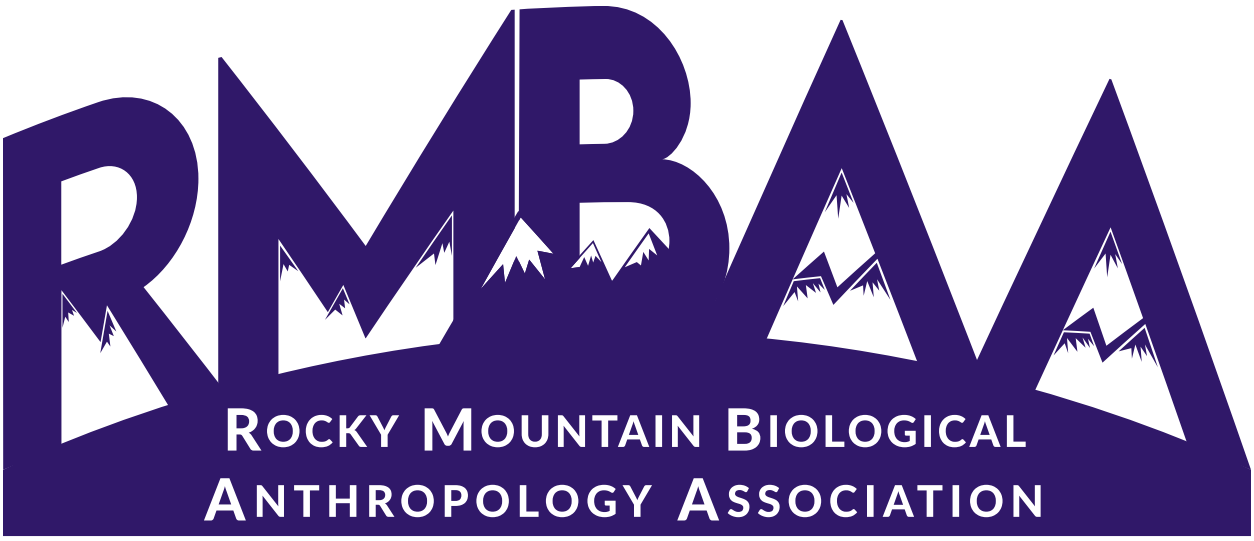
Program & Abstracts

October 4, 2025
Boulder, CO



Program and abstracts of the 4th Annual Meeting of the Rocky Mountain Biological Anthropology Association October 4, 2025

To be held at the
Hale Science Building, University of Colorado Boulder
Boulder, CO 80309

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Program

Message from the RMBAA President

Welcome to the fourth annual meeting of the **Rocky Mountain Biological Anthropology Association**! For those of you who have attended previously, thank you for your continued support. You are why we've been able to hold these meetings every year since 2022. For those of you attending for the first time, let me be the first to give you a big welcome! We have a great slate of activities planned for today that anyone with an interest in biological anthropology will enjoy. I hope that many of you newcomers will continue to attend RMBAA meetings for many years to come!

Todd R. Yokley
President and Founder
Rocky Mountain Biological Anthropology Association

RMBAA 2025 Student Awards

As a student-focused organization, we are pleased to once again offer **Student Awards** in recognition of the outstanding student-driven research presented at RMBAA. These awards are intended to support and encourage additional participation of undergraduate and graduate students. In 2025, **twelve undergraduate** and **nine graduate** student abstracts were considered for the student award, presenting an impressive array of creative new projects from across the spectrum of biological anthropology. **Student award recipients will be announced during closing remarks at 4:45—stay tuned!**

RMBAA Code of Conduct

The Rocky Mountain Biological Anthropology Association requires that all participants at the annual meeting adhere to the American Association of Biological Anthropologists Code of Conduct: We are committed to providing safe spaces that are free of threats, harassment, or assault, to all our members regardless of age, ethnicity, race, gender identity or expression, sexual orientation, disabilities, religion, marital status, or any other reason unrelated to professional performance. It is unethical in any professional setting to use the inequalities of power that characterize many professional relationships to obtain personal, sexual, economic, or professional advantages. It is also unethical to engage in any type of harassment, including sexual, sexual identity, or racial/ethnic harassment. Due to their centrality in professional training and networking in our discipline, conferences (such as this meeting) are clearly an extension of the workplace environment. As such, all college, university, or institutional rules regarding appropriate behavior apply in these contexts. We will not tolerate harassment of conference participants in any form or retaliation for reporting of misconduct. *Additional information can be found on the AABA website:* https://bioanth.org/about/aaba-code-of-conduct/

Keynote Speakers

Dr. Rolf Quam

The Sierra de Atapuerca (Spain): New Discoveries and Interpretations

Rolf Quam is a paleoanthropologist who focuses on evolutionary aspects of the cranium and mandible. In particular, he has collaborated on a long-term research project to reconstruct the hearing capacities in our fossil human ancestors. In addition to reconstructing an aspect of sensory perception, this research line has shed new light on the process of language evolution, including in our closest evolutionary relatives the Neandertals. Since 1996, he has participated in the ongoing fieldwork being carried out at the Pleistocene locality of Atapuerca in northern Spain. These sites contain some of the richest human fossil bearing deposits in the world and represent the earliest evidence for incipient mortuary practices in the fossil record. During the course of his research, Dr. Quam has personally studied a wide diversity of original human fossils from Europe, the Middle East and Africa spanning the last 3 million years of human evolution.

Dr. Sharon DeWitte

Diet, Migration, and Stress: Vulnerability to the Black Death and Health in Its Aftermath in Medieval London, England

Sharon DeWitte (PhD 2006, Pennsylvania State University) is a Professor in the Institute of Behavioral Science and Department of Anthropology at the University of Colorado, Boulder and a fellow of the American Association for the Advancement of Science and the Society of Antiquaries of London. Dr. DeWitte is a biological anthropologist with expertise in bioarchaeology, and her research primarily focuses on health and demography before, during, and after historical plague epidemics to understand local syndemic interactions that shape the outcomes of those epidemics and how epidemic disease affects biosocial conditions in surviving populations. Dr. DeWitte's research has been supported by the NSF, Wenner-Gren Foundation, School for Advanced Research, and American Association of University Women.

Professional Development Workshop

This year's workshop will be a **Speed Mentoring Session** where students will craft their personal "elevator pitch" and hold small-group conversations to practice networking, ask candid questions, and receive tailored advice. We are grateful to the faculty, graduate students, and professionals from across the Front Range who volunteered their time to support students at RMBAA.

Program

Program of the 4th Annual Meeting of the Rocky Mountain Biological Anthropology Association October 4, 2025

All events will be held in the Hale Science Building, University of Colorado Boulder, CO
All times are in the Mountain Time Zone

SCHEDULE OF EVENTS

8:30 AM **On-Site Registration Opens**

9:00 AM **Welcome and Opening Remarks,** Todd Yokley, RMBAA President

9:15 AM **Keynote Speaker 1:** Rolf Quam, Ph.D., *"The Sierra de Atapuerca (Spain): New Discoveries and Interpretations"*

10:15 AM **Coffee Break**

10:30 AM **Poster Session 1: Bioarcheology, Living Human Biology, and Forensic Anthropology**
Author summaries will begin at 10:30 and proceed in the order listed in the Scientific Program

12:00 PM **Lunch Break**

1:00 PM **Professional Development Workshop:** Speed Mentoring!

