

## GSA Data Repository Item 2003158

TABLE DR1. EXTENT OF AMINO ACID RACEMIZATION (D/L) FOR ASPARTIC AND GLUTAMIC ACIDS MEASURED IN *CANDONA* FROM FIVE DEEP LAKES

Lab ID (UAL)	Depth (cm)	Age (ka)*	$n^{\dagger}$	ex	Asp D/L		Glu D/L	
					avg	$\omega_x$	avg	$\omega_x$
<u>Bear Lake, BL96-1</u>								
2434	8	0.3	3	1	0.054	0.011	0.018	0.003
2437	13	0.4	5	0	0.062	0.008	0.018	0.008
2435	18	0.4	4	0	0.060	0.008	0.017	0.003
2442	23	0.5	6	0	0.063	0.007	0.017	0.004
2439	28	0.6	3	1	0.064	0.013	0.019	0.005
2441	33	0.7	3	0	0.063	0.004	0.016	0.005
2436	48	0.9	6	0	0.068	0.002	0.018	0.003
2610	77	1.3	11	1	0.078	0.017	0.021	0.019
2594	87	1.4	4	3	0.084	0.011	0.019	0.017
2609/2593	146	2.2	11	2	0.092	0.016	0.020	0.009
2613	186	2.8	7	0	0.104	0.015	0.022	0.013
2595/2642	246	3.6	16	5	0.105	0.028	0.024	0.009
2596/2643	296	4.3	14	7	0.113	0.033	0.024	0.010
2603/2677	347	5.1	6	2	0.112	0.025	0.030	0.013
2604/2645	397	5.8	6	4	0.129	0.028	0.029	0.017
2602/2676	449	6.5	9	2	0.136	0.041	0.026	0.011
2601/2644	497	7.2	16	3	0.134	0.029	0.031	0.011
<u>Bear Lake, BL96-2</u>								
2661	5	1.1	8	1	0.073	0.008	0.021	0.007
2662	35	1.6	6	1	0.089	0.002	0.022	0.004
2673	65	2.3	11	2	0.103	0.018	0.027	0.012
2678	91	3.1	8	1	0.109	0.013	0.027	0.009
2663	121	4.3	14	2	0.116	0.016	0.029	0.012
2696	151	5.7	24	0	0.146	0.014	0.030	0.008
2611/2634	185	7.6	20	12	0.145	0.037	0.037	0.016
2695	212	9.3	31	3	0.145	0.027	0.030	0.008
2664	242	11.4	13	1	0.180	0.037	0.034	0.007
2612/2635	256	12.5	10	6	0.223	0.036	0.042	0.011
2675	301	16.3	2	1	0.235	0.055	0.043	0.007
<u>Bear Lake, BL98-9</u>								
2694	1	0.2	16	0	0.047	0.039	0.020	0.017
2707	30	0.9	27	0	0.083	0.017	0.022	0.009
<u>Bear Lake, BL00-1D/E</u>								
3305	640	12.2	10	0	0.145	0.016	0.025	0.006
4031	930	17.1	6	3	0.225	0.032	0.044	0.013
3300	940	17.3	0	11	-	-	-	-
3299	940	17.3	4	11	0.225	0.030	0.038	0.008
3298	1240	22.1	6	1	0.156	0.037	0.033	0.016
4027	1670	28.5	7	1	0.242	0.020	0.039	0.007
3297	1840	30.9	7	1	0.223	0.033	0.049	0.019
4034	2100	34.5	4	5	0.273	0.019	0.051	0.013
3306	2140	35.1	10	2	0.215	0.049	0.051	0.010
4030	2410	38.8	2	4	0.290	0.009	0.056	0.009

4033	3020	47.3	8	1	0.274	0.046	0.082	0.036
3464	3040	47.6	6	2	0.244	0.066	0.058	0.025
3462	3340	52.0	5	4	0.237	0.047	0.064	0.008
3308	3640	56.6	6	4	0.238	0.033	0.068	0.014
4035	3650	56.7	8	1	0.308	0.055	0.079	0.035
3463	3940	61.5	7	3	0.270	0.069	0.055	0.008
4028	4180	65.6	8	0	0.306	0.038	0.078	0.025
4026	4640	74.3	6	1	0.319	0.034	0.082	0.025
3465	5140	85.1	4	1	0.297	0.013	0.116	0.014
4029	5360	90.4	6	0	0.286	0.058	0.096	0.029
4032	5610	96.8	7	1	0.314	0.039	0.096	0.021

Lake Ammersee, AS96-1

3294	1011	0.0	0	3	-	-	-	-
3285	1061	0.0	0	2	-	-	-	-
3286	1121	12.1	4	0	0.168	0.014	0.034	0.002
3287	1161	13.0	4	0	0.170	0.008	0.035	0.008
3289	1211	14.0	5	0	0.169	0.011	0.034	0.011
3292	1261	15.0	1	1	0.153	-	0.029	-

