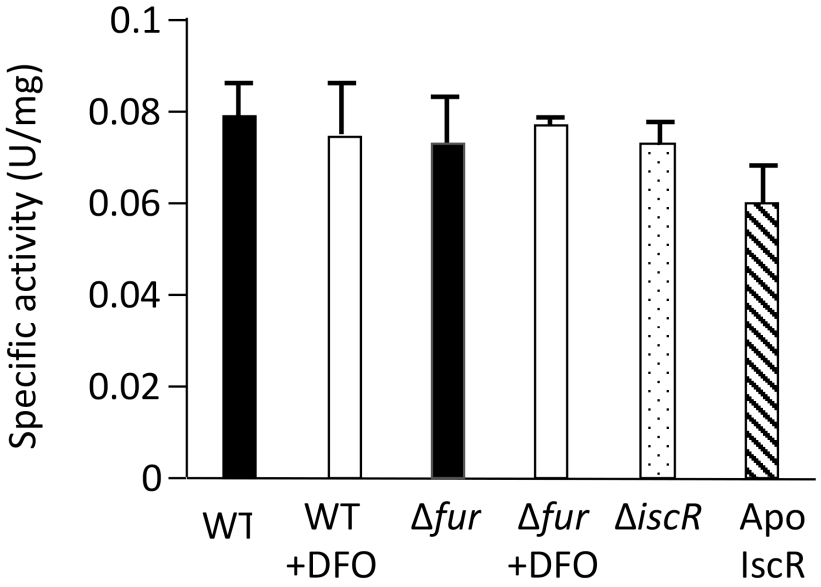
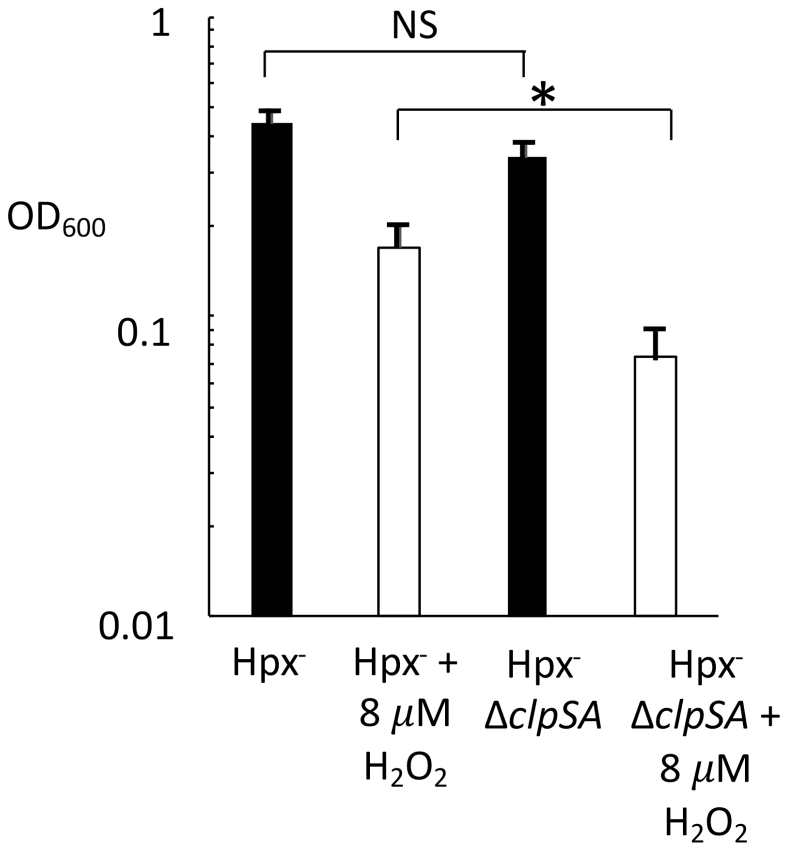
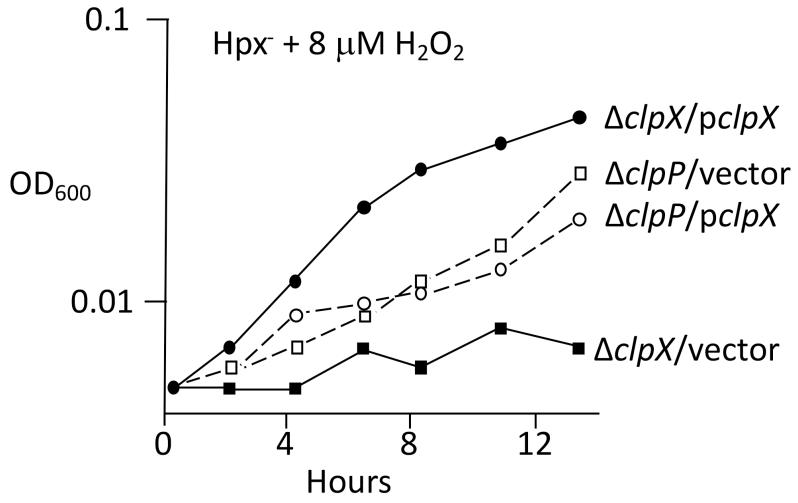
Supplemental Material.