2:00 PM **Coffee Break**

2:15 PM **Poster Session 2: Paleoanthropology and Primatology**
Author summaries will begin at 2:15 and proceed in the order listed on the Scientific Program

3:45 PM **Keynote Speaker 2:** Sharon DeWitte, Ph.D., *"Diet, Migration, and Stress: Vulnerability to the Black Death and Health in Its Aftermath in Medieval London, England"*

4:45 PM **Closing Remarks,** Todd Yokley, RMBAA President

Scientific Program

All events will be held in the Hale Science Building, University of Colorado Boulder, CO

Poster Session 1: Bioarcheology, Living Human Biology, and Forensic Anthropology

1 What Do Dinosaurs Have to Do With Anthropology? Using a Jurassic-Era Site to Teach Anthropological Science. M.H. HAMILTON, B.L. DRAKE. **Pg 9–10**

2 Accessing Biological Anthropology: Crowd Sourcing Solutions to Some Common Accessibility Issues. C.R. REYNOLDS, J.E. SCOTT, R. SAILOR. **Pg 19**

3 BoneViewer: An Open-Source 3D Learning Module for Human Osteology. M. SMITH, N. LEPPEK, P.E. MORSE. **Pg 20–21**

4 Enlightening the "Dark Ages": Embodiment of Political Disasters on Human Skeletal Remains. M. HYLLAND, M. HOWELLS, C. FELLMANN. **Pg 13**

5 Differential Diagnoses and Care Assessment for an Individual From Early Medieval Czechia. M. HARDIE, R. JAMES, L. HOSEK. **Pg 10**

6 The Loretto Sisters: Reconstructing Personhood and Community Identity Through Biological Profiles. L. BROWN, M. JORDAN, E. REARDON, L. HOSEK. **Pg 8**

7 Preliminary Faunal Analysis of a Postclassic Midden at Colha, an Ancient Maya Site in Northern Belize. S. CASILLAS, M. ADAM, J. HODGKINS. **Pg 8–9**

8 Investigating the Domesticated Status of Two Sets of Dog Remains From the Jones-Miller Archaeological Site. B.L. SIMONDS, A. WARRENER, J. HODGKINS. **Pg 20**

9 Small Angle X-ray Scattering Assessment of Positional Variation of Diagenesis in Archeological Human Second Metacarpal Bones. S.R. STOCK, J.D. ALMER, J.-S. PARK, S. MAYS. **Pg 22**

10 Assessing Heavy Metals Contamination in Spices and Teas With X-ray Fluorescence. A.M. ARCHER. **Pg 7–8**

11 Born of a Storm: Intergenerational Impacts of First Trimester Exposure to Hurricane Florence. M. HOWELLS, J. REICH, L.P. CHEN-EDINBORO, A. BLAIR. **Pg 12**

12 The Role of Climate Disasters on Prenatal Stress and Birth Outcomes. K.P. KELLEY, M. HOWELLS. **Pg 13–14**

13 Hips Don't Lie: How Pelvic Width Affects the Biomechanics of Walking. M. SMITH, A. WARRENER, P.E. MORSE, N. LEPPEK. **Pg 21**

14 Lifespan Variation in Facial Soft Tissue and Craniofacial Bone: A Geometric Morphometric Analysis of NMDID and Mexican Samples. C.P. CRUZ VENEGAS, C.A. ESPINOZA CAMPUZANO, H.J.H. EDGAR. **Pg 22–23**

15 Recognizing Bipartite Medial Cuneiform in Skeletal Remains: Case Study and Considerations for Osteological Analysis. S. HART. **Pg 11**

Program

16 Investigating the Impact of Osteoporosis on Skeletal Age-at-Death Estimation in the Os Coxa. K.E. SHERMAN, M.K. STOCK. **Pg 19–20**

Poster Session 2: Paleoanthropology and Primatology

17 Changes in Hominin Activities and Land-Use Through the Oldowan to Acheulean Transition at Olduvai Gorge, Tanzania. A.J. PELISSERO, E.W. HERRMANN, J.K. NJAU, J.A. MTURI, T. NEGASH, D. PELTIER, M. PANTE. **Pg 18–19**

18 Neanderthals and Modern Human Population Structures Defined by Bottlenecks. D.J. LUELOFF, A.E. MANN. **Pg 14–15**

19 Is Bigger Better? An Unexpected Relationship Between Prey Body Size and Intramuscular Macronutrient Composition in Eastern African Mammals. I. HESLIN, A. DU, D. RAUBENHEIMER, J.C. THOMPSON. **Pg 11**

20 Interobserver Error Analysis of Dorsal Canting and Longitudinal Shaft Curvature of *Pan paniscus* and *Macaca mulatta*. M. HUNSINGER, T.E. HOBBS, C.M. ORR. **Pg 12–13**

21 Variation in the Longitudinal Shaft Curvature of the Manual Intermediate Phalanges in *Homo*, *Pan*, and *Gorilla*. C.M. ORR, T.E. HOBBS, B.A. PATEL. **Pg 16**

22 Phalangeal Curvature in Platyrrhine Monkeys and Implications for the Evolution of Human Hand Morphology. B.A. PATEL, J.K. WON, L.E. HUNTER, C.M. ORR. **Pg 17**

23 Comparing the Presence, Distribution, and Purpose of Meissner's Corpuscles in Human and Non-Human Primates. R.C. WALKER-GILMAN. **Pg 23**

24 A Study of Dietary Habits in Modern Primates: The Application of Strontium and Calcium Ratio Analysis and Dental Morphology to Identify Dietary Categories. M. McDANIEL. **Pg 15**

25 Mantled Howler Monkey (*Alouatta palliata*) Feeding Tree Size and Plant Part Consumption Vary With Food Abundance Across Seasons and Forest Types. A.J. AGUIRRE, R.L. MILLER, F.V.E. KASER, M. ENNIS, L.M. BOLT, A.L. SCHREIER. **Pg 7**

26 Resource Use in Howler Monkeys. A. WHITE, S.R. GAZBY, T. CASTELLON, S. HOWELL. **Pg 23–24**

27 Edge Effects and Long Calling: Evaluating Several Adaptive Hypotheses for Howler Monkey (*Alouatta palliata*) Roaring. H.D. PEARSON, F.V.E. KASER, R.L. MILLER, M. ENNIS, C.E. JOHNSON, M.D. WASSERMAN, L.M. BOLT, A.L. SCHREIER. **Pg 17–18**

28 Protected Primates: The Spatial and Behavioral Patterns of Geoffroy's Spider Monkeys in a Protected Area. T. CASTELLON, A. WHITE, S. GAVZY, S. HOWELL. **Pg 9**

29 Acoustic Classification and Context-Specific Variation of Vocalizations in *Phaner pallescens*. E.S. NOMENJANAHARY, Z.M. RIDGWAY, A.K. ROWE, J. RANDRIANASY. **Pg 15–16**

30 Advancing Scientific Collection-Based Research With the Global Registry of Scientific Collections (GRSciColl). S.R. LEIGH, Y. GAO. **Pg 14**

Mantled Howler Monkey (*Alouatta palliata*) Feeding Tree Size and Plant Part Consumption Vary With Food Abundance Across Seasons and Forest Types

ARIEL J. AGUIRRE[1], REILLY L. MILLER[1], FRANCESCA V.E. KASER[1], MICHAEL ENNIS[1], LAURA M. BOLT[2], and AMY L. SCHREIER[1]

[1]Department of Biology, Regis University; [2]Institute of Forestry and Conservation, University of Toronto, CA

Food availability varies across seasons and forest types and primates need to modify their diets accordingly. Howler monkeys prefer fruit from large trees but often eat leaves due to seasonal availability of fruit and its lower abundance in forest fragments compared to continuous forests. We compared mantled howler monkeys' feeding behavior across wet and dry seasons at La Selva Research Station (La Selva), a continuous forest in Costa Rica, and between La Selva and a nearby small forest fragment, La Suerte Biological Research Station (LSBRS). In accordance with resource abundance, we predicted: howler monkeys at La Selva will consume more leaves during the dry season and more fruit during the wet season; howlers will consume more leaves and less fruit at LSBRS, whereas howlers at La Selva will consume more fruit due to the abundance of fruiting trees; howlers will feed from larger trees during the wet season at La Selva, and at La Selva compared to LSBRS. We conducted focal animal sampling, recording plant parts consumed, and measured feeding tree size (DBH). Our results show that howlers consumed more fruit and fed from significantly larger trees during the wet season at La Selva compared to the dry season, and howlers at LSBRS consumed more leaves and less fruit and fed from significantly smaller trees compared to monkeys at La Selva. These results demonstrate that howler monkeys modify aspects of their diet in response to food abundance, suggesting they may be resilient to current levels of seasonality and fragmentation.

