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Supplement of

Foraminiferal holobiont thermal tolerance under future warming – roommate problems or successful collaboration?

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Statistical analyses

Baseline data

Supplementary Table S1: One-way ANOVA comparing log transformed calcification rates of the *A. lobifera* and *S. orbiculus* after the 10 days of the acclimation period (number of samples: *S. orbiculus*-15, *A. lobifera*-14). Red values indicate significant differences.

	SS	df	MS	F	p
Intercept	122.05	1	122.05	10357.11	0.000
Group	0.29	1	0.29	24.39	0.000
Error	0.32	27	0.01		

Supplementary Table S2: One-way ANOVA comparing log transformed net photosynthesis of *A. lobifera* and *S. orbiculus* after the 10 days of acclimation period (number of samples: *S. orbiculus*-15, *A. lobifera*-15). Red values indicate significant differences.

	SS	df	MS	F	p
Intercept	51.17	1	51.17	1403.63	0.000
Group	0.98	1	0.98	26.82	0.000
Error	1.02	28	0.04		

Sorites orbiculus

Supplementary Table S3.1: Two-way ANOVA comparing calcification rates of *S. orbiculus* under different temperature treatments and weeks (number of samples: 15). Red values indicate significant differences.

	SS	df	MS	F	p
Intercept	435511.7	1	435511.7	955.09	0.000
Temperature	8459.2	3	2819.7	6.18	0.002
Week	4651.9	2	2326.0	5.10	0.012
Temperature*Week	10814.5	6	1802.4	3.95	0.004
Error	15047.7	33	456.0		

Supplementary Table S3.2: Tukey HSD post-hoc test demonstrating the differences between calcification rates of *S. orbiculus* under different temperature treatments and between weeks (number of samples: 15). Red values indicate significant differences.

	Week	Temperature	Calcification rates	{1}	{2}	{3}	{4}	{5}	{6}	{7}	{8}	{9}	{10}	{11}	{12}
{1}	1	25	102.41		0.99 7	1.00 0	1.00 0	1.00 0	1.00 0	1.00 0	0.31 1	1.00 0	0.817	0.237	0.287
{2}	1	30	86.20	0.99 7		0.99 6	0.94 3	1.00 0	1.00 0	1.00 0	0.94 9	0.98 2	0.323	0.044	0.938
{3}	1	32	102.96	1.00 0	0.99 6		1.00 0	1.00 0	1.00 0	1.00 0	0.29 2	1.00 0	0.834	0.253	0.270
{4}	1	35	109.87	1.00 0	0.94 3	1.00 0		0.98 9	0.98 4	1.00 0	0.12 2	1.00 0	0.970	0.509	0.111
{5}	2	25	92.51	1.00 0	1.00 0	1.00 0	0.98 9		1.00 0	1.00 0	0.71 4	0.99 9	0.442	0.061	0.685
{6}	2	30	90.10	1.00 0	1.00 0	1.00 0	0.98 4	1.00 0		1.00 0	0.87 7	0.99 7	0.452	0.077	0.850
{7}	2	32	98.62	1.00 0	1.00 0	1.00 0	1.00 0	1.00 0	1.00 0		0.45 4	1.00 0	0.683	0.146	0.425
{8}	2	35	62.89	0.31 1	0.94 9	0.29 2	0.12 2	0.71 4	0.87 0	0.45 4		0.19 8	0.009	0.000	1.000
{9}	3	25	106.24	1.00 0	0.98 2	1.00 0	1.00 0	0.99 9	0.99 7	1.00 0	0.19 8		0.916	0.362	0.181
{10}	3	30	131.43	0.81 7	0.32 3	0.83 4	0.97 0	0.44 2	0.45 2	0.68 3	0.00 9	0.91 6		1.000	0.008
{11}	3	32	144.30	0.23 7	0.04 4	0.25 3	0.50 9	0.06 1	0.07 7	0.14 6	0.00 0	0.36 2	1.000		0.000
{12}	3	35	62.18	0.28 7	0.93 8	0.27 0	0.11 1	0.68 5	0.85 0	0.42 5	1.00 0	0.18 1	0.008	0.000	

Supplementary Table S4.1: One-way ANOVA comparing net photosynthesis of *S. orbiculus* between weeks (number of samples: weeks 1&2-15, week 3-14). Red values indicate significant differences.

	SS	df	MS	F	p
Intercept	7732.77	1	7732.77	23.79	0.000
Week	273.15	2	136.57	0.42	0.660
Error	13327.71	41	325.07		

Supplementary Table S4.2: Kruskal-Wallis test and multiple comparison p-values comparing net photosynthesis of *S. orbiculus* under different temperature treatments (number of samples: weeks 1&2-15, week 3-14). Red values indicate significant differences.

