Supporting Information

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SI Methods

Sampling and Analytical Methods. Hominin teeth were sampled and analyzed as described in *Methods*. Results are presented in Table S1.

Isotope Enrichment Factors for Mammals. In our discussion, we estimate that the isotope enrichment for primates is likely *ca*. 14‰ (1). Thus, a pure C_3 diet would have a tooth enamel value of *ca*. −12‰ in mesic environments (i.e., *ca*. −26‰ for mesic pre-Industrial C_3 plants), whereas a pure C_4 diet would have a $\delta^{13}C$ value of *ca*. +2‰ to +4‰ (i.e., $\delta^{13}C_{1750}$ values of −12‰ to −10‰ for pre-Industrial C_4 plants). These nominal values of −26‰ and −12‰ for C_3 and C_4 plants, respectively, along with an enrichment of 14‰ for diet bioapatite will be used for discussions concerning the fraction of C_3- and C_4-based resources in diets.

Stratigraphic Information and Age Estimates for Hominins. Age ranges for hominins are based on their stratigraphic position relative relationship to the >350 layers of volcanic ash in the basin, of which >40 layers now have precise K-Ar or $^{40}Ar/^{39}Ar$ dates (2–6). These ages are further constrained by paleomagnetic information in some sections (2–6). In most instances, ages of hominins were computed by linear interpolation between stratigraphic levels of known age and the stratigraphic level of the hominin in question, but in some instances, the age was computed by linear extrapolation above or below stratigraphic levels of known age. Stratigraphic markers for individual hominins are given in Table S2.

Statistical Treatment. ANOVA and other statistical analyses were performed using JMP.

Taxonomic Assignments of Hominins. Taxonomic assignments are based on the material analyzed for stable isotope studies. Our sampling strategy has been to analyze only broken enamel surfaces so as not to disturb primary surfaces that might be of use to taxonomists and morphologists. Therefore, in some cases, we analyzed fragmentary material found in association with more complete fossils. Although it has been formerly assumed that this material is derived from the same organism, it is possible that, in some cases, this fragmentary material derives from a different individual and perhaps, even a different taxon. We use the identifications in Wood's (7) monograph on the Koobi Fora hominins and the recent compilation of Omo-Turkana Basin hominins (8) as a starting point. Several samples have had a history of being difficult to assign to a particular taxon, because they do not fit neatly in either *Paranthropus* or *Homo*; five such samples (KNM-ER 1482, 2593, 2607, 5431, and 42705) are assigned to Hominidae indet.

Biome Classification. The discussion of biomes is based on the United Nations Educational, Scientific, and Cultural Organization classification for African vegetation (9), which is primarily based on the fraction of woody cover; we further subdivide that nomenclature to allow better description of the continuum between 0% and 100% woody canopy cover. Woody cover percentages are used to describe biomes: grasslands, 0–10%; open woody grasslands, 10–20%; woody grasslands, 20–40%; grassy woodlands/bushlands/shrublands, 40–60%; woodlands/bushlands/shrublands, 60–80%; forests, 80–100%. These definitions and nomenclature are used to estimate the percentage woody cover in the geological record based on paleosols (10).

1. Cerling TE, Harris JM (1999) Carbon isotope fractionation between diet and bioapatite in ungulate mammals and implications for ecological and paleoecological studies. *Oecologia* 120:347–363.
2. Brown FH, Sarna-Wojcicki AM, Meyer CE, Haileab B (1992) Correlation of Pliocene and Quaternary tephra layers between the Turkana Basin of East Africa and the Gulf of Aden. *Quat Int* 13/14:55–67.
3. Brown FH, Haileab B, McDougall I (2006) Sequence of tuffs between the KBS Tuff and the Chari Tuff in the Turkana Basin, Kenya and Ethiopia. *J Geol Soc London* 163:185–204.
4. McDougall I, Brown FH (2006) Precise $^{40}Ar/^{39}Ar$ geochronology for the upper Koobi Fora Formation, Turkana Basin, northern Kenya. *J Geol Soc London* 163:205–220.
5. McDougall I, Brown FH (2008) Geochronology of the pre-KBS Tuff sequence, Omo Group, Turkana Basin. *J Geol Soc London* 165:549–562.
6. McDougall I, et al. (2012) New single crystal $^{40}Ar/^{39}Ar$ ages improve time scale for deposition of the Omo Group, Omo–Turkana Basin, East Africa. *J Geol Soc London* 169:213–226.
7. Wood BA (1991) *Koobi Fora Research Project Volume 4: Hominid Cranial Remains* (Oxford Univ Press, Oxford), Vol 4.
8. Wood BA, Leakey MG (2011) The Omo-Turkana Basin fossil hominins and their contribution to our understanding of human evolution in Africa. *Evol Anthropol* 20(6):264–292.
9. White F (1983) *The Vegetation of Africa* (United Nations Scientific and Cultural Organization, Paris), Vol 20.
10. Cerling TE, et al. (2011) Woody cover and hominin environments in the past 6 million years. *Nature* 476(7358):51–56.

