

ABSTRACTS

primate lives can be derived it is imperative to determine how seemingly incompatible lines of evidence are related. To this end, examples of how different lines of evidence are complementary and can be integrated to develop cohesive environmental models, including stable isotope ($n = 22$) data from the Holocene record of Lukenya Hill, Kenya, will be presented. The stable isotope evidence from Lukenya Hill indicates decreased woody cover on the Athi-Kapiti Plains over time in the Holocene which has implications for understanding the development of human herding communities in the region, and, potentially, the future of the ecosystem and modern human communities. As we establish cross-disciplinary lines of communication linking the past to the present and the future in framing biological anthropology's public message on global climate change, we will need to unravel the complexity of the spatial and temporal associations of ecological proxies.

Funding for the Lukenya Hill study was provided by a National Science Foundation – Archaeology Doctoral Dissertation Improvement Grant (BCS – 1245803) to J.R.R. and Dietrich Stout.

Quantifying free simple sugars in orangutan foods using spectrophotometry: Implications for orangutan feeding ecology

NATALIE J. ROBINSON, LEXI R. LANG, ERIN E. KANE and CHERYL D. KNOTT

Anthropology, Boston University

Orangutans (*Pongo pygmaeus wurmbii*) in Gunung Palung National Park, West Kalimantan, Indonesia experience significant seasonal and annual fluctuations in the availability of their preferred food, ripe fruit. When ripe fruit is limited, orangutans increase their consumption of bark, pith, and leaves, which are continuously available and may act as fallback foods. While these foods are presumed to be less nutritious, it is not clear whether this is the case. Free simple sugars (FSS) provide orangutans with readily-metabolizable energy, and are thus an important nutritional compound for food choice. Here, we examine FSS concentrations in a variety of orangutan foods ($n=54$) to better understand orangutan foraging and nutritional ecology. We predicted that preferred foods would have higher concentrations of FSS than fallback foods.

We analyzed FSS concentrations using a modified phenol-sulfuric acid method, and tested sample absorbency using a spectrophotometer at 490 nm. We analyzed 54 samples from 48 species, examining six plant parts: bark, flowers, leaves, pulp, seeds, and skin/pulp. Although preliminary results indicated no statistically significant differences in sugar content across the six food categories ($F(5,47)=1.78$, $p=0.14$), we did find that preferred foods (fruit pulp and seeds) had an average sugar concentration that was

significantly higher (4.7%) than fallback foods (leaves and bark) ($t=2.355$, $p=0.04$).

Therefore, as predicted, we find that orangutans prefer food types with higher concentrations of FSS. Obtaining adequate caloric and nutritional intake is crucial for orangutan reproduction and development, and thus this study provides new insight into what drives orangutan dietary choices.

National Science Foundation (BCS-1638823, BCS-0936199, 9414388), National Geographic Society, US Fish and Wildlife (F15AP00812, F12AP00369, 98210-8-G661), Leakey Foundation, Disney Wildlife Conservation Fund, Wenner-Gren Foundation, Nacey-Maggoncald Foundation.

Preliminary investigation of morphological integration between the talus, calcaneus and navicular of apes and humans

NICOLE L. ROBINSON and J. MICHAEL PLAVCAN

Anthropology, University of Arkansas

Analyses of morphological integration among primates commonly focuses on the relationships between the face, braincase and base of the skull, as well as the upper and lower dentition. These studies rarely include the post-cranial skeleton, but those that have focused on the pelvic girdle and the relationships between the upper and lower limbs. The associations between the bones of the hindfoot and their articular surfaces have largely been ignored among primates, even though the foot demonstrates high degrees of variation and modification. This adaptive variation allows us to study the relationship between morphology and locomotion, which can then be used to study the locomotion patterns of fossil hominins and apes and their unique characteristics. Because the articulations between the talus, calcaneus and navicular act together to stabilize the hindfoot in locomotion and form a direct interface with the substrate, the matching articular surfaces are highly integrated. This suggests that these surfaces form a complex structural unit rather than separate bones, for natural selection to influence. However, preliminary results suggest that there is no difference in correlation both within and between bones, where high correlations were found in most comparisons. Thus, the study of morphological integration of the talus, calcaneus, and navicular can help resolve the issue surrounding the development of a foot adapted for bipedal locomotion from a more primitive ape foot. While articular surfaces were expected to be more highly correlated, results demonstrate that integration within and between bones is no different.

Reconstructing admixture and migration dynamics of post-contact Mexico

JUAN ESTEBAN RODRIGUEZ-RODRIGUEZ¹, JAVIER BLANCO-PORTILLO¹, ALEXANDER IOANNIDIS² and ANDRES MORENO-ESTRADA¹

¹Human Population Genomics, LANGEBIO-CINVESTAV, Mexico, ²Department of Genetics, Stanford University

Mexico has considerable population substructure due to historical events and different amounts of admixture between diverse human groups, predominantly Native Americans, Europeans, Sub-Saharan Africans and, to a lesser extent, East Asians. Using genome-wide SNP array data from indigenous and admixed Mexican populations, we explored the ancestry tract-length distribution from 7 different states across Mexico to infer the timing of admixture in each region, as well as the number of migratory pulses. We observed older admixture timings in the earliest colonial cities. We show for the first time a second pulse of combined European/Native American origin in the states of Guanajuato and Guerrero. Moreover, first admixture event predictions agree with historical records, reporting a considerable increase of the admixed population between 1570-1646. In the other hand, we identified some individuals from Guerrero with more than 5% of Asian ancestry. To trace the origin of this understudied heritage, we compared the Asian-derived Mexican haplotypes with a reference panel of Southeast and East Asian populations. These individuals, particularly from the Pacific Coastal port of Acapulco, clustered with Indonesian and non-Negrito Filipino populations, suggesting a historical genetic record from the Manila Galleon trade between Philippines and Mexico. These unexpected ancestries may have repercussions in clinical genomics research as they have not been taken into account considerably in these studies.

Supported by CONACYT grant CB-2015-01-251380 (Mexico) Evolutionary Genomic Analysis of indigenous populations from Mexico

Genetic evidence for early separation of Neanderthals and Denisovans and an early archaic bottleneck

ALAN R. ROGERS¹, RYAN J. BOHLENDER² and CHAD D. HUFF³

¹Anthropology, University of Utah, ²Epidemiology, MD Anderson Cancer Center, ³Epidemiology, MD Anderson Cancer Center

Whole-genome sequence data allow us to reconstruct human evolutionary history in unprecedented detail. We use Legofit to study the past several hundred thousand years. Our results show that (1) the Neanderthal population was large and deeply subdivided; (2) Neanderthals and Denisovans separated early in the Middle Pleistocene; and (3) their ancestors survived a narrow bottleneck of population size. They also