ABSTRACTS OF PAPERS

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Southwestern Association of
Biological Anthropologists
University of Arizona, Tucson

November 21-22, 2014

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SOUTHWESTERN ASSOCIATION OF BIOLOGICAL ANTHROPOLOGISTS
Abstracts of Papers

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ACKNOWLEDGEMENTS

The organizing committee would like to thank the School of Human Evolution and Social Change at Arizona State University and the School of Anthropology at the University of Arizona for financial support. We would also like to thank the Institute of Human Origins at Arizona State University, and in particular Lindsay Mullen of the Institute of Human Origins for logistical support. Finally, we would like to thank Brent Adrian of Midwestern University for providing art work for our organization’s logo.
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**SWABA 2014 CONFERENCE SCHEDULE OF EVENTS**

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<tr>
<td>Building</td>
<td>Arizona State Museum*</td>
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<tr>
<td>Reception</td>
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<td>Welcome</td>
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<td>Session I</td>
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<td>Break</td>
<td>2:30pm– 2:45pm</td>
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<td>Session IV</td>
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<tr>
<td>Business Meeting</td>
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<td>Posters and Student Prize</td>
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<tr>
<td>Social Events</td>
<td>Dinner: TBA</td>
<td>Dinner: Reilly’s*</td>
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*Note: See maps for locations of reception, conference, and social events.*

Welcome Reception and Registration – The welcome reception will be held at the Arizona State Museum (see map on following page). We will have a registration desk that will accept registration fees *by cash or check only* throughout the reception ($30 for faculty/$15 for students). During the reception, we will have access to the exhibits in the museum, which are focused on Native American history in the southwest. We will have cheese plates but will not have dinner available at the museum.

Conference – The conference is in the Manuel Pacheco Integrated Learning Center Room 120. This facility is under the UA Mall (under ground level grass fields) and can be reached by stairs on either side of the mall or by an elevator. We will have signs out to direct you to the location. The poster session will be held in the courtyard of the ILC. Lunch will be catered by Tucson Tamale Company.

Dinner on Saturday Night – This is not covered by your registration fee, but we will have space available for dinner and drinks Saturday night at Reilly Craft Pizza (101 E Pennington St, Tucson, AZ 85701) in the outdoor Beer Garden. Reilly Craft Pizza is easily reached by car (parking garage right across the street) or by the Streetcar (there is a street car stop on University Ave. near the Arizona State Museum and another at Helen St. and Warren Ave. near Aloft).

An interactive Google map of all the event locations and hotels is online at: [https://www.google.com/maps/d/edit?mid=zpTIWQYE1Slc.ktrI675oEVTO](https://www.google.com/maps/d/edit?mid=zpTIWQYE1Slc.ktrI675oEVTO)
Note that facility is under the mall (you must go down the stairs or elevator on ground level)
Reilly Craft Pizza and Drink
101 E Pennington St
Tucson, AZ 85701
### SWABA 2014 Program at a Glance November 22nd

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<tr>
<th>Time</th>
<th>Name (first author)</th>
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<td>Housman</td>
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<tr>
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<td>10:45 AM</td>
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<td>II: Bioarchaeology and zooarchaeology</td>
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<td>11:15 AM</td>
<td>Mountain</td>
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<td>1:15 PM</td>
<td>Lazagabaster</td>
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<td>2:45 PM</td>
<td>Bray</td>
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**SWABA 2014 SATURDAY NOVEMBER 22nd, 2014**

**Session 1: Genes, Brains, and Biomechanics**

9:00am  **Genevieve Housman, Lorena M. Havill, and Anne C. Stone.** DIFFERENTIAL DNA METHYLATION ACROSS BABOON SKELETAL TISSUES

9:15am  **Kari L. Hanson, Branka Hrvoj-Mihic, Caroline F. Horton, Katerina Semendeferi.** NEW APPROACHES IN MODELING HUMAN BRAIN EVOLUTION USING NEURODEVELOPMENTAL DISORDERS: THE CASE FOR WILLIAMS SYNDROME

9:30am  **Justin D'Agostino.** FLEXIBILITY IN LEARNING COLOR-REWARD ASSOCIATIONS IN GIBBONS: CAN GIBBONS GENERALIZE AND LEARN TO LEARN?

9:45am  **Kelsey E. Jelenc, David A. Raichlen.** RESTING POSTURES IN HUMAN EVOLUTION: SQUATTING, SITTING, AND THE BIOMECHANICS OF LOW BACK PAIN.

10:00am  **Louis Calistro Alvarado, Martin N. Muller, Melissa Emery Thompson, Magdalena Klimek, Ilona Nenko, Grazyna Jasienska.** CONTRASTING THE ROLES OF PARENTING AND TESTOSTERONE ON THE PRODUCTION OF MUSCULATURE IN RURAL POLISH MEN

10:15am – 10:30am BREAK

**Session 2: Bioarchaeology and Zooarchaeology**

10:30am  **Angela Mallard.** A PRELIMINARY EXAMINATION OF FAUNAL REMAINS FROM A CLASSIC PERIOD HOHOKAM SITE IN ARIZONA

10:45am  **Mary C. Stiner.** FINDING A COMMON BAND-WIDTH: CAUSES OF CONVERGENCE AND DIVERSITY IN PALEOLITHIC BEADS

11:00am  **Rachael M. Byrd.** PHENOTYPIC VARIATION AND MIGRATION STRATEGIES OF TRANSITIONAL FORAGER-FARMERS

11:15am  **Rebecca Mountain** MODELING THE EFFECTS OF NATURAL SELECTION AND DEVELOPMENTAL PLASTICITY ON DECLINING SKELETAL ROBUSTICITY AND BONE MINERAL DENSITY IN MODERN HUMANS

11:30am  **Kathleen S. Paul, and Christopher M. Stojanowski.** THE UTILITY OF DECIDUOUS DENTAL MORPHOLOGY IN RECONSTRUCTING
GENEALOGICAL RELATIONSHIPS: IMPLICATIONS FOR BIOARCHAEOLOGICAL RESEARCH

11:45am - 1:15pm Lunch and Posters

Session 3: Paleoecology and Primate Evolution

1:15pm  Ignacio A. Lazagabaster, Jan van der Made. RELATING MICROWEAR ANALYSIS ON THE ANTERIOR DENTITION TO THE FEEDING BEHAVIOURS OF EXTANT PIGS (SUOIDEA): POTENTIAL USE IN THE RECONSTRUCTION OF EARLY HOMININ PALEOENVIRONMENTS

1:30pm  Kaye E. Reed, Christopher J. Campisano, John Rowan, Erin Dimaggio, and Ramon Arrowsmith. PALEOANTHROPOLOGY OF THE LEDI-GERARU, ETHIOPIA: NEW EVIDENCE FOR HABITAT CHANGE IN THE AFAR BETWEEN 3.4 MA TO 2.6 MA.

