
Supplementary information

Two defence systems eliminate plasmids from seventh pandemic *Vibrio cholerae*

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Supplementary Information

Two defence systems eliminate plasmids from 7th pandemic *Vibrio cholerae*

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Supplementary Table 1. Summary of bioinformatics results.

Gene ^a	Protein (aa)	BLAST-P	Homology ^b	Structural prediction ^c	Putative domain(s) ^d
VC1771 (AWB74 290.1)	DdmD 1190	Hypothetical protein	CRISPR-associated nuclease/helicase Cas3 and various helicases; alignment to helicase domain. Holiday junction resolvases; alignment to PD-(D/E)xK nuclease motif.	Various helicase domain-containing proteins; alignment to Superfamily 2 (SF2) helicase motifs involved in nucleotide binding and hydrolysis.	N-terminal domain containing Superfamily 2 (SF2) helicase; aa 1-900. C-terminal domain containing PD-(D/E)xK nuclease motif; aa 901-1190.
VC1770 (AWB74 289.1)	DdmE 687	Hypothetical protein	No confident prediction	Argonautes (Ago) and prokaryotic Argonautes (pAgo)	None detected
VC0492 (AWB73 039.1)	DdmA 388	Hypothetical protein	SAVED domain-containing protein Cap4; alignment to N-terminal Cap4_nuclease domain.	SAVED domain-containing protein Cap4 and various nucleases; alignment to N-terminal Cap4_nuclease domain.	N-terminal Cap4_nuclease (PF14130); Cap4 dsDNA endonuclease domain containing PD-(D/E)xK nuclease motif; aa 1-235. C-terminal domain of unknown function; aa 236-388.
VC0491 (AWB73 038.1)	DdmB 170	Hypothetical protein	No confident prediction	No confident prediction	Domain of unknown function; DUF6521 (PF20131); aa 7-168.
VC0490 (AWB73 037.1)	DdmC 653	DUF3732-containing protein	Chromosome partition protein Smc; Condensin, Smc, head domain. Various Structural maintenance of chromosomes (SMC) family proteins and SMC-like proteins. Various coiled-coil containing proteins.	Various Structural maintenance of chromosomes (SMC) family proteins and SMC-like proteins; alignment to globular head domain.	AAA_29; P-loop containing region of AAA domain (PF13555); aa 17-45. SMC_N; RecF/RecN/SMC N terminal domain (PF02463); aa 23-83. DUF3732 (PF12532); aa 462-648.

^a – Locus tag according to Heidelberg *et al.*, as previously described¹ (Protein sequence accession number for the *V. cholerae* strain A1552, used throughout this work).

^b – Remote homology detection by HHpred (Supplementary Table 3).

^c – Based on structural predictions done using Phyre2/iTasser and structural alignments of models created using RoseTTAFold and AlphaFold2 (Extended data Fig. 7).

^d – Putative domains were predicted by PFAM or inferred from homology predictions and structural models.

Supplementary Table 2.xlsx. Putative homologues of DdmDE and DdmABC detected by PHMMER.

The table lists the significant matches to each protein sequence of interest as well as the alignment between the query and target sequence.

Supplementary Table 3.xlsx. Results of remote homology search using HHpred.

The table lists all matching database sequences to each protein sequence of interest, followed by the list of query-template alignments.

Supplementary Table 4. Bacterial strains used and constructed in this study.

Strain name	Genotype ^{a, b}	Strain #	Source
<i>V. cholerae</i>			
A1552	A1552 wild type; O1 El Tor Inaba; isolated in 1992, Peruvian origin; Rif ^R	1	2,3
Sa5Y	Sa5Y; non-O1/O139 environmental isolate CA, USA	275	4
A1552: pSa5Y-Amp	A1552 carrying pSa5Y-Amp	8635	This study
A1552: pBAD	A1552 carrying pBAD/Myc-HisA	8637	This study
Sa5Y: pSa5Y-Kan	Sa5Y carrying pSa5Y-Kan	8636	This study
A1552: pSa5Y-Kan	A1552 carrying pSa5Y-Kan	8638	This study
Sa5Y: pSa5Y-Kan-pheS*	Sa5Y carrying pSa5Y-Kan-pheS*	6851	This study
SL4G	SL4G; non-O1/O139 environmental isolate CA, USA	955	4
SO5Y	SO5Y; non-O1/O139 environmental isolate CA, USA	960	4
SP7G	SP7G; non-O1/O139 environmental isolate CA, USA	952	4
SL6Y	SL6Y; non-O1/O139 environmental isolate CA, USA	953	4
L6G	L6G; non-O1/O139 environmental isolate CA, USA	956	4
W6G	W6G; non-O1/O139 environmental isolate CA, USA	354	4
W7G	W7G; non-O1/O139 environmental isolate CA, USA	962	4
SA10G	SA10G; non-O1/O139 environmental isolate CA, USA	5539	4
SL5Y	SL5Y; non-O1/O139 environmental isolate CA, USA	954	4
SL5Y: pSa5Y-Kan	SL5Y carrying plasmid pSa5Y-Kan	8644	This study
SA3G	SA3G; non-O1/O139 environmental isolate CA, USA	957	4
SA3G: pSa5Y-Kan	SA3G carrying pSa5Y-Kan	8648	This study
SA7G	SA7G; non-O1/O139 environmental isolate CA, USA	959	4
SA7G: pSa5Y-Kan	SA7G carrying pSa5Y-Kan	8642	This study
E7G	E7G; non-O1/O139 environmental isolate CA, USA	963	4
E7G: pSa5Y-Kan	E7G carrying pSa5Y-Kan	8645	This study
W10G	W10G; non-O1/O139 environmental isolate CA, USA	5537	4
W10G: pSa5Y-Kan	W10G carrying pSa5Y-Kan	8671	This study
SP6G	SP6G; non-O1/O139 environmental isolate CA, USA	964	4
SP6G: pSa5Y-Kan	SP6G carrying pSa5Y-Kan	8646	This study
ATCC25872	ATCC25872; O37 serogroup, isolated in 1965, Czechoslovakia; Strep ^R	276	5
ATCC25872: pSa5Y-Kan	ATCC25872 carrying pSa5Y-Kan	8651	This study

O395	O395; O1 Classical Ogawa; isolated in 1965, India; Strep ^R	76	⁶
O395: pSa5Y-Kan	O395 carrying pSa5Y-Kan	8643	This study
N16961	N16961; O1 El Tor Inaba; isolated in 1975, Bangladesh; <i>hapR</i> frame-shift; Strep ^R	2	¹
N16961: pSa5Y-Kan	N16961 carrying pSa5Y-Kan	8639	This study
C6706	C6706-original; O1 El Tor Inaba; isolated in 1991, Peru; Strep ^S (original isolate before introduction of streptomycin resistance-causing mutation; non-mutated <i>luxO</i>)	4522	Gift from J. Mekalanos ⁷
C6706: pSa5Y-Kan	C6706 carrying pSa5Y-Kan	8640	This study
DRC-193A	DRC-193A; O1 patient isolate, 2011, Democratic Republic of Congo; Strep ^R	1954	⁸
DRC-193A: pSa5Y-Kan	DRC-193A carrying pSa5Y-Kan	8641	This study
MO10	MO10; O139 strain isolated in 1992, India; <i>hapR</i> mutated (HapR[R12L]), Strep ^R	5	⁹
MO10: pSa5Y-Kan	MO10 carrying pSa5Y-Kan	8650	This study
VCO139#11	VCO139#11; O139 isolate from Bangladesh	975	Laboratory collection
VCO139#11: pSa5Y-Kan	VCO139#11 carrying pSa5Y-Kan	8647	This study
AI1837	AI1837; O139; isolated in 1993, Bangladesh; Strep ^R	1502	¹⁰
AI1837: pSa5Y-Kan	AI1837 carrying pSa5Y-Kan	8672	This study
A1552: pSa5Yori	A1552 carrying pSa5Yori	8659	This study
A1552: pB1067ori	A1552 carrying pB1067ori	8664	This study
A1552: pColE1ori	A1552 carrying pColE1ori	8661	This study
A1552: p15Aori	A1552 carrying p15Aori	8663	This study
SL5Y: pSa5Yori	SL5Y carrying pSa5Yori	8660	This study
SL5Y: pB1067ori	SL5Y carrying pB1067ori	8666	This study
SL5Y: pColE1ori	SL5Y carrying pColE1ori	8662	This study
SL5Y: p15Aori	SL5Y carrying p15Aori	8665	This study
SP6G: pSa5Yori	SP6G carrying pSa5Yori	8667	This study
SP6G: pB1067ori	SP6G carrying pB1067ori	8670	This study
SP6G: pColE1ori	SP6G carrying pColE1ori	8668	This study
SP6G: p15Aori	SP6G carrying p15Aori	8669	This study
SA3G: pSa5Yori	SA3G carrying pSa5Yori	8799	This study
SA3G: pB1067ori	SA3G carrying pB1067ori	8800	This study
SA3G: pColE1ori	SA3G carrying pColE1ori	8801	This study
SA3G: p15Aori	SA3G carrying p15Aori	8802	This study
MO10: pSa5Y-Amp	MO10 carrying pSa5Y-Amp	8674	This study
ASGC#1-Kan	A1552 with serogroup converted O1->O139 (full region) by natural transformation with VCO139-Kan (MO10 derivative) as donor; genome checked by microarray hybridization	105	¹¹
ASGC#1: pSa5Y-Amp	ASGC#1 carrying pSa5Y-Amp	8675	This study

