Friday and Saturday
November 17-18, 2017
University of Texas at San Antonio
Downtown Campus

TABA Texas Association of Biological Anthropologists
Annual Meeting 2017
SCHEDULE OF EVENTS

Friday, November 17, 2017

6:00 – 7:00   Keynote Address: Dr. Jill Pruetz (Texas State University)
“Chimps on the savanna: hunting and other behaviors related to a hot, dry, and open environment”
Riklin Auditorium, UTSA Downtown campus

7:00 – 9:00   Opening Reception and Undergraduate Poster Session
Registration available at Reception
Doubletree Hotel

Saturday, November 18, 2017
All events at Doubletree Hotel (Salon de Gala B)

8:30 – 9:00   Registration

9:00 – 10:00  Podium Session I: Human Evolution

10:00 – 10:30 Coffee Break

10:30 – 11:30 Podium Session II: Behavior

11:30 – 1:30  Lunch

12:30 – 1:30  TABA Business Meeting

1:30 – 2:15   Podium Session III: Phylogeny and Evolution

2:15 – 3:00   Podium Session IV: Morphology

3:00 – 3:45   Poster Presentations and Refreshments

3:45 – 4:00   Closing Remarks and Awards

6:00 – 9:00   Social Gathering at The Cove (606 W Cypress St)
CHIMPS ON THE SAVANNA: HUNTING AND OTHER BEHAVIORS RELATED TO A HOT, DRY, AND OPEN ENVIRONMENT
DR. JILL PRUETZ, Department of Anthropology, Texas State University

At the Fongoli site in Senegal, chimpanzees occupy a savanna-mosaic woodland at the northernmost extent of the species’ range, and this community is thus far the only habituated group of apes in this type of habitat. They have been studied since 2001 in this hot, dry and open environment. Fongoli chimpanzees are therefore a good living primate model with which to examine theories regarding how extinct apes, including early hominins, adapted to hotter, drier and more open savanna environments. These apes exhibit behaviors that are unique to this community or are rare among chimpanzees, and they appear to rely on tool use and other behaviors to successfully combat the pressures they face in the savanna-woodland. I focus in this talk on Fongoli apes’ tool-assisted hunting behavior collected over the course of more than 10 years (2006-2016), as well as review various thermoregulatory behaviors they exhibit, such as cave and water use and being active at night. Fongoli chimpanzees are the only apes recorded to systematically hunt with tools, with almost 500 cases now recorded. Tool-assisted hunting behavior, where apes target the nocturnal Galago senegalensis as their main vertebrate prey, is concentrated in the early rainy season, whereas the period of extreme fruit scarcity follows the peak hunting season, bringing into question the timing of such seasonal hunting. While the tool kit at Fongoli is less varied than that of some forest-living chimpanzees, tool behavior is frequent and could be instrumental for their survival in this harsh environment.

Jill Pruetz is a Professor in the Department of Anthropology at Texas State University. Her dissertation research focused on food availability, competition, and dominance in female vervet and patas monkeys. Her postdoctoral research shifted to chimpanzee distribution in savanna habitats in Senegal. She is now the Principal Investigator of the Fongoli Savanna Chimpanzee Project, focusing on savanna socioecology and comparative studies with chimps living in forested environments, which can inform our understanding of early hominin behavior. She has conducted research in Senegal, Kenya, Panama, Costa Rica, Nicaragua, and Peru, and leads a field school in Costa Rica. She is also the Director of Neighbor Ape, a non-profit that promotes sustainable conservation of chimpanzee habitats, and of the animals themselves, in Senegal. More about her research and academic activities can be found at her faculty webpage and on her blog. She can also be found on Instagram and Twitter (@jillpruetz).
UNDERGRADUATE POSTER PRESENTATIONS
Friday, November 17, 2017

1. The microanatomy of bone trauma. CHRISTIANA FAKHRI, STEPHANIE BAKER, JOY OGUNLANA, SAMANTHA MITCHELL, PATRICK LEWIS

2. Preliminary skeletal analysis of Etruscan tomb G13-001. LORI BAKER, COLLEEN ZORI, DAVIDE ZORI, AVALON STUTZMAN, CANDACE WEDDLE-LIVINGSTONE, VERONICA IKESHOJI-ORLATI

3. Exploring the association of sexual dichromatism in primates with mating system and diet. ARIELLE LIU, LAURA MATTHEWS, JADELYS TONOS, AMY DUNHAM

4. Quantifying bone surface modification frequencies: accounting for variation in specimen sizes. KRISTEN ANDERSON, JOSEPH FERRARO

5. Object curiosity in orangutans (Pongo abelii, P. pygmaeus): relation to tool usage. ILANA NYVEEN, LUCRECIA AGUILAR, ZARIN MACHANDA
PODIUM TALKS
Saturday, November 18, 2017

Session I: Human Evolution

9:00 – 9:15  *Homo naledi* from the Rising Star cave system in South Africa. DARRYL DE RUITER

9:15 – 9:30  Specimen dates and species longevity: an evaluation of the use of temporal range data for questions of ancestry in the hominin fossil record. TIMOTHY L CAMPBELL, CHRIS A ROBINSON, SUSANNE COTE, DARRYL J DE RUITER

9:30 – 9:45  Foramen magnum position as a cranial indicator of bipedal locomotion. E. CHRISTOPHER KIRK, GABRIELLE A. RUSSO

9:45 – 10:00 Patterns of morphometric change in experimentally domesticated foxes: Implications for “self-domestication” in human evolution. SCOTT D. MADDUX, EMMA K. WOOD, THOMAS E. SOUTHARD, ANASTASIYA V. KHARLAMOVA, LYUDMILA N. TRUT, ROBERT G. FRANCISCUS

Session II: Behavior

10:30 – 10:45 Intraspecific variation in arthropod consumption by female and male redtail (*Cercopithecus ascanius*) and blue (*C. mitis*) monkeys in Kibale National Park, Uganda. MARTHA MCKEON LYKE, ANTHONY DI FIORE, JOANNA E. LAMBERT

10:45 – 11:00 The behavioral costs of parasitism in female chacma baboons (*Papio ursinus*). ERIC C. SHATTUCK, LARISSA SWEDELL, STEFFEN FOERSTER

11:00 – 11:15 Changes in association patterns in relation to female reproductive status among wild spider monkeys in Amazonian Ecuador. MARYJKA B. BLASZCZYK, CLARA J. SCARRY, ANTHONY DI FIORE, ANDRES LINK

11:15 – 11:30 Timing of early morning behaviors of primates at Tiputini Biodiversity Station in Amazonian Ecuador (*Ateles belzebuth, Plecturocebus discolor, Lagothrix lagotricha poeppigii, Pithecia aequatorialis*). MAX SNODDERLY, KELSEY ELLIS, SARINA LIEBERMAN, ANDRES LINK, EUDARDO FERNANDEZ-DUQUE, ANTHONY DI FIORE
Session III: Evolution

1:30 – 1:45 One, two...many: pair-living as a stepping stone to group-living in primate social evolution. LUCA POZZI, PETER M. KAPPELER

1:45 – 2:00 Evolutionary patterns of sex-based power: the emergence of male dominance in primates. REBECCA JEAN LEWIS, E. CHRISTOPHER KIRK, ASHLEY GOSSELIN-ILDARI

2:00 – 2:15 Agriculture and human senses: investigating the roles of positive selection and relaxation of functional constraint on human chemosensory genes. CARRIE C. VEILLEUX, EVA C. GARRETT, RICHARD BANKOFF, NATHANIEL J. DOMINY, GEORGE H. PERRY, AMANDA D. MELIN

Session IV: Morphology

2:15 – 2:30 Heterotopic ossiciation: the uninvited guest. JESSICA K. JUAREZ

2:30 – 2:45 Mind over matter: an ontogenetic perspective. MAGDALENA MUCHLINSKI

2:45 – 3:00 Intraspecific variation in strepsirrhine vertebral morphology. LIZA J. SHAPIRO, ADDISON D. KEMP
POSTER PRESENTATIONS

1. Introducing methods for quantifying quadrupedal kinematics in free-ranging primates. ALLISON MCNAMARA, NOAH T. DUNHAM, LIZA SHAPIRO, JESSE W. YOUNG

