Recently, it has been debated whether the mechanical precursor to modern human bipedal kinematics lies in the human-like extended hindlimb of Pongo during arboreal bipedalism, or Gorilla during terrestrial quadrupedalism. Here we explore this further by analyzing limb mechanics during quadrupedalism in Pongo, ontogenetically and interspecifically, to determine if extended limbs also characterize their non-bipedal gaits. Limb kinematics were calculated from video of terrestrial quadrupedal walking in 6 freely-moving Pongo pygmaeus (6-44 years) and 3 Pongo abelii (6-39 years) and compared with existing data on Gorilla gorilla and Pan troglodytes. Like other great apes, Pongo showed high forelimb protraction but limited elbow yield (average < 5 o). Pongo showed higher hip protraction (55.5o) but greater knee flexion (145.4o) at touchdown than Gorilla. Pongo also showed the greatest hindlimb retraction (123.3o) and knee extension (172o) at toe-off, though the youngest P. abelii individuals had greater knee flexion at toe-off. The hindlimb extension at toe-off is similar to that observed during Pongo arboreal bipedalism and during the late stance phase of human walking. Like humans, Pongo showed little or no knee yield and even appeared to extend their knees between touchdown and midstance. Gorilla touchdown kinematics are most similar to modern humans. However, during the second half of stance, Pongo shows more human-like hip and knee extension compared with Gorilla and Pan. These results emphasize that interpretations of hominin biomechanical evolution benefit from the inclusion of mechanical data from all great ape genera, and from both their bipedal and quadrupedal gaits.

The existence and importance of brain size evolution in early hominins

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A basic principle of evolutionary change is that functional/behavioral change generally drives anatomical evolution, rather than the other way around. Applied to human brain evolution, this principle suggests that identifiable changes in brain morphology relevant to some behavior will likely appear in fossils only after important behavioral/cognitive changes had already begun. Recent work assessing early hominin endocranial surfaces has been argued to show that the location and arrangement of important language areas (posterolateral prefrontal: BA 44, 45, 47) remained in primitive positions until ~1.5 MYA. This may imply that important behavioral/cognitive advancements had only occurred by that point. However, this would ignore important implications of increasing brain size evident in early hominins. In this study, a best-fit polynomial line predicting endocranial volume over time was calculated for 168 fossil specimens (excluding robust australopithecines, Homo naledi, and floresiensis) from the literature. Using this equation, it is estimated that fully 22% of the total change in brain volume over the last 3 MYA had already occurred by 1.77 MYA (i.e. Dmanisi). In addition, 30% had occurred by 1.5 MYA, 48% by 1.0 MYA, 74% by 500 KYA, and 90% by 250 KYA (near the origin of Homo sapiens). Since: 1) social complexity and general cognitive ability are correlates of absolute brain size in primates, 2) larger brains likely support increased conceptual complexity, and 3) extant apes have latent language-relevant capabilities, the brain size increases in early hominins suggest enhanced communication (language?) had likely occurred by 1.77 MYA, even if gyri/sulci appear 'primitive.'

Stress, diet, and mortuary ritual at Huaca Santa Rosa de Pucalá: 1,000 years of biocultural change and persisting identities in the Lambayeque Valley Complex, Peru (300-1375 CE)

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Over the last 10,000 years, various efforts have documented measurable declines in Indigenous health in the Americas in settings of increasing sociopolitical complexity and inequality. One such context is the monumental site of Huaca Santa Rosa de Pucalá (HSRP). Located in the Lambayeque Valley Complex on the north coast of Peru, this site was a major religious and political center of gravity occupied for 1000 years amongst ever-increasing forms of inequality in states and empires. Here, we test the hypothesis that human remains from HSRP (N=104) follow this trend between 300-1375 CE. Data was collected on multiple skeletal stress markers and pathological processes, trauma, activity patterns, and oral health. We fail to reject the hypotheses. Prevalence of enamel hypoplasia, cribra orbitalia, porotic hyperostosis, and periosteal inflammation broadly increased over time, as with the rest of the Lambayeque region. People buried at HSRP could not escape the trajectory of unfolding changes in the world around them. Further, morbidity and oral health patterns are consistent with low-status commoner peoples – the local Muchik. Integrating these observations with the mortuary pattern data from the site demonstrates an even more complex situation. Many HSRP individuals continued reproducing elements of ancestral Moche mortuary patterns while interacting with influences from highland societies. These observations embody changing social realities and provide new evidence of how Muchik peoples experienced, persisted, and negotiated with these changes. The work also highlights the significant complementarity between bioarchaeology and mortuary analysis to help develop holistic biocultural reconstructions.

Eats fruits and leaves: modern gibbons as guides to a healthier 'Miocene diet' of arboreal vegetation

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Primates, as arboreal residents, diet on sympatric animal inhabitants and directly on the tissues of the trees themselves—primarily leaves, fruits, and exudates. Gibbons, the smallest and deepest clade of apes, are primarily frugivores but also depend on leaves and the occasional ingestion of insect and avian soma. While recently trendy human diets, such as "Paleo," subscribe to a centrality of meat consumption, our frugivore-like gut and teeth suggest a more ancient dietary foundation. I hypothesized that gibbons could serve as an excellent model organism and living alternative to many troubled aspects of our modern (Western) human diet. I analyzed micronutrient numbers from human food databases and dietary summaries of gibbon species in All the World's Primates. Micronutrient analysis suggests that tropical (e.g. S[E] Asian) arboreal fruits—such as citrus, mango, coconut, and durian—frequently reappear as exemplars of highly nourishing foods across the array of essential vitamins (e.g. C, E, Bs, A, D3) and minerals (K, Na, Ca, P, Mg, Fe, Zn) most deficient in modern temperate diets. Calculations revealed that gibbons are, on average, 2/3rds frugivore and 1/4th folivore, but only 1/20th carnivore. This ancient arboreal dietary archetype, albeit admittedly with nearly 20 million years of independent evolution, suggests that many modern deficiencies could derive from chronic inaccessibility to fresh fruits that we co-evolved with in previous epochs. It is also confirmatory that hominids established novel dietary niches through extractive foraging upon heavier and harder fruits—thereby accelerating infant weaning, while additionally increasing fertility, group sizes, and effective warding-off of terrestrial predators.

What do the abundances of bovid tribes actually explain about habitat?

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Since 1974, researchers have used fossil records from the Family Bovidae to reconstruct past habitats. Fossil species abundances were originally used to suggest that the tribes Alcelaphini and Antilopini both indicated open and grassland habitats, while later studies proposed that other tribes inhabited either more wooded habitats or wetlands. Here, we consider six modern and fossil bovid tribes to assess the utility of using abundance data to reconstruct past habitats. We used existing studies of modern national parks which had bovid tribal abundance data and researched the diet and social organization of each species. We then collected tribal abundance