1:45pm  Erica R. Davis, Brenda R. Benefit and Monte L. Mccrossin. INCISOR VARIATION AT MIDDLE MIocene MABOKO INDICATES THE POSSIBLE PRESENCE OF AT LEAST TWO SMALL-BODIED APE SPECIES

2:00pm  Ellis M. Locke. PATTERNS OF TAXONOMIC DIVERSITY AND RELATIVE GEOGRAPHIC OCCUPANCY OF MIO-PLIOCENE CROWN CATARRHINI

2:15pm  Irene E. Smail. PRIMATE COMMUNITY EVOLUTION IN THE SOUTHERN AFRICAN PLIO-PLEISTOCENE: DIETARY OVERLAP AND NICHE DIFFERENTIATION OF FOSSIL CERCOPITHECOIDS

2:30pm - 2:45pm BREAK

Session 4: Primatology and Human Behavioral Ecology

2:45pm  Joel Bray, Zarin P. Machanda, Martin N. Muller, Richard W. Wrangham. THE ONTOGENY OF FORAGING BEHAVIOR IN WILD CHIMPANZEEs (PAN TROGLODYTES SCHWEINFURTHII)

3:00pm  Drew K. Enigk, Melissa Emery Thompson, Zarin P. Machanda, Richard W. Wrangham, Martin N. Muller. MALE CHIMPANZEEs INCREASINGLY TARGET ADULT MALES FOR DYADIC SOCIAL INTERACTIONS DURING ADOLESCENCE IN KIBALE NATIONAL PARK, UGANDA
3:15pm  *Kristin SabbI, Melissa Emery Thompson, Zarin Machanda, Martin N. Muller, Richard W. Wrangham*. CHIMPANZEE PLAY STYLES MIRROR ADULT SOCIAL PATTERNS

3:30pm  *S. K. Patterson, T. J. Bergman, D. L. Cheney, R. M. Seyfarth, J. C. Beehner*. RISES IN TESTOSTERONE PREDICT RISES IN DOMINANCE RANK FOR MALE CHACMA BABOONS

3:45pm  *Chloe Atwater, Jan de Vynck, Alastair Potts, Jayne Wilkins, Richard Cowling, Kim Hill*. WOOD FORAGING IN THE TREE-LIMITED ENVIRONMENT OF THE CAPE FLORAL REGION OF SOUTH AFRICA

4:00pm  BUSINESS MEETING

4:15pm – 5:15pm  POSTERS and STUDENT PRIZE

**POSTER SESSION**

11:45am-1:15pm & 4:15pm-5:15pm

**Brad Bowman, Ivy Pike.** ENDEMIC VIOLENCE AND CHILDREN'S NUTRITIONAL HEALTH IN TURKANA PASTORAL COMMUNITIES IN NORTHERN KENYA.

**Allisen C. Dahlstedt.** INFECTIOUS DISEASE WITHIN THE PREHISTORIC ANDES: EARLY CASES OF TUBERCULOSIS AND HUMAN TREPONEMATOSIS IN SOUTHERN PERU

**Kailie Dombrausky, Donica Spence, Brenda Benefit.** THE EFFECT OF SIBLING EMIGRATION ON A JUVENILE SIAMANGS' (*SYMPHALANGUS SYNDACTYLUS*) ACTIVITY BUDGET

**Hallie M. Edmonds.** PRELIMINARY ANALYSIS OF THE CROSS-SECTIONAL GEOMETRIC PROPERTIES OF THE PRIMATE ZYGOMATIC ARCH

**Halszka Glowacka, William H. Kimbel.** ONTOGENY OF THE MANDIBULAR CORPUS IN *AUSTRALOPITHECUS AFARENSIS*

**Amy Langston.** ENRICHING THE LIVES OF CAPTIVE CAPUCHINS

**Ignacio A. Lazagabaster, John Rowan, René Bobe.** FIDELITY OF PALEOECOLOGICAL DATA BASED ON BOVID, EQUID, AND SUID ABUNDANCE AT DIFFERENT SPATIAL SCALES IN THE OKOTE MEMBER OF THE KOOBI FORA FORMATION, KENYA

**Monte L. McCrossin.** ADAPTIVE DIVERSITY OF AFRICAN MIocene BUSHBABIES: IMPLICATIONS FOR THE EVOLUTIONARY HISTORY OF GALAGIDAE

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Hans P. Nesse, E. Susanne Daly, Kierstin K. Catlett, Kathleen S. Paul. STATISTICAL ISSUES IN TESTING THE QUANTITATIVE PREDICTIONS OF THE INHIBITORY CASCADE (IC) MODEL

John Rowan, J. Tyler Faith, Yemane Gebru, John G. Fleagle. PATTERNS OF LATE QUATERNARY EAST AFRICAN BIOGEOGRAPHY BASED ON FOSSIL BOVIDAE FROM THE KIBISH FORMATION, SOUTHERN ETHIOPIA: IMPLICATIONS FOR MODERN HUMAN DISPERSALS

Heather F. Smith, Noreen Von Cramon-Taubadel. A CATARRHINE PRIMATE INFERENCE MODEL FOR HOMININ MORPHOLOGICAL EVOLUTION

Donica Spence, Brenda Benefit. ARE TERRESTRIAL SIAMANGS LEFT OR RIGHT HANDED?

Samantha Streuli, Jennifer Ahern, Adam Kolatorowicz, Giuseppe Vercellotti. APPLICATION OF FORDISC TO AN HISTORIC ITALIAN POPULATION FOR SEX DETERMINATION

Charles Withnell. PRIMATE DIVERSITY IN THE EOCENE OF NORTH AMERICA: USING PRIMATE AND RODENT DIVERSITY TO TEST THE ROLE OF CLIMATE CHANGE
ABSTRACTS

Wood foraging in the tree-limited environment of the cape floral region of South Africa
CHLOE ATWATER¹, JAN DE VYNCK², ALASTAIR POTT³, JAYNE WILKINS¹, RICHARD COWLING², KIM HILL¹. ¹School of Human Evolution and Social Change, Arizona State University, Arizona, US, ²Department of Botany, University of Cape Town, Cape Town, South Africa, ³Department of Botany, Nelson Mandela Metropolitan University, Port Elizabeth, South Africa

Wood is an essential resource for hunter-gatherers. It is necessary for cooking fuel, heat, and potentially safety, and hence influences site location choice and group size. Due to a low diversity and abundance of trees, wood may have been a limited resource for H. sapiens in the Cape Floral Region (CFR) of South Africa during the Middle Stone Age (MSA). Drawing from behavior ecology foraging models, experiments with modern wood foragers were conducted to test this hypothesis. Foragers were observed collecting indigenous wood fuel species in the seven biomes present in the CFR and central place foraging models were applied. Experimental fires were also performed to assess the quality of the wood fuels. Preliminary results indicate that woody fynbos species provide sufficient fuel for human needs in a stable environment, despite the low abundance of tree wood. Future experiments will investigate how fire events and depletion due to human exploitation affect wood availability. Results will be built into an agent-based model of the paleoscape of the CFR, which can be used to assess the effects of wood constraint on MSA H. sapiens populations and predict the potential location of MSA sites.