2. Internal nasal anatomy of *Rooneyia viejaensis*: implications for crown primate olfactory systems. INGRID K. LUNDEEN, E. CHRISTOPHER KIRK

3. Age-at-formation of linear enamel hypoplasia as it relates to weaning among prehistoric and historic Native Americans on the Western Gulf coastal plains of Texas. LAUREN GEORGIANA KOUTLIAS, CAROLINE ZNACHKO, EMILY ARLENE EDWARDS

4. An investigation into the etiology of Schmorl’s nodes through a cross comparison of forensic, clinical and medieval skeletal samples. CAROLINE ZNACHKO

5. Modern human nasal projection: reassessing a climatic adaptation. SCOTT D. MADDUX, LAUREN N. BUTARIĆ, ROBERT G. FRANCISCUS

6. Comparison of biomechanical properties of the femora and humeri among soldiers from Fort Craig, New Mexico and contemporaneous males from the Terry collection. SHELBY LYNN GARZA, DANIEL JAY WESCOTT

7. Comparative trabecular microarchitecture of the navicular across extant primate species. MADELYNNE DUDAS, WILLIAM HARCOURT-SMITH

8. Field observations of East African and Milne-Edwards’ pottos (*Perodicticus iberanus* and *P. edwardsii*) in ten sites in Angola, Cameroon, Kenya, Nigeria, Rwanda, and Uganda. AVEREE M. LUHRS, K.A.I. NEKARIS, MAGDALENA S. SVENSSON

9. Evaluation for the use of transverse palatine, zygomaticomaxillary, and metopic sutures in ancestry estimations. ROBYN KRAMER, MARY SWEARINGER

10. Estimating body mass in *Homo erectus* using the talus, DEBORAH L. CUNNINGHAM, MELINDA V. RÖGERS, DANIEL J. WESCOTT, ROBERT C. MCCARTHY

11. Selection drove the evolution of the lemur skull. ANNA PENNA, GABRIEL MARROIG

12. Sexual dimorphism in the trochlear angle of the humerus: a preliminary investigation in hunter-gatherers and agriculturalists. ALEXA PENNAVARIA, SCOTT MADDUX

13. Craniofacial growth in a mouse model of osteogenesis imperfecta. RACHEL A. MENEGAZ, JASON M. ORGAN
ABSTRACTS (IN ORDER OF PRESENTATION)

Session I: Human Evolution

_Homo naledi from the Rising Star cave system in South Africa._ DARRYL DE RUITER. Department of Anthropology, Texas A&M University

_Homo naledi_ is a previously unknown species of extinct hominin discovered within the Dinaledi and Lesedi Chambers of the Rising Star cave system, Gauteng, South Africa. Although the Lesedi Chamber assemblage remains undated, the Dinaledi Chamber assemblage was deposited between 236-335 Ka, placing _H. naledi_ in the Middle Pleistocene. To date more than 1800 specimens have been recovered, with comprehensive representation of skeletal elements across the lifespan, and from multiple individuals. With at least 18 individuals and most skeletal elements represented by multiple specimens, this is the largest assemblage of a single species of hominin yet discovered in Africa. _Homo naledi_ is characterized by body mass and stature similar to small-bodied human populations, with a small endocranial volume similar to australopiths. Cranial morphology of _H. naledi_ is unique, but most similar to early _Homo_ species including _H. erectus, H. habilis, H. rudolfensis,_ and Middle Pleistocene _Homo._ _Homo naledi_ has human-like manipulatory adaptations of the hand and wrist, alongside a human-like leg and foot. These human-like aspects are contrasted in the postcrania with a more primitive or australopith-like trunk, shoulder, fingers, pelvis, and proximal femur. Nonetheless, the shared derived features that connect _H. naledi_ with other members of _Homo_ occupy most regions of the _H. naledi_ skeleton and represent distinct functional systems, including locomotion, manipulation, and mastication. The Rising Star cave system presents a unique set of depositional circumstances, leading us to hypothesize that the _H. naledi_ remains represent deliberate body disposal in a non-human species of hominin.

_Specimen dates and species longevity: an evaluation of the use of temporal range data for questions of ancestry in the hominin fossil record._ TIMOTHY L CAMPBELL¹, CHRIS A ROBINSON², SUSANNE COTE³, DARRYL J DE RUITER⁴. ¹Department of Anthropology, Texas A&M University; ²Department of Biological Sciences, Bronx Community College; ³Department of Anthropology and Archaeology, University of Calgary; ⁴Department of Anthropology, Texas A&M University

Utilizing _Australopithecus sediba_ as a case study, we evaluate statements implying that this taxon cannot be ancestral to _Homo_ as the specimens from Malapa are found later in time (~1.98 Ma) than the earliest proposed examples of our genus (~2.8–2.4 Ma). For hypotheses about the ancestral nature of _A. sediba_ to be plausible, two things must be established. First, it must be possible for ancestral and descendant taxa to coexist. Under a budding cladogenesis model of speciation a subset of a species differentiates into a new daughter taxon while the remainder of the species maintains cohesion. Among mammals, contemporaneous ancestral and descendant taxa are reported in the literature, ranging from rodents to proboscideans. Second, the amount of time represented by a “ghost lineage” must be reasonable. Many studies that have estimated the average mammal species duration have values ranging between 2-4 Ma, although these estimates...
are dependent on the dataset used and the taxonomic group. Utilizing published temporal range data of fossil hominin species, and incorporating proposed dating error, we calculate a conservative average hominin species temporal range of ~0.97 Myr. Using this estimate in a thought experiment wherein Malapa represents the first appearance date (FAD), midrange date, or last appearance date of the species, possible FAD’s for A. sediba range from 2.95–1.98 Ma. As these scenarios are all equally plausible, there is no a priori reason that A. sediba could not be ancestral to Homo based solely on the dates of the specimens currently known.

Foramen magnum position as a cranial indicator of bipedal locomotion. E. CHRISTOPHER KIRK¹, GABRIELLE A. RUSSO². ¹Department of Anthropology, University of Texas at Austin; ²Department of Anthropology, Stony Brook University

Humans possess more anteriorly positioned foramina magna than other living primates, and this association has often been linked the habitual use of bipedal locomotion and orthograde postures. Accordingly, relative foramen magnum position has been viewed as a possible indicator of bipedalism in a range of Miocene to Pliocene hominin taxa. However, the status of modern humans as the only living habitually bipedal primate species has hindered comparative analyses seeking to test the proposed functional relationship between anteriorly positioned foramina magna and bipedalism. In 2013, we provided evidence that habitually bipedal species in four mammalian clades (macropodid marsupials, dipodid rodents, heteromyid rodents, and hominin primates) demonstrate anteriorly positioned foramina magna compared to quadrupedal close relatives. We also demonstrated an association between anteriorly positioned foramina magna and orthograde in strepsirrhine primates. These findings were criticized in 2016 for calculating relative foramen magnum position through the use of anatomical reference points (e.g., position of the posterior molar) that may change position as a result of selection on the masticatory apparatus. Here we present comparative data for mammals on relative foramen magn position using a reference landmark (the sphenoid-occipital synchondrosis) that is less likely to be influenced by changes in masticatory anatomy. We also analyze relative foramen magnum position in a third rodent clade (Anomaluroidea) that includes both bipedal and quadrupedal members. These analyses provide further evidence for an association between bipedal locomotion and anteriorly positioned foramina magna across mammals. Our findings suggest that the anteriorly positioned foramina magna of some fossil hominins are functionally linked to habitual bipedalism, and that relative foramen magnum position is a useful cranial indicator of bipedal locomotion in the hominin fossil record.