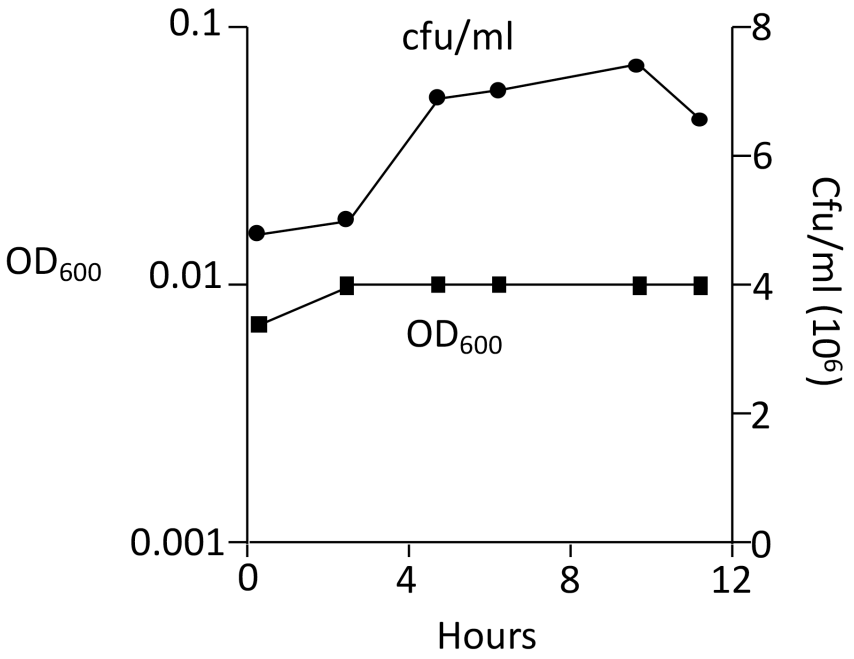
Supplementary Figure 1. The *clpSA-lacZ* fusion is not regulated by Fur or IscR. The cells were grown aerobically in medium that included histidine and aromatic and branched-chain amino acids. Where indicated, 100 µM of the cell-permeable iron chelator desferrioxamine (DFO) was supplied to deactivate the Fur:Fe(II) repressor. Apo-IscR strains lack the Fe-S cluster in IscR. Strains: ASE149, ASE227, ASE242, ASE248.