Funding: Regis University's Undergraduate Research, Inquiry, and Scholarly Engagement.

Assessing Heavy Metals Contamination in Spices and Teas With X-ray Fluorescence

ALIYAH M. ARCHER

Department of Anthropology, University of Northern Colorado

Spices and herbs are globally utilized for consumption in everything from dishes cooked at home to fancy meals at five-star restaurants. Everyone from children to adults consume spices daily, and use of spice in cuisine sits at the intersection of nutritional, biological, and cultural anthropological inquiry. Spices and herbs have been made more readily available by industrialization. However, industrialization has also increased the potential for carcinogenic or otherwise toxic materials to show up in our foods. In fact, Consumer Reports reported in 2021 that one-third of spice products tested had high enough levels of arsenic, lead, and cadmium to pose a health concern. The current project aimed to determine whether or not spices available locally in Greeley, Colorado contained these heavy metals. Using X-Ray Fluorescence, this project measured elemental concentrations of lead, cadmium, arsenic, and mercury. The spices tested included basil, black pepper, chili, cinnamon, crushed red pepper, coriander, cumin, curry, ginger, onion, oregano, paprika, thyme, and turmeric purchased within the Weld County area from a range of grocery stores and brands. 140 samples of spices and 20 samples of tea were tested for carcinogenic and other toxic inclusions. This study used

the Artax software to qualitatively assess the presence or absence of each toxin. This study found no toxic levels of heavy metals within any of the tested spices. Future studies may investigate nutrient profiles of spices to better understand how they are beneficial to human health and can be more inclusive of cultural health practices and medicinal alternatives while acknowledging the colonial practices that have impacted communities already practicing with this knowledge.

Funding: University of Northern Colorado Office of Undergraduate Research Grant.

The Loretto Sisters: Reconstructing Personhood and Community Identity Through Biological Profiles

LIBBY BROWN, M. JORDAN, EMILY REARDON, and LAUREN HOSEK

Department of Anthropology, University of Colorado, Boulder

Recent ethical debates in the field of bioarchaeology have sparked a movement toward a more humanistic approach to understanding human skeletal remains, using individual lived experiences to frame interpretations of larger communities. In the summer of 2022, the Loretto Heights Cemetery was excavated and relocated due to upcoming construction. The Loretto Sisters belonged to a Catholic Religious Order that was founded in 1812 and first came to Colorado in 1864. The 62 Sisters buried there were exhumed, and bioarchaeological analysis was conducted on 55 individuals with the support of the living Loretto Community before reburial. Biological profiles have been developed for 42 of these individuals. A biological profile is an in-depth analysis of an individual's skeleton that converts codified analyses into text. This text is transformed into a narrative story focused on bone preservation, dental health, and pathology—which can all provide hints about the details of someone's life and situate them within their wider community. After all biological profiles are complete, we will share them—and all other data collected—with the Loretto Community. While also contributing to a more ethical bioarchaeology, taking a community-centered approach has allowed us access to community resources and knowledge that enhanced the depth of our research by focusing on specific community interests. These biological profile narratives and data collected are next being used to investigate research questions about health and migration developed with the Loretto Community.

Preliminary Faunal Analysis of a Postclassic Midden at Colha, an Ancient Maya Site in Northern Belize

SANJUANA CASILLAS[1], MANDA ADAM[2], and JAMIE HODGKINS[1]

[1]University of Colorado Denver; [2]University of Texas Austin

In the summer of 2023, a Postclassic midden dating 1000-1500 CE was uncovered in the ancient Maya site of Colha in Northern Belize. The intention of the initial excavation was to identify and excavate the midden located in the southern part of the monumental center, designated Operation 2224. The midden produced a variety of cultural materials and helped to investigate transformations from the Terminal Classic to Postclassic at Colha. Animal bone was found throughout the midden, consisting of 5 suboperations. This poster presents the preliminary results of the faunal analysis from Colha. Standard zooarchaeological methods were applied to examine taphonomy, preservation, and bone modification. Preliminary faunal analysis suggests that the Maya were transporting a diverse range of species,

primarily utilizing the animals for consumption with some cases of bone modification of deer (Cervidae). Over 10% of the total fish bones display heat altering while over 27% of the total turtle shell bones display heat altering. Other representative taxa include sharks (Chondrichthyes), crocodilians (Crocodylia), paca (*Cuniculus paca*), tapirs (*Tapirus*), and peccary (Tayassuidae). Furthermore, the analysis aims to investigate changes and continuities in the ancient Maya diet from the Classic to the Postclassic period at Colha.

Protected Primates: The Spatial and Behavioral Patterns of Geoffroy's Spider Monkeys in a Protected Area

TAYLOR CASTELLON, ARDEN WHITE, SAIRREESE GAVZY, and SUSAN HOWELL

Department of Anthropology, University of Colorado at Colorado Springs

Understanding the spatial ecology of Geoffroy's spider monkeys (*Ateles geoffroyi*) requires examining how behavioral patterns correspond to environmental features. This study analyzes 273 behavioral observations collected in July 2025 at La Selva Biological Station to assess associations between specific behaviors (foraging, climbing, sleeping, traveling) and two ecological variables: forest canopy layer (lower vs. upper) and water presence (visible vs. not visible). Chi-square tests of independence and standardized residuals were used to identify statistically significant patterns. Foraging behavior was significantly associated with the lower canopy ($\chi^2 = 4.238$, $p = 0.0395$), as was climbing ($\chi^2 = 5.907$, $p = 0.0151$), suggesting that food accessibility and vertical locomotion are concentrated in this forest stratum. Traveling behavior was significantly more common in areas where water was not visible ($\chi^2 = 4.504$, $p = 0.0338$), indicating a preference for drier or more traversable terrain. Sleeping and resting behaviors showed non-significant tendencies toward the upper canopy ($\chi^2 = 2.347$, $p = 0.1256$) and proximity to water ($\chi^2 = 3.439$, $p = 0.0637$). No statistically significant associations were found between behavior and forest type, including abandoned agroforestry, ecological preserve, and old growth areas (e.g., climbing: $\chi^2 = 2.348$, $p = 0.3091$; traveling: $\chi^2 = 1.714$, $p = 0.4244$). These findings suggest that spider monkeys adjust activity patterns in response to canopy structure and water availability, but not strongly in relation to forest management history or type, highlighting key elements of their ecological flexibility and habitat use.

What Do Dinosaurs Have to Do With Anthropology? Using a Jurassic-Era Site to Teach Anthropological Science

MARIAN H. HAMILTON[1] and B. LEE DRAKE[2]

[1]Department of Anthropology, University of Northern Colorado; [2]Department of Anthropology, University of New Mexico

Although dinosaurs and humans are separated by more than 140 million years, studying deep-time ecosystems can strengthen core anthropological skills. This case study highlights an undergraduate field school run by the University of Northern Colorado's Anthropology department at a Jurassic-era dinosaur locality in Wyoming. It is designed to train anthropology students in excavation, geochemistry, and taphonomic analysis. Students participate in systematic fossil recovery, learning provenience control, mapping, and sediment recording techniques directly applicable to archaeological contexts. Geochemical sampling and data analysis introduces students to methods for reconstructing paleoenvironments—skills transferable to questions about hominin landscapes, resource use, and site formation. Tapho-

nomic analysis of dinosaur bone beds provides a comparative framework for understanding how biological, geological, and cultural materials accumulate and preserve over time.

Through this interdisciplinary experience, students develop practical excavation techniques and develop a conceptual understanding of how environmental processes shape the archaeological record. Evaluations show increased student confidence in interpreting depositional contexts, increased interest and excitement at participating in fieldwork, and strong skill development in applying geochemical data to past ecosystem reconstructions. This program demonstrates that teaching anthropological methods need not be bound to the Quaternary, and that deep-time paleontology can be a powerful teaching tool. Furthermore, by situating the field program locally rather than requiring long-distance travel, this program addresses some of the systematic equity concerns surrounding undergraduate field work. This case study argues that field experiences, regardless of time period, can cultivate the analytical and field skills essential to studying our own species' past.

