Supplementary Materials for

Expression of Heterologous *OsDHAR* Gene Improves Glutathione (GSH)-Dependent Antioxidant System and Maintenance of Cellular Redox Status in *Synechococcus elongatus* PCC 7942

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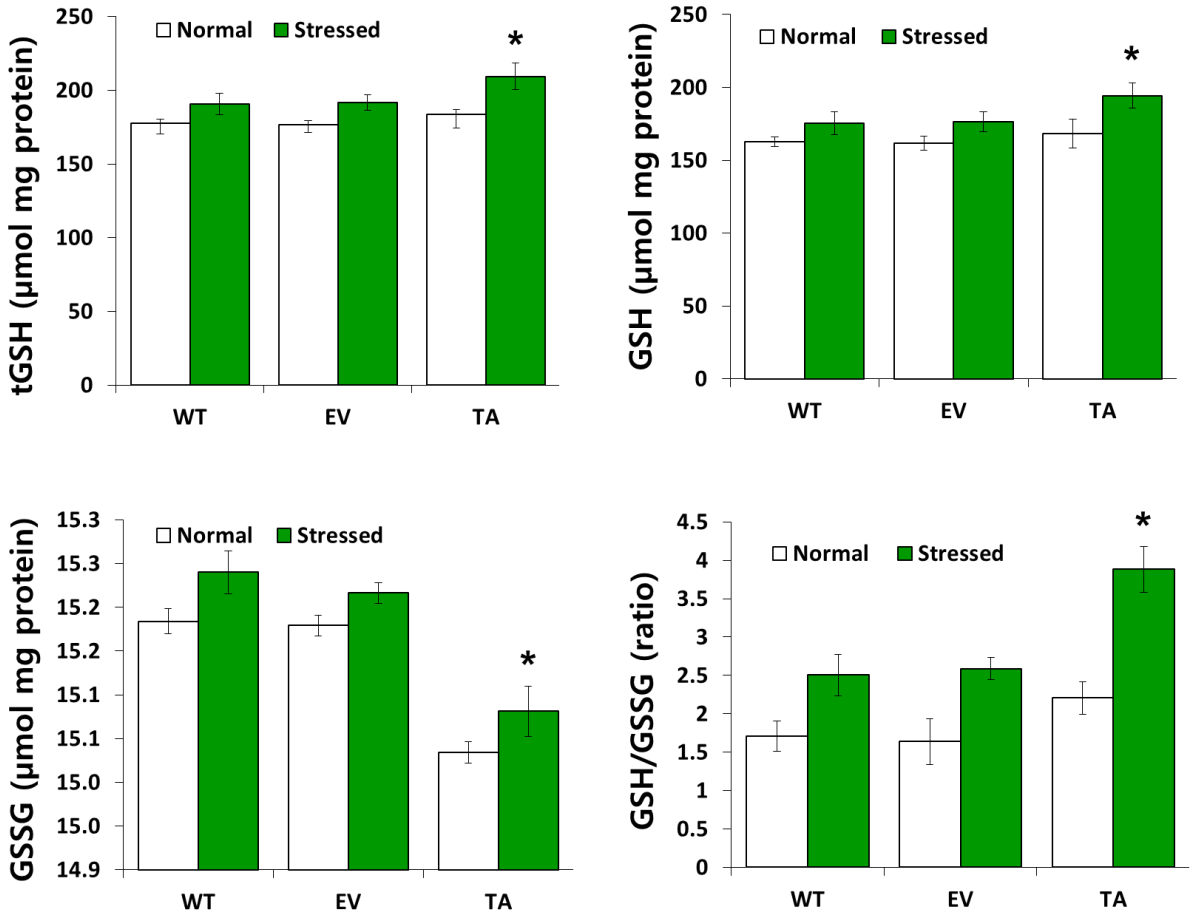
Supplementary Figures S1 and S3