Lake Constance, BO97-14

2973	121	2.1	4	1	0.091	0.012	0.022	0.005
2971	162	3.3	7	1	0.098	0.017	0.021	0.004
2969	209	4.6	11	0	0.117	0.009	0.025	0.006
2967	211	4.6	15	1	0.122	0.011	0.025	0.005
2978	434	10.0	6	1	0.164	0.010	0.034	0.008
3156	518	11.7	12	2	0.156	0.010	0.034	0.002
2982	573	12.7	4	0	0.144	0.017	0.034	0.011
3164	575	12.7	6	2	0.151	0.014	0.033	0.008
2975	586	12.9	6	0	0.146	0.005	0.034	0.010
3159	585	12.9	6	2	0.161	0.010	0.039	0.010
2980	612	13.4	12	0	0.152	0.009	0.035	0.005

Lake Issyk-Kul, IK97-11

2955	36	3.2	14	0	0.073	0.009	0.019	0.002
2960	173	6.3	14	0	0.095	0.009	0.025	0.006
2958	322	8.7	12	0	0.108	0.012	0.027	0.006

Lake Issyk-Kul, IK97-5

3206	65	8.0	10	0	0.139	0.061	0.024	0.006
------	----	-----	----	---	-------	-------	-------	-------

Lake Michigan, LM-4

2466	176.5	6.9	3	0	0.198	0.012	0.048	0.018
3126	193.5	7.4	2	1	0.214	0.024	0.044	0.002
3124	205.5	7.7	1	3	0.216	-	0.043	-
3125	221.0	8.2	4	5	0.188	0.023	0.044	0.009
3123	236.0	8.7	3	0	0.219	0.047	0.044	0.011
3127	254.5	9.3	5	1	0.195	0.023	0.042	0.012

Lake Michigan, LM-9

2449/3128	93.5	7.5	16	0	0.183	0.009	0.038	0.009
2448/3129	124.0	8.5	13	0	0.185	0.028	0.037	0.009
2444/3130	188.5	10.7	16	1	0.174	0.031	0.041	0.014

Modern

2646	-	0	7	0	0.036	0.011	0.015	0.005
------	---	---	---	---	-------	-------	-------	-------

2653/2656	0	1	6	1	0.040	0.005	0.019	0.010
-----------	---	---	---	---	-------	-------	-------	-------

---

\*Ages are in thousands of calendar years before present (ka), based on age models in Table DR2.

† $n$  = number of individual analyses used to calculate the sample average (avg) and standard error ( $\sigma_x$ ); ex = the number of analyses excluded based on criteria discussed in text.

---

**GSA Data Repository item #**

TABLE DR2. RADIOCARBON AGES AND CORRESPONDING AGE MODELS FOR LAKE-SEDIMENT CORES

Depth (cm)	Age (cal yr BP)	Age model* (x = depth, cm)
---------------	--------------------	-------------------------------

Bear Lake, BL96-1

7	365	$14.013x + 195$
12	360	$r^2 = 0.997$
23	380	
48	885	
48	970	
252	3545	
401	6055	
493	6995	

Bear Lake, BL96-2

3	920	$0.1316x^2 + 11.069x + 1002$
99	3690	$r^2 = 0.988$
121	4880	
121	4830	
151	5840	
151	5990	
175	7300	
175	7215	
201	9170	
212	9780	
212	9540	
246	12135	
299	14960	
299	15045	
300	14670	
307	14515	
313	16790	
333	19320	
353	22025	
373	24750	
385	25095	
393	26600	

Bear Lake, BL98-9

1	160	
30	850	

Bear Lake, BL00-1D/E

0	0	$0.000000414x^3 - 0.0030x^2 + 20.835x$
1500	26000	$r^2 = 1.000$
5000	82000	
6600	127700	

Lake Constance, BO97-14

119.6	2600	$-0.0130x^2 + 32.516x - 1650$
-------	------	-------------------------------

126.1	2600	$r^2 = 0.989$
159.6	3260	
161.6	3260	
208.8	4100	
211.8	4100	
423.6	9400	
433.6	9400	
508.0	11640	
573.3	12200	
585.8	13670	
611.8	14505	
760.3	15580	
865.4	16265	

Lake Issyk-Kul, IK97-11

12.5	2865	$-0.0221x^2 + 27.120x + 2286$
119.5	4533	$r^2 = 0.973$
157.5	5907	
218.5	7437	
218.5	7499	
258.5	7977	
338.5	9017	
338.5	8599	

Lake Michigan, LM-4

151.5	6060	$30.701x + 1440$
181.5	7150	$r^2 = 0.992$
201.5	7585	
221.5	8155	
241.5	8790	
259.5	9315	
268.0	9910	
281.0	10000	

Lake Michigan, LM-9

45.5	5840	$34.504x + 4227$
75.5	6835	$r^2 = 0.988$
95.5	7545	
115.5	7940	
135.5	8905	
155.5	9985	
185.5	10360	
205.5	11390	

---

\*Age models provide the chronological control for ostracodes used to calibrate the rate of amino acid racemization. Ages listed here have been calibrated to calendar years using standard procedures. For Bear Lake and Lake Issyk-Kul, and Lake Michigan, the estimated hardwater effect was subtracted from ages on carbonates, as discussed by the original authors cited in Table 1 of the text.

---