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TITLE

A new approach to quantify enamel thickness distribution and the enamel-dentine junction topography in primate teeth

COMMENTS

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Dental inner structural organization is a key diagnostic element for assessing fossil primate taxa. It is now recognized that throughout hominid evolution, and especially in *Homo*, enamel thickness (ET) varied quickly and repeatedly, thus more closely reverberating microevolutionary fluctuations. In contrast, the more stable and conservative underlying dentine, more accurately reflects macroevolutionary changes. In fact, while ET is generally considered an indicator of taxonomic affinities, it varies with respect to a number of bio-ecological determinants, such as life span, sexual dimorphism, and of course dietary habits. However, the prevalent signal of enamel (i.e., taxonomic vs. functional) remains uncertain. Conversely, the enamel-dentine junction (EDJ) is a reliable proxy to discriminate hominid taxa, even at sub-specific level. In dental (paleo)anthropology, ET and EDJ are routinely assessed separately: using "average" estimates (such as the relative ET index) and qualitative evaluation of its distribution cartographies, for the former, and by advanced morphometric methods, for the latter. Here we introduce an original surface matching-based approach to quantify and statistically compare chromatic cartographies representing ET distribution and the EDJ shape. We applied this method to a limited set of unworn maxillary and mandibular M1s (N=39) representing the extant hominids. By using PCA and between-group PCA, we distinguish the four great ape taxa either for the ET or EDJ maps. When the results from both tooth tissues are combined, a taxonomic signal is still detectable, even if some taxa overlap. This exploratory study highlights the promising prospects of this method, notably to investigate the primate fossil record.