

bipedal saltatory mammals (gerbilline rodents, dipodid rodents, and macropodid marsupials) exhibit rostrally-shifted foramina magna compared to quadrupedal close phyletic relatives. Among strepsirrhines, orthograde species have rostrally-shifted foramina magna compared to pronograde species, but the magnitude of this displacement is relatively small. These data reveal that rostral displacement of the foramen magnum is a feature shared by multiple clades of bipedal mammals. Our analysis thus provides further support for the use of foramen magnum position to reconstruct locomotor behavior in fossil species.

**Assessing diagenetic alteration of carbon and oxygen isotope values in fossil faunal enamel from Kromdraai, South Africa.**

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The analysis of carbon and oxygen isotopes in mammalian enamel has been successfully incorporated into studies of the palaeoenvironmental context of hominin evolution. However, diagenetic alteration of tissue values and fractionation effects introduced during sample preparation may obscure biogenic isotopic information. This study presents faunal enamel isotopic data from Kromdraai, a hominid locale in South Africa comprised of two adjacent sites of significantly different ages, and describes methods of detecting different modes of diagenetic alteration in this fossil assemblage. Isotopic and compositional analyses of the Kromdraai material suggest that significant alteration of enamel carbonate  $\delta^{18}\text{O}$  and  $\delta^{13}\text{C}$  has occurred, although enamel phosphate  $\delta^{18}\text{O}$  values may still reflect authentic biogenic information. A comparison of faunal isotopic values from Kromdraai A and Kromdraai B

reveals significant differences between animals having different feeding ecologies, as well as between animals of the same feeding ecology in Kromdraai B versus Kromdraai A. We discuss possible diagenetic overprinting of ecological and environmental distinctions between taxa and time periods, and suggest that examination of the phosphate  $\delta^{18}\text{O}$  – carbonate  $\delta^{18}\text{O}$  relationship can reveal diagenetic alteration in fossil enamel. We also report on the effects of isotopic fractionation on enamel phosphate samples prepared using a micro-precipitation protocol, and the associated implications for the analysis of phosphate  $\delta^{18}\text{O}$  – carbonate  $\delta^{18}\text{O}$  relationships in fossil enamel samples. This study was funded by the L.S.B. Leakey Foundation.

**81. Twelve-point osteon morphotype scoring schemes are not better than a six-point scoring scheme for interpreting habitual bending: Evaluation in chimpanzee femora.**

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A new osteon morphotype score (MTS) allows for quantifying regional mechanically important collagen/lamellar variations between secondary osteons. We modified the method of R.B. Martin and co-workers and reported its superior utility in various non-anthropoid bones (Skedros et al., 2009 BONE). In chimpanzee femora, however, some osteons did not fit well within this method. We further modified our six-point scoring system (6A) into two new 12-point scoring methods and hypothesized that they would outperform 6A. Milled methacrylate-embedded sections from each of eight adult chimpanzees were obtained at the proximal (70%)

diaphysis and scored in circularly polarized images using: 6A scoring method, first 12-point method (12A, more importance on “hoop” birefringence), and second 12-point method (12B, more importance on the “alternating” birefringence patterns). Average image MTSS were analyzed to determine medial vs. lateral (“compression” vs. “tension”) differences. Statistically significant differences in predominant collagen fiber orientation (CFO, expressed as image graylevels) (158.7 medial vs. 134.2 lateral) are consistent with habitual compression vs. tension. Statistically significant differences ( $p < 0.05$ ) in MTS were also shown between the medial and lateral regions using all scores. Predominant CFO correlated significantly and positively with each score method: 6A ( $r = 0.77$ ), 12A ( $r = 0.76$ ), and 12B ( $r = 0.67$ ). These results reject the hypothesis that the 12-point scoring methods out-perform the six-point method. The 6A method was either stronger or equivalent in correlating with predominant CFO. These results show that the extra time and tedium required in assigning six additional scores in the 12-point schemes is not necessary when evaluating adaptation for habitual bending.

**Platyrrhine incisal curvature and diet: An independent test of the incisor morphological correlates with dietary proportions reported for extant hominoids.**

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Despite the relatively large size of anthropoid incisors in relation to the remainder of the dental arcade and the prominent role that these teeth occupy in the pre-processing of food prior to ingestion, comparatively little is known about the functional morphology of anthropoid incisor shape and crown curvature. The