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(1) more comparative studies of extant species linking behavior to anatomy; (2) those comparisons should extend across mammals (and beyond) for cases of convergence; (3) we need to acknowledge the possibility of parallelisms rather than homology in closely-related species; (4) research should be theoretically motivated, and test hypotheses that can be generalized across taxa; in this regard, we should focus on what traits "makes us human," and what evolutionary processes shape such traits; (5) but we also need critical reflection on these guiding questions, and an appreciation that the animal-human boundary and our definitions of humanness are based on historical fictions that are often destructive rather than productive. I illustrate this approach with a phylogenetic comparative analysis of hair density in mammals and a study of the psychophysiology of social relationships in wild chimpanzees.

Physical activity patterns and age-related bone loss in Ancient Nubia

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This study compares entheseal changes and trabecular microarchitecture characteristics in individuals from two Ancient Nubian sites, Kerma and Tombos, to better understand the connection between physical activity and age-related decline in trabecular bone quality. For each individual, microCT scans of 4th lumbar vertebrae were analyzed to calculate standard measures of trabecular microarchitecture (e.g., trabecular number, connectivity density, etc.), and entheseal scores were averaged to generate an Upper, Lower, and Overall Body score. An entheseal score of three indicates a transition to more robust muscle markers reflecting higher levels of physical activity, which in turn are associated with higher measures of bone quantity and quality. Individuals were placed into groups defined by an average score of below three or above three. Since entheseal scores are positively correlated with age, only individuals under 50 years were included. Independent Samples *t*-Tests were used to compare differences in trabecular microarchitecture between groups. In both samples, individuals with entheseal scores below three interestingly displayed higher markers of microarchitecture quality and lower markers of microarchitecture decline. In the Tombos sample, significant differences in microarchitecture measures were found between groups, most notably in comparisons using Lower Body scores. In the Kerma sample, statistically significant differences were only found between groups based on Upper Body scores, though similar patterns were seen based on Overall and Lower Body scores. These results suggest that biocultural factors other than physical activity may be contributing to trabecular bone health in these populations, such as reduced nutritional status due to resource access.

Niche partitioning in fossil bovids near the Mio-Pliocene boundary at Lothagam, Turkana Basin, Kenya

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The spread of C_4-dominated environments constituted a major shift in eastern African terrestrial ecosystems during the late Miocene to Pliocene periods. While previous work has shown that many families of eastern African herbivores adopted C_4 diets during this time, we know little about how dietary resource partitioning was structured at finer, taxonomic scales, such as within the speciose and diverse bovid tribes. The Lothagam sequence (Turkana Basin, Kenya) spans the late Miocene to Pliocene (~7.5 to 3.5 Ma) and has produced an abundant mammal fauna that is ideal for investigating how increasing abundance of C_4 grasses influenced niche partitioning within the large herbivore guild. Here, we report new $\delta^{13}C$ and $\delta^{18}O$ isotope data from tooth enamel (n = 120) and body mass estimates from tooth measurements (n = 93) for nine bovid tribes from Lothagam. Linear models predicting $\delta^{13}C$ and $\delta^{18}O$ values and estimated body mass by time revealed no significant shifts, which implies that most tribes were characterized by static dietary and body mass niches. Alcelaphins and bovins were both C_4 specialists but differed in average mass (~ 65 versus > 100 kg, respectively). Tragelaphins were relatively large-bodied (~ 80 kg on average) and had the lowest average $\delta^{13}C$ values (-6.6‰), suggesting mixed-feeding with a preference for browse. Other taxa seem to have been mixed feeders varying only by mass. We concluded that Lothagam bovids may have differentiated their niches in other ways (e.g., microhabitat use and migratory behavior) that are common among extant taxa today.

