

Poster #	Full Abstract
1	<p>Primates shed light on glowing mammals: Adaptation or epiphenomenon? JULIANA HICKS*, NIDHI AVASATTHI*, JASMINE BONADIES* and AMANDA N. SPRIGGS. University at Albany - SUNY.</p> <p>Background: Fluorescence has been documented in several mammalian families, yet Primates as an order have received limited attention in this regard. Within Primates, the suborder Strepsirrhini has been particularly overlooked. Strepsirrhines are compelling subjects due to retention of primitive mammalian characteristics, representing a significant knowledge gap with respect to occurrence of fluorescing pelage within class Mammalia. Methods: We expanded on the Travouillon et al. (2023) data set, and presence or absence of fluorescence in the pelage of preserved Strepsirrhine specimens was investigated. Ultraviolet light was used to illuminate the pelage of 48 individuals (n=26 species) and presence or absence of fluorescence was recorded across several body regions (ventral, dorsal, lateral and facial). Results were documented using digital photography. Chi square tests were used to examine the relationship between ecological variables (activity pattern, substrate preference, and diet) and the presence or absence of fluorescence fur. Results: Significant associations were found, specifically, lateral body regions varied due to diet, ventral body regions varied due to activity pattern, and all body regions varied due to substrate. Results imply that presence of fluorescence across several body regions is not independent of activity pattern, substrate preference, or diet. Conclusion: Analyses further explore the relationships between fluorescence, niche partitioning, and ecological variables, in addition to determining effects of phylogeny. This research addresses crucial deficiencies in our understanding of the phenomenon of “glowing mammals” and allows for exploration of broader evolutionary questions, such as whether fluorescence in Primates serves an adaptive function or is merely a byproduct of hair chemistry.</p> <p>Funding: UAlbany Fall 2023 Endowed Undergraduate Research Award, Lita and Steven Greenwald Research Fund.</p>
2	<p>The effects of antemortem tooth loss on craniofacial shape in apes and humans. ASHLEY R. LASTER*, CLAIRE A. KIRCHHOFF, SIOBHAN B. COOKE and CLAIRE E. TERHUNE. University of Arkansas.</p> <p>Background: Antemortem tooth loss (AMTL) (i.e., tooth loss that occurs before death) is prevalent in humans and many primates, and several studies have analyzed AMTL in multiple groups of primates. Some work suggests that AMTL can affect masticatory function and diet; however, the effects of AMTL on craniofacial shape and biomechanics have not been analyzed further. We measured craniofacial and mandibular shape in relation to AMTL with the expectation that individuals with at least one tooth lost antemortem would show significant differences in cranial and/or mandibular shape when compared to those without AMTL. Methods: AMTL rates were examined in three primate species: wild-caught samples of Pan troglodytes (n=68) and Gorilla gorilla (n=85), and an archaeological sample of Homo sapiens (n=88) from Ancient Nubia. Prevalences of AMTL were first compared among species and sexes using Fisher’s exact tests geometric morphometric techniques were then employed to measure craniofacial and mandibular shapes and compare individuals with versus without AMTL for each species. Results: Results reveal that humans show the highest prevalence of AMTL, followed by chimps, and then gorillas. No sex differences were noted in AMTL prevalence for any species. The shape analyses further indicate that gorillas and humans (but not chimps) with AMTL had significantly different mandible shapes; there was no impact of AMTL on cranial shape. Conclusion: This work has implications for understanding the effects of AMTL on the skull of both wild primates and modern humans, and how AMTL impacts craniofacial shape and masticatory function.</p>
3	<p>Getting to the point: Assessing dietary signal from tooth sharpness in the postcanine dentition of primates. GABRIELA MAROTO*, LUCAS K. DELEZENE, GARY T. SCHWARTZ and E. SUSANNE DALY. Salisbury University.</p> <p>Background: This project aims to enhance our understanding of the relationship between postcanine tooth morphology and dietary ecology in primates by assessing two measures of occlusal surface sharpness related to Dirichlet normal energy (DNE): total surface DNE and sign-oriented DNE (vDNE), with the later excluding occlusal sulci and capturing the convex part of the occlusal surface first encountering food particles. Previous work suggests there is an association between sharper molars and the shearing of fibrous, tougher food items, such as mature leaves or insects. Methods: Here we build on this work, assessing the relationship between diet and tooth sharpness in mandibular fourth premolars (P4s) and second molars</p>

	<p>(M2s) in a taxonomically broad sample comprising 22 haplorrhine primate taxa (n=383 individuals). Dietary groups were assigned based on their primary diet and material properties of foods consumed. Both measures of DNE were quantified with the molaR package in R. Dietary differences in tooth sharpness were assessed using a phylogenetically controlled, Markov-chain Monte Carlo sampled generalized linear model with the R package MCMCglmm. Results: Our analyses support previous research showing that taxa incorporating tough foods in their diets possess significantly sharper postcanine teeth than those consuming diets with predominantly softer or harder food items. Of the two measures, vDNE is the more functionally relevant measurement as it more clearly differentiates between dietary groups, particularly within hominoids and cercopithecoids. Conclusion: Overall, these findings underscore the importance of considering occlusal surface sharpness, particularly measured by vDNE, for assessing dental functional morphology and suggest caution when interpreting studies using total DNE.</p> <p>Funding: Arizona State University (School of Human Evolution and Social Change; Graduate and Professional Student Association) and Salisbury University (Office of Graduate Studies and Research; Henson School for Science and Technology).</p>
4	<p>Cusp vs crown: Comparing dietary signals across wear stages using dental topographic analysis. CAITLYNN OLSON*, RISA L. LAMA-LUTHER and RILEY C.W. O'NEILL. University of Minnesota.</p> <p>Background: Dental topographic analysis (DTA) of dietary signals requires new and comprehensive methods in this rising field to improve understanding of behavior in the fossil record. This study is vital to understanding dietary signals – indicators of environmental adaptation and evolutionary processes – which reflect dietary preferences, such as how different dietary preferences led to environmental adaptations and how dietary preferences shaped evolution. Methods: This study evaluated whether DTA values differ between cusps and whole-crowns across wear stages and assessed whether evaluating cusps individually provides unique dietary signals compared to whole-crowns. Linear mixed effect models were applied to the meshes created by scanning specimens with a structured blue-light scanner in order to assign wear values. Individual cusps and whole-crowns of lower second molars in 143 extant primates (frugivores, folivores, and hard-object consumers) were evaluated with Percent Dentine Exposure (PDE) as a measure of wear. Dental topographic variables assessed include: ariaDNE, OPCR, and RFI. Results: Our findings show ariaDNE decreases moderately across tooth regions while RFI shows uneven wear across cusps, especially the entoconid. OPCR showed less pronounced wear, especially in the protoconid and hypoconid. Preliminary results are significant ($p < 0.05$), suggesting there's region-specific responses to wear. Conclusion: Since our analyses at the crown-level and cusp-level showed significant differences in DTA values, results indicate that using a cusp-level analysis could provide us with dietary signals that are more distinct or that we haven't seen. There's individual benefits to each method, however using these together for future dietary signal analysis could offer new, more complete information about evolutionary adaptation.</p> <p>Funding: The Leakey Foundation research grant; NSF BCS 1846153; NSF BCS 2235734; NSF DMS 1944925.</p>
5	<p>Investigating the correlation between cranial anatomy and diet in cercopithecoids and ceboids. SADIE WALL*, ZANA SIMS, JONATHAN KELLER and KIERAN P. MCNULTY. University of Minnesota.</p> <p>Background: Dentition is often the focus of dietary studies whereas cranial anatomy has been found to vary with diet in only a limited way. Nevertheless, understanding the correlation between cranial anatomy and diet could further our knowledge of functional adaptive morphology in primates and may be extended to dietary analysis of fossil primates. Methods: To explore the relationship between facial anatomy and diet, we collected data from 56 cercopithecoid and ceboid crania, representing frugivorous, omnivorous, and frugivorous/insectivorous species. Five cranial measurements hypothesized to have some association with diet were subjected to analysis of variance (ANOVA) with Tukey's HSD posthoc tests as well as principal component analysis (PCA) and discriminant function analysis (DFA) to assess differences among diet categories. Results: : ANOVA and Tukey's HSD revealed few differences in means among diet categories: frugivore and frugivore/insectivore pairs were significant for palate length ($p = 0.044$) and facial length ($p < 0.001$), and the omnivore and frugivore/insectivore pair was significant for facial length ($p < 0.001$). PCA results were only suggestive of a relationship between these measurements and diet, and even DFA was not able to robustly cross-validate the dietary categories. Conclusion: These initial results do not support previous studies that suggested a correlation between diet and these measurements.</p>

