

Table DR1. Stable carbon and oxygen isotope data, and temperature  
for *Natica detracta* 1, ND1.

Sample distance from apex (mm)	$\delta^{13}\text{C}$ ‰	$\delta^{18}\text{O}$ ‰	Temperature <sup>a</sup> (°C)
0.10	0.40	-1.04	21.7
0.20	0.04	-1.19	22.3
1.00	0.16	-1.12	22.0
2.67	0.29	-0.75	20.4
3.34	0.28	-0.26	18.3
5.01	0.56	-0.25	18.2
6.68	0.75	0.00	17.1
7.24	-0.15	-0.40	18.9
7.80	-0.18	-0.13	17.7
8.35	-0.24	-0.01	17.2
10.02	0.10	-0.25	18.2
11.69	0.61	-0.58	19.6
12.53	0.99	-0.71	20.2
13.36	0.47	-1.02	21.6
14.19	0.02	-1.00	21.5
15.03	0.11	-0.75	20.4
15.87	0.05	-0.60	19.7
16.70	0.36	-0.57	19.6
18.09	0.12	-0.59	19.7
18.37	-0.07	-0.91	21.1
19.21	-0.05	-0.41	18.9
20.04	0.15	-0.41	18.9
21.71	0.08	-0.22	18.1
22.27	-0.10	-0.30	18.4
22.83	-0.13	-0.08	17.5
23.38	0.71	-0.04	17.3
24.22	0.35	-0.07	17.4
25.05	0.61	-0.34	18.6
25.89	1.35	-1.55	23.9
26.72	0.08	-0.62	19.8
27.56	-0.11	-0.46	19.1
28.39	-0.09	-0.20	18.0
29.22	-0.27	-0.14	17.7
30.06	-0.17	-0.22	18.1
30.89	-0.32	-0.06	17.4
31.73	0.05	-0.14	17.7
33.40	0.43	0.13	16.5

<sup>a</sup>Temperature equation for biogenic aragonite byGrossman and Ku (1986);  $\delta^{18}\text{O}_{\text{water}} = -0.8$  ‰

Table DR2. Stable carbon and oxygen isotope data,  
and temperature for *Natica detracta* 2, ND2.

Sample distance from apex (mm)	$\delta^{13}\text{C}$ ‰	$\delta^{18}\text{O}$ ‰	Temperature <sup>a</sup> °C
0.00	-0.00	-1.22	22.4
0.64	-0.26	-0.76	20.4
1.28	-0.33	-0.37	18.7
1.98	-0.08	-0.26	18.3
2.56	-0.63	0.16	16.4
3.20	-0.72	-0.20	18.0
3.84	-0.58	-0.09	17.5
4.48	-0.62	-0.16	17.8
5.12	-0.54	-0.31	18.5
5.76	-0.74	-0.19	18.0
6.40	-0.43	-0.35	18.6
7.04	-0.94	-0.05	17.4
7.68	-0.97	0.03	17.0
8.32	0.21	-0.34	18.6
8.96	-0.39	0.10	16.7
9.60	-0.60	0.04	16.9
10.24	-0.71	0.21	16.2
10.88	-0.56	0.16	16.4
11.52	-0.80	0.12	16.6
12.16	-0.83	0.18	16.4
12.80	-0.91	0.14	16.5
13.44	-0.88	0.19	16.3
14.08	-0.68	0.14	16.5
14.72	-0.55	0.28	15.9
15.36	-0.51	0.20	16.3
16.00	-0.26	0.18	16.4
16.64	-0.29	0.23	16.1
17.28	-0.28	0.16	16.4
17.92	-0.39	-0.31	18.5
18.56	-0.47	-0.56	19.5
19.20	-0.27	-0.99	21.4
19.84	-0.07	-0.57	19.6
20.48	0.54	-0.57	19.6
21.12	-0.03	-0.65	19.9
21.76	-0.10	-0.50	19.3
22.40	0.14	-0.38	18.8
23.04	0.44	-0.27	18.3
23.68	0.36	-0.18	17.9
24.32	0.26	-0.07	17.4
24.96	0.21	0.06	16.9
25.60	0.27	0.13	16.6
26.24	0.11	0.14	16.5
26.88	-0.28	0.18	16.4
27.52	-0.14	0.24	16.1
28.16	0.11	0.29	15.9
28.80	0.34	0.25	16.1
29.44	0.24	0.13	16.6
30.08	0.24	0.22	16.2
30.72	-0.02	0.24	16.1
31.36	-0.08	0.29	15.9
32.00	-0.09	0.33	15.7
32.64	-0.11	0.30	15.8
33.92	0.03	-0.19	18.0
34.56	0.05	-0.37	18.7
35.20	0.06	-0.72	20.2
35.84	-0.04	-0.60	19.7