Kruskal-Wallis test: H (3, N= 44) =29.05 p=0.000				
	25	30	32	35
25		0.173	1.000	0.000
30	0.173		0.872	0.072
32	1.000	0.872		0.000
35	0.000	0.072	0.000	

Amphistegina lobifera

Supplementary Table S5.1: Two-way ANOVA comparing log transformed calcification rates of *A. lobifera* under different temperature treatments and between weeks (number of samples: 15). Red values indicate significant differences.

	SS	df	MS	F	p
Intercept	53.87	1	53.90	666.57	0.000
Temperature	3.07	3	1.02	12.65	0.000
Week	0.07	1	0.07	0.89	0.357
Temperature*Week	0.23	3	0.08	0.97	0.425
Error	1.78	22	0.08		

Supplementary Table S5.2: Tukey HSD post-hoc test demonstrating the differences between log transformed calcification rates of *A. lobifera* under different temperature treatments and between weeks (number of samples: 15). Red values indicate significant differences.

	Temperature	Week	Log (calcification rates)	{1}	{2}	{3}	{4}	{5}	{6}	{7}	{8}
{1}	25	1	1.64		0.750	1.000	1.000	1.000	0.959	0.017	0.026
{3}	30	1	1.59	1.000	0.818		1.000	1.000	0.984	0.015	0.025
{5}	32	1	1.57	1.000	0.844	1.000	0.999		0.989	0.017	0.028
{7}	35	1	0.80	0.017	0.423	0.015	0.005	0.017	0.099		1.000
{2}	25	2	1.27	0.750		0.818	0.556	0.844	0.998	0.423	0.544
{4}	30	2	1.68	1.000	0.556	1.000		0.999	0.859	0.005	0.008
{6}	32	2	1.41	0.959	0.998	0.984	0.859	0.989		0.099	0.151
{8}	35	2	0.85	0.026	0.544	0.025	0.008	0.028	0.151	1.000	

Supplementary Table S6.1: Two-way ANOVA comparing net photosynthesis of *A. lobifera* under different temperature treatments and between weeks (number of samples: 15) Red values indicate significant differences.

	SS	df	MS	F	p
Intercept	4870.09	1	4870.09	21.92	0.000
Temperature	12698.82	3	4232.94	19.05	0.000
Week	420.01	1	420.01	1.89	0.183
Temperature*Week	574.36	3	191.45	0.86	0.476
Error	4888.04	22	222.18		

Supplementary Table S6.2: Tukey HSD post-hoc test demonstrating the differences between net photosynthesis of *A. lobifera* under different temperature treatments and between weeks (number of samples: 15). Red values indicate significant differences.

	Temperature	Week	Net photosynthesis	{1}	{2}	{3}	{4}	{5}	{6}	{7}	{8}
{1}	25	1	33.78		0.972	0.976	0.439	0.993	1.000	0.006	0.001
{3}	30	1	22.92	0.976	1.000		0.908	1.000	0.985	0.028	0.002
{5}	32	1	24.92	0.993	1.000	1.000	0.830		0.997	0.018	0.001
{7}	35	1	-15.17	0.006	0.061	0.028	0.306	0.018	0.004		0.934
{2}	25	2	21.78	0.972		1.000	0.959	1.000	0.982	0.061	0.006
{4}	30	2	9.75	0.439	0.959	0.908		0.830	0.429	0.306	0.034
{6}	32	2	32.17	1.000	0.982	0.985	0.429	0.997		0.004	0.000
{8}	35	2	-27.42	0.001	0.006	0.002	0.034	0.001	0.000	0.934	

Supplementary Table S7.1: one-way ANOVA comparing the log transformed bleached specimens of *A. lobifera* during the third week under different temperature treatments (number of samples: 15). Red values indicate significant differences.

	SS	df	MS	F	p
Intercept	5.94	1	5.94	144.76	0.000
Temperature	0.75	3	0.25	6.09	0.011
Error	0.45	11	0.04		

Supplementary Table S7.2: Tukey HSD post-hoc test demonstrating the differences between temperatures in log transformed bleached *A. lobifera* specimens during the third week (number of samples: 15). Red values indicate significant differences.

	Temperature	log (bleached specimens+1)	{1}	{2}	{3}	{4}
{1}	25	0.85		1.000	0.156	0.035
{2}	30	0.86	1.000		0.101	0.019
{3}	32	0.49	0.156	0.101		0.752
{4}	35	0.35	0.035	0.019	0.752	

Raw data

Supplementary Table S8: Calcification rates ($\mu\text{mol CaCO}_3 \text{ week}^{-1} \text{ individual}^{-1}$) and net photosynthesis ($\mu\text{g L}^{-1} \text{ O}_2 \text{ individual}^{-1}$) baseline measurements taken after the 10 days acclimation period of both species. Values marked with an asterisk are the anomalous low values of samples that were excluded from the rest of the experiment.