	However, future research should include greater taxonomic sampling within each diet category and implement a phylogenetic correction to better assess the relationship between diet and cranial anatomy.
6	<p>Ontogenetic fiber type changes in the superficial anterior temporalis of tufted capuchins. AYSSA SANCHEZ*, CAITLIN B. YOAKUM, ANDREA B. TAYLOR, CALLUM F. ROSS, JANINE CHALK-WILAYTO, MYRA F. LAIRD, CLAIRE E. TERHUNE and MEGAN A. HOLMES. Duke University.</p> <p>Background: The superficial anterior temporalis (SAT) plays an important role in generating vertical bite forces during hard-object feeding. In fact, larger proportions of Type 2 (fast-contracting, fatigable) compared to Type 1 (slow-contracting, fatigue-resistant) myosin proteins have been found in the SAT of baboons and large-bodied apes, further establishing this functional relationship. Adult <i>Sapajus apella</i> habitually exploit mechanically-challenging foods; we therefore predict that the presence of Type 2 myosin will increase throughout ontogeny in <i>S. apella</i>, matching the shift from weaning to an adult diet, while Type 1 decreases. Methods: Immunohistochemistry and digital microscopy were used to assess the presence or absence of myosin proteins in the SAT of an ontogenetic sample of <i>S. apella</i> using three monoclonal antibodies: NOQ-Type 1; MYH6-Type 1 alpha-cardiac; MY32-Type 2]. Age groups were classified as infant (n=3), juvenile (n=2), or adult (n=4) according to dental eruption patterns. Frequency and proportion of each myosin protein were calculated as well as the proportion of hybrid fibers. Results: Adults showed a 34% increase in Type 2 expression compared to infants, but a 17% decrease in Type 1 expression. Hybrid fibers were prevalent across ontogeny (34%-56%). Log-linear analyses demonstrated significant differences ($p < 0.001$) in fiber type composition between age groups Conclusion: This preliminary analysis suggests <i>S. apella</i> SAT fiber type is not static across ontogeny and likely reflects increased occlusal-force demands with shifting dietary behaviors. It also reinforces previous work demonstrating the prevalence of hybrid fibers in primate jaw muscles.</p> <p>Funding: This research was supported by grants from the National Science Foundation's Biological Anthropology directorate (NSF-BCS-1945771, NSF-BCS-1944915, NSF-BCS-1945283, NSF-BCS-1945767).</p>
7	<p>Representation of primates in fiction films from 1900 to 2024. CARLYN M. JENKINS* and CRYSTAL RILEY KOENIG. Southern Utah University.</p> <p>Background: This research examines the evolution of non-human primate representation in fiction films from the early 1900s to the present. Methods: Fiction films were included in the dataset based on the following criteria; 1) A primate must appear on screen for 10% of the movie; 2) films must not be amateur-made or animated; and 3) films must have been made between 1900 and 2024. Each film was screened for the actions of the primate and anthropomorphism created by the plot. We expected that: 1) modern films would show a decrease in anger and violence directed at primates; 2) older films would contain higher inaccuracies in describing primates; and 3) more recent films would have more primate screen time. Results: Forty-four films have been screened so far, with additional data collection ongoing. Four themes have become apparent. First, violence towards primates continues in modern films despite our expectation of greater respect for animals in recent years. Secondly, heavy use of scientific jargon about primates creates an air of authority in primate storylines, despite widespread inaccuracies in describing and discussing primates. Third, inaccuracies were consistent throughout sampling. Common inaccuracies include primates commonly originating from incorrect places, calling an ape a monkey, incorrect diet depictions, and overestimating cognitive abilities. Finally, an unexpected finding was that the majority of primate depictions fell into one of two categories: primates were typically depicted as either harmless, adorable, comedic relief (e.g. Gibby, Dunston Checks In) or as dangerous, violent creatures posing a threat to humans (e.g. Blood Monkey, Monkey Shines). Conclusion: The results of this research may help to inform standards for primate actors' welfare and have broader implications for how representations of primates impact conservation attitudes.</p> <p>Funding: This research was partially funded by the Connect Grant through the Gerald R. Sherratt Library at Southern Utah University.</p>
8	<p>Postural variation in bearded capuchin nut-cracking behavior. DIEGO A CONTRERAS*, GABRIELA OLIVEIRA AFFONÇO, NYLA S. CHEN, MÁBIA B. CERA, ADAM VAN CASTEREN, TAYLOR A POLVADORE, TATIANE VALENÇA, MARIANA DUTRA FOGAÇA, CLAIRE E TERHUNE, MEGAN A. HOLMES, JANINE CHALK-WILAYTO, TIAGO FALÓTICO and MYRA F. LAIRD. McGill University.</p> <p>Background: Bearded capuchin monkeys (<i>Sapajus libidinosus</i>) living in Ubajara National Park, Brazil frequently consume two hard-shelled nuts that require the use of stone tools: <i>Acrocomia aculeata</i> (macaúba) and <i>Attalea speciosa</i> (babaçu). Macaúba is the most ubiquitous food source for this</p>

	<p>population and is less mechanically challenging than babaçu. We test how techniques to successfully crack both nuts varied for this extractive behavior among adults. Methods: We analyzed 90 videos of bearded capuchins (36 males and 54 females) in lateral view using stone tools to perform single fractures of macaúba (n = 58) and babaçu (n = 32) nuts. Using the pose-tracking deep-learning framework SLEAP.ai, we recorded two-dimensional coordinates of 11 points across the body in addition to the stone and the nut, resulting in the quantification of a total of 4500 frames. Results: Generalized Procrustes analysis and principal components analysis (PCA) of the positional data indicate that along PC1 (21.1%), overall postural variation is driven by the distance the rock is held from the body's center of mass. Male and female adults show no significant differences in successful and unsuccessful cracking postures for macaúba, but PC1 values were significantly lower ($p = 0.026$) for successful babaçu cracks indicating that the rock was held closer to the body in comparison to unsuccessful cracks. Conclusion: Despite high variability in nut-cracking techniques in this population, these results highlight the importance of horizontal coordination between the hands and body for nut-cracking techniques in these bearded capuchins.</p> <p>Funding: This study was supported by NSF (BCS-1945771, BCS-1944915, BCS-1945283, BCS-1945767), The Leakey Foundation; The Animal Behavior Society, CAPES (#88887.511836/2020-00 and #88881.722618/2022-01); FAPESP (2018/01292-9); and The National Geographic Society (NGS-64133R-19).</p>
9	<p>Environment and joint size scaling in laboratory and wild macaques . MICHEIA-ROSE PERREAULT* and NICHOLAS B. HOLOWKA. University at Buffalo.</p> <p>Background: Limb joints must withstand gravitational forces during locomotion, and therefore, joint surface area generally scales with body size across species, however, within species, there could be variation in lifetime loading related to things like physical activity. Long bone cortices and trabeculae can respond plastically to loading, but the effects of loading on joint size are unclear. Methods: We predicted that macaques reared in laboratory environments with restricted mobility would have smaller femoral head articular surfaces relative to body size than wild macaques. The laboratory specimens in our sample (N=23) came from the University at Buffalo Primate Skeleton Collection, and the wild specimens (N=31) came from the Harvard Museum of Comparative Zoology. For all specimens the body mass of the individual had been recorded at death, and we calculated femoral head volumes using linear dimensions measured with calipers. We calculated the linear regression equation for the relationship between log body mass and log femoral head volume for wild macaques, and then calculated the deviation from this equation for femoral head volume in lab macaques. Results: Contrary to our hypothesis, we found that the lab macaques had larger joint sizes than predicted for their body mass. One possible explanation for this result is that the laboratory macaques were in positive energy balance, allowing them to grow relatively larger joints. Conclusion: By understanding the effects of loading on joint size are unclear but determining these effects could improve reconstructions of lifetime activity in fossils.</p> <p>Funding: Experiential Learning Network.</p>
10	<p>Hindlimb kinematics in wild chimpanzee quadrupedal walking. RYAN SRIVASTAVA*, THOMAS STILLWELL*, LAURA MACLATCHY and LAUREN SARRINGHAUS. James Madison University.</p> <p>Background: Chimpanzee locomotor kinematics has been studied primarily through a captive lens with limited understanding of how locomotor performance of captive individuals compares to those in the wild. As wild individuals are more active and often moving on uneven terrain compared to their captive counterparts, we measured the hindlimb kinematic performance of individuals in the wild and compared this to published results from captive individuals. Methods: We measured joint angles from video of quadrupedal walking in wild chimpanzees at Ngogo, Kibale National Park, Uganda. All sequences were filmed with individuals orthogonal to the camera. Hip and knee joint angles were measured at touchdown, midstance, and toe-off in 15 adult individuals (11 males, 4 females) with 8 of these individuals representing averaged values from repeated sampling. Results: Our preliminary data of hip and knee joint angles during quadrupedal walking overlap with published data (means and ranges) at touchdown and midstance but not during toe-off. Our wild sample mean hip angle of 134° and knee angle of 142° and the associated 95% CIs are higher than the published angle ranges for toe-off in captive Pan individuals. Conclusion: We found greater hip and knee extension during toe-off in</p>

	<p>wild Pan individuals compared to published captive data, which calls for further investigation to determine if this disparity is due to differences in other gait parameters (step length/speed), subject demographics, methodology, or environmental factors. If wild chimpanzees do move differently than their captive counterparts, this needs to be taken into consideration when using captive data in modeling typical chimpanzee locomotion.</p> <p>Funding: Jeffrey E. Tickle '90 Family Endowment in Science & Mathematics (JMU), National Science Foundation Grant 1850328, Leaky Foundation.</p>
11	<p>Locomotor strategies and ecological adaptations in Cercopithecidae: Insights from humeral and scapular morphology. ESHA SHARMA*, CHARMI PATEL*, CHRISTINA MCGRATH, ERNESTO GAGARIN and MARIE VERGAMINI. Virginia Commonwealth University.</p> <p>Background: The Cercopithecidae family, including cheek pouch and leaf-eating monkeys across Africa and Asia, exhibits diverse adaptations such as complex social structures, specialized digestive systems, and varied shoulder anatomy that correlate with different locomotor strategies, with shoulder joint anatomy serving as a crucial indicator of ecological adaptations and activity, as demonstrated by studies on fossil data from regions like Hadar and Ledi-Geraru linking the distal humerus to locomotion. Building on these findings, this project analyzes humeral head data in relation to scapular surface area, focusing on the teres major and minor muscle attachments to infer strength and locomotor strategies, while also using this muscle attachment data to reconstruct the paleoecological environments of fossil primates, potentially revealing the types of ecoregions, such as savannas or riverine forests, in which these species thrived. Methods: This study analyzes the morphology of the humeral head and its relationship to the scapula's surface area across different non-human primate species. A ratio was formulated based on the scapular surface area and humeral anatomy to infer muscle attachment sites, specifically focusing on the teres major and minor muscles. Data from both extant and fossil species are included to draw broader conclusions about the impact of muscle attachment on strength and locomotor behavior. Results: Preliminary findings suggest distinct correlations between scapular surface area and humeral head shape, particularly with respect to muscle attachment areas. Species with more robust teres muscle attachments appear to display stronger, more efficient locomotor strategies, especially in arboreal or terrestrial settings. Conclusion: Understanding muscle attachment patterns provides insights into the locomotor strategies and ecological adaptations of both extant and fossil primates. This analysis contributes to reconstructing paleoecological environments and the evolutionary implications of primate locomotion, offering a more nuanced view of their ecological niches.</p> <p>Funding: This research was funded by Virginia Commonwealth University's Undergraduate Research and Creative Scholarship Summer Fellowship.</p>
12	<p>Travel velocity patterns of lowland woolly monkeys (<i>Lagothrix lagotricha poeppigii</i>) at the Tiputini Biodiversity Station, Ecuador. NICHOLAS GUETERSLOH* and KELSEY ELLIS. Miami University.</p> <p>Background: Travel is a crucial function animals use to fulfill needs including food acquisition, reproduction, and finding sleeping sites. Given the cognitive demands of spatially and temporally locating preferred resources across a landscape, studies on naturalistic travel paths may help us better understand the cognitive capacities and spatial memory of the species in question. In primates, a number of studies have tried to better understand cognitive abilities and spatial memory of preferred resources (e.g., do primates use landmarks, sensory gradients, and/or Euclidean maps, etc.) using metrics such as speed and path linearity. Methods: We used location data collected between 2014 and 2015 on four groups of wild woolly monkeys (<i>Lagothrix lagotricha poeppigii</i>) from the Tiputini Biodiversity Station in Amazonian Ecuador to examine if average velocity (i.e., speed) differs between areas of repeated use (e.g., core areas, defined by 50% isopleth of kernel density estimates) compared to less used areas of their home range. Results: Similar to chimpanzees, woolly monkeys tended to move faster (average increase of 0.34 m/min across groups) in less used areas of their home range, however, this difference was only significant for group D ($W = 2118147$, $p\text{-value} < 0.001$). Conclusion: Despite being one of the smallest groups, Group D had the largest home range, and the need to traverse greater distances compared to other groups to monitor important resources may be one factor leading to this difference. Furthermore, the fission-fusion dynamics of woolly monkeys, especially at larger group sizes, may allow for greater amounts of inter-individual variation in spatio-temporal behavior, obfuscating results. Moving forward, we would like to look at path linearity in relation to resource value to further evaluate and understand woolly monkey spatial cognition.</p>

