Supporting Information

Cerling et al. 10.1073/pnas.1104627108

Table S1. Fossil equids, giraffes, hippos, and suids from Kay Behrensmeyer Site (KBS) and Okote Members, Koobi Fora region, Kenya

Sample number	Genus and species	$\delta^{13}C$	$\delta^{18}O$	Tooth	Member
Equidae					
F5066	*Equus* sp. indet.	−2.5	−3.8	m1 or m2	Okote
F5070	*Equus* sp. indet.	−2.1	−1.9	Lp3	Okote
K92-4832	*Hipparion* sp.	−2.1	−1.2	M3	Okote
KNM ER 1224	*Equus* sp. indet.	−0.3	0.0	Lp2	KBS
KNM ER 1227	*Equus* cf. *grevyi*	−0.7	1.6	P3 or P4	Okote
KNM ER 1250	*Equus koobiforensis*	0.7	4.0	RM3	KBS
KNM ER 1255	*Equus koobiforensis*	−0.9	2.6	LM2	KBS
KNM ER 1259	*Equus* sp. indet.	−0.1	1.8	RP3	KBS
KNM ER 1259	*Equus* sp. indet.	−0.8	0.2	LP3	KBS
KNM ER 2064	*Equus* sp. indet.	−0.1	2.0	RP3 or P4	KBS
KNM ER 2066	*Equus grevyi*?	0.7	1.6	M1 or M2	Okote
KNM ER 2642	*Hipparion* sp.	−0.1	3.9	LM3	KBS
KNM ER 2642	*Hipparion* sp.	−1.2	1.2	LM3	KBS
KNM ER 2668	*Hipparion* cf. *aethiopicum*	0.1	0.3	P2	Okote
KNM ER 2672	*Equus* cf. *grevyi*	−1.1	2.8	M1 or M2	Okote
KNM ER 2680	*Equus* cf. *grevyi*	0.5	−1.0	P3 or P4	Okote
KNM ER 2684	*Equus* cf. *grevyi*	−0.6	2.0	P3 or P4	Okote
KNM ER 4030	*Equus* sp. indet.	1.3	−1.2	M1 or M2	KBS
KNM ER 5359	*Hipparion* sp.	−0.4	7.1	RM1 or M2	KBS
	average	−0.4	1.4		
	SD	0.9	2.2		
	number	18	18		
Giraffidae					
KNM ER 1492	*Giraffa pygmaea*	−10.7	2.1	LM3	KBS
KNM ER 932	*Giraffa stillei*	−12.1	3.8	M3	KBS
KNM ER 1495	*Giraffa stillei*	−12.2	3.8	M3	KBS
KNM ER 664	*Giraffa jumae*	−12.5	2.7	M3	Okote
	average	−11.9	3.1		
	SD	0.8	0.8		
	number	4	4		
Hippopotamidae					
KNM ER 2045	*Hippopotamus aethiopicus*	−3.6	−5.7	Rm1	Okote
KNM ER 5502	*Hippopotamus aethiopicus*	−2.7	1.2	m2	Okote
KNM ER 5512	*Hippopotamus aethiopicus*	−1.3	−4.7	M3	Okote
KNM ER 5573	*Hippopotamus aethiopicus*	−1.0	−2.1	m2	Okote
KNM ER 5576	*Hippopotamus aethiopicus*	−1.5	−3.0	M3	KBS
KNM ER 638	*Hippopotamus aethiopicus*	−0.3	−2.6	M3	KBS
KNM ER 671	*Hippopotamus aethiopicus*	−1.9	−2.3	RM3	KBS
KNM ER 1396	*Hippopotamus gorgops*	0.1	−5.7	RC	Okote
KNM ER 1409	*Hippopotamus gorgops*	−1.6	−3.9	Lm	Okote
KNM ER 1427	*Hippopotamus gorgops*	−0.7	−2.7	M2	Okote
KNM ER 5509	*Hippopotamus gorgops*	−3.0	−0.7	Rdp4	KBS
KNM ER 5510	*Hippopotamus gorgops*	−0.2	−3.0	Lm2	KBS
KNM ER 5513	*Hippopotamus gorgops*	−0.1	−1.8	m	KBS
KNM ER 5543	*Hippopotamus gorgops*	−1.4	−4.8	Rc	Okote
KNM ER 637	*Hippopotamus gorgops*	−1.1	−0.5	RM3	KBS
KNM ER 1422	*Hippopotamus karumensis*	0.0	−2.7	LM3	KBS
KNM ER 2186	*Hippopotamus karumensis*	−1.8	−4.1	Rm3	KBS
KNM ER 5464	*Hippopotamus karumensis*	−0.5	−3.8	LM3	KBS
KNM ER 5500	*Hippopotamus karumensis*	−2.1	−3.5	RM3	Okote
KNM ER 5501	*Hippopotamus karumensis*	−0.6	−5.0	LM3	Okote
KNM ER 5577	*Hippopotamus karumensis*	−0.6	−2.6	M	Okote
KNM ER 5648	*Hippopotamus karumensis*	−2.7	−5.7	M	KBS
F20004	*Hippopotamus* sp.	−1.0	−4.2	p4	Okote
	average	−1.3	−3.2		
	SD	1.0	1.8		
	count	23	23		
Suidae					
KNM ER 3653	*Metridiochoerus andrewsi*	0.4	−0.5	Rm3	KBS
KNM ER 5240	*Metridiochoerus hopwoodi*	0.4	0.5	Rm3	KBS
KNM ER 3240	*Metridiochoerus compactus*	0.5	2.4	m3	Okote
KNM ER 3627	*Metridiochoerus compactus*	0.1	2.9	Rm3	Okote
KNM ER 2719	*Metridiochoerus hopwoodi*	−0.2	1.4	m3	Okote

