

Supplementary material

Cyanobacteria produce arsenosugars

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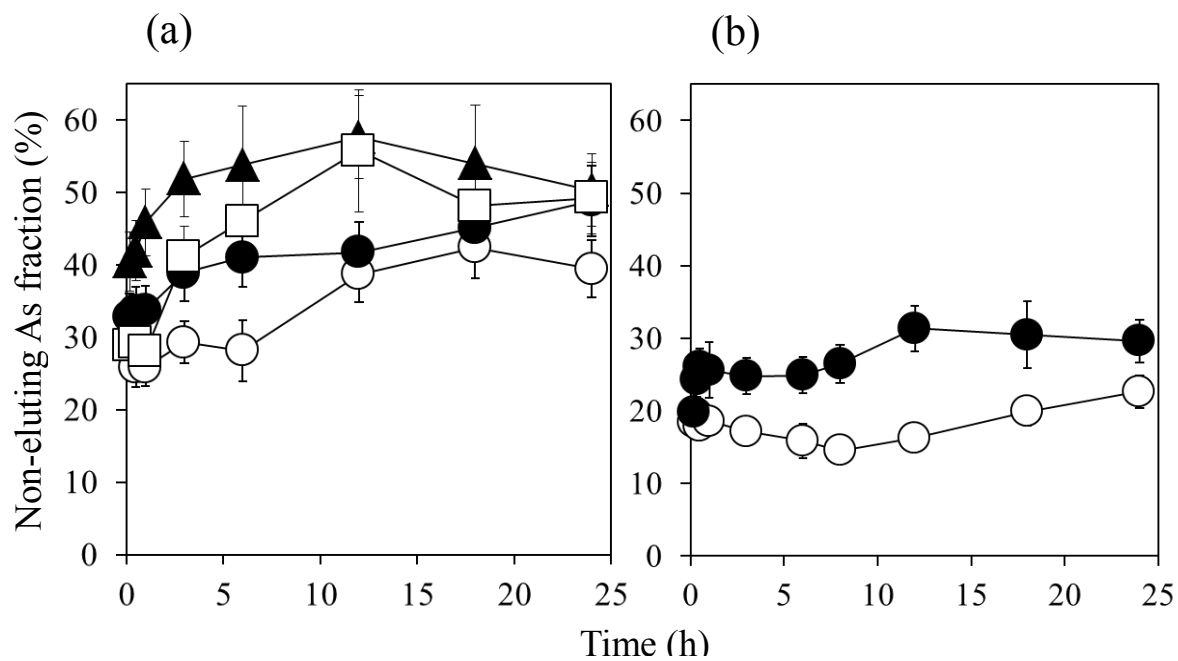


Fig. S1. Time courses of non-eluting As fractions from the RP-HPLC column in extracts of (a) *Synechocystis* and (b) *Nostoc* cells exposed to various concentrations of As^v (○, 0.1 mM; ●, 0.5 mM; ▲, 1 mM; □, 5 mM) for 24 h. Data are means ± s.d. for three independent experiments.

Table S1. Contents of total As and As species in extracts of *Synechocystis* and *Nostoc* cells exposed to various concentrations of As^V for 24 h

Data are means ± s.d. for three independent experiments. ND, not detectable. Values in parentheses are the mean percentages of each As species of the sum of species. Extraction yields of the water-soluble As metabolites were determined by comparing total As contents in the extracts with those in the cells. Column recoveries in RP-HPLC were evaluated by comparing the sum of As species contents with total As contents in the extracts. Extraction yields and column recoveries are means ± s.d. of the values for 10 min to 24 h

