ENAMEL-DENTINE JUNCTION MORPHOLOGY OF EXTANT HOMINOID AND FOSSIL HOMININ LOWER MOLARS

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Abstract of Dissertation

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This thesis is comprised of four individual projects (chapters two to five) which are based upon an examination of the enamel-dentine junction (EDJ) of lower molars in various extant hominoids and fossil hominins. Collectively, these manuscripts represent the first comprehensive analyses of EDJ morphology in a range of hominoid taxa and at the high degree of resolution made possible through the use of micro-computed tomography. They explore the taxonomic relevance of EDJ morphology, both quantitatively and qualitatively, and in doing so reveal how detailed aspects of the outer enamel surface morphology develop. They also provide insights into the developmental processes that determine the form of the functional interface between the dentition and the food, upon which natural selection acts.

The first chapter introduces the goals of the thesis and reviews relevant literature that is pertinent to the various topics within the thesis. It also provides a detailed discussion of the materials and methods used to image and analyze EDJ morphology. Chapter two demonstrates that when the morphology of the EDJ can be captured in sufficient detail, analysis of its morphology can discriminate between species and subspecies of extant chimpanzees. Chapter three extends these findings to an analysis of lower molars belonging to *Australopithecus africanus* and *Paranthropus robustus* from southern Africa and demonstrates that EDJ morphology is distinctive both between each taxon, as well as between first, second, and third molars of each taxon. Chapter four examines the expression of four dental traits on the lower molars of a range of extant and

extinct hominoids (including fossil hominins). It demonstrates that these traits originate at the EDJ, that the EDJ is primarily responsible for their degree of expression, and that when examined across a wide range of taxa the morphological variability in the expression of these traits can be considerable. The fifth chapter focuses specifically on one dental trait, the protostylid, and examines its EDJ manifestation in samples of *Australopithecus africanus* and *Paranthropus robustus*. The results of this analysis reveal taxon-specific patterns in protostylid expression that are difficult to detect at the enamel surface as well as evidence that current definitions of the trait itself should be re-examined.