Sample number	<i>Sorites orbiculus</i>		<i>Amphistegina lobifera</i>	
	Calcification rates	Net photosynthesis	Calcification rates	Net photosynthesis
1	91 ± 7	13	212 ± 5	43
2	66 ± 10	12	182 ± 9	-1*
3	97 ± 3	15	110 ± 8	19
4	95 ± 0	14	131 ± 14	35
5	106 ± 7	21	NA	40
6	107 ± 5	27	119 ± 15	25
7	101 ± 0	22	128 ± 3	43
8	106 ± 3	28	134 ± 0	35
9	85 ± 12	9	184 ± 11	53
10	60 ± 4	4*	219 ± 0	21
11	83 ± 3	12	84 ± 5	25
12	83 ± 6	15	119 ± 3	10
13	67 ± 3	11	117 ± 14	42
14	138 ± 1	6	229 ± 9	35
15	71 ± 6	9	151 ± 15	30
16	76 ± 10	9	134 ± 22	38

Supplementary Table S9: Calcification rates ($\mu\text{mol CaCO}_3 \text{ week}^{-1} \text{ individual}^{-1}$) and net photosynthesis ($\mu\text{g L}^{-1} \text{ O}_2 \text{ individual}^{-1}$) of *S. orbiculus* under different temperature treatments and weeks. Value marked with an asterisk is the abnormal high value with respect to previous weeks as well as to other replicates. This value was not included in the average and error calculations nor in the statistical analysis.

Temperature (°C)	Week 1		Week 2		Week 3	
	Calcification rates	Net photosynthesis	Calcification rates	Net photosynthesis	Calcification rates	Net photosynthesis
25	81 ± 15	18	65 ± 6	27	74 ± 6	39
25	97 ± 12	22	103 ± 6	25	119 ± 10	26
25	107 ± 7	33	92 ± 2	20	101 ± 1	20
25	125 ± 2	33	110 ± 2	25	131 ± 14	13
30	83 ± 7	10	109 ± 3	38	156 ± 0	18
30	99 ± 9	13	82 ± 9	3	113 ± 2	4
30	77 ± 9	15	79 ± 9	7	126 ± 8	12
32	106 ± 7	14	88 ± 10	13	93 ± 11	44
32	97 ± 10	23	83 ± 3	9	183 ± 0	55
32	117 ± 16	16	130 ± 4	14	138 ± 7	26
32	92 ± 3	18	94 ± 4	13	163 ± 7	34
35	101 ± 12	-3	56 ± 2	-17	40 ± 2	-25
35	120 ± 2	-5	54 ± 6	-18	42 ± 13	-28
35	116 ± 7	2	69 ± 1	-3	66 ± 8	-7
35	102 ± 3	-10	72 ± 7	1	101 ± 4	50*

Supplementary Table S10: Calcification rate ($\mu\text{mol CaCO}_3 \text{ week}^{-1} \text{ individual}^{-1}$) and net photosynthesis ($\mu\text{g L}^{-1} \text{ O}_2 \text{ individual}^{-1}$) of *A. lobifera* under different temperature treatments and weeks.

Temperature (°C)	Week 1		Week 2	
	Calcification rates	Net photosynthesis	Calcification rates	Net photosynthesis
25	41 ± 11	25	18 ± 0	-1
25	98 ± 17	49	68 ± 15	44
25	20 ± 6	27	5 ± 8	22
30	36 ± 6	28	28 ± 14	3
30	39 ± 0	18	66 ± 17	-7
30	67 ± 2	46	70 ± 8	40
30	24 ± 18	0	41 ± 0	2
32	59 ± 8	26	22 ± 0	45
32	18 ± 10	26	15 ± 3	22
32	30 ± 7	25	37 ± 9	27
32	60 ± 3	23	36 ± 9	35
35	10 ± 14	-11	6 ± 18	-32
35	2 ± 6	-27	10 ± 8	-16
35	8 ± 4	-14	11 ± 12	-45
35	9 ± 14	-8	4 ± 28	-18

Supplementary Table S11: Number of bleached specimens of *A. lobifera* between the second and third weeks of the experiment.

	25°C	30°C	32°C	35°C
Replicate 1	6	8	5	1
Replicate 2	-	9	4	1
Replicate 3	6	4	0	2
Replicate 4	6	5	2	1