Cells	As ^V concentration in the medium (mM)	As content (µg As mg ⁻¹ Chl)							Extraction yield (%)	Column recovery (%)
		Total As	As ^V	As ^{III}	MA ^V	DMA ^V	Oxo-Gly	Oxo-PO ₄		
<i>Synechocystis</i>	0.1	0.77 ± 0.069	0.39 ± 0.036 (76)	0.045 ± 0.0040 (8.6)	0.031 ± 0.0028 (6.0)	0.021 ± 0.0019 (4.1)	ND	0.027 ± 0.0025 (5.3)	77 ± 11	61 ± 6.8
	0.5	1.3 ± 0.12	0.80 ± 0.072 (84)	0.093 ± 0.084 (9.8)	0.018 ± 0.0017 (1.9)	0.022 ± 0.0020 (2.3)	ND	0.022 ± 0.0020 (2.3)	94 ± 17	55 ± 5.8
	1	1.8 ± 0.16	1.1 ± 0.10 (83)	0.12 ± 0.011 (9.0)	0.033 ± 0.0030 (2.5)	0.025 ± 0.0022 (1.8)	0.049 ± 0.0044 (3.7)	ND	96 ± 17	44 ± 6.5
	5	2.0 ± 0.18	1.6 ± 0.15 (83)	0.21 ± 0.019 (11)	0.047 ± 0.042 (2.4)	0.027 ± 0.0024 (1.4)	0.055 ± 0.049 (2.8)	ND	112 ± 17	50 ± 10

Table S1. (Cont.)

Cells	As ^V concentration in the medium (mM)	As content ($\mu\text{g As mg}^{-1}$ Chl)							Extraction yield (%)	Column recovery (%)
		Total As	As ^V	As ^{III}	MA ^V	DMA ^V	Oxo-Gly	Oxo-PO ₄		
<i>Nostoc</i> (without air-bubbling)	0.1	15 ± 1.3	11 ± 1.0 (90)	0.86 ± 0.078 (7.1)	0.056 ± 0.0050 (0.46)	0.068 ± 0.0061 (0.55)	0.19 ± 0.017 (1.5)	ND	93 ± 6.6	79 ± 3.1
	1	31 ± 2.8	19 ± 1.7 (73)	6.4 ± 0.58 (24)	0.058 ± 0.0053 (0.22)	0.071 ± 0.0064 (0.27)	0.50 ± 0.045 (1.9)	ND	93 ± 6.5	69 ± 4.7

Table S2. Retention times, detection limits and spike recoveries of As compounds in cell extracts in (a) RP-HPLC and (b) SAX-HPLC

The intra-day precision of retention times was determined as the coefficient of variation (CV) in the eight repeat analyses of the same standard solution. Detection limits were estimated from three times the signal-to-noise ratio. Spiking experiments with standard As species in triplicate were performed in RP-HPLC because quantification of As compounds was done only by RP-HPLC column

As species	Retention time		Detection limit ($\mu\text{g As L}^{-1}$)	Spike recovery (%)	
	Mean (min)	CV (%)		<i>Synechocystis</i>	<i>Nostoc</i>
(a)					
As ^V	2.1	0.12	0.29	90 ± 3.0	92 ± 1.7
As ^{III}	2.6	0.11	0.42	99 ± 1.5	97 ± 1.7
MA ^V	2.8	0.10	0.29	99 ± 3.6	99 ± 2.7
DMA ^V	3.2	0.13	0.35	102 ± 1.8	99 ± 2.0
Oxo-SO ₃	3.4	0.69	0.35	100 ± 7.2	104 ± 1.5
AB	3.6	0.11	0.35	102 ± 1.4	100 ± 3.5
Oxo-PO ₄	3.9	0.50	0.35	98 ± 0.87	100 ± 2.2
Oxo-SO ₄	4.2	0.60	0.35	98 ± 4.2	106 ± 2.2
TMAO	6.7	0.16	0.89	102 ± 2.8	103 ± 5.7
TMA	7.2	0.10	0.59	105 ± 0.11	102 ± 1.8
AC	7.8	0.10	0.59	96 ± 0.20	97 ± 1.0
Oxo-Gly	10.4	3.5	0.35	107 ± 1.9	95 ± 4.4

Table S2. (Cont.)

As species	Retention time		Detection limit ($\mu\text{g As L}^{-1}$)	Spike recovery (%)	
	Mean (min)	CV (%)		<i>Synechocystis</i>	<i>Nostoc</i>
(b)					
As ^{III}	1.0	0.32	0.66		
Oxo-Gly	1.0	0.27	0.87		
DMA ^V	1.3	1.0	0.87		
MA ^V	1.9	0.79	0.87		
Oxo-PO ₄	2.2	0.45	0.87		
As ^V	3.8	0.84	1.53		
Oxo-SO ₃	4.6	0.61	0.87		
Oxo-SO ₄	8.6	0.61	0.87		