5,000 new students mailed in a sample of their genetic material. Each sample was tested for allelic variation of genes that influence how the body uses folic acid and metabolizes lactose and alcohol.
Controversy over this program was immediate and extensive. The program was designed and implemented by faculty from the Department of Molecular and Cell Biology with no input from faculty in other departments. Much of the controversy centered on ethical issues, as students were asked to provide genetic material prior to being given a chance to learn about genetic testing, the ethical and psychological implications, or the evolutionary context in which such variants evolved. In August, the California Department of Public Health ruled that the project amounted to medical research and required that the University use a licensed clinical laboratory rather than process the genetic data on campus. Due to financial concerns the University decided to only provide the results in aggregate rather than individually. During this symposium I will report on how this program unfolded over the fall semester.

Metabolic rhythms in haplorhine and strepsirrhine primates.

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Microstructural evidence from teeth and bone has recently been used to support the hypothesis that growth, metabolism, and reproduction – i.e., life history – are centrally regulated by a neuroendocrine rhythm known as the Havers-Halberg Oscillation (HHO). Many questions about HHO biology and its relationship to life history evolution remain. For example, studies have shown that body mass is a strong predictor of HHO for anthropoid primates, but it cannot explain the unusual HHO patterns of strepsirrhine primates. It is uncertain whether this results from phylogenetic differences in HHO regulation across major primate clades, or whether such differences are eliminated by application of more physiologically relevant predictor variables.
This study examines Retzius line periodicity (a proxy for HHO) gathered from histological sections of haplorhine and strepsirrhine teeth to provide insight into this question. Results for regressions of Retzius periodicity against body mass, brain mass, encephalization, and basal metabolic rate (BMR) show that for all primates, brain mass and BMR are the best predictor variables. However, strepsirrhines still differ in these two relationships with respect to haplorhines. This suggests that while brain mass and BMR are more physiologically appropriate variables for assessing patterns in HHO variation, phylogeny may still play a major role in governing how HHOs of specific taxa respond to ecological forces. Results also suggest that relatively longer HHOs seen in larger-brained subfossil lemurs correspond with their relatively "slower" life history schedules, reinforcing the idea that HHO can influence the evolution of life history in response to specific ecological selection regimes.
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Investigating early diagenesis: The qualitative preservation of collagen in bones after short interment periods.

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Shortly after death, all body tissues, including bone and its components, inevitably undergo taphonomic changes that consequently lead to total dissolution of the dead body. Depending on multiple factors, such as burial context, temperature, soil pH, water balance etc., decomposition is either favoured, causing faster alteration and loss of tissue, or delayed, resulting in a better preservation. Due to the complexity of factors contributing to the taphonomic fate of skeletal tissue in particular, diagenetic pathways are still not fully characterized and understood. Despite the fact that many authors emphasize the crucial role of the first years postmortem in setting the course for long-term preservation or decay, little systematic research has been conducted in this field.
The aim of this study was to trace the initial bone collagen breakdown from the first years of interment up to later burial periods in order to investigate the mechanism of mineralized peptide degradation under varying soil conditions and the influence of inhumation time. Assessing the integrity of bone collagen is essential for various archaeometric analyses, focusing on radiocarbon dating and stable isotope analysis to reconstruct dietary patterns of past populations.
We analyzed a set of long bones from two different cemeteries with burial times ranging from 8 to 60 and 90 to 150 years. Comparative amino acid analysis (HPLC) revealed a selective loss of certain amino acids, showing stronger coherence with soil properties than inhumation time. Histological features and collagen quantity proved to be unreliable markers for collagen quality.

Evolution of tuberculosis: a meta-analysis of paleopathological evidence.

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Tuberculosis is a re-emerging disease and is a major problem in both developing and developed countries today. An estimated one third of the world's population are infected and almost two million people die from the disease each year. Bone lesions occur in 3-5% of active tuberculosis cases and can be used to diagnose the disease in ancient skeletal remains. A meta-analysis was conducted on 394 paleopathological tuberculosis cases from 180 sites (9000-200 years BP) on all continents for the purpose of testing two hypotheses; 1) the prevalence of bone lesions does not change through time and 2) the distribution of lesions throughout the skeleton does not change over time.
The prevalence of bone lesions was found to significantly decrease over time ($P<0.05$). The distribution of bone lesions was found to change from mainly spinal in earlier time periods to include more cases in other regions of the skeleton (long bones, joints, hands, feet) in later time periods. This difference in distribution was evaluated using a Chi-squared test and found to be significant ($P<0.01$). These findings may represent the evolution of the relationship of host and pathogen over time, with the pathogen becoming less virulent but using more of the host's tissues to survive.

The LB1 endocast: un-adorned, unsmoothed, a replication study based on the original CT scan data.

