Table S1: Bacterial strains used in this study

Designation	Relevant genotype	Source or Reference
E. coli K12		
TR6968	*pyr* F-	MG1655 wt, (JENSEN 1993)
TR7177	*ara thi-1* Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB*+ Δ(*lacI-Z*)	FC29, (CAIRNS AND FOSTER 1991)
TR7178	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	FC40, (CAIRNS AND FOSTER 1991)
TR7311	*ΔrecD2741*::Kan	V2896, Susan Amundsen
TR7314	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ / F'$_{128}$ *proAB*+ Δ(*lacI-Z*)	FC394, (FOSTER AND TRIMARCHI 1995)
TR7317	*ara thi-1* Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB*+ Δ(*lacI-Z*) *traD411*::Kan	PFJ64, (FOSTER AND TRIMARCHI 1995)
TR7318	*ara thi-1* Rif^R Δ(gpt-lac)$_5$/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traD411*::Kan	PFJ65, (FOSTER AND TRIMARCHI 1995)
TR7319	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traI*::Tn*5*	PFJ87, (FOSTER AND TRIMARCHI 1995)
TR7320	*ara thi-1* Δ(*gpt-lac*)$_5$ / F'$_{128}$ *proAB*+ Δ(*lacI-Z*) *traI*::Tn*5*	PFJ98, (FOSTER AND TRIMARCHI 1995)
TR7321	pOX38 *traN1*::*cat*	(KLIMKE AND FROST 1998)
TR7328	F'$_{42}$ *traD*::*tetRA*/ pBT200 -traD+	(HAFT *et al.* 2007)
TT22953	Δ(*argF-lac*)$_{169}$ Δ*recA635::*Kan	BW26547, (DATSENKO AND WANNER 2000)
TT23247	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ Δ*recA635*::Kan /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	Lab. collection
TT23248	*ara thi-1* Δ(*gpt-lac*)$_5$ Δ*recA635::*Kan /F'$_{128}$ *proAB*+ Δ(*lacI-Z*)	Lab. collection
TT23249	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ Δ*recA635*::Kan	Lab. collection
TT24588	*ara thi-1 argE recA1* Rif^R Nal^R Δ(*gpt-lac*)$_5$ / F'$_{128}$ *proAB*+ l*acZ*::Tn*10 traS*::Tn*5*	(SYVANEN *et al.* 1986)
TT24787	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ F- (=TT26180)	FC36[a], (CAIRNS AND FOSTER 1991)
TT26307	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *mhpC31*::Tn*10*dTet	Lab. collection
TT26893	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*traI51*::Rif	Lab. collection
TT26896	Δ*ompA772*::Kan	JW0940[b], Keio Collection
TT26898	*ara thi-1* Rif^S Δ(*gpt-lac*)$_5$	P90C, (MILLER 1972)
TT27036	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ F-	Lab. Collection

TT27037	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27043	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *yagU21*::Tn*10*dTet Δ*mhpT*::Cam	This study
TT27047	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ Δ*recA635::*Kan	This study
TT27048	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ Δ*recA635::*Kan /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27052	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔrecD2741*::Kan	This study
TT27054	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ *ΔrecD2741*::Kan	This study
TT27058	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ *ΔrecD2741*::Kan /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27061	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *mhpC31*::Tn*10*dTet Δ*traI51*::Rif	This study
TT27062	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*traI51*::Rif	This study
TT27063	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ Δ*ompA772*::Kan	This study
TT27064	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ Δ*ompA772*::Kan	This study
TT27065	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ Δ*ompA772*::Kan /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27066	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ Δ*ompA772*::Kan /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *mhpC31*::Tn*10*dTet	This study
TT27067	*ara thi-1* Sm^R Δ(*gpt-lac)*$_5$ Δ*ompA772*::Kan /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27068	*ara thi-1* Δ(*gpt-lac*)$_5$ Δ*ompA772*::Kan /F'$_{128}$ *proAB+* Δ(*lacI-Z*)	This study
TT27083	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*mhpT*::Cam	This study
TT27084	*ara thi-1* Rif^R Δ(*gpt-lac*)5/F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*traD*::*tetRA*	This study
TT27085	*ara thi-1* Rif^R Δ(*gpt-lac*)5/F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*traN1*::Cam	This study
TT27086	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traG*::Tn*10*dTet	This study
TT27087	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traT*::Tn*10*dTet	This study
TT27088	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traS*::Tn*5*	This study
TT27089	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*mhpT*::Cam *traD*::*tetRA*	This study
TT27090	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs)	This study

