APPENDIX II

Stable isotopic compositions of brachiopod shells (in ‰ vs. PDB) from Kansas and New Mexico. SP = specimen. LC = luminescent character of sampled area of brachiopod shells (key at end of appendix). Letter next to interval (INT) represents the fossil depth zone for that interval (M = myalinid zone, F = fusulinid zone, A = ammonoid zone, G = gondolellid zone).

INT (cm)	GENUS	SP[1]	$\delta^{13}C$ (‰)	$\delta^{18}O$ (‰)	LC
OREAD CYCLE, KANSAS					
470F	*Com*[2]	a	4.74	-1.81	NL
		b	4.58	-1.28	NL-SP
		c	5.37	-1.41	NL-SP
	Cru	a	3.47	-1.52	NL-SP
		b	3.64	-1.44	NL-ST
		c	3.42	-1.63	NL-SP
	Neo	a	3.40	-1.62	NL-ST
		b	3.99	-1.34	NL
		b1	3.83	-1.34	NL
		c	3.63	-1.62	NL-SP
460F	*Com*	a	5.37	-1.34	NL
		b	5.13	-1.30	NL-SP
		c	4.65	-1.57	NL-SP
		d	5.16	-1.48	NL
		e	4.63	-1.63	NL
		f	4.66	-2.12	NL
	Neo	a	3.36	-1.72	NL
		a1	3.84	-2.00	NL
		b1	3.87	-1.66	NL
		c	3.47	-2.15	NL
		c1	3.67	-1.96	NL
	Neoph.	a	4.37	-1.49	NL
250F	*Com*	a	4.04	-1.33	NL
		b	4.84	-1.36	NL
		c	5.36	-1.08	NL
	Neo	a	3.77	-1.67	NL
		a1	3.93	-1.26	NL
		b	3.43	-1.80	NL-SP
		c	3.58	-1.38	NL
-5A	*Com*	a	4.43	-0.77	NL
		b	4.82	-1.03	NL
		c	4.51	-1.45	NL
	Neo	a	4.96	-1.26	NL
		b	4.38	-1.37	NL-ST
		b1	4.52	-1.00	NL-SP
		c	4.65	-0.90	NL-SP
-23A	*Cru*	a	2.58	-0.88	NL-SP
STANTON CYCLE (NW), KANSAS					
310F	*Com*	a	3.39	-1.43	NL
		a1	3.57	-1.20	NL
		b	3.39	-1.41	NL
		b1	3.25	-1.30	NL
		c	4.66	-1.48	NL
	Neo	a	2.71	-2.63	NL-vFL
		b	2.77	-1.99	NL-vFL
		c	2.54	-2.03	NL
85A	*Cru*	a	2.84	-1.46	DL
		b	3.52	-2.22	NL-SP
		c	3.07	-2.33	NL
23A	*Cru*	a	3.32	-2.06	NL-SP
13A	*Com*	a	3.70	-1.50	NL
		b	4.49	-1.60	NL
		c	4.03	-1.62	NL
	Cru	a	3.35	-2.12	NL
		b	3.21	-1.83	NL
	Neo	a	3.36	-1.92	NL
		b	3.71	-1.23	NL
-30F	*Com*	a	4.76	-1.58	NL
		a1	4.66	-1.33	NL
	Neo	a	3.51	-1.43	NL
		b	3.29	-2.06	NL
		c	3.07	-2.41	NL
STANTON CYCLE (SW), KANSAS					
105	*Cru*	a	*3.26*[3]	*-2.14*[3]	BL+NL
45	*Cru*	a	*2.34*	*-4.53*	BL
25A	*Cru*	a	2.90	-1.67	NL+L
		b	3.23	-1.73	NL-SP
		c	2.60	-2.00	L+NL
5A	*Com*	a	5.53	-1.66	NL
		b	5.39	-1.75	NL-SP
		c	4.96	-1.55	NL
	Cru	a	5.39	-1.17	NL
	Neo	a	4.41	-1.72	NL
		b	3.84	-1.85	NL+L
-28F	*Com*	a	5.16	-1.71	NL-SP
		b	5.26	-1.67	NL-SP
	Neo	a	3.42	-1.91	NL
		a1	3.22	-2.02	NL
		b	3.05	-2.08	NL
		c	2.95	-2.22	NL
		c1	3.10	-2.12	NL
WYANDOTTE CYCLE, KANSAS					
0A	*Com*	a	4.40	-2.03	NL
		b	4.42	-1.90	NL
		c	4.35	-2.29	NL
	Neo	a	3.52	-1.66	NL
		b	3.70	-1.67	NL
		c	3.75	-1.70	NL
		c1	3.47	-1.86	NL
IOLA CYCLE, KANSAS					
127F	*Com*	a	4.47	-1.89	NL
		b	4.55	-1.90	NL
		c	4.48	-1.67	NL
		c1	4.54	-2.08	NL
	Cru	a	2.67	-1.31	NL
	Neo	a	4.03	-1.78	NL
		b	3.13	-1.61	NL
		b1	3.43	-2.21	NL
		c	2.89	-1.98	NL
CHERRYVALE CYCLE, KANSAS					
100F	*Com*	a	3.48	-2.55	NL
		b	3.49	-2.75	NL
		c	3.01	-3.69	NL
		d	2.57	-3.22	NL

(Cont.)