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Adulthood longevity of males and females during a Japanese prehistoric period, Jomon, estimated from reduction of dental pulp cavity, with additional information from clavicles

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The Jomon period is a Holocene prehistoric period of Japan before introduction of wet-rice agriculture. Sasaki and Kondo (2016) estimated the adulthood longevity based on 234 tooth remains from Jomon sites around the archipelago. Using teeth was expected to alleviate age biases due to differential preservations. They focused on the reduction of dental pulp volumes in mandibular canine roots, and estimated the age profile of the Jomon to have been within the variation of modern hunter-gatherer populations. In their study, since reduction rate of referenced population, as it is, had rendered implausibly long longevity, they assumed that the rate was variable among populations, and estimated it simultaneously with the age profile by maximizing likelihood. In this study, based on the same approach as Sasaki and Kondo (2016), the age profile was estimated separately for males and females. The sex information was obtained from the volume of canine root in form of posterior probability, and incorporated into the likelihood calculations. Since the tooth sample alone was not enough for detection of significant differences between the sexes, information from the state of clavicle sternal end was additionally incorporated to narrow down possible range, utilizing timing of the fusion reported by Langley-Sirley and Jantz (2010). As the result, it was observed that the number of deaths was greater in females than in males during the life stages of adolescent–early adulthood. The greater mortality was suggested for early stages of female lives compared to the male during the Jomon period.

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Investigating risk avoidance during arboreal locomotion in wild primates

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Existing research on the arboreal origins of primate locomotor evolution often seeks to connect variation in postcranial morphology with locomotor performance, ignoring cognition and behavior per se. This study aims to integrate the cognitive processes that may also determine performance outcomes of primate arboreal locomotion. One way to characterize how primates may assess risks in their environment is to understand latency – the time spent pausing between sequential bouts of locomotion. Periods of latency can be used to gather and process information before making the next move. We recorded high-speed videos of free-ranging cercopithecid monkeys (3 species, Kibale National Park, Uganda) and lemurs (4 species, Ranomafana National Park and Anja Community Reserve, Madagascar) as they engaged in spontaneous arboreal locomotion. For preliminary analysis, we distinguished

between bouts of generalized quadrupedal locomotion, leaping, dropping, and other types of movements, using the behavioral coding software Datavyu. Initial results show that primates are capable of transitioning between different locomotor modes as well as between gaps in substrates without pause. These results affirm the previous understanding that primates are adept at arboreal locomotion. Nevertheless, latent periods do occasionally occur before crossing gaps. In ongoing analyses, we are investigating whether such pauses happen more frequently, for example, in large-bodied primates – for whom arboreal locomotion in particularly precarious. We are also investigating what happens during these pauses, such as exploratory touching of a substrate before locomotion resumes.

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A potentially adaptive increase in *AMY1* copy number in Peruvian populations

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The gene duplications and deletions in the amylase locus are of particular interest regarding their influence on human evolution and health. Prior work has associated the copy number variation of the starch digesting enzyme, salivary amylase (*AMY1*), with an increase in starch consumption during the agricultural revolution. While many earlier studies have attempted to describe the landscape of this copy number variation across populations, the sequencing of new genomes every year renders this an ongoing task. Utilizing a copy-number caller, mrCaNaVaR, on samples from the 1000 genomes project along with the Human Genome Diversity Project, we have demonstrated that the Peruvian in Lima and Pima in Mexico populations have the highest known copy numbers. Using digital droplet PCR on samples from the PEL population, we have confirmed this finding for Peruvians. As a secondary measure, we also calculated the gene copy number from unadmixed Quechua and Mayan samples that yielded the same results. Genome-wide Vst analyses between Peruvian and other American populations determine this region to be an outlier. Furthermore, low copy numbers in Tibetan samples indicate that high-altitude is not driving this observation. Instead, we hypothesize this variation in Peruvians is influenced by the heavy dietary reliance on starchy potatoes domesticated in the Andes around 6000-10000 BP. Our results shed light on the ongoing investigation regarding the evolution and adaptive potential of the amylase locus and how this history may impact modern day human variation in metabolic responses to starch-rich food.