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13	<p>Use of passive acoustic monitors to detect early morning vocalizations in four sympatric primates (Alouatta, Ateles, Lagothrix, Plectorucebus) at the Tiputini Biodiversity Station, Ecuador. ASHLEY SIDERI*, ALLY SMITH* and KELSEY ELLIS. Miami University.</p> <p>Background: Direct observation of early primate vocalizations can prove challenging at times, especially when species, or individuals, are difficult to locate, are unhabituated, or have the tendency to alter their behavior in human presence (i.e., stop vocalizing). One way to mitigate this challenge is for researchers to incorporate the use of passive acoustic monitoring into their data collection protocol. Methods: To test the efficacy and efficiency of passive acoustic monitoring in capturing early morning vocalizations, we used BirdNet to locate and identify species specific calls, then compared the times of primate vocalizations recorded by long-term observers to those picked up by two types of passive acoustic monitors, Song Meters and Audiomoths, deployed across the Tiputini Biodiversity Station in Amazonian Ecuador. Results: We found discrepancies between the first morning vocalizations recorded by observers and those detected by BirdNet, particularly for those animals that routinely call before sunrise. For example, the first morning vocalizations recorded for Alouatta by observers was on average 63 mins (N = 127) after nautical twilight, whereas those detected from PAMs (N = 83) occurred 34 minutes after nautical twilight. Conclusion: We find that using passive acoustic monitors can be useful in complementing observer recorded data. The obvious time differences between the first vocalizations heard by the observers and the first times picked up by the passive acoustic monitors show that while having observers recording data out in the field is an important aspect of data collection, having additional methods of data recording can also be beneficial. In the case of this study, the passive acoustic monitoring data showed that the observers in the field were often missing recording the true first vocalizations of the primates in the morning.</p>
14	<p>Primate census surveying in Soqtapata -- A conservation concession in the tropical Andes of Peru. ELISABETH FRANK*, LAURA ABONDANO, YNGRID CORDOVA and KELSEY ELLIS. Miami University.</p> <p>Background: Census data can provide us with critical information about the presence of flora and fauna at a given site, which in turn provides us with important information about the distribution and habitat preferences of given taxa. In this study, we used census methods to identify the distribution of primate species/groups along an altitudinal gradient of Andean and Amazonian terrain found at Soqtapata, Peru to a) help clarify taxonomic designation of the primates at this site, and b) better understand their habitat preferences and group compositions. Methods: Census surveys were conducted over eight weeks in summer 2024 through linear transects by walking 4 km of main trails of the concession. Each time an individual/group was detected, species ID demographic data were recorded and location data were collected via a Garmin GPS. When possible, I conducted follows of individuals/groups & collected photographic data for identification. Results: Over two summers (2021 and 2024), we completed 94 census surveys with 19 primate encounters. We identified at least two groups of large-headed capuchins (Sapajus macrocephalus) and one group of woolly monkeys (Lagothrix sp.). There were 22 encounters of the Sapajus groups outside of the census periods and seven encounters with the Lagothrix groups. The average group composition of the Sapajus groups were 2-4 individuals. Conclusion: While we successfully encountered primate groups, there were 29 other primate encounters that occurred outside of census periods, highlighting the limitations of census surveys with unhabituated primates. Future research should consider more passive methods of data collection in order to detect the presence or absence of animals at sites that are more difficult to traverse and have limited visibility.</p> <p>Funding: Funding for this research was provided by the Rebecca Jeanne Andrew Memorial Award, Undergraduate Summer Scholars Program, Dean's Scholar Award, Undergraduate Research Award, and the Center for Career Exploration & Success from Miami University.</p>
15	<p>Passive acoustic monitoring and machine learning: A preliminary soundscape analysis of Soqtapata in Andean-Amazonian Peru . KATHRYN KEELEY* and KELSEY ELLIS. Miami University.</p> <p>Background: Passive Acoustic Monitoring (PAM) is an increasingly popular method of automated data collection that involves surveying wildlife and environments through the use of unattended sound recorders or acoustic sensors. Despite its potential, PAM has only recently been used to study primates. In this study, I used passive acoustic monitors to detect primate presence at Soqtapata-conservation concession occupying 9,600 hectares of</p>

	<p>Andean-Amazonian forest in the Cusco region of Peru—in which little research has been conducted thus far on resident wildlife. Methods: Audiomoth full-spectrum acoustic-loggers were rotated along the concession’s main trails over a period of nine weeks in the summer of 2024, gathering ~559,200 minutes of recordings. Recorders were deployed for approximately ten days before being redeployed elsewhere. To filter this data, RavenPro (an audio-visualization software) was first utilized to select a sample of vocalizations unique to a target species. These samples were then used to train BirdNET, a deep neural network, to automatically detect similar vocalizations in the remaining dataset. Arbimon, an AI-powered ecoacoustic analysis platform, was also used for its pattern-matching capabilities. Results: So far, we have detected capuchins (<i>Sapajus macrocephalus</i>), woolly monkeys (<i>Lagothrix lagotricha</i> sp.), and saddle-back tamarins (<i>Leontocebus</i> sp.) at the site. We believe that owl monkeys are also present, but have yet to identify their vocalizations in the recordings. Conclusion: PAM has proven to be a very useful tool, especially when identifying unhabituated species. However, a significant amount of training is required when utilizing machine learning analysis. BirdNET in particular struggles to differentiate between avian and primate vocalizations, as well as variation in primate vocalizations (chirps, long calls, barks, etc.) even when trained on a large set of sample data. Arbimon’s pattern-matching audio analysis currently demonstrates a strong ability to identify similar call-types and vocalizations from the dataset, but requires validating potential matches that, when working with an especially large dataset, can be time-consuming. Future analysis of this dataset will reveal more information regarding the temporal habits of Soqtapata’s resident primates.</p> <p>Funding: Undergraduate Summer Scholars (USS) and the Undergraduate Research Award Program (URA), Miami University.</p>
16	<p>Maternal positional behavior and energetics during infant carrying in <i>Propithecus coquereli</i>. WALTER T. THOMPSON* and ROSHNA E. WUNDERLICH. James Madison University.</p> <p>Background: Infant carrying has evolved multiple times in primates and is hypothesized to be energetically expensive. Sifakas (<i>Propithecus coquereli</i>) are strepsirrhine primates who use dynamic locomotor modes such as vertical clinging and leaping, yet they still carry their infants for more than 6 months and at over 30% of maternal body weight. Methods: We hypothesized sifaka mothers will experience higher energy expenditure or modify their locomotor behavior in response to infant growth. We fit two sifaka mothers at the Duke Lemur Center with Technosmart Axy-5 accelerometer collars and collected simultaneous video and acceleration data for 3 1-week intervals from 2 infants (3-6 months old). Positional behavior, overall dynamic body acceleration (ODBA, a proxy for energy expenditure due to movement), and peak acceleration were quantified relative to age and weight of the infant. Results: Overall frequency of infant carrying did not change significantly as the infant grew in weight, however carrying frequency during leaping decreased when the infant was in the heaviest weight class. The frequency of resting increased while traveling decreased as the infants grew in weight. Between infant ages of 3-5 months the mother’s ODBA increased, however, ODBA decreased around 6 months when the mother's carrying frequency was reduced. Conclusion: Infant carrying in sifakas is energetically expensive, associated with behavior modifications in mothers, and it is likely related to the relatively slow somatic growth observed in sifakas. Examination of the energetics of infant carrying in additional strepsirrhine primates can help us better understand the evolution and implications of this infant care strategy in primates.</p> <p>Funding: Support for this project came from the LSB Leakey Foundation, the Duke Lemur Center Director’s Fund, the JMU College of Science and Mathematics, and the Crabtree endowment to the JMU Biology Department.</p>
17	<p>The effect of younger siblings on first-time mothering success of female chimpanzees in Gombe National Park, Tanzania. LAUREN KIM*, SHANNON ROIVAS and IAN GILBY. Arizona State University.</p> <p>Background: In primates, the offspring of first-time mothers are less likely to survive than those of multiparous females, likely due to lack of experience with rearing. One way that nulliparous females may gain mothering experience and improve their likelihood of success is by providing alloparental care to their younger siblings. Our study investigated the correlation between survival probability of a female chimpanzee’s first-born and whether she had younger siblings prior to motherhood. Methods: We used long-term data from 33 first-time mothers in two communities of chimpanzees at Gombe National Park to quantify variation in offspring survival for primiparous mothers. Then, we employed a Cox proportional hazards model to compare survival through infancy, weaning, and adolescence for offspring of primiparous mothers with and without younger siblings. Results: Our results did not provide sufficient evidence to support the claim that having younger siblings improves the likelihood of success</p>