Endemic violence and children’s nutritional health in turkana pastoral communities in northern kenya.
BRAD BOWMAN, IVY PIKE. School of Anthropology, University of Arizona

Globally, violence accounts for over 1.5 million deaths annually and is one of the leading causes of death. Endemic violence is interwoven into the fabric of not only the social, economic, and political foundations of the lives of its sufferers but it also represents a powerful global health challenge. Ethnic violence in Northern Kenya poses a dynamic area of study wherein interethic violence affects experience not only at the individual level but also at the family and community level within the everyday lives of pastoralists. Utilizing mixed methods of ethnography and comparative epidemiology to contextualize the lived experiences of pastoralists, this project focuses on two ethnic Turkana communities, one directly impacted by the violence and one more removed, to examine how gendered differences in how family structures are established and how this affects household and community health outcomes. Comparing female-headed household to male-headed households, children do no worse, nutritionally speaking, in female-headed households. However it is worth noting that children in male-headed households are not doing better either.
The ontogeny of foraging behavior in wild chimpanzees (*Pan troglodytes schweinfurthii*)
JOEL BRAY¹, ZARIN P. MACHANDA², MARTIN N. MULLER³, and RICHARD W. WRANGHAM².¹ School of Human Evolution and Social Change, Arizona State University, ²Department of Human Evolutionary Biology, Harvard University, ³Department of Anthropology, University of New Mexico

Primates have an extended period of development before they reach adulthood. One explanation for their delayed maturation is that they need a long time to learn complex foraging behaviors. Chimpanzees provide a good opportunity to test this hypothesis because they eat diverse foods, some of which require extensive handling. To explore the ontogeny of foraging behavior in chimpanzees, we used 3 years of behavioral data (2010-2013) from 28 immature and 29 adult individuals of the Kanyawara community in Kibale National Park, Uganda. We compared several measures of feeding behavior among infants, juveniles, adolescents and adults, including total daily feeding time, proportion of time spent feeding by food type, distribution of feeding time over the day, and fruit ingestion rates (number of food items eaten per minute of feeding). By late infancy chimpanzees displayed adult-like diurnal feeding peaks and ate fruit and fibrous foods at comparable proportions to adults; however, they spent a mean of only 24.5% of total time feeding, significantly less than adults (p = 0.002), whereas juvenile feeding time was equivalent to adult levels (juveniles: mean = 41.0%; adults: mean = 42.8%; p = 0.47). Furthermore, ingestion rates displayed the slowest developmental trajectory of any feeding measure, remaining below adult levels until adolescence. If extended juvenility functions to allow the learning of complex feeding behavior, these data suggest that ingestion rates may be constrained by foraging complexity. Future studies should assess whether the development of ingestion rates varies by the difficulty involved in processing different foods.

This research was supported by National Science Foundation grant BCS-1355014.

Phenotypic variation and migration strategies of transitional forager-farmers
RACHAEL M. BYRD. School of Anthropology, University of Arizona

This study examines phenotypic variation and biological distances estimated from morphological traits from three Early Agricultural period (EAP) (2100 BC–AD 50) site-complexes in the Sonoran Desert of southern Arizona and northern Sonora. Using this regional population sample as a case study, the hypothesis tested is that phenotypic homogeneity characterizes close biological affinity during subsistence transitions as people become increasingly sedentary. Seven measurements from 62 EAP male and female crania were used to calculate phenotypic variances, biological distances, and $F_{ST}$ values with RMET 5.0 software. Analyses were applied to both pooled site-complex
samples and to males and females separately. Results show differential variation between site-complex population samples, multiple significant biological distances, and significant $F_{ST}$ values for the EAP regional sample that indicate widespread phenotypic heterogeneity rather than homogeneity. Significantly lower than expected variance in the Cienega Creek male sample is inferred to suggest a small closely related population present during the Cienega phase. Greater than expected male variation is attributed to higher frequencies of gene flow in the La Playa and Santa Cruz River site-complex samples. These EAP males are inferred to be more mobile across the Sonoran Desert landscape and representative of multiple biological affinities compared with females. This study provides evidence supporting the canalization of phenotypic variation between the sexes when associated with human populations becoming increasingly reliant on agriculture.

Contrasting the Roles of Parenting and Testosterone on the Production of Musculature in Rural Polish Men
LOUIS CALISTRO ALVARADO$^1$, MARTIN N. MULLER$^1$, MELISSA EMERY THOMPSON$^1$, MAGDALENA KLIMEK$^2$, ILONA NENKO$^3$, GRAZYNA JASIENSKA$^2$.$^1$Department of Anthropology, University of New Mexico; $^2$Department of Environmental Health, Jagiellonian University, $^3$Department of Animal and Plant Sciences, University of Sheffield

The steroid hormone testosterone supports male mating effort through a broad range of behavioral and physiological effects, including the maintenance of sexually dimorphic muscle used in male-male competition. Although a persistent relationship between men’s testosterone levels and musculature is often assumed, most studies either fail to find evidence for such a relationship, or document very weak associations. In contrast, associations between testosterone and muscle mass in non-human primate males are higher. Here, we propose the ‘Paternal Provisioning Hypothesis,’ which predicts that men’s skeletal muscle is less dependent on the effects of androgens than that of other primates, and more sensitive to the physical demands of men’s workload. This permits human fathers to down-regulate testosterone, because of testosterone’s negative impacts on pair-bonding and parenting effort, but without sacrificing the strength and musculature necessary to provision mates and offspring. We tested predictions of the Paternal Provisioning Hypothesis by examining parental status, salivary testosterone levels, anthropometry, and strength among 122 men (ages 18-78) at the Mogielica Human Ecology Study Site in rural Poland. We chose this population because men often practice subsistence agriculture, and other forms of physically demanding labor. Grip and chest strength were assessed using a dynamometer, and upper-body musculature was estimated from arm muscle circumference. Testosterone showed no association with strength or muscle mass measures, and was lower in older men and fathers. Fatherhood and workload, by contrast, were positive predictors of musculature and strength. These findings provide support for the Paternal Provisioning Hypothesis.

Flexibility in learning color-reward associations in gibbons: can gibbons generalize and learn to learn?
JUSTIN D’AGOSTINO, California State University Los Angeles
Previous studies in learning set formations have shown that animals can in fact learn to learn with subsequent problems being solved in fewer presentations. Gibbons (Hylobatidae) have struggled with learning set formations and do not show the learning to learn pattern as found in other species. Gibbons have also struggled in reversal learning studies - a similar type of discrimination problem to assess learning set formations. However, there have been conflicting results and this study attempts to clarify by assessing gibbon learning capacities. We tested captive gibbons’ ability to associate colours and directions with provisioned food items in two experiments. Our results are similar to most previous studies in that there was no evidence of gibbons learning to learn. However, once the learning association was made, the gibbons performed quite well above chance level. We found no differences across colour and location associations indicating learning was not affected by the particular colour / reward / direction association. However, there were variations in learning performance with regard to genera, sex and age. The hoolock (Hoolock hoolock) and siamang (Symphalangus syndactylus) learned the fastest and the lar group (Hylobates sp.) learned the slowest. Across all genera tested, males learned the fastest and the older gibbons had a more consistent performance. We reason the results could be due to a small sample size and or the environmental variability in the native habitats of the subjects tested. However, further comparative study is necessary in order to incorporate realistic cognitive variables into foraging models.

Infectious Disease within the Prehistoric Andes: Early Cases of Tuberculosis and Human Treponematosis in Southern Peru
ALLISEN C. DAHLSTEDT. School of Human Evolution and Social Change, Arizona State University.