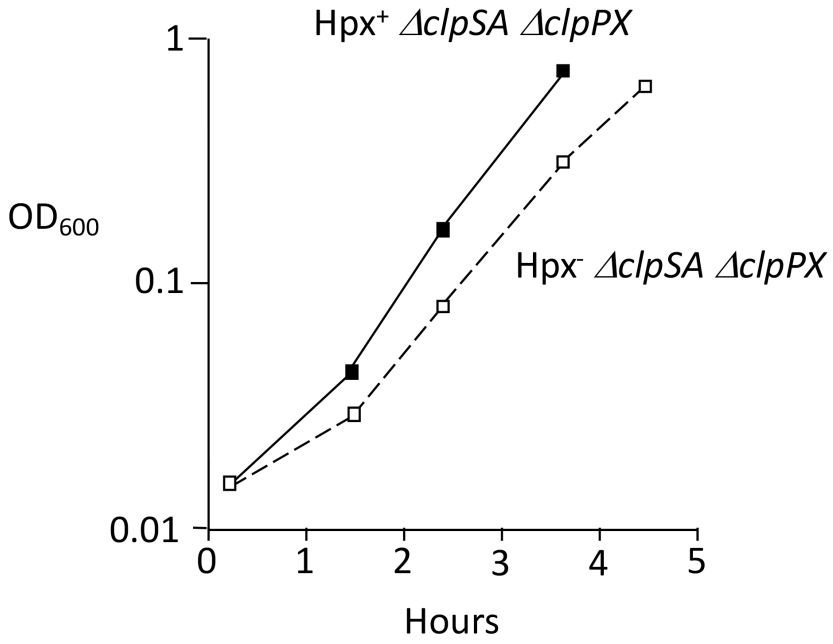
Supplementary Figure 2. The transient phenotype of the Hpx- *clpSA* mutant is statistically robust. Anaerobic cultures were diluted into aerobic medium with or without 8 μM H_2O_2 at time zero. The time points were measured after 12 hours. Strains: LC106, ASE11.



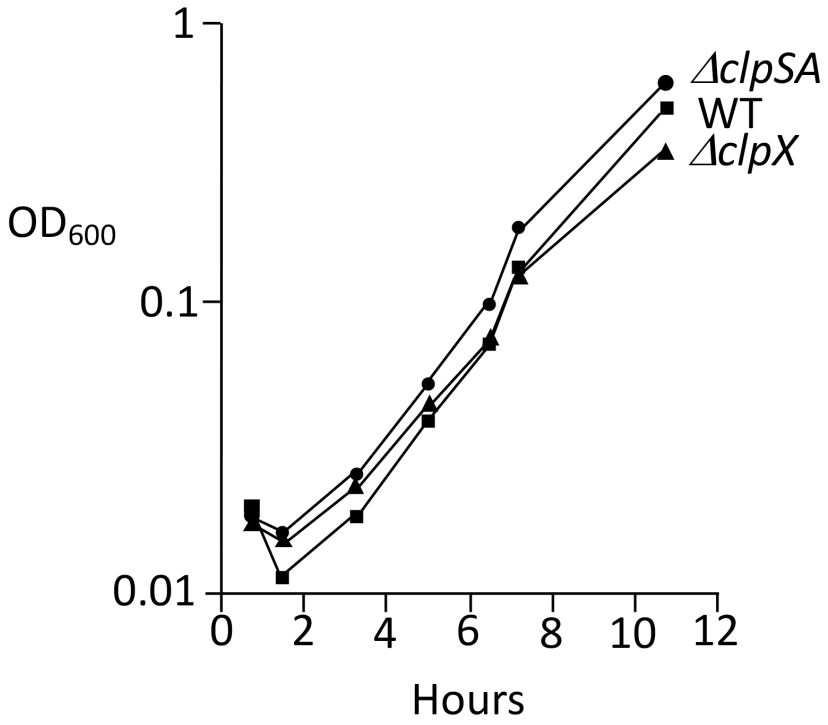
Supplementary Figure 3. ClpX and ClpP exhibit independent effects upon cell growth. Anaerobic cultures were diluted into aerobic medium containing 8 μM H_2O_2 at time zero. The *clpX* mutant consistently exhibits greater sensitivity to H_2O_2 than does a *clpP* mutant. A *clpX* plasmid complements the *clpX* but not the *clpP* mutation, indicating that the *clpP* phenotype does not arise from a polar effect upon *clpX*. Strains: ASE398, ASE400, ASE413, ASE414.