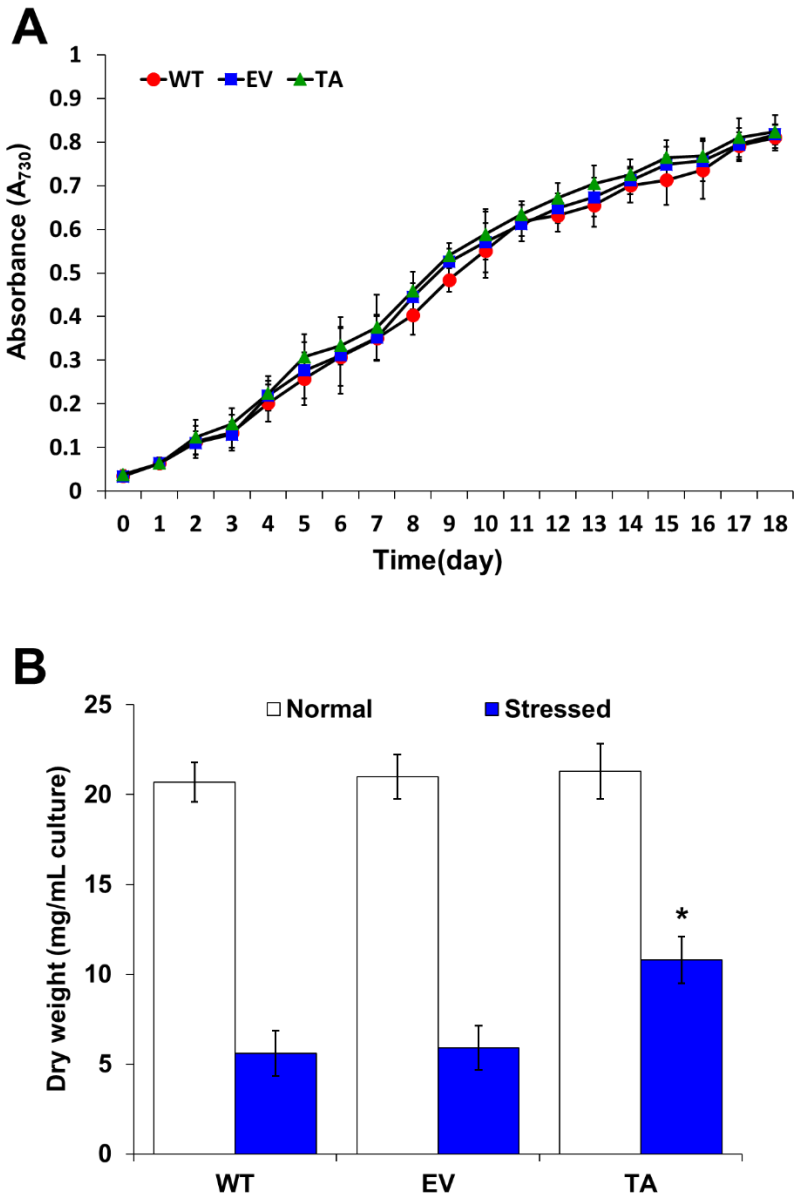
Supplementary Tables S1 to S2

Supplementary Figure S1.

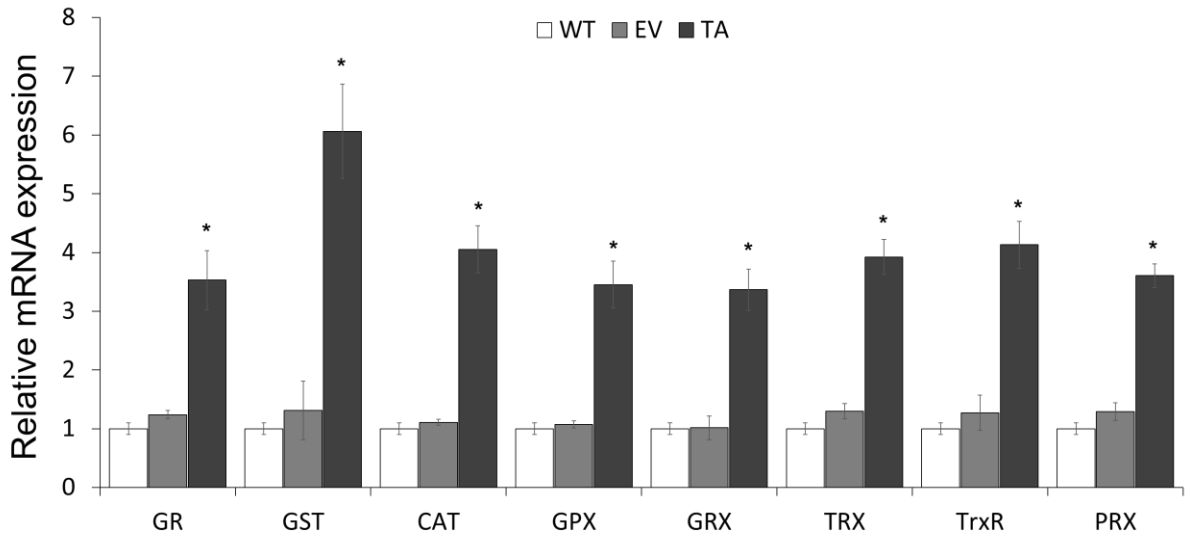


Supplementary Figure S1. Analysis of antioxidant redox status in TA strains after H_2O_2 treatment. Total glutathione (GSH+GSSG) and oxidized glutathione (GSSG) were determined by measuring absorbances at 412 nm. Reduced GSH content was calculated by subtraction of GSSG from total GSH. Total glutathione (GSH+GSSG), reduced glutathione (GSH), oxidized glutathione (GSSG), and ratio of GSH to GSSG. Error bars indicate ± SD of three independent experiments. Asterisks indicate significant differences between treatments as estimated by Student's *t*-test ($P < 0.05$).

