

Table S1 – Results of isotope analysis from shells of *M. galloprovincialis* B1 and C. d = double measurement; σ = standard deviation. Distance from commissure indicates position of sampling point. Aragonitic (nacreous) layer isotope data were normalized against calcite isotope values using the equation of Rubinson and Clayton (1969) for $\delta^{13}\text{C}$ and that of Tarutani et al. (1969) for $\delta^{18}\text{O}$.

Bivalve	Sample type	Corrected values				Distance from commissure (in cm)
		$\delta^{13}\text{C}_{\text{PDB}}$ (‰)	$\pm \sigma$	$\delta^{18}\text{O}_{\text{PDB-carbonate}}$ (‰)	$\pm \sigma$	
<i>M. galloprovincialis</i> B1 - 4.5cm	bulk measurement	2.2	0.02	1.0	0.02	0.50
	bulk measurement	0.7	0.02	-0.2	0.03	1.70
	bulk measurement	0.3	0.02	-0.1	0.02	2.40
	bulk measurement	2.1	0.02	0.7	0.02	0.50
	bulk measurement	-0.6	0.02	-0.6	0.01	1.10
	bulk measurement	-1.0	0.01	0.0	0.03	1.70
	bulk measurement	-0.8	0.02	0.8	0.01	2.40
	bulk measurement	-0.8	0.02	1.1	0.02	3.00
	bulk measurement	-0.2	0.01	1.3	0.02	3.60
	bulk measurement (d)	-0.1	0.02	1.4	0.02	3.60
<i>M. galloprovincialis</i> B1 - 5.1cm	bulk measurement	1.3	0.01	0.0	0.01	0.20
	bulk measurement	1.3	0.01	0.0	0.02	1.70
	bulk measurement	1.2	0.02	-0.2	0.03	2.40
	bulk measurement	-0.2	0.01	-0.5	0.02	1.10
	bulk measurement	-0.1	0.02	0.7	0.01	1.70
	bulk measurement	-0.1	0.02	0.8	0.02	2.40
	bulk measurement	0.2	0.02	1.2	0.03	3.20
	bulk measurement	0.4	0.02	0.0	0.02	3.90
<i>M. galloprovincialis</i> C - 5.4cm	bulk measurement	0.0	0.02	0.6	0.03	0.30
	bulk measurement	-1.5	0.03	-1.0	0.02	1.00
	bulk measurement	-0.8	0.02	-0.6	0.03	1.70
	bulk measurement	-0.6	0.03	0.1	0.02	2.40
	bulk measurement (d)	-0.5	0.01	-0.2	0.02	2.40
	bulk measurement	-0.2	0.02	0.0	0.03	3.70
	bulk measurement	-0.2	0.02	0.5	0.02	0.30
	bulk measurement	-1.2	0.02	-0.9	0.02	1.00
	bulk measurement (d)	-1.3	0.03	-1.0	0.02	1.00
	bulk measurement	-1.2	0.02	-0.3	0.02	1.70
	bulk measurement	-0.6	0.01	0.5	0.02	2.40
	bulk measurement	-0.7	0.02	0.6	0.03	3.10
bulk measurement	-0.6	0.02	0.9	0.02	3.70	
<i>M. galloprovincialis</i> C - 4.1cm	bulk measurement	0.4	0.02	0.3	0.02	0.20
	bulk measurement	0.2	0.02	0.5	0.02	1.60

