

**Supplementary material to ‘Trace-element and stable-isotope composition of the *Cyprideis torosa* (Crustacea, Ostracoda) shell’ *Journal of Micropalaeontology*
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Site information, analytical methods and data for previously-unpublished studies reported in the paper

1. Kyleakin, Isle of Skye, Scotland

Living *Cyprideis torosa* specimens were collected from An-t-Ob, a small tidal inlet behind the village of Kyleakin, Isle of Skye by D. J. Horne (Queen Mary, University of London) on 7 and 9 June 2004 (see main paper for location map). At the time of sampling, water temperature was 14 – 18 °C and optical salinity 27 - 32 S. Specimens of *Cyprideis torosa* were picked from the sediment residues, preserved in ethanol and dissected. Forty single valves were used for analysis, brush cleaned under a low power binocular microscope using a fine brush and deionised water. Clean valve material was placed into acid-washed 5 mL polypropylene tubes and dissolved in 1 mL 0.6M Merck Aristar™ HCl. The Ca, Mg, and Sr content of the ostracod valves were determined using a JY Ultima 2C ICP-AES calibrated using multi-element standards prepared with Spectrosol™ standard solutions for ICP. The results were corrected for blank contamination in the solvent acid and for instrumental drift using an external drift monitor. Results are given in Supplementary Table 1. Based on multiple analyses of a calcite standard (PE3), precision was $\pm 0.63\%$ RSD (relative standard deviation) for Mg/Ca and $\pm 0.51\%$ RSD for Sr.

2. The Fleet Lagoon, Dorset, UK

Living *Cyprideis torosa* specimens were collected from the low-salinity (TDS ~6 gL⁻¹, temperature = 10.5 °C at the time of sample collection in October 1994) end of The Fleet lagoon in Dorset, southern England (see main paper for a location map). Twenty one individual valves were used for analysis, brush cleaned under a low power binocular microscope using a fine brush and deionised water. Clean valve material was placed into acid-washed 25ml sterilin tubes and dissolved in 2 mL 0.6M Merck Aristar™ HCl. The Ca, Mg, and Sr content of the ostracod valves were determined using a JY-70 Plus inductively coupled plasma-atomic emission spectrometer (ICP-AES) calibrated using multi-element standards prepared with Spectrosol™ standard solutions for ICP. The results were corrected for blank contamination in the solvent acid and for instrumental drift using an external drift monitor. Results are given in Supplementary Table 2. Based on multiple analyses of the 'in-house' aragonite standard, precision was ±2.1% RSD (relative standard deviation) for Mg/Ca and ±1.4% RSD for Sr/Ca.

3. Allhallows Proto-Thames-Medway site, Eastern England

Samples were collected from a section exposed at Allhallows, Kent, Eastern England (see main paper for a location map and Bates et al. (2002) for details of the stratigraphical levels sampled). Level OC8 from Allhallows contains a mixture of smooth and noded ecophenotypes of *Cyprideis torosa*, whereas OC30 contains only noded forms. In this study, noded and smooth forms of *C. torosa* were selected from levels OC8 and OC30 (28 smooth specimens and 29 noded specimens, respectively, from OC8 and 30 noded specimens from OC30) and their trace-element content analysed. Single shells were selected and then brush cleaned with deionised water under a low-power binocular microscope. Clean valves were placed into acid-washed 5ml polypropylene tubes and dissolved in 2 mL 0.6M Merck Aristar™ HCl. The Ca, Mg, and Sr contents of the ostracod

valves were determined using a JY-70 Plus inductively coupled plasma-atomic emission spectrometer (ICP-AES) calibrated using multi-element standards prepared with Spectrosol™ standard solutions for ICP. The results were corrected for blank contamination in the solvent acid and for instrumental drift using an external drift monitor. Results are given in Supplementary Table 3. Based on multiple analyses of an 'in-house' calcite standard, precision was $\pm 1.8\%$ RSD (relative standard deviation) for Mg/Ca and $\pm 0.3\%$ RSD for Sr.

4. An Loch Mór, Iniss Oírr, Ireland

One recent sample of *Cyprideis torosa* was collected from the northern end of An Loch Mór, Inis Oírr, Ireland, in 0.8 m of water, with TDS of 5 gL^{-1} . (see main paper for a location map). Four additional samples were selected from different levels of Holocene sediments from a core recovered from the lake. Further details of the sediment record from An Loch Mór are in Holmes et al. (2007). Individual samples composed of up to 27 valves of *Cyprideis torosa* were analysed. Further analytical details are in Holmes et al. (2007). Data are presented in Holmes et al. (2007) and in Supplementary Table 4.

Supplementary references

Bates, M.R., Keen, D.H., Whittaker, J.E., Merry, J.S. & Wenban-Smith, F.F. 2002. Middle Pleistocene molluscan and ostracod faunas from Allhallows, Kent, UK. *Proceedings of the Geologists Association*, **113**: 223-236.

Holmes, J.A., Jones, R.L., Haas, J.N., McDermott, F., Molloy, K., & O'Connell, M. 2007. Multi-proxy evidence for Holocene lake-level and salinity changes at An Loch Mór, a coastal lake on the Aran Islands, western Ireland. *Quaternary Science Reviews*, **26**: 2438-2462.

Supplementary Table 1. Trace-element ratios of single adult shells of *Cyprideis torosa* from Kyleakin.

