Supplementary Material

Deionococcus proteotlycius Genomic Library Exploration Enhances Oxidative Stress Resistance and Poly-3-hydroxybutyrate Production in Recombinant *Escherichia coli*

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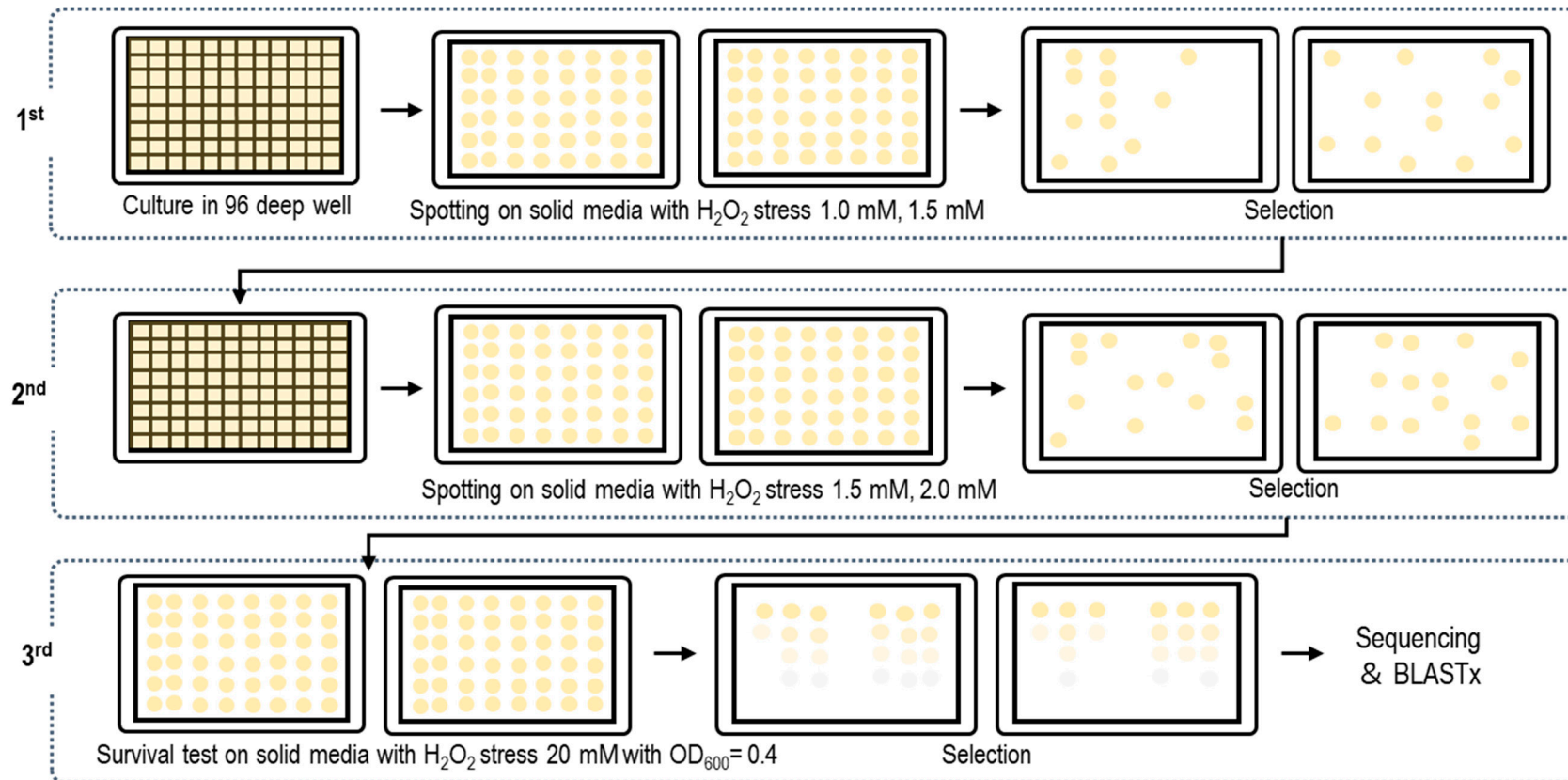
Supple Table S1. List of quantitative real-time PCR primers in this study

