

**Table S1.** Experimental data used for generation of Venn diagrams.

Stress	Cell exposure conditions	Reference
Heat stress	20, 30, 60 min, a shift from 34°C to 44°C 70 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ; 1% $\text{CO}_2$	2,3
Cold stress	15, 20, 30 min, a shift from 34°C to 22°C 70 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ; 1% $\text{CO}_2$	1,3,16
Salt stress	15, 20, 30 min, 0.5 M NaCl 70 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ; 1% $\text{CO}_2$	3,5
Osmotic stress	15, 20, 30, 60, 120 min; 0.5 M sorbitol 70 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ; 1% $\text{CO}_2$	4,13
Light stress	15, 60 min a shift from 20 to 300 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ 32°C; 1% $\text{CO}_2$	6,9
Oxidative stress	15 min, 10 $\mu\text{M}$ methylviologen, 30°C, 50 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ; 1% $\text{CO}_2$	9
	15, 30 min; 3 mM $\text{H}_2\text{O}_2$ ; 30°C; 30 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ; 3,78 mM $\text{Na}_2\text{CO}_3$	6,9,39
Redox	60 min, 10 $\mu\text{M}$ DCMU at 20 and 300 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ;	4,8
	60 min, 10 $\mu\text{M}$ DBMIB at 20 and 300 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ; 30°C, 1% $\text{CO}_2$	
UV-B	UV-B (wavelength range 280–320 nm) at 20 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$	7
Low pH	30°C; 30 $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ; transfer from pH 8.0 to pH 2.5 without $\text{CO}_2$	10,11

**Venn diagrams** were created using transcriptomics experimental data from studies of the responses of *Synechocystis* sp. strain PCC 6803 to heat and cold shock; salt, osmotic, light, UV-B, and oxidative stresses; and changes in the redox status of cells (Tables S2 and S3). The exposure periods varied from 15 to 120 min; similar conditions were used in control tests. The same platform (Takara, Japan) was used for DNA microarray transcriptomics data in all experiments with the exception of UV-B, which was analyzed with custom-made DNA microarrays. Genes with at least two-fold changes transcription were selected for the analysis. A gene was assigned the rank +1 if it was upregulated, –1 if it was downregulated, and 0 if its transcription remained unchanged. A gene was considered to be induced by heat, salt, or osmotic stress if its rank was +1 in, at least, two experimental studies of the respective stressor. In case of light stress, oxidative stress, or changes in the redox status of the photosynthetic ETC, a gene was considered to be induced if its rank was +1 in, at least, one respective experimental study. Venn diagrams were constructed with the InteractiVenn online tool (<http://www.interactivenn.net>).

**Table S2.** Genes that are highly induced by heat shock and other stressors in the cyanobacterium *Synechocystis* sp. strain PCC 6803