Sample number	Genus and species	$\delta^{13}C$	$\delta^{18}O$	Tooth	Member
F15779	*Metridiochoerus* sp.	−0.2	−0.3	m3	Okote
F20008	*Metridiochoerus* sp.	0.2	−0.8	m3	Okote
F20009	*Metridiochoerus* sp.	−2.2	−0.3	m3	Okote
F20018	*Metridiochoerus* sp.	−0.5	−0.5	m3	Okote
F20221	*Metridiochoerus* sp.	−0.7	−2.6	m2	Okote
	average	−0.2	0.2		
	SD	0.8	1.6		
	count	10	10		
F20206	*Theropithecus oswaldi*	−1.0	0.4	m2	Okote

Table S2. $\delta^{13}C$ values for hominin and *Theropithecus oswaldi* fossils

Specimen number	Taxon	$\delta^{13}C$	Tooth	Site/area	Member or age, Ma	Ref.
ARA-VP-1 1818	*Ardipithecus ramidus*	−10.7		Aramis	ARA-VP-1	1
ARA-VP-1 3290	*Ardipithecus ramidus*	−10.3		Aramis	ARA-VP-1	1
ARA-VP-1 3291	*Ardipithecus ramidus*	−11.2		Aramis	ARA-VP-1	1
ARA-VP-1 700	*Ardipithecus ramidus*	−8.5		Aramis	ARA-VP-1	1
ARA-VP-6/1 500-90	*Ardipithecus ramidus*	−10.2		Aramis	ARA-VP-6	1
ARA-VP-6/1 500-113	*Ardipithecus ramidus*	−10.2		Aramis	ARA-VP-6	1
ARA-VP-6/1 500-115	*Ardipithecus ramidus*	−10.8		Aramis	ARA-VP-6	1
MLD 30	*Australopithecus africanus*	−5.6	RM1	Makapansgat	MAK3	2
MLD 41	*Australopithecus africanus*	−11.3	M	Makapansgat	MAK3	2
MLD12	*Australopithecus africanus*	−7.7	RM3	Makapansgat	MAK3	2
MLD28	*Australopithecus africanus*	−8.1	RM3	Makapansgat	MAK3	2
STS 31	*Australopithecus africanus*	−6.8	RM3	Sterkfontein	ST4	3
STS 32	*Australopithecus africanus*	−7.8	RM3	Sterkfontein	ST4	3
STS 2218	*Australopithecus africanus*	−5.9	M	Sterkfontein	ST4	3
STS 45	*Australopithecus africanus*	−4.0	RM2	Sterkfontein	ST4	3
STS 72	*Australopithecus africanus*	−9.7	RM3	Sterkfontein	ST4	3
STW 14	*Australopithecus africanus*	−6.7	Lm1	Sterkfontein	ST4	4
STW 211	*Australopithecus africanus*	−7.3	M	Sterkfontein	ST4	4
STW 229	*Australopithecus africanus*	−5.8	P	Sterkfontein	ST4	4
STW 252	*Australopithecus africanus*	−7.4	RM1	Sterkfontein	ST4	4
STW 276	*Australopithecus africanus*	−8.0	Lm1	Sterkfontein	ST4	4
STW 303	*Australopithecus africanus*	−4.3	RM2	Sterkfontein	ST4	4
STW 304	*Australopithecus africanus*	−7.4	M	Sterkfontein	ST4	4
