

Supporting information

Materials and methods

The parameters of the seawater carbonate system (Table S1) were calculated from pH and pCO₂ measurements with CO2 SYS software (Lewis and Wallace, 1998), using the values for the equilibrium constants K₁ and K₂ for carbonic acid dissociation from Roy et al. (1993) and that for K_B for boric acid of Dickson (1990). The pH change was determined with a pH meter (pH510, OAKTON) which was calibrated with standard National Bureau of Standards (NBS) buffer solutions (Hanna).

The primers of the target genes used in quantitative reverse transcriptase-polymerase chain reaction are shown in Table S2.

Results

The light levels, including the maximal and mean daytime PAR values during the experiments are shown in Supplementary Fig.1.

Table S1 Carbonate chemistry parameters of the growth medium for ambient (390 μatm ; LC) and elevated CO_2 (1000 μatm ; HC) cultures. TA stands for total alkalinity. The values are means \pm SD, n = 3. Different superscripted letters represent significant difference between the ambient and acidified conditions.

pCO_2	pH_{NBS}	DIC ($\mu\text{mol kg}^{-1}$)	HCO_3^- ($\mu\text{mol kg}^{-1}$)	CO_3^{2-} ($\mu\text{mol kg}^{-1}$)	CO_2 ($\mu\text{mol kg}^{-1}$)	Total alkalinity ($\mu\text{mol kg}^{-1}$)
LC	8.19 ± 0.02^a	2025.4 ± 85.8^a	1809.5 ± 70.0^a	203.3 ± 15.6^a	12.6^a	2319.3 ± 104.1^a
HC	7.83 ± 0.02^b	2208.9 ± 92.6^b	2072.5 ± 84.2^b	104.0 ± 8.4^b	32.3^b	2336.9 ± 102.8^a

Table S2 Nucleotide sequences of primers used in the real-time quantitative PCR

Gene	Primer name	Sequences(5'-3')	Amplicon size (bp)
Histone H4	H4-F	AGGCAAAGCGTGGTGGTCTTA	156
	H4-R	TCTGGGGAGCCTCAGTCAATA	
Synthase of mitochondrial ATP synthase	SM-F	AGGACAATACCAGCCCTACGAACCG	147
	SM-R	ACCTTGGAGTGGACACCCTTGACAT	
Nitrite reductase	NR-F	ATTGGGTGATTTCGCTTGAGAG	182
	NR-R	CACCTCACTCGTCCCTTGTTCT	
Fucoxanthin chlorophyll <i>a/c</i> protein, lhcf type	FC-F	CGGCTGGGACACCTTTGACG	197
	FC-R	ATCTTGGAACGACGGCAGTATC	
Carbonic anhydrase	CA-F	TGGGAACTGAGGCTGGAACC	162
	CA-R	AAGCACGGACACCACCACATT	
NADH dehydrogenase subunit2	NADH-F	TATTGGTTGCGGTGTTAGGTC	155
	NADH-R	GAAATACTTAATACCCGCCTCA	
Peroxisomal membrane protein-related	PMP-F	ATCTTGGTGGTGTAAATCGTCC	205
	PMP-R	GTTCCCTTTGGTTTCCTCCTG	
Ribulose-1,5-bisphosphate carboxylase/oxygenase large subunit	Rbcl-F	TCAATACTTCGCTTTTATCGCAT	176
	Rbcl-R	CAGTAGCAGGACCTTGGAACG	

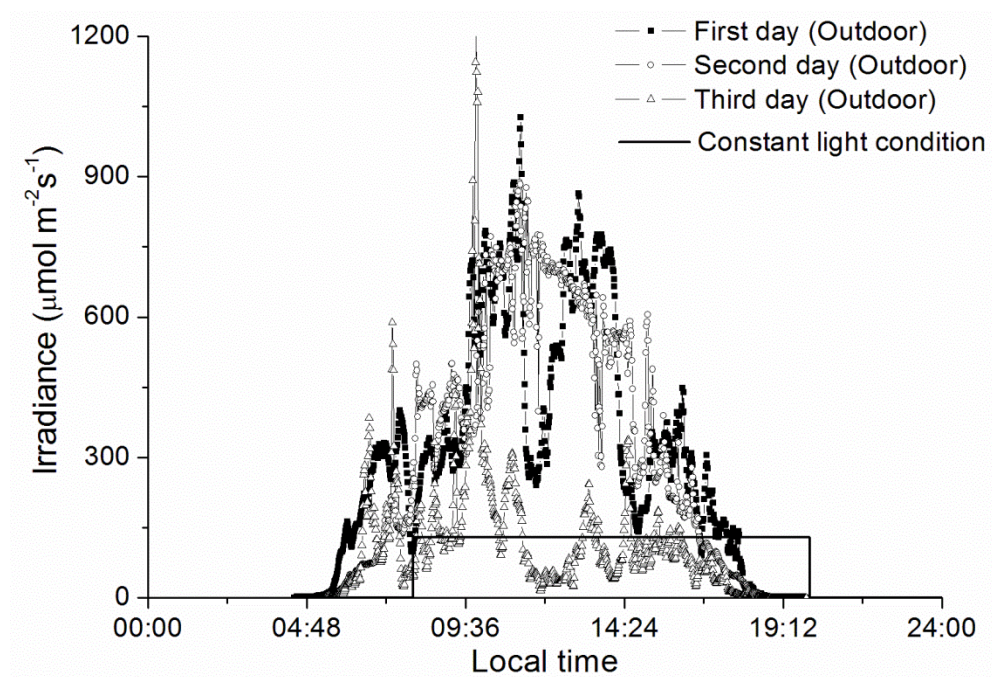


Fig. S1 Light conditions during the experiments.

Reference

- Dickson, A. G.: Standard potential of the reaction: $\text{AgCl (s)} + \frac{1}{2} \text{H}_2 \text{(g)} = \text{Ag (s)} + \text{HCl (aq)}$, and the standard acidity constant of the ion HSO_4^- in synthetic seawater from 273.15 to 318.15 K. *J. Chem. Thermodyn.*, 22, 113-127, 1990.
- Lewis, E., and Wallace, D. W. R.: Program Developed for CO_2 System Calculations, ORNL/CDIAC-105, Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, US Department of Energy, 1998.
- Roy, R. N., Roy, L. N., Vogel, K. M., Porter-Moore, C., Pearson, T., Good, C. E., Millero, F. J., and Campbell, D. M.: The dissociation constants of carbonic acid in seawater at salinities 5 to 45 and temperature 0 to 45 °C, *Mar. Chem.*, 44, 249-267, 1993.