Funding: This work is funded in part by the University of Northern Colorado's Office of Sponsored Projects and the UNC Anthropology Department.

Differential Diagnoses and Care Assessment for an Individual From Early Medieval Czechia

MEG HARDIE, ROBIN JAMES, and LAUREN HOSEK

Department of Anthropology, University of Colorado, Boulder

The study of "atypical" burials, or burials that exhibit uncommon characteristics in a larger sample, is valuable when assessing individual experiences alongside a broader population. In deep historical explorations of 9-10th century Czechia in Central Europe, atypical burials provide critical context for the development of Christian institutions as well as changing social perspectives on certain diseases and physical impairments. The individual featured in this presentation was analyzed as part of a larger interdisciplinary project constructing a multi-site bioarchaeology of burial practices across Czechia, focusing on burials that deviate from typical Christian mortuary forms. The osteobiographical history of this person consists of an assessment of both their biological disposition and burial context. This person exhibits very particular paleopathology, including radioulnar synostosis – a developmental condition likely causing permanent immobile pronation of the hands – and partially remodeled head trauma differentially diagnosed as probable "symbolic" or incomplete trepanation. Despite likely developmental issues and resulting mobility challenges, this individual lived well into their adulthood and did not have other skeletally evident health concerns such as malnutrition, chronic infection, or poor dental health. We use a bioarchaeology of care approach to explore how developmental differences may have had implications for health, social status, and mortuary treatment of this person. Rather than focusing on ideas of "abnormality" or "deviance" that often stigmatize people with atypical burials, this individual's osteobiography demonstrates the potential to identify historical examples of care, support, and survival that contribute to our understanding of medieval health and social identity.

Funding: This research was supported by a Research and Innovation Seed Grant from University of Colorado, Boulder.

Recognizing Bipartite Medial Cuneiform in Skeletal Remains: Case Study and Considerations for Osteological Analysis

SARAH HART

Colorado Mesa University

Bipartite medial cuneiform (BMC) is a rare congenital anomaly resulting from the failure of two primary ossification centers to coalesce, resulting in a pseudoarthrosis. This condition typically affects males and presents bilaterally. The majority of reported cases have been identified incidentally through diagnostic imaging for an unrelated condition, the most common being a sports injury. Because of BMC's low population incidence (variably reported as 0.1 – 2.4%) and its latency, there is limited information about the condition in both the clinical and anthropological literature. Colorado Mesa University's Forensic Investigation Research Station (FIRS) Modern Osteology Collection is currently composed of 110 individuals. A case of bilateral BMC was identified in the skeletal remains of a 71-year-old male. The donor's reported biodemographic data did not list the condition or any related sequelae. The purpose of this case example was to review the limited literature related to BMC and describe co-occurring pathology. Severe osteoarthritis and left side distal tibiofibular synostosis were observed. In most cases, BMC does not affect overall function. However, any acute trauma or chronic overuse can create new issues, and it is important to gain a better understanding of this condition to avoid misdiagnosing this variant as a fracture, which could result in inaccurate treatment plans. Within forensic investigations, recognizing this variant may aid in individual identification and help distinguish this condition from postmortem trauma or taphonomic changes.

Is Bigger Better? An Unexpected Relationship Between Prey Body Size and Intramuscular Macronutrient Composition in Eastern African Mammals

ISABEL HESLIN[1], ANDREW DU[1], DAVID RAUBENHEIMER[2], and JESSICA C. THOMPSON[3]

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It is widespread in reconstructions of hominin diets to assume a positive relationship between proportional body fat and body size in prey species which has implications for hominin dietary evolution. This assumption is, however, based on estimates derived from non-African species (typically European and North American mammals), and/or domesticated mammals, as proxies for wild African mammals. Here, we test the validity of this assumption for African hominin diets by compiling macro-nutritional data on proportions of lipids, carbs, and protein in African mammals and examined their relationship to body size. Available data demonstrated that African mammals typically defined as large game (> 5 kg), are relatively lean. Small game (< 5 kg) African mammals are more variable in macronutrient composition but are generally fattier relative to body size than large game. The only exceptions are mega-herbivores (> 1000 kg), such as hippopotamus and elephant. Our analysis suggests that the use of non-African mammals as a proxy for nutritional composition of African hominin diets is unreliable, which has implications for how the behavioral ecology of African hominin groups has been reconstructed.

Abstracts

Born of a Storm: Intergenerational Impacts of First Trimester Exposure to Hurricane Florence

MICHAELA HOWELLS[1], JESSICA REICH[2], LENIS P. CHEN-EDINBORO[3], and ALEXANDRA BLAIR[4]

[1]Department of Anthropology and Geography, Colorado State University; [2]Department of Psychology, University of North Carolina Wilmington; [3]School of Health and Applied Human Sciences, University of North Carolina Wilmington; [4]Department of Anthropology, University of North Carolina Wilmington

Climate driven disasters are increasing in frequency and severity. However, the impacts of these disasters are not equally experienced across communities or demographics. Although pregnant individuals were only recently identified as a particularly at-risk group in disasters, their experiences can have significant ramifications on their own health and the health of their unborn offspring. Our previous research found increased cortisol levels among pregnant individuals following Hurricane Florence. This difference was especially pronounced in unmarried individuals. In our current study we examined intergenerational impacts of this disaster, with specific attention to trimester of pregnancy when the hurricane made landfall. We assessed 7,240 births and their outcomes, comparing the hurricane year to two previous non-disaster years. Individuals in their first trimester during the hurricane had elevated risks of low birthweight, low APGAR scores, and preterm birth. Although experienced across groups, these risks were particularly pronounced among unmarried individuals. These results indicate that increased prenatal stress in the first trimester can have significant effects on the phenotypic development of offspring. Disaster-related prenatal stress' disproportionate effect on early fetal development may be an important risk factor driving potential intergenerational health challenges. With the increase in the frequency and severity in disasters, and the highest risk period for the unborn early in gestation, mitigation and planning strategies need to incorporate additional stress reduction and support for all pregnant individuals. Taken together, this research highlights the importance of targeted prenatal support during and after climate-related disasters.

Funding: Natural Hazards Center (Boulder Colorado) Quick Response Grant (NSF).

Interobserver Error Analysis of Dorsal Canting and Longitudinal Shaft Curvature of *Pan paniscus* and *Macaca mulatta*

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[1]Department of Integrative Biology, University of Colorado Denver; [2]Department of Cell & Developmental Biology, University of Colorado Medical Campus

Anthropologists measure phalangeal form to inform locomotor behavior in fossil primates. Longitudinal shaft curvature (measured as the included angle of a best-fit circle) and the dorsal inclination of the proximal metacarpophalangeal joint surface (measured as a dorsal canting angle) are measurements commonly used to draw locomotor inferences. This study tests whether the dorsal canting (DC) and longitudinal shaft curvature (IA) variables can be measured reliably using a standardized procedure. An interobserver error analysis was performed to test the DC and IA measurements of two species; *Macaca mulatta* (macaque) and *Pan paniscus* (bonobo) using the fifth manual proximal phalanx. The fifth proximal phalanx is typically the most variable digit in morphology, and it was chosen to maximize the chance of error between observers. *Pan paniscus* is known to have metacarpophalangeal joints that are not

dorsally canted (low DC) but phalangeal shafts that are strongly curved (high IA). In contrast, *Macaca mulatta* has been shown to have dorsally canted joints (high DC) but flatter shafts (low IA). Each observer utilized the 3D modeling software Amira to place a series of 8 landmarks on phalanges from 1 set of 36 individuals (20 bonobos, 16 macaques). Each observer's data set was then run through MATLAB using established calculations. A paired t-test shows that dorsal canting was statistically significant while included angle was not. DC differences were minimal, which doesn't swamp observed differences between taxa and IA validates the reliability of procedure. These methods may be applied to inform locomotor behavior within the fossil record.

