thropologists, linguists, and geneticists. Progress has been limited in large part by the quality of the linguistic data available to researchers and by the methods used to reconstruct linguistic relationships. Dunn and colleagues (2005) recently suggested that structural linguistic data (i.e., aspects of sound systems and grammar) and innovative phylogenetic methods might overcome these limitations.

This study will employ structural linguistic data and Bayesian phylogenetic inference to examine the relationship between linguistic and genetic data collected from Native Latin Americans. The genetic data are comprised of the microsatellite markers typed for 18 South American populations by Wang and colleagues (2005). The structural linguistic data for these populations will be compiled from the literature. A maximum likelihood model-fitting method will be used to test the hypothesis that the linguistic tree estimated from the structural linguistic data corresponds to the genetic tree of the populations, and we will use coalescent-based simulation and matrix correlation tests to further compare the patterns of genetic and linguistic variation.

Physical and cognitive predictors of skills and expertise across the lifespan.

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Little is known about why humans have an extended juvenile development and long post-reproductive lifespan. Unlike most animals which live only as long as they can reproduce and take care of themselves, humans live past their reproductive years, experience significant declines in production, and often become dependent on support of others for their survival. Intergenerational contributions to skill development in younger kin could help explain past selection for longevity, but even less is known about development of older adult expertise in small-scale society. The distribution and ontogeny of everyday abilities, focusing on development of expertise and older adults' roles in the enculturation process are described among the Tsimane, a small-scale forager-horticulturalist group in the Bolivian Amazon. Investigation of the physical growth, cognitive experience, and reproductive investments moderating the ontogeny of skills and abilities, and the role of older adults as instructors, exemplars, and transmitters provides insight into past selection for longevity among humans. Results indicate that while complex skills essential to survival can take decades to learn, development of expertise takes nearly a lifetime with most experts older than 40. Expertise is scheduled with strong skills mastered earlier, while difficult skills independent of strength, such as music, storytelling, and artifact manufacture come later. Intergenerational transmission of a cumulative traditional culture helps buffer mortality risks and has been made possible by extension of the human lifespan. Among Tsimane, older adults make important contributions to younger kin's skill development that likely affect fitness, helping explain "old age".

An atlas of modern human cranial morphology constructed via non-rigid deformation analysis of high-resolution CT images.

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Comparative studies of skeletal morphology are only as good as the quality of the comparison sample. Comparisons made to a limited sample, or one that has unrecognized biases, can compromise the conclusions. A standardized atlas representing average morphology - and incorporating information about localized variation - is of obvious usefulness to the field. We present a method for constructing such an atlas using nonrigid deformation analysis of high-resolution CT images. The technique involves morphing CT images of crania into an arbitrarily selected target image. Distortion matrices that describe how each individual image differs from the target are then used to estimate the morphological average of all the images. The individual images are then remorphed into this average, and a new average is calculated. The process is repeated until subsequent iterations do not change. Variation at each point across the sample can be determined from this data, allowing for detailed global statistical analyses of the difference between an individual (e.g., a fossil) and the population average at each point. Beneficial qualities of this approach include: 1) additional specimens can easily be added, increasing the sample pool used to estimate the population average; 2) external and internal structures (e.g., endocranial surface) are automatically included; 3) sub-population comparisons can easily be made by appropriate subdivisions of the resulting distortion matrices. We demonstrate the technique with a pilot study of images of crania obtained from the Open Research Scan Archive at Penn, including 10 individuals each from Europe, India, Africa, and Asia.

Subsistence strategies of the early inhabitants of southernmost California.

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Some of the earliest New World sites are located in coastal southern California. Traditionally, we thought the earliest immigrants were big game hunters who traveled across the Bering land bridge, moved through today's Great Basin, then down through New Mexico and Arizona, and later into coastal regions where they began shellfish collection. A more recent hypothesis is that some groups of people traveled by boat directly down the coast.

Several sites near San Diego, CA, first excavated in the 1930's, are now known to be more than 9,000 years old. The sites present a unique opportunity to reconstruct diet and subsistence strategies at the threshold age for New World human occupation. Based largely on ethnographic evidence, they were originally thought to be similar to individuals living in the area at Spanish Contact. Those people collected plant foods (especially acorn), terrestrial mammals, and various mollusk species.

We extracted and analyzed bone collagen from several individuals from two different sites. Radiocarbon dates on human bone collagen and on shell demonstrate a range of occupation from 9,440 to 5,650 Cal BP. Bone collagen $\square^{15}$N values (14.2 to 21.3‰) are equivalent to or higher than those of recent marine mammal hunters and salmon fishing people. The $\lrcorner^{13}$C values (-16.6 to -12.1‰) overlap the salmon fishers; but are lower than one set of hunters. These results are consistent with an early marine adaptation with open ocean fishing and an early migration route into the New World. Support: Regents of the University of California.

Ranging patterns of hamadryas baboons: random walk analyses.

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The analysis of animal movement patterns via various forms of random walk is one of the fasting growing areas of research in the ecological sciences. In recent years advances in both theory and methodology have generated a substantial increase in the understanding of the spatial patterns produced during basic foraging activities and their underlying ecological correlates. The ability to quantify and compare movement patterns is essential to a thorough understanding of the animal's interaction with its environment, is vital in generic behavioural modelling, and has profound implications for conservation initiatives. However, whilst recent research into Lévy walks and scale-free phenomena are encouraging, primates remain under-represented in this field.

The current study examines the ranging patterns of a band of hamadryas baboons (*Papio hamadryas*) at the Filoha outpost of Awash National Park, Ethiopia from March 2005–February 2006. During all-day follows, the geographic center of the band was mapped every 15 minutes using a handheld GPS unit. Over 3,000 step lengths, turning angles and waiting times were documented across 105 complete follows spanning both wet and dry seasons. The data were subject to a comprehensive maximum likelihood distribution-fitting strategy involving model selection via the Akaike information criterion. Findings demonstrate that both step lengths and waiting times are power-law distributed, whilst turning angles are significantly biased towards zero. This suggests that resource patches are scale free in both distribution and size, and that the daily foraging round can be modelled as a correlated Lévy walk.