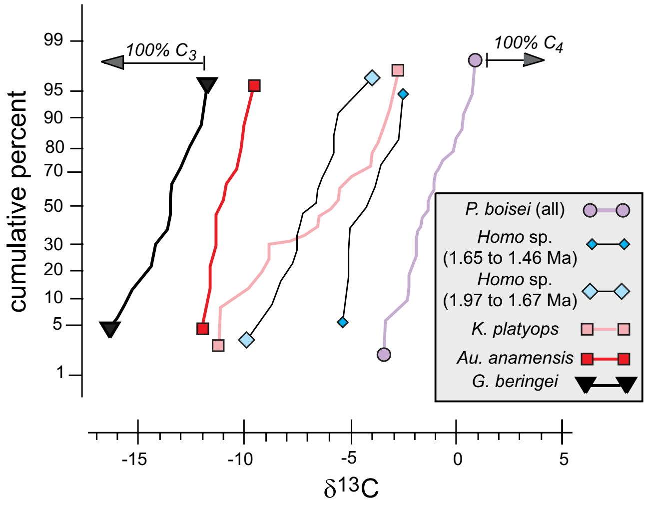

Fig. S1. Cumulative probabilities of $\delta^{13}C$ values for hominin groups ($n > 5$ individuals) in the Turkana Basin.

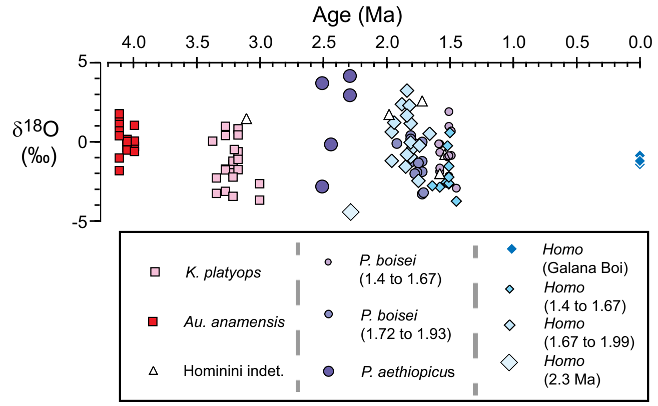

Fig. S2. $\delta^{18}O$ of hominin teeth as a function of age and taxon for the Turkana Basin. Values are reported in Table S1.

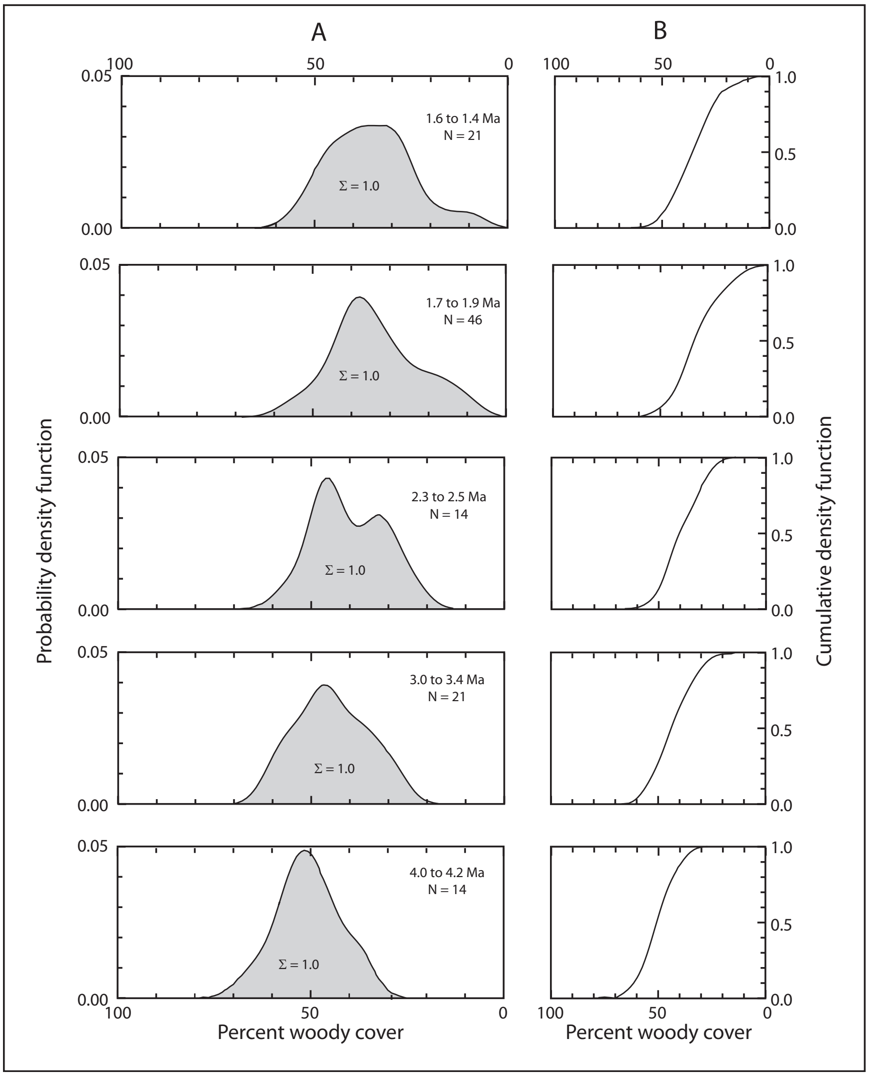

Fig. S3. Estimates of woody cover based on paleosols from the Nachukui and Koobi Fora Formations, Turkana Basin, using data from refs. 1 and 2 and methods from ref. 3, with samples chosen to correspond to time intervals discussed in the text. (*A*) Probability density functions summed for all paleosols for each time interval. (*B*) Cumulative density function from *A* for each time interval.