STW 309b (409)	*Australopithecus africanus*	−6.1	Lm1	Sterkfontein	ST4	4
STW 315	*Australopithecus africanus*	−5.7	Ldm2	Sterkfontein	ST4	4
STW 73	*Australopithecus africanus*	−8.8	RM2	Sterkfontein	ST4	4
STW 207	*Australopithecus africanus*?	−2.0	?	Sterkfontein	ST4	4
STW 213i	*Australopithecus africanus*?	−1.8	Lm1	Sterkfontein	ST4	4
STW 236	*Australopithecus africanus*?	−3.7	P	Sterkfontein	ST4	4
SK 27	*Homo* sp.	−8.2	LM3	Swartkans	SK1	5
SK 80/847	*Homo* sp.	−7.1	P	Swartkans	SK1	5
SK 2635	*Homo* sp.	−9.2	P	Swartkans	SK1	5
OH62	*Homo habilis*	−8.3	LM2	Olduvai	1.8	6
OH65	*Homo habilis*	−5.2	LM3	Olduvai	1.8	6
OH7	*Homo habilis*	−8.8	Lm2	Olduvai	1.75	6
SK 19	*Paranthropus robustus*	−6.3	Rm3	Swartkrans	SK1	3
SK 41	*Paranthropus robustus*	−6.7	LM3	Swartkrans	SK1	3
SK 57	*Paranthropus robustus*	−6.5	LM3	Swartkrans	SK1	3
SK 876	*Paranthropus robustus*	−6.7	M	Swartkrans	SK1	5
SK 878	*Paranthropus robustus*	−6.8	Rp3	Swartkrans	SK1	7
SK 879	*Paranthropus robustus*	−8.5	M	Swartkrans	SK1	7
SK 879	*Paranthropus robustus*	−8.1	M	Swartkrans	SK1	7
SK1512	*Paranthropus robustus*	−8.8	P	Swartkrans	SK1	7
SK 14000	*Paranthropus robustus*	−5.9	LM3	Swartkrans	SK1	3
SK 14132	*Paranthropus robustus*	−6.9	RM3	Swartkrans	SK1	3
SK 24605	*Paranthropus robustus*	−7.3	RM3	Swartkrans	SK1	8
SK 24606	*Paranthropus robustus*	−6.1	RM2	Swartkrans	SK1	8
SKW 6	*Paranthropus robustus*	−7.0	LM3	Swartkrans	SK1	3
SKW 3068	*Paranthropus robustus*	−8.1	LM2	Swartkrans	SK1	3
SKW 4768	*Paranthropus robustus*	−7.4	LM2	Swartkrans	SK1	3
SKW 6427	*Paranthropus robustus*	−8.6	M	Swartkrans	SK1	8
SKX 5939	*Paranthropus robustus*	−5.4	M	Swartkrans	SK1	8
SKX 333	*Paranthropus robustus*	−10.0	Rm1	Swartkrans	SK2	7
SKX 1312	*Paranthropus robustus*	−8.1	LM1	Swartkrans	SK2	7
SKX 5015	*Paranthropus robustus*	−9.6	Lm3	Swartkrans	SK1	7
SKX 35025	*Paranthropus robustus*	−7.9	RM	Swartkrans	SK3	7
TM 1600	*Paranthropus robustus*	−7.9	Lm2	Kromdraai	KB3	3
KNM-CH-302	*Paranthropus boisei*	−1.3	m-frag	Baringo	1.42	this study