Patterns of morphometric change in experimentally domesticated foxes: Implications for “self-domestication” in human evolution. SCOTT D. MADDX¹, EMMA K. WOOD², THOMAS E. SOUTHARD³, ANASTASIYA V. KHALAMOVA⁴, LYUDMILA N. TRUT⁴, ROBERT G. FRANCISCUS². ¹Center for Anatomical Sciences, University of North Texas Health Science Center; ²Department of Anthropology, University of Iowa; ³Department of Orthodontics, University of Iowa; ⁴Institute of Cytology and Genetics, Siberian Branch of Russian Academy of Sciences

In paleoanthropology, ‘self-domestication’ is increasingly regarded as a potential explanatory model for craniofacial evolution in Homo sapiens. This model posits that neotenous craniofacial morphology among humans was an attendant outcome of selection for reduced aggression in
response to increased demographic densities and/or social complexity. While research into early dogs and bonobos has generally supported the human ‘self-domestication’ hypothesis, the Russian domesticated fox-farm experiments provide an unparalleled investigative resource as a long-term, controlled study of behavior-morphology coevolution. We employed linear and 3D geometric morphometric measures of the cranium, dentition, and postcranial skeleton in sex-balanced samples from control (n = 50), tame (n = 50), and aggressive (n = 50) experimental fox strains. All measurements were taken directly on macerated, and fully cleaned skeletal and dental elements, affording a higher level of measurement accuracy relative to other protocols (e.g., radiographs). Contrary to expectations, tame fox skulls generally did not exhibit morphology consistent with paedomorphosis (e.g., reduced facial lengths). Interestingly, however, while most of the tame foxes exhibited relatively long faces, a small number exhibited extremely short faces. Further, dental size dimensions were found to be significantly reduced in the tame fox sample compared to the control and aggressive fox strains, paralleling well-documented dental size reduction trends in dogs, bonobos, and humans. Additionally, the aggressive strain was found to exhibit significantly broader faces than tame and control strains. Broad faces also characterize pre-modern fossil humans, and are associated with higher levels of circulating fetal testosterone in extant humans. Accordingly, while the results of this study provide further support that behavioral selection related to aggression has developmentally associated morphological consequences, our study suggests that the interplay of hormones and neurotransmitters linking behavior and morphology during ontogeny are likely more complex than previously suggested by proponents of the self-domestication hypothesis.

Session II: Behavior

**Intraspecific variation in arthropod consumption by female and male redtail** *(Cercopithecus ascanius)* **and blue** *(C. mitis)* **monkeys in Kibale National Park, Uganda.**

MARTHA MCKEON LYKE¹, ANTHONY DI FIORE², JOANNA E. LAMBERT³. ¹Department of Anthropology, University of Texas at San Antonio; ²Department of Anthropology, University of Texas at Austin; ³Department of Anthropology, University of Colorado Boulder

The feeding strategies of many primate species vary by sex, and females are often reported to consume more protein-rich foods than males due to the increased nutritional demands of reproduction. Arthropods are generally protein-rich and comprise a substantial portion of the diet of many omnivorous primate species. Here, we examine variation by sex in the arthropod consumption of sympatric omnivorous redtail *(Cercopithecus ascanius)* and blue *(C. mitis)* monkeys inhabiting Kibale National Park, Uganda, to test the hypothesis that females consume more arthropods. We sequenced arthropod DNA from 221 fecal samples (redtails n=115, blues n=106) collected over a six-month period encompassing one wet and dry seasonal cycle. We calculated the total number of arthropod family DNA present in each sample (species richness) and found that female redtail samples had a greater average species richness than males (12.5 vs. 10.5 taxa/sample), but this difference was not significant (p=0.118). The average species richness of the blue monkey samples was similar for females and males (10.5 vs 10.2 taxa/sample). We also calculated the frequency of arthropod occurrence as number of fecal samples where DNA was present for each arthropod family identified. Overall, females of both species consumed more different taxa than males (p<0.001). Results of our data indicate that female redtail and
blue monkeys consume significantly more different arthropod taxa than males, but not more arthropod taxa per sample. This suggests that females of these groups do not necessarily consume more arthropods than males, but do consume a greater diversity of taxa.

The behavioral costs of parasitism in female chacma baboons (*Papio ursinus*). ERIC C. SHATTUCK1, LARISSA SWEDELL2, STEFFEN FOERSTER3, 1 Department of Anthropology, University of Texas at San Antonio; 2 Department of Anthropology, Queens College, City University New York; 3 Department of Evolutionary Anthropology, Duke University

Host behavioral changes during infection (i.e., sickness behavior), including lethargy, may be an adaptive means of reprioritizing energy expenditure and hastening recovery. However, other research suggests that sickness behavior is sensitive to several social and ecological factors, such as reproductive state or threats to dominance. Relatively little is known about non-human primate sickness behavior and its plasticity across reproductive cycles and seasons. Here, we assess whether infections with a common intestinal nematode, *Trichuris* sp., is associated with behavioral changes among female chacma baboons (*Papio ursinus*), and the extent to which such associations vary with reproductive state. The shedding of *Trichuris* eggs was quantified in 4,914 fecal samples collected from 30 individually recognized females in 2 troops inhabiting the Tokai Forest, Cape Town, South Africa, between August 2013 and June 2015. Behavior was assessed in 15 minute continuous focal samples for >5,000 hours of total observation time. Using general linear mixed effect (random slope and intercept) models, we found no significant association between *Trichuris* egg counts and behavior during pregnancy, lactation, or the luteal phase, controlling for season. During the follicular phase, the association between *Trichuris* burden and social behavior as well as activity levels varied by season. Our findings suggest that primates may modulate behavior in response to *Trichuris* infections, and that such changes vary by reproductive state and season, potentially reflecting differential energetic costs of immunity through the cycle. We discuss possible mediators of those effects, including variation in reproductive and stress hormones.

Changes in association patterns in relation to female reproductive status among wild spider monkeys in Amazonian Ecuador. MARYJKA B. BLASZCZYK1, CLARA J. SCARRY2, ANTHONY DI FIORE1, ANDRES LINK3. 1Department of Anthropology, University of Texas at Austin; 2Department of Anthropology, Miami University; 3Department of Biological Sciences and School of Business, Universidad de Los Andes

The structure of social networks within animal groups is important for a variety of ecological and health-related processes, including the spread of social information and infectious disease. Knowledge of the ways in which social networks change with varying environmental and sociodemographic conditions is therefore critical to informing our understanding of effects of social network structure on health and fitness in wild animal populations. Spider monkeys have long interbirth intervals (ca. 3 years) and females are only sexually receptive for a short period every few years. The presence of sexually receptive females should therefore have a pronounced effect on association patterns among spider monkeys living in fission-fusion societies. We explored subgroup association networks among spider monkeys over two periods, one in which no conceiptive females were present and one with several sexually receptive adult females. Male-female dyads had significantly stronger associations when conceiveptive females were present, but
male-male association patterns did not differ across the two periods. For the period with no
conceptive females, females had lower social network strength and eigenvector centrality than
males, but there were no sex differences in these network measures for period with conceptive
females. Our results demonstrate some of the ways in which social networks change in relation
to sociodemographic parameters such as female reproductive state, and have implications for
understanding disease and information transmission dynamics among wild spider monkeys.

**Timing of early morning behaviors of primates at Tiputini Biodiversity Station in Amazonian Ecuador (Ateles belzebuth, Plecturocebus discolor, Lagothrix lagotricha poeppigii, Pithecia aequatorialis).** MAX SNODDERLY¹, KELSEY ELLIS², SARINA LIEBERMAN¹, ANDRÉS LINK³, EUDARDO FERNANDEZ-DUQUE⁴, ANTHONY DI FIORE². ¹Department of Neuroscience, University of Texas at Austin; ²Department of Anthropology, University of Texas at Austin; ³Biological Sciences and School of Management, Universidad de Los Andes; ⁴Department of Anthropology, Yale University

We compared timing of morning behaviors for four sympatric New World taxa with
polymorphic color vision systems. All males of these taxa are dichromats that may have a
foraging advantage in dim light. With rare exceptions, morning activities began only after onset
of nautical twilight (~48 min before sunrise). The smaller monkeys, *Pithecia* and *Plecturocebus*
(formerly *Callicebus*), did not emerge from the sleeping tree until sunrise or even later. In
contrast, the larger monkeys, *Ateles* and *Lagothrix*, emerged from the sleeping tree before sunrise
about half the time. Surprisingly, none of the taxa routinely began feeding before sunrise, in spite
of the potential advantages to dichromats. *Ateles* was the first taxon to feed; using it as the
reference taxon in a linear mixed model showed that its first feeding bouts occurred significantly
earlier than those of *Pithecia* (p<0.001), but not the other monkeys. In post-hoc pairwise
comparisons, *Pithecia* fed significantly later than the other three taxa (p<0.001 for all
comparisons); the median time of *Pithecia’s* first feeding bout was more than 2 hours after
sunrise. Male *Ateles* fed at the same time as females and male *Lagothrix* fed later than females
(p=0.02), even though male dichromats might have been able to use the twilight hours to their
advantage. There was a large temporal dispersion of first feeding bouts for all taxa, in part due to
variation throughout the year. All taxa followed the same general pattern, feeding earliest in
January-April, latest in May-August, and in-between in September-December. This pattern may
be related to availability of ripe fruit, which is greatest in January-April, least in May-August,
and in-between in September-December. This relationship could imply a foraging strategy to
conserve energy when ripe fruit availability is low, and starting early to compete for preferred
resources when they are available.