1. Levin NE, Brown FH, Behrensmeyer AK, Bobe R, Cerling TE (2011) Paleosol carbonates from the Omo Group: Isotopic records of local and regional environmental change in East Africa. *Palaeogeogr Palaeoecol Palaeoclim* 307:75–89.
2. Wynn JG (2000) Paleosols, stable carbon isotopes, and paleoenvironmental interpretation of Kanapoi, Northern Kenya. *J Hum Evol* 39(4):411–432.
3. Cerling TE, et al. (2011) Woody cover and hominin environments in the past 6 million years. *Nature* 476(7358):51–56.

Table S1. Stable isotope values of hominins in this study grouped by age

Specimen no.	Element	Taxon	$\delta^{13}C$	$\delta^{18}O$	Age (Ma)	± (Ma)
4.12–3.95 Ma						
KNM-ER 18540	m frag	*Australopithecus anamensis*	−11.3	−0.6	4.00	0.05
KNM-ER 20420	lt M2	*Au. anamensis*	−10.8	−0.1	4.00	0.05
KNM-KP 29287	rt m1	*Au. anamensis*	−9.9	0.1	4.06	0.04
KNM-KP 29287	rt m2	*Au. anamensis*	−9.5	−0.5	4.06	0.04
KNM-KP 29287	rt m3	*Au. anamensis*	−10.3	−0.4	4.06	0.04
KNM-KP 29287	lt m3	*Au. anamensis*	−10.9	0.4	4.06	0.04
KNM-KP 29287A	lt m2	*Au. anamensis*	−10.3	0.4	4.06	0.04
KNM-ER 30200B	lt M3	*Au. anamensis*	−11.6	−0.1	4.00	0.05
KNM-KP 30498D	lt M3	*Au. anamensis*	−11.6	1.0	4.12	0.04
KNM-KP 30502D	rt m3	*Au. anamensis*	−9.3	−1.7	4.12	0.04
KNM-KP 30502E	lt m3	*Au. anamensis*	−9.7	−1.1	4.12	0.04
KNM-ER 30745	lt M3	*Au. anamensis*	−10.0	1.3	4.00	0.05
KNM-KP 35839	lt P3	*Au. anamensis*	−11.3	0.3	4.12	0.04
KNM-KP 35840A	lt M3	*Au. anamensis*	−11.0	1.7	4.12	0.04
KNM-KP 35842	M	*Au. anamensis*	−10.3	—	4.12	0.04
KNM-KP 35847	lt m2	*Au. anamensis*	−12.0	1.3	4.12	0.04
KNM-KP 35851	lt M3	*Au. anamensis*	−11.3	1.1	4.12	0.04
3.4–3.0 Ma						
KNM-WT 8556B	m	*Kenyanthropus platyops*	−6.6	−3.3	3.24	0.10
KNM-WT 16006	lt m2	*K. platyops*	−5.4	−3.3	3.37	0.05
KNM-WT 22936	rt m1	*K. platyops*	−9.2	0.1	3.40	0.20
KNM-LT 23181	rt dM2	*K. platyops*	−4.9	0.9	3.30	0.20
KNM-LT 23182	rt m3	*K. platyops*	−5.9	0.5	3.30	0.20
KNM-LT 25936	P frag	*K. platyops*	−8.9	−1.7	3.30	0.20
KNM-WT 38332	rt M2	*K. platyops*	−2.7	−2.3	3.37	0.05
KNM-WT 38335	M	*K. platyops*	−5.6	−3.5	3.24	0.10
KNM-WT 38338	M2	*K. platyops*	−9.9	−3.3	3.30	0.10
KNM-WT 38342	lt m1	*K. platyops*	−11.1	−3.2	3.30	0.10
KNM-WT 38344	m1 or m2	*K. platyops*	−3.7	−3.7	3.03	0.10
KNM-WT 38346	M	*K. platyops*	−8.8	0.8	3.20	0.10
KNM-WT 38350	lt M	*K. platyops*	−11.1	−1.2	3.24	0.10
KNM-WT 38356	M1 or M2	*K. platyops*	−3.0	−2.5	3.03	0.10
KNM-WT 38358B	lt m2	*K. platyops*	−4.7	−1.6	3.20	0.10
KNM-WT 38358C	lt m3	*K. platyops*	−3.3	−1.2	3.20	0.10
KNM-WT 38358D	lt m1	*K. platyops*	−3.7	−0.1	3.20	0.10
KNM-WT 38358F	rt M3	*K. platyops*	−4.0	−0.3	3.20	0.10
KNM-WT 38359	m1 or m2	*K. platyops*	−4.0	−0.4	3.23	0.10
KNM-WT 38361H	lt P4	*K. platyops*	−7.2	−1.7	3.24	0.10
KNM-WT 38362B	lt M1 or M2	*K. platyops*	−6.6	−2.3	3.24	0.10
KNM-ER 5431F	lt p4	Hominini indet.	−4.3	1.5	3.10	0.10
2.25–2.55 Ma						
KNM-WT 16005	lt m2	*Paranthropus aethiopicus*	−5.1	−0.2	2.45	0.05
KNM-WT 17000	lt M2	*P. aethiopicus*	−0.3	−2.7	2.52	0.05
KNM-WT 38351	lt M frag	*P. aethiopicus*	−4.7	3.8	2.30	0.05
KNM-WT 38353A	m1 or m2	*P. aethiopicus*	−4.6	4.2	2.30	0.05
KNM-WT 38353B	lt m1 or m2	*P. aethiopicus*	−4.4	3.0	2.30	0.05
KNM-WT 42718	rt m1	*Homo* sp.	−7.2	−4.4	2.29	0.03
1.99–1.67 Ma						
KNM-ER 816B	M frag	*P. cf boisei*	−1.9	−1.3	1.73	0.03
KNM-ER 3952F	lt M3	*P. cf boisei*	−1.2	0.0	1.82	0.05
KNM-ER 732A	rt P4	*P. boisei*	−0.1	−1.8	1.78	0.10
KNM-ER 810	p3	*P. boisei*	−3.4	−3.3	1.73	0.03
KNM-ER 1469A	lt m3	*P. boisei*	−2.3	−0.1	1.93	0.04
KNM-ER 1479A	m3	*P. boisei*	−2.3	0.2	1.82	0.05
KNM-ER 1804	lt M3	*P. boisei*	−1.2	−0.7	1.73	0.03
KNM-ER 1806C	rt m3	*P. boisei*	−1.3	−2.0	1.76	0.04
KNM-ER 13750	m frag	*P. boisei*	0.2	0.5	1.82	0.05
KNM-ER 15940	lt m3	*P. boisei*	−1.1	−0.6	1.73	0.03
KNM-WT 17396	lt m3	*P. boisei*	−1.9	−3.1	1.77	0.03
KNM-WT 37100	m2 or m3	*P. boisei*	−1.8	−1.5	1.77	0.03
KNM-WT 37748	rt M3	*P. boisei*	−2.1	0.0	1.77	0.03
KNM-ER 1478A	m frag	*Homo* sp.	−8.6	1.3	1.82	0.05

