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ANTERIOR TEETH AND THE MANDIBULAR SYMPHYSIS:
A Morphometric Analysis of Correlation in Extant Hominoids

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Abstract

This thesis is part of a larger collaborative project focused on an integrated investigation of the evolution and biomechanics of mandibular form in extant great apes and early *Australopithecus*. The overarching question of the NSF project is what variables influence differences among hominoid species in the shape of the mandible. This information will be used to better understand why the mandible changed through time in the genus *Australopithecus*.

Objectives: One of the variables that could potentially affect the shape of the mandible is the size and shape of the teeth since the mandible must have the space to house those teeth. Here, we quantify and compare the shapes of the lateral incisor and canine roots and crowns, and mandibular symphysis in hominoids. The goal is to assess the hypothesis that the shape of the mandibular symphysis is influenced by the shape of the permanent incisor and canine, by examining covariation between the symphysis and lateral incisor and canine shapes.

Materials and Methods: Differences in lateral incisor and canine shape were assessed by collecting three-dimensional landmarks and semilandmarks from MicroCT scans on the incisor and canine roots and crown outlines from a sample of seven specimens comprising males and females of the extant hominoid genera *Gorilla, Homo, Pan*, and *Pongo*. Specimen configurations were superimposed using Generalized Procrustes Analysis (GPA) and shape differences among the genera in the shapes of roots and crowns were evaluated through Principal Components Analysis (PCA). Multivariate Analysis of Variance (MANOVA) on the principal component (PC) scores tested whether the shapes of the teeth, crowns, roots, and symphyses of each genus were significantly different from those of the other genera. Discriminant Function Analysis (DFA) with and without cross-validation was performed on a subset of the PC scores to explore how accurately specimens could be classified to the correct genus using these data. The relationship between the shapes of the teeth and the shape of the mandibular symphysis was investigated using two-block partial least squares (2B-PLS) analysis.

Results: Including data from the mandibular canine and not the incisor would be more effective for discriminating between hominid taxa. Evidence suggests covariation exists between the symphysis and the overall canine shape in all taxa, the canine crown in all taxa, and the incisor crown in *Homo* only.

Conclusion: These results and future ones with a larger sample size may also provide evidence that intraspecific variation in mandibular canine morphology is not so extensive as to preclude the use of morphological data from the mandibular canine and symphysis together in taxonomic analyses of fossil hominid specimens.