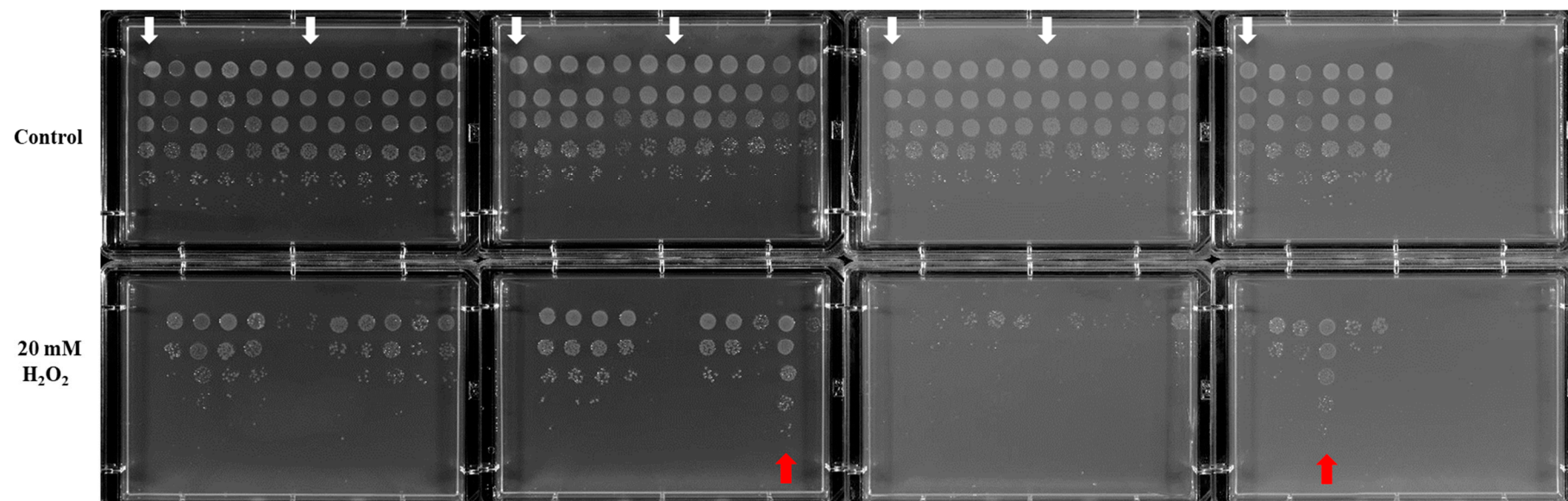| Pathway	Gene	Forward primer	Reverse primer
Internal control	polA	GCTGAACGTGCAGCCATTAA	CAATCATCGCCCGTTTGATAA
	dnaA	TGGCGAAAGAGCTGACTAACC	ACGGCAGGCATGAAGCA
Oxidative stress related gene	katE	CAATTCCACAAGGGCAAAGT	CTTCCCTTCGGCATTAATCA
	katG	GCATCTGCTTCTACCTTCCG	CTCAACACCAACCACACCAG
	dps	AAACAAGCGCACTGGAACAT	CTGCACTGCACGTTCTGC
	ahpC	ACTGCAGAAACTGGGCGTAG	GTTGTCGAAGTTACGGGTCAG
	sodA	GCTGAAAGGCGATAAACTGG	ACACATCCAGGCCCATAATC
Sigma factors	rpoS	CGCCGCCGGATGATC	CAGACCACGATTGCCATAACG
Oxidative stress regulator	oxyR	GAAGCACAGACCCACCAGTT	CAAACAACGGCACTTCAATG
	soxS	TACTTGCAACGAATGTTCCG	ACATAACCCAGGTCCATTGC
Pentose phosphate pathway Glycolysis	ptsG	ACTGGCGTTGTGCTGTCCTT	GGTAAGCAGCCCACTGAGAGA
	zwf	GGCGCTGCGTTTTGCTAA	TTCTGCCACGGTAATCTCAACA
	pykA	GCGCTGACCGAAAAAGACAA	CAGCCAGGTAATCTACGCCAAT
	pykF	CGAGTTCAACAATGACAACCGTAA	ATCAGCGGAGCATCCAGTTT
	aceE	CCAAAGGCAAAGCGACAGTAAT	CCTGGTGCGCGATGTTTT
TCA cycle	icdA	AAGTTCACCGAAGGAGCGTTTA	GCCACCGTCGATCAGTTCA
	sucA	GTCTCGCGTTGCCAAGATTTAT	GTGGCGTAAGCGAGGTTTTC
	mdh	AGGCGCTTGCACTACTGTTAAAA	CGGGAGTCACTGGAGCGATA
	sdhC	CACATGATGATGGATTTTGGCTAT	GCACGACAGTAATAACAAAGGAGATTT
Gluconeogenesis and anaplerosis	pps	CCTCCCTGGGTGAAATGATTACTA	GGCGGTTGTGGCGAAA
	ppc	GGAAGAGAACCTCGGCTACAAA	CCGCCCATCCACGAAGT
	pck	CGTCTTTCCGTCCGTTTCAT	GCTCGGGCGAATAAACATGT
	maeB	GAAGAGCTGGCGGAGATCAC	GCGGCTCAATACCAAAACGA
	sfcA	TGCGGTTGGCAAAATGG	AGGGCTTCGGCAGAGGTT
Glyoxylate shunt	aceA	TGCACGGTGAGTCGAAAAAA	TAGACTGCTTCAATACCCGCTTT
	aceB	TGGCGTGGTGAGGCAAT	GGAAGAAATAGAGCGCAAAATCA