	<p>for first-time mothers. Conclusion: Overall, this suggests that 1) presence of younger siblings alone might not be a sufficient metric for capturing alloparental care experience, 2) there may be alternative explanations or benefits for providing alloparental care to siblings beyond gaining mothering experience, or 3) actual correlations may be obscured by our limited sample size.</p> <p>Funding: I have received full funding by Barrett, the Honors College in Arizona State University to cover the costs associated with attending the AABA 94th annual meeting.</p>
18	<p>Prevalence of color blindness in chimpanzees (<i>Pan troglodytes</i>). NICOLE A. RANGOUSSIS*, CLARA L. MARIENCHECK and BRENDA J. BRADLEY. The George Washington University.</p> <p>Background: My project explores whether chimpanzees have mutations at opsin genes that likely result in color blindness or changes in spectral tuning. If so, how does color blindness in chimpanzees compare to color blindness in humans (in terms of type and frequency)? Methods: I am examining the DNA sequences for 233 captive chimpanzees (<i>Pan troglodytes</i> versus) to identify the types of mutations at X-linked opsin genes (OPN1LW and OPN1MW), assessing likely functional impact of these variations, and calculating variant frequencies. This project is part of a larger consortium sequencing the full genomes of a large sample of chimpanzees. I am using variant call files to identify polymorphisms. I am looking specifically for amino acids mutations that can change the spectral tuning of opsin proteins by shifting the lambda max. Results: I have since identified 17 missense variants in OPN1LW at high frequencies in this sample set (minor allele ranging from 0.38-0.48). Six of these coding variants are in exon 3, one is in exon 4, and 7 are in exon 5, the exons that are most likely to impact spectral tuning. Conclusion: My preliminary results suggest that color vision variation might be more common in chimpanzees than previously realized.</p> <p>Funding: GWU Luther Rice Undergraduate Research Fellowship.</p>
19	<p>Gut microbial sampling as a proxy for SIV status in wild vervet monkeys (<i>Chlorocebus pygerythrus pygerythrus</i>). REESE E. HOTTEN-SOMERS*, JESSICA A. MARTIN, PRUDENT MOKGOKONG, ALICIA M. RICH, AMY M. SCOTT, MARYJKA B. BLASZCZYK, DESIRÉ L. DALTON, KATHERINE AMATO and CHRISTOPHER A. SCHMITT. Boston University.</p> <p>Background: Wild vervet monkeys (<i>Chlorocebus pygerythrus pygerythrus</i>) have a high prevalence of simian immunodeficiency virus (SIV). Unlike in humans, vervets do not experience dramatic immunodeficiency when SIV+, yet recent research has shown characteristic shifts in gut microbial composition; most notably underabundance of <i>Succinivibrio</i>, overabundance of <i>Veillonella</i>, and shifts in <i>Ruminococcaceae</i> and <i>Rikenellaceae</i> taxa. Methods: We developed an R-based bioinformatic method to predict SIV status using fecal microbiome data from 75 wild South African vervets from two sites: Soetdoring Nature Reserve and a farm near Gariep Dam. Using unsupervised clustering, we found two distinct microbiome enterotypes. Weighted UniFrac analyses using PcoA show significant differences in microbial abundance and composition in enterotype, but not sex, age, nor location. Permanova tests suggest significant interactions between enterotype with sex and site, which could be a result of sampling bias. Results: Twelve genera show differential abundance between enterotypes, including an unknown genus in the Order <i>Veillonellales</i> ($W = -4.33$, $p < 0.001$; LFC = -0.71) and <i>Gemmiger A</i> in the family <i>Ruminococcaceae</i> ($W = 4.00$, $p < 0.001$; LFC = 1.23), and proportions of key taxa in enterotype 2 are similar in relative composition to those published for SIV+ vervets; although enterotype 1 shows proportionately higher disease-causing taxa Conclusion: These results suggest that SIV infection is the primary indicator of microbial differences in wild vervets, and so gut microbial may be predictive of SIV status and a means of non-invasive disease tracking. We plan to verify our results by testing plasma matched to our microbiome sampling for SIV.</p> <p>Funding: Boston University Undergraduate Research Opportunities Program (UROP) to REHS; the Boston University Center for Innovation in the Social Science to JAM; original data collection was funded by grants to CAS from Boston University, The Leakey Foundation, and the National Geographic Society; sequencing was funded by a grant from the Wenner-Gren Foundation to KA.</p>
20	<p>Fruit consumption, species diversity, and neophobia in wild Panamanian white-faced capuchin monkeys (<i>Cebus imitator</i>). JESSICA D. JACOB*. University of North Carolina at Greensboro.</p>

	<p>Background: This study elucidates the role of neophobia in the seasonal foraging strategies of wild Panamanian white-faced capuchin monkeys (<i>Cebus imitator</i>) inhabiting the Sector Santa Rosa (SSR) in Northwestern Costa Rica. Methods: Using Veilleux et al.'s published dataset, over 650 foraging bouts of a wild population of Panamanian white-faced capuchin monkeys were analyzed. Statistical analyses were conducted on the number of fruits consumed, the number of species consumed and their frequency distribution, the relative frequency of fruit morphotypes, the number of fruits bitten and subsequently rejected, and the morphotype and species of rejected fruits. Results: As hypothesized, a greater number of fruits were consumed during periods of relative resource paucity. During periods of relative resource abundance, a wider array of species were consumed and rejections occurred more frequently. A strong morphotype preference for the consumption and rejection of fruits was identified. Conclusion: These findings suggest that capuchins employ an energy-maximizing approach to foraging in response to scarcity. The morphotype preference observed may reflect relative ease of detection, greater antioxidant capacity, or passive consumption of invertebrate pollinators. These results contribute to our understanding of the foraging strategies of an adaptable and highly intelligent primate species.</p>
21	<p>Males who sired offspring in captivity are not all fully flanged. MCKENNA HURLBUT*, STEPHANIE CANINGTON, SARAH FACHNIE and ALEXANDRA KRALICK. Bryn Mawr College.</p> <p>Background: Male orangutans exhibit a rare form of variation, with some developing secondary sex characteristics called flanges at puberty, whereas others delay flange development for years or even life. We investigate whether both flanged and unflanged males reproduce in captivity, as in the wild, or if zoo breeding practices favor flanged males, potentially limiting the use of captive populations for paternity research. Methods: We analyzed the first 1,265 captive male orangutans cataloged in the 2015 International Studbook. Flanging status was assessed for a subset (N=199; born 1919-2002), when available, using facial photographs from a newspaper archive (newspapers.com). We only include sons when looking at offspring. Results: Most sires appeared flanged at the time of reproduction; however, at least two males successfully sired offspring while lacking large flanges. Itu (ID 621) appeared to lack large face flanges at ages 11 and 12, siring a stillborn at age 12 before developing full flanges sometime before 16. Kyan (ID 608) also sired an offspring when lacking large face flanges. Conclusion: These results show that zoos are not necessarily selectively breeding only flanged males, consistent with wild studies that find males are capable of siring offspring without being fully flanged. Future directions include examining timing of flange development of fathers and offspring to examine heredity and flange timing as well as investigating the impact of stressful events such as transfer and capture on reproductive success and flanging status.</p>
22	<p>Shifting downtime: The impact of habitat type on resting behavior in white-handed gibbons across Thailand. LAUREN YOST*, THAD Q. BARTLETT and LYDIA E. O. LIGHT. University of North Carolina at Charlotte.</p> <p>Background: The effects of climate change on white-handed gibbons (<i>Hylobates lar</i>) in Thailand have yet to be fully investigated. Typical gibbon habitats, such as those in Khao Yai National Park, consist of lush evergreen forests with consistent fruiting seasons. However, such forests are becoming increasingly rare due to fluctuations in temperature, rainfall, human activity, and other impacts of climate change. Understanding and anticipating the challenges that gibbons and other primate species will face is vital for guiding research and conservation efforts. Huai Kha Kaeng Wildlife Sanctuary, located about five hours northwest of Khao Yai, presents a unique opportunity to observe how white-handed gibbons may adapt to their changing environment. The sanctuary is divided into two distinct biomes: an evergreen forest similar to Khao Yai and a savanna with sparse tree cover and lower abundance of ripe fruit. Gibbons are efficient energy minimizers, typically resting more during the cool season from November to January when fruit is in lower abundance. We hypothesize that one way gibbons facing lower levels of fruit availability adapt is by maintaining higher rates of rest year-round. This study assesses differences in behavior between two gibbon groups in Khao Yai National Park and two groups in Huai Kha Kaeng Wildlife Sanctuary to understand better how habitat influences rest. Methods: We used twelve months of observational data from Huai Kha Kaeng (Dr. Lydia E.O. Light, 2013) and twelve months from Khao Yai (Dr. Thad Bartlett, 1994). Groups D and L from Huai Kha Kaeng reside in the savanna biome, while groups C and A from Khao Yai serve as the control group, representing evergreen gibbon habitats. We calculated percentages by month and then pooled those data into seasons. The percentage of time gibbons spent resting was calculated by dividing the total number of resting observations by the total number of observations, with results broken down by month. We then conducted pooled t tests to compare the two data sets both overall and by season. Results: The Huai Kha Kaeng groups spent an average of 48.1% of their day resting annually, while the Khao Yai groups rested 26.2% of the time. When analyzed by season, the Huai Kha Kaeng groups spent an average of 50.8% of the cool</p>