ORF	Gene	Protein	Function	Abiotic stressor						Redox		ROS
				Heat	Salt	Osmo	Light	UV-B	pH	DBMIB	DCMU	
<i>slr1285</i>	<i>hik34</i>	Hik34	Sensory histidine kinase 34	+	+	+		+	+	+		+
<i>sll0306</i>	<i>sigB</i>	SigB	RNA polymerase $\sigma$ factor B	+	+	+		+	+	+		+
<i>sll2012</i> <sup>1</sup>	<i>sigD</i> <sup>1</sup>	SigD <sup>1</sup>	RNA polymerase $\sigma$ factor D	+	+		+	+	+	+	+	+
<i>slr2075</i>	<i>groES</i>	GroES	HSP 10 kDa chaperone	+	+	+	+	+		+		
<i>slr2076</i>	<i>groEL1</i>	GroEL1	HSP 60 kDa chaperone 1	+	+	+	+	+		+		
<i>slr0416</i>	<i>groEL2</i>	GroEL2	HSP 60 kDa chaperone 2	+	+	+	+					
<i>sll1514</i>	<i>hspA</i>	HspA	HSP 17 kDa	+	+	+	+	+	+	+		+
<i>sll0170</i>	<i>dnaK2</i>	DnaK2	HSP 70 kDa	+	+	+	+	+	+	+		+
<i>slr0093</i>	<i>dnaJ</i>	DnaJ	HSP 40 kDa	+	+	+		+	+	+		+
<i>sll0430</i>	<i>htpG</i>	HtpG	HSP 90 kDa	+	+	+	+	+		+		
<i>slr1641</i>	<i>clpB1</i>	ClpB1	HSP 100 kDa chaperone	+	+	+	+	+		+		+
<i>slr1204</i>	<i>htrA</i>	HtrA	Serine protease	+	+	+		+	+	+		+
<i>slr0008</i>	<i>ctpA</i>	CtpA	C-terminal processing protease	+			+	+	+			+
<i>sll1621</i>	<i>sll1621</i>	PrxA	Peroxisredoxin	+	+		+	+		+		+
<i>slr0095</i>	<i>smtA</i>	SmtA	S-adenosylmethyonine methyltransferase	+	+		+			+		+
<i>slr1674</i>	<i>slr1674</i>	Slr1674	Thermal defense of PS II	+	+		+	+	+	+		+
<i>slr1963</i>	<i>ocpA</i>	OCP	Orange carotenoid protein	+		+	+	+		+		
<i>slr1512</i> <sup>1</sup>	<i>sbtA</i> <sup>1</sup>	SbtA <sup>1</sup>	Na-dependent bicarbonate transporter	+			+					+
<i>slr1516</i>	<i>sodB</i>	SodB	Superoxide dismutase	+	+	+	+	+	+			
<i>sll0528</i>	<i>sll0528</i>	Sll0528	Site-2 metalloprotease	+	+	+	+	+	+	+		+
<i>slr1675</i>	<i>hypA1</i>	HypA1	Hydrogenase synthesis protein	+	+	+	+	+	+	+		+
<i>ssl3044</i> <sup>1</sup>	<i>ssl3044</i> <sup>1</sup>	Fdx <sup>1</sup>	Ferredoxin, hydrogenase component	+	+	+	+	+	+	+		+
<i>slr1687</i> <sup>1</sup>	<i>nblB1</i> <sup>1</sup>	NblB2 <sup>1</sup>	Phycobilisome degradation protein	+	+	+	+	+	+	+	+	+
<i>sll0939</i>	<i>sll0939</i>	Sll0939	Resistance to low pH	+	+	+		+	+	+	+	+
<i>slr0967</i>	<i>slr0967</i>	Slr0967	Resistance to low pH	+	+	+		+	+	+	+	+