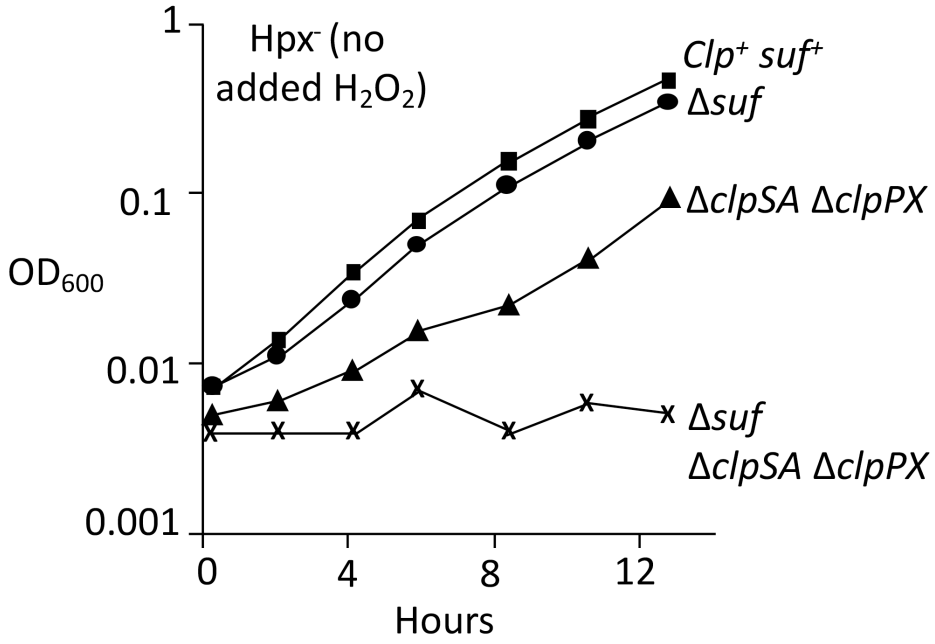
Supplementary Figure 4. The Δ*clpSA* Δ*clpX* mutant remains viable even when 8 μM H_2O_2 blocks its growth. Anaerobic cultures of Hpx$^-$ *ΔclpSA ΔclpX* cells (ASE21) were diluted at time zero into aerobic media containing 8 μM H_2O_2. At intervals aliquots of the cells were removed the cells were plated on anoxic medium to determine viability.



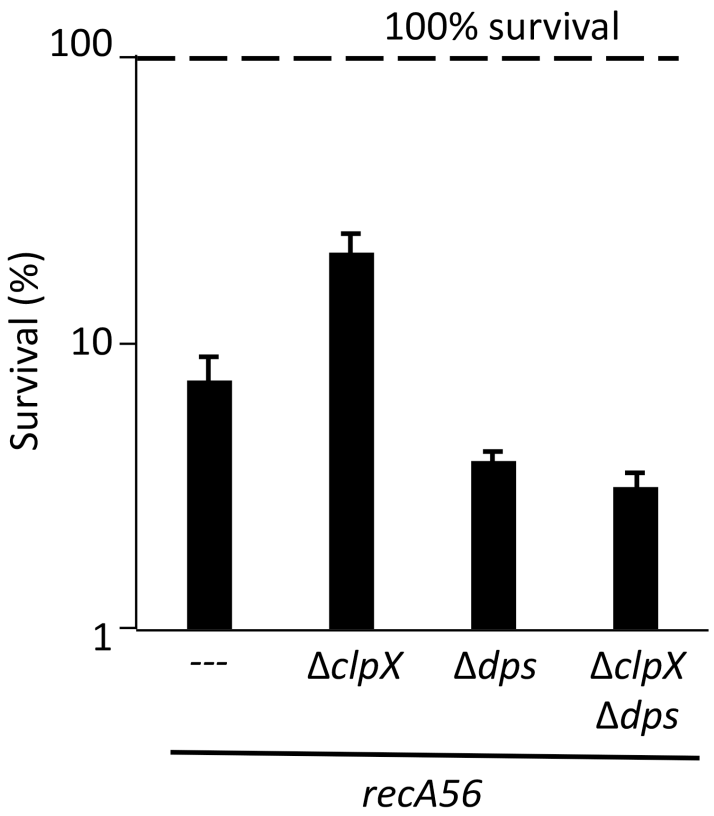
Supplementary Figure 5. Hpx$^-$ *ΔclpSA ΔclpPX* cells do not exhibit a significant growth defect in aerobic LB media. Anaerobic cultures were diluted into aerobic LB at time zero. Strains: ASE125, ASE217.