Table 2—continued.

Sample distance from apex (mm)	$\delta^{13}\text{C}$ ‰	$\delta^{18}\text{O}$ ‰	Temperature <sup>a</sup> °C
36.48	-0.00	-0.44	19.0
37.12	0.15	0.15	16.5
37.76	0.08	0.01	17.1
38.40	0.20	0.06	16.9
40.12	0.27	0.13	16.6
40.98	0.34	0.25	16.1
41.84	0.42	0.15	16.5
42.69	0.54	0.13	16.6
43.55	0.65	-0.31	18.5
44.41	0.37	0.22	16.2
45.27	0.48	0.08	16.8
46.12	0.56	0.04	17.0
46.98	0.52	-0.22	18.1
47.84	0.38	-0.47	19.2
48.70	0.07	-0.78	20.5
49.56	-0.09	-1.10	21.9
50.42	-0.19	-0.85	20.8
51.28	-0.06	-0.61	19.8
52.14	0.27	-0.47	19.2
53.00	0.33	-0.33	18.5
54.00	0.56	-0.38	18.8

<sup>a</sup>Temperature equation for biogenic aragonite by  
Grossman and Ku (1986);  $\delta^{18}\text{O}_{\text{water}} = -0.8$  ‰

Table DR3. Stable carbon and oxygen isotope data,  
and temperature for *Surcula hauniensis*, SH.

Sample distance from apex (mm)	$\delta^{13}\text{C}$ ‰	$\delta^{18}\text{O}$ ‰	Temperature <sup>a</sup> °C
10.00	-0.89	-0.30	18.4
15.04	-0.94	-0.20	18.0
20.08	-1.16	-0.02	17.2
31.00	-1.60	-0.21	18.0
25.12	-1.24	-0.19	17.9
30.16	-1.37	-0.37	18.7
41.08	-2.13	-0.06	17.4
52.00	-2.66	-0.75	20.4
24.28	-1.28	-0.19	18.0
35.20	-1.62	-0.55	19.5
46.12	-2.73	-0.72	20.2
57.04	-2.35	0.03	17.0
29.32	-1.52	-0.32	18.5
40.24	-1.82	-0.48	19.2
12.52	-0.90	-0.21	18.0
51.16	-2.59	-0.97	21.3
23.44	-1.52	-0.21	18.0
59.14	-2.18	-0.23	18.1
45.28	-2.53	-0.70	20.2
17.56	-1.08	-0.03	17.2
56.20	-2.32	-0.26	18.3
28.48	-1.61	-0.11	17.6
64.18	-1.74	-0.18	17.9
50.32	-2.30	-1.24	22.5
36.46	-2.22	-0.12	17.6
22.60	-1.42	0.20	16.3
44.44	-2.44	-0.61	19.8
69.22	-1.03	-0.29	18.4
55.36	-2.24	-0.54	19.5
27.64	-1.21	-0.37	18.7
49.48	-2.66	-0.70	20.2
21.76	-1.39	-0.26	18.2
60.40	-1.08	-0.23	18.1
32.68	-1.83	-0.38	18.8
18.82	-1.14	-0.21	18.0
54.52	-2.78	-0.58	19.6
26.80	-1.40	-0.28	18.3
65.44	-0.91	-1.00	21.5
37.72	-1.79	-0.32	18.5
48.64	-2.80	-1.17	22.2
20.92	-1.38	-0.29	18.4
31.84	-1.69	-0.23	18.1
70.48	-0.45	-0.59	19.7
42.76	-1.95	-0.49	19.2
73.48	1.26	-1.49	23.6
53.68	-2.68	-0.53	19.4
25.96	-1.38	-0.32	18.5
61.66	-1.14	0.12	16.6
47.80	-2.74	-1.10	21.9
33.94	-2.04	-0.23	18.1
66.70	-0.79	-0.94	21.2
52.84	-2.46	-0.83	20.7
38.98	-2.25	-0.03	17.2
46.96	-0.82	-0.64	19.9
57.88	-1.94	-0.33	18.5
62.92	-1.31	-0.34	18.6
67.96	0.79	-1.50	23.6