	Sr/Ca (molar)	Mg/Ca (molar)
	0.00412	0.01768
	0.00420	0.01705
	0.00387	0.02013
	0.00445	0.01355
	0.00383	0.01587
	0.00395	0.01912
	0.00420	0.01622
	0.00455	0.01316
	0.00414	0.01820
	0.00384	0.01477
	0.00393	0.02147
	0.00400	0.00896
	0.00398	0.01721
	0.00368	0.01648
	0.00377	0.00819
	0.00373	0.01376
	0.00375	0.00790
	0.00368	0.01132
	0.00399	0.00863
	0.00397	0.01741
	0.00388	0.01212
	0.00355	0.01715
	0.00340	0.01382
	0.00330	0.01763
	0.00302	0.01660
	0.00322	0.01677
	0.00363	0.01698
	0.00395	0.01175
	0.00320	0.01661
	0.00348	0.01458
	0.00331	0.01169
	0.00360	0.01210
	0.00335	0.01449
	0.00363	0.01216
	0.00370	0.01604
	0.00363	0.01528
	0.00356	0.01320
	0.00333	0.01284
	0.00353	0.01264
	0.00333	0.01400
Mean	0.00373	0.01464
1s	0.00034	0.00320
RSD%	9	22

Supplementary Table 2. Trace-element ratios of single adult shells of *Cyprideis torosa* from The Fleet.

Specimen	Sr/Ca \square	Mg/Ca
BPC1	0.003612	0.009176
BPC2	0.003596	0.003510
BPC3	0.002493	0.005626
BPC4	0.003512	0.007679
BPC5	0.002604	0.006703
BPC6	0.003497	0.007073
BPC10	0.002673	0.008246
BPC11	0.002468	0.006985
BPC12	0.003264	0.004884
BPC13	0.003106	0.004260
BPC14	0.002758	0.007400
BPC15	0.002773	0.008150
BPH2	0.003390	0.005774
BPH3	0.003261	0.003682
BPH4	0.004080	0.007392
BPH5	0.003256	0.007923
BPH6	0.003025	0.006649
BPH7	0.003024	0.007103
BPH8	0.002869	0.006161
BK2	0.003233	0.007129
BK3	0.003308	0.007566
Mean	0.003133	0.006622
1s	0.000417	0.001518
RSD \square %	13	23

Supplementary Table 3. Trace-element ratios of single adult shells of *Cyprideis torosa* from Allhallows.

	Sr/Ca (molar)	Sr/Ca (molar)	Sr/Ca (molar)	Mg/Ca (molar)	Mg/Ca (molar)	Mg/Ca (molar)
	OC8 smooth	OC8 noded	OC30 noded	OC8 smooth	OC8 noded	OC30 noded
	0.00225	0.00165	0.00210	0.00825	0.00713	0.00866
	0.00224	0.00183	0.00230	0.00754	0.00788	0.00917
	0.00110	0.00178	0.00236	0.00675	0.00626	0.00787
	0.00201	0.00172	0.00139	0.00841	0.00953	0.00752
	0.00090	0.00234	0.00209	0.00837	0.00806	0.00635
	0.00195	0.00126	0.00200	0.00824	0.00780	0.00707
	0.00184	0.00214	0.00178	0.00683	0.00760	0.00800
	0.00155	0.00198	0.00182	0.01249	0.00653	0.01238
	0.00205	0.00192	0.00159	0.00771	0.01047	0.00593
	0.00204	0.00203	0.00231	0.00849	0.00817	0.00879
	0.00182	0.00222	0.00244	0.00942	0.00590	0.00867
	0.00170	0.00183	0.00203	0.00985	0.00677	0.00776
	0.00123	0.00130	0.00134	0.00829	0.00642	0.00670
	0.00148	0.00171	0.00239	0.00688	0.00756	0.00791
	0.00198	0.00144	0.00231	0.00826	0.00757	0.00885
	0.00238	0.00214	0.00209	0.00739	0.00577	0.00716
	0.00189	0.00216	0.00189	0.00717	0.00824	0.00833
	0.00180	0.00184	0.00188	0.00643	0.00671	0.00807
	0.00214	0.00161	0.00216	0.01014	0.00610	0.01112
	0.00204	0.00156	0.00171	0.00680	0.00529	0.00594
	0.00155	0.00121	0.00206	0.00664	0.00745	0.00706
	0.00171	0.00211	0.00190	0.00793	0.00998	0.00909
	0.00226	0.00119	0.00238	0.00875	0.00777	0.00661
	0.00201	0.00110	0.00226	0.00858	0.00705	0.00757
	0.00224	0.00216	0.00236	0.00752	0.00815	0.00850
	0.00189	0.00144	0.00138	0.00669	0.00608	0.00859
	0.00164	0.00132	0.00139	0.00678	0.00665	0.00928
	0.00206	0.00156	0.00202	0.00686	0.00746	0.00704
		0.00218	0.00239		0.00765	0.00830
			0.00242			0.00864
Mean	0.00185	0.00175	0.00202	0.00798	0.00738	0.00810
1s	0.00036	0.00036	0.00034	0.00133	0.00121	0.00138
RSD%	19	21	17	17	16	17

Supplementary Table 4. Strontium-isotope ratios of multiple shell samples of *Cyprideis torosa* from An Loch Mór, Ireland.

Sample no.	Age (cal. a BP)	$^{87}\text{Sr}/^{86}\text{Sr}$	2s error
TIMECHS 1 An Loch Mor, N. end	modern	0.708998	0.000014
TIMECHS 6 MOR 1 IIA 25.84	850	0.708994	0.000014
TIMECHS 4 MOR 1 V1B 30.34	3700	0.708792	0.000014
TIMECHS 2 MOR 1 V1B 34.67	11450	0.708897	0.000014
TIMECHS 3 MOR 1 V1B 34.69	11450	0.708753	0.000014