Today, infectious diseases such as tuberculosis devastate millions of lives annually. In addition to informing the experiences and behaviors of past individuals, the prehistoric prevalence and distribution of such diseases contextualize their modern (re-)emergence, spread, and surrounding social perceptions. Here I examine the expression, distribution, and severity of pathological lesions on the skeletal and dental remains of 143 individuals from Omo M10, a Tiwanaku migrant community in Moquegua, Peru. Differential diagnoses reveal several probable cases of highly infectious diseases, including human treponematosis and tuberculosis.

A multitude of genetic, biogeochemical, and material culture studies demonstrate an unprecedented level of interaction between individuals throughout Peru, Bolivia, Chile, and Argentina during the Middle Horizon (500-1000AD). Infectious diseases often appear and spread with such population growth and increased human interaction, among other environmental and behavioral factors. The ideal archaeological preservation and unprecedented individual mobility within the south-central Andes offers an ideal context to explore the prevalence and spread of infectious disease in South American prehistory.

The two cases of advanced Pott’s disease, marked by lower thoracic vertebral collapse, identified here are among the earliest indicators of tuberculosis in southern Peru. The presence of clear caries sicca, diagnostic of treponemal disease, indicates the previously
unreported regional presence of syphilis in at least one individual. These cases indicate the early appearance and spread of highly infectious diseases with state expansion in the prehistoric New World. Future biogeochemical studies will investigate the potential spread of these diseases through the residential mobility of infected individuals.

**Incisor variation at middle Miocene Maboko indicates the possible presence of at least two small-bodied ape species**

ERICA R. DAVIS, BRENDA R. BENEFIT and MONTE L. MCCROSSIN. Department of Anthropology, New Mexico State University

The hypodigms and taxonomic classifications of Early and Middle Miocene small-bodied apes from Uganda and Kenya are under constant revision and rearrangement. This is largely due to the incomplete nature of the material and the relatively small number of teeth associated in maxillae and mandibles. For species where no associated incisors are known, isolated ones are attributed to them based on inference. A small collection of small-bodied ape permanent and deciduous incisors was discovered during the excavation of in situ sediments at ~15 my Maboko Island between 1987 and 1997. The sample of ten I1’s are slightly smaller than *M. clarki* from Napak and therefore are currently the smallest known for any small-bodied ape species. Six of these I1’s are attributed to the more common species at Maboko which is presently called *Micropithecus leakeyorum*. They are characterized by an asymmetrical crown and a low and asymmetrical V-shaped lingual cingulum that is longer and taller on the mesial than distal side, most similar to *Pliopithecus vindobonensis*. An additional four specimens appear to belong to a different type and/or species with a more symmetrical crown and a U-shaped lingual cingulum most similar to NAP XV 65’09, currently attributed to *Karamojo pithecus akismia* (they are less like other specimens attributed to that species). Two small-bodied ape species may therefore be present at Maboko, one with upper central incisors more similar to *Pliopithecus* and the other with a morphology more consistent with other East African small-bodied apes.

**The Effect of Sibling Emigration on a Juvenile Siamangs’ (*Symphalangus syndactylus*) Activity Budget**

KAILIE DOMBRAUSKY, DONICA SPENCE, BRENDA BENEFIT, New Mexico State University Anthropology Department

Siamangs are predominantly monogamous in the wild and engage in biparental care of the offspring, with mothers carrying infants until 10 months of age, after which fathers take on the role. From an evolutionary perspective, male parental care appears to alter the life history of the species by shortening inter-birth intervals relative to other apes. Weaning in siamangs occurs early, averaging 2.5 years, but juveniles continue to maintain close proximity to and regular interactions with their parents. At the El Paso Zoo the older female sibling (7 years old) who participated in care for the younger sibling “emigrated” out of the group when the younger juvenile was nearly 3 years old. Prior to the siblings departure the two siblings may have competed for parental attention, but once that competition no longer existed the juvenile could either a) initiate more interactions with her parents, or b) initiate fewer interactions with her parents if the lack of
competition with her sibling made her parents seem less desirable. We used the Hinde Index (normally used for infants) to investigate how the presence and emigration of the older sibling may have affected the behaviors and parenting of the younger female. According to the Hinde Index, before emigration attention was relatively equal between mother (45%), father (37.14%), and older sibling (43.24%); after emigration, mother received (31.37%) and father (41.82%). The data shows an increase in the number of attempted interactions with the parents indicating a potential transfer of attention from the older sibling to parents.

**Preliminary analysis of the cross-sectional geometric properties of the primate zygomatic arch**

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Forces associated with chewing subject the cranium to varying loads (e.g., bending and torsion), depending on the material properties of the food being consumed. As such, cross-sectional geometric properties (e.g., cortical area (CA) and cross-sectional shape (CSS)) are expected to reflect the magnitude and types of loads experienced. As a site of high chewing loads, the zygomatic arch is expected to respond to increased masticatory forces; however, it is unclear whether this response manifests as changes in the internal cortical bone distribution of the arch and/or arch CSS. Furthermore, strain is highest anteriorly and decreases posteriorly along the arch, but it is unclear whether the morphology reflects this variation. Here, these discrepancies are addressed through a comparative analysis of zygomatic arch CA and CSS.

Data on CA and CSS were collected from microCT scans of zygomatic arches from 8 species of haplorhine primates (n=57). Primates were separated into two dietary groups (resistant or non-resistant consumers) according to their dietary material properties. CA and CSS values were compared between dietary groups at several points along the zygomatic arch.

Pairwise comparisons of zygomatic arch CA measures between closely related taxa of differing dietary group revealed significant differences (p<0.05) between pairs. CSS comparisons revealed elliptical cross sections in anterior arch regions of resistant consumers compared to non-resistant consumers. CA variation and differences in CSS along the arch supports the prediction that loading, and thus the morphology, is non-uniform along the zygomatic arch and that diet type may be inferred from CA and CSS.

**Male chimpanzees increasingly target adult males for dyadic social interactions during adolescence in Kibale National Park, Uganda**

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Dominance relationships and social bonds among males are critical for reproductive success in chimpanzees. Adolescence is an important part of chimpanzee life history
because it is the period in which males establish these relationships. Previous fieldwork has examined adolescent male interactions with adults, but our understanding of variability in adolescent strategies is still limited. Here, we analyze behavioral changes during the transition to adulthood in adolescent males of the Kanyawara chimpanzee (Pan troglodytes schweinfurthii) community in Kibale National Park, Uganda. From June to August 2013 and May to August 2014, I conducted all-day focal follows on six adolescent males, aged 9 to 15. Adolescent males spent less time in close proximity to their mothers and more time in close proximity to adult males, than did younger males. Adolescent males were predominantly responsible for instigating close proximity and grooming with adult males (Hinde’s index = 0.35). The probability of having an adult male as a nearest neighbor was more than twice the probability of having another adolescent male as a nearest neighbor, though there was noticeable variation among individuals. These results suggest that male chimpanzees act on an intensified preference for association with adult males during the period of adolescence.