Funding: National Science Foundation (BCS #1539741, BCS #1317047), The Leakey Foundation, Wenner-Gren Foundation.

Enlightening the "Dark Ages": Embodiment of Political Disasters on Human Skeletal Remains

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The "Dark Ages" are frequently characterized as historically insignificant due to the relative scarcity of written records and the economic and social constraints following the fall of the Roman Empire. However, the osteological and archaeological record from this time provides critical insight into the impact of this political collapse on individuals. Utilizing published osteological records across this period, we assessed the impact that the loss of major political infrastructure had on health outcomes. We used a temporal and spatial comparison to assess rates of dental, cranial, and post-cranial skeletal pathologies following major infrastructural changes. These political transitions increased malnutrition, trauma, and disease, reflected through porous cranial lesions (PCLs), linear enamel hypoplasia (LEH), Harris lines, and more. This work aims to humanize the lived experiences of those who were unable to tell their own stories during significant times of change and upheaval. As we ourselves experience a significant period of global political instability and conflict, the human costs of a fallen empire become even more relevant. Results from this study provide a baseline to compare the effects of contemporary political collapses around the globe and can aid in developing plans to mitigate and manage disaster casualties associated with political collapse.

The Role of Climate Disasters on Prenatal Stress and Birth Outcomes

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Human driven climate change has resulted in more intense and frequent climate disasters. Although these events can be stressful across the population, the effects are not necessarily experienced the same way. For instance, physiologically vulnerable populations—like those in utero—may be disproportionally affected. In this project we compared four case studies that measure prenatal stress and pregnancy outcomes following a variety of disaster types. These included the Quebec Ice Storm (Canada), Cyclone Yasi (Australia), Wenchuan Earthquake (China), and Hurricane Florence (USA). Regardless of the type of disaster or the population represented, there were significant ramifications to birth outcomes. These included reduced birthweights, smaller head circumference to body length ratios, and increased incidences

of premature birth. The studies that continued following the offspring following birth indicated long-term modifications to brain development and temperament throughout their life course. These findings reflect a powerful international snapshot of research assessing disasters, prenatal stress, and pregnancy outcomes. Together they illustrate the benefit of taking a life history approach to disaster studies and response. By assessing exposure points early in pregnancy and following individuals through their life course we can better understand the long-term impacts of PNMS. Overall, these findings would benefit both disaster response planning and response.

Advancing Scientific Collection-Based Research With the Global Registry of Scientific Collections (GRSciColl)

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Natural history museums preserve over 1.1 billion specimens, providing critical data for science, education, and global challenges like climate change and infectious disease. However, only 16% of museum objects have digitally discoverable records . Biological anthropologists often rely on these collections—including primate materials, fossil hominins, and, in some museums, human remains—to study human evolution, functional anatomy, and genetic variation. Traditional methods for identifying holdings, such as curator consultations or published references, can be inefficient and may be biased toward large institutions.

In this presentation, we discuss how the Global Registry of Scientific Collections (GRSciColl, https://scientific-collections.gbif.org/), part of the Global Biodiversity Information Facility (GBIF), addresses these challenges by centralizing metadata on scientific collections, enabling researchers to locate materials independently, reduce biases, and enhance sampling diversity. GRSciColl supports interdisciplinary collaboration, digital resource sharing (e.g., 3D models, genomic data), and educational applications, such as data literacy training. It also standardizes institutional references, improving specimen provenance tracking and data interoperability. By democratizing access to collections—including those in low-resource regions—GRSciColl bridges the gap between physical specimens and digital research needs, fostering innovation in biological anthropology and beyond. This resource is essential for maximizing the scientific and educational potential of natural history collections in an era of rapid environmental change.

Neanderthals and Modern Human Population Structures Defined by Bottlenecks

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Neanderthals and Anatomically Modern Humans (AMH) have introgressed or mated since about 250 thousand years ago (kya), all the way up to the Neanderthal extinction around 40kya. In that time these populations were plagued by evolutionary forces such as genetic bottlenecks. Genetic bottlenecks, a sharp reduction in the size of a population typically resulting in lower genetic diversity, are a common evolutionary force that have affected the evolutionary history of both AMH and Neanderthals as well as their population structures. This study aimed to evaluate the impact of incorporating bottlenecks in population structure simulations and research. We ran genetic simulations using msprime, which stores hypothetical genetic

sequences, with different parameters including bottlenecks to gage their impact on population structure. Using principal coordinate analysis, we evaluated genetic separation and diversity of the populations analyzed. Bottlenecks are crucial in creating accurate population structures amongst modern populations. In this study, the bottlenecks we applied reduced genetic diversity amongst the Eurasian population to accurately represent what we expect to see from Eurasian populations today. Results from this research show that simulating bottlenecks and other evolutionary forces can greatly improve our understanding of ourselves, where we come from, and where we fit amongst the world.

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A Study of Dietary Habits in Modern Primates: The Application of Strontium and Calcium Ratio Analysis and Dental Morphology to Identify Dietary Categories

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Diet analysis is extremely important in both anthropological and ecological research. Primate diets include folivory, frugivory, insectivory, or combinations of these. Diets of unknown specimens can be inferred by chemical analysis of bones and teeth and can be conducted absent of taxonomic information. It can even be informative in assigning taxonomic identities to unknown specimens. Using nine unidentified primate mandibles from the University of Northern Colorado's Biology department, this study uses three methods to differentiate them into dietary categories. First, this study uses qualitative methods for assigning dietary categories using dental morphology: molars that have low, rounded cusps typically indicate frugivorous species, while molars that have low, pointed cusps with shearing crests indicate folivorous species. Second, strontium to calcium (Sr/Ca) ratios differentiates folivores and frugivores based on X-Ray fluorescence (XRF) measurements from tooth enamel; frugivores have lower Sr/Ca values than folivores. Also using handheld XRF, this study finally analyses zinc to calcium (Zn/Ca) ratios to differentiate samples with any correlation with insectivory, assuming insectivores have higher zinc levels than herbivores. Future analysis of these unknown primate specimens could deepen our understanding further by determining age, estimating body size, or applying destructive stable isotope analysis to further specify individual dietary habits.

Acoustic Classification and Context-Specific Variation of Vocalizations in *Phaner pallescens*

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Vocalizations are crucial in animal communication, conveying identity, status, and social context. Few studies have been conducted on *Phaner pallescens* (pale fork-marked lemur), an endangered nocturnal lemur, but previous work has identified three main call types: KIU/KI, KEA, and HON. We aimed to expand this work by investigating acoustic variation of call sequences and syllables during aggressive and mutual grooming interactions. To do this, we recorded vocalizations and lemur behaviors in Zombitse Vohibasia National Park, Madagascar, from January to June 2022. Using hierarchical agglomerative

clustering in R, we classified our acoustic data into five distinct call types (KI, KIU, K, KEA, HON), identifying two new, which represent the vocal repertoire observed across all contexts. At the syllable level, mutual grooming calls had significantly higher peak frequencies ($W = 422$, $p < 0.001$) and longer durations ($W = 1075.5$, $p < 0.001$). A Pearson correlation showed a strong positive relationship between duration and frequency in grooming calls ($r = 0.652$, $p < 0.001$), but not in aggressive calls. At the sequence level, grooming calls had longer durations than aggressive calls ($W = 52$, $p = 0.018$), while peak frequencies ($W = 70.5$, $p = 0.068$) and power densities ($t = -0.246$, $p = 0.809$) did not differ significantly. These results suggest mutual grooming calls involve broader vocal modulation, reflecting affiliative function, while aggressive calls are more rigid and lower-pitched. This study provides the first comprehensive classification and acoustic analysis of *P. pallescens* vocalizations, shedding light on their social communication and behavior.