	lacIZ(Ω) *mhpC31*::Tn*10*dTet Δ*traN1*::Cam	
TT27091	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*mhpT*::Cam *traG*::Tn*10*dTet	This study
TT27092	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*mhpT*::Cam *traT*:: Tn*10*dTet	This study
TT27093	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *mhpC31*::Tn*10*dTet *traS*::Tn*5*	This study
TT27095	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traD*::*tetRA*	This study
TT27096	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*traN1*::Cam	This study
TT27097	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traG*::Tn*10*dTet	This study
TT27098	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traT*::Tn*10*dTet	This study
TT27099	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traS*::Tn*5*	This study
TT27100	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ P$_{Tet}$-*ompA* /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27109	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ Δ*ompA772*::FRT	This study
TT27110	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ Δ*ompA772*::FRT *ΔrecD2741*::Kan	This study
TT27111	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ Δ*ompA772*::FRT /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27112	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ Δ*ompA772*::FRT *ΔrecD2741*::Kan /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27113	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔrecD2741*::Kan /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*traI51*::Rif	This study
TT27254	*ΔgalK729*::Kan	JW0740[b], Keio Collection
TT27263	*ΔgalP789*::Kan	JW2910[b], Keio Collection
TT27271	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ P$_{Tet}$-*ompA*	This study
TT27272	*ara thi-1* Sm^R Δ(*gpt-lac*)$_5$ P$_{Tet}$-*ompA* /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27274	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ /F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *yagU21*::Tn*10*dTet Δ*mhpT*::Cam Δ(*rclR*)*ykgD21*::Kan	This study
TT27301	*ΔmglB777*::Kan	JW2137[b], Keio Collection
TT27329	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔgalK729*::Kan	
TT27330	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔgalK729*::Kan/F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study

TT27331	*ara thi-1* Δ(*gpt-lac*)$_5$ *ΔgalK729*::Kan /F'$_{128}$ *proAB+* Δ(*lacI-Z*)	This study
TT27332	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔgalP789*::Kan	This study
TT27333	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔgalP789*::Kan /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27334	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔgalP789*::FRT	This study
TT27335	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔgalP789*::FRT *Δ*mglB777::Kan	This study
TT27336	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔmglB777*::Kan	This study
TT27337	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔmglB777*::Kan /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study
TT27338	*ara thi-1* Rif^R Δ(*gpt-lac*)$_5$ *ΔgalP789*::FRT *ΔmglB777*::Kan /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	This study

S. enterica

Typhimurium LT2

TT18302	*leuD21 proB1657*::Tn*10*/ F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	(GALITSKI AND ROTH 1995)
TT24721	*leuD21 proB1657*::Tn*10*/ F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*traI51*::Rif	Lab. Collection
TT25377	*leuD21* Δ*proAB670*::Spc pSLT- / F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	Lab. Collection
TT25387	*leuD21* Δ*proAB670*::Spc	Lab. Collection
TT25414	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω)	Lab. Collection
TT26303	*leuD21* Δ*proAB670*::Spc pSLT- / F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *mhpC31*::Tn*10*dTet	Lab. Collection
TT26321	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *yagU21*:: Tn*10*dTet	(SANO *et al.* 2014)
TT27038	*leuD21* Δ*proAB670*::Spc pSLT- / F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*mhpT*::Cam	Lab. Collection
TT27040	*leuD21* Δ*proAB670*::Spc pSLT- / F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *yagU21*::Tn*10*dTet Δ*mhpT*::Cam	This study
TT27049	*leuD21* Δ*proAB670*::Spc pSLT- / F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *mhpC31*::Tn*10*dTet	This study
TT27059	*leuD21* Δ*proAB670*::Spc /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*traI51*::Rif	This study
TT27060	*leuD21* Δ*proAB670*::Spc /F'$_{128}$ *proAB+ lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *mhpC31*::Tn*10*dTet Δ*traI51*::Rif	This study
TT27070	*leuD21*/ F'$_{42}$ *lac+ traD*::*tetRA*	This study
TT27071	*leuD21*/ pOX38 Δ*traN1*::Cam	This study

