**Supplementary materials:**  
**Table S1.** Primers used in this study.

<b>Name</b>	<b>Sequences (5'-3')</b>
<b>gRNA-up</b>	ACTAGTATTATACCTAGGACTGAG
<b>gRNA-down-mgsA</b>	GTCCTAGGTATAAATACTAGT <u>AACGTCAACGCGATGTTGAGGTTTTAGAGCTAGAAATAGC</u>
<b>gRNA-down-frdA</b>	GTCCTAGGTATAAATACTAGT <u>AAATGACCCAACTGGAAGTGGTTTTAGAGCTAGAAATAGC</u>
<b>gRNA-down-ldhA</b>	GTCCTAGGTATAAATACTAGT <u>AAAACCGCTAAAAGTGGCAAGTTTTAGAGCTAGAAATAGC</u>
<b>gRNA-down-pta</b>	GTCCTAGGTATAAATACTAGT <u>ACGATAGTCGTAGTCTGATCGTTTTAGAGCTAGAAATAGC</u>
<b>gRNA-down-adhE</b>	GTCCTAGGTATAAATACTAGT <u>GACTCTGGGTTGTGGTTCCIGTTTTAGAGCTAGAAATAGC</u>
<b>gRNA-pl-promoter-atoD-down</b>	GTCCTAGGTATAAATACTAGT <u>AACATTCAATAATCTCATTGTTTTAGAGCTAGAAATAGC</u>
<b>gRNA-H-NS-down</b>	GTCCTAGGTATAAATACTAGT <u>TTACAGCTGGAGTACGGCCCGTTTTAGAGCTAGAAATAGC</u>
<b>frdA-L-up</b>	ACTGGTGATACTTCGCCATC
<b>frdA-L-down</b>	CACTAATCTCAAAAAGTATACCGGTGGCGAAGCGGATGC 阿 AG
<b>frdA-R-up</b>	CTGCATCCGCTTCGCCACCGGTATACTTTTGAGATTAGTG
<b>frdA-R-down</b>	AGTTAGGAATGGATGCGCTC
<b>ldhA-L-up</b>	ATCATACGGGTCATTGCCAG
<b>ldhA-L-down</b>	GTCCTTTGGCTTTGAGCTGGATTCCTGACAGCAGAAGCTC
<b>ldhA-R-up</b>	GAGCTTCTGCTGTCAGGAATCCAGCTCAAAGCCAAAGGAC
<b>ldhA-R-down</b>	CCCACCAGATAACGGAGATC
<b>adhE-L-up</b>	GTCTGAATAACGGCACTG
<b>adhE-L-down</b>	CACTCAAGAGCAAGTAGACACTACGGTCGTGATTATGTAG
<b>adhE-R-up</b>	CTACATAATCACGACCGTAGTGTCTACTTGCTCTTGAGTG
<b>adhE-R-down</b>	AAGACGCGCTGACAATAC
<b>pta-L-up</b>	ACTACGCGACGAAAGAAGAC
<b>pta-L-down</b>	GTTAACCGGCTTGCGCATAAACGCCTTTGCGTTCCATTG
<b>pta-R-up</b>	CAATGGAACGCAAAGGCGTTTATGCGCAAGCCGGTTAAC