	<p>season (November through February), 45.3% of the hot season (March through May), and 48.42% of the wet season (June through October) resting. The Khao Yai results showed that the gibbons spent 29.6% of their day during the wet season resting, 19.4% during the hot season, and 27.6% during the wet season. The difference in time spent resting was significant both overall [$t(22) = -6.76$, $p < 0.0001$] and in every season [wet: $t(22) = -6.76$, $p < 0.0001$; cool-dry: $t(6) = -3.33$, $p = 0.0159$; hot-dry: $t(4) = -3.75$, $p < 0.0200$]. Conclusion: These results indicate that gibbon activity budgets shift with changing seasons, allowing them to conserve energy as access to fruit decreases. In habitats like the savanna at Huai Kha Kaeng, seasonal shifts have a lesser impact compared to habitats like Khao Yai due to year-round resource scarcity. In the coming years, as habitats continue to decline, drastic shifts in the phenology of plants and animals will destabilize ecosystems. Conducting comparative studies between different habitats is essential for predicting how species may adapt their behavior to these changes.</p>
23	<p>Growing up baboon: Age-related grooming partner preferences among immature male olive baboons. ASHLEY W. WOOD*, NATALIA P. MUÑOZ*, MARISSA M. VESTAL* and MONICA L. WAKEFIELD. Northern Kentucky University.</p> <p>Background: Social grooming in primates is an important indicator of strength of social bonds. Among adult olive baboons (<i>Papio anubis</i>), there are distinct sex differences in grooming partner preferences. Notably, among adult males, social grooming with other males is highly uncommon. The aim of our research is to uncover the age in which these partner preferences change to represent the patterns seen in adulthood. Methods: For this study we are focused on weaned immature males and aim to analyze the changes in observed grooming partner preferences as male individuals age up from the juvenile to sub-adult life stage. We utilized three years of grooming data, January 2022 - December 2024, collected at the Uaso Ngirio Baboon Project (UNBP) to calculate dyadic grooming indices for all bouts involving a target juvenile or sub-adult. Data were collected by trained observers using a 1-0 sampling, in which a maximum of 1 bout per dyad was observed per day. Dyads were then coded as 'brother', 'sister', 'mother', or 'other', and analyzed accordingly. Results: We previously found evidence that sex-typic grooming partner preferences are developing in the juvenile life stage with juvenile females (JF) investing more time in grooming than juvenile males (JM). Where 54% of juveniles had their mother as one of their preferred partners, JFs were more likely to have their mother as a preferred partner than JMs (86% of JFs had their mother as a preferred partner compared to 36% of JMs). For this project we specifically focused on immature males and found that 60% of JMs had a maternal brother as a preferred partner, significantly more than other kin and non-kin partners ($X^2(3, N = 101) = 13.9275$, $p < 0.01$). This was surprising given the rarity of male-male grooming in adulthood. When we compare this to young sub-adult males, early results indicate a pattern of sub-adult males tending to shift their grooming focus to both sub-adult and adult female friends and begin to groom less with their brothers and other direct kin. Conclusion: It's possible that JMs prefer to groom with brothers over sisters and mothers because the mother is already focused on grooming with her daughters over her sons. In addition, relationships between brothers could last longer since upon transferring from the natal troop, their relationship with their mother and sisters end, whereas they may join new troops alongside their brothers. Sub-adult males on the other hand are shifting their focus to future mating opportunities by fostering relationships with unrelated females. This study demonstrates how individuals change their grooming patterns as they age up from the juvenile life stage to the sub-adult one.</p> <p>Funding: Funded in part by grants from Northern Kentucky University given to the Department of Sociology, Anthropology and Philosophy.</p>
24	<p>Morphological measures of developmental stress and prenatal testosterone in primates: cranial asymmetry and 2D:4D ratio. SKYE GRUBB*, SIMON APOLLO*, FRANCES J. WHITE and STEPHEN R. FROST. University of Oregon.</p> <p>Background: Fluctuating asymmetry is studied in primates, but less research connects fluctuating asymmetry with other anatomical measures of developmental stress in individuals. The degree of cranial asymmetry is thought to reflect the degree of genetic and/or environmental stress experienced during development. In contrast, the ratio of the second to fourth digit reflects levels of prenatal testosterone exposure, with low ratios (or a longer fourth digit) reflecting higher testosterone. This study seeks to find a possible relationship between morphological measures of developmental stress and prenatal testosterone levels as a whole-body phenomenon. Methods: The lengths of the 2nd and 4th proximal phalanges (2D:4D ratio) were measured via calipers in nine individual specimens. 31 landmarks (24 paired) on corresponding skulls from the same individuals were measured via a Microscribe-3DLX. Cranial asymmetry was calculated from landmark data using MorphoJ. Results: Nine specimens returned both 2D:4D ratios and cranial asymmetry (2D:4D mean 0.9142, sd 0.0619 and asymmetry 0.00125, sd 0.00147). The 2D:4D ratio and cranial asymmetry</p>

	<p>were significantly negatively correlated (Spearman correlation coefficient -0.750, $p=0.0199$). Conclusion: These results indicate association between cranial asymmetry and prenatal testosterone levels experienced by individuals during development. Individuals with low 2D:4D ratios showed higher levels of cranial asymmetry, suggesting higher levels of prenatal testosterone exposure may act as a stressor during development, affecting phenotypic expression of genotypes in populations. This expressed instability ultimately may impact perceived attractiveness of individuals with consequences for mating success.</p>
25	<p>Primates and pollution: <i>Macaca maura</i> roadside garbage interactions in Bantimurung-Bulusaraung National Park, Indonesia. JOAQUIN RAFAEL RAMOSO*, MEADOW OLIVAS*, PUTU OKA NGAKAN and ERIN P. RILEY. San Diego State University.</p> <p>Background: Waste mismanagement causes adverse environmental effects, including degradation of wildlife habitats, particularly along roadsides where animals encounter littered trash. Our objectives in this study were to 1) investigate how an endangered primate species, the moor macaque (<i>Macaca maura</i>), interacts with garbage along the major road that bisects Bantimurung-Bulusaraung National Park in South Sulawesi, Indonesia and 2) identify what types of trash they are attracted to. Methods: We conducted observations across six days in August 2024, recording all occurrences of macaque interactions (i.e., physical contact) with garbage. We recorded the type of trash they interacted with: bottle, cup, wrapper, plastic bag, box, provisioned food, or unidentified/other. We documented each individual's age-sex classification, whether they encountered the trash briefly or if they actively manipulated it for over three seconds, and whether they found the trash already lying on the ground or if it was directly provisioned (i.e., thrown at them) from a human. Results: We observed a total of 180 interactions, with 67.2% involving immature males. 81.1% of interactions lasted for a duration of over three seconds. Provisioned food was the trash type most commonly interacted with (36.7%), followed by bottles (19.4%) and wrappers (14.4%). Interactions were particularly frequent during traffic congestion when people were more likely to provision the macaques from their vehicles. These results suggest that immature macaques are becoming increasingly habituated to the presence of garbage and human provisioning. Conclusion: Our findings raise concerns as interaction with garbage can disrupt primates' feeding behaviors and expose them to physical harm, synthetic chemicals, and pathogens through entanglement, ingestion, and oral manipulation. In order to promote sustainable human-wildlife coexistence, conservation efforts should be directed to improve waste disposal infrastructure, reduce production of single-use plastic, and educate the public on the dangers of littering and provisioning.</p> <p>Funding: Our fieldwork was funded by a National Science Foundation International Research Experiences for Students grant. The project is titled, "People, primates, and tropical forests: Integrated primatological and ecological research to advance human-primate coexistence and ecosystem health in Indonesia" (Principal Investigator: Professor Erin P. Riley).</p>
26	<p>Investigating temporal changes in mandibular molar cusp areas in the <i>Australopithecus anamensis</i> - <i>A. afarensis</i> lineage. VALERIA TUKA*, GARY T. SCHWARTZ and AMANDA E. SLOTTER. Arizona State University.</p> <p>Background: Investigating morphological traits in the fossil record is key to understanding how extinct species lived and evolved over time. This study analyzes temporal change in mandibular molar cusp areas within the <i>Australopithecus anamensis</i>-<i>A. afarensis</i> lineage, the strongest case of anagenesis in the hominin fossil record. Examining how cusp areas evolved over time may allow us to assess whether changes in molar crown anatomy reflect shifts in dietary ecologies. Methods: The sample for this study includes occlusal photographs of mandibular molars (M1s and M2s) attributed to <i>A. anamensis</i> and <i>A. afarensis</i>. For the purposes of this study, cusp area is defined as the occlusal area a specific cusp (e.g., the protoconid) occupies on the surface of the molar, and was measured using the program ImageJ. The null hypothesis is that there would be no change (i.e., stasis) in overall occlusal crown conformation (i.e., cusp areas) over time within the <i>A. anamensis</i>-<i>A. afarensis</i> lineage. We used Spearman's Rank Correlation Coefficient to test for significant associations between geologic age of the specimens and cusp areas. Results: Preliminary results suggest that for all of the principal cusps—protoconid, metaconid, entoconid, hypoconid, and hypoconulid—we failed to reject the null hypothesis of stasis. It is important to note, however, that our sample size remains relatively small and is currently skewed toward molars attributed to <i>Australopithecus anamensis</i>. This imbalance may limit our ability to detect changes over time, and efforts to expand the dataset are ongoing. Conclusion: While previous studies found temporal changes in dentognathic anatomy in this lineage, our study provides no such support for temporal changes in mandibular molar cusp areas.</p>