AIIHSGC#4	A1552 with serogroup converted O1->O139 (only half region <i>gmhD</i> ->IS1358) by natural transformation with VCO139-Kan (MO10 derivative) as donor; clone 4, part of VPI-2 deleted (VC1760-1788); genome checked by microarray hybridization	126	11
AIIHSGC#4: pSa5Y-Amp	AIIHSGC#4 carrying pSa5Y-Amp	8673	This study
AIIHSGC#5	A1552 with serogroup converted O1->O139 (only half region <i>gmhD</i> ->IS1358) by natural transformation with VCO139-Kan (MO10 derivative) as donor; clone 5; genome checked by microarray hybridization	127	11
AIIHSGC#5: pSa5Y-Amp	AIIHSGC#5 carrying pSa5Y-Amp	8676	This study
A1552-VPI-2 Δ#1	A1552-VPI-2 Δ#1 (ΔVC1760-1764::FRT- <i>kan</i> -FRT)	8677	This study
A1552-VPI-2 Δ#2	A1552-VPI-2 Δ#2 (ΔVC1765-1769::FRT- <i>kan</i> -FRT)	8678	This study
A1552-VPI-2 Δ#3	A1552-VPI-2 Δ#3 (ΔVC1770-1772::FRT- <i>kan</i> -FRT)	8679	This study
A1552-VPI-2 Δ#4	A1552-VPI-2 Δ#4 (ΔVC1773-1779::FRT- <i>kan</i> -FRT)	8680	This study
A1552-VPI-2 Δ#5	A1552-VPI-2 Δ#5 (ΔVC1780-1787::FRT- <i>kan</i> -FRT)	8681	This study
A1552-VPI-2 Δ#1: pSa5Y-Amp	A1552-VPI-2 Δ#1 (ΔVC1760-1764::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8682	This study
A1552-VPI-2 Δ#2: pSa5Y-Amp	A1552-VPI-2 Δ#2 (ΔVC1765-1769::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8683	This study
A1552-VPI-2 Δ#3: pSa5Y-Amp	A1552-VPI-2 Δ#3 (ΔVC1770-1772::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8684	This study
A1552-VPI-2 Δ#4: pSa5Y-Amp	A1552-VPI-2 Δ#4 (ΔVC1773-1779::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8685	This study
A1552-VPI-2 Δ#5: pSa5Y-Amp	A1552-VPI-2 Δ#5 (ΔVC1780-1787::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8686	This study
A1552ΔVC1770	A1552ΔVC1770::FRT	8690	This study
A1552ΔVC1771	A1552ΔVC1771::FRT	8691	This study
A1552ΔVC1772	A1552ΔVC1772::FRT	8692	This study
A1552ΔVC1770: pSa5Y-Amp	A1552ΔVC1770::FRT carrying pSa5Y-Amp	8693	This study
A1552ΔVC1771: pSa5Y-Amp	A1552ΔVC1771::FRT carrying pSa5Y-Amp	8694	This study
A1552ΔVC1772: pSa5Y-Amp	A1552ΔVC1772::FRT carrying pSa5Y-Amp	8695	This study
A1552-VPI-2 Δ#3, TnVC1770	A1552-VPI-2 Δ#3 (ΔVC1770-1772::FRT- <i>kan</i> -FRT), TnVC1770	8699	This study
A1552-VPI-2 Δ#3, TnVC1771	A1552-VPI-2 Δ#3 (ΔVC1770-1772::FRT- <i>kan</i> -FRT), TnVC1771	8700	This study
A1552ΔVC1770, TnVC1770	A1552ΔVC1770::FRT, TnVC1770	8701	This study
A1552ΔVC1771, TnVC1771	A1552ΔVC1771::FRT, TnVC1771	8702	This study

A1552-VPI-2 Δ#3, TnVC1770: pSa5Y-Amp	A1552-VPI-2 Δ#3 (ΔVC1770-1772::FRT- <i>kan</i> -FRT), TnVC1770 carrying pSa5Y-Amp	8703	This study
A1552-VPI-2 Δ#3, TnVC1771: pSa5Y-Amp	A1552-VPI-2 Δ#3 (ΔVC1770-1772::FRT- <i>kan</i> -FRT), TnVC1771 carrying pSa5Y-Amp	8704	This study
A1552ΔVC1770, TnVC1770: pSa5Y-Amp	A1552ΔVC1770::FRT, TnVC1770 carrying pSa5Y-Amp	8705	This study
A1552ΔVC1771, TnVC1771: pSa5Y-Amp	A1552ΔVC1771::FRT, TnVC1771 carrying pSa5Y-Amp	8706	This study
P27459	P27459; O1 El Tor Inaba; isolated in 1976, Bangladesh; Strep ^R	1504	¹²
P27459: pSa5Y-Kan	P27459 carrying pSa5Y-Kan	8729	This study
E7946	E7946; O1 El Tor Ogawa; isolated in 1978, Bahrain; Strep ^R	2600	¹³
E7946: pSa5Y-Kan	E7946 carrying pSa5Y-Kan	8730	This study
A1552ΔVC1771	A1552ΔVC1771	8717	This study
N16961ΔVC1771	N16961ΔVC1771	8718	This study
P27459ΔVC1771	P27459ΔVC1771	8719	This study
DRC-193AΔVC1771	DRC-193AΔVC1771	8720	This study
E7946ΔVC1771	E7946ΔVC1771	8721	This study
C6706ΔVC1771	C6706ΔVC1771	8722	This study
A1552ΔVC1771: pSa5Y-Kan	A1552ΔVC1771 carrying pSa5Y-Kan	8723	This study
N16961ΔVC1771: pSa5Y-Kan	N16961ΔVC1771 carrying pSa5Y-Kan	8724	This study
P27459ΔVC1771: pSa5Y-Kan	P27459ΔVC1771 carrying pSa5Y-Kan	8725	This study
DRC-193AΔVC1771: pSa5Y-Kan	DRC-193AΔVC1771 carrying pSa5Y-Kan	8726	This study
E7946ΔVC1771: pSa5Y-Kan	E7946ΔVC1771 carrying pSa5Y-Kan	8727	This study
C6706ΔVC1771: pSa5Y-Kan	C6706ΔVC1771 carrying pSa5Y-Kan	8728	This study
A1552ΔVPI-1	A1552ΔVPI-1::FRT (ΔVC0817-VC0847::FRT)	1486	¹⁴
A1552ΔVSP-I	A1552ΔVSP-I (ΔVC0185-VC0175::FRT- <i>kan</i> -FRT)	8712	This study
A1552ΔVSP-II	A1552ΔVSP-II (ΔVC0490-VC0516::FRT- <i>kan</i> -FRT)	8713	This study
A1552ΔVPI-1: pSa5Y-Amp	A1552ΔVPI-1::FRT (ΔVC0817-VC0847::FRT) carrying pSa5Y-Amp	8714	This study
A1552ΔVSP-I: pSa5Y-Amp	A1552ΔVSP-I (ΔVC0185-VC0175::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8715	This study
A1552ΔVSP-II: pSa5Y-Amp	A1552ΔVSP-II (ΔVC0490-VC0516::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8716	This study
A1552-VSP-II Δ#1	A1552-VSP-II Δ#1 (ΔVC0490-0493::FRT- <i>kan</i> -FRT)	8731	This study
A1552-VSP-II Δ#2	A1552-VSP-II Δ#2 (ΔVC0494-0498::FRT- <i>kan</i> -FRT)	8732	This study