INT (cm)	GENUS	SP[1]	$\delta^{13}C$ (‰)	$\delta^{18}O$ (‰)	LC
		e	2.96	-2.73	NL
	Cru	a	3.26	-2.59	NL
		b	3.37	-2.12	NL
		c	2.85	-2.28	NL
	Hystric	a	3.24	-2.38	NL
		b	3.09	-2.41	NL
		c	2.84	-2.38	NL
85F	*Com*	a	4.67	-2.06	NL
		b	5.12	-2.09	NL
		c	4.98	-1.97	NL+DL ST
		d	5.46	-1.70	NL
		d1	5.04	-2.02	NL
	Cru	a	3.65	-2.32	NL-ST
		b	3.46	-1.84	NL
		c	3.69	-2.26	NL
		d	3.75	-2.21	NL
		e	3.56	-2.61	NL
		f	3.79	-1.87	NL
58F	*Cru*	a	3.45	-2.20	NL
		b	3.75	-2.00	NL
		c	3.54	-2.34	NL
-13M	*Com*	a	3.78	-2.18	NL
		b	3.73	-1.38	NL
		c	3.14	-1.99	NL
	Neo	a	3.16	-1.92	NL
		a1	3.41	-1.86	NL
		b	2.80	-2.54	NL
DENNIS CYCLE, KANSAS					
152F	*Com*	a	4.11	-1.89	NL
		b	3.03	-2.09	NL
		b1	4.13	-2.40	NL
		b2	3.78	-1.86	NL
		c	4.14	-2.37	NL
	Cru	a	3.40	-1.95	NL-SP
		b	2.93	-2.34	NL
		c	*1.50*	*-6.24*	L
	Neo	a	2.97	-2.43	NL
		b	2.99	-2.14	NL
		c	2.79	-2.13	NL
42F	*Com*	a	4.11	-1.85	NL
		b	4.42	-1.60	NL
		c	4.43	-1.42	NL
	Cru	a	*1.28*	*-6.77*	L
		b	*1.10*	*-7.08*	L
		c	2.98	-1.90	NL
		d	3.19	-2.33	NL-SP
	Neo	a	2.96	-1.98	NL
		a1	3.36	-1.53	NL
		b	3.21	-2.24	NL
		c1	3.22	-2.14	NL
-10A	*Neo*	a	4.97	-1.79	NL
SWOPE CYCLE, KANSAS					
138A	*Com*	a	2.63	-2.24	NL
		a1	2.68	-1.99	NL
		a2	3.87	-2.07	NL
		b	4.20	-1.17	NL
		b1	4.06	-1.94	NL
		c	4.62	-1.72	NL
	Cru	a	2.84	-2.31	NL+L
		b	2.35	-2.76	NL
		c	2.47	-1.91	NL
		d	*1.23*	*-4.40*	L
	Neo	a	1.96	-2.20	NL
		a1	2.16	-2.25	NL
130A	*Cru*	a	*1.35*	*-4.80*	L
		b	2.76	-2.27	NL
		c	2.43	-2.29	NL
100G	*Cru*	a	2.67	-2.33	NL-SP
		b	2.98	-2.20	NL-ST
		c	2.40	-2.43	NL
		d	2.47	-2.62	NL-ST
		e	3.12	-2.07	NL-BD
-43F	*Com*	a	3.61	-1.53	NL+L
		b	3.52	-1.72	NL-SP
		c	3.53	-1.72	NL
UPPER JEMEZ SPRINGS CYCLE (HOT SPRINGS SECTION), NEW MEXICO					
1130	*Com*	a1	4.29	-3.82	NL
	Neo	a	3.62	-3.58	NL
		b	2.96	-3.89	NL
1000	*Com*	a	3.81	-3.59	NL-ST
		b	4.89	-2.66	NL
		b1	4.52	-3.24	NL
		c	*3.13*	*-4.67*	NL-ST
	Cru	a	2.33	-3.85	NL-SP
		a1	2.28	-4.04	NL-SP
	Neo	a	3.66	-3.66	NL
		b	3.42	-3.15	NL
		c	3.42	-3.85	NL
900	*Com*	a	4.40	-2.71	NL-SP
		b	4.55	-3.03	NL
		c	4.60	-3.30	NL
	Cru	a	2.69	-4.49	NL-ST
		b	2.90	-4.17	NL+L
		c	3.08	-3.75	NL-ST
	Neo	a	3.49	-3.28	NL
		b	4.43	-2.64	NL
		c	3.40	-2.85	NL
		c1	3.25	-2.85	NL
800	*Com*	a	4.68	-2.79	NL-ST
		b	4.05	-2.64	NL
		c	*2.74*	*-3.65*	NL-ST
		d	*1.92*	*-4.17*	NL-ST
	Neo	a	3.97	-2.89	NL
		b	3.63	-2.46	NL
		c	2.95	-2.95	NL
500	*Derbyia*	a	3.16	-2.64	NL-SP
		b	*3.61*	*-4.15*	NL-BR
		c	*3.37*	*-7.07*	BR
UPPER JEMEZ SPRINGS CYCLE (JEMEZ SPRINGS SECTION), NEW MEXICO					
180	*Com*	a	3.95	-3.64	NL-BD
		b	3.68	-3.79	NL-SP
		c	4.47	-3.64	NL
	Cru	a	*1.51*	*-3.80*	DL
100	*Com*	a	3.79	-4.39	NL
		b	2.65	-3.92	NL
		c	*2.36*	*-4.78*	NL-SP
		c1	*1.57*	*-5.25*	BR
	Cru	a	2.24	-4.16	NL
	Derbyia	a	*-0.20*	*-3.95*	BR-NL
	Hystric	a	*0.83*	*-4.06*	NL-L

