

deciduous forest of the west, spiny desert of the southwest, and mangroves of the coast. We present preliminary results from a study of Verreaux's sifaka socioecology at Kirindy Mite. Data were collected in June-August 2006. Thirteen individuals from 4 social groups were captured. Mean adult body mass was  $2.97 \pm 0.22$  kg. Females had significantly longer body length than males ( $p=0.003$ ), a trend for greater body mass ( $p=0.073$ ), but no difference in canine length. Adult males exhibited the bimorphic trait of chest staining. The location of three social groups was recorded twice daily for 30 days using a GPS. Home ranges averaged 7.88 ha. Home range size was similar to other sites. However, home ranges at Kirindy Mite overlapped less with neighboring groups than at other sites. These preliminary results suggest that the transitional habitat of Kirindy Mite influences Verreaux's sifaka morphology and behavior. Their adult body mass was less than sifaka in Kirindy and greater than Beza sifaka. As in Kirindy, reversed sexual dimorphism was present. Funding was provided by the Lazar Foundation/Student International Discussion Group at the Nicholas School of the Environment at Duke University.

#### Late Miocene fossil locality Nakali in Kenya and its paleoenvironment.

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Fossil ape from the Late Miocene of Africa was very poorly known until quite recently. Only exception was *Samburupithecus kiptalami* from the Namurungule Formation (9.6 Ma) in Samburu Hills, northern Kenya. Unfortunately, *Samburupithecus* is known from only a single maxilla, and its phylogenetic status is still controversial. There is debate on the implication of the paucity of African ape fossils during this time period, that is either a sampling bias or a decline of endemic fossil apes leading to their extinction. Our recent discovery of a diverse primate fauna from Nakali, 60 km south of Samburu Hills, supports the former possibility. From the Late Miocene Nakali Formation, four catarrhine taxa were collected including a large-bodied hominoid that is clearly distinguishable from *Samburupithecus*. The fossil bearing horizon was dated as 9.8-9.9 Ma by <sup>40</sup>Ar/<sup>39</sup>Ar method and magnetostratigraphy. The associated fauna exhibits a general resemblance to that of the Namurungule fauna. However, the Nakali fauna includes strict forest dwellers such as a small-bodied colobine and a non-

cercopithecoid small catarrhine, which are absent from the Namurungule fauna. Regardless of the geographical and temporal proximity, a significant difference of regional environment is presumed between these fossil sites.

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#### The Magician: Collaborative Studies of an Ancestral Hopi Leader.

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The Magician's burial was excavated in 1939 from the site of Ridge Ruin, an ancestral Hopi site located east of Flagstaff, Arizona. Dating to A.D. 1150-1200, the burial contained the skeleton of an adult male and one of the richest mortuary assemblages ever recovered in the U.S. Southwest. The skeleton has been analyzed on several occasions by physical anthropologists; and archaeologists and Hopi cultural advisors have worked together in interpreting the Magician's grave goods. In addition to describing the Magician as a high-ranking individual who had considerable magical power, these advisors have identified the clans and religious societies to which he may have belonged. Archaeologists continue to have a great interest in the Magician's burial because of what it can reveal about the organization of ancestral Puebloan societies. The burial is also of great interest to the Hopi both for what it can reveal about their past, especially with reference to issues of cultural affiliation, as well as for their religious concerns about respectful treatment of their ancestors' skeletal remains and grave goods. This poster summarizes previous research done on the Magician's burial, highlights issues raised by its eventual repatriation and reburial, and describes current efforts to further document and study its contents prior to repatriation in ways that will be meaningful for physical anthropologists, archaeologists, and the Hopi.

#### Skeletal biology of new Gallina burials from Rio Arriba County, New Mexico.

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The Gallina occupied a relatively small area of northwestern New Mexico appearing abruptly around 1000 AD and disappearing as abruptly between 1250 and 1300 AD, possibly as a result of genocide. Here we report on the skeletal biology and paleopathology of a new series of Gallina burials from the site of Cañada Simon I. Discovered in Fall 2005 during the attempted reburial of a partial human skeleton collected as it eroded out of a road cut bank in 1992, the site was excavated in October 2005 and May 2006. During the excavations six additional sets of remains were recovered.

