

Relative enamel thickness, cuspal enamel thickness, and lateral wall enamel thickness in maxillary premolars and molars of apes and hominins

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High relative enamel thickness (RET), thick cuspal, and thick lateral enamel are hypothesized to protect teeth from fracturing during hard object feeding (durophagy). However, it is unclear whether each trait is exclusive to durophagous species or if they co-occur.

RET, average enamel thickness (AET), cuspal, and lateral enamel thickness were recorded from mesial sections of maxillary premolars and molars. *Pan troglodytes* (n=8), *Gorilla gorilla* (n=6), and *Homo neanderthalensis* (n=8) are less likely to be durophagous; *Pongo* (n=10) and *Paranthropus robustus* (n=13) are more likely durophagous. *Australopithecus africanus* (n=10), *Homo naledi* (n=9), and *Homo sapiens* (n=20) provide additional comparisons. Cuspal and lateral enamel thickness was compared to AET within species.

H. neanderthalensis, *P. troglodytes*, and *G. gorilla* had low average RET (16.81, 11.30, 9.70, respectively) and none had particularly thick cuspal enamel. The lingual lateral walls of *P. troglodytes* (UM2) and *H. neanderthalensis* (UP4) had significantly thicker enamel compared to AET. Average RET of the other hominins was 20 or more. *H. naledi* (UP4/UM2), *H. sapiens* (UP4/UM2), and *P. robustus* (UM2) had significantly thicker enamel over lingual cusp tips than AET. *H. naledi* (UP4/UM2), *H. sapiens* (UP4-UM2), *A. africanus* (UP4-UM2), and *P. robustus* (UP4/UM2) had significantly thicker lingual lateral walls than AET.

Significant thickening along lingual lateral walls is not exclusively found in durophagous species. The “durophagous” traits co-occur in *H. sapiens* and *P. robustus*, but *Pongo* has only slightly thickened lingual lateral enamel and RET (17.89). Together, results suggest the predicted durophagous enamel distribution may be present in non-durophagous species.

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