	bulk measurement	0.4	0.02	-0.1	0.03	2.20
	bulk measurement	0.3	0.02	0.5	0.02	0.20
	bulk measurement	-0.7	0.03	-0.7	0.04	0.80
	bulk measurement (d)	-0.8	0.02	-0.7	0.02	0.80
	bulk measurement	-0.4	0.03	0.6	0.02	1.60
	bulk measurement	-0.4	0.02	-0.4	0.02	2.20
	bulk measurement	-0.2	0.01	-0.7	0.03	3.00
	bulk measurement (d)	-0.1	0.02	-0.6	0.03	3.00
	bulk measurement	0.1	0.02	0.0	0.03	3.60
	with periostracum	2.38	0.02	0.76	0.01	0.20
	with periostracum	-0.17	0.02	0.57	0.02	1.00
<i>M. galloprovincialis</i> B1 - 3.9cm	with periostracum (d)	-0.18	0.01	0.44	0.04	1.00
	with periostracum	-1.63	0.02	-0.50	0.03	1.90
	with periostracum	-0.96	0.02	-0.39	0.02	2.70
	(+/-) without periostracum	2.04	0.02	0.55	0.02	0.20
	(+/-) without periostracum	-0.35	0.01	0.55	0.02	1.00
<i>M. galloprovincialis</i> B1 - 3.9cm	(+/-) without periostracum	-1.29	0.02	-0.26	0.02	1.90
	(+/-) without periostracum	-0.29	0.02	0.03	0.03	2.70
	(+/-) without periostracum (d)	-0.30	0.01	0.04	0.02	2.70
	periostracum + calcite	-0.77	0.02	0.02	0.03	1.30
	calcite	-1.07	0.02	0.08	0.03	1.30
	calcite + nacre	-1.11	0.01	-0.04	0.03	1.30
	nacre	-2.58	0.03	-1.21	0.02	1.30
	periostracum + calcite	-1.01	0.02	0.69	0.02	1.80
	calcite	-1.21	0.02	0.63	0.03	1.80
<i>M. galloprovincialis</i> B1 - 5.0cm	calcite + nacre	-1.10	0.02	0.56	0.03	1.80
	nacre	-1.81	0.02	-1.23	0.02	1.80
	periostracum + calcite	-1.12	0.02	1.22	0.02	2.50
	calcite	-1.22	0.02	1.18	0.03	2.50
	calcite (d)	-1.23	0.02	1.06	0.02	2.50
	calcite + nacre	-0.62	0.02	0.79	0.02	2.50
	nacre	-1.99	0.02	-1.36	0.02	2.50
	periostracum + calcite	-0.50	0.02	-0.37	0.02	0.70
<i>M. galloprovincialis</i> B1 - 4.7cm	calcite	-0.31	0.01	-0.19	0.02	0.70
	calcite + nacre	-0.94	0.01	-0.54	0.02	0.70
	nacre	-1.82	0.02	-0.97	0.03	0.70
	periostracum + calcite	-0.67	0.01	0.24	0.03	1.20
	calcite	-0.75	0.02	0.28	0.03	1.20
	calcite + nacre	-0.51	0.02	0.07	0.03	1.20
	nacre	-1.12	0.02	-1.02	0.02	1.20
	nacre (d)	-1.34	0.02	-0.88	0.02	1.20
	periostracum + calcite	-0.76	0.02	0.64	0.04	1.80
	calcite	-0.57	0.02	0.65	0.02	1.80
	calcite + nacre	-0.33	0.01	0.61	0.02	1.80

	nacre	-1.48	0.02	-0.88	0.03	1.80
	periostracum + calcite	-0.18	0.02	-0.71	0.02	0.90
	calcite	-0.40	0.02	-0.70	0.02	0.90
	calcite + nacre	-0.63	0.01	-0.85	0.03	0.90
	nacre	-1.96	0.01	-1.34	0.02	0.90
	periostracum + calcite	-0.91	0.02	0.29	0.02	1.50
	calcite	-0.87	0.03	0.00	0.03	1.50
<i>M. galloprovincialis</i> C - 4.0cm(2)	calcite (d)	-0.91	0.02	-0.01	0.02	1.50
	calcite + nacre	-0.44	0.02	-0.19	0.03	1.50
	nacre	-1.76	0.02	-1.35	0.02	1.50
	periostracum + calcite	-0.63	0.01	0.78	0.02	2.20
	calcite	-0.57	0.01	0.77	0.03	2.20
	calcite + nacre	-0.19	0.02	0.48	0.02	2.20
	nacre	-1.61	0.02	-1.25	0.02	2.20
	periostracum + calcite	-0.65	0.02	-0.60	0.04	0.80
	calcite	-0.77	0.03	-0.71	0.01	0.80
	calcite + nacre	-1.01	0.02	-0.78	0.02	0.80
	nacre	-2.33	0.02	-1.08	0.03	0.80
	nacre (d)	-2.41	0.02	-1.06	0.02	0.80
	periostracum + calcite	-1.20	0.01	0.22	0.04	1.30
<i>M. galloprovincialis</i> C - 4.7cm	calcite	-1.18	0.01	0.12	0.02	1.30
	calcite + nacre	-0.93	0.02	-0.15	0.03	1.30
	nacre	-1.87	0.02	-1.43	0.03	1.30
	periostracum + calcite	-1.29	0.02	0.65	0.02	1.90
	calcite	-1.14	0.02	0.82	0.03	1.90
	calcite + nacre	-0.19	0.02	0.24	0.01	1.90
	nacre	-1.91	0.02	-1.51	0.03	1.90
<i>M. galloprovincialis</i> B1 - 5.0cm	detailed measurement - A	2.3	0.02	0.2	0.04	0.25
	detailed measurement - B	2.4	0.02	0.2	0.03	0.31
	detailed measurement - C	2.2	0.01	0.2	0.03	0.36
	detailed measurement - D	0.0	0.02	-0.5	0.02	0.52
	detailed measurement - E	-2.4	0.01	-1.2	0.03	0.60
	detailed measurement - F	-2.1	0.01	-1.3	0.02	0.65
	detailed measurement - G	-1.7	0.02	-1.1	0.02	0.75
	detailed measurement - H	-1.3	0.02	-0.9	0.02	0.80
	detailed measurement - I	-1.0	0.01	-0.5	0.02	0.88
	detailed measurement - J	-1.1	0.03	-0.5	0.02	0.95
	detailed measurement - K	-1.1	0.01	-1.0	0.04	1.00
	detailed measurement - L	-1.2	0.01	-1.1	0.03	1.10
	detailed measurement - M	-1.2	0.01	-0.5	0.03	1.20
	detailed measurement - N	-1.3	0.02	-0.4	0.02	1.25
	detailed measurement - O	-1.2	0.02	-0.2	0.03	1.35
	detailed measurement - P	-1.1	0.02	-0.3	0.04	1.40
	detailed measurement - Q	-1.0	0.02	-0.2	0.02	1.50
	detailed measurement - R	-0.8	0.02	-0.2	0.03	1.55