A1552-VSP-II Δ#3	A1552-VSP-II Δ#3 (ΔVC0499-0503::FRT- <i>kan</i> -FRT)	8733	This study
A1552-VSP-II Δ#4	A1552-VSP-II Δ#4 (ΔVC0504-0510::FRT- <i>kan</i> -FRT)	8734	This study
A1552-VSP-II Δ#5	A1552-VSP-II Δ#5 (ΔLat-1[A1552 VC_00274-00278]-VC0516::FRT- <i>kan</i> -FRT)	8735	This study
A1552-VSP-II Δ#1: pSa5Y-Amp	A1552-VSP-II Δ#1 (ΔVC0490-0493::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8736	This study
A1552-VSP-II Δ#2: pSa5Y-Amp	A1552-VSP-II Δ#2 (ΔVC0494-0498::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8737	This study
A1552-VSP-II Δ#3: pSa5Y-Amp	A1552-VSP-II Δ#3 (ΔVC0499-0503::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8738	This study
A1552-VSP-II Δ#4: pSa5Y-Amp	A1552-VSP-II Δ#4 (ΔVC0504-0510::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8739	This study
A1552-VSP-II Δ#5: pSa5Y-Amp	A1552-VSP-II Δ#5 (ΔLat-1[A1552 VC_00274-00278]-VC0516::FRT- <i>kan</i> -FRT) carrying pSa5Y-Amp	8740	This study
A1552ΔVC0490	A1552ΔVC0490::FRT	8745	This study
A1552ΔVC0491	A1552ΔVC0491::FRT	8746	This study
A1552ΔVC0492	A1552ΔVC0492::FRT	8747	This study
A1552ΔVC0493	A1552ΔVC0493::FRT	8748	This study
A1552ΔVC0490: pSa5Y-Amp	A1552ΔVC0490::FRT carrying pSa5Y-Amp	8749	This study
A1552ΔVC0491: pSa5Y-Amp	A1552ΔVC0491::FRT carrying pSa5Y-Amp	8750	This study
A1552ΔVC0492: pSa5Y-Amp	A1552ΔVC0492::FRT carrying pSa5Y-Amp	8751	This study
A1552ΔVC0493: pSa5Y-Amp	A1552ΔVC0493::FRT carrying pSa5Y-Amp	8752	This study
A1552-VSP-II Δ#1, TnVC0490	A1552-VSP-II Δ#1 (ΔVC0490-0493::FRT- <i>kan</i> -FRT), TnVC0490	8756	This study
A1552-VSP-II Δ#1, TnVC0491	A1552-VSP-II Δ#1 (ΔVC0490-0493::FRT- <i>kan</i> -FRT), TnVC0491	8757	This study
A1552-VSP-II Δ#1, TnVC0492	A1552-VSP-II Δ#1 (ΔVC0490-0493::FRT- <i>kan</i> -FRT), TnVC0492	8758	This study
A1552ΔVC0490, TnVC0490	A1552ΔVC0490::FRT, TnVC0490	8759	This study
A1552ΔVC0491, TnVC0491	A1552ΔVC0491::FRT, TnVC0491	8760	This study
A1552ΔVC0492, TnVC0492	A1552ΔVC0492::FRT, TnVC0492	8761	This study
A1552-VSP-II Δ#1, TnVC0490: pSa5Y-Amp	A1552-VSP-II Δ#1 (ΔVC0490-0493::FRT- <i>kan</i> -FRT), TnVC0490 carrying pSa5Y-Amp	8763	This study
A1552-VSP-II Δ#1, TnVC0491: pSa5Y-Amp	A1552-VSP-II Δ#1 (ΔVC0490-0493::FRT- <i>kan</i> -FRT), TnVC0491 carrying pSa5Y-Amp	8764	This study
A1552-VSP-II Δ#1, TnVC0492: pSa5Y-Amp	A1552-VSP-II Δ#1 (ΔVC0490-0493::FRT- <i>kan</i> -FRT), TnVC0492 carrying pSa5Y-Amp	8765	This study
A1552ΔVC0490, TnVC0490: pSa5Y-Amp	A1552ΔVC0490::FRT, TnVC0490 carrying pSa5Y-Amp	8766	This study

A1552ΔVC0491, TnVC0491: pSa5Y-Amp	A1552ΔVC0491::FRT, TnVC0491 carrying pSa5Y-Amp	8767	This study
A1552ΔVC0492, TnVC0492: pSa5Y-Amp	A1552ΔVC0492::FRT, TnVC0492 carrying pSa5Y-Amp	8768	This study
O395: pSa5Y-Amp	O395 carrying pSa5Y-Amp	9399	This study
569B	569B; O1 classical Inaba; isolated in 1948, India	1148	15
569B: pSa5Y-Amp	569B carrying pSa5Y-Amp	9400	This study
O395-VC1771[P29]	O395-VC1771[S29P]	9392	This study
O395-VC1771[P29]: pSa5Y-Amp	O395-VC1771[S29P] carrying pSa5Y-Amp	9396	This study
O395-VC1771[E891]	O395-VC1771[K891E]	9393	This study
O395-VC1771[E891]: pSa5Y-Amp	O395-VC1771[K891E] carrying pSa5Y-Amp	9397	This study
O395-VC1771[P29, E891]	O395-VC1771[S29P, K891E]	9394	This study
O395-VC1771[P29, E891]: pSa5Y-Amp	O395-VC1771[S29P, K891E] carrying pSa5Y- Amp	9398	This study
A1552-VC1771[O395]	A1552-VC1771[P29S, E891K]	9391	This study
A1552-VC1771[O395]: pSa5Y-Amp	A1552-VC1771[P29S, E891K] carrying pSa5Y- Amp	9395	This study
A1552-VC1771[O395], ΔVC0490-93::FRT	A1552-VC1771[P29S, E891K], ΔVC0490- 93::FRT	9424	This study
A1552-VC1771[O395], ΔVC0490-93::FRT: pSa5Y- Amp	A1552-VC1771[P29S, E891K], ΔVC0490- 93::FRT carrying pSa5Y-Amp	9436	This study
A1552ΔVC1770: pSa5Y-Kan	A1552ΔVC1770::FRT carrying pSa5Y-Kan	8707	This study
A1552ΔVC1770: pSa5Yori	A1552ΔVC1770::FRT carrying pSa5Yori	8708	This study
A1552ΔVC1770: pColE1ori	A1552ΔVC1770::FRT carrying pColE1ori	8709	This study
A1552ΔVC1770: p15Aori	A1552ΔVC1770::FRT carrying p15Aori	8710	This study
A1552ΔVC1770: pB1067ori	A1552ΔVC1770::FRT carrying pB1067ori	8711	This study
A1552ΔVC0490: pSa5Y-Kan	A1552ΔVC0490::FRT carrying pSa5Y-Kan	8779	This study
A1552ΔVC0490: pSa5Yori	A1552ΔVC0490::FRT carrying pSa5Yori	8780	This study
A1552ΔVC0490: pColE1ori	A1552ΔVC0490::FRT carrying pColE1ori	8782	This study
A1552ΔVC0490: p15Aori	A1552ΔVC0490::FRT carrying p15Aori	8783	This study
A1552ΔVC0490: pB1067ori	A1552ΔVC0490::FRT carrying pB1067ori	8781	This study
A1552ΔddmABC	A1552-VSP-II Δ#1 (ΔVC0490-0493::FRT)	8535	This study
A1552ΔddmDE	A1552-VPI-2 Δ#3 (ΔVC1770-1772::FRT)	8534	This study
A1552Δddm	A1552ΔVC1770-1772::FRT, ΔVC0490- 0493::FRT	8560	This study
A1552ΔddmDE: pBAD	A1552ΔVC1770-1772::FRT carrying pBAD/Myc-HisA	8834	This study