<i>sll0668</i>	<i>sll0668</i>	ISY352e2	Transposase	+	+		+					
<i>slr1686</i> <sup>1</sup>	<i>slr1686</i> <sup>1</sup>		Protein of unknown function	+	+		+	+				+
<i>sll1862</i> <sup>1</sup>	<i>sll1862</i> <sup>1</sup>		Unknown protein	+	+	+						+
<i>slr1603</i>	<i>slr1603</i>		Protein of unknown function	+	+	+		+		+		+
<i>sll1853</i> <sup>1</sup>	<i>sll1853</i> <sup>1</sup>		Protein of unknown function	+	+					+		
<i>sll0846</i>	<i>sll0846</i>		Protein of unknown function	+	+	+	+	+	+	+		+
<i>sll1884</i>	<i>sll1884</i>		Protein of unknown function	+	+	+	+					+
<i>sll1009</i>	<i>frpC</i>	FrpC	Fe-regulated membrane protein	+								±
<i>sll0982</i>	<i>sll0982</i>		Protein of unknown function	+								±
<i>slr1127</i>	<i>slr1127</i>		Protein of unknown function	+								±
<i>sll1673</i> <sup>2</sup>	<i>rre2</i> <sup>2</sup>	Rre2 <sup>2</sup>	Response regulator Rre2	+								
<i>sll1501</i> <sup>2</sup>	<i>cbiA</i> <sup>2</sup>	CbiA <sup>2</sup>	Cobalamin biosynthesis protein	+								
<i>slr1377</i> <sup>2</sup>	<i>lepB</i> <sup>2</sup>	LepB <sup>2</sup>	Leader peptidase	+								
<i>slr1597</i> <sup>2</sup>	<i>parA</i> <sup>2</sup>	ParA <sup>2</sup>	Chromosome partitioning ATPase	+								
<i>ssl3364</i> <sup>2</sup>	<i>ssl3364</i> <sup>2</sup>	Cp12 <sup>2</sup>	Intrinsically disordered family protein	+								
<i>sll0441</i> <sup>2</sup>	<i>sll0441</i> <sup>2</sup>		Protein of unknown function	+								
<i>sll1892</i> <sup>2</sup>	<i>sll1892</i> <sup>2</sup>		Protein of unknown function	+								
<i>sll1433</i> <sup>2</sup>	<i>sll1433</i> <sup>2</sup>		Protein of unknown function	+								
<i>slr0069</i> <sup>2</sup>	<i>slr0069</i> <sup>2</sup>		Protein of unknown function	+								
<i>slr0670</i> <sup>2</sup>	<i>slr0670</i> <sup>2</sup>		Protein of unknown function	+								
<i>slr1812</i> <sup>2</sup>	<i>slr1812</i> <sup>2</sup>		Protein of unknown function	+								
<i>slr1813</i> <sup>2</sup>	<i>slr1813</i> <sup>2</sup>		Protein of unknown function	+								
<i>slr1814</i> <sup>2</sup>	<i>slr1814</i> <sup>2</sup>		Protein of unknown function	+								