	detailed measurement - S	-0.8	0.03	-0.6	0.03	1.60
	detailed measurement - T	-0.6	0.03	0.1	0.02	1.70
	detailed measurement - A	2.0	0.02	0.5	0.03	0.40
	detailed measurement - B	1.9	0.02	0.4	0.02	0.45
	detailed measurement - C	1.9	0.01	0.3	0.04	0.50
	detailed measurement - D	2.0	0.02	0.2	0.04	0.55
	detailed measurement - E	2.0	0.01	-0.1	0.02	0.60
	detailed measurement - F	1.2	0.02	-0.3	0.03	0.65
	detailed measurement - G	0.3	0.02	-0.8	0.04	0.70
	detailed measurement - H	-1.0	0.02	-1.2	0.02	0.75
	detailed measurement - I	-1.2	0.01	-1.1	0.02	0.80
	detailed measurement - J	-1.2	0.02	-1.2	0.01	0.85
<i>M. galloprovincialis</i> B1 - 4.5cm	detailed measurement - K	-1.3	0.02	-1.4	0.03	0.90
	detailed measurement - L	-0.7	0.01	-1.0	0.01	0.95
	detailed measurement - M	-0.7	0.01	-0.9	0.03	1.00
	detailed measurement - N	-0.6	0.02	-0.9	0.03	1.05
	detailed measurement - O	-0.6	0.02	-0.7	0.03	1.10
	detailed measurement - P	-0.7	0.02	-0.6	0.03	1.15
	detailed measurement - Q	-0.7	0.02	-0.8	0.03	1.20
	detailed measurement - R	-0.7	0.02	-0.8	0.04	1.25
	detailed measurement - S	-0.7	0.02	-0.7	0.04	1.30
	detailed measurement - T	-0.7	0.02	-0.7	0.02	1.35
	detailed measurement - A	-0.1	0.03	0.2	0.03	0.15
	detailed measurement - B	-0.2	0.02	0.4	0.02	0.20
	detailed measurement - C	-0.2	0.02	0.4	0.03	0.25
	detailed measurement - D	-0.2	0.01	0.4	0.02	0.30
	detailed measurement - E	-0.2	0.02	0.2	0.04	0.35
	detailed measurement - F	-0.3	0.02	0.1	0.05	0.40
	detailed measurement - G	-0.4	0.02	0.1	0.02	0.45
	detailed measurement - H	-0.6	0.01	0.1	0.04	0.50
	detailed measurement - I	-0.7	0.01	0.1	0.03	0.55
	detailed measurement - J	-1.2	0.01	-0.2	0.02	0.60
	detailed measurement - K	-2.0	0.02	-0.8	0.02	0.65
	detailed measurement - L	-2.2	0.03	-1.3	0.03	0.70
<i>M. galloprovincialis</i> C - 4.5cm	detailed measurement - M	-2.1	0.01	-1.4	0.02	0.75
	detailed measurement - N	-2.0	0.02	-1.4	0.04	0.80
	detailed measurement - O	-1.5	0.03	-0.9	0.02	0.85
	detailed measurement - P	-1.4	0.01	-0.9	0.03	0.90
	detailed measurement - Q	-1.1	0.02	-0.7	0.03	0.95
	detailed measurement - R	-0.9	0.02	-0.7	0.03	1.00
	detailed measurement - S	-0.9	0.02	-0.7	0.03	1.05
	detailed measurement - T	-1.0	0.02	-0.8	0.02	1.10
	detailed measurement - U	-1.1	0.02	-0.8	0.03	1.15
	detailed measurement - V	-1.3	0.02	-0.8	0.04	1.20
	detailed measurement - W	-1.3	0.02	-0.7	0.03	1.25
	detailed measurement - X	-1.2	0.02	-0.7	0.02	1.30
	detailed measurement - Y	-1.3	0.02	-1.0	0.02	1.35
	detailed measurement - Z	-1.3	0.03	-0.9	0.04	1.40

Table S2 - Results of microprobe analysis maps (total area) in weight percent (wt %). See Fig(s). 8 and 9 for location of element maps.