A1552 Δ ddmABC: pBAD	A1552 Δ VC0490-0493::FRT carrying pBAD/Myc-HisA	8835	This study
A1552 Δ ddm: pBAD	A1552 Δ VC1770-1772::FRT, Δ VC0490-0493::FRT carrying pBAD/Myc-HisA	8836	This study
A1552 Δ ddmABC, TnddmABC	A1552 Δ VC0490-0493::FRT, TnddmABC	8775	This study
A1552 Δ ddm, TnddmABC	A1552 Δ VC1770-1772::FRT, Δ VC0490-0493::FRT, TnddmABC	8776	This study
A1552 Δ ddmDE, TnddmDE	A1552 Δ VC1770-1772::FRT, TnddmDE	8777	This study
A1552 Δ ddm, TnddmDE	A1552 Δ VC1770-1772::FRT, Δ VC0490-0493::FRT, TnddmDE	8778	This study
A1552 Δ ddmABC: pSa5Y-Amp	A1552 Δ VC0490-0493::FRT carrying pSa5Y-Amp	8784	This study
A1552 Δ ddmDE: pSa5Y-Amp	A1552 Δ VC1770-1772::FRT carrying pSa5Y-Amp	8785	This study
A1552 Δ ddm: pSa5Y-Amp	A1552 Δ VC1770-1772::FRT, Δ VC0490-0493::FRT carrying pSa5Y-Amp	8786	This study
A1552 Δ ddmABC, TnddmABC: pSa5Y-Amp	A1552 Δ VC0490-0493::FRT, TnddmABC carrying pSa5Y-Amp	8787	This study
A1552 Δ ddm, TnddmABC: pSa5Y-Amp	A1552 Δ VC1770-1772::FRT, Δ VC0490-0493::FRT, TnddmABC carrying pSa5Y-Amp	8788	This study
A1552 Δ ddmDE, TnddmDE: pSa5Y-Amp	A1552 Δ VC1770-1772::FRT, TnddmDE carrying pSa5Y-Amp	8789	This study
A1552 Δ ddm, TnddmDE: pSa5Y-Amp	A1552 Δ VC1770-1772::FRT, Δ VC0490-0493::FRT, TnddmDE carrying pSa5Y-Amp	8790	This study
TND1379 (SAD2440)	E7946 Strep ^R , <i>P_{tac}-tfoX</i> , Δ luxO, Δ VC1807::Cm ^R , <i>pilA</i> S67C, <i>mCherry-comM</i> , 0.11 Mbp:: <i>parS_{P1}</i> , 1.963 Mbp:: <i>parS_{MT1}</i> , Δ lacZ:: <i>P_{lac}-CFP-parB_{P1}</i> yGFP- <i>parB_{MT1}</i> Zeo ^R	8497	Gift from A. Dalia ¹⁶
A1552-yGFP-ParB ^{MT1}	A1552 Ω lacZ:: <i>P_{lac}-CFP-parB^{P1}</i> , yGFP- <i>parB^{MT1}</i> Zeo ^R	8771	This study
A1552-yGFP-ParB ^{MT1} : pSa5Y-Kan	A1552 Ω lacZ:: <i>P_{lac}-CFP-parB^{P1}</i> , yGFP- <i>parB^{MT1}</i> Zeo ^R carrying pSa5Y-Kan	8791	This study
A1552-yGFP-ParB ^{MT1} : pSa5Y- <i>parS^{MT1}</i>	A1552 Ω lacZ:: <i>P_{lac}-CFP-parB^{P1}</i> , yGFP- <i>parB^{MT1}</i> Zeo ^R carrying pSa5Y- <i>parS^{MT1}</i>	8792	This study
A1552-yGFP-ParB ^{MT1} , Δ ddmDE: pSa5Y- <i>parS^{MT1}</i>	A1552 Ω lacZ:: <i>P_{lac}-CFP-parB^{P1}</i> , yGFP- <i>parB^{MT1}</i> ::FRT, Δ VC1770-1772::FRT carrying pSa5Y- <i>parS^{MT1}</i>	8827	This study
A1552-yGFP-ParB ^{MT1} , Δ ddmABC: pSa5Y- <i>parS^{MT1}</i>	A1552 Ω lacZ:: <i>P_{lac}-CFP-parB^{P1}</i> , yGFP- <i>parB^{MT1}</i> ::FRT, Δ VC0490-0493::FRT carrying pSa5Y- <i>parS^{MT1}</i>	8828	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm: pSa5Y- <i>parS^{MT1}</i>	A1552 Ω lacZ:: <i>P_{lac}-CFP-parB^{P1}</i> , yGFP- <i>parB^{MT1}</i> ::FRT, Δ VC1770-1772::FRT, Δ VC0490-0493::FRT carrying pSa5Y- <i>parS^{MT1}</i>	8829	This study

A1552-yGFP-ParB ^{MT1} , Δ ddmDE, TnddmDE: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::P _{lac} -CFP-parB ^{P1} , yGFP-parB ^{MT1} ::FRT, Δ VC1770-1772::FRT, TnddmDE carrying pSa5Y-parS ^{MT1}	8830	This study
A1552-yGFP-ParB ^{MT1} , Δ ddmABC, TnddmABC: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::P _{lac} -CFP-parB ^{P1} , yGFP-parB ^{MT1} ::FRT, Δ VC0490-0493::FRT, TnddmABC carrying pSa5Y-parS ^{MT1}	8831	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmDE: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::P _{lac} -CFP-parB ^{P1} , yGFP-parB ^{MT1} ::FRT, Δ VC1770-1772::FRT, Δ VC0490-0493::FRT, TnddmDE carrying pSa5Y-parS ^{MT1}	8832	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmABC: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::P _{lac} -CFP-parB ^{P1} , yGFP-parB ^{MT1} ::FRT, Δ VC1770-1772::FRT, Δ VC0490-0493::FRT, TnddmABC carrying pSa5Y-parS ^{MT1}	8833	This study
A1552-DdmC[K40A]	A1552-VC0490[K40A]	9427	This study
A1552-DdmA[K57A]	A1552-VC0492[K57A]	9428	This study
A1552-DdmD[K55A]	A1552-VC1771[K55A]	9429	This study
A1552-DdmD[E273A]	A1552-VC1771[E273A]	9430	This study
A1552-DdmD[K1102A]	A1552-VC1771[K1102A]	9463	This study
A1552-DdmC[K40A]: pSa5Y-Amp	A1552-VC0490[K40A] carrying pSa5Y-Amp	9439	This study
A1552-DdmA[K57A]: pSa5Y-Amp	A1552-VC0492[K57A] carrying pSa5Y-Amp	9440	This study
A1552-DdmD[K55A]: pSa5Y-Amp	A1552-VC1771[K55A] carrying pSa5Y-Amp	9441	This study
A1552-DdmD[E273A]: pSa5Y-Amp	A1552-VC1771[E273A] carrying pSa5Y-Amp	9442	This study
A1552-DdmD[K1102A]: pSa5Y-Amp	A1552-VC1771[K1102A] carrying pSa5Y-Amp	9476	This study
A1552 Δ ddmABC, TnddmABC [DdmA K57A]	A1552 Δ VC0490-0493::FRT, TnddmABC [DdmA K57A]	9443	This study
A1552 Δ ddm, TnddmABC [DdmA K57A]	A1552 Δ VC1770-72::FRT, Δ VC0490- 0493::FRT, TnddmABC [DdmA K57A]	9444	This study
A1552 Δ ddmABC, TnddmABC [DdmC K40A]	A1552 Δ VC0490-0493::FRT, TnddmABC [DdmC K40A]	9445	This study
A1552 Δ ddm, TnddmABC [DdmC K40A]	A1552 Δ VC1770-72::FRT, Δ VC0490- 0493::FRT, TnddmABC [DdmC K40A]	9446	This study
A1552 Δ ddmABC, TnddmABC [DdmA K57A]: pSa5Y-Amp	A1552 Δ VC0490-0493::FRT, TnddmABC [DdmA K57A] carrying pSa5Y-Amp	9454	This study
A1552 Δ ddm, TnddmABC [DdmA K57A]: pSa5Y-Amp	A1552 Δ VC1770-72::FRT, Δ VC0490- 0493::FRT, TnddmABC [DdmA K57A] carrying pSa5Y-Amp	9455	This study
A1552 Δ ddmABC, TnddmABC [DdmC K40A]: pSa5Y-Amp	A1552 Δ VC0490-0493::FRT, TnddmABC [DdmC K40A] carrying pSa5Y-Amp	9456	This study
A1552 Δ ddm, TnddmABC [DdmC K40A]: pSa5Y-Amp	A1552 Δ VC1770-72::FRT, Δ VC0490- 0493::FRT, TnddmABC [DdmC K40A] carrying pSa5Y-Amp	9457	This study