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**Ontogeny of the mandibular corpus in Australopithecus afarensis**

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Mandibular morphology can be informative regarding taxonomic affinity of hominin taxa. As such, understanding mandibular development can aid in identifying juvenile hominin material taxonomically, but can also contribute to an understanding of how morphological features arise in relation to hypothesized selective forces. Due to the paucity of juvenile remains in the fossil record of early hominins, however, little is known about how hominin mandibles grow to attain their adult form. Here, using previously unpublished infant and juvenile specimens, we report a quantitative assessment of ontogenetic patterns of change in corpus size and shape in *Australopithecus afarensis*. Using comparative data from chimpanzees and humans, we ask the question: given its reduced canines, does *A. afarensis* more closely resemble apes or humans in the pattern of mandibular corpus growth? Our results indicate that *A. afarensis* resembles humans more than chimpanzees in its percentage of adult corpus height and breadth attained at successive stages of dental emergence. *A. afarensis* is also more similar to humans in corpus cross-sectional shape changes throughout ontogeny. We suggest that canine reduction may have had an important influence on the growth trajectory of the *A. afarensis* mandibular corpus such that, as in humans, it achieved adult values relatively early. Our results underscore the importance of considering the influence of the developing dentition on both juvenile and adult mandibular morphology.

**New approaches in modeling human brain evolution using neurodevelopmental disorders: the case for Williams syndrome**

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Comparative neuroanatomy from an evolutionary perspective continues to make great strides in characterizing and defining unique elements of the human neuroanatomical phenotype associated with key behavioral adaptations in humans and other hominoids. Developmental differences in both cortical and subcortical structures observed in human and non-human primate brains support enhanced capacities for the acquisition of cultural behaviors and hierarchical social systems in primate lineages, providing the substrates for the emergence of uniquely human capacities, including the acquisition of language and more complex cultural behavior and cognition. In conjunction with these studies, an understanding of the functional implications of human-derived anatomical traits can be gained through analyses of pathological development. Altered developmental timing is a typical feature of neurodevelopmental disorders, providing functional insights into neurological development specific to our species. Further, the distribution of excitatory and inhibitory neurons may be disrupted, and differences in the morphology of specific neuronal populations differs in important ways. We will discuss the use of neurological disorders as models for the evolution of the human brain, suggesting that the gene deletion involved in Williams syndrome may provide a sort of “knock-out model” for the study of human-specific genetic variation affecting the development of brain areas involved in social cognition.

**Differential DNA methylation across baboon skeletal tissues**

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Epigenetic regulation, including DNA methylation, can impact the development and maintenance of complex skeletal traits and thereby contribute to morphological diversity in primate evolution. Knowledge and appreciation of normal epigenetic variation in primates and skeletal tissues is a necessary first step towards understanding the role of epigenetics in the evolution of skeletal variation. We investigated the relationship between epigenetic variation and skeletal variation in one species and identified DNA methylation patterns from bone and cartilage of age- and sex-matched baboons, six with and six without knee osteoarthritis (OA). Genomic DNA was extracted from right distal femur bone (n=12) and cartilage samples (n=12), and genome-wide methylation was detected using the Illumina HumanMethylation 450K BeadChip. Several loci were significantly differentially methylated between normal and OA individuals, between bone and cartilage, and between the four groups based on tissue type and OA status. Specifically, out of over 450,000 positions, approximately 2.06% were differentially methylated between the OA and control groups, 1.94% between tissue types, and 1.32% among the four combinations of tissue type and OA status. From an evolutionary perspective, these results begin to give us an appreciation for normal methylation variation in one species and in two skeletal tissues. They also give us insight into the
The degree to which a common skeletal condition (OA) affects that variation. Expansion of this sample set and more focused testing of specific genes will advance our knowledge of the degree to which the epigenetic phenomenon of DNA methylation may regulate complex skeletal traits in primate evolution.

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**Resting postures in human evolution: squatting, sitting, and the biomechanics of low back pain.**  
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In many contemporary cultures, people do not rest in chairs, but instead rest in squatting and floor-sitting postures. These “traditional” styles of rest appear in the hominin fossil record as early as 1.8 mya, meaning that chair-sitting is a relatively recent form of inactivity, and one known to negatively impact human health. Low back pain (LBP) is a common health problem linked with sitting in Western contexts, but is less prevalent among populations that rest in traditional postures. This study examines the link between forms of rest and LBP by comparing how the back functions biomechanically in different resting postures. It was hypothesized that traditional postures would elicit a more kyphotic lumbar curve and higher levels of muscle activity, both of which could reduce the risk of developing LBP.

Lumbar angle and erector spinae (ES) activity were measured in ten subjects during periods of chair-sitting, floor-sitting, and squatting. Paired t-tests were used to compare variables between conditions. All sitting styles resulted in a kyphotic curvature of the lumbar spine. However, squatting elicited higher levels of ES activity than chair-sitting, which may help to keep the ES well-conditioned to withstand high forces during strenuous physical activity. In contrast, chair-sitting can cause atrophy of the ES over time, increasing vulnerability to injury and pain. Ultimately, these differences in muscle activity may help to explain the current cultural patterning of LBP. Since this study only included Western subjects, future work will examine lower back biomechanics in non-western subjects who are experienced at squatting.

**Enriching the lives of captive capuchins**  
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Capuchins are charismatic neotropical primates that have been shown to be quite adept at tool-use and sophisticated food manipulation. These primates are a popular choice in zoos across the country and the world. As such, they inevitably land into the care of facilities that are unable to meet their physical and ethological needs due to lack of financial or human resources. This can lead to stereotypical behavior, abnormalities, and an overall decrease in welfare of the animal. This study investigates the use of two enrichment devices with seven captive capuchins at Alameda Park Zoo, Alamogordo, New Mexico. Enrichment devices were constructed utilizing PVC pipe and other cost-
effective assembly materials. A time budget was constructed before, during, and after the introduction of enrichment devices. It was proposed that the use of enrichment devices would increase species typical foraging behaviors, and decrease abnormal stereotypical behavior like aggression and cage biting. Preliminary results suggest that foraging time is increased and abnormalities such as cage biting have decreased. Further, the Alameda capuchins will opt to work for their food when given the choice between an enrichment feeder and straw-foraging free feeding. This research reveals that enrichments can influence capuchin welfare. Further, it will hopefully open the door to cost-effective enrichments that can be constructed and provided for many animals at the zoo.

Fidelity of paleoecological data based on bovid, equid, and suid abundance at different spatial scales in the Okote Member of the Koobi Fora Formation, Kenya

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The Okote Member (ca. 1.5-1.3 Ma) of the Koobi Fora Formation, East Turkana, Kenya, is spatially extensive and has produced a rich record of mammalian evolution and remains of three hominin species (*Homo habilis, H. erectus, Paranthropus boisei*). Here we use the craniodental remains of large fossil herbivores (families Bovidae, Equidae, and Suidae) to infer Okote paleoecology at different spatial scales. We collected specimens from the “valley of the suids”, a spatially restricted (40000 m²) outcrop of the Okote Member in Ileret, Kenya, and contrast these data to the relative abundance of bovid, equid, and suid taxa in the Okote Member over its entire outcrop along the shores of Lake Turkana in the Koobi Fora Formation. A chi-square analysis showed non-significant results for relative abundances of bovid, equid, and suid taxa ($\chi^2=166.83$, df=10, $p=0.068$) and the relative abundance of browsers and grazers ($\chi^2=9.04$, df=1, $p=0.94$). At both spatial scales the Okote Member abundance data suggests a mosaic of grassland and open woodland habitat, as evinced by the equally high proportions of Alcelaphini, Reduncini, and *Equus* in both collections. The suid genera *Kolpochoerus* and *Metridiochoerus*, both of which are grazing lineages, occur in equal abundance in both collections. Our results suggest that similar ecological information is retained at different collection scales.