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27	<p>Investigating dental morphology and evolutionary relationships in the Paranthropus clade. WILLIAM BRAEDON FARKAS* and GEOFFREY THOMAS. Florida State University.</p> <p>Background: The genus Paranthropus represents a group of hominins characterized by robust cranio-dental features, with their large post-canine dentition suggesting dietary adaptations to hard or abrasive foods. Investigating the morphometric variation in maxillary molars provides critical insights into their evolutionary development, ecological niche, and the ongoing debate over whether the genus evolved monophyletically or polyphyletically. Methods: To analyze maxillary molar morphology in the genus Paranthropus, I employ geometric morphometric methods, including precise landmarking of occlusal features to capture shape variation. These data are subjected to Procrustes Superimposition to remove effects of size, orientation, and position, followed by allometric analysis to examine the relationship between shape and size, providing insights into developmental and evolutionary patterns. Results: The results of my geometric morphometric analysis revealed significant shape variation in the maxillary molars of the genus Paranthropus, supporting a strong link between dental morphology and dietary adaptations. Procrustes Superimposition highlighted consistent shape patterns across specimens, with distinct clustering of <i>P. boisei</i> and <i>P. robustus</i>, suggesting possible ecological or functional specialization. Allometric analysis further demonstrated that molar shape variation was not solely attributable to size differences, indicating an adaptive response independent of allometric scaling. These findings contribute to the evidence for the genus's monophyletic evolution while also shedding light on its ecological diversification. Conclusion: This research provides new insights into the evolutionary development and ecological adaptations of Paranthropus through the detailed analysis of maxillary molar morphology, contributing to the ongoing debate about their phylogenetic relationships and adaptive strategies. These findings are highly relevant to paleoanthropology as they enhance our understanding of hominin dietary specialization, niche differentiation, and the broader evolutionary processes that shaped early human ancestors.</p> <p>Funding: The Anthropology Department at Florida State University has provided funding for the CT-scans of the specimens required for this research. The total payment is \$225.</p>
28	<p>Linking puku (<i>Kobus vardonii</i>) ecology to early hominin behavior: insights from seasonal floodplain adaptations. SWETHA GARBHAM*, SID MORAN*, ELIZABETH M. DOOLEY, AMY L. RECTOR and MARIE VERGAMINI.</p> <p>Virginia Commonwealth University. Background: This study, based in South Luangwa National Park, Zambia, explores parallels between Puku ecology and early hominin behavior. The Puku (<i>Kobus vardonii</i>), a medium-sized antelope native to south-central Africa, inhabits seasonal floodplains that experience dynamic ecological changes, including pressures that may mirror those faced by early hominins in similar environments. Methods: This project combined a literature review with data from the Zambia Rift Valley Research Project. Live animal census surveys were conducted across floodplain, woodland, and grassland habitats during the dry season. Vehicle-based surveys assessed mammalian distribution, while systematic bone walk surveys investigated taphonomic patterns. Geographic Information System tools analyzed spatial patterns of habitat use, species distribution, and environmental variables influencing Puku behavior. Results: Puku distribution was significantly influenced by temperature, time of day, river proximity, and seasonal variations. Observations indicated that Puku populations shift to drier areas during high-water seasons, likely to mitigate predation risks. Dietary analysis highlighted flexibility in resource utilization, echoing potential adaptive strategies of early hominins. Spatial analyses revealed discrepancies between live animal observations and skeletal remains, emphasizing the role of habitat structure in shaping ecological and taphonomic patterns. Conclusion: Linking Puku ecology with paleoanthropology provides valuable insights into the environmental pressures faced by early hominins. These pressures, including seasonal resource availability and predation risks, underscore the importance of integrating contemporary ecological research with evolutionary frameworks to enhance interpretations of hominin paleoenvironments.</p> <p>Funding: This research was funded by Virginia Commonwealth University's Undergraduate Research and Creative Scholarship Summer Fellowship.</p>

29	<p>A scoping review of maternal exposures and human milk miRNAs: Focusing on marginalization and intergenerational health outcomes. SAMANTHA WU*, ALLIE OH*, ERIKA YU* and AMY L. NON. University of Pennsylvania.</p> <p>Background: Human milk (HM) is rich in microRNAs, which may function through epigenetic regulation to improve the long-term health of the infant. The influence of maternal health and the environment on miRNA composition may serve as a mechanism for the intergenerational transmission of health outcomes or adaptations. This scoping review summarizes current literature on how maternal health and environmental conditions, especially pertaining to marginalized communities, may alter microRNA expression in human milk. Methods: We conducted a systematic search for all articles pertaining to maternal/infant factors and HM microRNAs (Pubmed and Embase), and extracted detailed information from the 63 included articles on differential miRNA expression, methodology, demographics, and inferred/observed infant health implications. Results: Although a range of maternal characteristics have been investigated, the distribution of focus varied greatly. For example, almost half the studies researched the effects of lactation stage, whereas only 12.8% examined associations with stress, infectious diseases, socioeconomic status, and race/ethnicity, collectively. Analysis of lactation stage revealed many altered miRNAs involved in immune, neural, and metabolic development, suggesting that early weaning – more prevalent among marginalized groups – may affect infant development. Another overarching trend included negative associations between adiposity-related measures and miRNA expression. Many other exposures and conditions showed promising associations, but limited comparable studies and conflicting results suggest more research is needed. Conclusion: Although the field has expanded considerably in recent years, more standardization of methodologies is needed for comparability of results, along with inclusion of more racial and social minorities, lending insight into mechanisms of intergenerational epigenetic transmission.</p>
30	<p>MOMS matter: A comprehensive analysis of the influence of maternal cultural and behavior factors on child development among Mexican Americans. KENDRA SANCHEZ*, LUCIA CICHOWSKI REJZEK*, PEYTON CLEAVER*, JASON OLINER*, KIMBERLY D'ANNA-HERNANDEZ and AMY NON. University of California, San Diego.</p> <p>Background: Rising rates of maternal and child health issues within Mexican American communities may be influenced by immigration-related psychosocial stressors. Further, early exposure to protective maternal sociocultural and emotional factors may also influence a child's growth, along with emotional adjustment. Methods: The current study leverages longitudinal biomarkers and social measures from the Mothers Open to Measuring Stress (MOMs) study, a cohort of Mexican-descent mothers and their children in North County, San Diego. Using linear models, we studied the influence of maternal sociocultural factors on infant stress response and development (cortisol reactivity to vaccines/medical visits, gestational age, and BMI percentile) at birth, 6 months, and preschool age. Results: Marginal bivariate correlations were found between infant gestational age and total maternal social support ($r = 0.1654$, $p = 0.085$), adherence to familism ($r = 0.170$, $p = 0.076$), and maternal anxiety ($r = -0.176$, $p = 0.067$); after controlling for maternal age, birth place, and relationship status, the association remained significant with a binary measure of maternal social support ($p = 0.0438$). While maternal factors did not associate with preschool-aged BMI percentiles, it is noteworthy that only half were at a healthy weight for their age or gender, via national guidelines. Conclusion: These findings suggest that in some cases, existing protective sociocultural factors within Mexican-American communities, such as social support and cultural values, may be important for child development and well-being. Findings may be useful for informing health and social policy and providing support for community-based initiatives.</p> <p>Funding: This work is supported by research grants from NIMH R15 (1R15MH099498-01A1 and 1R15MH11209-01) and NSF RUI (BCS 1651222) to Kimberly D'Anna Hernandez, NSF (2316775) to Amy L Non and Kimberly D'Anna Hernandez, as well as TRELS and UCSD Scholars Fellowship to Lucia Cichowski Rejzek, and CAMP fellowship to Kendra Sanchez.</p>
31	<p>Testing nonadult age estimation methods on a contemporary Taiwanese sample. KARA BECKER* and AN-DI YIM. George Mason University.</p> <p>Background: There are many different methods of age estimation for nonadult individuals, these methods vary in their application and used different reference populations. This research seeks to test different long-bone dimensions-based methods of nonadult age estimation in a Taiwanese sample. Using MCP-S-Age software developed by Kyra E. Stull and the Radiographic Postnatal Measurement Tables from Juvenile Osteology: A Laboratory and Field Manual (Scheuer et al., 2009). Methods: Different long bone measurements were taken from computed tomography (CT) scans from a</p>

	<p>sample of 117 contemporary nonadult Taiwanese individuals with known ages. Two methods were tested: the MCP-S-Age interface and Scheuer et al. (2009). The point estimates and age ranges were separately compared to the true age of the individuals to determine if the true ages fall within the estimated range (accuracy) and estimate bias and inaccuracy of each method. Bias was calculated by averaging the differences between the point estimate and true age, while inaccuracy was calculated by averaging the absolute differences between the point estimate and the true age. Results: The MCP-S-Age estimations were significantly (21.63%) more accurate than the estimation based on Scheuer et al. (2009) in reference to the overall estimated age range. With an accuracy rate of 82.64% for MCP-S-Age estimations compared to a 47.01% accuracy rate for estimations based on Scheuer et al. (2009). Compared to Scheuer et al. (2009) the MCP-S-Age software had less inaccuracy and bias, with an average inaccuracy from the true age being 2.37 years for the MCP-S-Age compared to 2.84 years for Scheuer et al. (2009). Due to the biases from the reference populations there was a tendency for the age estimations to fall above the true age for estimations based on Scheuer et al. (2009), and a tendency for the MCP-S-Age estimations to fall below the true age. A residual plot showed an increasing inaccuracy as age increases for both Scheuer et al. (2009) and MCP-S-Age. However, as age increases, the inaccuracy of the MCP-S-Age estimations decreases more than it does for estimation based on Scheuer et al. (2009). Conclusion: The results from this research indicated that for Taiwanese nonadult individuals, the best method for age estimation is to utilize MCP-S-Age software instead of Scheuer et al. (2009). Future studies will test other long bone dimensions-based nonadult age estimation methods.</p>
32	<p>The effectiveness of undergraduate learning assistants in forensic anthropology. MIKAYLA MILLER*. George Mason University.</p> <p>Background: The purpose of this study was to investigate the effectiveness of using undergraduate learning assistants in a 400-level forensic anthropology course. Methods: A lab activity was created by the undergraduate learning assistant to introduce students to the concept of subadult age estimation within forensic anthropology, allowing them to learn about methods that were not heavily described throughout the course. Oral feedback was collected during this activity. Grades and feedback from course evaluations were compared between two semesters: one without a learning assistant and one with a learning assistant. Results: Most students were interested and fascinated by the activity and correctly completed the assignment given to them. There was a slight tendency to overestimate ages in some portions of the activity, but this was only present in the teeth-related examples, indicating the learning objectives were completed. The learning assistant also received positive comments in the final course evaluations. Between the two semesters, there was a 2.65% increase in grade percentages overall (class average of 84.48% to 87.13%, $p > 0.05$, two-sample t test). There was a slight (0.1) increase in the average score in response to the question "I gained an understanding of the main concepts in this course" in the final course evaluations. Conclusion: Although the results were not statistically significant, there was a slight increase in grade percentages and students' self-assessment when the learning assistant was present in the classroom. Future studies will focus on investigating the effectiveness of incorporating more learning assistant-led course activities and the long-term outcomes of the course.</p>
33	<p>Assessing undergraduate beliefs and misconceptions about evolution in an introductory biological anthropology class. KRISTIN K. DAVIS* and HEATHER L. NORTON. University of Cincinnati.</p> <p>Background: ANTH 1003, Introduction to Biological Anthropology, is a course that fulfills a general education science requirement for students at the University of Cincinnati. It attracts students with varying class standings, and the majority of students are pursuing majors outside of STEM fields. Methods: To assess baseline understanding of evolutionary concepts as well as common misconceptions of evolution, we administered a voluntary survey to ANTH 1003 students at the start of the Fall 2024 semester (UC IRB #2024-0676). A total of 27 students (71% undergraduates) spanning 21 different majors (66% outside of the department of Anthropology) participated. The survey assessed concept comprehension of evolutionary theory (ET), scientific facts (SF), processes of evolution (PE), and the language of science (LS) using a 5-point Likert Scale. Results: Students showed a general understanding of ET/SF, but misconceptions were noticeable (i.e. 26% strongly or somewhat agreed that dinosaurs and humans lived at the same time). Students exhibited stronger comprehension of LS (i.e. 81% of students somewhat or strongly agreed scientific theories being a set of repeatedly tested hypotheses that have yet to be rejected). While students show a basic comprehension of general evolutionary processes, many lacked a nuanced understanding of detailed concepts (e.g. the role of genetic drift). Conclusion: Using these pre-course survey data, educators at UC will develop active learning activities to help address gaps in incoming student knowledge. Future studies will verify the effectiveness of these activities by implementing both pre- and post-course surveys to assess comprehension.</p>