<sup>a</sup>Temperature equation for biogenic aragonite by  
Grossman and Ku (1986);  $\delta^{18}\text{O}_{\text{water}} = -0.8$  ‰

Table DR4. Stable oxygen and carbon isotope data, and temperature for <i>Dentalium rugiferum</i> , DR.			
Sample distance from posterior end (mm)	$\delta^{13}\text{C}$ ‰	$\delta^{18}\text{O}$ ‰	Temperature <sup>a</sup> °C
0.00	1.61	-0.17	17.9
0.67	1.44	-0.53	19.4
1.34	1.55	-0.45	19.1
2.00	1.82	-0.43	19.0
2.67	1.62	-0.77	20.5
3.34	1.63	-0.77	20.5
4.00	1.61	-0.03	17.2
5.34	1.57	-0.22	18.1
6.00	1.61	-0.34	18.6
6.67	1.54	-0.93	21.2
7.34	1.57	-1.30	22.8
8.00	1.65	-1.12	22.0
8.67	1.63	-1.08	21.8
9.34	1.74	-0.77	20.5
10.00	1.54	-0.37	18.7
10.67	1.31	-0.22	18.1
11.34	1.35	-0.17	17.8
12.00	1.47	-0.09	17.5
12.67	1.46	-0.27	18.3
13.34	1.38	-0.39	18.8
14.00	1.37	-0.15	17.8
14.67	1.16	-0.42	18.9
15.34	1.14	-0.27	18.3
16.00	1.34	-0.27	18.3
16.67	1.29	-0.46	19.1
17.34	1.37	-0.55	19.5
18.00	1.47	-0.76	20.4
18.67	1.22	-0.92	21.1
19.34	1.88	-0.28	18.3
20.00	1.53	-0.55	19.5
20.67	1.50	-0.35	18.6

<sup>a</sup>Temperature equation for biogenic aragonite by Grossman and Ku (1986);  $\delta^{18}\text{O}_{\text{water}} = -0.8$  ‰

Table DR5. Stable carbon and oxygen isotope data,  
and temperature for *Turritella* spp., TURR.