Supple Table S2. Genetic information of the neighbor genes of *deipr_0871* and its homolog, *dr_0891*

The list of genes in *D. proteolyticus*

locus_tag	Location	Product
Deipr_0866	918064..917162	hypothetical protein
Deipr_0867	919101..918133	NUDIX hydrolase
Deipr_0868	919285..919527	cold-shock DNA-binding domain protein
Deipr_0869	921102..919723	Methylenetetrahydrofolate--tRNA-(uracil-5-)-methyltransferase
Deipr_0870	921241..922314	integral membrane sensor signal transduction histidine kinase
Deipr_0871	922311..923012	two component transcriptional regulator, LuxR family
Deipr_0872	923052..923813	protein of unknown function DUF124
Deipr_0873	924924..923878	thioredoxin reductase
Deipr_0874	925053..925643	Holliday junction ATP-dependent DNA helicase ruvA

The list of genes in *D. radiodurans*

locus_tag	Location	Product
DR_0888	897508..898269	hypothetical protein
DR_0889	898277..898627	hypothetical protein
DR_0890	898628..899065	conserved hypothetical protein
DR_0891	899727..899143	DNA-binding response regulator
DR_0892	900833..899724	sensor histidine kinase
DR_0893	901689..900994	conserved hypothetical protein
DR_0894	903279..901774	hypothetical protein
DR_0895	903383..903769	hypothetical protein
DR_0896	903759..904532	ribosomal large subunit pseudouridine synthase B

Supple Fig. S1. Screening of positive clones by hydrogen peroxide. *E.coli* (XL1-Blue) containing recombinant DNA fragments were incubated in liquid medium with 50 µg/mL kanamycin and spotting on 1.0, 1.5, and 2.0 mM H_2O_2 in 1st, 2nd screening step, 20 mM H_2O_2 for 1 hr in 3rd screening.

Supple Fig. S2. 3rd screening selection. The white arrows indicate *E.coli* harboring empty vector as control; The red arrows indicate selected E.coli harboring *D. proteolyticus* genes with outstanding oxidative stress resistance. Adjusting cell $OD_{600} = 0.4$

TCS HK	TCS-RR	DNA binding domain
Deipr_0128	Deipr_0129	OmpR family
Deipr_0376	Deipr_0377	-
Deipr_0799	Deipr_0800	NarL/FixJ family
Deipr_0870	Deipr_0871	NarL/FixJ family
Deipr_1062	Deipr_1061	-
Deipr_1165	Deipr_1167	NarL/FixJ family
Deipr_1504	Deipr_1503	OmpR family
Deipr_1922	Deipr_1923	OmpR family
Deipr_1967	Deipr_1968	OmpR family
Deipr_2675	Deipr_2674	OmpR family
Deipr_2694	Deipr_2693	OmpR family

Orphan HK	Additional domain
Deipr_0252	GAF domain
Deipr_0865	-
Deipr_1801	PAS/PAC domain
Deipr_2217	GAF domain
Deipr_2254	-
Deipr_2523	PAS/PAC domain

Orphan RR	Domain
Deipr_0059	-
Deipr_0147	OmpR family
Deipr_0158	OmpR family
Deipr_0764	wHTH and BTAD domain
Deipr_1307	OmpR family
Deipr_2630	-

HK : Histidine kinase   ■ Core gene (>50%)

RR : Response regulator   ■ Accessory gene (<50%)

Supple Fig. S3. Core and accessory analysis of two component system, orphan histidine kinase and orphan response regulators in D. *proteolyticus*. Core and accessory genes were determined based on the homology (50%) and functional domains were analyzed using interpro database.