	Funding: Charles Phelps Taft Research Center Mentor/Mentee Grant.
34	<p>The historical and demographic differences between donated and purchased individuals in skeletal collections: Impacts on education and research. STELLA RIEHL*. Loyola University Chicago.</p> <p>Background: The use of human skeletal collections for research and education is a critical topic for discussion, as there is a long history of exploitative acquisition of human bodies. Recent suggestions for change include using ethically donated skeletal remains. The goal of this research is to compare the demographic and pathological profiles of human remains purchased from biological supply companies in the 1960's and 1970's by Loyola University Chicago's Department of Anthropology with skeletons acquired through the National Body Donor Program, and to explore whether differences might impact education and research. Methods: Age at death and sex estimations of 36 skeletons were undertaken following the guidelines employed within biological and forensic anthropology; pathological conditions, such as trauma, neoplasm, and developmental anomalies were noted when applicable. Results: The results of this analysis indicate that individuals whose bodies were recently donated have an appreciably greater age at death, as well as a higher frequency of pathological conditions and medical interventions than those purchased decades ago. Conclusion: It appears that recently donated remains reflect the lives of individuals who could afford medical care and lived longer with chronic conditions. Individuals whose bodies were purchased from biological supply companies remain unknown and nameless; their bodies likely reflect lives impacted by marginalization, structural violence, and exploitation. While both groups of individuals provide paleopathologists with vital information about disease processes and the inextricable links between lived experiences and disease outcomes, it is essential to appreciate the histories behind each human when seeking to understand health and disease, past and present.</p>
35	<p>How presentations of human evolution, modern human diversity, and the concept of race differ in natural history museum exhibitions around the world and why it matters. JAMIE MILBY*. University of Delaware.</p> <p>Background: Museums are authorities for disseminating scientific information to the public. Human evolution exhibits address questions of who we are, where we come from, and why we are here, with modern human diversity and race intimately intertwined within these questions. How and why do natural history museums in differing cultural contexts present the story of human evolution, modern human diversity, and race to the public differently? Methods: I travelled to six natural history museums in three countries to document each human evolution exhibition. I examined the mediums, language, and design used and analyzed the existing literature on museum exhibition design and audience learning outcomes. Results: Each museum uniquely combines the interests of the curators and the narrative they find important. A key theme emerged in museums within the same cultural context. American museums focus on evolution prior to Homo sapiens, largely avoiding deeper conversations on modern human diversity and the concept of race. Instead, both worked to reconcile religiosity and evolution for their audience. South African museums highlight current and historical issues within anthropology, focusing on a shared African heritage and the meaning of self-identity in a post-apartheid era. British museums represent a transitory middle ground for opening opportunities for deeper discussions. They also tend to have more focus on regional archaeological heritage. Conclusion: Museums balance internal influences with the external experiences of visitors to create educational exhibits distinct to their culture. As a result, human diversity, race, and evolution are interpreted and displayed differently around the world.</p> <p>Funding: David A. Plastino Scholars Program.</p>
36	<p>Descriptive analysis of educational goals and fertility desires among individuals of North Carolina. NOELLE HARRIS*, ANNELIESE LONG and AMANDA THOMPSON. University of North Carolina at Chapel Hill.</p> <p>Background: This research explores the relationship between educational goals and fertility preferences among individuals capable of childbearing in North Carolina. The objective of this analysis was to evaluate the relationship between educational goals and fertility, since prior work has suggested higher education has been associated with higher likelihood of delaying and/or forgoing having children. Methods: Primary data was obtained through the Fertility Expectations, Experiences, and Life Intentions study in North Carolina from July to October 2024. The project consisted of a study questionnaire (N=188) and interview (N=29). Among the questionnaire participants, individuals were split into four groups (based upon their</p>

	<p>anticipated years left of education) to descriptively examine how educational goals were related to fertility desires: no more education, those unsure, 2-4 years left, and more than four years left. Results: Participants were asked their timeline for childbirth and were given choices of “less than 2 years”, “2-5 years”, and “more than 5 years.” The group that most wanted children within 2 years were those not pursuing further education, while those with 4 or more years had an increased likelihood of wanting children after 5 years. Conclusion: Further analysis demonstrates that those who had attained their educational goals and wanted children within 2 years disproportionately valued stability. Many discussed the importance of a permanent home and a career that could provide the desired family benefits. Understanding how childbearing individuals prioritize and weigh educational factors in their decisions in raising children will allow anthropologists to better understand the nature of the constraints surrounding childbirth in North Carolina.</p> <p>Funding: Anneliese Marie Long acknowledges funding from the UNC - Carolina Population Center (T32- HD091058) and the UNC - Center for the American South.</p>
37	<p>Class affordances for queer mental health outcomes within the family planning process. SANG PARK*. University of North Carolina at Chapel Hill.</p> <p>Background: This topic looks at queer parents undergoing the family planning process and the structural barriers to achieving their ideal family. Methods: Semi-structured interviews were conducted with queer couples undergoing the family planning process or the process of being a queer parent to a kid and reflecting on their initial planning process. Questions about the role of community, assisted reproductive technologies, and non-traditional, folk healing routes were asked in relation to the process. Results: We found that queer community played a significant role in aiding mental health issues which were exacerbated by structural barriers within the family planning process for queer individuals. Moreover, we found that financial access to doulas, medical technologies such as IVF and reciprocal IVF, and non-Western medical practices such as acupuncture facilitated good mental health outcomes. Moreover, individuals represented their own value systems regarding parenting which acknowledged the nuances of gender diversity; namely, people recategorized to-be parents as 'womb-energizing' and 'womb-carrying.' Conclusion: Mental health outcomes and the ability approximate one's ideal family structure are subject to much internal variation within queer populations, whereby medical services that subvert the structural barriers to family planning as a non-heterosexual couple are only available to those who can afford them. (Also will touch on the interviewees' personal value systems and how they can be better integrated into the medical system in a structural, affordable manner).</p>
38	<p>Understanding metabolic syndrome in older Vietnamese adults: The role of customized diagnostic criteria and definitions. CAMILLA RIZZI*, ALAN A. COHEN and ROBERT L. TENNYSON. Bishop's University (Canada).</p> <p>Background: Metabolic Syndrome (MetS) refers to a cluster of conditions, such as high blood pressure, obesity, and abnormal cholesterol levels, that significantly increase the risk of heart disease, diabetes, and other chronic health issues. While global MetS rates are rising rapidly, it remains unclear whether they reflect a singular underlying biological construct or context dependent variations. Understanding MetS across diverse populations is critical for assessing health trends and advising effective public health interventions. Methods: This study utilizes data from the Vietnam Health and Aging Study (VHAS), which includes 2,447 adults aged 60 and older. We assessed Metabolic Syndrome (MetS) prevalence using three diagnostic criteria: NCEP ATP III (2001), Modified NCEP ATP III - Asian Specific Adaptation (2005), and IDF (2005). To examine whether MetS functions as a single construct or consists of distinct metabolic dysfunctions, we conducted principal components analysis (PCA). PCA was used to evaluate how MetS components cluster together and to determine the proportion of variance explained by each principal component. Results: Our analysis revealed that the Modified NCEP ATP III - Asian Specific Adaptation (2005) identified the highest prevalence of Metabolic Syndrome (MetS), particularly among women. Principal components analysis (PCA) indicated that MetS components did not load onto a single factor but rather distributed across multiple dimensions. The first principal component (PC1) explained 29.5% of the variance, while the second principal component (PC2) explained 22.9%. These findings suggest that MetS is not a singular biological construct but rather a set of distinct metabolic dysfunctions, challenging the universality of standard diagnostic criteria. Conclusion: Our findings challenge the assumption that Metabolic Syndrome (MetS) is a universal biological construct, highlighting the need for culturally and regionally specific diagnostic criteria. By demonstrating how metabolic health varies across populations, this research contributes to biological anthropology, emphasizing the interplay between biology, environment, and socio cultural factors in shaping health outcomes.</p>

