

## Supplementary Material

**Table S1.** Maximum cellular domoic acid (DA), mean cellular DA during the exponential and stationary phases, mean extracellular DA; for *P. multiseri* CCL70 and *P. australis* PNC1 grown on nitrate, ammonium, urea, arginine, glutamine, glutamate and taurine (the latter for *P. australis* only); nd = not detectable;  $n = 2 \pm \text{SE}$ . \*\* We did not detect DA in the *P. multiseri* culture medium, in any of our treatments. It cannot be excluded that a methodological failure occurred during preservation of the vials containing dissolved DA, because extracellular DA has been reported in all previous studies on toxigenic *P. multiseri*.

<i>P. multiseri</i> CCL70				
	Maximum DA (pg·Cell <sup>-1</sup> )	Mean DA Exponential Phase (pg·Cell <sup>-1</sup> )	Mean DA Stationary Phase (pg·Cell <sup>-1</sup> )	Mean DA Extracellular **
Nitrate	2.03 ± 0.64	0.07 ± 0.04	1.39 ± 0.55	nd
Urea	2.53 ± 0.25	0.03 ± 3 × 10 <sup>-5</sup>	2.18 ± 0.09	nd
Ammonium	0.30 ± 0.04	0.24 ± 0.03	0.14 ± 0.01	nd
Arginine	0.87 ± 0.12	0.006 ± 0.01	0.49 ± 0.01	nd
Glutamine	0.60 ± 0.01	0.003 ± 0.005	0.22 ± 0.02	nd
Glutamate	nd	nd	nd	nd
<i>P. australis</i> PNC1				
	Maximum DA (fg·Cell <sup>-1</sup> )	Mean DA Exponential Phase (fg·Cell <sup>-1</sup> )	Mean DA Stationary Phase (fg·Cell <sup>-1</sup> )	Mean DA Extracellular ng·mL <sup>-1</sup>
Nitrate	37.1 ± 12.7	2.4 ± 0.1	12.3 ± 3.3	6.7 ± 2.7
Urea	24.8 ± 5.9	2.3 ± 0.1	7.9 ± 0.2	15.5 ± 0.7
Ammonium	43.9 ± 2.3	13.4 ± 0.6	19.5 ± 1.9	15.4 ± 0.6
Arginine	nd	nd	nd	nd
Glutamine	nd	nd	nd	nd
Glutamate	79.0 ± 6.4	12.4 ± 0.2	22.6 ± 3.8	20.1
Taurine	nd	nd	nd	nd

**Table S2.** Specific growth rate, biomass in stationary phase and domoic acid (DA) content of *P. multiseriis* and *P. australis* growing in batch culture with different nitrogen sources; GLN = glutamine; GLU = glutamate; na = not determined; nd = not detected.

Species	Strain (Origin)	N Source ( $\mu\text{M-N}$ )	Irradiance ( $\mu\text{mol Photons m}^{-2}\cdot\text{s}^{-1}$ )	Specific Growth Rate ( $\text{d}^{-1}$ )	Biomass in Stationary Phase ( $10^3 \text{ Cells mL}^{-1}$ )	DA Content ( $\text{Cell}^{-1}$ )	Reference		
<i>P. multiseriis</i>	NPARL (Canada)	NO <sub>3</sub>	880 <sup>a</sup>	40		129	0.2–10 pg	Bates <i>et al.</i> (1989) [1]	
			880 <sup>a</sup>	100		30–205	0.04–21 pg		
			880 <sup>a</sup>	140		36	0.2–0.9 pg		
			880 <sup>a</sup>	165		129	1.3–18 pg		
		NO <sub>3</sub>	50	100		90	0.4 pg	Bates <i>et al.</i>	
			1000	100		256	9.6 pg	(1991) [2]	
		NO <sub>3</sub>	55	100		100 <sup>b</sup>	0.30 pg <sup>b</sup>	Bates <i>et al.</i> (1993) [3]	
			110	100		160 <sup>b</sup>	1 pg <sup>b</sup>		
			220	100		240 <sup>b</sup>	1.4 pg <sup>b</sup>		
			440	100		180 <sup>b</sup>	1.7 pg <sup>b</sup>		
			440	100		300 <sup>c</sup>	0.6–4.2 pg <sup>c</sup>		
		NH <sub>4</sub>	55	100		100 <sup>b</sup>	0.3 pg <sup>b</sup>	Bates <i>et al.</i> (1993) [3]	
			110	100		160 <sup>b</sup>	1 pg <sup>b</sup>		
			220	100		180 <sup>b</sup>	3.7 pg <sup>b</sup>		
			440	100		130 <sup>b</sup>	5 pg <sup>b</sup>		
				440	100		30 <sup>c</sup>	0.6–8.5 pg <sup>c</sup>	
			NO <sub>3</sub>	880 <sup>a</sup>	100	0.65	150 <sup>d</sup>	2 pg <sup>c</sup>	Douglas & Bates (1992) [4]
	TKA-2 (USA)	NO <sub>3</sub>	220	100		166		Bates <i>et al.</i> (1993) [3]	
			440	100		203			
			880	100		195			
		NH <sub>4</sub>	220	100		123		Bates <i>et al.</i> (1993) [3]	
			440	100		30			
			880	100		1			
	MD-1 (USA)	NO <sub>3</sub>	220	100		246		Bates <i>et al.</i> (1993) [3]	
440			100		261				
880			100		265				
NH <sub>4</sub>		220	100		178		Bates <i>et al.</i> (1993) [3]		
		440	100		82				
		880	100		1				

