Supporting Information

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SI Materials and Methods

Tooth samples were obtained over several field seasons by teams led by E.L.S. in the Jebel Qatrani and Birket Qarun Formations, Fayum Depression, northern Egypt. Individual samples were cleaned, with accompanying matrix removed by hand, and the tooth surfaces were then air-abraded to remove surface contaminants on the outer layers of enamel (those most prone to diagenetic alteration). A diamond drill bit was used to extract samples from the teeth, although for some larger samples, fragments of enamel could be snapped off and ground with an agate pestle and mortar. A minimum sample size of five individuals per population was used to ensure results were statistically significant (consistent with Clementz and Koch, ref. 1).

To obtain the oxygen and carbon stable isotope ratios, we followed the sample pretreatment methods of Koch *et al.* (2). Powdered enamel samples of 0.1–0.5 mg were treated with 0.5 ml of ~3% sodium hypochlorite in 1.5-ml centrifuge tubes for 24 hr to oxidize any organic matter, then rinsed five times with distilled water in a centrifuge. They were then treated for 24 hr with 0.5 ml of 1 M calcium acetate buffered with acetic acid to pH 4.9 to remove carbonate contaminants in non-carbonate lattice sites (e.g. pore-filling cements), rinsed five times with distilled water, and dried in an oven at 50°C overnight (2).

The oxygen and carbon results were obtained in the Department of Earth Sciences, Oxford, U.K., using a VG Isogas Prism II mass spectrometer with an on-line VG Isocarb common acid bath preparation system. All samples were cleaned with hydrogen peroxide and dried in an oven at 60°C overnight. When loaded into the preparation system, each sample was reacted with purified phosphoric acid at 90°C, with the liberated carbon dioxide being frozen (using liquid nitrogen) into a "finger," which then entered the spectrometer for analysis.

Both oxygen and carbon stable isotope ratios are reported relative to the PDB (Pee Dee Formation belemnite) standard, and the sample analyses were completed in six runs. Calibration was against the in-house NOCZ Carrara marble standard, with reproducibility of the standard better than 0.2‰. Oxygen isotope ratios were later calculated relative to SMOW (standard mean ocean water) to accurately compare them with published data, using the formula

$$\delta^{18}O_{SMOW} = 30.91 + (1.03091 \times \delta^{18}O_{PDB}).$$

Statistical analyses were performed on the data using either Microsoft Excel 2003 or the palaeontological program PAST (3). There were too few samples to determine whether the populations were normally distributed, meaning results from analysis of variance (ANOVA) techniques followed by a post-hoc Tukey test were of uncertain accuracy. Therefore nonparametric Kruskal–Wallis and Mann–Whitney *U* tests were performed for comparison. The results indicate very little difference in significance between the various statistical methods.

Powdered rock samples were not subjected to any chemical treatment prior to insertion into the mass spectrometer other than use of H_2O_2 and oven-drying at 60°C.

1. Clementz MT, Koch PL (2001) Differentiating aquatic mammal habitat and foraging ecology with stable isotopes in tooth enamel. *Oecologia* 129:461–472.
2. Koch PL, Tuross N, Fogel ML (1997) The effects of sample treatment and diagenesis on the isotopic integrity of carbonate in biogenic hydroxylapatite. *J Archaeol Sci* 24:417–429.
3. Hammer Ø, Harper DAT, Ryan PD (2001) PAST: Paleontological Statistics Software Package for Education and Data Analysis. *Paleontol Electr* 4:9.

Table S1. Isotopic data for individual specimens

Taxon	D.P.C. no.	*n*	Locus	Locality	Mean ($\pm 1\sigma$) $\delta^{13}C$, ‰ PDB	Mean ($\pm 1\sigma$) $\delta^{18}O$, ‰ PDB	Mean $\delta^{18}O$, ‰ SMOW
Moeritherium sp.	23303	6	L M3	BQ-2	−8.736 ± 0.19	−3.981 ± 0.20	26.806
	22412	2	L M3	BQ-2	−8.858 ± 0.03	−3.244 ± 0.01	27.566
	21516	3	?	BQ-2	−9.147 ± 0.13	−3.915 ± 0.13	26.874
	21746	5	U M	BQ-2	−8.266 ± 0.22	−3.871 ± 0.36	26.919
	21352	2	M	BQ-2	−8.994 ± 0.05	−4.433 ± 0.23	26.340
Barytherium sp.	20844	7	?	BQ-2	−7.654 ± 0.13	−3.813 ± 0.14	26.979
	20849	5	?	BQ-9	−7.716 ± 0.10	−4.679 ± 0.22	26.086
	20857	2	?	BQ-4	−8.355 ± 0.03	−4.577 ± 0.07	26.192
	21170	3	?	BQ-2	−7.075 ± 0.10	−4.452 ± 0.12	26.320
	20893	4	?	BQ-8	−8.433 ± 0.11	−3.754 ± 0.23	27.040
Anthracothere	17126	1	L P3	L-41	−6.445	−1.521	29.342
	16540	2	M 1–2	L-41	−8.062 ± 0.18	0.939 ± 0.94	31.878
	21941	2	U P	L-41	−8.294 ± 0.17	1.630 ± 0.22	32.590
	21656	5	L M3	L-41	−8.908 ± 0.17	1.028 ± 0.19	31.970
	14157	1	M1	L-41	−9.218	1.963	32.934
	21887	2	M 1–2	L-41	−9.765 ± 0.35	0.443 ± 0.16	31.367
Thyrohyrax meyeri	20233	1	M1	L-41	−8.719	0.806	31.741
	21941	3	M3	L-41	−9.006 ± 0.38	0.514 ± 0.18	31.440
	21350	2	L M3	L-41	−7.313 ± 0.20	2.022 ± 0.46	32.995
	22354	1	M3	L-41	−7.278	0.995	31.936
	22680	1	M3	L-41	−7.729	2.399	33.383
	15433	1	L M3	L-41	−7.718	1.280	32.230
Saghatherium bowni	16712	2	M3	L-41	−7.998	3.469	34.486
	22923	1	L M3	L-41	−7.980	3.255	34.266
	17031	2	L M3	L-41	−8.292 ± 0.17	0.623 ± 0.49	31.552
	22632	2	L M3	L-41	−8.025 ± 0.16	1.612 ± 0.28	32.572
	15433	2	M3	L-41	−9.187 ± 0.22	3.060 ± 0.04	31.795
	22336	1	L M2	L-41	−7.645	0.858	32.363
	17042	1	L M3	L-41	−8.322	1.409	32.682
	15345	2	M3	L-41	−8.415 ± 0.04	1.719 ± 0.04	33.143
	22680	1	M3	L-41	−8.620	2.166	34.065
BQ-2 hyracoid	22415	1	U M	BQ-2	−5.762	0.282	31.201
	21831	1	M1	BQ-2	−6.429	−0.088	30.819
	21833	1	U M	BQ-2	−6.488	−0.580	30.312
	21248	3	M1	BQ-2	−5.805 ± 0.32	0.586 ± 0.10	31.514
	21756	1	L M	BQ-2	−6.865	0.576	31.504
	21490	1	M2	BQ-2	−5.949	−1.252	29.619

