To assess the impact of introduced predators on this faunal community, monthly scat samples were collected October 2008 through June 2009, spanning both wet and dry seasons. Scats (n = 37) were identified to predator by size and morphology of the fecal specimen. Samples were dissected using a binocular scope with remains identified to broad faunal categories. Wild cat scats were most prevalent (68%), followed by civet and dog. Vertebrate prey (including rodents and lemurs) was more frequent in the dry season, with insects and plants being common across both seasons. Cats show higher counts of vertebrate prey than the other predators, with one cat sample containing a femoral distal epiphysis from an immature ring-tailed lemur.

Given the existence of *Lemur catta* remains in the samples we can infer that introduced predators are impacting the ecology of primates at BMSR, especially during the dry season. The presence of young lemur material indicates the potential threat of introduced predators on immature lemurs in particular, corresponding with previous observations of predation events by felids at BMSR.

The dietary competitive environment of early Eocene euprimates in North America.

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The earliest Eocene marked the appearance of the first North American euprimates. Despite the fact that leading hypotheses assert that traits involved in food acquisition underlie euprimate origination and early diversification, the precise role that dietary competition played in establishing euprimates as successful members of mammalian communities is unclear. This is because the degree of niche overlap between euprimates and all likely mammalian dietary competitors ("euprimate guild") is unknown. This research determines the temporal pattern of niche overlap within an Eocene euprimate guild and elucidates the nature of dietary competitive interactions surrounding the earliest euprimates in North America.

To evaluate the validity of using dental morphology to reconstruct dietary niche overlap, a discriminant function analysis was performed on nineteen 3D molar measurements in two extant euprimate guilds (Balta, Peru; Mindanao, Philippines; 106 species). Results showed that dietary niche reclassification rates were high (87%). Thus, a PCA of these molar measurements from an Eocene euprimate guild (Bighorn Basin, Wyoming) was conducted, and multidimensional polygons, each representing a species' dietary niche, were derived from this analysis. Calculation of an F-statistic using Euclidean distances associated with these polygons revealed that dietary niches of Eocene euprimates overlapped with some, but not all, contemporaneous non-euprimate species (p<0.05). Furthermore, correlation analyses of polygon distributions demonstrated that patterns of competition changed over the duration of the Wasatchian. This suggests that the dietary competitive environment of the earliest North American euprimates was complex, and thus that diet had a variable effect on the course of this euprimate radiation.

Secular changes in robusticity of limb bones in Americans.

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Secular changes in limb bone lengths over time have been studied extensively by anthropologists over the last few decades. Curiously, secular changes in skeletal robusticity have been largely ignored; instead, robusticity is generally studied to infer the level of activity in prehistoric populations. Over the last two hundred years, the trend towards a more sedentary lifestyle suggests significant changes could have occurred.

This study analyzed several measurements taken from the femur, tibia and humerus collected from the Terry Collection and the Forensic Data Bank to bridge the gap in our understanding of secular changes in robusticity. The sample was subdivided based on sex and ancestry. All individuals were born between 1828 and 1995. Long bone lengths, breadths, and robusticity indices were regressed on birth year using loess curves. Inflection points of 1900 or 1940 were discerned in the groups and used with parametric and nonparametric tests to determine statistical significance. All p values were adjusted for multiple comparisons.

Nineteen of the 48 comparisons showed significant secular changes ($p < 0.02$). All limb bones increased in length over time, with the exception of the white male humerus. Also, all four groups show a decrease in lower limb bone breadths, which, coupled with an increase in length, decreased robusticity. Concurrently, the shorter humerus in white males and the increase in the other groups' epiphyseal breadths increased upper limb robusticity. Of the four groups analyzed, black males demonstrated the greatest secular changes in robusticity.

Non-metric cranial and pelvic traits as a measure of sexual dimorphism in a modern South African population.

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The current study combined the Walker (2008) and Klales et al. (2012) methods to score non-metric cranial and pelvic traits on modern white and black South Africans. The contributions of genetics and the environment has led to population-specific distribution of non-metric traits (Garvin 2012). Krüger et al. (nd), demonstrated that the Walker (2008) method is applicable to a modern South African sample; however, the degree of expression is unique to the population. Similarly, high classification accuracies are noted on modern South Africans for non-metric pelvic traits for Klales et al. (2012) (Kenyhercz 2012). The purpose of this study was to combine non-metric data from 71 corresponding skulls and innominates to examine the degree of sexual dimorphism in a modern South African sample as well as to examine correct classifications derived from these non-metric traits. Depending on the statistical analysis and variables employed, correct classifications ranged from 82-100%. The traits from the innominate consistently provided higher classifications than traits from the skull, even outperforming a combination of skull and innominate traits, thus indicating greater sexual dimorphism in the innominate as opposed to the skull in modern South Africans.

3D retrodeformation of paleoanthropological fossils based on biomechanical simulation.

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Plastic taphonomic deformation is a major problem in studying paleoanthropological fossils. In general, paleoanthropologists retrodeform the fossil manually according to the position of anatomical landmarks or based on symmetry planes. Another method is to analyse the change of shape of a simple anatomical structure as the orbit in order to compute strain parameters and infer the magnitude and orientation of the deformation. This is particularly interesting as it does not only allow one to retrodeform the fossil but it also gives information about the taphonomic process, which may be correlated with geologic measurements.

We propose to extend this method by analysing the deformation of the complete fossil. We used the open-source SOFA software framework targeted at real-time biomechanical simulation. The fossil is modelled as a linear homogeneous stiff material which is plunged into a linear homogeneous soft material which represents the surrounding geological layers. We apply a directional force on the surrounding material and simulate the 3D deformation of the

virtual fossil. We compute then a quality factor which is based on the correspondence or the symmetry of deformed and non-deformed landmarks. We search for the direction and magnitude of the force which maximizes the factor quality and we get a retrodeformation force and a 3D retrodeformed version of the fossil.

