Supplementary 1

Table S1: Descriptions of all articles used for digitization in Section 2.

Primary Author	Year	Species	Strain	Isolation place	Isolation Year	Taxonomic Group	Media type	Photoperiod	Irradiance	Temperature
Hansen, P. J.	2002	*Ceratium lineatum*	N/A	Øresund, Denmark	1995	Dinoflagellate	f/2	16h:8h	60 µmol photons	15 ±1°C
		Heterocapsa triquetra	K-0481	Øresund, Denmark	1988	Dinoflagellate				
		Prorocentrum minimum	K-0295	Kattegat, Denmark	1989	Dinoflagellate				
Lundholm, N.	2004	*Pseudo-nitzschia pungens*	CL-193	Deadmans Harbour, Bay of Fundy, Canada	2002	Diatom	L1	16h:8h	100 µmol photons	15 ±1°C
		Pseudo-nitzschia multiseries	CL-195	Deadmans Harbour, Bay of Fundy, Canada	2002	Diatom				
		Pseudo-nitzschia multiseries	OKPm013-2	Okkiray Bay, Iwate Prefecture, Japan	2001	Diatom				
		Nitzschia navis-varingica	VHL987	Ha Long Bay, Vietnam	1998	Diatom				
		Pseudo-nitzschia australis	PS11V	Baiona, Ría Vigo, Spain	2001	Diatom				
		Pseudo-nitzschia sp.	NWFSC095	Sequim Bay, Washington, USA	2002	Diatom				

Primary Author	Year	Species	Strain	Isolation place	Isolation Year	Taxonomic Group	Media type	Photoperiod	Irradiance	Temperature
Lundholm, N.	2004	*Pseudo-nitzschia calliantha*	CL-190	Baie-Sainte-Anne, New Brunswick, Canada	2002	Diatom	L1	16h:8h	100 µmol photons	15 ±1°C
		Pseudo-nitzschia delicatissima	Tasm10	Hobart Harbour, Tasmania	2000	Diatom				
		Pseudo-nitzschia fraudulenta	CL-192	Deadmans Harbour, Bay of Fundy, Canada	2002	Diatom				
		Pseudo-nitzschia granii	PG	Ocean Station Papa, NE Pacific	2000	Diatom				
		Pseudo-nitzschia seriata	CL-150	Tracadie Harbour, PEI, Canada	2002	Diatom			55 µmol photons	4°C
		Pseudo-nitzschia cf. turgidula	PT	Ocean Station Papa, NE Pacific	2002	Diatom			100 µmol photons	15 ±1°C
Hansen, P. J	2007	*Ceratium lineatum*	N/A	Øresund, Denmark	1995	Dinoflagellate	f/2	16h:8h	60 µmol photons	15 ±1°C
		Heterocapsa triquetra	K-0481	Øresund, Denmark	1988	Dinoflagellate				
		Prorocentrum minimum	K-0295	Kattegat, Denmark	1989	Dinoflagellate				
Schmidt, L. E.	2001	*Chrysochromulina polylepis*	K-0259	Øresund, Denmark	1988	Prymnesiophyte	f/2	16h:8h	60 µmol photons	15 ±1°C
		Chrysochromulina simplex	K-0272	Victoria, Austalia	1988	Prymnesiophyte				

Primary Author	Year	Species	Strain	Isolation place	Isolation Year	Taxonomic Group	Media type	Photoperiod	Irradiance	Temperature
Møgelhøj, M. K.	2006	*Rhodomonas marina*	K-0435	Kattegat, Denmark	1990	Cryptophyte	B1 modified using 0.5 mL vitamin stock/L	16h:8h	65 µmol photons	15 ±2°C
		Rhodomonas salina	K-0294	Øresund, Denmark	1989	Cryptophyte				
		Heterocapsa triquetra	K-0481	Øresund, Denmark	1988	Dinoflagellate				
		Prorocentrum micans	K-0335	Kattegat, Denmark	1989	Dinoflagellate				
		Prorocentrum minimum	K-0295	Kattegat, Denmark	1989	Dinoflagellate				
		Phaeodactylum tricornutum	N/A	Unknown	Unknown	Diatom				
Nielsen, L. T.	2007	*Heterocapsa triquetra*	N/A	Unknown	Unknown	Dinoflagellate	f/2 w/ 3x Si	16h:8h	20, 35, 80, and 250 µmol photons	16.5 ±0.5°C
		Nitzschia navis-varingica	VHL985	Unknown	Unknown	Diatom				
Berge, T	2010	*Prorocentrum minimum*	K-1138	Skagerrak	2008	Dinoflagellate	f/2	14h:10h	150 µmol photons	15°C
		Prorocentrum micans	K-1137	Skagerrak	2008	Dinoflagellate				
		Karlodinium veneficum	K-1413	North Sea	2007	Dinoflagellate				
		Heterocapsa triquetra	K-1133	Baltic	2007	Dinoflagellate				
		Rhodomonas marina	K-0435	Kattegat, Denmark	1990	Cryptophyte				
		Teleaulax amphioxeia	N/A	The Sound, Denmark	2009	Cryptophyte				
		Coscinodiscus granii	K-1048	USA	1994	Diatom				
		Prymnesium parvum	K-0623	Unknown	Unknown	Prymnesiophyte				