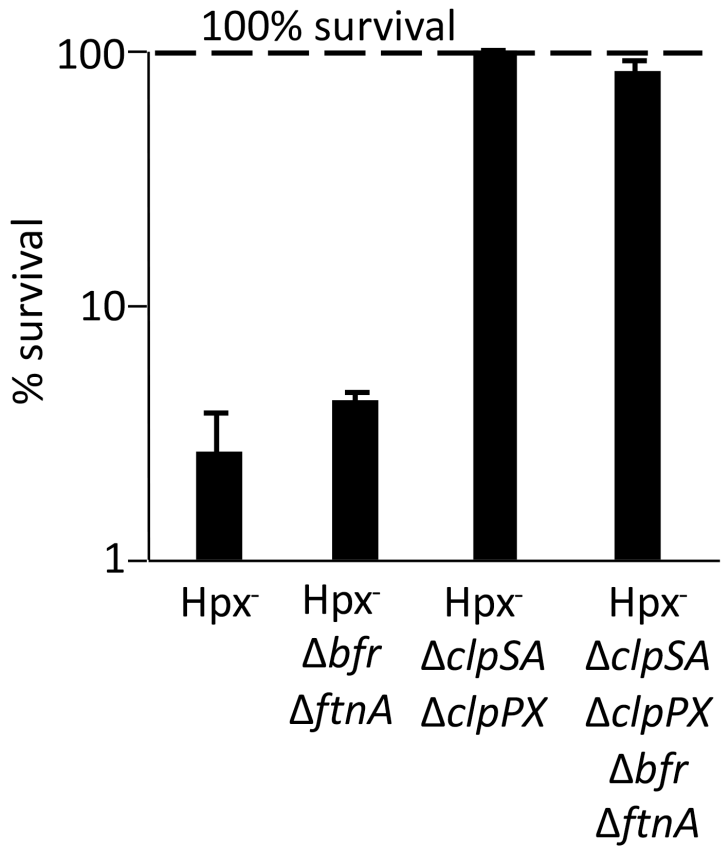
Supplementary Figure 6. ClpX and ClpSA are not necessary to recover from an abrupt nutritional downshift. The cells were precultured aerobically in LB media to OD 0.1. They were then centrifuged and resuspended at time zero in minimal glucose medium containing Phe, Tyr, Trp, and His. Strains: MG1655, ASE3, ASE9.



