Supplementary Table 1. Cyanophycin metabolism, arginine catabolism, and arginine and aspartate transport genes in cyanobacteria.

The cyanobacteria included in the phylogenetic analysis of Shih *et al.* (2013) were used as test strains. The indicated *Anabaena* genes were used as query in BLAST analysis, which was completed by analysis using as query the corresponding *Synechocystis* genes (except *cphA2*, *natF* and *natH*, not present in this organism). The presence of a gene in a strain is indicated by a check mark ( $\checkmark$ ). Every strain containing *cphA1* contains *cphB1*, normally in an operon; † indicates that the clustering of the two genes is not conserved. For *cphA2*, ¶ indicates the presence of a *cphB2* gene in the neighbourhood of *cphA2* as shown in Fig. 1.

Clade/Strain	Gene								
	cphB1 cphA1	cphA2	iadC	agrE	putA	bgtB	natF	natH	
Clade A									
Trichodesmium erythraeum IMS101	1		1	1	✓		1	/	
Lyngbya sp. PCC 8106	<b>✓</b> †		1	1	1		1	1	
Arthrospira platensis Paraca	1		1	1	1		1	1	
Arthrospira platensis NIES-39	1		1	1	1		1	1	
Arthrospira sp. PCC 8005	1		1	1	1		1	1	
Arthrospira maxima CS-328	1		1	/	1		1	/	
Oscillatoria nigro-viridis PCC 7112	1	<b>√</b> ¶	1	1	1		1	1	
Microcoleus vaginatus FGP-2	1	<b>√</b> ¶	1	1	1		1	1	
Oscillatoria sp. PCC 6506	1	<b>√</b> ¶	1	1	/		1	1	
Kamptonema formosum PCC 6407	1	<b>√</b> ¶	1	1	/		/	/	
Oscillatoria sp. PCC 10802	/	1	/	/	/				
Oscillatoria acuminata PCC 6304	1		/	/	/		/	/	
Clade B1									
Fischerella sp. PCC 9605	/	✓ ¶	1	/	1	/			
Fischerella sp. PCC 9431	/	✓ ¶	1	/	1	1	1	/	
Fischerella sp. PCC 9339	/	✓ ¶	1	/	1	/	1	/	
Fischerella sp. JSC-11	/	- "	1	/	1	1	1	1	
Chlorogloeopsis sp. PCC 7702	/	<b>√</b> ¶	1	/	1	1	<u> </u>		
Mastigocladopsis repens PCC 10914	/	✓ ¶	1	/	1	/			
Calothrix sp. PCC 7103	/	✓ ¶	/	/	1	1	1	/	
Calothrix sp. PCC 6303	1	V	1	1	1	<b>-</b>	1	1	
Nostoc sp. PCC 7524	<b>/</b>	<b>√</b> ¶	1	1	1	1	/	<b>/</b>	
Anabaena sp. PCC 7120	/	✓ ¶	/	/	1	1	1	/	
Anabaena variabilis ATCC 29413	<b>/</b>	✓ ¶	1	1	1	1	1	<b>/</b>	
Nostoc sp. PCC 7107	/	✓ ¶	1	/	1	1	1	/	
Cylindrospermum stagnale PCC 7417	/	✓ ¶	/	/	1	1	1	/	
Anabaena cylindrica PCC 7122	/	✓ ¶	/	1	1	1	1	/	
Anabaena sp. PCC 7108	<b>/</b>	V	/	/	/	· ·	/	/	
Raphidiopsis brookii D9	/		1	1	1		1	1	
Cylindrospermopsis raciborskii CS-505		,	1					+	
'Nostoc azollae' 0708	1	1	✓ ✓	1	✓ ✓		✓ ✓	1	
Nodularia spumignea CCY9414	/	<u> </u>		-	_	<b>√</b>	-		
Calothrix sp. PCC 7507	/	<b>✓</b>	/	<b>✓</b>	1	/	1	<b>✓</b>	
Microchaete PCC 7126		ļ	<u> </u>		_	1	-		
Nostoc puntiforme PCC 73102	<b>√</b>	<b>√</b>	1	<b>/</b>	<i>\</i>	<b>/</b>	1	<b>√</b>	