We performed experiments on the highly-distorted lower face STS 52a (Australopithecus africanus). The quality factor is based on the alignment with the corresponding mandible STS 52b which is assumed weakly deformed. The results are consistent with the paleo-anthropological observations.

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Cost of male mate competition in bonobos.

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Cortisol excretion in males of group living species is often associated with social rank and competition for estrous females. Rank-related patterns of cortisol levels can be used to study mechanisms of rank maintenance and costs associated with mate competition. Bonobos (*Pan paniscus*) are interesting because males form a linear dominance hierarchy but are not dominant over females and therefore aggressive male-male competition over access to females alone is not considered to be a successful reproductive strategy. In this study on social correlates of urinary cortisol in wild male bonobos, we investigated the relationship between cortisol levels and several aspects of mate competition, including male rank, aggression rates, and association time with estrous females. We found that cortisol levels correlated positively with dominance rank when estrous females were present, but not when they were absent. This result indicates that aggressive behaviour plays a minor role in maintenance of high rank. While aggression received from males and females explained within-individual variation in cortisol levels, it was the time spent in association with estrous females that best explained between-individual variation in male cortisol levels. The observed increase in male cortisol may be associated with spatial proximity to estrous females and could result from anticipated aggression from other group members, reduced feeding time in the males, or a combination of both.

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Synchrotron light identifies the biogenic uptake of metacinnabar in a bone sample from an Antigua, West Indies, Royal Naval Hospital Cemetery (1793-1822).

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Mercury is a heavy metal that exists in three categories of species: elemental mercury, inorganic mercury, and organic mercury. Elemental mercury and inorganic mercury compounds have been used for centuries to treat ailments such as syphilis and yellow fever. As part of a larger study on lead poisoning in colonial Antigua, a mass spectroscopic analysis (ICP-MS) of bone elements from 17 individuals once buried in a Royal Naval Hospital cemetery (1793-1822) revealed a high level of mercury in one individual. Analyzing trace elements that are identified within an archaeological context has been a challenge due to the difficulty of determining whether the element was present in the environment or associated with a biological event during life. Synchrotron radiation X-ray fluorescence (SR-XRF) was employed to determine whether the mercury was present in the bone as a result of environmental contamination or due to biogenic uptake. The SR-XRF study revealed an osteon with mercury-labelled lamellae, which is indicative that the mercury was biogenic. The synchrotron radiation X-ray absorption spectroscopic (SR-XAS) technique of X-ray Absorption Near Edge Structure (XANES) was used to determine that the mercury was present in the bone tissue as an inorganic mercuric sulfide in the beta structural form otherwise known as metacinnabar. While this inorganic form is not as toxic as organic mercury, there may have been an impact on the individual's health.

Explorations in paleodemography: An overview of the Artificial Anasazi agent-based modeling project, with new observations on demographic estimation.

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Population settlement, growth, expansion and eventual abandonment of ancestral Pueblo sites in the Four Corners region of the United States have posed enduring questions for bioarchaeologists and paleodemographers, including the respective roles of drought, conflict, disease, and intrinsic demographic factors in the abandonment of the region. In order to better understand the role of these factors, the Artificial Anasazi (AA) Project was initiated. The central component of this project is an agent-based computer model that uses extensive archaeological and environmental data to simulate the rise and fall of populations in the Long House Valley, located in northeastern Arizona.

Data from this valley, coupled with archaeological estimates of growth and change, provide a baseline to compare to simulation outcomes. The simulations allow us to reproduce settlement decision-making and demographic behaviors of households in each Pueblo period, and to compare these with the observed archaeological record. The advantages of agent-based simulation include the ability to test a wide variety of fertility and mortality rates and ascertain the most realistic and probable set of "fits" to the observed Long House Valley data. We demonstrate that, using only the environmental opportunities and constraints as a first approximation, simulated population trajectories can be produced that are strikingly similar to the archaeological trajectories. Additionally, we present new results on the range of vital rates underlying these trajectories, discuss their fit in terms of fertility and mortality data from anthropological populations, and examine how the AA model can further explore the impact of these underlying vital rates.

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Ancestral estimation using E.A. Marino's analysis of the first cervical vertebra applied to three modern ethnic groups.

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Ancestry identification in forensic anthropology is vital for the medico-legal field. Forensic anthropologists have long sought to develop ancestry determination methods using complete and fragmented skeletal elements. Ancestry is most commonly assessed using cranial traits. Post-cranial methods for identifying individuals are needed in the field because cranial elements are broken and incomplete. Examining other elements can increase the likelihood of identification of the individual in question. Eugene Marino developed a method for estimating ancestry from eight measurements of the superior and inferior articular surfaces and vertebral foramen of the atlas from individuals of European and African descent. These specimens were from the Terry and Hamann-Todd collections. This study applies Marino's method to post-1950s individuals who are self-classified as Hispanic, Caucasian, and, African-American. Two hundred and fourteen specimens were measured from the William Bass Skeletal Collection, the Pima County, Arizona's Coroner's Office, and the Maxwell Museum at the University of New Mexico. Each measurement was obtained using sliding calipers. The measurements taken from this study were analyzed using Statistical Package for the Social Sciences (SPSS) to establish a discriminant function that distinguishes Hispanic individuals from members of other populations. The analysis supports Marino's results in prediction of African-Americans and Whites with 60-72% accuracy. This study also concludes that a