TT27072	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traD*::*tetRA*	This study
TT27073	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traG*::Tn*10*dTet	This study
TT27074	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*traN1*::Cam	This study
TT27075	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traT*::Tn*10*dTet	This study
TT27076	*leuD21* Δ*proAB670*::Spc pSLT-/ F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *traS*::Tn*5*	This study
TT27077	*leuD21* Δ*proAB670*::Spc/ F'$_{128}$ *proAB*+ Δ(*lacI-Z*) *traN1*::Cam	This study
TT27078	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*mhpT*::Cam *traD*::*tetRA*	This study
TT27079	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*mhpT*::Cam *traG*:: Tn*10*dTet	This study
TT27080	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *mhpC31*::Tn*10*dTet Δ*traN1*::Cam	This study
TT27081	*leuD21* Δ*proAB670*::Spc / F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) Δ*mhpT*::Cam *traT*:: Tn*10*dTet	This study
TT27082	*leuD21* Δ*proAB670*::Spc pSLT-/ F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *mhpC31*::Tn*10*dTet *traS*::Tn*5*	This study
TT27273	*leuD21* Δ*proAB670*::Spc pSLT-/ F'$_{128}$ *proAB*+ *lacI*^{q} *lacI33*(fs) *lacIZ*(Ω) *yagU21*::Tn*10*dTet Δ*mhpT*::Cam Δ(*rclR*)*ykgD21*::Kan	This study

Footnote: [a] FC36 and TT27036 are Rif^{R} and Sm^{R} derivatives of P90C (CSH142, (MILLER 1972)), respectively. The full genotype of P90C (TT26898) is *ara-600 thi-1* Δ(*gpt-lac*)$_{5}$ *relA1 spoT1;* the 115 Kb chromosomal deletion (*gpt-lac*)$_{5}$ (originally known as Δ(*lac-proB*)$_{XIII}$) removes the *proAB* and *lac* operons that are on F' 128 but not the *dinB* gene.

[b] Mutants from the Keio collection (BABA *et al.* 2006) have single-gene deletions, where the open-reading frame coding sequence is replaced with a kanamycin resistance cassette (Kan) flanked by flippase recognition target (FRT) sites. Expression of flippase (FLP) allows removal of the antibiotic marker and leaves a FRT scar sequence at the point of insertion.

Table S2: List of primers

Number	Name	Sequence 5'->3'	Use
TP2827	lacZ-Fwd	GAAGTGGCGAGCGATACAC	qPCR
TP2828	lacZ-Rev	GTAAGGCGGTCGGGATAGTT	qPCR
TP2866	traG-Fwd	ACGGTCAGTTGCGTATCAG	qPCR
TP2867	traG-Rev	CAGGTCTTCGTAGAAGTTAGTG	qPCR
TP2874	ePck-Fwd	CTTTCCGTCCGTTTCATCAC	qPCR
TP2875	ePck-Rev	TTCTTTCCACTGCGGGTTAG	qPCR
TP93	F3376-Tn10	ACCTTTGGTCACCAACGCTTTTCC	Diagnosis
TP246	R635-Tn10	TCCATTGCTGTTGACAAAGGGAAT	Diagnosis
TP2085	traI-Fwd	TCACACAGATGGCAATGGACAA	Diagnosis
TP2086	traI-Rev	CCGCCTCCTTACCTTCGAGAAT	Diagnosis
TP2915	rtsF-Fwd	ACAGCTGCCGGACCGTGGCC	Diagnosis
TP2856	rtsF-Rev	TCACAGTCCAGAGATACAACACAA	Diagnosis
TP3120	ompA-tetR	GTTGTAGACTTTACATCGCCAGGGGTGCTCGGCATAAGCCTTAAGACCC ACTTTCACATT	Linear transformation
TP3125	ompA-tetA	TCGCGATAGCTGTCTTTTTCATTTTTTGCGCCTCGTTATCACTAAGCAC TTGTCTCCTG	Linear transformation
TP3123	ompA-Fwd	GACCGAAACGGTAGGAAACA	Diagnosis
TP3124	ompA-Rev	GGCTTTGAAATGGGTTACGA	Diagnosis
TP3209	traG-Fwd	TACATGCGTCAGCAGCTTTC	Diagnosis
TP3210	traG-Rev	CTTCCAACTCACTACTGATA	Diagnosis
TP3351	ykgDKan-Fwd	CACAGGTTAATACTGAGAAAACATTCTCAGTTTGCTTCTGTGTAGGCT GGAGCTGCTTCG	Linear transformation
TP3352	ykgDKan-Rev	GCTATTTGTAGACGCAACTTTGTTAATACAGCCAGCGGCGCATATGAA TATCCTCCTTAG	Linear transformation
TP3353	ykgD-Fwd	TTATTCGTTGGCATGCGTTA	Diagnosis
TP3354	ykgD-Rev	CTGGGCCGCTATTTGTAGAC	Diagnosis
TP3411	recD-Fwd	TGGCGGATTTAGGGTAAGCG	Diagnosis
TP3412	recD-Rev	TTACACAACCCGACCCAACG	Diagnosis

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