,	<b>/</b>	✓ ¶	<i>\</i>	1	<b>/</b>	<b>√</b>			
Scytomena hofmanni UTEX 2349 Rivularia sp. PCC 7116	/	✓ ¶	<i>\</i>	<i>\</i>	✓ ✓	1	,	,	
•		/ m		-	+		1	✓	
Synechocystis sp. PCC 7509	<i>\</i>	/ ¶	<i>\</i>	/	/	/	,	,	
Gloeocapsa sp. PCC 7428 Chroococcidiopsis thermalis PCC 7203	/	✓ ¶	<i>\</i>	/	<i>\</i>	<b>/</b>	<b>/</b>	<b>√</b>	
•	✓	✓ ¶	1	<b>✓</b>	<b>/</b>	<b>√</b>	1	<b>√</b>	
Clade B2 Halothece sp. PCC 7418		-	-	-	-	-	-	-	
Spirulina subsalsa PCC 9445	/		1	1	1	1	1	/	
Spirulina major PCC 6313	<b>✓</b>		1	1			1	1	
Atelocyanobacterium thalassa UCYN-A	· ·		•	•	/		· ·	-	
Cyanothece sp. CCY0110	,	/ (1	,	,	,	-	,		
Cyanothece sp. CC10110  Cyanothece sp. ATCC 51472	<b>√</b>	✓ ¶	<b>√</b>	/	<i>\</i>	1	<b>/</b>	/	
Cyanomece sp. ATCC 51472	✓		✓	✓	✓		1	1	

	cphB1	cphA2	iadC	agrE	putA	bgtB	natF	natH
0 4 4 7 0 7 4 4 0	cphA1							
Cyanothece sp. ATCC 51142	/		<b>✓</b>	<b>/</b>	<b>/</b>		<b>✓</b>	/
Crocosphaera watsonii WH 0003	<b>/</b>		<b>√</b>	<b>/</b>	<b>/</b>		<b>✓</b>	<b>/</b>
Crocosphaera watsonii WH 8501	/		<b>√</b>	<b>/</b>	<b>✓</b>		<b>✓</b>	<i>\</i>
Cyanothece sp. PCC 8802	/		<b>√</b>	<b>/</b>	<b>/</b>		/	/
Cyanothece sp. PCC 8801	<b>/</b>		1	<b>/</b>	<b>/</b>		1	<i>\</i>
Synechocystis sp. PCC 6803	/		<b>√</b>	✓ ✓	<b>√</b>	<b>✓</b>		
Pleurocapsa sp. PCC 7327	<b>✓</b>		1		<b>/</b>		<b>✓</b>	<b>√</b>
Microcystis aeruginosa NIES-843 Microcystis aeruginosa PCC 7806	/		<i>\</i>	/	/	/	1	/
Cyanothece sp. PCC 7822	/	,	<b>/</b>	/	/	<b>√</b>	1	<i>\</i>
Cyanothece sp. PCC 7424	/	1	1	/	1	1	1	1
Prochloron didemni P1		•	-	•	•	•	•	· ·
Gloeocapsa sp. PCC 73106			,	,	,	,		
	<b>/</b>		<b>√</b>	1	<b>√</b>	1	1	<i>\</i>
Synechococcus sp. PCC 7002 Leptolyngbya sp. PCC 7376	<b>/</b>		<i>\</i>	1	<b>/</b>	-		
Cyanobacterium stanieri PCC 7202	/		1	/	✓ ✓	-	<b>✓</b>	
Geminocystis herdmanii PCC 6308	1		1	<i>\</i>	1	/		
Cyanobacterium aponinum sp. PCC 10605	/		1	1	1	1		
Stanieria cyanosphaera PCC 7437		/	1	1	1	1	/	/
Pleurocapsa sp. PCC 7319	<b>/</b> †	•		_				
Xenococcus sp. PCC 7319	<b>√</b>	-	1	<b>/</b>	<b>/</b>	<b>✓</b>	<b>/</b>	<i>\</i>
Chrococcidiopsis sp. PCC 6712	<i>\</i>	/ 6	1	1	<i>\</i>		<i>\</i>	<i>\</i>
Clade B3	<b>✓</b>	✓ ¶	/	/	/	/	/	/
Moorea producens 3L	/		1	1	1		1	/
Coleofasciculus chthonoplastes PCC 7420	1		1	1	1		<del></del>	
Microcoleus sp. PCC 7113		✓ ¶	1	+	-		/	/
•	1	<b>7</b>	1	✓	✓	✓	•	· ·
Other clade B Crinalium epipsammum PCC 9333								
	✓	1	1	1	1	1		1
Chamaesiphon minutus PCC 6605	✓		1	1	1		1	/
Geitlerinema sp. PCC 7105	<b>✓</b> †		1	1	/			
Olada O4	<u> </u>							
Clade C1 Synechococcus sp. RCC307								
Prochlorococcus marinus NATL 2A							1	/