The sample comprises five adults of greater than 20 years and two sub-adults of less than five. The disposition of the burials mirrors that typically associated with the Gallina as skeletal elements, particularly heads, are not in anatomical position, burials are randomly distributed, and the manner of death appears traumatic. Specifically, evidence of trauma indicates extreme interpersonal violence including broken necks, fractured long bones and ribs, and a crushed pelvis. Outside of trauma, the individuals appear to have been in good health with the pathology profile being what would be expected from maize horticulturists of this time period and location. Levels of DJD are moderate and increase with the age of the individual. Dental wear is moderate to extreme with frequent antemortem tooth loss and alveolar abscessing. This and future work at Cañada Simon I will hopefully lead to a better understanding of Gallina lifeways and the nature of their demise.

#### Using the length of the 2<sup>nd</sup> to 4<sup>th</sup> digit ratio (2D:4D) to investigate the influence of prenatal sex hormones on non-human primate mating systems and human social evolution.

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There is a genetic link, via the *HoxA* and *HoxD* group of genes, between the development of the digits and the reproductive system. In humans, the length ratio of the 2<sup>nd</sup> and 4<sup>th</sup> digits (2D:4D) correlates negatively with prenatal testosterone (PT) and low male 2D:4D has been associated with higher fertility and more successful male-male competitive abilities. Variation in human mating behaviors, using marriage systems as a proxy, has been shown to correlate with mean 2D:4D such that monogamous groups show low PT (high 2D:4D) and polygynous societies show high PT (low 2D:4D). This study investigates whether similar patterns of mean 2D:4D are expressed across non-human primate mating systems. Using 2D:4D as a bio-marker, our evidence indicates that PT varies between taxa, with the lowest PT (higher 2D:4D) found in monogamous New World Monkeys and Apes. Across monkeys as a whole, species with high intensity/high intra-sexual competition had the highest PT (low 2D:4D) whilst those with low intensity/low frequency competition had the lowest PT (highest 2D:4D). We conclude that prenatal sex hormones are implicated in the organisation and expression of mating systems in the Primate order and consider the effects of lowered PT on human social evolution.

#### *Homo floresiensis* and *Homo sapiens* size-adjusted cranial shape variation.

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On the basis of a unique combination of morphological features, the LB1 specimen was assigned a novel taxon *Homo floresiensis* (Brown *et al.*, 2004); however, critiques propose LB1 does not differ significantly from modern humans, LB1 belongs to a local short-stature population, and LB1 suffered from microcephaly (Jacob *et al.*, 2006). Comparisons of LB1 with a small sample of microcephalic patients failed to support diagnosis of any specific form of the disease (Argue *et al.*, 2006; Falk *et al.*, 2005). We demonstrate that LB1 cranial shape falls outside the range of normal modern human skull shape by analysis of multiple cranial dimensions relative to their overall size as measured by their geometric mean (GM). Small size alone can not account for LB1 cranial shape.

The GM four of six cranial variables is significantly smaller for LB1 than a comparative sample of 2486 modern human (mean human GM = 122.3, human SD = 4.88; LB1 GM = 99.9,  $p < 0.001$ ) (Howells, 1996). Shape variation is characterized by analysis of relative size variables: raw size divided by individual geometric mean. Principle components analysis confirms that LB1 is an extreme outlier for a global modern human sample, with LB1 Euclidean distance from the centroid 13 standard deviations away from the modern human mean. These results suggest that LB1 can not be accommodated within a non-pathological global sample of *Homo sapiens*. These results are consistent with the taxonomic validity of *Homo floresiensis*, although they do not rule out the possibility that LB1 is pathological. Supported by NSF IGERT Grant No. 9987590.