**Session III: Evolution**

**One, two...many: pair-living as a stepping stone to group-living in primate social evolution.**
LUCA POZZI¹, PETER M. KAPPELER². ¹Department of Anthropology, University of Texas at
San Antonio; ²Behavioral Ecology & Sociobiology Unit, German Primate Center

Primates exhibit great diversity in social systems, including solitary, pair-, and group-living (uni-
or multi-male) species. Recent comparative analyses yielded conflicting results about the number
and direction of evolutionary transitions among these three social systems as well as about the
selective pressures favoring the evolution of pair-living, in particular. Using a newer and more detailed primate phylogeny, we conducted Bayesian ancestral state reconstructions and stochastic mapping to explore the effects of different model assumptions, phylogenies and sample sizes on the reconstruction of primate social evolution. We evaluated alternative models of social evolution, including unstructured models, the increasing complexity model and a recently proposed model by Shultz et al. (2011) that considers pair-living as derived from group-living systems. In contrast to previous analyses, we found that models assuming that pair-living evolved from solitary ancestors and gave rise to group-living enjoyed by far the most support. This result has implications for our understanding of social evolution in general and about the evolutionary determinants of pair-living in particular. Pair-living in primates, therefore, appears to be a necessary stepping stone in evolving greater levels of social complexity rather than a derived consequence of increased infanticide risk.

Evolutionary patterns of sex-based power: the emergence of male dominance in primates. REBECCA JEAN LEWIS, E. CHRISTOPHER KIRK, ASHLEY GOSSELIN-ILDARI. 1Department of Anthropology, University of Texas at Austin; 2Department of Evolutionary Anthropology, Duke University

Many primates exhibit intersexual power inequalities. We hypothesized that both dominance and leverage influence sex-based power. If sexual dimorphism causes intersexual dominance, we predicted that highly dimorphic species are constrained to be male dominant, and low dimorphism species are free to demonstrate any pattern of power. If market effects influence intersexual leverage, we predicted that females have more power when social group sex ratios are more female-biased and estrus is asynchronous. Using phylogenetic logistic regression and ancestral state reconstructions (ASRs), we analyzed intersexual dominance status, body mass and canine ratio, expected estrous overlap, reproductive seasonality, and sex ratio data for 79 extant primate species. While male dominance is most common in primates, every major extant clade includes at least one species that is not male dominant. Male dominance was significantly associated with greater dimorphism in body mass and canine length and with female-biased sex-ratios. Very low expected estrus overlap was significantly associated with female dominance and co-dominance. Based on multiple ASR analyses, male dominance was not necessarily the ancestral condition for primates, strepsirrhines, or haplorhines. The last common ancestor (LCA) of anthropoids was probably male dominant but probably did not exhibit high sexual dimorphism. High dimorphism probably characterized the catarrhine LCA, which constrained dominance relationships within this clade and helps explain why living catarrhines are primarily male dominant. Male dominance evolved multiple times in primates and is probably common because multiple traits are linked to male dominance but fewer traits are associated with female dominance or co-dominance.

Agriculture and human senses: investigating the roles of positive selection and relaxation of functional constraint on human chemosensory genes. CARRIE C. VEILLEUX, EVA C. GARRETT, RICHARD BANKOFF, NATHANIEL J. DOMINY, GEORGE H. PERRY, AMANDA D. MELIN. 1Department of Anthropology & Archaeology, University of Calgary; 2Department of Anthropology, Boston University; 3Department of Anthropology, The Pennsylvania State University; 4Department of Anthropology, Dartmouth College
Human transitions to agriculture, which began around 10,000 years ago, occurred independently in geographic regions around the world and involved diverse plant and animal domesticates. Yet, these transitions all represent a profound shift in how humans acquire and process foods. Previous genomic and morphological studies suggest that the adoption of a farming subsistence strategy is associated with major changes in human environments and biology, including metabolic function. However, little work has explored how the adoption of farming influenced human sensory systems, particularly the senses often involved in evaluating food quality, toxicity, and ripeness (the “chemosenses”: taste, olfaction). Thus, in this study, we investigated the influence of subsistence strategy on the evolution of human chemosensory genes. Specifically, we used targeted capture and sequencing to analyze 895 genes (encoding taste receptors and olfactory receptors) and 71 neutral intergenic regions in 165 individuals from two distinct geographic regions: Uganda and the Philippines. In each region, we sampled two hunter-gatherer populations and a neighboring agricultural population, thus allowing us to investigate convergent evolution of sensory genes across two independent transitions to agriculture. To investigate positive selection, we employed three allele frequency-based tests (population branch statistics, Bayescan, and bayenv2) and identified functional variants that may reflect adaptations to farming. Additionally, we examined the frequency of loss of function variants and whole gene deletions to investigate whether there has been a relaxation of functional constraint on any olfactory or taste receptor genes associated with subsistence strategy. We found signatures of positive selection in at least two bitter taste receptor genes and thirteen olfactory receptor genes associated with agriculture in Uganda and the Philippines, suggesting the transition to a farming-based subsistence strategy is associated with changes in sensory capabilities.

Session IV: Morphology

Heterotopic ossication: the uninvited guest. JESSICA K. JUAREZ. Structural Anatomy and Rehabilitation Sciences, University of North Texas Health Science Center

Heterotopic ossification (HO) is the proliferation of aberrant bone in soft-tissue following traumatic injury and is accompanied by prolonged inflammation, skin irritation and pain. Though most frequently seen in combat-related amputation and polytrauma patients, HO in the civilian population commonly follows hip arthroplasty, severe burn injury, and has also been associated with traumatic brain injury. The only treatment for HO is excision and as the etiology is not well understood, reoccurrence often follows. To mitigate reoccurrence following excision, a prophylactic regime of radiation therapy and systemically delivered non-steroidal anti-inflammatory drugs is prescribed. A number of complications are associated with these prophylactic measures, including fracture non-union, gastritis, and delayed wound-healing. The severity of these complications often results in patient non-compliance which may contribute to continued aberrant bone proliferation. A greater understanding of HO and the role of inflammation during the process of bone formation presents opportunities for research in applications of novel treatment alternatives, metabolic bone disease studies and directed bone growth investigations. Additionally, prosthetic rehabilitation practices and potential applications as a personal identifying feature in both bio-archaeology and forensically significant cases may be possible with continued efforts.
Mind over matter: an ontogenetic perspective. MAGDALENA MUCHLINSKI. Center for Anatomical Sciences, University of North Texas

The Growth Regulatory Hypothesis states that brain growth governs somatic growth. Muscle as a percentage of body mass (%TBM) varies during adulthood, but the amount of variation in muscle as a %TBM is most notable during early development. In humans, there is a marked inverse relationship between the rate of growth (and glucose consumption) in the brain and the rate of growth in skeletal muscle, with a pronounced shift in resource allocation directly preceding puberty. This shift occurs because early in life, brain growth is the focus of glucose consumption. This study evaluates if a similar relationship can be found in non-human primates. Total muscle mass and endocranial volume were collected from seventeen different primate species (n=82). Using molar eruption as a marker of adult brain size, we examined how muscle mass as a %TBM changes as individual’s age. We observed a shift in muscle mass soon after the first lower molar erupts. In Pan, muscle as a %TBM averages 18% early in life, while it averaged 35% in adults. A similar pattern was documented among other primates (e.g., Galago 11% versus 35%, Ateles 27% versus 51%, Colobus 25% versus 54%). Examining how muscle mass changes ontogenetically is another method of evaluating the proposed metabolic trade-off between brain size and muscle mass.