Map 1	Minimum (wt%)	Maximum (wt%)	Mean (wt%)	(Std. Dev.)	Maximum in ppm
Ba	0.1	0.264	0.030	0.045	2640
Ca	30.867	39.102	37.345	0.700	391020
Cl	0	0.167	0.035	0.035	1670
Fe	0.1	0.237	0.026	0.038	2370
Mg	0.1	0.123	0.029	0.027	1230
Mn	0	0.241	0.025	0.037	2410
Na	0	0.445	0.227	0.066	4450
P	0	0.428	0.026	0.031	4280
Si	0	0.170	0.041	0.035	1700
Sr	0	0.280	0.101	0.062	2800

Map 2	Minimum (wt%)	Maximum (wt%)	Mean (wt%)	(Std. Dev.)	Maximum in ppm
Ba	0.1	0.288	0.031	0.046	2880
Ca	1.294	38.972	36.810	1.078	389720
Cl	0	0.255	0.041	0.039	2550
Fe	0.1	0.263	0.029	0.041	2630
Mg	0.1	1.411	0.168	0.105	14110
Mn	0	0.769	0.026	0.038	7690
Na	0	0.428	0.161	0.062	4280
P	0	0.468	0.029	0.032	4680
Si	0	0.717	0.086	0.061	7170
Sr	0	0.391	0.107	0.067	3910

Map 3	Minimum (wt%)	Maximum (wt%)	Mean (wt%)	(Std. Dev.)	Maximum in ppm
Ba	0.1	0.442	0.031	0.046	4420
Ca	17.434	40.687	36.876	0.785	406870
Cl	0	0.393	0.040	0.036	3930
Fe	0.1	0.689	0.030	0.042	6890
Mg	0.1	0.388	0.110	0.050	3880
Mn	0	0.706	0.025	0.037	7060
Na	0	0.462	0.175	0.062	4620
P	0	0.528	0.024	0.028	5280
Si	0	0.272	0.046	0.033	2720
Sr	0	0.587	0.090	0.061	5870

Map 4	Minimum (wt%)	Maximum (wt%)	Mean (wt%)	(Std. Dev.)	Maximum in ppm
Ba	0.1	0.268	0.035	0.048	2680
Ca	29.587	38.297	34.999	1.639	382970
Cl	0	0.199	0.032	0.032	1990
Fe	0.1	0.199	0.031	0.041	1990
Mg	0.1	0.226	0.063	0.041	2260
Mn	0	0.278	0.025	0.035	2780
Na	0	0.497	0.209	0.065	4970
P	0	0.151	0.023	0.027	1510
Si	0	0.117	0.032	0.023	1170
Sr	0	0.280	0.079	0.056	2800

Map 5	Minimum (wt%)	Maximum (wt%)	Mean (wt%)	(Std. Dev.)	Maximum in ppm
Ba	0.1	0.251	0.031	0.046	2510
Ca	1.169	39.037	36.558	1.564	390370
Cl	0	0.243	0.034	0.033	2430
Fe	0.1	0.677	0.028	0.041	6770
Mg	0.1	0.981	0.194	0.132	9810
Mn	0	0.706	0.024	0.037	7060
Na	0	0.468	0.144	0.064	4680
P	0	0.171	0.026	0.029	1710
Si	0	0.190	0.030	0.024	1900
Sr	0	0.325	0.090	0.059	3250

Map 6	Minimum wt%	Maximum wt%	Mean wt%	(Std. Dev.)	Maximum in ppm
Ba	0.1	0.766	0.032	0.049	7660
Ca	0.000	37.853	34.142	7.519	378530
Cl	0	1.371	0.102	0.176	13710
Fe	0.1	0.649	0.030	0.042	6490
Mg	0.1	0.276	0.006	0.023	2760
Mn	0	0.182	0.024	0.034	1820
Na	0	0.932	0.531	0.159	9320
P	0	0.160	0.018	0.024	1600
Si	0	0.325	0.050	0.028	3250
Sr	0	0.344	0.091	0.064	3440

Map 7	Minimum wt%	Maximum wt%	Mean wt%	(Std. Dev.)	Maximum in ppm
Ba	0.1	0.355	0.032	0.047	3550
Ca	0.375	38.579	35.813	2.360	385790
Cl	0	0.856	0.082	0.067	8560
Fe	0.1	0.312	0.030	0.041	3120
Mg	0.1	0.241	0.002	0.009	2410
Mn	0	0.248	0.025	0.035	2480
Na	0	1.060	0.577	0.110	10600
P	0	0.386	0.023	0.027	3860
Si	0	0.832	0.060	0.029	8320
Sr	0	0.373	0.103	0.062	3730