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Variation in the Longitudinal Shaft Curvature of the Manual Intermediate Phalanges in *Homo*, *Pan*, and *Gorilla*

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The degree of longitudinal shaft curvature of the proximal phalanges of the hand and foot has long been recognized to correlate with the frequency of suspensory and climbing locomotion among primates. It is therefore considered a highly useful variable for reconstructing the behaviors of fossil taxa including early hominins. The intermediate phalanges of the hand should respond similarly to the biomechanical demands of locomotion, but their functional morphology has received less attention. Using the included angle method, we analyze variation in the curvature of the manual intermediate phalanges in *Homo sapiens*, *Pan* spp. (*P. paniscus* and *P. troglodytes*), and *Gorilla* spp. (*G. beringei* and *G. gorilla*) across rays II – V. Following the expected pattern based on frequency of arboreal climbing and suspension, *Pan* spp. shows the most highly curved phalanges across all rays, but *Gorilla* spp. and *H. sapiens* are more similar in having flatter shafts. However, there is significant variation among rays, with all three taxa showing a pattern of curvature in which Ray III ≈ Ray IV > Ray II > Ray V. This pattern is especially pronounced within *H. sapiens*, which displays especially flat second and fifth phalanges. The extensive overlap of included angle values for *Gorilla* and *Homo* combined with the observed inter-ray variation complicates the interpretation of shaft curvature in the intermediate phalanges and limits its utility as an indicator of locomotor behavior for fossil specimens. However, expansion of the study to include the most highly suspensory primates (*Ateles*, *Hylobates*, and *Pongo*) as well as palmigrade and digitigrade monkeys is warranted.

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Phalangeal Curvature in Platyrrhine Monkeys and Implications for the Evolution of Human Hand Morphology

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Manual phalangeal curvature is a key skeletal correlate for reconstructing locomotor behavior in fossil hominins. Greater curvature is typically interpreted as an adaptation for habitual below-branch suspensory behaviors. Conversely, flatter phalanges are commonly associated with relying less on suspension and more on terrestrial locomotion. An alternative to the latter is the hypothesis that flattened phalanges represent not simply abandonment of arboreality, but a derived condition shaped by selection to enhance dexterity. To test this hypothesis, we investigated whether flat manual phalanges occur in Platyrrhine monkeys with diverse positional behaviors as well as varying degrees of manual dexterity. Shaft curvature was quantified on 3D models of third manual proximal phalanges from 98 specimens of 17 Platyrrhine genera.

Results reveal that medium-sized capuchin monkeys (*Cebus* and *Sapajus*), known for tool use, extractive foraging, and coordinated bimanual activities, exhibit the flattest phalanges for their body size. While the small-bodied callitrichines also exhibit low curvature, this is likely associated with their specialized claw-like nails and vertical clinging behaviors, since the similarly-sized squirrel monkey (*Saimiri*) has more curved phalanges. In contrast, relatively large-bodied atelines (*Ateles*, *Brachyteles*, *Lagothrix*) display markedly higher curvature, consistent with habitual below-branch suspension.

These findings support the hypothesis that reduced phalangeal curvature can evolve convergently in primates with sophisticated manipulative repertoires, as seen in both humans and capuchins. Thus, flattened phalanges in hominins may not be solely a by-product of obligate bipedality but also reflect selection for tool use and object manipulation. The morphological convergence between the genus *Homo* and capuchins underscores the importance of manual behaviors—beyond locomotor ecology—in shaping the evolution of digit form and function.

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Edge Effects and Long Calling: Evaluating Several Adaptive Hypotheses for Howler Monkey (*Alouatta palliata*) Roaring

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While many animal species employ long-distance calling as part of their communication repertoire, its function is not well understood. Howler monkeys are especially well known for their roaring behavior, which has not been examined in the context of edge effects despite widespread forest fragmenta-

tion through their geographic range. In this study we examined roaring behavior in mantled howler monkeys (*Alouatta palliata*) at La Selva Research Station, Costa Rica. We tested various hypotheses for long calling, including inter-group spacing, resource defense, mate defense, and infant defense, with respect to edge effects by comparing roaring, vegetation, and demographic parameters across forest edge and interior zones. We collected data on roaring behavior via all-occurrences sampling, recording the length of roar bouts, number of roars per bout, and roar bouts/hour. We also measured tree DBH, canopy cover and height, tree density, and the number of adult females and infants per group. Our findings reveal that roar bout length and number of roars per bout were significantly greater in the forest interior compared to edge, providing preliminary support for the inter-group spacing hypothesis since the majority of howler groups inhabit the forest interior. Additional data on inter-species encounters will allow us to better test this hypothesis. We found limited differences in demographic and vegetation characteristics across forest zones and thus our roaring results were not consistent with the resource defense, mate defense, or infant defense hypotheses. This may be related to defining edge a priori; we recommend determining the depth of edge influence (DEI) in future work to more accurately assess howler roaring behavior in the context of edge effects. Our study improves understanding of primate communication in disturbed landscapes; continued study of edge effects is critical in the context of current widespread habitat alteration and fragmentation across the tropics.

Changes in Hominin Activities and Land-Use Through the Oldowan to Acheulean Transition at Olduvai Gorge, Tanzania

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Olduvai Gorge, Tanzania holds a central place in our current understanding of the evolution of hominins in the early Pleistocene. The oldest stratigraphic units at Olduvai, Beds I and II (~2.03-1.14 Ma), encompass a time period containing key evolutionary and cultural transitions within our lineage. These include the appearance of *Homo erectus*, the development of the Acheulean lithic industry, and potentially the expansion of hominin carnivorous behavior. The broader behavioral changes indicated by these transitions would have altered hominin activity patterns at multiple, archaeologically visible spatial scales. While comparisons have been drawn between specific archaeological sites within Beds I and II Olduvai, relatively little work has been done that analyzes how hominin presence and land-use across the Olduvai basin would have changed through time as a result of these shifts. Drawing on decades of paleoanthropological data from the site, paired with high-resolution surficial and UAV-based stratigraphic mapping, we investigated the spatial changes in the traces of hominin activities at Olduvai across the Oldowan-Acheulean transition. Our analysis demonstrates notable changes in the broader pattern of hominin activity locations between Bed I and Bed II times, even after controlling for sampling strategy and outcrop exposure. In Bed I, the locations with traces of hominin activities are more clustered and limited in

their spatial distribution on the paleolandscape, while beginning in middle Bed II, they are more abundant and widely dispersed. This suggests that the hominins later in the sequence were less spatially constrained in their environment and may have played a different ecological role at Olduvai than earlier hominins, becoming a more competitive presence on the landscape.

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Accessing Biological Anthropology: Crowd Sourcing Solutions to Some Common Accessibility Issues

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For both ethical and legal reasons, we need to work to ensure that our classes and our class materials are accessible to as many of our students as possible. This important work can be challenging for many classes and subjects, but unique challenges arise for courses—especially online courses—that include and require an understanding of many complex images and their physical features. Given the skeletal anatomy, great number of fossils, and quantitative data students must learn about, recognize, analyze, and describe in biological anthropology courses, these challenges are very real. How do we best support students who may be unable to visually interact with digital versions of these materials? And how do we do so in a way that both adequately describes the images (be they drawings, graphs, photos, or 3D scans), but still allows students to practice analyzing and describing them in their own words? In this poster, we will review current State and Federal laws regarding images and accessibility and provide some potential guidelines for meeting them. The bulk of this poster will center around common image-related issues, and will pose questions to which we can all crowd source solutions together.

Investigating the Impact of Osteoporosis on Skeletal Age-at-Death Estimation in the Os Coxa

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Objectives: Accurate skeletal age estimation is crucial in forensic and bioarchaeological contexts, yet the impact of osteoporosis on pelvic age estimation sites in males remains largely unstudied. This research investigates the relationship between osteoporosis and skeletal age at death in the os coxa, focusing on the acetabulum and pubic symphysis. I hypothesize that bone degradation caused by osteoporosis in these regions affects age estimation methods, leading to discrepancies in accuracy.