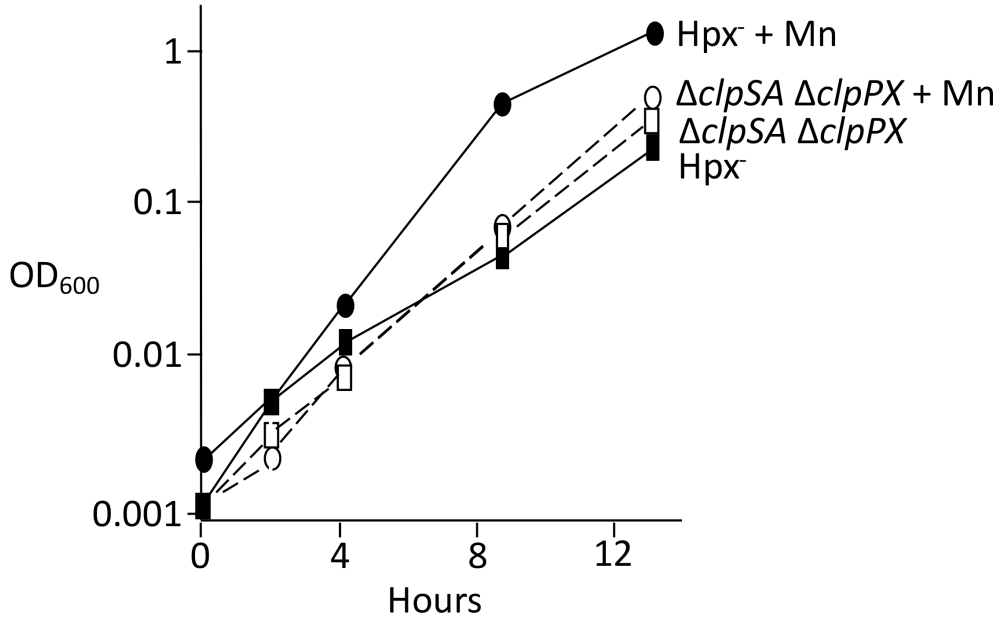
Supplementary Figure 7. The Clp proteins work independently of the Suf cluster-assembly system. Anaerobic cultures of Hpx$^-$ mutants were diluted at time zero into aerobic medium. No additional H_2O_2 was added, indicating that the phenotypes arise from only the ~ 1 μM H_2O_2 that arises in Hpx$^-$ cultures. Strains: LC106, SJ1017, ASE213, and ASE300.



Supplementary Figure 8. The protective effect of a *clpX* mutation depends upon Dps in a *recA* strain. Anaerobic cultures were aerated, and 2.5 mM H_2O_2 was added for 2 minutes. Catalase was then added, and viability was determined by plating on anaerobic LB plates. The use of *recA* strains allowed DNA damage to be perceived without the amplification of Fenton chemistry by cystine addition, as in Fig. 10. Strains: ASE386, ASE388, ASE390.



Supplementary Figure 9. Unlike Dps, ferritin and bacterioferritin did not affect the level of free iron available to participate in Fenton chemistry. Anaerobic cells were then aerated for two hours. They were diluted in the same medium, incubated for 3 min with 0.5 mM cystine, and exposed to 2.5 mM H_2O_2 for 2 minutes. Catalase was added, and viability was determined by plating. Strains: LC106, ASE125, ASE308, ASE310.



Supplementary Figure 10. Mn does not poison Hpx$^-$ cells or Hpx$^+$ Clp$^-$ cells. Anaerobic cultures of Hpx$^-$ cells (LC106) were diluted into aerobic medium at time zero, with or without the addition of 4 μM manganese. The Hpx$^+$ *ΔclpSA ΔclpX* cells (ASE217) were precultured aerobically and then diluted in media with or without 4 μM manganese.

