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Title: Comparative Transcriptomics between Synechococcus PCC 7942 and Synechocystis PCC 6803 Provide Insights into Mechanisms of Stress Acclimation

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Abstract: Synechococcus sp. PCC 7942 and Synechocystis sp. PCC 6803 are model cyanobacteria from which the metabolism and adaptive responses of other cyanobacteria are inferred. Using stranded and 5' enriched libraries, we measured the gene expression response of cells transferred from reference conditions to stress conditions of decreased inorganic carbon, increased salinity, increased pH, and decreased illumination at 1-h and 24-h after transfer. We found that the specific responses of the two strains were by no means identical. Transcriptome profiles allowed us to improve the structural annotation of the genome i.e. identify possible missed genes (including anti-sense), alter gene coordinates and determine transcriptional units (operons). Finally, we predicted associations between proteins of unknown function and biochemical pathways by revealing proteins of known functions that are co-regulated with the unknowns. Future studies of these model organisms will benefit from the cataloging of their responses to environmentally relevant stresses, and improvements in their genome annotations found here.

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