Supplementary Figure S2.



Supplementary Figure S2. Dry weights of *OsDHAR*-overexpressing transgenic TA strains under normal and stress conditions. **(A)** Growth profiles of WT, EV, and TA strains. growth levels of the different *S. elongatus* PCC 7942 strains were compared to those of the TA strain under normal conditions. Samples were grown for 18 days at 30°C with shaking under normal conditions. **(B)** Dry weights measured after growth under normal condition for 14 days and stress conditions for 7 days after H_2O_2 treatment at 7 days. WT, WT strains; EV, empty vector strains; TA, transgenic strains. Error bars indicate ± SD of three or more independent experiments. Asterisks indicate significant differences between treatments as estimated by Student's *t*-test ($P < 0.05$).



Supplementary Figure S3. Expression analysis of qRT-PCR identified GSH-related genes. GSH-related genes expression level was considered to be 1 of WT strains; described as relative values. GSH-related genes expression difference was calculated relative to the expression level in WT strains. WT, WT strains; EV, empty vector strains; TA, transgenic strains. Error bars indicate ± SD of three or more independent experiments. Asterisks indicate significant differences between treatments as estimated by Student's *t*-test ($P < 0.05$).

Supplementary Table S1. Cyanobacterial strains and plasmids used in this study.

Strain or Plasmid	Characteristic(s)	Antibiotic resistance	Source or reference
Strains			
AMC06	Wild type *Synechococcus elongatus* strain PCC 7942	none	Lab collection
DH5α	*Escherichia coli* cloning host	none	Lab collection
Plasmids	Relevant characteristics*		
pAM4957 (pCV0069)	*S. elongatus* carrying *pCV0069* as a single recombinant; cloNAT^r	NAT	Lab collection
pAM4957::OsDHAR	S7942NS2-NAT1-Ptrc/SwaI-OsDHAR-RBS_*OsDHAR*, 5672 bp, cloNAT^r, for IPTG-inducible *OsDHAR* expression	NAT	This work

* Abbreviations for antibiotics: Nourseothricin (NAT, cloNAT).

Supplementary Table S2. Primers used in this study.

Name	Sequence
OsDHAR-F-SwaI	5′-TGCGGATCCTAAGGAGGAAAATTTATGGGCGTGGAGGTGTGCGTCAAGGCCGCCGTCG-3′
OsDHAR-R-SwaI	5′- GCCGGGGAGCTCCTTCATTTATTTTTACGCATTCACTTTTGGTGCCCATCCAGCAATCAGG-3′
OsDHAR-qRT-PCR-F	5’-ATGGGCGTGGAGGTGTGCGTCAAGGCCGCC-3’
OsDHAR-qRT-PCR-R	5′-TGACAAGAGACGGGGTTGGGTAC-3′
rpoA-F	5′-TCGGTTCGGGCTTACAACTG-3′
rpoA-R	5′-AGCAAGTCAGCAACGGAGTTC-3′
NS2-F	5’-GTCAACGTAAATGCATGCCGC-3’
NS2-R	5’-GGTCACTACTTGGTAGCAACTC-3’
Ptrc-F	5′-AATTGTGAGCGGATAACAATT-3′
OsDHAR-R	5′-ATTTATTTTTACGCATTCACTTTTGG-3′
GR-F	5′-ATGAGTTTTGACTACGACCTC-3′
GR-R	5′-GCCCCCGACCAAATCGGTTTC-3′
GST-F	5′-ATGTATAAGGTTTTCGGAGA-3′
GST-R	5′-ATGAGTTTCGTTAGCAAGTA-3′
CAT-F	5′-ATGACAGTCGTTATCTACTAC-3′
CAT-R	5′-GATCGCTAACCAACGAAACCA-3′
GPX-F	5′-ATGCCTTTCAAAGCAAAAGA-3′
GPX-R	5′-TGTTTGACAGAAAGGACAAA-3′
GRX-F	5′-ATGATGACTCCTGAACTCC-3′
GRX-R	5′-TTGAACAACGTTGTTGGAA-3′
TRX-F	5′-ATGAACGTTGGCGATCGCGTGC-3′
TRX-R	5′-AGTTAGAATCGCTGCAATTTCG-3′
TrxR-F	5′-ATGCTTCCAGTCGTCACAGC-3′
TrxR-R	5′-GAGGCAGGGAGTTAAGAGTC-3′
PRX-F	5′-ATGACCGAAGGAGCCCTGCGCG-3′
PRX-R	5′-CAGAACGACGTATTTGCCCCGG-3′