A1552 Δ ddmDE, TnddmDE [DdmD K55A]	A1552 Δ VC1770-72::FRT, TnddmDE [DdmD K55A]	9464	This study
A1552 Δ ddmDE, TnddmDE [DdmD E273A]	A1552 Δ VC1770-72::FRT, TnddmDE [DdmD E273A]	9465	This study
A1552 Δ ddmDE, TnddmDE [DdmD K1102A]	A1552 Δ VC1770-72::FRT, TnddmDE [DdmD K1102A]	9466	This study
A1552 Δ ddm, TnddmDE [DdmD K55A]	A1552 Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmDE [DdmD K55A]	9467	This study
A1552 Δ ddm, TnddmDE [DdmD E273A]	A1552 Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmDE [DdmD E273A]	9468	This study
A1552 Δ ddm, TnddmDE [DdmD K1102A]	A1552 Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmDE [DdmD K1102A]	9469	This study
A1552 Δ ddmDE, TnddmDE [DdmD K55A]: pSa5Y-Amp	A1552 Δ VC1770-72::FRT, TnddmDE [DdmD K55A] carrying pSa5Y-Amp	9477	This study
A1552 Δ ddmDE, TnddmDE [DdmD E273A]: pSa5Y-Amp	A1552 Δ VC1770-72::FRT, TnddmDE [DdmD E273A] carrying pSa5Y-Amp	9478	This study
A1552 Δ ddmDE, TnddmDE [DdmD K1102A]: pSa5Y-Amp	A1552 Δ VC1770-72::FRT, TnddmDE [DdmD K1102A] carrying pSa5Y-Amp	9479	This study
A1552 Δ ddm, TnddmDE [DdmD K55A]: pSa5Y-Amp	A1552 Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmDE [DdmD K55A] carrying pSa5Y-Amp	9480	This study
A1552 Δ ddm, TnddmDE [DdmD E273A]: pSa5Y-Amp	A1552 Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmDE [DdmD E273A] carrying pSa5Y-Amp	9481	This study
A1552 Δ ddm, TnddmDE [DdmD K1102A]: pSa5Y-Amp	A1552 Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmDE [DdmD K1102A] carrying pSa5Y-Amp	9482	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmC: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP-ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmC carrying pSa5Y-parS ^{MT1}	9431	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmB: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP-ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmB carrying pSa5Y-parS ^{MT1}	9432	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmA: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP-ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmA carrying pSa5Y-parS ^{MT1}	9433	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmABC [DdmA K57A]: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP-ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmABC [DdmA K57A] carrying pSa5Y-parS ^{MT1}	9434	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmABC [DdmC K40A]: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP-ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmABC [DdmC K40A] carrying pSa5Y-parS ^{MT1}	9435	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmD: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP-ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490-0493::FRT, TnddmD carrying pSa5Y-parS ^{MT1}	9486	This study

A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmE: pSa5Y- parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP- ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490- 0493::FRT, TnddmE carrying pSa5Y-parS ^{MT1}	9487	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmDE [DdmD K55A]: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP- ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490- 0493::FRT, TnddmDE [DdmD K55A] carrying pSa5Y-parS ^{MT1}	9483	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmDE [DdmD E273A]: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP- ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490- 0493::FRT, TnddmDE [DdmD E273A] carrying pSa5Y-parS ^{MT1}	9484	This study
A1552-yGFP-ParB ^{MT1} , Δ ddm, TnddmDE [DdmD K1102A]: pSa5Y-parS ^{MT1}	A1552 Ω lacZ::CFP-ParB ^{P1} , yGFP- ParB ^{MT1} ::FRT, Δ VC1770-72::FRT, Δ VC0490- 0493::FRT, TnddmDE [DdmD K1102A] carrying pSa5Y-parS ^{MT1}	9485	This study
A1552 Δ ddm: pSa5Y-Kan	A1552 Δ VC1770-1772::FRT, Δ VC0490- 0493::FRT carrying pSa5Y-Kan	9488	This study
A1552: pBAD-Kan	A1552 carrying pBAD-Kan	9385	This study
A1552 Δ ddm: pBAD-Kan	A1552 Δ VC1770-1772::FRT, Δ VC0490- 0493::FRT carrying pBAD-Kan	9489	This study
A1552: pE7G2-Kan	A1552 carrying pE7G2-Kan	9155	This study
A1552 Δ ddm: pE7G2-Kan	A1552 Δ VC1770-1772::FRT, Δ VC0490- 0493::FRT carrying pE7G2-Kan	9159	This study
A1552: pSIO-Kan	A1552 carrying pSIO-Kan	9217	This study
A1552 Δ ddm: pSIO-Kan	A1552 Δ VC1770-1772::FRT, Δ VC0490- 0493::FRT carrying pSIO-Kan	9218	This study
A1552: pES213-Kan	A1552 carrying pES213-Kan	9240	This study
A1552 Δ ddm: pES213-Kan	A1552 Δ VC1770-1772::FRT, Δ VC0490- 0493::FRT carrying pES213-Kan	9241	This study
A1552: pSA7G1-Kan	A1552 carrying pSA7G1-Kan	9229	This study
A1552 Δ ddm: pSA7G1-Kan	A1552 Δ VC1770-1772::FRT, Δ VC0490- 0493::FRT carrying pSA7G1-Kan	9227	This study
A1552: pW6G-Kan	A1552 carrying pW6G-Kan	9141	This study
A1552 Δ ddm: pW6G-Kan	A1552 Δ VC1770-1772::FRT, Δ VC0490- 0493::FRT carrying pW6G-Kan	9143	This study
A1552: pVCR94	A1552 carrying pVCR94	9401	This study
A1552 Δ ddm: pVCR94	A1552 Δ VC1770-1772::FRT, Δ VC0490- 0493::FRT carrying pVCR94	9404	This study
A1552: pVCR94 Δ hde	A1552 carrying pVCR94 Δ hde::FRT-Kan-FRT	9438	This study
A1552: pVCR94 Δ parM	A1552 carrying pVCR94 Δ parM::FRT-Kan-FRT	9452	This study
A1552: pVCR94 Δ TA	A1552 carrying pVCR94 Δ TA::FRT-Kan-FRT	9453	This study
A1552: pVCR94, pSa5Y- Kan	A1552 carrying pVCR94 and pSa5Y-Kan	9437	This study
A1552 Δ ddmABC, TnddmABC: pVCR94	A1552 Δ VC0490-0493::FRT, TnddmABC carrying pVCR94	9405	This study
A1552 Δ ddm, TnddmABC: pVCR94	A1552 Δ VC1770-1772::FRT, Δ VC0490- 0493::FRT, TnddmABC carrying pVCR94	9406	This study
A1552 Δ ddmDE, TnddmDE: pVCR94	A1552 Δ VC1770-1772::FRT, TnddmDE carrying pVCR94	9407	This study

A1552 Δ ddm, TnddmDE: pVCR94	A1552 Δ VC1770-1772::FRT, Δ VC0490-0493::FRT, TnddmDE carrying pVCR94	9408	This study
A1552 Δ ddmDE: pVCR94	A1552 Δ VC1770-1772::FRT carrying pVCR94	9402	This study
A1552 Δ ddmABC: pVCR94	A1552 Δ VC0490-0493::FRT carrying pVCR94	9403	This study
A1552 Δ ddmDE: pW6G-Kan	A1552 Δ VC1770-1772::FRT carrying pW6G-Kan	9491	This study
A1552 Δ ddmABC: pW6G-Kan	A1552 Δ VC0490-0493::FRT carrying pW6G-Kan	9492	This study
A1552 Δ lacZ::FRT	A1552 Δ lacZ::FRT	1208	¹⁷
A1552 Δ lacZ::FRT: pVCR94	A1552 Δ lacZ::FRT carrying pVCR94	9490	This study
A1552-SXT	A1552 carrying SXT ^{MO10} ICE; SXT was introduced into A1552 by natural transformation on chitin with DNA from MO10; Rif ^R , Sul ^R , Tm ^R , Cm ^R , Strep ^R	6854	This study
A1552-VchInd5	A1552 carrying VchInd5 ICE; VchInd5 was introduced into A1552 by natural transformation on chitin with DNA from DRC-193A; Rif ^R , Sul ^R , Tm ^R , Cm ^R , Strep ^R	8441	This study
<i>E. coli</i>			
S17-1 λ pir	Tp ^R Sm ^R thi pro hsdR ⁺ hsdM+ recA RP4-2-Tc::Mu-Km::Tn7 (λ pir)	648	¹⁸
MFDpir	MG1655 RP4-2-Tc::[Δ Mu1::aac(3)IV- Δ aphA- Δ nic35- Δ Mu2::zeo] Δ dapA::(erm-pir) Δ recA	4662	¹⁹
DH5 α	F- ϕ 80lacZ Δ M15 Δ (lacZYA-argF) U169 deoR recA1 endA1 hsdR17 (rk-, mk+) phoA supE44 λ -thi-1 gyrA96 relA1	736	Invitrogen
TOP10	F- mcrA Δ (mrr-hsdRMS-mcrBC) ϕ 80lacZ Δ M15 Δ lacX74 recA1 araD139 Δ (ara leu) 7697 galU galK rpsL (Strep ^R) endA1 nupG	741	Invitrogen
S17-1 λ pir: pGP704-Tn-empty	S17-1 λ pir carrying pGP704-TnAraC	5513	²⁰
S17-1 λ pir: pGP704-TnddmDE	S17-1 λ pir carrying pGP704-TnddmDE	8770	This study
S17-1 λ pir: pGP704-TnddmD	S17-1 λ pir carrying pGP704-TnddmD	8697	This study
S17-1 λ pir: pGP704-TnddmE	S17-1 λ pir carrying pGP704-TnddmE	8698	This study
MG1655	K12; λ - F-; rph-1	2904	Laboratory collection
MG1655-Tn-empty	MG1655 with integrated TnAraC	8804	This study
MG1655-TnddmDE	MG1655 with integrated TnddmDE	8805	This study
MG1655-TnddmABC	MG1655 with integrated TnddmABC	8838	This study
MG1655-Tn-empty: pSa5Y-Kan	MG1655-TnAraC carrying pSa5Y-Kan	8807	This study
MG1655-Tn-empty: pSa5Yori	MG1655-TnAraC carrying pSa5Yori	8808	This study
MG1655-Tn-empty: pColE1ori	MG1655-TnAraC carrying pColE1ori	8810	This study