Prochlorococcus marinus NATL 1A							1	/
Prochlorococcus marinus CCMP1986							<del>'</del>	· •
Prochlorococcus marinus MIT9515							/	/
Prochlorococcus marinus AS9601								
Prochlorococcus marinus MIT9301								
Prochlorococcus marinus MIT9215								
Prochlorococcus marinus MIT9202								
Prochlorococcus marinus MIT9312							/	/
Prochlorococcus marinus MIT9211							/	/
Prochlorococcus marinus CCMP1375		-	1	-	1	1	<b>✓</b>	<i>\</i>
Prochlorococcus marinus MIT9313		1	1	1	1	1	<b>/</b>	<b>/</b>
Prochlorococcus marinus MIT9303					1	-	1	/
Synechococcus sp. CC9605			1	1	+	+	1	/
Synechococcus sp. CC9605		1	1	1	1	1	<b>√</b>	<i>\</i>
Synechococcus sp. BI 107					1	1	<b>/</b>	<i>\</i>
Synechococcus sp. BL107 Synechococcus sp. CC9902			1	1	+	+	<b>/</b>	<i>\</i>
Synechococcus sp. CC9902 Synechococcus sp. WH7805		-	-		+	+	1	<i>\</i>
Synechococcus sp. WH7803		-			1	1	1	/
Synechococcus sp. CC9311		1	1	1	1	1	1	/
Synechococcus sp. WH8016		1			1	1	1	/
Synechococcus sp. RS9916					+	1	1	/
Synechococcus sp. RS9917		1	1	1	1	1	./	/
Synechococcus sp. WH5701		<b> </b>	<del>                                     </del>		+	+	1	1
	i	1	1	1	+	1		
•							./	./
Synechococcus sp. CB0205						1	1	/
•							<i>y</i>	<i>y</i>

	cphB1 cphA1	cphA2	iadC	agrE	putA	bgtB	natF	natH
Clade C	,							
Prochlorothrix hollandica PCC 9006	1		1	1	1		1	1
Clade C2								1
Synechococcus elongatus PCC 7942							1	1
Synechococcus elongatus PCC 6301							✓	1
Clade C3								
Leptolyngbya sp. PCC 6406							/	1
Nodosilinea nodulosa PCC 7104	<b>/</b> †		1	1	1	1	1	1
Synechococcus sp PCC 7335	<i>'</i>		1	1	1		1	1
Leptolyngbya sp. PCC 7375	1		1	1	1		/	1
Clade D								1
Geitlerinema sp. PCC 7407	1		1	1	1		1	1
Leptolyngbya sp. PCC 6306	1	<b>✓</b> ¶	1	1	1	1		
Clade E								1
Thermosynechococcus elongatus BP-1	1		1	1	1			
Synechococcus sp. PCC 6312	1		1	1	1	1	/	1
Cyanothece sp. PCC 7425	/	1	1	1	1		1	1
Acaryochloris marina MBIC11017					1		1	1
Acaryochloris sp. CCMEE5410							1	1
Clade F								
Synechococcus sp. PCC 7502	<b>/</b> †		1	1	1		1	1
Pseudanabaena sp. PCC 6802	<b>/</b> †		1	1	1		1	1
Pseudanabaena sp. PCC 7429	<b>/</b> †		1	1	1		1	1
Pseudanabaena sp. PCC 7367	<b>/</b> †		1	1	1	1	1	1
Clade G								
Synechococcus sp. JA-3-3AB							1	1
Synechococcus sp. JA-2-3B´a(2-13)	<b>√</b> †	✓	✓	✓	1		1	1
Synechococcus sp. PCC 7336	-			1	1	1	1	1
Deeply divergent								<u> </u>
Gloeobacter violaceus PCC 7421	<b>/</b> †		1	1	1			
Recently discovered								
Gloeomargarita lithophora D10	1		✓	1	1			
Gloeobacter kilauensis JS1	<b>√</b> †		✓	1	1			
Richelia intracellularis HH01	1		/				1	1