103
104 **Table S1: Strains**
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MG1655	*F⁻ wild-type E. coli*
LC106	*ΔahpF::kan Δ(katG17::*Tn*10)1 Δ(katE12::*Tn*10)1*
AS015	LC106 with p*clpSA*
ASE3	MG1655 *ΔclpX::cat*
ASE7	LC106 *ΔclpX::cat*
ASE9	MG1655 *ΔclpSA::cat~zbj-1230::*Tn*10*
ASE11	LC106 *ΔclpSA::cat~zbj-1230::*Tn*10*
ASE15	ASE11 with pWKS30
ASE17	ASE11 with p*clpSA*
ASE21	LC106 *ΔclpX::cat ΔclpSA::cat~zbj-1230::*Tn*10*
ASE36	LC106 with p*clpPX*
ASE38	ASE7 with pWKS30
ASE40	ASE7 with p*clpPX*
ASE67	LC106 *ΔclpP::cat*
ASE117	LC106 *Δdps::cat Δ(clpX::cat)*
ASE119	LC106 *ΔclpPX::cat*
ASE125	LC106 *ΔclpPX::cat Δ(clpSA::cat)*
ASE149	MG1655 *attλ*::[pSJ501::*clpS'-lacZ⁺*]~*cat*
ASE151	ASE125 with pWKS30
ASE153	ASE125 with p*clpSA*
ASE155	LC106 *attλ*::[pSJ501::*clpS'-lacZ⁺*]~*cat*
ASE157	LC106 *ΔoxyR*::spec *attλ*::[pSJ501::*clpS'-lacZ⁺*]~*cat*
ASE173	MG1655 *attλ*::[pSJ501::*clpS'-lacZ⁺*] with p*ACYC184*
ASE175	MG1655 *attλ*::[pSJ501::*clpS'-lacZ⁺*] with p*GS058*
ASE197	MG1655 *ΔclpPX::cat*
ASE201	MG1655 *clpX::cat Δ(clpSA::cat)*
ASE203	MG1655 *ΔclpP::cat*
ASE207	LC106 *Δ(clpP::cat) Δ(clpSA::cat)*
ASE213	LC106 *Δ(clpPX::cat) Δ(clpSA::cat)*
ASE217	MG1655 *Δ(clpPX::cat) Δ(clpSA::cat)*
ASE225	MG1655 *ΔoxyR*::spec *attλ*::[pSJ501::*clpS'-lacZ⁺*]
ASE227	MG1655 *Δfur*::kan *attλ*::[pSJ501::*clpS'-lacZ⁺*]
ASE242	MG1655 *ΔiscR1::cat attλ*::[pSJ501::*clpS'-lacZ⁺*]
ASE248	MG1655 *iscR-(C92A/C92A/C104A)~zfh-3600::*kan *attλ*::[pSJ501::*clpS'-lacZ⁺*]
ASE252	MG1655 *attλ*::[pSJ501::*clpPX'-lacZ⁺*]~*cat*
ASE254	LC106 *attλ*::[pSJ501::*clpPX'-lacZ⁺*]~*cat*
ASE270	MG1655 *Δdps::cat*
ASE272	LC106 *Δdps::cat Δ(clpPX::cat) Δ(clpSA::cat)*
ASE282	LC106 *Δdps::cat*

ASE296	LC106 *Δbfr::cat*
ASE298	LC106 *Δbfr::cat Δ(clpPX::cat) Δ(clpSA::cat)*
SJ1017	LC106 *ΔsufBCDSE1::cat*
ASE300	LC106 *ΔsufBCDSE1::cat Δ(clpPX::cat) Δ(clpSA::cat)*
ASE308	LC106 *ΔftnA::cat Δ(bfr::cat)*
ASE310	LC106 *ΔftnA::cat Δ(bfr::cat) Δ(clpPX::cat) Δ(clpSA::cat)*
ASE386	MG1655 *ΔclpX::cat recA56-srlC300::Tn10*
ASE388	MG1655 *Δdps::cat recA56-srlC300::Tn10*
ASE390	MG1655 *ΔclpX::cat Δ(dps::cat) recA56-srlC300::Tn10*
ASE394	LC106 with pCKR101
ASE396	LC106 with p*clpX*
ASE398	ASE7 with pCKR101
ASE400	ASE7 with *pclpX*
ASE402	ASE119 with pCKR101
ASE404	ASE119 with *pclpX*
ASE406	ASE207 with pCKR101
ASE408	ASE207 with *pclpX*
ASE412	LC106 *iucC::lacZ ΔclpX::cat*
ASE413	ASE67 with pCKR101
ASE414	ASE67 with *pclpX*
ASE425	MG1655 pColV(*iucC*::lacZ) *ΔclpX::cat*

MG1655 (1) is a wild-type strain that was obtained from the *E. coli* Genetic Stock Center. LC106 (2) is an Hpx^- derivative of it. The plasmids pWKS30 (3) and pACYC184 and pGS058 are described (4). Derivative strains listed above were constructed using alleles that were provided by colleagues. The *Δdps::cat* and *ΔoxyR*::spec (5) alleles were obtained in strains from Stephen Finkel and Gigi Storz, respectively. The *Δfur*::kan allele was transduced from EM1256 (6). The *ΔiscR1::cat* allele was generated in (7). The *iscR-(C92A/C92A/C104A)~zfh-3600::kan* allele was obtained in PK7887 (8); the *ΔsufBCDSE1::cat* allele (7) was made in our lab. The pCKR101 plasmid (7) was provided by Jeff Gardner. The *recA56* allele was reported (9). The pColV(*iucC::lacZ*) plasmid (10) was obtained from Joe Nielands.