Methods: This study analyzed 60 adult males (20–99 yrs.). Bone mineral density (BMD) was obtained using computed tomography (CT) scans from the New Mexico Decedent Image Database. BMD was assessed with transverse slices in ImageJ (Fiji) at the posterior margin of the acetabulum and the pubic symphyseal body. Three measurements from the superior to inferior surface of each region were collected, and the average BMD was calculated. T-scores were used to separate individuals into osteoporotic and

non-osteoporotic groups (osteoporosis defined as ≤ -2.0 BMD). To assess the effects of osteoporosis on age estimation accuracy, t-tests and regression analyses were performed using "R." Age estimates from established morphological methods were compared to known ages-at-death.

Results: Two distributions were examined: 50 healthy and 10 osteoporotic individuals, based on t-scores from the pubic symphysis. T-tests showed the osteoporotic group was significantly older than the healthy group ($p<0.001$), and regression analyses revealed that osteoporosis impacts age estimation from the pubic symphysis.

Discussion: Recognizing over-aging in individuals with osteoporosis is essential for improving skeletal age estimation. Accounting for osteoporosis-related bone changes may enhance accuracy, aiding the identification of unknown individuals.

Funding: Metropolitan State University of Denver.

Investigating the Domesticated Status of Two Sets of Dog Remains From the Jones-Miller Archaeological Site

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In 1972, the Jones-Miller Bison Kill Site was discovered on the Jones family's property in northeastern Colorado. Excavations conducted throughout the 1970s by Dennis Stanford in association with the Smithsonian uncovered over 40,000 skeletal elements, the majority belonging to *Bison antiquus*, along with more than one hundred projectile points associated with the Hell Gap complex. Within the assemblage, the remains of two domesticated dogs (*Canis familiaris*) were also reported. These finds are significant, since radiocarbon dating places the site at approximately 10,800 BP, several hundred years earlier than the oldest confirmed *Canis familiaris* in North America. Using standard zooarchaeological methods, this study will analyze the taphonomic history of the reported dog remains and evaluate morphological markers relevant to distinguishing domesticated dogs from wolves. This research is important for clarifying the taxonomic status of the specimens and for contributing to broader understandings of the timing and nature of dog domestication in the Americas.

BoneViewer: An Open-Source 3D Learning Module for Human Osteology

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Most professional degrees in human health include curricula pertaining to osteological anatomy. The University of Colorado (CU) Anschutz Medical Campus is typical in providing students across multiple schools and disciplines with access to real human bones for studying osteology. Yet this resource also presents several disadvantages: 1) Access to bones is restricted to the osteology lab, which creates a learning gap for students attempting to review this material from home. 2) Bones are a limited, fragile resource, and their repeated handling has resulted in considerable damage and loss within the collection. 3) Human osteological collections worldwide have historically been acquired using means that are unethical by modern standards and that dehumanize the preserved individuals, creating a gulf

between learners and the human remains they use as study tools.

High-quality virtual 3D models represent an opportunity to provide students with 24-hour access to human osteological remains that have been ethically sourced without risking damage to real bones. We designed BoneViewer, an open-source, publicly available osteology learning module that uses high resolution 3D scans of bones that CU Anschutz students have access to while learning osteology. Scans were collected using an Artec Spider scanner, specific structures were individually colorized using Quixel Mixer, and the module was built as an executable program in Unreal Engine 5.5. BoneViewer includes a learning mode, in which students can manipulate a given bone and highlight specific features. It also includes a quiz mode, allowing students to practice identifying the same osteological features, similar to how these are tested in routine practical exams.

BoneViewer is freely available from the Open Educational Resource hub on the Modern Human Anatomy Program website. Future versions of the software may permit instructors to customize the list of structures and expand models to include fragments and bony pathologies.

Hips Don't Lie: How Pelvic Width Affects the Biomechanics of Walking

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The obstetrical dilemma argues that the female pelvis is constrained by two opposing evolutionary pressures: bipedal gait and childbirth. On average, females have a wider pelvis than males. Anthropologists have long argued that the greater width of the female pelvis is less biomechanically efficient compared to males.

However, current data do not support that greater pelvic width reduces locomotor efficiency. Rather, relative to leg length, greater pelvic width is correlated with increased stride length. However, recent studies have treated pelvic width as a discrete variable (narrow/wide) and have been limited to walking, obscuring the relationship between pelvic width and stride length during running. Additionally, previous studies use external pelvic markers, which is not the most biomechanically relevant measurement of pelvic width.

We assess the relationship between pelvic width, lower limb length, and stride length at various walking and running speeds. Thirty-one infrared markers were placed on relevant anatomical landmarks of participants aged 18-45, who walked and ran at set and preferred speeds on a treadmill. Vicon Nexus motion capture software was used to measure and analyze stride length and pelvic rotation. Pelvic width was measured as the biomechanical biacetabular breadth, measured with the SARA pipeline. Data collection for this study is ongoing.

We predict that pelvic width will be positively correlated with stride length when controlling for leg length at a given locomotor speed, and that wider pelves will result in increased anterior displacement of the pelvis, further increasing stride length. We further predict that people with shorter legs and wider pelves will prefer faster walking and running speeds than those with narrower pelves. These results will contribute to ongoing debates on the complex relationship between human pelvic morphology and gait.

Abstracts

Small Angle X-ray Scattering Assessment of Positional Variation of Diagenesis in Archeological Human Second Metacarpal Bones

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One complication in the study of archeologically-recovered bones is that diagenesis (post-burial changes) can be highly variable, even at a single site and within a single bone. Diagenesis can alter the mineral phase of bone (carbonated apatite, cAp), and it can eradicate the collagen matrix in which the mineral nanoplatelets are/were embedded. Earlier results on human second metacarpal bones (mc2) with small-angle x-ray scattering (SAXS) demonstrated that the presence/absence of collagen D-period peaks correlated with the extent of diagenesis determined by other techniques. The earlier noninvasive SAXS method averaged all positions sampled. The present study extended the earlier work by analyzing each position's SAXS pattern separately to determine how diagenesis varied with position.

A set of 33 human mc2 were studied by SAXS from the Wharram Percy medieval cemetery. A non-diagenetically altered human mc2 was a reference. For each mc2's central diaphysis, a series of SAXS patterns were recorded at Beamline 1-ID, the Advanced Photon Source using 72 keV photons, a 130 µm x 130 µm beam size and 130 µm step size. The D-period peak intensity vs position was compared for the different mc2s. The data for each mc2 were collected in less than 7 min, suggesting large numbers of similar bones could be surveyed using this approach.

Funding: Data were produced using resources of the Advanced Photon Source (APS), a U.S. DOE Office of Science User Facility operated by Argonne National Laboratory under Contract No. DE-AC02-06CH11357.

Lifespan Variation in Facial Soft Tissue and Craniofacial Bone: A Geometric Morphometric Analysis of NMDID and Mexican Samples

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We analyzed shape variation in facial soft tissue and craniofacial bone across the human lifespan using 3D landmarks from the New Mexico Decedent Image Database (NMDID) and a contemporary Mexican sample. Geometric morphometric methods were applied to Procrustes-aligned coordinates. In soft tissue (n = 245), the first two principal components explained 34.85% of total variance. Within this variation, aging is associated with a shift from greater midfacial projection (upturned nose, full lips, projected lower third) to a flatter, descended profile with a longer nose, thin lips, retraction and elongation of the lower third, and changes in the eyelid (palpebral) region (elongation and descent). In craniofacial bone (n = 245), the first two PCs explained 32.27%, indicating less variation than in soft tissue. Bony patterns describe changes in anteroposterior projections and a gradient of facial height associated with shifts in orbital configuration (including orbital enlargement due to resorption), the nasal aperture, and mandibular descent; however, no decisive age groupings are evident in PCA space. Overall, soft tissue

emphasizes anteroposterior nasolabial and orbital changes, with vertical variation as a secondary axis, whereas bone shows subtler variation without clear age clusters. Conclusion: facial aging is expressed more clearly in soft tissue, dominated by anteroposterior changes in the nasolabial and eyelid complexes; the bony component shows subtler, heterogeneous variation without defined age groupings in morphometric space.

