ABSTRACTS

Meat eating frequencies in wild chimpanzees - The effect of absolute meat amounts, hunt participation and female reproductive state on the δ^{15}N ratios of hair

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We know that the roots of hunting and meat eating lie deep in our shared evolutionary past with chimpanzees (*Pan troglodytes*). Expanding our knowledge of chimpanzee meat eating variability in the wild requires non-invasive and indirect quantitative data on meat eating. We here validate the use of stable isotope analysis in shed hair to reconstruct meat eating behavior, by analyzing a new extensive isotope dataset (n=268) of chimpanzees from Taï forest (Côte d'Ivoire) and relating it to observed amounts of eaten meat, as well as age, sex, reproductive state and hunting participation, while controlling for group, individual differences and differences in observation time.

We collected hair from fresh nest of 27 known individuals from two communities, right after six months of detailed meat eating data recordings were completed. Meat eating amounts were estimated based on prey body parts, their respective weight for different primate taxa, sex and age classes. These estimates resulted in significant differences in meat amounts eaten by chimpanzees. Hunting activity varied strongly between groups (20 vs. 3 hunts). Meat amounts correlate with participation observed in hunts, with three impact hunting males consuming 15 - 25kg of meat during the six month study, whereas the average was 3.8kg. The isotope signatures, particularly in δ^{15}N, relate to these large differences, but suggest that not only amount of meat, but also sex (reproductive state of females) play a role in δ^{15}N signatures of hair, which should find increasing consideration in future studies using isotopes in wild primates.

Accurately reconstructing crown heights of anterior teeth using micro-computed tomographic scans of fossil teeth

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Accurate reconstructions of crown height from partially worn teeth play an important role in studies of dental growth and development in paleoanthropology and bioarcheology. Such reconstructions have previously been achieved for canines using Adobe Photoshop to extend mesial/distal sides of the cusp tip from labial view or labial/lingual sides from sagittal view (thin sections). Here, we show that this technique can be used to accurately and non-destructively reconstruct canines and incisors (which cannot be reconstructed from facial view) using μ-CT scans of teeth. We digitally reconstructed artificially worn (cropped) crowns on 2D standardized developmental sections from μCT scans. Crown heights were measured on 2D digital sections of practically unworn *Homo naledi* mandibular canines (n=5), maxillary canines (n=3), mandibular lateral incisors (n=1), and maxillary lateral incisors (n=3). Cusp tips were digitally cropped to represent different wear patterns. Each cropped cusp was digitally reconstructed and measured by each author three times. Percent error for the reconstructions was low, averaging 0.30%, with low intra- and inter-observer error. ANOVA analysis revealed no significant effects for the crop type or the author doing the reconstruction. Significant effects were found for tooth type, with mandibular teeth showing less error. Results indicate that this method of reconstructing crown heights on μCT scans is accurate, though accuracy varies by tooth type. This is the first time the method has been attempted and validated non-destructively for incisors. This method can be used in studies of growth and development as well as studies of 2D enamel thickness using μCT data.

Tiwanaku affiliation and quality of life in Middle Horizon San Pedro de Atacama, Chile

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Recent studies suggest that the people of the San Pedro de Atacama oases in Northern Chile engaged in a complex relationship with the Tiwanaku polity during the Middle Horizon (AD 400-1000). On a regional level, this relationship may have lead to the use of Tiwanaku offerings as prestige items. As it is likely that each *ayllu* (kin based community structure) experienced a different relationship with the Tiwanaku, regional studies may be missing social complexity present within the region. Here, we address this limitation by testing the hypothesis that social complexity and access to resources varied by *ayllu*, and that this variation was related to the degree of interaction each *ayllu* had with the Tiwanaku polity. We do this by analyzing 239 burials associated with two Middle Horizon *ayllus* (Quitor: N=150, Solcor: N=89). Individuals associated with each ayllu were evaluated based on diet (antemortem tooth loss, which has been linked to corn consumption; corn is a high value food in this context), trauma, cranial modification, and origin of mortuary goods (Tiwanaku, non-Tiwanaku foreign, or local). Chi-square tests and correspondence analyses were performed to assess differences between *ayllus*. Results indicate that Solcor has significantly more Tiwanaku grave goods (p=0.00125), higher rates of antemortem tooth loss (p<0.0001), lower rates of trauma (p=0.03625), and more sex-based equity than Quitor. These findings support the idea that Tiwanaku influence differed by ayllu and moreover, suggest that there was significant variability between neighboring ayllus in access to resources and prestige goods.

Large mammal community structure and habitat variability in eastern and southern African *Paranthropus* and *Australopithecus*

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Eastern and southern *Paranthropus* and *Australopithecus* overlapped temporally, but differed in geographic distributions and potential niche occupation. Isotope and microwear data suggests that congeners relied on variable diets. Here, we apply large mammal community analyses to assess habitat variability and seasonality used by eastern and southern African robust and gracile hominins.

To compare paleoecological contexts, associated assemblages of large mammals from >30 southern and eastern African *Paranthropus* and *Australopithecus* sites were analyzed using a community approach. Multivariate correspondence analyses compared fossil communities to 191 extant communities in modern African habitats. The modern African sample includes abiotic variables such as mean annual temperature and seasonality and precipitation seasonality. Using presence/absence data of 243 extant large mammal species and their locomotor and dietary adaptations, modern communities were described in terms of abiotic data, and this variability was used to retrodict community affinities for plio-pleistocene hominins.

Multivariate analyses suggest that large mammal communities associated with *P. robustus* and *P. boisei* were most ecologically similar to those of modern seasonal grasslands. While *P. boisei* sites were likely wetter over the course of the year, *P. robustus* sites were more influenced by