(Cont.)

INT (cm)	GENUS	SP[1]	$\delta^{13}C$ (‰)	$\delta^{18}O$ (‰)	LC
		a1	*-1.65*	*-6.88*	BR
	Neo	a	3.53	-3.56	NL-BD
		a1	4.03	-3.59	NL-BD
		b	3.10	-4.04	NL
		b1	3.37	-3.60	NL
		b2	3.65	-3.58	NL
		c	*2.40*	*-4.52*	NL-SP
10	*Com*	a	4.31	-3.58	NL+LMF
		b	3.80	-4.10	NL-SP
		c	4.41	-3.51	NL-SP
		d	*2.79*	*-3.06*	FL-BR
		d1	*3.70*	*-3.84*	FL-BR
		e	*-1.11*	*-5.57*	BR
		e1	*1.04*	*-3.85*	FL
		e2	*1.59*	*-4.93*	NL-ST
	Derbyia	a	*-0.55*	*-4.66*	BR
		a1	*-0.20*	*-6.44*	FL-ST
	Neo	a	*2.44*	*-5.26*	vFL-SP
		b	2.57	-3.63	FL-ST
		c	3.70	-2.12	NL-SP
		d	3.35	-3.35	NL
		d1	3.27	-3.14	NL
		d2	3.30	-3.40	NL

LOWER JEMEZ SPRINGS CYCLE, NEW MEXICO

600	*Com*	a	3.92	-3.45	NL
350	*Derbyia*	a	2.31	-3.90	NL-SP
	Neo	a	2.81	-3.90	NL
		a1	2.40	-3.72	NL
		b	2.77	-3.68	NL-SP
		c	2.69	-3.97	NL
250	*Com*	a	3.12	-3.80	NL
		b	2.38	-3.87	NL
	Derbyia	a	1.72	-3.93	NL
	Neo	a	2.34	-3.58	NL
		b	2.21	-4.73	NL
		b1	2.92	-3.97	NL
		c	2.66	-4.08	NL

WILD COW FM., NEW MEXICO

INT (cm)	GENUS	SP[1]	$\delta^{13}C$ (‰)	$\delta^{18}O$ (‰)	LC
100	*Com*	a	4.84	-3.05	NL
10	*Com*	a	4.17	-3.17	NL
		b	4.67	-2.57	NL
		c	4.70	-3.63	NL
	Neo	a	3.31	-3.32	NL-SP
		b	3.96	-3.85	NL
		b1	4.41	-3.01	NL
		c	3.43	-4.03	NL

LOWER SALESVILLE CYCLE, TEXAS

-380	*Cru*	3.51	-3.05	
		3.95	-2.21	
		4.01	-2.41	
	Com	5.26	-2.05	
		4.78	-2.24	
		3.24	-2.47	
	Neo	3.62	-2.19	
		3.55	-2.42	
		3.48	-2.12	
-480	*Cru*	3.69	-2.28	
		3.61	-2.55	
		3.90	-2.21	
	Com	4.79	-1.95	
		5.11	-2.15	
	Neo	4.46	-1.88	
		3.16	-1.49	
-580	*Cru*	3.83	-2.58	
		4.11	-2.22	
		3.18	-2.75	
	Com	5.20	-1.92	
		5.48	-2.32	
-680	*Cru*	3.82	-2.64	
		4.02	-2.44	
-880	*Cru*	4.20	-2.18	
	Com	4.79	-1.71	
		5.15	-2.07	
		4.82	-2.02	
	Neo	3.64	-2.17	
		4.35	-1.92	

Key:

DEGREE:
- BL = bright luminescence
- L = luminescence
- FL = faint luminescence
- vFL = very faint luminescence
- NL = completely non-luminescent

FEATURES:
- ST = luminescent streaks, usually on the order of 100 µ long
- SP = luminescent specks
- MF = microfractures
- BD = luminescent bands

Footnotes:

[1] each shell is given a different letter; multiple analyses of the same shell are denoted a1, a2, etc.

[2] *Cru* = Crurithyris, *Com* = Composita, *Neo* = Neospirifer, *Neophyr = Neophyricodothyris, Hystric = Hystriculina*

[3] Isotopic values in italics do not meet criteria for non-luminescence and are not included in calculation of mean values and isotope stratigraphy.