Table S1. Cont.

Specimen no.	Element	Taxon	$\delta^{13}C$	$\delta^{18}O$	Age (Ma)	± (Ma)
KNM-ER 1478A	M2	*Homo* sp.	−8.1	0.0	1.82	0.05
KNM-ER 1483E	m frag	*Homo* sp.	−7.5	2.4	1.89	0.03
KNM-ER 1593C	m1	*Homo* sp.	−7.4	2.1	1.80	0.07
KNM-ER 1802B	lt M3 or m3	*Homo* sp.	−6.4	−1.2	1.97	0.03
KNM-ER 1805	lt m1	*Homo* sp.	−7.7	−2.4	1.76	0.04
KNM-ER 1814E	m3	*Homo* sp.	−6.6	0.6	1.67	0.10
KNM-ER 2599	lt p4	*Homo* sp.	−9.9	−1.6	1.86	0.03
KNM-ER 2600	m-frag	*Homo* sp.	−6.1	−1.0	1.82	0.05
KNM-ER 3734	lt m3	*Homo* sp.	−5.8	1.2	1.95	0.03
KNM-ER 7330	rt P3	*Homo* sp.	−5.5	2.3	1.83	0.04
KNM-WT 37745	rt p3	*Homo* sp.	−6.4	−0.2	1.75	0.05
KNM-ER 45501	m frag	*Homo* sp.	−5.8	−0.7	1.85	0.10
KNM-ER 45502	lt m1 or m2	*Homo* sp.	−3.9	3.4	1.85	0.10
KNM-ER 45503	M2 or M3	*Homo* sp.	−8.6	1.7	1.85	0.10
KNM-ER 62000	rt M1	*Homo* sp.	−7.2	0.6	1.97	0.04
KNM-ER 1482A	lt m2	Hominini indet.	−0.4	1.8	1.99	0.05
KNM-ER 2607	m frag	Hominini indet.	−9.2	2.6	1.73	0.10
1.65–1.46 Ma						
KNM-ER 3887	rt M3	*P. cf boisei*	−1.7	−2.9	1.46	0.03
KNM-ER 729A	lt p4	*P. boisei*	0.0	−0.7	1.53	0.03
KNM-ER 733A	rt m3	*P. boisei*	−1.5	−2.6	1.52	0.03
KNM-ER 733D	lt P4	*P. boisei*	−0.5	−2.2	1.52	0.03
KNM-ER 801C	lt m3	*P. boisei*	0.4	−1.8	1.59	0.04
KNM-ER 802D	lt m1	*P. boisei*	−0.1	−1.7	1.59	0.04
KNM-ER 802G	m3	*P. boisei*	−1.9	0.0	1.59	0.04
KNM-ER 818	lt m3	*P. boisei*	0.7	1.9	1.50	0.05
KNM-ER 1171C	lt m1	*P. boisei*	−0.6	−1.9	1.59	0.04
KNM-ER 1819	m3	*P. boisei*	0.9	−0.7	1.60	0.10
KNM-ER 3737B	rt m1	*P. boisei*	−1.6	−2.5	1.59	0.04
KNM-ER 6080	rt m2	*P. boisei*	−2.2	−0.6	1.52	0.03
KNM-ER 6082	lt p3	*P. boisei*	−0.8	1.1	1.50	0.04
KNM-ER 15951F	m frag	*P. boisei*	−3.3	−0.9	1.52	0.03
KNM-ER 730A	lt m1	*Homo*	−2.6	−0.7	1.54	0.05
KNM-ER 807	lt M1	*Homo*	−5.6	−1.7	1.52	0.05
KNM-ER 807	lt M2	*Homo*	−5.2	−2.2	1.52	0.05
KNM-ER 808G	rt M1	*Homo*	−5.1	−2.2	1.52	0.03
KNM-ER 809A	lt m1	*Homo*	−5.0	−2.6	1.53	0.03
KNM-ER 820	lt dm2	*Homo*	−3.5	−0.2	1.51	0.05
KNM-ER 992B	lt c	*Homo*	−5.0	0.6	1.46	0.03
KNM-ER 1808I	m frag	*Homo*	−2.6	−3.7	1.59	0.03
KNM-ER 3733	lt M1	*Homo*	−4.6	−2.8	1.65	0.05
KNM-ER 3733	lt M2	*Homo*	−3.8	−2.8	1.65	0.05
KNM-ER 2593	m frag	Hominini indet.	−0.8	−0.4	1.55	0.05
KNM-ER 42705	m3 frag	Hominini indet.	−2.0	−2.4	1.59	0.04
0.01 Ma						
KNM-LT 13700b	rt m2	*H. sapiens*	−6.9	−0.9	0.01	0.005
KNM-LT 13700b	rt m3	*H. sapiens*	−5.4	−1.3	0.01	0.005
KNM-LT 27714B	lt m2	*H. sapiens*	−2.2	−0.9	0.01	0.005
KNM-LT 27719C	rt M2	*H. sapiens*	−2.6	−1.5	0.01	0.005
KNM-WT 38400	lt m1	*H. sapiens*	−6.8	−0.9	0.01	0.005