Intraspecific variation in strepsirrhine vertebral morphology. LIZA J. SHAPIRO, ADDISON D. KEMP. Department of Anthropology, University of Texas at Austin

Intraspecific morphological variation can provide unique insights on the evolutionary process from both functional and developmental perspectives. Intraspecific variation in primate vertebral morphology has not been well studied, but research on the spine of non-primate mammals has shown that reduced intraspecific variability may reflect the process of natural selection and/or the timing and pattern of developmental processes. Here, we used a modified Levene’s test to compare intraspecific variation across five morphological features in the lower thoracic and lumbar regions of seven strepsirrhine species (Arctocebus calabarensis, Nycticebus coucang, Perodicticus potto, Indri indri, Lepilemur mustelinus, Otolermur crassicaudatus, Euoticus elegantulus; n=74 individuals). We predicted that if variation follows developmental timing, dimensions of the neural canal (earliest in development) will exhibit the least variability, vertebral bodies will be intermediate, and the spinous processes will exhibit the most variability (latest in development). Alternatively, if variation is biomechanically driven, we predicted that vertebral dimensions related to function/locomotion (vertebral body, spinous processes) will exhibit less variability than dimensions of the neural canal. Combining data for all species showed partial support for the biomechanical hypothesis, with lowest variability in vertebral body dimensions, highest variability in the neural canal, and spinous processes intermediate. When individual species were evaluated, patterns were not consistent, which may be due to limited sample sizes. However, the two taxa most in accordance with the biomechanical hypothesis were Indri and Lepilemur, suggesting a distinction related to their highly demanding form of locomotion, vertical clinging and leaping.
UNDERGRADUATE POSTER ABSTRACTS

The microanatomy of bone trauma. CHRISTIANA FAKHRI¹, STEPHANIE BAKER¹, JOY OGUNLANA¹, SAMANTHA MITCHELL², PATRICK LEWIS¹. ¹Department of Biology, Sam Houston State University; ²Department of Anthropology, Texas Tech University

Trauma morphology in human bones provides evidence regarding the mechanism of injury or death. For example, weapon type, caliber of bullet, and the trajectory of impact can all be estimated from the damage to bone. Such damage is generally examined at the gross anatomical level. Recent work with CT scans, however, suggests that more data may be available on a finer scale. Here, we study asymmetry in human bones with identifiable trauma by examining skeletal specimens housed at the Southeast Texas Applied Forensic Sciences (STAFS) Facility in Huntsville, TX. The specimen included in this study is a skull with ballistic trauma. The bone was scanned at the University of Texas Computed Tomography Lab. Amira 5.6.0 was used to visualize, render, and collect data. Cortical bone thicknesses were measured and the number of microfractures counted, each at regular intervals around the circumference of each wound. Cortical bone thickness was measured using the provided measuring tools in Amira 5.6.0, and microfractures were counted by observing the internal and external surfaces of the bone. Nonparametric methods were used to analyze data, and preliminary results suggest asymmetry in both variables. Based on our preliminary results we are planning further studies to determine the causes of the asymmetry. Our ultimate goal is to provide law enforcement and the medicolegal community with a larger, more refined data set to better estimate the causes of bone trauma.

Preliminary skeletal analysis of Etruscan tomb G13-001. LORI BAKER¹, COLLEEN ZORI¹, DAVIDE ZORI¹, AVALON STUTZMAN¹, CANDACE WEDDLE-LIVINGSTONE³, VERONICA IKESHOJI-ORLATI⁴. ¹Department of Anthropology, Baylor University; ²Baylor Interdisciplinary Core, Baylor University; ³South Carolina School of the Arts, Anderson University; ⁴Department of Research and Learning, Vanderbilt University

The San Giuliano Archaeological Research Project (SGARP) was launched in May of 2016 with the goal to reconstruct the temporal changes in human occupation of the plateau and the surrounding associated necropolis. The San Giuliano site is located in the Lazio region of Italy near Barbarano Romano. This area contains more than 500 rock-cut Etruscan tombs that have not been systematically documented and studied. Tomb G13-001 is an extensively looted 6th century BC tomb, located in the Chima tumulus and has been excavated over two field seasons. The dromos of the tomb yielded a significant number of artifacts and skeletal elements most likely discarded after looting episodes. The interior was decorated to resemble an Etruscan home with a carved roof beam and two couches on both sides and a platform along the back of the tomb. The tomb has yielded 1535 skeletal fragments as well as a multitude of ceramics, spindle whorls, and even a Neolithic point. The majority of the skeletal fragments (n=1253) were unidentifiable with 90% of those measuring between 0-20mm. Eighteen percent of the elements were identifiable. Left tibiae were counted and used to estimate the minimum number of individuals of 12. The excavation also yielded 69 teeth, 62% of which were mostly complete. Sex estimation was only possible for a right femoral head and a left ilium both of which were classified as female. Four fetal bones, two right femora, a right ulna, and a right tibia were also
recovered. Length measurements of the bones placed one femur and the ulna at 18 weeks in utero. This presentation will describe the preliminary findings of the osteological analysis along with the associated material culture.

**Exploring the association of sexual dichromatism in primates with mating system and diet.**
ARIELLE LIU, LAURA MATTHEWS, JADELYS TONOS, AMY DUNHAM. BioSciences, Rice University

Sexual dichromatism, most commonly noted in birds, is also present in high levels in some primates. The evolutionary mechanism by which sexual dichromatism evolved is unclear, as is its purpose. It is widely accepted that sexual selection plays a role in the evolution of sexual dichromatism, and evidence supports such a role in both birds and primates. An initial study of sexual dichromatism in primates focusing on lemurs was conducted to explore the association of sexual dichromatism with mating system and diet across 99 lemur species. Data about all lemur species, including presence of dichromatism, mating system, and diet were collected from various sources and examined for relationships with sexual dichromatism. A strong correlation was found between mating system and dichromatism as well as diet and dichromatism. Most dichromatic species were either frugivores or frugivore-folivores, and no dichromatic species were omnivorous or gumnivorous. The mating system of all dichromatic species was either pairs or promiscuous groups, with most dichromatic species having promiscuous groups mating systems. The study is being expanded to all primates. Data such as diet and mating system as well as dimorphism, habitat, and social systems are being collected and will be analyzed to look for relationships between sexual dichromatism and species characteristics.

**Quantifying bone surface modification frequencies: accounting for variation in specimen sizes.**
KRISTEN ANDERSON, JOSEPH FERRARO. Department of Anthropology, Baylor University

Bone surface modifications are commonly observed in archaeological, paleontological, and forensic contexts. Past actualistic/experimental research has established criteria for identifying individual marks (e.g., cut mark, tooth mark, percussion striae and notch, etc.), as well as expected assemblage-based frequencies of damages for a variety of scenarios (e.g., hominin-to-carnivore, carnivore-to-hominin-to-carnivore). While great strides have been made in identifying individual marks to specific classes, much less research has explored the assumptions and methodological difficulties of employing the latter assemblage-based frequencies in direct comparisons between referent and study assemblages (e.g., Ferraro et al. 2013). Here, we raise two questions: are assemblage-based bone damage frequencies directly comparable between assemblages? And, if not, what methodological advances might help resolve this issue? In this poster, we test a pair of hypotheses within a single experimental context (stone tool butchery of goat limbs with subsequent hammerstone percussion for marrow extraction). Our null hypotheses are: 1) that bone damage frequencies do not vary according to bone fragment size; and 2) that bone damage frequencies do not vary by bone portion. As other studies have shown that bone fragment size distributions and portion representations do vary by experimental/actualistic scenarios, should either of our hypotheses be falsified, it would raise serious questions as to current methodological practices (i.e. that is acceptable to directly compare bone damage frequencies at the assemblage-level). In 2010, Rendille pastoralists in the Chalbi Basin, northern
Kenya, butchered 16 goat limbs using basalt flakes and hammerstones. All bone fragments >1cm were recovered, cleaned, measured, and examined for surface modifications. We report here that bone damage frequencies for cut marks, percussion marks (pits/striae), and precision notches all vary according to bone fragment size and portion. In turn, we advocate that researchers should control for these variables when comparing bone damage frequencies between assemblages by using “specimen size classes” (SSC).