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An essential part of science is the process of replication. Thanks to our colleagues listed below and their Indonesian colleagues at ARKENAS in Jakarta, it has been possible for the authors to independently analyze the original CT scan data for the LB1 cra-

nium. Using ITK-SNAP and Analyse software programs, we have independently segmented the data to produce an endocasts in their original form, without smoothing, or correcting for broken cranial elements or distortion, and to compare these with the "virtual" endocast created by Falk et al (2005). While agreeing with this earlier effort in most regards, particularly the strong gyri recti of the prefrontal lobe, we regard other aspects of their reconstruction as problematic, such as the left and right temporal lobes, the juncture between occipital and cerebellar lobes, and presence of a lunate sulcus. Our initial volume estimates bracket those reported by Falk et al (2005), though we expect the original undistorted endocast to be somewhat smaller. It will be interesting to see any future independent analyses done on the newer micro- CT scan data which might become available in the future. Acknowledgements: We are grateful to Drs. Michael Morwood, Peter Brown, Bill Jungers, Thomas Sutikna, Rokus Dun Awe, Wahyu Saptomo, Jatmiko, and Tony Djubiatomo, Director of the Indonesian Research and Development Centre for Archaeology for giving us access to the CT scan data.

A zoologist's perspective on the evolution of human ovarian aging: implications for women's health in the postmenopausal age.

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Life expectancy has increased gradually over the course of human evolution–but it has doubled in industrialized societies since the early 1900s, resulting in much longer postmenopausal life spans for modern women. From a comparative biological perspective, human menopause may not require special evolutionary explanation. Midlife fertility loss followed by extended postreproductive life spans occurs in a wide range of other female vertebrates, and is an expected outcome of a finite ovarian reserve produced under particular developmental constraints. In industrialized societies, reproductive aging in women correlates clearly with other clinical aging syndromes, including increasing rates of cardiovascular disease, some cancers, osteoarthritis, and sensory deficits. Intriguing questions remain concerning whether the postmenopausal life span is a human ancestral trait, an adaptation for life in extended kin networks, an artifact of cultural protections against ancestral mortality pressures, or a complex combination of these.

These questions can be addressed more incisively as anthropologists and biogerontologists begin a coordinated effort to obtain more extensive comparative clinical data, particularly a variety of traditional people. These data would ideally include functional measures and clinical predictors of disease, as well as reproductive measures, from midlife, older, and very old age classes. A refinement of scientists' view of the menopausal transition, and a working knowledge of the ancestral physiological trade-offs inherent in our reproductive health, are both essential for addressing women's health concerns over the course of the life span.

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Diet and ontogenetic changes in human mandibular strength.

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Mandibular size and shape are commonly used to infer masticatory load history in archaeological human populations and fossil hominids. However, several factors, including genetic programming and functional demands, influence growth and development of the human mandible into its resultant adult form. The degree to which these separate factors drive mandibular morphology is not yet clear. The goal of this study was to quantify and compare ontogenetic trends in mandibular corpus cross-sectional properties between two archeological populations representing distinct dietary habits.

Using bi-planar radiographs and a hollow asymmetrical beam model, strength and rigidity properties were determined in the mandibular corpus in Arikara (n=42) and Tigara (n=63) population samples. The Tigara sample represents an arctic population with a demanding dietary regime and robust adult mandibles compared to the Arikara. Ages, determined from dental eruption, tooth development, and epiphyseal closure, ranged from infancy to adulthood. To assess developmental patterns in mandibular strength between populations, residual values from polynomial lines fit through the pooled data set were compared using ANCOVA and independent t-tests.

If differential mechanical environments associated with population-specific masticatory forces drive mandibular form, then divergent growth trajectories should be present between the two populations analyzed here. Results of this study indicate that this is in fact the case for the majority of properties examined. This suggests that while certain morphological characters possess population-specific genetic predispositions, most differences are evident only after the initiation of masticatory demands, supporting developmental plasticity as a major factor in determination of adult mandibular form.

A comparative study of the anatomical mechanical advantage of the elbow flexor and extensor muscles in anthropoid primates.

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Previous studies of the mechanical advantage of the muscles controlling flexion and extension of the elbow have generally focused on either the *biceps brachii muscle* (BBM), or the *triceps brachii muscle* (TBM). The anatomical mechanical advantage (AMA) of these muscles, which is an approximation of their effective mechanical advantage, can be calculated from landmarks on the radius and ulna as the ratio of lever arm length to forearm length. Studies have suggested that elbow AMA can be used to distinguish between primates with different locomotor behaviors, making it potentially informative in behavioral reconstructions of fossil primates, but some contest its usefulness. This study examines the *brachialis muscle* (BM), an elbow flexor that has received little attention in AMA studies, along with the TBM and BBM. Lever arms of these muscles and forearm lengths were measured in a sample of anthropoid primates representing a broad range of locomotor behaviors. For the BBM and BM, the relationship between lever arm and forearm length was assessed. Results indicate that relative BM lever arm length consistently distinguishes "slow" suspensory species from brachiators and quadrupeds, but relative BBM lever arm length does not. Mean AMA scores were also calculated for all three muscles, and these scores were compared on scatter plots. These data show that, when considered together, AMA scores from multiple muscles reliably discriminate suspensory taxa from primarily quadrupedal primates. Hence, BM and TBM AMA calculations from entirely preserved ulnae can be used to inform fossil primate behavioral reconstructions.

Variation in rates of enamel deposition in two samples of deciduous dentition.

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Enamel deposition taking place during dental development leaves a visible record of rates of growth through enamel microstructures in the tooth crown. Research addressing the variation in dental development between human populations has resulted in an accepted range of enamel growth for human secondary dentition (Reid and Dean 2006), allowing comparisons to both non-human primates and hominin species. The range of daily rates of enamel growth and periodicity has not yet been established for human deciduous teeth, however. In this research, histological thin-sections showing daily cross-striation counts and long-period striae markers are used to determine the rates of deposi-