Relating microwear analysis on the anterior dentition to the feeding behaviours of extant pigs (*Suidae*): potential use in the reconstruction of early hominin paleoenvironments

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Suid skeletal remains are very abundant elements in the faunal assemblages of many fossil-hominin sites along the Plio-Pleistocene and they had been traditionally very important both in biochronological and paleoenvironmental studies in Africa. While the
taxonomy of the group is well established, many aspects of the ecology of fossil species remain poorly understood. The most typical ecological adaptation of the Suidae is their rooting behavior, providing access to subsurface food. Depending on their preferences, different species have different rooting styles, using their incisors to extract the food from the soil. We hypothesize that the microscopic signature in the incisors reflects to a certain point the variability in this mode of feeding.

In order to characterize different rooting styles, we adapted classic dental microwear procedures. First and second lower incisors (n=62) representing 6 extant species of the superfamily Suoidea (Po.porcus, S.scrofa, Ph.africanus, C.wagneri, Pe.tajacu, T.pecari) were analyzed under SEM at 500x (442 microphotographs). We found significant interspecies differences for scratch length, width and orientation but no differences in pit size. Results suggest that those species adapted to root intensively and deep (like Po.porcus and S.scrofa) present longer, wider and more longitudinally orientated scratches. The specialized grazer Ph.africanus, which is known to present a distinctive rooting style, is mainly characterized by long transversal scratches. These data can now be used as a reference to compare fossil suid species and contribute to a better understanding of the evolution and ecology of suids in fossil-hominin sites, and improve the resolution of paleoenvironmental reconstructions.

Patterns of taxonomic diversity and relative geographic occupancy of Mio-Pliocene crown Catarrhini
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Of the extant Old World primates, cercopithecoids are significantly more widespread, species-rich, and ecologically diverse compared with living hominoids, but their taxonomic and ecological dominance has occurred relatively recently. This study uses measures of relative number of occurrences and relative range area to describe the known geographic distributions of hominoids and cercopithecoids during the Mio-Pliocene, and compares changes in these distributions with shifts in taxonomic richness within these groups. A shift from an Old World primate fauna characterized by greater hominoid richness to one with greater cercopithecoid richness occurs in the Late Miocene, concomitant with a decline in hominoid geographic range and dramatic increase in cercopithecoid range. The increased area inhabited by cercopithecids can be primarily attributed to the rapid range expansion of early colobines, which is unexpectedly large relative to their low richness, suggesting a small number of taxa were able to inhabit a wide variety of habitat types across a large area. These results imply that the expansive geographic range of hominoids in the Middle Miocene was a function of their high levels of taxonomic diversity, and that they became geographically restricted as this diversity was lost during the Late Miocene. This contrasts with the geographic expansion of cercopithecoids, particularly the colobines, which was decoupled from changes in taxonomic diversity. This study lends support to previous hypotheses that greater ecological flexibility allowed cercopithecoids to persist and even flourish through the series of major climatic events in the Late Miocene.
A Preliminary Examination of Faunal Remains from a Classic Period Hohokam Site in Arizona
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Analysis of faunal remains from Rowley, a Hohokam site in central Arizona occupied during the Classic Period (c. A.D. 1150-1350), suggests that a variety of wild desert fauna were utilized. Of particular interest is the overwhelming number of specimens from *Lepus* sp. and *Lepus californicus* in comparison to *Sylvilagus* sp. At present, this appears to indicate a largely open desert landscape during the site’s occupation. Presence of several large birds of prey also may be an indication of ceremonial use of this space. Future research on this assemblage will include a comparison to other Hohokam sites in the central Arizona area, with a concentration specifically on nearby sites such as Mesa Grande and the environmental utilization of its residents.

Adaptive diversity of African Miocene bushbabies: Implications for the evolutionary history of Galagidae.
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Strepsirhine fossils from a variety of Miocene localities in eastern Africa are among the few groups of extinct prosimians that can be confidently linked to particular radiations of modern primates. Two genera from this time range, *Progalago* and *Komba*, have been linked to the extant Family Galagidae by features of their skulls, dentition, and postcrania. Detailed examination of these characteristics reveals, however, that while *Komba* is, in fact, a galagid, the familial affinities of *Progalago* within the Lorisoida are uncertain. Several species of the genus *Komba* are currently recognized but one of the named species manifests the same morphology as *Komba robustus* and is a junior synonym. Previous analyses have suggested that individual species of *Komba* may be directly ancestral to lineages of living bushbaby species. The reconstructed common ancestor of extant galagids, however, exhibits a suite of shared derived features that are not possessed by the species of *Komba*.

Multiple regression models are used to refine body mass estimations for the various species of *Komba*, and these reveal an array of species ranging in size from very small forms that are most comparable to the dwarf galago (*Galagoides demidoff*) to those weighing slightly more than the thick-tailed bushbaby (*Otolemur crassicaudatus*). Measurements of mandibular molar shear crests reveal that the smallest species of *Komba* were likely committed insectivores while the largest species appear to have been more frugivorous. These results show that the adaptive structures of African lorisoid guilds have changed significantly from the early Miocene through the present.

Modeling the Effects of Natural Selection and Developmental Plasticity on Declining Skeletal Robusticity and Bone Mineral Density in Modern Humans
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There has been a rising incidence of osteoporosis and skeletal fragility worldwide in modern human populations over the last century often attributed to inadequate nutrition and lack of physical activity. However, this may in fact reflect a continuation of an...
evolutionary trend towards decreased postcranial robusticity, which began in early *Homo* and has continued throughout modern human history.

The goal of this paper is to create a model predicting the effects of natural selection on skeletal robusticity and bone mineral density (BMD) in anatomically modern *Homo sapiens*. It alternatively creates predictions assuming developmental plasticity to be the primary mechanism behind changes in robusticity. The model examines the tradeoffs between maintaining high levels of robusticity and energy expenditure in changing environments. Bone formation has been shown to be significantly impaired even under relatively minor restrictions of energy availability indicating that it is a metabolically expensive process. Thus, we might expect natural selection to shape the reaction norm of skeletal robusticity over time to reflect this tradeoff, shifting to accommodate changes in human behavior and environments over the last 50,000 years. While robusticity has declined significantly over time, modern humans are still capable of producing as robust bones as their archaic *Homo* ancestors, suggesting developmental plasticity could be the primary mechanism for the decline in robusticity. Robusticity also does not change uniformly across the skeleton, and therefore this model also examines changes in robusticity by major skeletal region.

