ELECTRONIC SUPPLEMENTARY MATERIALS

Three-dimensional molar enamel distribution and thickness in *Australopithecus* and *Paranthropus*

A. J. Olejniczak[1*], T. M. Smith[1], M. M. Skinner[1], F. E. Grine[2,3], R. N. M. Feeney[1], J. F. Thackeray[4], J-J. Hublin[1]

Bootstrap resampling

The enamel thickness indexes 3DAET and 3DRET were subjected to bootstrap resampling with replacement. One thousand calculations of the mean value were performed by selecting *n* values at random, with replacement, from the original sample (*n* corresponds to the actual sample size for that taxon; see main document's Table 2). Results of the mean calculation, and 95% confidence intervals are given below as Supplementary Table 1.

Supplementary Table 1: Resampled mean values of 3DAET and 3DRET, and 95% confidence intervals.

Taxon	Sample mean 3DAET (mm)	Bootstrap mean 3DAET (mm)	3DAET 95% C.I.	Sample mean 3DRET	Mean 3DRET	3DRET 95% C.I.
Homo sapiens	1.43	1.41	1.409 - 1.414	23.97	23.55	23.494 - 23.608
Paranthropus robustus	1.83	1.84	1.830 - 1.845	23.27	23.23	23.130 - 23.336
Australopithecus africanus	1.48	1.48	1.472 - 1.484	17.70	17.71	17.623 - 17.791
Homo neandertalensis	1.08	1.08	1.082 - 1.086	15.55	15.51	15.479 - 15.539
Hylobates muelleri	0.49	0.49	0.487 - 0.490	14.72	14.73	14.685 - 14.771
Pongo pygmaeus	1.01	1.01	1.003 - 1.009	14.49	14.48	14.441 - 14.521
Pan troglodytes	0.75	0.75	0.753 - 0.7553	11.80	11.80	11.778 - 11.812
Symphalangus syndactylus	0.55	0.55	0.545 - 0.548	11.15	11.15	11.117 - 11.175
Gorilla gorilla	0.98	0.98	0.978 - 0.986	9.77	9.75	9.712 - 9.779

Pairwise enamel thickness differences

Connover's post-hoc pairwise comparisons for the Kruskal-Wallis test are reported below as Supplementary Table 2. X's indicate that groups have significantly different mean values for the variable in question. The Kruskal-Wallis test statistics are given below the table.

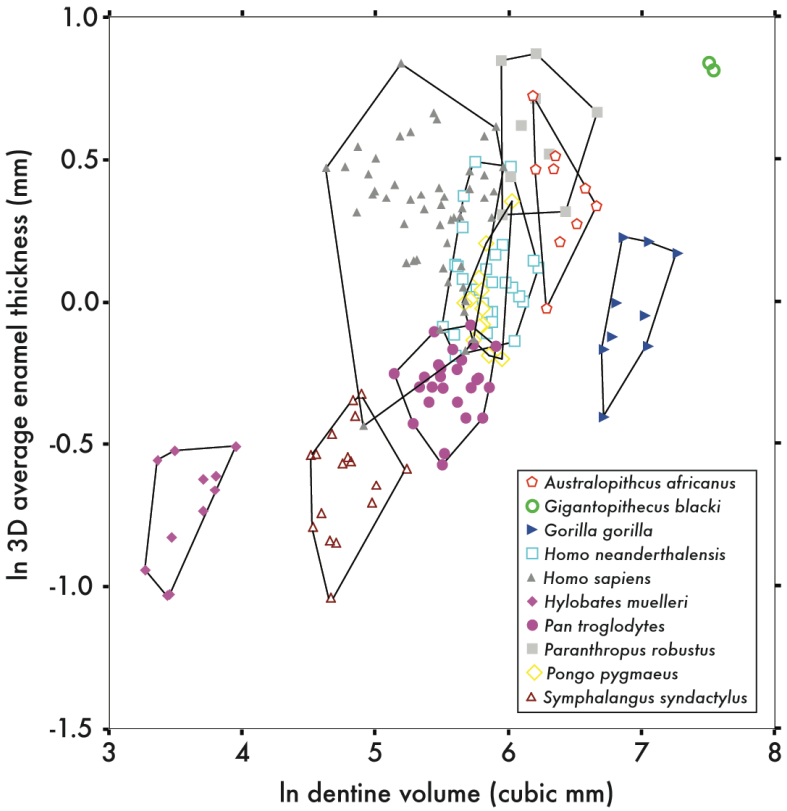
Supplementary Table 2: Kruskal-Wallis post-hoc results for group differences in 3D enamel thickness measurements.