Primary Author	Year	Species	Strain	Isolation place	Isolation Year	Taxonomic Group	Media type	Photoperiod	Irradiance	Temperature
Berge, T	2012	*Heterocapsa triquetra*	A4c, NA	Copenhagen, Denmark	2007	Dinoflagellate	L1	16h:8h	150 µmol photons	15°C
		Heterocapsa triquetra	A5c, K-1134	Copenhagen, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	A2b, K-1131	Copenhagen, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	A4a, Na	Copenhagen, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	F2e, NA	Gedser Harbour, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	F1f, NA	Gedser Harbour, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	F1c, K-1125	Gedser Harbour, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	F1a, K-1124	Gedser Harbour, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	2-1, K-1127	Stege Harbour, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	2-3, NA	Stege Harbour, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	2-5, NA	Stege Harbour, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	2-6, NA	Stege Harbour, Denmark	2007	Dinoflagellate				
		Heterocapsa triquetra	HTMS0402	Masan Bay Korea	2004	Dinoflagellate				

Primary Author	Year	Species	Strain	Isolation place	Isolation Year	Taxonomic Group	Media type	Photoperiod	Irradiance	Temperature
Berge, T	2012	*Heterocapsa triquetra*	KAC 26	Kalmarsund, Sweden	2000	Dinoflagellate	L1	16h:8h	150 µmol photons	15℃
		Heterocapsa triquetra	KAC 27	Kalmarsund, Sweden	2000	Dinoflagellate				
		Heterocapsa triquetra	NC 98	West Coast, Norway	1998	Dinoflagellate				
		Heterocapsa triquetra	K-0482	Kattegat, Denmark	1988	Dinoflagellate				
		Heterocapsa triquetra	KAC 49	West Coast, Sweden	1986	Dinoflagellate				
		Heterocapsa triquetra	K-0447	The Sound, Denmark	1984	Dinoflagellate				
		Heterocapsa triquetra	NIES 235	Osaka Bay, Japan	1982	Dinoflagellate				
		Heterocapsa triquetra	NIES 7	Farima-Nada, Japan	1981	Dinoflagellate				
		Heterocapsa triquetra	CCMP 449	Lawrence Estuary, Canada	1960	Dinoflagellate				
		Heterocapsa triquetra	PLY 169	Tamar Estuary, England	1957	Dinoflagellate				
Søgaard, D. H.	2011	Fragilariopsis sp.	CCMP 2297	Baffin Bay	1998	Diatom	L1	16h:8h	50 µmol photons	3 ±2℃
		Chlamydomonas sp.	CCMP 2294	Baffin Bay	2003	Chlorophyte				
		Fragilariopsis nana	SCCAP K-0637	Labrador Sea	Unknown	Diatom				
Søderberg, L. M.	2007	*Ceratium fusus*	N/A	The Sound, Denmark	2003	Dinoflagellate	f/2	16h:8h	100 µmol photons; 25 & 200 µmol photons	15 ±1℃
		Ceratium furca	N/A	The Sound, Denmark	2003	Dinoflagellate				
		Ceratium tripos	N/A	The Sound, Denmark	1998	Dinoflagellate				

Primary Author	Year	Species	Strain	Isolation place	Isolation Year	Taxonomic Group	Media type	Photoperiod	Irradiance	Temperature
Weisse, T.	2006	*Cryptomonas sp.*	SAG 26.80	Unknown	Unknown	Cryptophyte	MWC	14h:10h	10-30 µmol photons	15 ±0.2°C
Liu, W.	2007	*Chattonella marina*	NIES-3	Osaka Bay, Japan	1982	Raphidophyte	K	12h:12h	c. 42 µmol photons	22-24°C

Supplementary 2

Comparison of Aerated and pH-drift Cultures of *Thalassiosira pseudonana* CCMP1335

Cultures of the diatom *Thalassiosira pseudonana* (Clone CCMP 1335) in 40-ml glass tubes were maintained in balanced growth (i.e., in semicontinuous culture) in f/2 medium at 18 °C and under continuous illumination of 190 μmol photons m^{-2} s^{-1}, provided by cool-white fluorescent bulbs (see Section 4.1 for more details). The cultures were used to inoculate 2-L volumes of f/2 medium (Guillard, 1973). One was sealed (pH-drift); the second (aerated) was bubbled with air that had been passed through an activated charcoal filter (MacIntyre and Cullen, 2005). Both were stirred with Teflon-coated magnetic stir bars.