Sample distance from apex (mm)	$\delta^{13}\text{C}$ ‰	$\delta^{18}\text{O}$ ‰	Temperature <sup>a</sup> °C
10.00	3.19	-1.95	25.6
11.87	3.09	-1.95	25.6
13.74	3.17	-1.98	25.7
15.61	3.03	-1.89	25.3
17.48	2.71	-1.70	24.5
19.35	3.33	-1.72	24.6
21.22	3.18	-1.88	25.3
23.09	2.86	-1.44	23.4
24.96	2.85	-1.48	23.6
26.83	2.92	-1.25	22.6
28.70	3.03	-1.31	22.8
30.70	3.44	-2.33	27.2
31.70	3.22	-2.26	26.9
32.74	3.45	-2.03	25.9
33.70	3.10	-1.91	25.4
34.67	3.34	-2.13	26.4
35.63	3.02	-1.56	23.9
36.60	3.48	-2.35	27.3
37.56	3.22	-1.87	25.2
38.53	3.25	-2.33	27.2
39.49	3.31	-2.29	27.1
40.46	3.39	-2.39	27.5
41.42	3.09	-2.11	26.3
43.35	2.87	-2.08	26.2
45.28	3.38	-2.27	27.0
46.25	3.56	-2.42	27.6
47.21	3.41	-1.89	25.3
48.18	3.60	-2.48	27.9
49.14	3.45	-2.33	27.2
50.11	3.45	-2.28	27.0
51.07	3.28	-2.03	25.9
52.04	3.24	-2.20	26.7
53.00	3.47	-2.22	26.7
54.93	3.65	-2.31	27.1
55.90	3.50	-2.17	26.5
56.86	3.73	-2.63	28.5
57.83	3.80	-2.24	26.8
58.79	3.84	-2.45	27.8
60.72	3.82	-2.09	26.2
62.65	3.76	-1.90	25.4
64.58	3.52	-1.75	24.7
65.55	3.36	-2.54	28.2
66.51	3.31	-1.70	24.5
67.45	3.36	-2.72	29.0
68.44	3.35	-2.07	26.1
70.37	3.47	-2.08	26.2
72.30	3.42	-2.24	26.9

<sup>a</sup>Temperature equation for biogenic aragonite by  
Grossman and Ku (1986);  $\delta^{18}\text{O}_{\text{water}} = -0.8$  ‰

Table DR6. Stable carbon and oxygen isotope data,  
and temperature for *Lenticulina* spp.

Core	Depth (m)	$\delta^{13}\text{C}$ (‰)	$\delta^{18}\text{O}$ (‰)	$\delta^{18}\text{O}^{\text{a}}$ (‰)	Temperature <sup>b</sup> (°C)
Store Bælt	56.10	0.30	-0.97	-0.49	15.6
Core No.8604A	66.00	0.15	-0.65	-0.17	14.2
	69.20	-0.13	-0.87	-0.39	15.1
	74.95	0.55	-0.72	-0.24	14.5
	86.35	0.34	-0.98	-0.50	15.7
	88.50	-0.02	-0.62	-0.14	14.0
	92.30	0.03	-0.81	-0.33	14.9
	95.80	0.60	-0.65	-0.17	14.2
	97.85	0.62	-1.51	-1.03	18.0
	99.45	0.79	-0.56	-0.08	13.8
	100.65	0.34	-1.80	-1.32	19.4
	101.85	0.64	-1.31	-0.83	17.1
	102.70	0.64	-1.35	-0.87	17.3
	104.50	0.24	-1.59	-1.11	18.4
Viborg Core No.5	0.50	0.63	-1.05	-0.57	15.9
	1.50	0.39	-1.31	-0.83	17.1
	3.00	-0.39	-1.13	-0.65	16.3
	4.80	-0.65	-1.36	-0.88	17.4
	5.20	-0.92	-1.36	-0.88	17.3
	5.70	-1.03	-1.12	-0.64	16.3
	6.00	0.61	-0.80	-0.32	14.8
	8.50	0.37	-1.27	-0.79	16.9
9.80	0.13	-0.96	-0.48	15.6	

<sup>a</sup>The  $\delta^{18}\text{O}$  data has been corrected by +0.48‰ for disequilibrium effects.

<sup>b</sup>Temperature equation for biogenic calcite by O'Neil et al. (1969);  
 $\delta^{18}\text{O}_{\text{water}} = -0.8\text{‰}$

## REFERENCES CITED

- Grossman, E.L., and Ku, T.-L., 1986, Oxygen and carbon isotope fractionation in biogenic aragonite, temperature effects: *Chemical Geology*, v. 59, p. 59–74.
- O'Neil, J.R., Clayton, R.N., and Mayeda, T.K., 1969, Oxygen isotope fractionation in divalent metal carbonates: *Journal of Chemical Physics*, v. 51, p. 5547–5558.