MG1655-Tn-empty: p15Aori	MG1655-TnAraC carrying p15Aori	8811	This study
MG1655-Tn-empty: pmini-P1ori	MG1655-TnAraC carrying pmini-P1ori	8812	This study
MG1655-Tn-empty: pRK2ori	MG1655-TnAraC carrying pRK2ori	8813	This study
MG1655-Tn-empty: pSC101ori	MG1655-TnAraC carrying pSC101ori	8814	This study
MG1655-TnddmDE: pSa5Y-Kan	MG1655-TnddmDE carrying pSa5Y-Kan	8815	This study
MG1655-TnddmDE: pSa5Yori	MG1655-TnddmDE carrying pSa5Yori	8816	This study
MG1655-TnddmDE: pColE1ori	MG1655-TnddmDE carrying pColE1ori	8818	This study
MG1655-TnddmDE: p15Aori	MG1655-TnddmDE carrying p15Aori	8819	This study
MG1655-TnddmDE: pmini-P1ori	MG1655-TnddmDE carrying pmini-P1ori	8820	This study
MG1655-TnddmDE: pRK2ori	MG1655-TnddmDE carrying pRK2ori	8821	This study
MG1655-TnddmDE: pSC101ori	MG1655-TnddmDE carrying pSC101ori	8822	This study
MG1655-TnddmABC: pSa5Y-Kan	MG1655-TnddmABC carrying pSa5Y-Kan	8839	This study
MG1655-TnddmABC: pSa5Yori	MG1655-TnddmABC carrying pSa5Yori	8840	This study
MG1655-TnddmABC: pColE1ori	MG1655-TnddmABC carrying pColE1ori	8842	This study
MG1655-TnddmABC: p15Aori	MG1655-TnddmABC carrying p15Aori	8843	This study
MG1655-TnddmABC: pmini-P1ori	MG1655-TnddmABC carrying pmini-P1ori	8844	This study
MG1655-TnddmABC: pRK2ori	MG1655-TnddmABC carrying pRK2ori	8845	This study
MG1655-TnddmABC: pSC101ori	MG1655-TnddmABC carrying pSC101ori	8841	This study
MG1655-TnddmC	MG1655 with integrated TnddmC	9447	This study
MG1655-TnddmB	MG1655 with integrated TnddmB	9448	This study
MG1655-TnddmA	MG1655 with integrated TnddmA	9449	This study
MG1655-TnddmABC [DdmA K57A]	MG1655 with integrated TnddmABC encoding K57A variant of DdmA	9450	This study
MG1655-TnddmABC [DdmC K40A]	MG1655 with integrated TnddmABC encoding K40A variant of DdmC	9451	This study
MFDpir: pSa5Y-oriT	MFDpir carrying pSa5Y-oriT	9473	This study
MG1655-Strep	MG1655-Strep; streptomycin-resistant mutant selected after UV treatment	4453	This study
MG1655-Strep: pSA7G1- Kan	MG1655-Strep carrying pSA7G1-Kan	9224	This study
MG1655-Strep: pW6G- Kan	MG1655-Strep carrying pW6G-Kan	9244	This study

NC213	MG1655 Nx ^R carrying pVCR94	8974	Gift from V. Burrus ²¹
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^a *V. cholerae* locus tag numbers are according to Heidelberg *et al.*, as previously described¹.

^b Cm – Chloramphenicol; Kan – Kanamycin; Nx – Nalidixic acid; Rif – Rifampicin; Strep – Streptomycin;

Sul – Sulfamethoxazole; Tm – Trimethoprim; Zeo – Zeocin.

Supplementary Table 5. Plasmids used and constructed in this study.

Plasmid	Plasmid information ^a	Strain #	Source
pBR-FRT-Kan-FRT2	pBR322 derivative containing improved FRT- <i>aph</i> -FRT cassette, used as template for TransFLP; Amp ^R , Kan ^R	3782	22
pBR-FLP	pBR322 derivative containing FLP+, λ cI857+, λ pR from pCP20 integrated into the <i>EcoRV</i> site of pBR322, used for FLP recombination; Amp ^R	1203	17
pUX-BF13	pUX-BF13 - <i>oriR6K</i> , helper plasmid with Tn7 transposition function; Amp ^R	457(S17 λ pir) 4933(MFDpir)	23
pFRT-aph-pheS*	pBR322 derivative containing FRT- <i>aph</i> -FRT cassette, as well as <i>pheS</i> *[A294G/T251A], used as template for construction of pSa5Y-Kan- <i>pheS</i> *; Amp ^R , Kan ^R	4591	24
pSa5Y	3,494 bp MRB family plasmid isolated from <i>V. cholerae</i> strain Sa5Y; GenBank: CP089143	275	This study
pSL4G	3,198 bp pSa5Y-like MRB family plasmid isolated from <i>V. cholerae</i> strain SL4G; GenBank: CP089146	955	This study
pSO5Y	3,494 bp pSa5Y-like MRB family plasmid isolated from <i>V. cholerae</i> strain SO5Y; GenBank: CP089144	960	This study
pSA7G3	2,466 bp plasmid isolated from <i>V. cholerae</i> strain SA7G; encodes plasmid replication initiation protein; GenBank: CP089145	959	This study
pE7G2	2,466 bp plasmid isolated from <i>V. cholerae</i> strain E7G; encodes plasmid replication initiation protein; GenBank: CP089147	963	This study
pSa5Y-Amp	pSa5Y-Amp-SacI(cw); Amp ^R with the promoter amplified from pBAD/Myc-HisA cloned into <i>SacI</i> site of pSa5Y in the clock-wise orientation; Amp ^R	8634	This study
pBAD/Myc-HisA	pBR322-derived expression vector; ColE1/pMB1/pBR322/pUC origin of replication; <i>araBAD</i> promoter (<i>P</i> _{BAD}); Amp ^R	24	Invitrogen
pBAD-Kan	pBAD/Myc-HisA with Amp ^R replaced by Kan ^R	3363	25
pSa5Y-Kan	FRT- <i>kan</i> -FRT integrated into pSa5Y replacing the adhesin gene; obtained by natural transformation on chitin with a PCR fragment containing FRT- <i>kan</i> -FRT flanked by regions homologous to sequences from either side of the adhesin gene; Kan ^R	8649	This study
pSa5Y-Kan-pheS*	FRT- <i>kan-pheS</i> *-FRT integrated into pSa5Y replacing the adhesin gene; obtained by natural transformation on chitin with a PCR fragment containing FRT- <i>kan-pheS</i> *-FRT flanked by regions homologous to sequences from either side of the adhesin gene; Kan ^R	6851	This study