**Object curiosity in orangutans** (*Pongo abelii, P. pygmaeus*): relation to tool usage. ILANA NYVEEN\(^1\), LUCRECIA AGUILAR\(^1\), ZARIN MACHANDA\(^2\). \(^1\)Department of Ecology & Evolutionary Biology, Rice University; \(^2\)Department of Anthropology, Tufts University

Once believed to be a distinctly human trait, the use of tools has been documented in many other taxa. However, variation in tool use, especially among the great apes, remains largely unexplained. Variability in object curiosity across great ape species may help clarify trends in tool use. Understanding object curiosity is crucial to comprehending the origins of tool usage in hominins and apes, as well as bettering enrichment for captive primates. Though object utilization studies have been conducted with chimpanzees (*Pan troglodytes*) and, to a lesser extent, gorillas (*Gorilla gorilla*), orangutan (*Pongo abelii, P. pygmaeus*) object curiosity has yet to be explored, despite the species’ documented tool usage. We conducted an exploratory investigation of orangutan object curiosity by introducing three familiar objects and three novel objects to five orangutan subjects at the Houston Zoo. Familiar objects came from enclosure enrichment collections, while novel objects were fabricated out of diverse materials such as wrapping paper or PVC pipes. We filmed each subject interacting with each object in an isolated enclosure for 15 minutes, then analyzed each video for factors related to object curiosity. Subjects were significantly quicker to interact with novel objects than with familiar objects, and overall interacted with novel objects more. This suggests that orangutans have a higher affinity for novel objects, which may have contributed to their development of tool use traits. This study should serve as a starting point for more investigations regarding the links between object curiosity and tool use.
POSTER ABSTRACTS

Introducing methods for quantifying quadrupedal kinematics in free-ranging primates. ALLISON MCNAMARA1, NOAH T. DUNHAM2, LIZA SHAPIRO1, JESSE W. YOUNG2.
1Department of Anthropology, University of Texas at Austin; 2Department of Anatomy and Neurobiology, Northeast Ohio Medical University

Primate locomotor field studies historically lack the precision necessary to quantify biomechanics and the effect of finite substrate differences on locomotion; whereas, laboratory studies provide precise measurements, but fail to consider the effects of ecological and behavioral variation. We present methods for collecting kinematic data in primates’ natural habitats using consumer grade high-speed cameras, and we demonstrate novel methods for quantifying arboreal substrate characteristics. We first piloted these methods on free-ranging squirrels and arboreal substrates in Ohio and Texas. We then collected video data of nine platyrhine species and measured substrate characteristics at Tiputini Biodiversity Station in Ecuador. Modified GoPro Hero5 cameras equipped with varifocal zoom lenses provided high-resolution footage (1080p; 120 fps) at distances up to 50+ m. Gait digitization and analyses were conducted in our open-source MATLAB software, GaitKeeper. We used a TruPulse 360R rangefinder to quantify branch height (accuracy: ± 30 cm) and inclination angle relative to gravity. Inclination angles calculated using the rangefinder were comparable to those recorded with a digital inclinometer (mean error: 2.5°). Branch diameter was measured remotely using photogrammetric and parallel laser methods, which were then compared to digital caliper measurements. Both methods provided accurate estimations (mean error: 1.5 – 2.0 mm; percent error: 3.1 - 4.5%). Branch compliance (mN-1) was quantified by recording the force required to displace branches to known distances along a rope. Ultimately, these methods will help identify how primate quadrupedal gait kinematics respond to substrate variation in a complex arboreal habitat, furthering our understanding of the adaptive context in which primate locomotion evolved.

Internal nasal anatomy of Rooneyia viejaensis: implications for crown primate olfactory systems. INGRID K. LUNDEEN, E. CHRISTOPHER KIRK. Department of Anthropology, University of Texas at Austin

The anatomy of the nasal cavity is an important source of phylogenetic and functional information. Observations of the nasal cavity in fossil primates have been limited by (1) rarity of specimens preserving internal bony structures and (2) low resolution of CT scans. Recent advances in micro CT scanning resolution have facilitated comparative study of turbinals in both extant and fossil comparative samples. Rooneyia viejaensis is a Duchesnean primate from West Texas represented by a well-preserved cranium retaining intact bony turbinals. Virtual reconstructions of the bony anatomy of the nasal cavity in Rooneyia demonstrate the presence of four anteroposteriorly compressed, bullar ethmoturbinals. This anatomy is similar to some extant strepsirrhines, and probably represents the ancestral condition for crown primates. In contrast, tarsiers have two bullar ethmoturbinals and anthropoids have two scroll-shaped ethmoturbinals. Rooneyia further differs from haplorhines in lacking mediolateral compression of the ethmoturbinals. Rooneyia preserves a laminar nasoturbinal similar in shape to the nasoturbinals
of cheirogaleids. Strepsirrhines and small-to-medium sized platyrrhines have a nasoturbinal, which is absent in all catarrhines. Two frontoturbinals are present in non-primate euarchontans, while strepsirrhines are more variable. Frontoturbinals are lost in all haplorhines. *Rooneyia* preserves one frontoturbinal that, in combination with the retention of other primitive turbinals, suggests that the olfactory ecology of *Rooneyia* was broadly similar to that of living strepsirrhines. It is also clear that *Rooneyia* lacked the derived reduction of nasal cavity complexity shared by living haplorhines, providing further evidence that *Rooneyia* is neither a stem tarsiiform nor a stem anthropoid.

**Age-at-formation of linear enamel hypoplasia as it relates to weaning among prehistoric and historic Native Americans on the Western Gulf coastal plains of Texas.** LAUREN GEORGIANA KOUTLIAS1, CAROLINE ZNACHKO1, EMILY ARLENE EDWARDS2. 1Department of Anthropology, Texas State University; 2Department of Anthropology, Eastern Carolina University

Traditionally, the prevalence and severity of linear enamel hypoplasia (LEH) in archaeological individuals has been attributed to physiological insults from nutritional stressors and infectious disease. When the presence of LEH is observed in individuals ranging between 18 months and 4 years of age, it may also serve as an indicator of weaning stress, which can manifest as the result of the change from breastmilk to less nutritionally complete weaning food, as well as increased exposure to infections or illnesses linked to the lack of antibodies, lymphocytes, and immunoglobulins found in breastmilk. This study undertook an examination of LEH in the collections housed at the Texas Archaeological Research Laboratory in Austin, Texas. Coastal Texas natives first came into contact with Spaniards and French in the 1500-1600's during their exploration of the Texas coast. In Native prehistoric sites Ernest Witte, Morhiss, Blue Bayou, and the majority of Mitchell Ridge, the first enamel disruption occurred on teeth associated with a wide range of developmental ages, spanning anywhere from 18 months to 4 years. However, historically, the first signs of LEH from the Caplen site and portions of the Mitchell Ridge site occur in a narrowing window of developmental ages, from 2.5-3.5 years. Through a cross comparison of various LEH datasets gathered from 1980s - 1990s analyses of gulf coastal plains Texas sites in addition to self-collected data, this study seeks to better understand the potential impact European contact had on weaning ages via an examination of the shifting incidence of LEH.

**An investigation into the etiology of Schmorl’s nodes through a cross comparison of forensic, clinical and medieval skeletal samples.** CAROLINE ZNACHKO. Department of Anthropology, Texas State University

Bioarchaeologists have traditionally interpreted Schmorl’s nodes (SNs) as an indicator of work-related back injuries incorporated during one’s life history. However, SNs have been found in various bioarchaeological, forensic and clinical samples despite temporal and geographical differences. To better improve understanding of the potential influential causes of SNs, this study compares self-collected data from Turkey Creek Pueblo to the aggregated data from medieval, forensic and clinical samples described through Plomp et al. (2012), Dar et al. (2009), and Faccia et al. (2007) respectively. Analysis of Turkey Creek Pueblo, a 16th century Native American settlement from the Point of Pines Region in Arizona, consisted of 52 individuals. As an injury-
related skeletal pathology analyzed through distinct age groups and sex, it was hypothesized that there would be a difference in the variation between the self-collected Turkey Creek Pueblo sample and the comparative samples because of their differing behavioral patterns. Data indicated a prevalence rate of 46.15% amongst all individuals sampled, with increased frequencies among males and old adult subgroups. The findings of this study conveyed a similarity between all four assessed samples, and suggests that an alternative etiology besides work-related injury must be considered. With the inclusion of this data, results from this study can improve bioarchaeological interpretations of spinal health and resulting life histories.