Specimen numbers are from the National Museums of Kenya (KNM). m frag, molar fragment; lt, left; rt, right; m, lower molar; M, upper molar; p, lower premolar; P, upper premolar.

Table S2. $\delta^{13}C$ **and** $\delta^{18}O$ **values for tooth enamel from primates in East and Central Africa**

Sample	Species	Tooth	$\delta^{13}C$	$\delta^{13}C_{1750}$	$\delta^{18}O$	Year of death	Country	Location	Source
ICCN-KB-064	*Gorilla beringei*	M1	−16.8	−15.1	−3.0	2004	DRC	Kahuzi-Biega	This study
ICCN-KB-065	*G. beringei*	M1	−17.8	−16.2	−3.8	1996	DRC	Kahuzi-Biega	This study
ICCN-KB-066	*G. beringei*	M3	−14.0	−12.5	−4.1	1997	DRC	Kahuzi-Biega	This study
ICCN-KB-070	*G. beringei*	M3	−15.1	−13.3	−3.9	2003	DRC	Kahuzi-Biega	This study
ICCN-KB-078	*G. beringei*	m1	−15.9	−14.3	−3.8	1997	DRC	Kahuzi-Biega	This study
ICCN-KB-078	*G. beringei*	m2	−14.1	−12.6	−3.6	1997	DRC	Kahuzi-Biega	This study
ICCN-KB-088	*G. beringei*	m2	−14.2	−12.6	−3.0	1997	DRC	Kahuzi-Biega	This study
ICCN-KB-089	*G. beringei*	m3	−14.9	−13.3	−5.2	1997	DRC	Kahuzi-Biega	This study
L3150 E	*G. beringei*	P3	−15.4	−14.6	−4.3	1972	DRC	Kahuzi-Biega	This study
ICCN-WCS-022	*G. beringei*	P4	−14.8	−13.2	−2.9	1996	DRC	Itombwe massif	This study
ICCN-WCS-040	*G. beringei*	M3	−13.3	−11.7	−5.7	1996	DRC	Itombwe massif	This study
ICCN-WCS-074	*G. beringei*	m3	−13.0	−11.5	−2.5	1996	DRC	Itombwe massif	This study
ICCN-WCS-075	*G. beringei*	C	−14.3	−12.8	−4.5	1996	DRC	Itombwe massif	This study
ICCN-WCS-075	*G. beringei*	M2	−14.4	−12.9	−3.5	1996	DRC	Itombwe massif	This study
ICCN-WCS-076	*G. beringei*	M2	−15.5	−13.9	−4.6	1996	DRC	Itombwe massif	This study
CEF-048	*Cercopithecus* sp.	M3	−15.8	−14.3	−0.2	1995	DRC	Ituri	1
CEF-249	*Cercopithecus* sp.	M3	−16.9	−15.3	0.7	1995	DRC	Ituri	1
ICCN-KB-072	*Cercopithecus* sp.	M3	−14.9	−13.2	−2.9	2002	DRC	Kahuzi-Beiga	This study
ICCN-KB-072	*Cercopithecus* sp.	M2	−14.6	−12.8	−4.2	2002	DRC	Kahuzi-Beiga	This study
ET05-AA-M152	*C. aethiops*	lm2	−14.3	−13.5	6.1	1965	Ethiopia	Bulbula	2
ET05-AA-M151	*C. aethiops*	lM	−14.0	−13.2	5.4	1965	Ethiopia	Bulbula	2
ET05-AA-M299	*C. aethiops*	M	−13.4	−12.6	3.8	1965	Ethiopia	Bulbula	2
ET05-AA-M191	*C. aethiops*	m2	−12.3	−11.5	2.6	1965	Ethiopia	Debre Zehir	2
ET05-AA-M146	*C. neglectus*	M2	−16.5	−15.7	0.2	1965	Ethiopia	Godare	2
CEF-239	*Colobus* sp.	M3	−16.1	−14.6	4.9	1995	DRC	Ituri	1
JAH-015	*Colobus* sp.	m3	−16.5	−15.0	6.8	1995	DRC	Ituri	1
CEF-182	*Colobus* sp.	M3	−16.5	−15.0	0.1	1995	DRC	Ituri	1
L15359	*Colobus* sp.	C	−17.0	−16.3	−0.2	1966	DRC	unk	This study
ICCN-KB-063	*Colobus* sp.	M2	−14.6	−12.8	−1.5	2004	DRC	Kahuzi-Beiga	This study
CEF-135	*Pan troglodytes*	M2	−16.0	−14.5	−1.1	1995	DRC	Ituri	1
WCS-041	*P. troglodytes*	M2	−15.1	−13.5	−3.1	1996	DRC	Itombwe massif	This study
CEF-207	*Papio anubis*	M3	−17.1	−15.5	−1.4	1995	DRC	Ituri	1