<sup>1</sup> Genes that are induced by both heat and cold shock; <sup>2</sup> genes that are specifically induced by heat shock. “±” indicates the uncertainty in the results: at least, one or more set of data give positive result, while another set(s) of data demonstrate(s) negative result. ORF, open reading frame. Heat, heat stress (44°C); Salt, salt stress (0.5 M NaCl); Osmo, hyperosmotic stress (0.5 M sorbitol); Light, light stress (300  $\mu$ mol photons/(m<sup>2</sup> s)); UV, exposure to UVB; pH, lower pH ~4.0; DBMIB, 10  $\mu$ M 2,5-dibromo-6-isopropyl-3-methyl-1,4-benzoquinone; DCMU, 10  $\mu$ M 3-(3,4-dichlorophenyl)-1,1-dimethylurea; H<sub>2</sub>O<sub>2</sub>, 0.25 mM hydrogen peroxide.

**Table S3.** Genes that are highly induced by cold shock and other stressors in the cyanobacterium *Synechocystis* sp. strain PCC 6803

ORF	Gene	Protein	Function	Abiotic stressor						Redox		ROS
				Cold	Salt	Osmo	Light	UV-B	pH	DBMIB	DCMU	H <sub>2</sub> O <sub>2</sub>
<i>slI0790</i>	<i>hik31</i>	Hik31	Two-component sensor histidine kinase	+						+		
<i>slr1594</i>	<i>rre5</i>	Rre5	Response regulator	+			+			+		
<i>slr0083</i>	<i>crhR</i>	CrhR	RNA helicase	+	+	+	+			+		
<i>slI0517</i>	<i>rbpA1</i>	RbpA1	RNA binding protein A1	+								+
<i>slI0533</i>	<i>tig</i>	Tig	Ribosome trigger factor	+		+	+					
<i>slI1096</i>	<i>rpsL</i>	Rps12	30S ribosomal protein S12	+		+	+					
<i>slr0082</i>	<i>rimO</i>	RimO	Methyltransferase of ribosomal protein S12	+	+	+	+			+		
<i>slr1105</i>	<i>typA</i>	TypA	GTP-binding protein TypA/BipA	+		+	+			+		+
<i>slr1512</i> <sup>1</sup>	<i>sbtA</i> <sup>1</sup>	SbtA <sup>1</sup>	Na-dependent bicarbonate transporter	+			+					+
<i>slI1541</i>	<i>syc2</i>	Syc2	Carotenoid oxygenase	+	+		+	+		+		+
<i>slr1291</i>	<i>ndhD2</i>	NdhD2	NADH dehydrogenase subunit 4	+			+	+		+		+
<i>ssl2542</i>	<i>hliA</i>	HliA	High light inducible protein	+	+	+	+	+		+		+
<i>ssr2595</i>	<i>hliB</i>	HliB	High light inducible protein	+	+	+	+	+	+	+	+	
<i>slr1544</i>	<i>lilA</i>	LilA	Light-harvesting protein LilA	+	+	+	+	+	+	+	+	+
<i>slr1687</i>	<i>nblB</i>	NblB	Phycocyanobilin lyase NblB	+	+	+	+	+	+	+	+	+
<i>slI1742</i>	<i>nusG</i>	NusG	Transcription antitermination protein	+	+	+	+					+
<i>slI1818</i>	<i>rpoA</i>	RpoA	RNA polymerase alpha subunit $\sigma^{70}$	+		+	+					
<i>slI2012</i> <sup>1</sup>	<i>sigD</i> <sup>1</sup>	SigD <sup>1</sup>	RNA polymerase sigma factor SigD	+	+		+	+	+	+	+	+
<i>ssl3044</i> <sup>1</sup>	<i>ssl3044</i> <sup>1</sup>	Fdx <sup>1</sup>	Ferredoxin	+	+	+	+	+	+	+		+
<i>slr1350</i>	<i>desA</i>	DesA	$\Delta 12$ fatty acid desaturase	+			+					
<i>slI1441</i>	<i>desB</i>	DesB	$\omega 3$ fatty acid desaturase	+			+					
<i>slr1992</i>	<i>gpx2</i>	Gpx2	Hydroperoxy fatty acid reductase	+			+	+				
<i>slI1483</i>	<i>slI1483</i>		Salt-induced periplasmic protein	+	+	+	+	+	+	+	+	+
<i>slI0157</i>	<i>slI0157</i>		Zn-dependent hydrolase	+	+	+		+		+		
<i>slI0668</i> <sup>1</sup>	<i>slI0668</i> <sup>1</sup>	ISY352e2 <sup>1</sup>	Transposase	+	+		+					
<i>slI1863</i>	<i>slI1863</i>		Unknown protein	+	+	+						+
<i>slI1862</i> <sup>1</sup>	<i>slI1862</i> <sup>1</sup>		Unknown protein	+	+	+						+
<i>slI1853</i> <sup>1</sup>	<i>slI1853</i> <sup>1</sup>		Unknown protein	+	+					+		
<i>slr0551</i>	<i>slr0551</i>		Unknown protein	+		+	+	+		+	+	
<i>slr0959</i>	<i>slr0959</i>		Unknown protein	+	+		+	+				
<i>slr1686</i> <sup>1</sup>	<i>slr1686</i> <sup>1</sup>		Unknown protein	+	+		+	+				+
<i>slr1687</i> <sup>1</sup>	<i>slr1687</i> <sup>1</sup>		Unknown protein	+	+		+	+				+

<sup>1</sup> Genes that are induced by both cold and heat shock; RF, open reading frame; Cold, cold stress (22°C); Salt, salt stress (0.5 M NaCl); Osmo, hyperosmotic stress (0.5 M sorbitol); Light, light stress (300  $\mu\text{mol photons}/(\text{m}^2 \text{ s})$ ); UV, exposure to UVB; pH, lower pH ~4.0; DBMIB, 10  $\mu\text{M}$  2,5-dibromo-6-isopropyl-3-methyl-1,4-benzoquinone; DCMU, 10  $\mu\text{M}$  3-(3,4-dichlorophenyl)-1,1-dimethylurea; H<sub>2</sub>O<sub>2</sub>, 0.25 mM hydrogen peroxide.