**Modern human nasal projection: reassessing a climatic adaptation.** SCOTT D. MADDUX¹, LAUREN N. BUTARIC², ROBERT G. FRANCISCUS³. ¹Center for Anatomical Sciences, University of North Texas Health Science Center; ²Department of Anatomy, Des Moines University; ³Department of Anthropology, University of Iowa

Human populations inhabiting cold and/or dry environments are generally argued to exhibit external noses with greater nasal bridge elevation and anterior tip protrusion than those from hot-humid environments. However, previous studies investigating nasal projection have predominantly employed European samples as representatives of “cold-dry” environments, despite the existence of Asian and New World populations from even colder/drier environments. Here, we reassess nasal projection within climatic contexts employing a geographically and climatically diverse sample of modern human crania (n = 493), including Asian and New World sub-samples from mid-to-high northern latitudes. Analyses were conducted on 3D coordinates representing sixteen nasofacial landmarks in conjunction with climatic variables (e.g., temperature, absolute humidity) from the CRU-TS3 database. A Principal Components Analysis demonstrates that PC1 (25.2%) contrasts the relative height and width of the nasal aperture and nasal bones, while PC2 (15.1%) contrasts elevation or “tenting” of the nasal bridge and tip. Multivariate regression indicates that, while a significant association between nasal shape and climate exists (R² = 0.104, p < 0.0001), nasal bridge and tip elevation are not among the aspects of nasal morphology associated with climate. Rather, exceedingly projecting external noses appear primarily restricted to populations from Europe, North Africa, and Western Asia, with these geographically adjacent populations exhibiting morphology significantly different from other human populations (all p-values < 0.0001). Moreover, contrary to previous predicative models, Asian and New World populations from cold-dry environments generally exhibit levels of bridge/tip elevation similar to tropical populations. Our results suggest that external nasal projection is not a universal adaption to cold and/or dry climates among modern humans as often implicitly or explicitly advocated. Accordingly, these results have important implications for understanding climatic adaptation during modern human evolution, and potentially, for interpreting the fossil record of Neandertals and other archaic humans inhabiting cold-dry environments during the Pleistocene.

**Comparison of biomechanical properties of the femora and humeri among soldiers from Fort Craig, New Mexico and contemporaneous males from the Terry collection.** SHELBY LYNN GARZA, DANIEL JAY WESCOTT. Department of Anthropology, Texas State University
Between 1854 and 1885 Fort Craig in New Mexico had three all black units. The black soldiers were assigned heavy labor tasks and combat duty, while white soldiers were primarily officers, cavalry, and infantrymen. The purpose of this study is to examine long bone biomechanical differences between the soldiers from Fort Craig and contemporaneous males from the Terry collection. Three separate comparisons were made: 1) between black soldiers (n = 11) and contemporaneous black males (n = 32), 2) between white soldiers (n = 13) and contemporaneous white males (n = 19), 3) between black (n = 11) and white soldiers (n = 13). Bending and torsional rigidity as well as shaft shape at the midshaft and subtrochanteric regions of the femora and 35% of the distal end of the humeri were examined. Biomechanical properties were standardized for body size, and t-tests were used to compare groups. The results for the first comparison showed that the black soldiers had greater values in minimum bending rigidity (Imin) and more circular cross-sections of the femora at both midshaft and subtrochanteric and greater torsional rigidity (J) at femoral midshaft than black males from the Terry collection, but did not differ significantly in humeri strength. White soldiers had greater values in Imin, Imax, and J at the midshaft and subtrochanteric regions of the femora and the distal 35 percent of the humeri than contemporaneous white males. White soldiers exhibited greater femoral values (Imin, Imax, and J) and more circularity at subtrochanteric than black soldiers, but humeri strength did not differ significantly. These results suggest that soldiers from Fort Craig had a higher activity level and different patterns of loading than males from the general public in the lower limbs, but did not differ in humeri loading patterns.

Comparative trabecular microarchitecture of the navicular across extant primate species.
MADELYNNE DUDAS¹, WILLIAM HARCOURT-SMITH². ¹Department of Anthropology, University of Texas at Austin; ²Department of Anthropology, Lehman College CUNY

One of the crucial adaptations related to bipedalism is the longitudinal arch of the foot. The navicular, which lies within the longitudinal arch, is subjected to forces during locomotion as it transfers weight from the talus to the forefoot. Trabecular bone is known to respond to forces by aligning with them and/or by increasing in bone volume. This study investigated how trabecular patterns differ between taxa with various loading patterns during locomotion, with the prediction that bipedal humans would have unique trabecular patterns in comparison to nonhuman primates. Navicular microCT scans were obtained for H. sapiens (n=11), Gorilla (n=9), Pan (n=10), Pongo (n=4), Hylobates (n=1), Ateles (n=2), Procolobus (n=1), Colobus (n=1), and Erythrocebus (n=1). The bone volume faction (BV/TV), degree of anisotropy (DA), and trabecular thickness (Tb.Th) were calculated from the segmented trabecular bone in four irregularly shaped regions of interest (ROIs) using BoneJ. These ROIs included trabeculae neighboring the cortical bone where the functional signal tends to be strongest. The results indicate an increase in DA medially in H. sapiens with values greater than those of great apes. This corresponds with more uniform loading observed in H. sapiens. In comparison, great apes have a greater frequency of loading reflected in greater BV/TV and Tb.Th within each ROI. Within the navicular tuberosity, which contacts the ground in great apes but not in H. sapiens, great apes have a greater DA and BV/TV than H. sapiens. The gibbon and monkeys generally fell within the ranges of the great apes for BV/TV and DA with lower Tb.Th within the four ROIs. Because these results are congruent with known functional differences between these taxa, these results may serve as a useful comparative dataset for interpreting loading patterns in fossil hominins.
AVEREE M. LUHR1, K.A.I. NEKARIS2, MAGDALENA S. SVENSSON2. 1Department of Anthropology, University of Texas at San Antonio; 2Department of Social Sciences, Oxford Brookes University

Comparative behavioural research reveals both intra- and inter-species diversity within primates. Few long-term behavioural studies have been conducted on African nocturnal species, and inter-species generalisation is prevalent. Here we present observations on two species of pottos (P. ibeanus and P. edwardsi) to exemplify the need for an ethogram suited to the full range of perodicticine behaviour. The entire genus Perodicticus is characterised by a high level of variation in morphological traits, yet the degree of ecological, social, and behavioural variation between populations is uncertain. We observed pottos 57 times throughout all six locations. We recorded a total of 29 P. edwardsi and 26 P. ibeanus. Of 21 postures within an existing generalised lorisid ethogram, we recorded 20 at least once in one of the four locations. Of 50 behaviours, we observed 39 at least once. Eating, locomotion, freezing, and sniffing were the most common behaviours. We recorded novel behaviours not previously described for perodicticines including a type of scent marking, bark chewing and unique vocalisations. In this small collection of observations, trends towards differences in the behaviour and postures of Central pottos and Eastern pottos were made apparent. Further study is only possible with the establishment of species-specific ethograms for the diverse Perodicticus genus. Although a deceptively simple tool, comprehensive ethograms may assist us in answering questions on extant primate taxonomy.

Evaluation for the use of transverse palatine, zygomaticomaxillary, and metopic sutures in ancestry estimations. ROBYN KRAMER, MARY SWEARINGER. Department of Anthropology, Texas State University

The purpose of this study is to observe if traits that have been used for ancestry estimations have a biological basis or if environmental stressors are contributing to their presence and expression in populations. If the shape of the zygomaticomaxillary and transverse palatine suture and presence of a residual metopic suture are found to be inconsistent with a biological factor, they should not be utilized in ancestry estimation in biological anthropology. The sample includes two skeletal collections housed at Texas State University, specifically the donated skeletal collection and the collection of unidentified Latin American migrants. The collections contain individuals who are associated with existing ancestry categories of “American Black”, “American White”, and “Hispanic”. We hypothesize that if the sample does not exhibit traits that have been traditionally associated with these ancestry groups, then there may not be a biological basis for the expression of the trait. The expression may be reliant on external factors such as the environment or nutrition. Methods include observing asymmetry and expression in these three sutures. A standardized scoring method has been established for each suture to allow for statistical analysis. Results show that the American Black sample exhibit high levels of symmetry for all sutures, while the Hispanic and American White samples show similar patterns of equal probabilities for exhibiting asymmetrical and symmetrical zygomaticomaxillary and transverse palatine sutures. These results show that the American Black sample may not be
experiencing the same environmental stressors as the Hispanic and American White individuals in the sample.