K98-Lai-306-M3	*P. anubis*	M3	−4.1	−2.5	4.4	1997	Kenya	Laikipia	This study
K98-Lai-344	*P. anubis*	M3	−6.8	−5.2	4.9	1998	Kenya	Laikipia	This study
K97-231-Lai	*P. anubis*	M2	−4.8	−3.3	8.1	1997	Kenya	Laikipia	This study
87-OLOR-625	*P. anubis*	M2	−10.5	−9.2	4.3	1987	Kenya	Olorgesailie	This study
95-OLOR-235	*P. anubis*	m2	−11.1	−9.6	4.1	1995	Kenya	Olorgesailie	This study
K98-Tsv-147	*P. anubis*	m2	−8.8	−7.4	1.7	1994	Kenya	Tsavo	This study
K98-Tsv-148	*P. anubis*	m3	−12.3	−10.8	1.5	1994	Kenya	Tsavo	This study
SU96:5	*P. anubis*	M3	−12.5	−10.9	4.8	1996	Kenya	Turkana	This study
L4180	*P. anubis*	C	−13.6	−12.9	−2.3	1958	DRC	eastern DRC	This study
L5450	*P. anubis*	C	−13.2	−12.5	−1.5	1959	DRC	Kisoro/Rutsuru	This study
L5148	*P. anubis*	P4	−11.3	−10.5	−2.7	1959	DRC	Chagulube/Kalehe	This study
L5593	*P. anubis*	I	−10.3	−9.6	−2.1	1959	DRC	Nyamukubi/Kalehe	This study
ET05-BM-09	*P. anubis*	M3	−14.1	−12.4	−1.3	2000	Ethiopia	Bale NP	2
ET05-MAGO-02	*P. anubis*	M3	−14.0	−12.3	−0.3	2000	Ethiopia	Mago NP	2
ET05-NCHSR-08	*P. anubis*	M2	−14.5	−12.8	3.9	2000	Ethiopia	Nechisar NP	2
ET05-NCHSR-14	*P. anubis*	M3	−11.0	−9.3	−1.5	2000	Ethiopia	Nechisar NP	2
ET05-NCHSR-14	*P. anubis*	P	−13.2	−11.5	1.3	2000	Ethiopia	Nechisar NP	2
LS-1	*Papio hamadryas*	M3	−6.4	−4.7	−0.6	2000	Ethiopia	Awash NP	2
LS-2	*P. hamadryas*	M3	−12.1	−10.4	1.1	2000	Ethiopia	Awash NP	2
LS-3	*P. hamadryas*	M3	−11.8	−10.1	−0.2	2000	Ethiopia	Awash NP	2
GON04M-88	*P. hamadryas*	m3	−12.1	−10.4	0.6	2000	Ethiopia	Gona	2
GON06NO-03	*P. hamadryas*	m2	−11.9	−10.2	1.9	2000	Ethiopia	Gona	2
GON06NO-03	*P. hamadryas*	m3	−12.0	−10.3	2.2	2000	Ethiopia	Gona	2

Measured $\delta^{13}C$ values have been corrected to 1750 based on the estimated year of death of the individual; this correction is because of the change in the $\delta^{13}C$ value of the atmosphere from fossil fuel burning (3, 4). DRC, Democratic Republic of Congo.

1. Cerling TE, Hart JA, Hart TB (2004) Stable isotope ecology in the Ituri Forest. *Oecologia* 138(1):5–12.
2. Levin NE, et al. (2008) Herbivore enamel carbon isotopic composition and the environmental context of *Ardipithecus* at Gona, Ethiopia. *The Geology of Early Humans in the Horn of Africa,* Geological Society of America Special Paper, eds Quade J, Wynn JG (Geological Society of America, Boulder, CO), pp 215–234.
3. Francey RJ, et al. (1999) A 1000-year high precision record of $\delta^{13}C$ in atmospheric CO2. *Tellus B Chem Phys Meteorol* 51:170–193.
4. Keeling RF, Piper SC, Bollenbacher AF, Walker SJ (2010) Monthly atmospheric 13C/12C isotopic ratios for 11 SIO stations. *Trends: A Compendium of Data on Global Change* (Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, US Department of Energy, Oak Ridge, TN).

