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CUSP HEIGHT AND INTERCUSP DISTANCE: THE PATTERNING CASCADE MODEL AND ITS CAPACITY TO EXPLAIN CUSP SIZE VARIATION IN THREE-DIMENSIONAL, COMPLEX PRIMATE MOLARS

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Abstract

Mammalian cusp variability is suggested to result from the temporal and spatial epithelial-mesenchymal interactions directing the sequential initiation of enamel knots (EK) known as the Patterning Cascade Model (PCM). Over the past two decades, studies have revealed the capacity of the PCM as a developmental framework that can be used to predict accessory cusp expression in the family Hominidae. These studies have focused solely on cusp spacing and it is unknown if cusp height plays any meaningful role in cusp expression. I utilized 145 upper and 242 lower molars of Neanderthals, *Homo sapiens*, and *Pan troglodytes* at the EDJ to investigate if cusp height can be used to predict the occurrence and expression of hominid accessory cusps. I found that while cusp height is relevant and can be used to predict accessory cusp expression, to an extent, cusp spacing is the better predictor of the extra cusps observed in hominids. The results of this study expand upon the general understanding of the parameters driving molar crown configurations and the accurate assessment of novel dental traits found in the hominid fossil record.