pCal-Sa5Y-1	Calibrator plasmid for pSa5Y copy number determination; 300 bp <i>gyrA</i> (identical in A1552 and Sa5Y) and 627 bp pSa5Y fragments cloned in-between the <i>NcoI/EcoRI</i> sites in pBAD/Myc-HisA; Amp ^R	8652	This study
pCR-BluntII-TOPO-pSA7G3	Dephosphorylated <i>EcoRV</i> -linearized plasmid pSA7G3 cloned into pCR-BluntII-TOPO; Kan ^R , Zeo ^R	8653	This study
pCR-BluntII-TOPO-pE7G2	Dephosphorylated <i>EcoRV</i> -linearized plasmid pE7G2 cloned into pCR-BluntII-TOPO; Kan ^R , Zeo ^R	8654	This study
pGP704	R6Kori, <i>mob</i> , Amp ^R	6890	²⁶
pMJ174	pGP704 derivative; the Amp ^R cassette (<i>bla</i>) was replaced with Kan ^R (<i>aph</i>) and the <i>Bam</i> HI fragment containing <i>oriT</i> and <i>traJ</i> was removed by inverse PCR with phosphorylated primers followed by ligation; R6Kori, Kan ^R	6893	This study
pB1067	MRB family plasmid from <i>V. nigrispulchritudo</i>	4847	Gift from F. Le Roux ^{27,28}
pACYC177	p15ori, Amp ^R , Kan ^R	976	²⁹
pSC101	pSC101ori, Tet ^R	8522	Gift from D. Chattoraj
pGL5	mini-RK2ori, Kan ^R	8520	Gift from D. Chattoraj
pSP102	mini-P1, Cm ^R	8531	Gift from D. Chattoraj ³⁰
pSa5Yori	pSa5Y <i>ori</i> cloned into <i>XbaI/SacI</i> sites in pMJ174; Kan ^R	8655	This study
pB1067ori	pB1067 <i>ori</i> cloned into <i>XbaI/SacI</i> sites in pMJ174; Kan ^R	8656	This study
pColE1ori	ColE1 <i>ori</i> amplified from pBAD/Myc-HisA cloned into <i>XbaI/SacI</i> sites in pMJ174; Kan ^R	8657	This study
p15Aori	p15A <i>ori</i> amplified from pACYC177 cloned into <i>XbaI/SacI</i> sites in pMJ174; Kan ^R	8658	This study
pSC101ori	pSC101 <i>ori</i> (without the <i>par</i> locus) cloned into <i>XbaI/SacI</i> sites in pMJ174; Kan ^R	8774	This study
pRK2ori	mini-RK2 <i>ori</i> amplified from pGL5 cloned into <i>XbaI/SacI</i> sites in pMJ174; Kan ^R	8773	This study
pmini-P1ori	mini-P1 <i>ori</i> amplified from pSP102 cloned into <i>XbaI/SacI</i> sites in pMJ174; Kan ^R	8772	This study
pGP704-Sac28 (p28)	pGP704-Sac28, <i>ori</i> R6K, <i>sacB</i> ; Amp ^R	649	³¹
p28-ΔVC1771	pGP704-Sac28-ΔVC1771	8696	This study
p28-VC1771[P29, E891]	pGP704-Sac28-VC1771[P29, E891]	9386	This study
p28-VC1771[S29, K891]	pGP704-Sac28-VC1771[S29, K891]	9387	This study
p28-VC1771[S29, E891]	pGP704-Sac28-VC1771[S29, E891]	9388	This study
p28-VC1771[P29, K891]	pGP704-Sac28-VC1771[P29, K891]	9389	This study

p28-DdmC[K40A]	pGP704-Sac28-VC0490[K40A]	9409	This study
p28-DdmA[K57A]	pGP704-Sac28-VC0492[K57A]	9410	This study
p28-DdmD[K55A]	pGP704-Sac28-VC1771[K55A]	9411	This study
p28-DdmD[E273A]	pGP704-Sac28-VC1771[E273A]	9412	This study
p28-DdmD[K1102A]	pGP704-Sac28-VC1771[K1102A]	9458	This study
pGP704-TnAraC	pGP704-TnAraC; pGP704 with mini-Tn7 carrying <i>araC</i> and the <i>araBAD</i> promoter (P_{BAD}); Amp ^R , Gent ^R	5513($S17\lambda_{pir}$) 8793(MFD $_{pir}$)	7,20
pGP704-TnddmD	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC1771; Amp ^R , Gent ^R (TnddmD)	8697	This study
pGP704-TnddmE	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC1770; Amp ^R , Gent ^R (TnddmE)	8698	This study
pGP704-TnddmC	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC0490; Amp ^R , Gent ^R (TnddmC)	8753($S17\lambda_{pir}$) 9415(MFD $_{pir}$)	This study
pGP704-TnddmB	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC0491; Amp ^R , Gent ^R (TnddmB)	8754($S17\lambda_{pir}$) 9416(MFD $_{pir}$)	This study
pGP704-TnddmA	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC0492; Amp ^R , Gent ^R (TnddmA)	8755($S17\lambda_{pir}$) 9417(MFD $_{pir}$)	This study
pGP704-TnddmABC	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC0492-VC0490; Amp ^R , Gent ^R (TnddmABC)	8762($S17\lambda_{pir}$) 8837(MFD $_{pir}$)	This study
pGP704-TnddmDE	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC1771-VC1770; Amp ^R , Gent ^R (TnddmDE)	8770($S17\lambda_{pir}$) 8794(MFD $_{pir}$)	This study
pGP704-TnddmABC [DdmA K57A]	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC0492-VC0490 encoding K57A variant of VC0492; Amp ^R , Gent ^R (TnddmABC [DdmA K57A])	9413($S17\lambda_{pir}$) 9418(MFD $_{pir}$)	This study
pGP704-TnddmABC [DdmC K40A]	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC0492-VC0490 encoding K40A variant of VC0490; Amp ^R , Gent ^R (TnddmABC [DdmC K40A])	9423($S17\lambda_{pir}$) 9425(MFD $_{pir}$)	This study
pGP704-TnddmDE [DdmD K55A]	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC1771-VC1770 encoding K55A variant of VC1771; Amp ^R , Gent ^R (TnddmDE [DdmD K55A])	9459	This study
pGP704-TnddmDE [DdmD E273A]	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC1771-VC1770 encoding E273A variant of VC1771; Amp ^R , Gent ^R (TnddmDE [DdmD E273A])	9460	This study
pGP704-TnddmDE [DdmD K1102A]	pGP704 with mini-Tn7 carrying <i>araC</i> and P_{BAD} -VC1771-VC1770 encoding K1102A variant of VC1771; Amp ^R , Gent ^R (TnddmDE [DdmD K1102A])	9461	This study
pSa5Y- <i>parS</i> ^{MT1}	pSa5Y-Kan, <i>parS</i> ^{MT1} ; Kan ^R	8769	This study
pSa5Y- <i>oriT</i>	RP4 <i>oriT</i> sequence amplified from pGP704 cloned into <i>SacI</i> site in pSa5Y-Kan in the clock-wise orientation; Kan ^R	9462	This study

pE7G2-Kan	Kan ^R (<i>aph</i>) integrated into pE7G2 in intergenic region between ORF#3 and ORF#4; obtained by natural transformation on chitin of strain E7G with a PCR fragment containing <i>aph</i> flanked by regions homologous to sequences on either side of the insertion side; Kan ^R	9133	This study
pSIO1	4,906 bp MRB family plasmid isolated from <i>V. cholerae</i> strain SIO	1000	32
pSIO-Kan	PCR-amplified and <i>Stu</i> I-digested Kan ^R (<i>aph</i>) cassette integrated into <i>Dra</i> I site of plasmid pSIO1; Kan ^R	9105	This study
pES213	5,501 bp MRB family plasmid isolated from <i>V. fischeri</i> strain ES213	9162	Gift from E. Stabb ³³
pES213-Kan	PCR-amplified and <i>Stu</i> I-digested Kan ^R (<i>aph</i>) cassette integrated into <i>Eco</i> RV site of plasmid pES213; Kan ^R	9104	This study
pSA7G1	79,397 bp plasmid 1 from <i>V. cholerae</i> environmental strain SA7G; GenBank: CP053818	959	34
pSA7G1-Kan	Kan ^R (<i>aph</i>) integrated into pSA7G1 by natural transformation on chitin in strain SA7G (with an inactivated type VI secretion system to allow subsequent matings) with a PCR fragment containing <i>aph</i> flanked by regions homologous to sequences on either side of the insertion side (intergenic region between HPY17_19380 and HPY17_19385); Kan ^R	9210	This study
pW6G	306,484 bp plasmid from <i>V. cholerae</i> environmental strain W6G; GenBank: CP053812	354	34
pW6G-Kan	Kan ^R (<i>aph</i>) integrated into pW6G obtained by natural transformation on chitin in strain W6G with a PCR fragment containing Δ HPY05_20565:: <i>aph</i> flanked by regions homologous to sequences on either side of the insertion side; Kan ^R	9127	This study
pVCR94	171,829 bp IncC family plasmid isolated from <i>V. cholerae</i> O1 El Tor clinical isolate in Rwanda, 1994; Sul ^R , Tm ^R , Amp ^R , Cm ^R , Strep ^R , Tet ^R ; GenBank: CP033514	8974	Gift from V. Burrus ²¹

^a Amp – Ampicillin; Cm – Chloramphenicol; Gent – Gentamicin; Kan – Kanamycin; Strep –

Streptomycin; Sul – Sulfamethoxazole; Tm – Trimethoprim; Tet – Tetracycline; Zeo – Zeocin.

Supplementary Table 6. Primers used for cloning of the *ori* regions.