**Estimating body mass in Homo erectus using the talus.** DEBORAH L. CUNNINGHAM¹, MELINDA V. ROGERS¹, DANIEL J. WESCOTT¹, ROBERT C. MCCARTHY². ¹Department of Anthropology, Texas State University; ²Department of Biological Sciences, Benedictine University

Compared to contemporaneous fossils, the ~1.6-Ma hominin talus KNM-ER 5428, provisionally assigned as a male to *H. erectus*, is large. Boyle and DeSilva (2015) estimated a body mass greater than 90 kg based on a 33.7 mm mediolateral (ML) breadth at the midpoint of the talar trochlea using the average of McHenry’s (1992) three human regression equations. These values are three standard deviations greater than McHenry’s (1992) means, suggesting that the fossil measurement and body mass estimate are extrapolations beyond the data. We performed a two-fold analysis. First, we examined the variation in talus ML breadth in a male modern human sample of known body mass (n = 78). Second, we compared the talus ML measurement with femoral head breadth (FHB), an accepted proxy for body mass, using a worldwide human sample including both large- and small-bodied individuals. After controlling for obesity, the body masses of individuals with a talus measurement 33.2 mm or greater (33.2 - 36.7) ranged between 67.1 and 87.1 kg. The correlation between talus ML breadth and FHB is moderate (R² = 0.6) in a worldwide sample of males, suggesting considerable variation between FHB and talus ML breadth dimensions. We suggest that there is substantial evidence that KNM-ER 5428’s body mass could have been less than 90 kg

**Selection drove the evolution of the lemur skull.** ANNA PENNA¹, GABRIEL MARROIG². ¹Department of Anthropology, University of Texas at San Antonio; ²Department of Genetics and Evolutionary Biology, University of Sao Paulo

Multidimensional morphological structures like the cranium can describe the amount of variance available to evolution. Using comparative quantitative genetics models we investigated the stability of variance structure, and the evolutionary processes underlying the morphological diversification of the Strepsirrhini primate lineage. We report considerable stability in phenotypic covariance patterns. We detected deviations from neutrality along the whole clade of Strepsirrhini, especially in more inclusive nodes. We argue that such deviations reflect directional selection for size and anatomical features involved in chewing of specialized feeding behavior related with important historical shifts in the evolution of the lineage.

**Sexual dimorphism in the trochlear angle of the humerus: a preliminary investigation in hunter-gatherers and agriculturalists.** ALEXA PENNAVARIA, SCOTT MADDUX. Center for Anatomical Sciences, University of North Texas Health Science Center

Previous research has argued the elbow “carrying angle” to be sexually dimorphic in humans, with females exhibiting greater abduction of the supinated forearm at full extension. Moreover, it is generally assumed that the trochlear angle of the humerus is the primary skeletal basis of the carrying angle, and thus, may independently provide a reliable osteological indicator of sex in forensic, bioarchaeological, and paleoanthropological contexts. Here, we employed the software
TPSDig2 to derive trochlear angles from photographs of humeri collected on 40 (17 female/23 male) adult Archaic-period Amerindian hunter-gatherers and 54 (24 female/30 male) adult Medieval European agriculturalists. Due to handedness, angles from left and right humeri were averaged for each individual, with asymmetry assessed by subtracting the more acute angle from the more obtuse angle irrespective of actual left/right siding. Although based on small sample sizes, males and females were not found to be significantly different from each other in either the Amerindian (t=1.5, p=0.13) or European (t=-1.3, p=0.26) samples. With both sexes pooled, the Amerindian sample exhibited more acute trochlear angles (t=4.64, p<0.0001) and greater bilateral asymmetry (t=-2.07, p=0.042) than the Europeans. Additionally, although not statistically significant, Amerindian males (bilateral difference µ=5.92°) were found to be more asymmetrical than Amerindian females (µ=4.65°), while asymmetry values in European males (µ=3.69°) and females (µ=3.63°) were virtually identical. While failing to support the trochlear angle as a diagnostic sex indicator, our results are consistent with previous research generally demonstrating elevated levels of upper limb asymmetry in hunter-gatherer populations — asymmetries typically attributed to reliance on activities requiring greater unilateral loading of the dominant limb. Accordingly, the results of this study may indicate that more acute trochlear angles (less forearm abduction) reflect higher levels of biomechanical loading. Thus, sexual dimorphism in the carrying angle, if/when present, may be dependent on sex-specific activity patterns.

Craniofacial growth in a mouse model of osteogenesis imperfecta. RACHEL A. MENEGAZ¹, JASON M. ORGAN². ¹Center for Anatomical Sciences, University of North Texas Health Science Center; ²Department of Anatomy and Cell Biology, Indiana University School of Medicine

Type I collagen (Col1) is the primary organic component of bone. One genetic disorder of Col1, osteogenesis imperfecta (OI), is characterized by increased skeletal fragility and fracture risk, low bone mineral density, and shortened stature. The postcranial phenotype in OI has been studied extensively in experimental models, providing insight into the role of Col1 and its interactions with biomechanical loading in determining adult postcranial phenotypes. Patients with the severe OI type III also exhibit midface hypoplasia, basi cranial shortening, dental malocclusions, and sometimes compromised tooth properties. Compared to the postcrania, little is known about the etiology of the human craniofacial phenotype or its presentation in experimental models. Here we use a mouse model of OI type III in order to investigate the role of Col1 in the growth of the craniofacial skeleton. The OI murine (oim) is a strain with a nonlethal recessively inherited mutation of the COL1A2 gene. Homozygous (oim/-/-) mice are a model for OI type III. Wild-type (WT) and oim/-/- littermates were weaned at 21d and raised until adult (16 weeks). 3D landmarks were collected from serial in-vivo µCT scans, and Krusal-Wallis ANOVAs used to compare centroid sizes and morphometric distances between genotypes. Relative to their WT littermates, adult oim/-/- mice have smaller craniomandibular centroid sizes; decreased facial and basicranial lengths; decreased mandibular lengths, corpus heights, and toothrow lengths. Given its replication of the human phenotype, the oim model may be a potential avenue for understanding the influence of Col1 on craniofacial growth in varying biomechanical loading environments.
The 2017 annual meeting will be held at the UTSA Downtown campus (Riklin Auditorium; keynote address only) and the DoubleTree hotel. The Riklin Auditorium is located in the Frio Street North Building, room number FS 1.406.

Parking at the UTSA Downtown campus is free in university lots. Participants may park in Employee A, Employee B, and unmarked Commuter spaces. Please do not use Reserved spaces at any time. Parking is also available at the top floor of the parking garage. Entrance is at 289-299 La Trinidad St/N Pecos St. Fee is $2/hour.

The DoubleTree hotel is located at 502 W. Cesar E. Chavez. All events will be held in the Salon de Gala B.
NEARBY RESTAURANTS

**Pico de Gallo:** Family-owned, traditional Mexican fare with nightly live Mariachi music and a full bar. (111 S Leona St)

**Ro-Ho Pork and Bread:** Tortas, tacos, nachos and more (623 Urban Loop)

**Ranchero Grill & Tap:** Mexican and American (612 W Commerce St)

**Mi Tierra:** Traditional Mexican restaurant and bakery (218 Produce Row)

**La Margarita:** Mexican restaurant and oyster bar (120 Produce Row)

**Viva Villa Taqueria:** Authentic tacos, tortas, snacks, margaritas and more (905 Dolorosa)

**Candy’s Old Fashion:** Burgers, catfish, and shrimp (115 S Flores)

**Bill Miller BBQ:** Texas barbeque (430 S Santa Rosa Ave)
SOCIAL GATHERING AT THE COVE

The Cove (606 W. Cypress) is approximately 2.5 miles from the DoubleTree Hotel. There are parking lots at The Cove as well as a spillover lot directly across Cypress. Their menu is sustainable, local, and organic. In addition to tacos, burgers, salads, and sandwiches, they offer over 50 local beers on tap.