

six individuals, one adult female and five adult males, from the bottom of an inner courtyard cistern. Five out of six of these individuals (one female, four males) display cranial blunt force trauma. Macroscopic, microscopic, and radiographic analyses all confirm that these traumas occurred at or near the time of death.

Bioarchaeological, archaeological, and historical data are used to help develop a profile of these individuals to clarify reasons for their violent death and corpse desecration.  $^{14}\text{C}$  analysis of skeletal samples ( $n=2$ ) indicates that these individuals died between the late 8<sup>th</sup> and mid 10<sup>th</sup> centuries A.D., after the Qasr (fortress/palace) went out of official use. Historical evidence from this period implies that these individuals could have been involved in tribal conflicts or political unrest after the transition from Umayyad to Abbasid rule in the mid-8<sup>th</sup> century. Assessment of health and disease using skeletal indicators suggests that, compared with regional populations, these individuals were relatively healthy. Four out of six (one female, three males) had healed cranial trauma, signifying that this was not their first violent episode. We hypothesize that these individuals perished during an intraregional struggle for resources, particularly water, when the area was in a political vacuum after the 8<sup>th</sup> century. Future isotopic analyses of these individuals, indicating their primary dietary sources or non-local origin, could further elucidate who these individuals were and why they perished at Qasr al-Hallabat. The excavations at Qasr al-Hallabat are funded by the Spanish Agency for International Cooperation and the Spanish Institute for Cultural Heritage.

#### High resolution radiometric and stable isotopic analysis of pre-Columbian Puerto Rican paleodiet.

W.J. Pestle. Department of Anthropology, University of Illinois at Chicago.

The ability of biogeochemical techniques to produce information on the diets of individual consumers in past societies is something that no other line of archaeological inquiry is capable of providing. Given the scale and resolution of the data they produce, such techniques are ideally suited for the high resolution study of past social structure and change. Despite this usefulness, paleodietary studies have far too often relied on the analysis of just a few individuals from any given past site or society to form conclusions about socio-political patterns and processes. A reliance on such small sample sizes represents a major flaw in many such studies.

Contrary to this trend, the present work presents the results of an exhaustive radiometric and stable isotopic study of four large skeletal samples (combined  $n=396$ ) excavated from four pre-Columbian Puerto Rican sites. The radiometric and stable isotopic analysis of all of the individuals in these samples has made possible an unusually high resolution reconstruction of culturally and socio-politically driven synchronic and diachronic dietary variability in the pre-Columbian polities of Puerto Rico. While expensive and time-consuming, detailed and exhaustive studies of this sort present what is, perhaps, our best chance to reconstruct the

inner-workings of past food systems and societies.

This material is based upon work supported by the Heinz Latin American Archaeology Program, Howard Heinz Endowment, and the National Science Foundation under Grant No. BCS-0612727.

#### Morphometric variability in *A. africanus*.

T.R. Petersen. University of New Mexico.

The taxonomy of the *A. africanus* fossils has been a topic of routine controversy, and recent discoveries have only complicated the situation. A 3D morphometric analysis of basicranial shape was undertaken on a sample of South African specimens in order to identify divergent specimens. As these fossils are highly fragmentary, however, it was necessary to devise a method by which to estimate shape-space distances between specimens that share few common landmarks. A series of tests were conducted in which pairwise Procrustes distances were obtained for fossils sharing particular landmarks. These distances were compared to a corresponding distribution in a sex-, species-, and subspecies-balanced *Pan* sample. The percentage rank of each fossil pair's distance in the *Pan* distribution was recorded for each test. When a number of tests were available for a given pair, the percentage ranks were averaged with weight given to the number of included landmarks.

The resulting matrices of fossil pairs' average Procrustes distance percentiles in the *Pan* distribution were ordinated with both the PCO and NMDS approaches. Each ordination indicates that Stw 505 is substantially distinct from the other specimens. Sts 19 is also distinct, and always along an axis orthogonal to the one distinguishing Stw 505 from the other specimens. The Procrustes distances between these specimens, and between each of them and the remainder of the fossils, tend to be large. It is therefore unlikely that Sts 19 and Stw 505 are both conspecific and distinct from *A. africanus*. Supported by NSF grant no. BCS-0451969.

#### Regional patterns among Holocene hunter-gatherers of southern Africa.

Susan Pfeiffer<sup>1,2</sup> and Judith Sealy<sup>2</sup>, <sup>1</sup>University of Toronto, <sup>2</sup>University of Cape Town.

In the characterisation of the human past, hunter-gatherers are often portrayed in general terms, serving as the baseline from which subsequent populations deviated. Sample sizes are rarely large enough to make generalizations about regional adaptive strategies. The coastal and near-coastal environments of the southern tip of Africa provide archaeological evidence of continued exploitation by foragers for several thousand years, with little input from populations of adjoining inland locales. Hundreds of skeletons, curated at several institutions, have been the focus of a coordinated research program. They can now be described in terms of biological and behavioural similarities and differences. There is apparent homogeneity across the region in many features of skeletal morphology and patterns of child growth. There

are local differences in dietary patterns and evidence of interpersonal violence. Habitual behaviors show both similarities and differences. The strategies of resource exploitation that were successful in this environment illustrate this region's past, but also probably illustrate fundamental features of hunting and gathering in other non-marginal regions. The research provides a rich example of the interplay between biology and behaviour, as modulated by environment.

#### Influence of androgen receptor variation in primate and carnivore female social dominance.

L.A. Pfister<sup>1</sup>, L.T. Nash<sup>1</sup>, M.S. Rosenberg<sup>2</sup>, A.C. Stone<sup>1</sup>. <sup>1</sup>School of Human Evolution and Social Change, <sup>2</sup>School of Life Sciences and Biodesign Institute, Arizona State University.

Female social dominance over males is a rare social behavior within mammals, found only in the Primates and Carnivora. Dominance behaviors are correlated with androgen levels. Androgen hormones act by binding to androgen receptors (AR), which upon binding function as a transcription factor initiating a cascade of events. In mammals, the AR gene exhibits extensive variation within the first exon, characterized by variable length CAG repeats. AR expression *in vitro* is inversely related to the number of CAG repeats. Human males with many repeats suffer androgen insensitivity when androgens fall with age. Since females produce less androgen than males, a possible mechanism to increase androgen effects is by increasing the receptor availability. This can be accomplished by reducing the number of the AR CAG repeats. Thus, short AR repeats may act as a proximate mechanism contributing to female dominance. To test this hypothesis, publically available AR sequences for 24 species (15 primates, 9 carnivores) are analyzed for repeat length. Social behavior data comes from the literature. Within each order, female-dominant species *Crocota crocuta* (spotted hyena), *Lemur catta* (ringtail lemur) and *Propithecus verreauxi* (sifaka) exhibit significantly shorter repeat lengths than related species. This suggests that AR repeat length contributes to a female-dominant phenotype, though a short repeat length alone would not be predictive of such a complex phenotype. Future research will examine more species to explore the correlates of CAG repeat length and social dominance at both within and between sex levels of analysis.

#### Fighters, victims and average Joes: fracture patterns at the site of El Brujo, northern coastal Peru.

S.S. Phillips. Department of Anthropology, Tulane University.

In an effort to understand the nature and frequency of interpersonal violence in the pre-Hispanic Moche culture of northern coastal Peru, an analysis of fracture patterns was undertaken. Fracture pattern analysis includes comparisons of overall fracture rate, fracture location, timing (ante- or perimortem), and fracture mechanics. Fracture pattern analysis from the