Specimen number	Taxon	$\delta^{13}C$	Tooth	Site/area	Member or age, Ma	Ref.
KNM-ER-729A	*Paranthropus boisei*	0.0	Lp4	Turkana	1.52	this study
KNM-ER-732A	*Paranthropus boisei*	−0.1	P4	Turkana	1.58	this study
KNM-ER-733A	*Paranthropus boisei*	−1.5	Rm3	Turkana	1.52	this study
KNM-ER-733D	*Paranthropus boisei*	−0.5	LP4	Turkana	1.52	this study
KNM-ER-802D	*Paranthropus boisei*	−0.1	Lm1	Turkana	1.58	this study
KNM-ER-802G	*Paranthropus boisei*	−1.9	m3	Turkana	1.59	this study
KNM-ER-810	*Paranthropus boisei*	−3.4	p3	Turkana	1.77	this study
KNM-ER-816B	*Paranthropus boisei*	−1.9	RP4	Turkana	1.77	this study
KNM-ER-818	*Paranthropus boisei*	0.7	Lm3	Turkana	1.60	this study
KNM-ER-1171C	*Paranthropus boisei*	−0.6	Lm1	Turkana	1.58	this study
KNM-ER-13750	*Paranthropus boisei*	0.2	m-frag	Turkana	1.87	this study
KNM-ER-1469A	*Paranthropus boisei*	−2.3	Lm3	Turkana	1.89	this study
KNM-ER-1479A	*Paranthropus boisei*	−2.3	m3	Turkana	1.87	this study
KNM-ER-15940	*Paranthropus boisei*	−1.1	Lm3	Turkana	1.77	this study
KNM-ER-1804	*Paranthropus boisei*	−1.2	LM3	Turkana	1.77	this study
KNM-ER-1806C	*Paranthropus boisei*	−1.3	Rm3	Turkana	1.85	this study
KNM-ER-3737B	*Paranthropus boisei*	−1.6	Rm1	Turkana	1.58	this study
KNM-ER-3887	*Paranthropus boisei*	−1.6	RM3	Turkana	1.57	this study
KNM-ER-3952F	*Paranthropus boisei*	−1.3	LM3	Turkana	1.87	this study
KNM-ER-6080	*Paranthropus boisei*	−2.2	Rm2	Turkana	1.60	this study
KNM-WT-17396	*Paranthropus boisei*	−1.9	Lm3	Turkana	1.72	this study
KNM-WT-37100	*Paranthropus boisei*	−1.8	m2 or m3	Turkana	1.72	this study
KNM-WT-37748	*Paranthropus boisei*	−2.1	RM3	Turkana	1.72	this study
OH5	*Paranthropus boisei*	−1.2	LM2	Olduvai	1.82	6
Peninj	*Paranthropus boisei*	−0.7	Lm2	Peninj	1.62	6
F20206	*Theropithecus oswaldi*	−1.0	m2	Turkana	Okote	this study
SK 14162	*Theropithecus oswaldi*	−3.7	M	Swartkrans	SK1	9
SK 2158	*Theropithecus oswaldi*	−0.4	M	Swartkrans	SK1	9
SK 2181	*Theropithecus oswaldi*	−2.6	M2	Swartkrans	SK1	10
SK 403	*Theropithecus oswaldi*	−5.3	M	Swartkrans	SK1	10
SK 411	*Theropithecus oswaldi*	−4.0	M	Swartkrans	SK1	9
SK 491	*Theropithecus oswaldi*	−1.6	M	Swartkrans	SK1	10
SK 495	*Theropithecus oswaldi*	−2.8	M	Swartkrans	SK1	9
SK 507	*Theropithecus oswaldi*	−0.3	M	Swartkrans	SK1	9
SK 581	*Theropithecus oswaldi*	−2.4	M	Swartkrans	SK1	10
SK 597	*Theropithecus oswaldi*	−1.3	M	Swartkrans	SK1	10
SKX 616	*Theropithecus oswaldi*	−1.1	M	Swartkrans	SK2	10

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Table S3. Modern samples from Tsavo National Park