Statistical issues in testing the quantitative predictions of the inhibitory cascade (IC) model

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The inhibitory cascade (IC) model is a causal, linear model explaining the developmental mechanism underlying primary postcanine tooth size and initiation. This model has been applied with varying results to several mammals, including primates. These varying results may reflect biological phenomena, but it is necessary to first rule out statistical causes. Tests of the IC model involve testing three tooth areas (T1, T2, and T3), and calculation of ratios of these teeth (i.e., T2/T1 and T3/T1). These ratios are then regressed using reduced major axis regression. The model predicts the slope of the regressed line will be 2 and the y-intercept will be \(-1\).

In this study, we generated \(n\) groups of three random and strictly increasing or decreasing tooth sizes, as non-monotonic patterns are routinely explained using a non-IC model mechanism. The ratios were then computed, regressed and the sample was accepted or rejected at a nominal 0.05 level. Following the Monte Carlo approach, the procedure was repeated 1,000 times, for each \(n\), to estimate the acceptance rate under the null hypothesis as a function of sample size. The actual acceptance rate of the IC model was found to be higher than the nominal alpha value, indicating that the methods currently used may lead to more frequent acceptance of the IC model than is statistically valid. Although regression approaches are only one line of evidence for the IC model, our study highlights the need for the development of more rigorous statistical methods to test the IC model.
Rises in testosterone predict rises in dominance rank for male chacma baboons

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The challenge hypothesis posits that testosterone (T) and aggression are most closely related during times of intense reproductive competition. While results from seasonally breeding species have generally supported this hypothesis, those from non-seasonally breeding species have been equivocal.

Chacma baboons (Papio ursinus) are a group-living, non-seasonally breeding species. Competition for high rank equates to competition for mates because the highest-ranking males monopolize matings. Here we use noninvasive hormone samples (n=1,452) to examine how T relates to seasonal and social factors in adult male chacma baboons. Observational and hormonal data were collected from 2001-2005 on 26 wild males from the Moremi Game Reserve, Botswana.

First, we found that social challenges in chacma baboons were not seasonal, but occurred throughout the year. Second, when the hierarchy was stable (e.g., no rank changes within the top three dominance ranks), we found that the three highest ranking males had higher T levels than all lower-ranking males. Yet, when the hierarchy was unstable, only males that were climbing the hierarchy (within the top three ranks or climbed to one of these three ranks) exhibited elevated levels of T compared to males that were falling or stable in rank. Unless males were climbing to within these top three rank positions, T was unrelated to rising in rank. Finally, males that climbed to the alpha male position had increased T levels during the three months before the takeover and one month after. Our results suggest that elevated T levels among high-ranking males lead to higher dominance rank.

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The utility of deciduous dental morphology in reconstructing genealogical relationships: implications for bioarchaeological research.

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The identification of biological relatives within archaeological contexts is essential to understanding various (bio)social phenomena in antiquity, such as kin-structured mortuary behavior, differential health/frailty, and socioeconomic variability that has a
familial basis. Bioarchaeologists often turn to phenotypic variation to estimate genetic relatedness in contexts where DNA is inaccessible. Despite frequent application of permanent tooth morphology in these efforts, the use of deciduous tooth morphology remains relatively under-developed. One reason for this disparity is a lack of pedigree-based research focused on the primary dentition. Here, we examine the performance of a deciduous morphological character set in accurately reproducing documented genealogical relationships. Genetically related individuals are more likely to share genes that are identical by descent, therefore, we expected biological relatives to share more similar deciduous morphology and lower phenotypic distances than non-relatives. Following several published standards, we collected morphological data from casted deciduous tooth crowns of 66 Burlington Growth Study participants housed at the University of Toronto Faculty of Dentistry. Twenty morphological traits were used to generate 69 inter-sibling Euclidean distances with distance ordination via multidimensional scaling. Resulting average inter-sibling distances fell significantly below the average of 69 resampled pseudo-distances generated from 999 replicates of mixed relative and non-relative pairs (d=0.252, p<0.001). Accounting for variability at the within-cluster (sibling) and between-cluster (family) levels, we applied a multilevel modeling approach to explore variability in inter-sibling distances as predicted by several environmental and developmental factors.

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Paleoanthropology of the Ledi-Geraru, Ethiopia: New evidence for habitat change in the Afar between 3.4 Ma to 2.6 Ma.
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The lower Awash Valley (LAV) has yielded an incredible number of Australopithecus specimens from 3.8-2.95 Ma (Woranso-Mille, Hadar, Dikika) in addition to lithic evidence of a younger hominin at 2.6 Ma (Gona), as well as early Homo by at least 2.33 Ma (Hadar). Evidence for human evolution between 2.95-2.7 Ma, however, was missing from records in the LAV; indeed, the entire fossil record of Africa during this time is sparse. The Ledi-Geraru Research Project (LGRP) area preserves fossil deposits ranging from 3.4-2.5 Ma, and thus fills a significant temporal gap in the fossil record of the Afar, offering insights into hominin and mammalian evolution during this previously clouded time interval. We reconstructed the habitats of each Member of the Hadar Formation (3.4-2.95 Ma) using the fossil mammal communities recovered from both the Hadar and LGRP area, and also those from the younger 2.95-2.5 Ma deposits at Ledi-Geraru. Species were assigned a categorical trophic and locomotor adaptation based on craniodental measurements, mesowear, stable isotopes, and taxonomy. The adaptations of fossil communities were used in a correspondence analysis (CA) with 182 modern African communities to identify the most likely habitat for the fossil Members. This
A preference for same-sex play partners is one of the earliest and most pronounced sex differences in the behavior of human children. This difference is influenced by early androgen exposure, as well as differences in attraction to rough play exhibited by males. However, play behavior may also function as preparation for adult social behavior as a mechanism for practicing social interactions, forming bonds and evaluating future competitors. If so, we expect play styles to vary across species according to the adult behavioral patterns. Here we examine play partner preferences and the use of specific play behaviors by immature (aged 7-123 months) wild chimpanzees of the Kanyawara...
community in Kibale National Park, Uganda. We analyzed 76 video-recorded play bouts between male and female players. Males initiated more play bouts than females. Play bouts with at least one female partner were shorter and more likely to include embraces or carrying, whereas those with at least one male were longer and more likely to include mock biting and hitting. Despite this, both sexes exhibited a preference for male partners. Thus, unlike human children, immature female chimpanzees did not avoid the rough play of males. Play styles in chimpanzees mirrored adult social behavior, wherein males are more aggressive than females and both male-male and male-female social bonds are typically stronger than those between females.

**Primate Community Evolution in the southern African Plio-Pleistocene: Dietary overlap and niche differentiation of fossil cercopithecoids**

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Fossil cercopithecoids are well represented in Plio-Pleistocene cave deposits of southern Africa. The rich taxonomic diversity of these primate communities is unparalleled in the region today, and warrants further study into the ecology of these fossil taxa. This project examines changes in the dietary ecologies of fossil primate communities using multiple proxies for diet collected from the literature. Dental microwear, stable carbon isotope values, shearing crest lengths, and mandibular P4-M3 lengths were analyzed in multivariate space to determine whether there are visible patterns of niche differentiation among these taxa. In addition, this project looks at whether and how individuals may have altered their dietary ecology when faced with extinction risk posed by changes in resource availability.