Table S3. Stratigraphic information used to determine age estimates for hominin fossils in the Turkana Basin

Specimen	Formation	Member	Area/locality	Marker	Level	Age (Ma)	±
KNM-ER 729	Koobi Fora	Okote	Area 8	BPT	2	1.53	0.03
KNM-ER 730	Koobi Fora	KBS	Area 103	LKF	−5	1.54	0.05
KNM-ER 732	Koobi Fora	KBS	Area 10	Upper KBS		1.78	0.10
KNM-ER 733	Koobi Fora	Okote	Area 8	SubNILT	−4	1.52	0.03
KNM-ER 801	Koobi Fora	Okote	Area 6A	LIL	−8	1.59	0.04
KNM-ER 802	Koobi Fora	Okote	Area 6A	LIL	−8	1.59	0.04
KNM-ER 807	Koobi Fora	Okote	Area 8A	6159	−2	1.52	0.05
KNM-ER 808	Koobi Fora	Okote	Area 8	SubNILT	−5	1.52	0.03
KNM-ER 809	Koobi Fora	Okote	Area 8	BPT	2	1.53	0.03
KNM-ER 810	Koobi Fora	KBS	Area 104	A2	−4	1.73	0.03
KNM-ER 816	Koobi Fora	KBS	Area 104	A2	−4	1.73	0.03
KNM-ER 818	Koobi Fora	Okote	Area 6	ILN	−2	1.50	0.05
KNM-ER 820	Koobi Fora	Okote	Area 1	SubNILT	−2	1.51	0.05
KNM-ER 992	Koobi Fora	Okote	Area 1	ILN	10	1.46	0.03
KNM-ER 1171	Koobi Fora	Okote	Area 6A	LIL	−8	1.59	0.04
KNM-ER 1469	Koobi Fora	Upper Burgi	Area 131	KBS	−13	1.93	0.04
KNM-ER 1478	Koobi Fora	KBS	Area 105	KBS	cc	1.82	0.05
KNM-ER 1479	Koobi Fora	KBS	Area 105	KBS	cc	1.82	0.05
KNM-ER 1482	Koobi Fora	Upper Burgi	Area 131	KBS	−26	1.99	0.05
KNM-ER 1483	Koobi Fora	Upper Burgi	Area 131	KBS	−4	1.89	0.03
KNM-ER 1593	Koobi Fora	KBS	Area 12	KBS	*ca.* C4	1.80	0.07
KNM-ER 1802	Koobi Fora	Upper Burgi	Area 131	GPC	—	1.97	0.03
KNM-ER 1804	Koobi Fora	KBS	Area 104	A2	−4	1.73	0.03
KNM-ER 1805	Koobi Fora	KBS	Area 130	KBS	11	1.76	0.04
KNM-ER 1806	Koobi Fora	KBS	Area 130	KBS	11	1.76	0.04
KNM-ER 1808	Koobi Fora	KBS	Area 103	A6	−2	1.59	0.03
KNM-ER 1814	Koobi Fora	KBS	Area 127	KBS		1.67	0.10
KNM-ER 1819	Koobi Fora		Area 3	None		1.60	0.10
KNM-ER 2593	Koobi Fora	Okote	Area 6	MIL	+1	1.48	0.03
KNM-ER 2599	Koobi Fora	KBS	Area 15	KBS	2	1.86	0.03
KNM-ER 2600	Koobi Fora	KBS	Area 130	KBS	cc	1.82	0.05
KNM-ER 2607	Koobi Fora	KBS	Area 105			1.73	0.10
KNM-ER 3733	Koobi Fora	KBS	Area 104	White	−1	1.65	0.05
KNM-ER 3734	Koobi Fora	KBS	Area 105	GPC	1	1.95	0.03
KNM-ER 3737	Koobi Fora	Okote	Area 6A	LIL	−8	1.59	0.04
KNM-ER 3887	Koobi Fora	Okote	Area 1	ILN	10	1.46	0.03
KNM-ER 3952	Koobi Fora	KBS	Area 105	KBS	cc	1.82	0.05
KNM-ER 5431	Koobi Fora	Tulu Bor	Area 203	TUL		3.20	0.10
KNM-ER 6080	Koobi Fora	Okote	Area 8A	SubNILT	−4	1.52	0.03
KNM-ER 6082	Koobi Fora	Okote	Area 8A	ILN	−2	1.50	0.04
KNM-ER 7330	Koobi Fora	KBS	Area 107	C4	0	1.83	0.04
KNM-WT 8556	Nachukui	Lomekwi	LO5	TUL	17	3.24	0.10
KNM-ER 13750	Koobi Fora	KBS	Area 105	KBS	cc	1.82	0.05
KNM-ER 15940	Koobi Fora	KBS	Area 104	A2	−4	1.73	0.03
KNM-ER 15951	Koobi Fora	Okote	Area 8	SubNILT	−3	1.52	0.03
KNM-WT 16005	Nachukui	Lokalalei	Kangatukuseo	KU2		2.45	0.05
KNM-WT 16006	Nachukui	Lomekwi	LO4	TUL	5	3.37	0.05
KNM-WT 17000	Nachukui	Lokalelei	LO1	LKL	0	2.52	0.05
KNM-WT 17396	Nachukui	Kaito	Kokiselei KS1			1.77	0.03
KNM-ER 18540	Koobi Fora	Lonyumun	Area 261	MOI	−5	4.00	0.05
KNM-ER 20420	Koobi Fora	Lonyumun	Area 261	MOI	−5	4.00	0.05
KNM-WT 22936	Nachukui	South Turkwel				3.40	0.20
KNM-LT 23181	Nachukui	Kaiyumung				3.30	0.20
KNM-LT 23182	Nachukui	Kaiyumung				3.30	0.20
KNM-LT 25936	Nachukui	Kaiyumung				3.30	0.20
KNM-KP 29287	Kanapoi			KAN	3	4.06	0.04
KNM-ER 30200	Koobi Fora	Lonyumun	Area 261	MOI	−5	4.00	0.05
KNM-KP 30498	Kanapoi	—				4.12	0.04
KNM-KP 30502	Kanapoi	—				4.12	0.04
KNM-ER 30745	Koobi Fora	Lonyumun	Area 261	MOI	−5	4.00	0.05
KNM-KP 35839	Kanapoi	—				4.12	0.04
KNM-KP 35840	Kanapoi					4.12	0.04
KNM-KP 35842	Kanapoi	—				4.12	0.04