Sample	Species	Year of death	$\delta^{13}C$ measured	$\delta^{13}C$ corrected to 1750*	$\delta^{18}O$	Tooth
Equidae						
K00-Tsv-215	*Equus burchelli*	2000	0.7	2.0	0.3	M3
K00-Tsv-219	*Equus burchelli*	2000	0.2	1.5	1.7	M3
K98-Tsv-139	*Equus burchelli*	1970	0.5	1.2	6	M3
K98-Tsv-140	*Equus burchelli*	1970	0.8	1.5	3.5	M3
K98-Tsv-141	*Equus burchelli*	1970	0.1	0.8	5.9	M3
K98-Tsv-142	*Equus burchelli*	1970	0.2	0.9	3.8	P4
K99-139-Tsv	*Equus burchelli*	1998	1.0	2.3	2.9	M3
	average		1.4	3.4		
	SD		0.6	2.1		
	number		7	7		
Giraffidae						
K99-136-Tsv	*Giraffa camelopardalis*	1999	−14.2	−12.9	3.3	M3
K00-Tsv-111	*Giraffa camelopardalis*	1970	−11.8	−11.0	5.5	p2
K00-Tsv-112	*Giraffa camelopardalis*	1970	−11.9	−11.2	3.7	p2
K00-Tsv-114	*Giraffa camelopardalis*	1970	−11.1	−10.4	5.3	p2
K00-Tsv-131	*Giraffa camelopardalis*	1970	−10.7	−10.0	3.9	p2
K00-Tsv-147	*Giraffa camelopardalis*	1970	−11.1	−10.4	3.9	p2
K08-TSV-209e	*Giraffa camelopardalis*	2008	−14.1	−12.6	−0.2	M3

Sample	Species	Year of death	$\delta^{13}C$ measured	$\delta^{13}C$ corrected to 1750*	$\delta^{18}O$	Tooth
ODW 6	*Giraffa camelopardalis*	1995	−12.1	−11.0	4.2	M3
	average		−11.2	3.7		
	SD		1.1	1.7		
	number		8	8		
Hippopotamidae						
K08-TSV-201-C-ave	*Hippopotamus amphibius*	2007	−4.8	−3.4	−2.2	C
K08-TSV-208e	*Hippopotamus amphibius*	2007	−2.9	−1.5	−3.8	C
K99-133-TSV	*Hippopotamus amphibius*	1999	−2.6	−1.3	−3.1	M3
K99-133-TSV	*Hippopotamus amphibius*	1999	−1.8	−0.6	−2.6	M2
K00-Tsv-200	*Hippopotamus amphibius*	1996	−5.9	−4.7	−1.8	m3
K00-TSV-226-M/3	*Hippopotamus amphibius*	1999	−2.8	−1.6	−3.0	m3
	average		−2.2	−2.8		
	SD		1.5	0.7		
	number		6	6		
Suidae						
K08-TSV-205-C-ave	*Phacochoerus africanus*	2007	−0.8	0.6	1.4	C
K08-TSV-216e	*Phacochoerus africanus*	2007	1.2	2.6	0.1	c
K98-Tsv-164	*Phacochoerus africanus*	1970	−0.7	0.1	2.7	M2
K98-Tsv-165	*Phacochoerus africanus*	1970	0.2	0.9	0.7	M3
	average		1	1.2		
	SD		1.1	1.1		
	number		4	4		

*$\delta^{13}C$ values are corrected to 1750 due to changes in the isotope composition of the atmosphere (1–3).

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Table S4. Treated (TRT) vs. untreated (UNT) CO_2 yields, and isotope data for four *Paranthropus boisei* specimens

Specimen	CO_2 yield, μmol/mg	$\delta^{13}C$	$\delta^{18}O$
ER-810-UNT	**1.34**	**−2.4**	**−2.2**
ER-810-TRT	0.75	−3.4	−3.3
ER-1806C-UNT	**1.81**	**−4.0**	**−2.7**
ER-1806C-TRT	0.59	−1.3	−2.0
ER-818-UNT	0.70	0.2	1.5
ER-818-TRT	0.59	0.7	1.9
ER-729-UNT	0.64	−0.2	−0.1
ER-729-TRT	0.44	0.0	−0.7

Enamel samples with yields in **bold** contain exogenous carbonate.