Results suggest that *Parapapio* and *Papio* occupied a generalist dietary niche, while *Theropithecus*, *Cercopithecoides*, and *Dinopithecus* are reconstructed as more specialized. Additionally, changes in primate diets between Makapansgat Members 3 and 4 and Swartkrans Member 1 appear to correspond to changes in southern African Plio-Pleistocene environments that indicate that younger sites are characterized by increasing aridity and reduced woodland habitats. However, the primate community at Sterkfontein Member 4 is suggestive of a more homogenous habitat that supported a less diverse primate community than other southern African sites such as Makapansgat and Swartkrans. Focusing future research on multivariate approaches to fossil primate ecology will allow a better understanding of dietary variation within and across populations of species living in diverse habitats.

**A catarrhine primate inference model for hominin morphological evolution.**

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Phylogenetic reconstruction and taxonomic identification in fossil primates is dependent upon a thorough understanding of the phylogenetic utility of craniodental characters and
their morphological variability in extant primates. Here, we describe the development of such an inference model in catarrhine primates. Three-dimensional craniomandibular data were digitized from 15 hominoid and 14 cercopithecoid taxa. Cranial modules were delineated by: biomechanical strain, development, and anatomical complexity. Congruence of each cranial subset was statistically compared to a molecular consensus phylogeny.

In hominoids, the splanchnocranium, upper face, zygomatic, and zygotemporal regions reflected molecular distances most accurately. In cercopithecoids, the basicranium, zygomatic, maxilla, temporal, and zygotemporal were most reliable, supporting only the developmental hypothesis. Cercopithecoids displayed dramatic sex differences, such that male morphology was more phylogenetically informative than female morphology. Allometric corrections were applied to the cercopithecoid data by regressing the Procrustes variables over centroid size. When size-corrected data were compared to the molecular phylogeny, the number of congruent cranial subsets increased significantly. Commonalities between the two samples included a consistently reliable zygomatic bone and zygotemporal region. However, in hominoids, the regions of the face were generally most congruent; whereas in cercopithecoids, the basicranium and temporal bone were most reliable, and both sex separation and allometric corrections were necessary to obtain consistently reliable results. It is clear that separate evolutionary histories and adaptive pressures experienced by these groups resulted in differing patterns of phylogenetic utility. These differences highlight the importance of using taxonomically appropriate models for drawing inferences in the primate fossil record.

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Are terrestrial siamangs left or right handed?
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Recent studies have demonstrated strong hand preferences for complex bimanual tasks in a wide variety of non-human primates. When extracting peanut butter from a tube terrestrial primates show a consistent preference for the right hand whereas arboreal primates are consistently left-handed. It has been hypothesized that when terrestrial primates were released from having to use their right hands for balance or hanging, they shifted to right-handedness.

To determine whether handedness is learned by arboreal animals as they forage and move in the trees during their developmental years, or whether it is an innate hard-wired instinct that has been selected for in arboreal species, we studied handedness in a family of captive and predominantly terrestrial siamangs (adult couple and their two offspring) at the El Paso zoo. The family of four were all born and raised in captivity. In the wild siamangs are exclusively arboreal and left-handed for a complex bimanual water dipping activity (Morino, 2011). If handedness is innate, then left-handedness should be expressed in the El Paso siamangs in spite of their terrestriality. Handedness data for five complex bimanual activities was recorded from videos and photographs of the El Paso
siamangs taken from 2006-2014. We found that, like their wild relatives, the El Paso siamangs are left handed and that their handedness was consistent through time. From year to year handedness was not consistent in the juveniles, shifting from a slight right to slight left preference from year to year. We concluded that handedness is innate rather than learned.

Finding a common band-width: Causes of convergence and diversity in Paleolithic beads
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Ornaments (a.k.a. beads) are the most common and ubiquitous art form of the Late Pleistocene. This fact suggests a common, fundamental function somewhat different to other kinds of Paleolithic art. While the capacity for artistic expression could be considerably older than the record of preserved (durable) art would suggest, beads signal a novel development in the efficiency and flexibility of visual communication technology. The UP was a period of considerable regional differentiation in material culture, yet there is remarkable consistency in the dominant shapes and sizes of Paleolithic beads over >25,000 years and across vast stretches of space, even though they were crafted from diverse materials and, in the case of mollusc shells, diverse taxonomic families. Cultural and linguistic continuity cannot explain the meta-pattern. The evidence indicates that widespread adoption of beads was not only about local and sub-regional communication of personal identity or group affinity, but also an expansion in the geographic scale of social networks. The obsession with rounded basket-shaped shells in particular related in part to their light weight, wearing comfort, and visual attractiveness. The conformity of the beads grew spontaneously and in a self-organizing manner from individuals' interest in tapping into the network as a means for managing local risk.

Application of FORDISC to an Historic Italian Population for Sex Determination
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The applicability of FORDISC in resolving issues of sex assessment in an historic population was addressed by analyzing forty crania of unknown sex originating from a late 19th to early 20th century Italian ossuary. Fifty-six measurements were taken from each individual, entered into FORDSIC 3.1, and compared to the Forensic Databank and the Howells database to identify patterns of similarity to reference populations and determine the sex of individuals. We hypothesized the study sample would be more similar to the American White reference populations due to shared ancestry, most individuals in the study sample would be atypical of the reference populations, and that the majority of the individuals are female, based on visual assessment. Not including prior knowledge of the sample’s origin, FORDISC classified 67.5% of the sample as White while the remaining individuals were classified in multiple ancestry/sex groups. Posterior and typicality probabilities ranged from 0.177 to 1.000 and 0.011 to 0.993, respectively, with models providing 49.6-95.2% correct classification. Including prior knowledge of the sample’s origin classified 70% of the sample as female and 30%
as male. Only five crania were classified differently as pertains to sex when limiting comparison to the White samples in the historic and modern reference populations. All craniometric classifications were largely concordant with non-metric assessments of sex, suggesting that craniometric assessments may serve as verification for non-metric sex determination. One may apply FORDISC to an historic sample if familiar with levels of sexual dimorphism in the local population and proceeding with (statistical) caution.

**Primate Diversity in the Eocene of North America: Using Primate and Rodent Diversity to Test the Role of Climate Change**

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The Eocene has been noted as being the warmest time of the Cenozoic, and the epoch of the origin of primates in North America. It has long been noted that primate diversity declined through the Eocene with the eventual disappearance of primates by the end of the era in North America. A database of all Adapids, Omomyids, and Plesiadapiforms found in North America was compiled (n=142), and their presences/absence was noted through time for the five NALMAs. Sites were analyzed using cluster analysis (grouped according to the modern U.S. states) to establish a latitudinal test for response to climate change and/or regional connectedness and endemism. Using ocean cores, and the sporadic terrestrial paleosol record, a broad trend of climate change was recognized throughout the Eocene in the continental portion of the continent. Finally a database of rodents was compiled and tested in the same manner as the primates to see whether diversity in another mammalian group underwent the same ecological response to events such as PETM and the overall cooling and retreat of tropical conditions. Results show that trends in Eocene global climate is broadly correlated with the loss in diversity of Eocene primates in North America, but clustering shows that variable environments, sampling bias, and/or endemism may also play a substantial role in the range and distribution of primate taxa.