Table S3. Cont.

Specimen	Formation	Member	Area/locality	Marker	Level	Age (Ma)	±
KNM-KP 35847	Kanapoi	—				4.12	0.04
KNM-KP 35851	Kanapoi	—				4.12	0.04
KNM-WT 37100	Nachukui	Kaito	Kokiselei KS1			1.77	0.03
KNM-WT 37745	Nachukui	Kaito	NY1			1.75	0.05
KNM-WT 37748	Nachukui	Kaito	Kokiselei KS1			1.77	0.03
KNM-WT 38332	Nachukui	Lomekwi	LO4E	TUL	5	3.37	0.05
KNM-WT 38335	Nachukui	Lomekwi	LO4E	TUL	17	3.24	0.10
KNM-WT 38338	Nachukui	Lomekwi	LO4E			3.30	0.10
KNM-WT 38342	Nachukui	Lomekwi	LO4E			3.30	0.10
KNM-WT 38344	Nachukui	Lomekwi	LO9	TUL	36	3.03	0.10
KNM-WT 38346	Nachukui	Lomekwi	LO5			3.20	0.10
KNM-WT 38350	Nachukui	Lomekwi	LO5	TUL	17	3.24	0.10
KNM-WT 38351	Nachukui	Lomekwi	LO1			2.52	0.05
KNM-WT 38353	Nachukui	Kalochoro	LO3	KALO		2.30	0.05
KNM-WT 38353	Nachukui	Kalochoro	LO3	KALO		2.30	0.05
KNM-WT 38356	Nachukui	Lomekwi	LO9	TUL	36	3.03	0.10
KNM-WT 38358	Nachukui	Lomekwi	LO5	TUL	>19	3.20	0.10
KNM-WT 38359	Nachukui	Lomekwi	LO5	TUL	19	3.23	0.10
KNM-WT 38361	Nachukui	Lomekwi	LO5	TUL	17	3.24	0.10
KNM-WT 38362	Nachukui	Lomekwi	LO5	TUL	17	3.24	0.10
KNM-ER 42705	Koobi Fora	Okote	Area 6A			1.59	0.04
KNM-WT 42718	Nachukui	Kalochoro	LA1α	EKAL	2.2	2.29	0.03
KNM-ER 45501	Koobi Fora	KBS	Area 123			1.85	0.10
KNM-ER 45502	Koobi Fora	KBS	Area 123			1.85	0.10
KNM-ER 45503	Koobi Fora	KBS	Area 123			1.85	0.10
KNM-ER 62000	Koobi Fora	Upper Burgi	Area 131	KBS	−23	1.97	0.04

Ages based on the chronology from refs. 1–5. BPT, Black Pumice Tuff; EKAL, Ekalalei Tuff; GPC, gold pebble conglomerate (stratigraphic marker); ILN, Northern Ileret Tuff; KALO, Kalochoro Tuff; KAN, Kangaki Tuff; KBScc, KBS channel complex in Areas 130, 131, Koobi Fora; KU2, site name: Kangatukuseo 2; LIL, Lower Ileret Tuff; LKF, Lower Koobi Fora Tuff; LKL, Lokalalei Tuff; MIL, Middle Ileret Tuff; MOI, Moiti Tuff; SubNILT, Below Northern Ileret Tuff; TUL, Tulu Bor Tuff.

1. Brown FH, Sarna-Wojcicki AM, Meyer CE, Haileab B (1992) Correlation of Pliocene and Quaternary tephra layers between the Turkana Basin of East Africa and the Gulf of Aden. *Quat Int* 13/14:55–67.
2. Brown FH, Haileab B, McDougall I (2006) Sequence of tuffs between the KBS Tuff and the Chari Tuff in the Turkana Basin, Kenya and Ethiopia. *J Geol Soc London* 163:185–204.
3. McDougall I, Brown FH (2006) Precise $^{40}Ar/^{39}Ar$ geochronology for the upper Koobi Fora Formation, Turkana Basin, northern Kenya. *J Geol Soc London* 163:205–220.
4. McDougall I, Brown FH (2008) Geochronology of the pre-KBS Tuff sequence, Omo Group, Turkana Basin. *J Geol Soc London* 165:549–562.
5. McDougall I, et al. (2012) New single crystal $^{40}Ar/^{39}Ar$ ages improve time scale for deposition of the Omo Group, Omo–Turkana Basin, East Africa. *J Geol Soc London* 169:213–226.