Table S1. Bacterial strains and plasmids used in this work

Strain or plasmid	Description	Source or reference
Propionibacterium acidipropionici CGMCC 1.2232	Wild type	China General Microbiological Culture Collection Center
Δ*otsA*	Δ*otsA*::Ω : Wild type with insertion of Ω cassette and deletion in the *otsA* ORF	This work
Δ*treY*	Δ*treY*::Ω : Wild type with insertion of Ω cassette and deletion in the *treY* ORF	This work
Δ*otsA*Δ*treY*	Δ*otsA*::Ω/Δ*treY* : Wild type with deletion in the *otsA* and *trey* ORFs and insertion of Ω cassette in the *otsA* ORF	This work
E. coli		
DH5α	*supE44*Δ*lacU169 (Φ80 lacZ*Δ*M15) hsdR17 recA1 endA1 gyrA96 thi-1 relA1* λ^-	Vazyme Biotech (Nanjing) Co., Ltd.
JM109	*endA1 recA1 gyrA96 hsdR17 supE44*λ^- Δ *(lac-proAB)*/F' [*tra*Δ*36 proAB*$^+$ *lacZ*ΔM15]	Vazyme Biotech (Nanjing) Co., Ltd.
JM109 (λ *pir*)	JM109 lysogenized with λ pir bacteriophage	Vazyme Biotech (Nanjing) Co., Ltd.
S17-1	Tp^rSm^r *hsdR pro recA* RP4-2-Tc::Mu-Km::Tn *7* in chromosome	Vazyme Biotech (Nanjing) Co., Ltd.
S17-1 (λ *pir*)	S17-1 lysogenized with λ *pir* bacteriophage	Vazyme Biotech (Nanjing) Co., Ltd.
Plasmid		
pBluescript II SK+	Ap^r; cloning vector	Stratagene
pTK106	Ap^r Sm^r/Spc^r; source of the Sm^r/Spc^r gene (Ω cassette)	Prentki and Krisch (1984)
pJP5603	Km^r; R6K-based suicide vector	Kai M. Thormann et al. (2004)
pHSGSKm	Cm^rKm^r; pHSG396 carrying the Km^r gene and *sacRsacB*	Masuda et al. (2002)
pJP*mobsac*	Km^r; R6K-based suicide vector carrying *sacRsacB*	This work
pBOTSA I	pBII with PCR fragment containing upstream of *otsA*	This work
pBOTSA II	pBII with PCR fragments containing upstream and downstream of *otsA*	This work

pBOTSAX	pBOTSA II with Ω cassette insertion between PCR fragments	This work
pJPOTSA	pJP5603 carrying PCR fragments of *otsA* with Ω cassette insertion	This work
pBTREY I	pBII with PCR fragment containing upstream of *treY*	This work
pBTREY II	pBII with PCR fragments containing upstream and downstream of *treY*	This work
pBTREYX	pBOTSA II with Ω cassette insertion between PCR fragments	This work
pJPTREY	pJP5603 carrying PCR fragments of *treY* with Ω cassette insertion	This work
pJP*mobsac*TREY	pJP*mobsac* carrying PCR fragments of *treY*	This work