Table S2. *Cont.*

	NO <sub>3</sub>	200	230	0.42–0.55	na	na	
		200	25	0.42–0.66		na	
KP 84 (Canada)	Urea	200	25	0.38–0.60		na	Hillebrand & Sommer (1996)
	NH <sub>4</sub>	300	230	nd		na	[5]
		300	25	0.33–0.36		na	
	GLN	200	25	0.65–0.83		na	
NPBIO (Canada)	NO <sub>3</sub>	1,760 <sup>f</sup>	410	0.20–0.25	140–150	144–432 fg	Pan <i>et al.</i> (1996) [6]
CLN-1 (Canada)	GLU	28.10 <sup>3</sup>	100		733	0.067 pg	Lyons (2002) [7]
Mu411P (USA)	NO <sub>3</sub>	880 <sup>a</sup>	100			0.1–15 pg	Kudela (2003) [8]
<i>P. multiseriis</i>	CL-195 (Canada)	NO <sub>3</sub>	880 <sup>g</sup>	100		0.7 pg <sup>e</sup>	Lundholm <i>et al.</i> (2004) [9]
	OKPm013-2 (Japan)	NO <sub>3</sub>	880 <sup>g</sup>	100		1.15 pg <sup>e</sup>	Lundholm <i>et al.</i> (2004) [9]
		NO <sub>3</sub>	880 <sup>a</sup>	200			1.9–140 pg
CCL70 (UK)	NO <sub>3</sub>	440		0.56		3.16 pg <sup>e</sup>	Calu <i>et al.</i>
	Urea	440		0.67		5.17 pg <sup>e</sup>	(2009) [11]
CLN-47 (Canada)	NO <sub>3</sub>	88	150/200	0.65		362 fg	Thessen <i>et al.</i> (2009) [12]
	NH <sub>4</sub>	88	150/200	0.61		48 fg	
	Urea	88	150/200	0.68		24 fg	
Pn-1 (USA)	NO <sub>3</sub>	88	150/200	0.76		1250 fg	Thessen <i>et al.</i> (2009) [12]
	NH <sub>4</sub>	88	150/200	0.76		406 fg	
	Urea	88	150/200	0.30		1807 fg	

Table S2. Cont.

	DOMA-1 (USA)	NO <sub>3</sub>	54	22	0.8	20	12 pg <sup>e</sup>	Garrison <i>et al.</i> (1992) [13]
	DOMA-2 (USA)	NO <sub>3</sub>	54	32	0.82	20	37 pg <sup>e</sup>	Garrison <i>et al.</i> (1992) [13]
	WW4 (Ireland)	NO <sub>3</sub>	880 <sup>a</sup>	115	0.73–0.94	73–97	0.24–26 pg	Cuzak (2002) [14]
	PLY1St.19A (UK)	NO <sub>3</sub>	880 <sup>a</sup>	100		172	0.15 pg	Fehling <i>et al.</i> (2004) [15]
	PLY1St.54B (UK)	NO <sub>3</sub>	880 <sup>a</sup>	100		129	1.68 pg	Fehling <i>et al.</i> (2004) [15]
<i>P. australis</i>		NO <sub>3</sub>	50	100	0.89		0.48 fg	
	AU221-a (USA)	NH <sub>4</sub>	50	100	0.93		0.26 fg	Howard <i>et al.</i> (2007) [16]
		Urea	50	100	0.52		1.37 fg	
	PA2 (Chile)	NO <sub>3</sub>	880 <sup>a</sup>	100–140			0.04 pg	Àlvarez <i>et al.</i> (2009) [17]
	PA3 (Chile)	NO <sub>3</sub>	880 <sup>a</sup>	100–140			0.05 pg	Àlvarez <i>et al.</i> (2009) [17]
	PA4 (Chile)	NO <sub>3</sub>	880 <sup>a</sup>	100–140			1.74 pg	Àlvarez <i>et al.</i> (2009) [17]
	BTS-1 (Mexico)	NO <sub>3</sub>	880 <sup>g</sup>	200			0.11–3 pg	Santiago <i>et al.</i> (2011) [18]
	PNaus45 (France)	NO <sub>3</sub>	440 <sup>h</sup>	35–400	0.47–0.83		0.5–0.7 pg	Thorel <i>et al.</i> (2014) [19] <sup>i</sup>

<sup>a</sup> = F/2 medium; <sup>b,c</sup> = recalculated values from Figures 2 and 3, respectively (Bates *et al.*, 1993) [3];

<sup>d</sup> = recalculated value from Figure 1A (Douglas and Bates, 1992) [4]; <sup>e</sup> = maximum value; <sup>f</sup> = F medium;

<sup>g</sup> = L1 medium; <sup>h</sup> = K/2 medium; <sup>i</sup> = data from semi-continuous culture.

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