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Comparing the Presence, Distribution, and Purpose of Meissner's Corpuscles in Human and Non-Human Primates

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Mechanoreceptors within the human somatosensory system detect touch and pressure, and communicate those signals to the brain. Meissner's corpuscles are a type of mechanoreceptor primarily responsible for the detection of light touch. They are found in the middle dermis layer of hairless skin, which is present most notably on the hands and feet of humans and the tails of some platyrrhines. Although Meissner's corpuscles likely evolved on the hands of both human and non-human primate ancestors to aid in the grasping of small objects, they have further evolved in modern primates to aid in locomotion and help identify food. However, the exact role they play in the human body is still unknown. This study addresses and compares the presence of Meissner's corpuscles in living primates through the review of existing literature. First, I will explain the hypothesized purposes Meissner's corpuscles serve in non-human primates. Then, I will analyze the role that Meissner's corpuscles play in the human body by comparing their known purposes in non-human primates to their hypothesized function in humans. Based on literature review, I found that the distribution of Meissner's corpuscles in the extremities of primates, including some tails, impacts their reactivity to sensation, and therefore the primates' ability to perform tactile tasks. I was able to determine that, in non-human primates, Meissner's corpuscles appear to aid in food identification primarily by allowing primates to distinguish between ripe and unripe fruit using their hands. I also found that Meissner's corpuscles appear to allow for unique locomotive behavior in monkeys with fully prehensile tails by increasing tactility. Unfortunately, despite continuous research on the function of Meissner's corpuscles in primates, the extent of their distribution and their purpose in humans remains unclear. For this reason, it is critical to continue studies of the somatosensory system in both human and non-human primates.

Resource Use in Howler Monkeys

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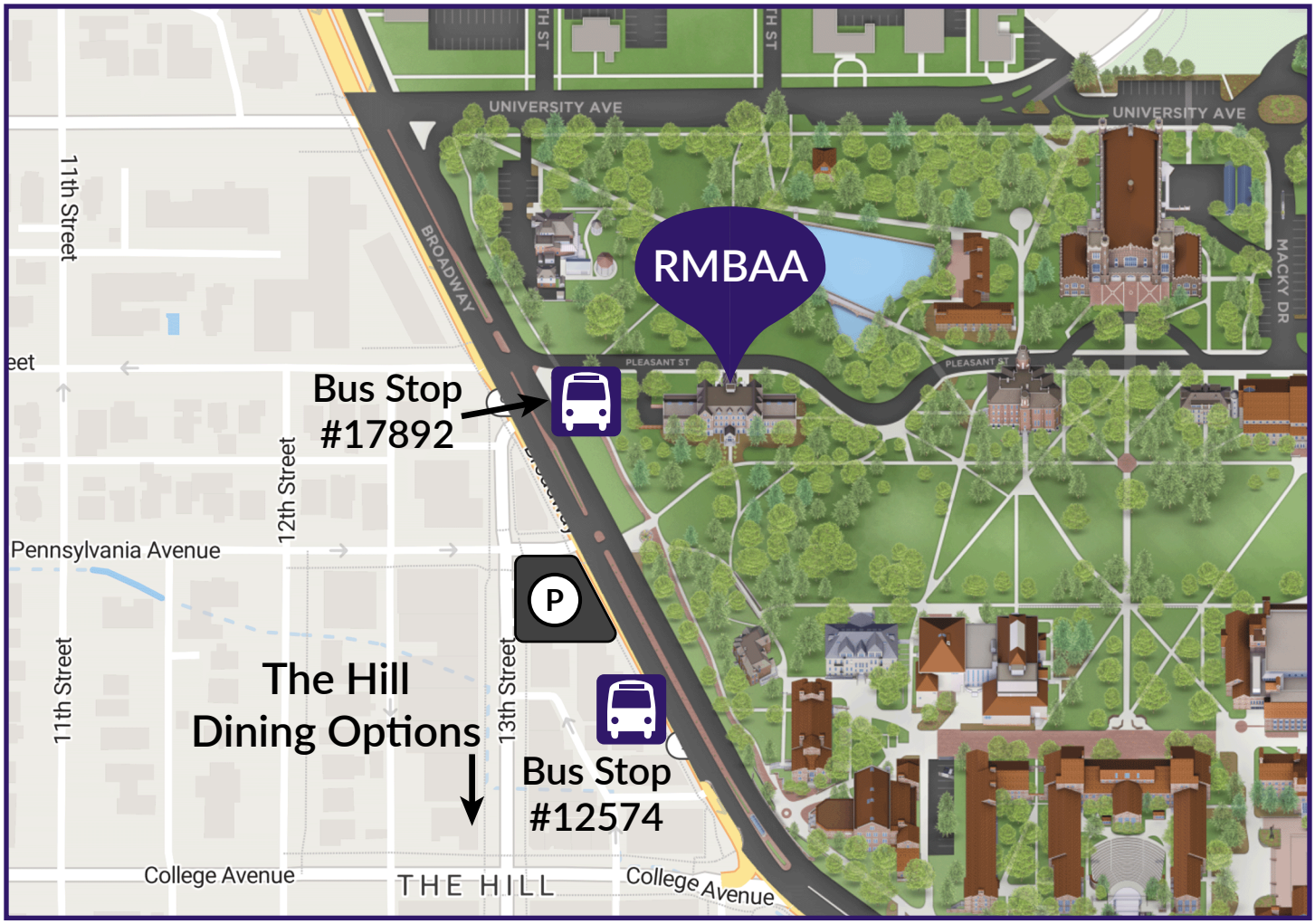
University of Colorado at Colorado Springs

Understanding the ecological behavior of mantled howler monkeys (*Alouatta palliata*) requires examining how specific behaviors align with environmental resource distributions. This study investigates associations between howler monkey behaviors, specifically foraging and sleeping/resting, and three resource categories: canopy layer, forest habitat type, and water resource availability. We analyzed 273 behavioral observations collected at La Selva Biological Station in July 2025 using chi-square tests of independence and standardized residuals to identify statistically significant relationships. Foraging was positively associated with the lower canopy (residual = +2.67) and negatively with the

upper canopy (–2.44), suggesting food resources are more accessible in lower strata. Foraging was also more common in ecological reserves and abandoned agroforestry zones, and less frequent in selectively logged forests, indicating sensitivity to forest disturbance. Sleeping/resting behavior showed a strong preference for the upper canopy (residual = +4.10) and avoidance of the lower canopy (–4.73), likely reflecting selection for safety or thermoregulation. These behaviors were also more commonly observed near major rivers (residual = +1.64), possibly due to favorable microclimates or reduced disturbance. These findings reveal a non-random distribution of behavior across habitats, highlighting a strong linkage between behavioral patterns and structural and hydrological features of the environment. Conservation strategies should prioritize maintaining vertical canopy complexity and protecting riparian zones to support behavioral diversity and long-term species persistence.

Venue & Location



Map courtesy of University of Colorado Boulder

Directions & Parking

The Hale Science Building is located at 1350 Pleasant St, Boulder, CO 80309, one block from the intersection of Broadway and University Ave. A paid hourly campus parking lot (ParkMobile app) is available across Broadway, and street parking can be obtained nearby on 13th St. and cross streets, becoming free a few blocks west of campus. CU Boulder parking information: https://www.colorado.edu/pts/parking/visitorshort-term-parking

For public transit, bus stops #12574 and #17892 are in the vicinity if coming from N or S respectively. There are frequent buses direct from Union Station in Denver (FF1), which stop at Broadway and Euclid Ave., a few blocks to the south.

Food

Diverse dining options are located in The Hill neighborhood across Broadway, and one block south on 13th St. from the meeting venue. Additional restaurants are located in the Downtown district, about a 15-20 min walk to the NW along Broadway.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