117 **Table S2: Primers**

clpSA deletion	5’-GGCGTTCTGCCGATAACCGTAACCGAAGATGATAACTGACATGTAGGCTGGAGCTGCTTCG-3’ 5’-TTCGAGATTACGGACTTGACCAACCTACCTAACAATCAGACATATGAATATCCTCCTTAG-3’
clpX deletion	5’-GTGTGCGGCACAAAGAACAAAGAAGAGGTTTTGACCCATGTGTAGGCTGGAGCTGCTTCG-3’ 5’-CCCTTTTTGGTTAACTAATTGTATGGGAATGGTTAATTACATATGAATATCCTCCTTAG-3’
clpP deletion	5’-CGGTACAGCAGGTTTTTTCAATTTTATCCAGGAGACGGAATGTAGGCTGGAGCTGCTTCG-3’ 5’-ATGAAGCGCCATAAGTTCATTCATGCGCCCTTTAACTTTCCATATGAATATCCTCCTTAG-3’
suf deletion	5’-CTGTTATACGCTGAAAGCGATGAAGTGAGGTAAATCGATGTGTAGGCTGGAGCTGCTTCG-3’ 5’-CAATGTGAGCCAACCGGATGAAAGCTGTCCTTTTAGTTTACATATGAATATCCTCCTTAG-3’
dps deletion	5’-TAATTACTGGGACATAACATCAAGAGGATATGAAATTATGTGTAGGCTGGAGCTGCTTCG-3’ 5’-TATCGGGTACTAAAGTTCTGCACCATCAGCGATGGATTTACATATGAATATCCTCCTTAG-3’
bfr deletion	5’-TCTACTCTTCAAAGAGTGGAAGCGAAGGAGTCAAAAAATGTGTAGGCTGGAGCTGCTTCG-3’ 5’-TCTTATTAACCGGGAGGGTTCTCCCTCCCGACACGGCTCACATATGAATATCCTCCTTAG-3’
ftnA deletion	5’-GCCACAGCAACAAATATAACCTTTGTGGAGCACTATCATGTGTAGGCTGGAGCTGCTTCG-3’ 5’-TTTGAAACGGCGGCAGTAAACCTGCCGCCGGAGAGCATTACATATGAATATCCTCCTTAG-3’
clpSA::lacZ	5’-AAGATCGTCGGTACCCTGGCATTTTGCCTTTAGGA-3’ 5’-GCGTAGCGCGAATTCCATTGTCAGTTATCATCTTC-3’
clpPX::lacZ	5’-ACGTAACTGCTGCAGCGGTGTTAGCGTAACAACAA-3’ 5’-ATGCTAGCTGGTACCCATGGGTCAAAACCTCTTC-3’
Cloning *clpPX*	5’-TGACAGGGATCCAAAGCCTCTTTCGGTGTTAGCGT-3’ 5’-ATACGTATCTGCAGGATGTTTCCCCCACATTCAA-3’
Cloning clpSA	5’-TAATATAATGGATCCATAAACCGGGGTCAGAGAGG-3’ 5’-ATAATATAACTGCAGACCTCCTCCACCCCATAAAC-3’
Cloning clpX	5’-ACGTACGTGGTACCCAAAGAAGAGGTTTTGACCCATGACAGATAAACGC-3’ 5’-AGTTCACTTGTCGACGGTTAATTATTCACCAGATGCCTGTTGC-3’

118
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References for supplementary material.

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