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<b>pta-R-down</b>	CAGAATGCGAAATGAGTGTG
<b>pl-L-up</b>	TCATTTAATACTGCCGCCTC
<b>pl-L-down</b>	GTGCTCAGTATCACCGCCAGTGGTATTTATGTCAACACCGCCGCTATGCAGAAAATTGCGCA C
<b>pl-R-up</b>	<b>GGCGGTGTTGACATAAATACCACTGGCGGTGATACTGAGCAC</b> TGCAAGAGGGATAAAAAATG
<b>pl-R-down</b>	GTCAGGTTGCCAAGTGTGTC
<b>pl-yz-FP</b>	AATACCACTGGCGGTGATAC
<b>mgsA-L-up</b>	CAACACGCTGGCCGAAGT
<b>mgsA-L-down</b>	GCTCAGTATCACCGCCAGTGGTATTTATGTCAACACCGCCATCCAGTCGCCGCATTTTC
<b>mgsA-R-up</b>	ACCCCTTGGGGCCTCTAAACGGGTCTTGAGGGGTTTTTTGCGTTCCACCCAGCTCATC
<b>mgsA-R-down</b>	CTCGCCATTACCTCAACTG
<b>hbd-up</b>	<b>GGCGGTGTTGACATAAATACCACTGGCGGTGATACTGAGCAC</b> AGGGAGGTCTGTTTAATG
<b>hbd-down</b>	CATGACTAATCCTCCTAAAATTTATTTTGAATAATCGTAG
<b>crt-up</b>	CTACGATTATTCAAATAAATTTTAGGAGGATTAGTCATG
<b>crt-down</b>	CAATCATATCATACCTCCAGCTATCTATTTTTGAAGCCTTC
<b>ter-up</b>	GAAGGCTTCAAAAATAGATAGCTGGAGGTATGATATGATTG
<b>ter-down</b>	CAAAAAACCCCTCAAGACCCGTTTAGAGGCCCAAGGGGTTATGCTAGTTAAATCCTGTCGA ACCTTTC
<b>hct-yz-mgsFP</b>	CCTTATTCACCAGGCGATTG
<b>hct-yz-mgsRP</b>	TGCCTGAGCAATTCCTGAAC
<b>pdmb-PpchA-</b>	CGCGGTCAAAAAATGCTAAGGCTGTTTTGGCGGATGAGA
<b>pchA-up</b>	
<b>pdmb-PpchA-</b>	GGTACGGATATATTCCTGTGCAGCTCATTTTCAGAATATTTGCCAGAAC
<b>pchA-down</b>	
<b>PpchA-pchA-</b>	GTTCTGGCAAATATTCTGAAATGAGCTGCACAGGAATATATCCGTACC
<b>pdmb-up</b>	
<b>PpchA-pchA-</b>	TCTCATCCGCCAAAACAGCCTTAGCATTTTTTTGACCGCG
<b>pdmb-down</b>	

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**LEE1-32-GFP-up** CATAACGGTTCTGGCAAATATTACTTGTACAGCTCGTCC  
**LEE1-32-GFP-down** TTGACATTTAATGATAATGTATTTTACACATTAAAGAAGGAGATATACATATGGTGAGCAAGGG  
**CGAGG**  
**pdm-b-AA-LEE1-32-up** ACATTATCATTAAATGTCAATTCTGAAATGAGCTGCACAGGAATATATCCGTAC  
**pdm-b-AA-LEE1-32-down** GGACGAGCTGTACAAGTAATATTTGCCAGAACCGTTATG  
**pdm-b-AA-GFP-LEE1-98-down** GATAATGTATTTTACACATTATTTGTTTAACTTTAAGAAGG  
**pdm-b-AA-GFP-LEE1-98+152-up** CTTCTTAAAGTTAAACAAAGCTTTAATATTTTAAGCT  
**pdm-b-AA-GFP-LEE1-98+152-down** AGCTTAAAATATTAAGCTTTGTTTAACTTTAAGAAG  
**pdm-b-AA-GFP-LEE1-98+218-up** GAAGAAAATCATCTCGTTAATTCTGAAATGAGCTGCACAG  
**pdm-b-AA-GFP-LEE1-98+218-down** CAAGTCCATACATTCAGCTTTTTGTTTAACTTTAAGAAG  
**LEE1-98+218-up** CTTCTTAAAGTTAAACAAAAGCTGAATGTATGGACTTG  
**LEE1-98+218-down** CTGTGCAGCTCATTTCAGAATTAACGAGATGATTTTCTTC  
**pdm-b-AA-GFP-LEE1-379+152-up** CATAAGCTACAGCCAGCACTTCTGAAATGAGCTGCACAG  
**pdm-b-AA-GFP-LEE1-379+152-down** ATAGCTTAAAATATTAAGCTTTGTTTAACTTTAAGAAGGAGATATACCATGGTGAGCAAGGG  
**CGAGG**  
**LEE1-379+152-up** CCTTCTTAAAGTTAAACAAAGCTTTAATATTTTAAGCTAT

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**LEE1-379+152-** CTGTGCAGCTCATTTCAGAAAGTGCTGGCTGTAGCTTATG

**down**

**LEE1-379+444-up** CTTCTTAAAGTTAAACAAAGCTGTCGGCCTACGCCGAC

**pdmB-AA-GFP-** GTCGGGCGTAGGCCGACAGCTTTGTTAACTTTAAGAAG

**LEE1-379+444-**

**down**

**pdmB-AA-GFP-** CCTTCTTAAAGTTAAACAAATAATGTGTAAAATACATTATC

**LEE1-379+444-up**

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The red characters are pI promoter sequences. The underline parts indicated the N20 sequences.