The two cultures were subsampled daily for analysis of DIC, pH, cell counts, and in vivo fluorescence. The DIC and pH were used to estimate the concentrations of CO_2, bicarbonate, and carbonate, using CO2SYS (Lewis and Wallace, 1998). Cell counts were performed with an Accuri C6 flow cytometer (BD, Franklin Lakes, NJ, USA), as described by MacIntyre et al. (2018). Fluorescence was measured with a FIRe fluorometer (Satlantic, Halifax, NS, Canada), using fits of the induction curve to estimate the quantum yield of PSII electron transport (F_v/F_m) and the photosynthetic cross section (σ). See Section 4.1 for more details.

In both cultures, there was a rapid increase in particles with chlorophyll a autofluorescence in the first 48 hours of the experiment (Figure S1 a, b). Thereafter, the concentration of particles decreased but their size, as inferred from the median side-scatter, increased (Figure S1 a, b). Both the initial peak in concentration and the subsequent rise in side scatter were more pronounced in the aerated culture. The most parsimonious explanation for this is that the cells aggregated in stationary phase. A biomass proxy (Figure S1 a, b) was calculated as the product of the two terms. This demonstrated the expected biomass response of exponential growth followed by stability in early stationary phase.

The changes in the biomass proxy were coincident with a draw-down in CO_2 and bicarbonate and a rise in carbonate (Figure S1 c, d). The drawdown was persistent in the pH-drift (sealed) culture but was reversed in the aerated culture after active biomass accumulation ceased. The lower pH in the latter favoured bicarbonate over carbonate, while carbonate dominated in the sealed culture.

There was a decline in photosynthetic efficiency (F_v/F_m) in both cultures, which was more pronounced in the pH-drift culture (Figure S1 e, f). In contrast, there was relatively little variation in the photosynthetic cross-section (σ) in either.

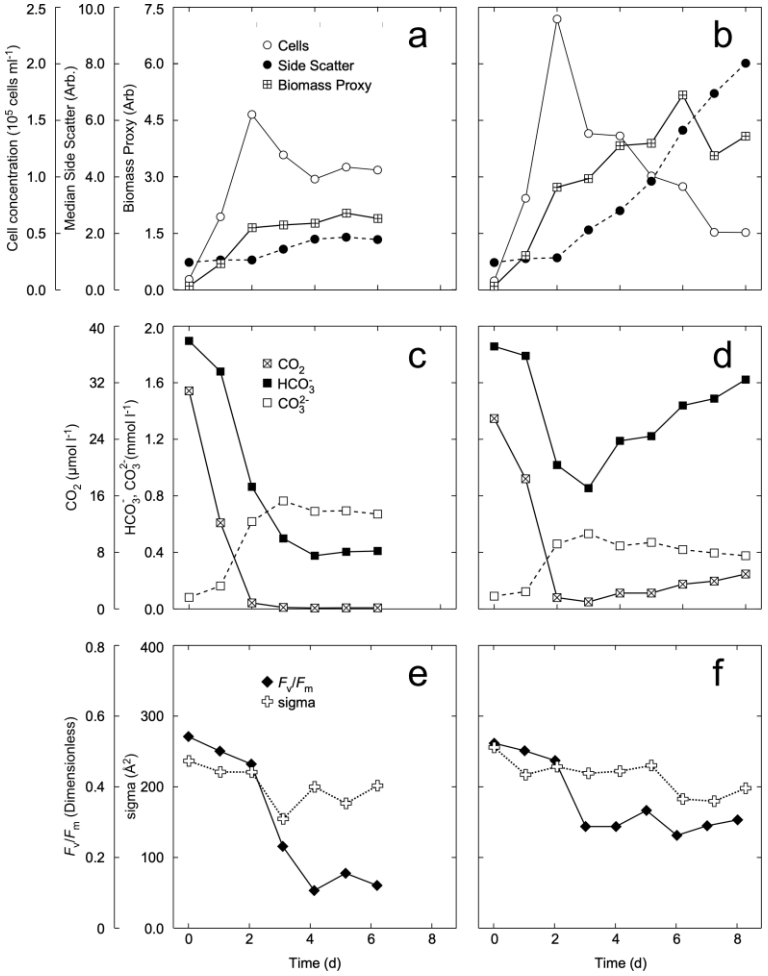

Figure S1: Time courses of biomass parameters (a, b), dissolved inorganic carbon (c, d), and photosynthetic response variables (e, f) in sealed (a, c, e) and aerated (b, d, f) cultures of *Thalassiosira pseudonana*.

Guillard, R. R. L.: Culture of phytoplankton for feeding marine invertebrates, In: Smith WL, Chanley MH (eds) Culture of marine invertebrate animals. Plenum Publishing Co., New York, 108-132, 1975.

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MacIntyre, H. L., Cullen, J. J., Whitsitt, T. J., Petri, B.: Enumerating viable phytoplankton using a culture-based Most Probable Number assay following ultraviolet-C treatment, J. Appl. Phycol., 30, 1073-1094. doi:10.1007/s10811-017-1254-8, 2018.