D.P.C., Duke Primate Center; *n*, number of analyses run for each sample; M, molar; P, premolar; U, upper; L, lower. Quarries BQ-2, BQ-4, BQ-8, and BQ-9 are within 5 m stratigraphic height of each other, in the Birket Qarun Formation, with similar facies assemblages. Fragmentary *Barytherium* samples are most likely to represent molar teeth.

Table S2. Kruskal–Wallis test of $\delta^{13}C$ (lower left) and $\delta^{18}O$ (upper right) means for each taxon

	Moeritherium sp.	*Barytherium* sp.	Anthracothere	*Thyrohyrax*	*Saghatherium*	BQ-2 hyracoid
Moeritherium sp.	—	0.3472	0.00617**	0.00617**	0.0027**	0.00617**
Barytherium sp.	0.02828*	—	0.00617**	0.00617**	0.0027**	0.00617**
Anthracothere	0.8551	0.2733	—	0.4233	0.09896	0.1093
Thyrohyrax	0.06789	0.5839	0.2623	—	0.1949	0.01041*
Saghatherium	0.07186	0.2571	0.3458	0.2888	—	0.001463**
BQ-2 hyracoid	0.00617**	0.00617**	0.01041*	0.003948**	0.001463**	—

*, $P < 0.05$; **, $P < 0.01$.

Table S3. ANOVA, $\delta^{13}C$ (lower left) and $\delta^{18}O$ (upper right) means for each taxon

	Moeritherium sp.	*Barytherium* sp.	Anthracothere	*Thyrohyrax*	*Saghatherium*	BQ-2 hyracoid
Moeritherium sp.	—	0.2167	0.00002**	0.00000**	0.00000**	0.00000**
Barytherium sp.	0.01134*	—	0.00001**	0.00000**	0.00000**	0.00000**
Anthracothere	0.5318	0.3171	—	0.3381	0.05027*	0.1876
Thyrohyrax	0.04284*	0.7788	0.4034	—	0.1886	0.00717**
Saghatherium	0.04201*	0.1387	0.6888	0.3148	—	0.000908**
BQ-2 hyracoid	0.00000**	0.00044**	0.00133**	0.00054**	0.00000**	—

*, $P < 0.05$; **, $P < 0.01$.

Table S4. Tukey test, $\delta^{13}C$ (lower left) and $\delta^{18}O$ (upper right)

	Moeritherium sp.	*Barytherium* sp.	Anthracothere	*Thyrohyrax*	*Saghatherium*	BQ-2 hyracoid
Moeritherium sp.	—	0.9756	0.0001**	0.0001**	0.0001**	0.0001**
Barytherium sp.	0.1621	—	0.0001**	0.0001**	0.0001**	0.0001**
Anthracothere	0.9406	0.6261	—	0.8446	0.1436	0.5732
Thyrohyrax	0.2768	0.9997	0.8008	—	0.7476	0.0796
Saghatherium	0.7501	0.8702	0.9976	0.962	—	0.0028**
BQ-2 hyracoid	0.0001**	0.0026**	0.0001*	0.0012**	0.0002**	—

*, $P < 0.05$; **, $P < 0.01$.

Table S5. Mann–Whitney *U* test, $\delta^{13}C$ (lower left) and $\delta^{18}O$ (upper right) means for each taxon

	Moeritherium sp.	*Barytherium* sp.	Anthracothere	*Thyrohyrax*	*Saghatherium*	BQ-2 hyracoid
Moeritherium sp.	—	0.4034	0.00811**	0.00811**	0.00335**	0.00811**
Barytherium sp.	0.03671*	—	0.00811**	0.00811**	0.00335**	0.00811**
Anthracothere	0.9273	0.3153	—	0.4712	0.1116	0.1282
Thyrohyrax	0.08284	0.6481	0.298	—	0.2159	0.01307*
Saghatherium	0.08304	0.3173	0.3768	0.3165	—	0.00179**
BQ-2 hyracoid	0.00811**	0.00811**	0.01307*	0.00508**	0.00179**	—

*, $P < 0.05$; **, $P < 0.01$.