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How much variation can we expect in subadult growth due to geographic and environmental variation? Evidence from *H. sapiens*

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To aid interpretation of sub-adult fossil hominin skeletal material, knowledge of variation in skeletal dimensions during the growth-span is needed. This analysis will provide measures of variation in specific skeletal dimensions at specific ages. Data were drawn Eveleth and Tanner's compendium of studies of growth from around the world limited to samples with the most complete reports on size and variation across the 2-18 year age range for sitting height, biacromial and billiac breadth. Only boys were included owing to their greater size variability compared to girls. Samples from Europe and of European descent, Africa and African descent, Asia, New Guinea were compared in terms of coefficients of variation (CV) to remove effects of differences in dimension sizes. CVs of sitting heights, ages 2-10 years ranged from 1.74 to 5.56, and for ages 11-17, from 0.71 to 2.05. CVs for biacromial breadth, for ages 3-10 years of age ranged from 0.71 to 0.14 and for ages and from 11-17, ranged from 4.83 to 9.73. CVs for biiliac breadth, ages 3-10 years of age, ranged from 25.62 to 38.43 and for ages 11-16 from 19.73 to 22.44. CVs of biacromial breadth increased in the pubertal years while CVs for biiliac breadth and sitting height weere lower. Compared to the mean CV of sitting height, the mean CV for biacromial breadth was 3.6 times and that biiliac breadth was 13 times greater. Expectations of skeletal variation among hominin subadult samples are informed by knowledge of normal geographic variation during the growth span.

Sex-based differences in dental microwear texture among the adults from Herculaneum

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The people of Herculaneum died via a pyroclastic event caused by the eruption of Mt. Vesuvius in AD 79. This study employs dental microwear texture analysis (DMTA) to address age and sex-based differences in the diets of 58 Herculaneum adults, 31 males and 27 females, aged 16 to 58. The DMTA followed standard procedures and the DMTA variables were complexity, anisotropy, scale of maximum complexity, and textural fill volume. Statistical testing used Bayesian linear regression and a binary logistic regression (BLR). This study considered Bayes Factors (BF_{10}) greater than 3 in favor of the alternative model compared to the null model significant. The BLR used all DMTA variables. Female anisotropy increased significantly with age (P(M) = 0.50; P(M|data) = 0.85; BF_M = 5.72; BF_{10} = 5.72; R^2 = 0.25). The BLR results indicate about half of the young adult males (16-29 year-old) had diets like the females. For the middle adults (30-49 years-old), only 17% and none of the old adult (over 50 years old) males had diets like the females. Compared to females, older male diets did not change as they aged, and males of all ages tended to eat harder foods compared to females. Older females ate a greater variety of foods compared to younger females and preferred soft or tough/fibrous foods. All told, differences in male and female diets increased as they aged, which gave middle and old adult females a distinct microwear signature compared to males and young females.

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Total number of neurons is not necessarily a better measure of cognitive ability than overall brain size

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What is the best measure of brain anatomy for predicting cognitive and behavioral ability across species? Absolute brain size in Primates is known to be associated with interesting behavioral dimensions, including social group size. Estimates of total neuron number, from the pioneering work of Herculano-Houzel and colleagues, have been suggested to be a better measure. However, neuron number by itself ignores the degrees and kinds of interconnections between neurons. Abnormal connectivity is specifically thought to underly some cognitive disorders in humans. By contrast, brain volume potentially indexes neuron number plus the complexity of neuronal interconnections and other support cells. Brains with lower neuron densities likely harbor correspondingly greater axonal and dendritic interconnection complexities. Using a small sample (n=10) of Primate species for which estimates of cerebral cortex neuron number (NN), absolute brain size (BR), general cognitive ability (GC), and social group size (GS) have been published, it is shown that BR rather than NN is actually a slightly better predictor (though not significantly) of both GC and GS. For GC the correlation with BR is r=0.76 ($p<0.01$), but with NN r=0.64 ($p<0.03$). For GS, the