### The relationship between height and dental caries – A life course perspective

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For years, researchers have been on the lookout for ways and means the interaction between nature and nurture. An individual's biological resources are influenced by their genetic endowment, their pre-natal and post-natal development and their social and physical environment in early life. Adversity in childhood becomes 'embodied' at an early age, its full impact manifesting later in life. For example, socio-economic circumstances influence foetal development and growth during childhood. Poor foetal development and delayed linear growth are associated with increased mortality. A variable commonly used in social sciences and social epidemiology to capture biological fitness is height. In this presentation we will review

how height has been used in social epidemiology and illustrate that use with an example. We interviewed and examined 652 13-years old Brazilian adolescents to investigate whether or not dental caries experience is associated with height in Brazilian adolescents. Our hypothesis was that taller children had better biological resources and would have better oral health signified by lower levels of dental caries. Dental caries was measured by decayed, missing and filled teeth (DMFT) index. Data on socioeconomic and family environment, health behaviour and anthropometric measures was also collected. After dichotomizing the outcome measure into high and low caries levels, logistic models were used in a series of simple and multiple regressions. Adjusted results showed that taller adolescents were less likely to experience high levels of caries. Thus, we could conclude that there is a relationship between height and dental caries experience in this sample of Brazilian adolescents.

### The utility of molecular techniques to address the impact of paleoclimatic events on demographic history of populations in Africa and Arabia.

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Increased availability of genetic data and advances in computational modeling techniques over the past decade have permitted greater resolution of hypotheses regarding human paleodemography. However, few attempts have been made to correlate past demographic changes with paleoclimatic data. Although studies have shown an expansion of European populations at the end of the last glacial maximum (LGM, 18-23,000 years ago), little comparable research has been conducted on Northeast African or Arabian populations. Evidence from speleothems, tufa deposits, and lake and groundwater records all support a history of fluctuating aridity over the past 25,000 years, with maximum arid conditions at the LGM, followed by a sudden humid transition at the onset of the Holocene. This project examines the utility of genetic approaches for detecting general demographic shifts that may be correlated with these types of paleoclimatic events. Established methods for detecting population bottlenecks and expansions were applied, including Tajima's D, haplotype frequencies, and mismatch distributions, as well as newer coalescent-based inference techniques, such as Bayesian skyline plots and computer modeling using Simcoal. Mitochondrial DNA from both humans and non-human primates living in similar environments in NE Africa and Arabia were utilized. Comparison across species provides insight into whether fluctuations in population size were caused by global external factors such as climate change, or by human-specific factors such as cultural adaptations. These data also contribute to our

greater goal of elucidating the evolutionary and demographic history of humans in Northeast Africa and Arabia.

### Morphological variation within primate species: papionines versus koalas.

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Diagnosis of species in the fossil material is a perennial problem in palaeontology. The only objective method available is the assessment of morphological differences and similarities among specimens. In order to tell whether two individuals differ morphologically in a way normal for conspecifics, or some of their differences exceed intraspecific levels, it is necessary to have reliable standards of within- and between- species variation. We have used cranial variation in an undoubted single species of the Koala (*Phascolarctus cinereus*) as a guideline. Koalas are arboreal mammals of the lifestyle similar to some primates, with vertical clinging and vertical sitting as habitual postures. Using multivariate coefficients of variation (MCV) proposed by Van Valen (1974) we have assessed variation in koalas (N=43, both sexes). MCVs ranged from 9.8% in the neurocranium through 11.1% in the splanchnocranium to 15.7% in the mandible. In a test sample of 48 male and female crania belonging to 6 species of the genus *Papio* MCV values ranged from 13.2% for neurocranium through 26.5% for splanchnocranium to 27.14% in the mandible. It follows that variation assessed by MCV in variously constituted samples of fossil hominids can indicate whether these samples consist of individuals belonging to one or to several species.

### Early *Homo erectus* occupations appear in Northeast and Southeast Asia. What about Central-East Asia (JAS, China)?

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Sometime after 2 Ma *Homo ergaster/erectus* moved out of Africa in two initial directions: 1) north toward Dmanisi, Georgia, and 2) east toward Sangiran, Indonesia. Chronometric reconstructions from Yuanmou in southern China, and Sangiran in Indonesia indicates hominins may have reached East Asia between 1.8 – 1.7 Ma. In addition, sites in the Nihewan Basin (e.g., Majuangou) in northern China have been tentatively dated to 1.66 Ma. Currently however, the hominin migration route to Northeast Asia is unclear, as *H. erectus* could have traveled north through Dmanisi and then east, or from the south passing by Yuanmou and/or Sangiran. In central Asia, the Himalayan Mountain Range