<i>ori</i>	Name	Sequence
pSa5Y	pSa5Y_Ori_F_XbaI	GCG TCT AGA GAC AGA AGC CAT TAG GGA TGT AAC G
	pSa5Y_Ori_R_SacI	GGT GAG CTC GGC TTG TGG TTA AGT GAA TAT TAC AG
ColE1	pBAD_ori_XbaI-F	GCG TCT AGA GAT CAA AGG ATC TTC TTG AGA TCC
	pBAD_ori_SacI-R	GGT GAG CTC GTT GCT GGC GTT TTT CCA TAG G
p15A	pACYC_ori_XbaI-F	GCG TCT AGA TAA GAT GAT CTT CTT GAG ATC G
	pACYC_ori_SacI-R	GGT GAG CTC GCG CTA GCG GAG TGT ATA CTG G
pB1067	pSFn1_ori_XbaI-F	GCG TCT AGA CGC GCT ATC GCT TGT CGG CCT TG
	pSFn1_ori_SacI-R	GGT GAG CTC AAG AGC AGG GCT TTA TAT AGG ACG
pSC101	XbaI-pSC101-ori-F	CCC CTC TAG ATT CCC TTT GAT ATG TAA CGG TG
	SacI-pSC101-ori-R	CCC CGA GCT CCG GAA CTG ACT AAA GTA GTG AG
RK2	XbaI-RK2-ori-F	CCC CTC TAG ATG TCG TGC CAG CTG CAT TAA TG
	SacI-RK2-ori-R	CCC CGA GCT CGG GCT TCC AGC GCC TTT CCG AC
mini-P1	XbaI-pSP102-ori-F	CCC CTC TAG ACG TCA TCT ACC TGC CTG GAC AG
	SacI-pSP102-ori-R	CCC CGA GCT CAT AAT ACG ACT CCC TTC CAA CC

Supplementary Table 7. Bacteriophages used in this study.

Phage	Family	DSMZ No. ^a
Escherichia phage lambda (λ)	<i>Siphoviridae</i>	DSM 4499
Escherichia phage P1	<i>Myoviridae</i>	DSM 5757
Escherichia phage T4	<i>Myoviridae</i>	DSM 4505
Escherichia phage T6	<i>Myoviridae</i>	DSM 4622
Escherichia phage T7	<i>Autographiviridae</i>	DSM 4623

^a German Collection of Microorganisms and Cell Cultures GmbH.

Supplementary Table 8. List of statistical comparisons.

Comparison	Adjusted <i>P</i> value	Symbol ^a	Information
Extended data Fig. 10a (pSa5Y panel) - One way ANOVA with Dunnett's multiple comparison test			
WT vs. <i>ΔddmDE</i>	0.9999	ns	N° of families = 1 N° of comparisons per family = 3 Alpha = 0.05
WT vs. <i>ΔddmABC</i>	0.9698	ns	
WT vs. <i>Δddm</i>	0.9409	ns	
Extended data Fig. 10a (pBAD panel) - One way ANOVA with Dunnett's multiple comparison test			
WT vs. <i>ΔddmDE</i>	0.8881	ns	N° of families = 1 N° of comparisons per family = 3 Alpha = 0.05
WT vs. <i>ΔddmABC</i>	0.9021	ns	
WT vs. <i>Δddm</i>	0.6723	ns	
Extended data Fig. 10b - One way ANOVA with Dunnett's multiple comparison test			
WT vs. <i>ΔddmDE</i>	0.5753	ns	N° of families = 1 N° of comparisons per family = 3 Alpha = 0.05
WT vs. <i>ΔddmABC</i>	0.0124	*	
WT vs. <i>Δddm</i>	0.0104	*	
Extended data Fig. 10c - One way ANOVA with Dunnett's multiple comparison test			
WT vs. <i>ΔddmDE</i>	0.1167	ns	N° of families = 1 N° of comparisons per family = 3 Alpha = 0.05
WT vs. <i>ΔddmABC</i>	0.0003	***	
WT vs. <i>Δddm</i>	<0.0001	****	
Fig. 4b - One way ANOVA with Dunnett's multiple comparison test			
WT x pSA7G1 vs. <i>ΔddmDE</i> x pSA7G1	0.0037	**	N° of families = 3 N° of comparisons per family = 3 Alpha = 0.05
WT x pSA7G1 vs. <i>ΔddmABC</i> x pSA7G1	0.0037	**	
WT x pSA7G1 vs. <i>Δddm</i> x pSA7G1	0.0001	***	
WT x pW6G vs. <i>ΔddmDE</i> x pW6G	>0.9999	ns	
WT x pW6G vs. <i>ΔddmABC</i> x pW6G	0.0365	*	
WT x pW6G vs. <i>Δddm</i> x pW6G	0.0616	ns	
WT x pVCR94 vs. <i>ΔddmDE</i> x pVCR94	0.1462	ns	
WT x pVCR94 vs. <i>ΔddmABC</i> x pVCR94	<0.0001	****	
WT x pVCR94 vs. <i>Δddm</i> x pVCR94	<0.0001	****	
Extended data Fig. 10h - One way ANOVA with Tukey's multiple comparison test			
WT (No plasmid) vs. <i>Δddm</i> (No plasmid)	0.5499	ns	N° of families = 1 N° of comparisons per family = 15 Alpha = 0.05
WT (No plasmid) vs. WT (pVCR94)	<0.0001	****	
WT (No plasmid) vs. <i>Δddm</i> (pVCR94)	<0.0001	****	
WT (No plasmid) vs. WT (pW6G)	<0.0001	****	
WT (No plasmid) vs. <i>Δddm</i> (pW6G)	<0.0001	****	
<i>Δddm</i> (No plasmid) vs. WT (pVCR94)	<0.0001	****	
<i>Δddm</i> (No plasmid) vs. <i>Δddm</i> (pVCR94)	<0.0001	****	
<i>Δddm</i> (No plasmid) vs. WT (pW6G)	<0.0001	****	
<i>Δddm</i> (No plasmid) vs. <i>Δddm</i> (pW6G)	<0.0001	****	

WT (pVCR94) vs. Δddm (pVCR94)	<0.0001	****	
WT (pVCR94) vs. WT (pW6G)	0.0395	*	
WT (pVCR94) vs. Δddm (pW6G)	0.2825	ns	
Δddm (pVCR94)vs. WT (pW6G)	<0.0001	****	
Δddm (pVCR94)vs. Δddm (pW6G)	0.0006	***	
WT (pW6G) vs. Δddm (pW6G)	0.0010	***	
Fig. 4c - One way ANOVA with Dunnett's multiple comparison test			
WT (No plasmid) vs. $\Delta ddmDE$ (No plasmid)	0.4033	ns	N° of families = 3 N° of comparisons per family = 2 Alpha = 0.05
WT (No plasmid) vs. $\Delta ddmABC$ (No plasmid)	0.7485	ns	
WT (pVCR94) vs. $\Delta ddmDE$ (pVCR94)	0.9981	ns	
WT (pVCR94) vs. $\Delta ddmABC$ (pVCR94)	0.0007	***	
WT (pW6G) vs. $\Delta ddmDE$ (pW6G)	0.9913	ns	
WT (pW6G) vs. $\Delta ddmABC$ (pW6G)	0.0019	**	
Extended data Fig. 10j - One way ANOVA with Tukey's multiple comparison test			
WT vs. SXT	<0.0001	****	N° of families = 1 N° of comparisons per family = 6 Alpha = 0.05
WT vs. <i>VchInd5</i>	<0.0001	****	
WT vs. pVCR94	<0.0001	****	
SXT vs. <i>VchInd5</i>	0.0213	*	
SXT vs. pVCR94	0.0002	***	
<i>VchInd5</i> vs. pVCR94	0.0086	**	
Fig. 4d - One way ANOVA with Tukey's multiple comparison test			
WT vs. SXT	0.0033	**	N° of families = 1 N° of comparisons per family = 6 Alpha = 0.05
WT vs. <i>VchInd5</i>	0.0006	***	
WT vs. pVCR94	<0.0001	****	
SXT vs. <i>VchInd5</i>	0.4307	ns	
SXT vs. pVCR94	0.0008	***	
<i>VchInd5</i> vs. pVCR94	0.0048	**	

^a * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$; **** $P < 0.0001$; ns – not significant.

Supplementary Video legends

Supplementary Video 1. Imaging of pSa5Y using a ParB-*parS* fluorescent reporter system.

Exponentially growing cells of strain A1552-yGFP-ParB^{MT1} carrying pSa5Y-*parS*^{MT1} were imaged automatically by time-lapse microscopy at 1 second intervals for 10 seconds. The video is a composite of three separate examples and is displayed at 2 frames per second. Scale bar = 2.5 μ m, time (s), as indicated.

Supplementary Video 2. Over-expression of *ddmABC* clusters pSa5Y into static foci.

Cells of strain A1552-yGFP-ParB^{MT1} Δ *ddmDE* Δ *ddmABC* T*nddmABC* carrying pSa5Y-*parS*^{MT1} were cultured in the absence (No Ara) and presence (+Ara) of 0.02% arabinose, as indicated, and imaged automatically by time-lapse microscopy at 0.6 second intervals for 20 seconds. The videos are displayed at 5 frames per second. Scale bar = 2.5 μ m, time (s), as indicated.

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