Group 1	Group 2	3DAET*	3DRET*
Australopithecus africanus	*Paranthropus robustus*		X
Australopithecus africanus	*Gorilla gorilla*	X	X
Australopithecus africanus	*Hylobates muelleri*	X	X
Australopithecus africanus	*Symphalangus syndactylus*	X	X
Australopithecus africanus	*Pan trodlodytes*	X	X
Australopithecus africanus	*Pongo pygmaeus*	X	X
Australopithecus africanus	*Homo sapiens*		X
Australopithecus africanus	*Homo neanderthalensis*	X	
Paranthropus robustus	*Gorilla gorilla*	X	X
Paranthropus robustus	*Hylobates muelleri*	X	X
Paranthropus robustus	*Symphalangus syndactylus*	X	X
Paranthropus robustus	*Pan trodlodytes*	X	X
Paranthropus robustus	*Pongo pygmaeus*	X	X
Paranthropus robustus	*Homo sapiens*	X	
Paranthropus robustus	*Homo neanderthalensis*	X	X
Gorilla gorilla	*Hylobates muelleri*	X	X
Gorilla gorilla	*Symphalangus syndactylus*	X	
Gorilla gorilla	*Pan trodlodytes*	X	X
Gorilla gorilla	*Pongo pygmaeus*		X
Gorilla gorilla	*Homo sapiens*	X	X
Gorilla gorilla	*Homo neanderthalensis*		X
Hylobates muelleri	*Symphalangus syndactylus*		X
Hylobates muelleri	*Pan trodlodytes*	X	X
Hylobates muelleri	*Pongo pygmaeus*	X	
Hylobates muelleri	*Homo sapiens*	X	X
Hylobates muelleri	*Homo neanderthalensis*	X	
Symphalangus syndactylus	*Pan trodlodytes*	X	
Symphalangus syndactylus	*Pongo pygmaeus*	X	X
Symphalangus syndactylus	*Homo sapiens*	X	X
Symphalangus syndactylus	*Homo neanderthalensis*	X	X
Pan trodlodytes	*Pongo pygmaeus*	X	X
Pan trodlodytes	*Homo sapiens*	X	X
Pan trodlodytes	*Homo neanderthalensis*	X	X
Pongo pygmaeus	*Homo sapiens*	X	X
Pongo pygmaeus	*Homo neanderthalensis*		
Homo sapiens	*Homo neanderthalensis*	X	X

*X indicates that the group comparison is significant at alpha = 0.05.
3DAET Kruskal-Wallis test statistics: Chi Square = 132.93; $p < 0.001$.
3DRET Kruskal-Wallis test statistics: Chi Square = 120.079; $p < 0.001$.

Enamel thickness versus dentine volume (Supplementary Figure 1)

Average enamel thickness (3DAET) versus dentine volume (a widely used proxy for tooth size) shows substantial overlap between taxa, particularly among hominins. In light of this overlap, we suggest that dietary interpretations of fossil hominins based on dentine horn height and enamel thickness distribution are more reliable than those based solely on summary enamel thickness measures.



Relative dentine horn height

Following Olejniczak et al. (2008), relative dentine horn height (RDHH) was measured with the following procedure: the height of the dentine horn from a line parallel to the bi-cervical diameter and coursing through the lowest point of enamel in the mid-occlusal basin (horn height) was divided by the total height of the dentine crown measured from the bi-cervical diameter to the dentine horn tip (dentine height), yielding the height of the dentine horn as a percentage of the total height of the dentine crown. The data reported below for *Australopithecus* and *Paranthropus* are new measurements reported here for the first time; measurements of other taxa appeared in Olejniczak et al. (2008a).

Supplementary Table 3: Relative dentine horn height (RDHH) in hominoid taxa (ordered on protocone RDHH).

Taxon	Protocone RDHH (%)	Paracone RDHH (%)	Protoconid RDHH (%)	Metaconid RDHH (%)
Gigantopithecus blacki	23.93%	22.33%	28.36%	27.18%
Paranthropus robustus	27.63%	26.66%	31.35%	28.79%
Pongo pygmaeus	28.15%	27.13%	28.03%	30.69%
Sivapithecus sivalensis	32.11%	35.80%		
Australopithecus africanus	33.88%	31.74%	32.34%	32.23%
Pan troglodytes	34.71%	37.31%		
Homo sapiens	35.34%	36.17%	38.25%	34.72%
Gorilla gorilla	40.39%	38.24%		