39	<p>Intimate partner violence predicts accelerated biological aging in young women. ALLISON OH*, SOFIA CARRERA, CHRIS KUZAWA and THOMAS MCDADE. Harvard University.</p> <p>Background: Social support predicts health and longevity across primates and is hypothesized to slow biological aging in humans. However, it is unclear how intimate partner violence (IPV), a major violation of a fundamental social bond, impacts biological aging. This study leverages epigenetic clocks to examine the relationship between exposure to IPV and epigenetic age acceleration (EAA) in women. Methods: Data come from the Cebu Longitudinal Health and Nutrition Survey based in the Philippines. Women from a "younger" (N = 828) and "older" (N = 1058) cohort (mean age 20.9 and 48.5 years, respectively) reported experiences of IPV (physical, emotional, or threat-based). Linear models were used to predict EAA, measured using the Horvath, PhenoAge, and GrimAge epigenetic clocks. Results: The relationship between IPV and EAA was age-dependent. All types of IPV predicted accelerated aging in young women. PhenoAge revealed the largest effect sizes: physical (p-value < 0.001, β = 2.00), emotional (p-value = 0.002, β = 1.29), and threat-based (p-value < 0.001, β = 1.89). No significant associations were found in the older cohort. Results were unchanged when controlling for socioeconomic factors. Conclusion: These findings suggest that IPV predicts accelerated biological aging in young women, with no association in older women. Young adulthood may be a critical period of exposure to IPV. Alternatively, the effect on EAA may be temporary, and the "younger" cohort likely experienced IPV more recently than the "older" cohort. Longitudinal sampling of the same individuals can further test this possibility.</p>
40	<p>Assessing the impact of access to government services on food insecurity and the prevalence of chronic health conditions in people experiencing housing insecurity. ISABELLA ALBIANI*, TIAN WALKER, ALLISSA VAN STEENIS, L. ZACHARY DUBOIS, LESLEY JO WEAVER and J. JOSH SNODGRASS. University of Oregon.</p> <p>Background: People struggling with housing insecurity face many obstacles, such as the challenges of enrolling in health insurance and SNAP benefits, both of which have been related to lower prevalence of chronic disease. This study aims to assess how enrollment in these programs affect food security and chronic health conditions amongst adults experiencing houselessness in a mid-sized city in Oregon. Methods: Participants were asked if they have health insurance and if they are currently receiving food stamps. Food insecurity was assessed using a modified version of the USDA's food insecurity module, while chronic health conditions were assessed using the average of three sitting blood pressure measurements to assess possible hypertension and a single finger prick blood test for HbA1c to screen for diabetes. Results: Preliminary analyses of participant data (n=243) revealed 92% of participants reported having health insurance coverage while 19% reported receiving food stamps. 78% of participants met the diagnostic criteria for hypertension (systolic \geq 140, diastolic \geq 80) and 14% met the criteria for diabetes (HbA1c \geq 6.5%). A Welch's t-test indicated a significant difference in systolic blood pressure between participants who were on food stamps (n = 39, M = 127) and those who were not (n = 173, M = 135) (t(85.75) = -2.63, p = 0.01). Future analyses will determine the level of food insecurity amongst participants using an aggregate score of the modified USDA questionnaire. Access to insurance and SNAP will be examined in relation to food insecurity scores and chronic health condition diagnoses using multivariable regression analyses. Conclusion: The exploration of structural factors, such as access to government benefits, helps us understand how these as social determinants of health contribute to poor health outcomes for marginalized populations.</p> <p>Funding: The larger project is funded by the NSF, my research has been funded by the University of Oregon Center for Undergraduate Research and the Clark Honors College Mentored Research Project.</p>
41	<p>Unjust science: The stewardship and repatriation responsibilities of institutions with African American remains . ADRIENNE M. KULLY* and OLIVIA A. JONES. West Virginia University.</p> <p>Background: The existence of African American remains in institutional osteological collections reflects a troubling legacy of exploitation tied to enslavement, grave desecration, and scientific racism. These practices reflect human rights violations and have reduced African American remains to objects of study, overlooking their cultural and human significance. This study aims to examine institutional failures in handling these remains and advocates for reforms grounded in restorative justice principles. Methods: Historical and contemporary sources, including peer-reviewed articles, archaeological case studies, and legal discussions provide the foundation for analysis on the treatment of African American remains. Key materials</p>

	<p>include the African Burial Ground Project, studies on illicit grave robbing, and research into various institutional policies. Legal scholarship on the proposed African American Graves Protection and Repatriation Act (AAGPRA) informs discussion on the need for formal protections. Ethical frameworks, particularly restorative justice, were used to assess institutional policy oversights, including transparency in acquisition practices and engagement with descendant communities. The absence of legal protections akin to the Native American Graves Protection and Repatriation Act (NAGPRA) is also examined. Results: The results identify an overall lack of many institutions to address their treatment of African American remains, including inadequate community consultation and a lack of transparent institutional policies regarding acquisition and repatriation. Many institutions still do not have internal frameworks or policies for reviewing potential skeletal donations, resulting in systemic inequities in acquisition and care of these remains. Conclusion: Therefore, this research identifies persistent failures of institutions that represent a damaging ongoing ethical issue for the entire disciplines of anatomy of anthropology. By engaging descendant communities in decision-making and establishing legal protections, institutions can foster trust, accountability, and begin long-term healing. The implementation of restorative justice principles in the stewardship of these remains is crucial to addressing historical injustices and promoting social justice.</p>
42	<p>The skeletons in our closets: Legal and ethical dilemmas of university-controlled human osteological collections. JACOB SMERTNECK*, ADRIENNE M. KULLY* and OLIVIA A. JONES. West Virginia University.</p> <p>Background: Human skeletal remains are an integral resource for anatomical research and training; however, these collections may present a complex dilemma at the intersection of law, ethics, and institutional history. Continued use of human remains with little to no provenance raises critical questions about consent, cultural sensitivity, and compliance with laws such as the Native American Graves Protection and Repatriation Act (NAGPRA). While NAGPRA provides a legal framework for the stewardship and repatriation of Indigenous Ancestors, no equivalent federal law exists for human remains of unknown origin. Although modern ethical theory and current initiative offer guidance, such as the American Anthropological Association's Commission for the Ethical Treatment of Human Remains recommendations, the lack of universally accepted standards for preservation, documentation, and ethical handling of human remains leaves significant gaps in addressing situations that do not fall under NAGPRA's purview. Methods: This study conducts a review of three U.S. universities and two U.S. museums to evaluate adherence to ethical guidelines and legal compliance. This sample was chosen because these cases presented publicly available information, and the resulting public scrutiny was severe. Furthermore, a review of U.S. legislation regarding human remains of unknown provenance was performed. Results: The results highlight key challenges in provenance research, such as insufficient funding, lack of specialized identification and archives training, and inadequate record-keeping. Additionally, a significant gap exists in legislation regarding ethical treatment of human remains once they enter an institution, relying primarily on unenforced recommendations. Conclusion: By emphasizing transparency and accountability in institutional practices, this study suggests that provenance research and ethical standards are essential for restoring public trust and fostering unbiased research at institutions. Future research will aim to apply these principles to a collection of unknown origin housed at a U.S. university to develop a practical, ethically informed model for long-term care.</p> <p>Funding: Federal Work-Study and WVU Eberly College of Arts and Science.</p>
43	<p>Social class, identity, and cranial modification in the ancient Andes. ZENUS FRANCIS* and ARMANDO ANZELLINI. Lehigh University.</p> <p>Background: I sought to investigate the relationship between cranial modification and eliteness across the Ancient Andes to determine if modification was a method of ascribing status. I hypothesized that cranial modification would be more prevalent in sites where it was associated with eliteness than in sites where it was indeterminate of elite status. Methods: I conducted a meta analysis on the relationship between elite status and cranial modification from a data base of sites across the Andes region. I built a dataset that differentiated sites where cranial modification was associated with elite status and where it determined to not be associated and conducted statistical analysis comparing populations of unmodified and modified individuals. I conducted this analysis between sites, within sites, and across temporal periods to understand the dynamics and change of these patterns. Results: Using a chi-square test I was unable to show any statistical difference between eliteness and modification populations. Additionally, I was unable to observe a statistical difference in the unmodified and modified populations across all sites. Conclusion: Conducting a meta-analysis of cranial modification across the Andes region, I was unable to support my hypothesis that cranial modification was a tool for inscribing elite status.</p>

	Conducting a meta-scale analysis of cranial modification can help us understand large geographical and temporal patterns of cranial modification, which can illuminate its relationship to social structure.
44	<p>Weaning and the waxing and waning of empire in pre-hispanic Arequipa, Peru. FAITH HAVENS*, ASHLEY BACKUS*, CAMILA ALVAREZ*, JUAN MARTINEZ-LOPEZ* and BETH K. SCAFFIDI. University of California, Merced.</p> <p>Background: This study conducts stable isotope analysis of tooth dentin from 4 different sites located in Arequipa, Peru to compare weaning ages and early life dietary changes. The sites of Quilcapampa and Beringa were inhabited by commoners, while Uraca and La Real were inhabited by elites, all of which are mid-elevation sites. These sites are dated from the Early Intermediate Period (~200 BCE-750 CE; Quilcapampa) through the Late Intermediate Period (1100-1432 CE; La Real, Berina, Uraca). Methods: Each tooth was properly cleaned and ablated before being microsectioned – the microsectioned teeth were soaked in 10mL of HCl, rinsed (x3) with Millipore, oven-dried, freeze-dried, and stuffed as lyophilized collagen into capsules for analysis on a Costech Elemental Analyzer. Comparisons between site, sex, and temporal period groups were carried out by a student's t-test. Results: Our results indicated that females had higher $\delta^{15}\text{N}$ ‰ than males ($P = < 0.0001$) –none of the comparisons between groups yielded $\delta^{13}\text{C}$ ‰. Elite individuals had a lower $\delta^{15}\text{N}$ ‰ level than commoners ($P = 0.0195$). Quilcapampa had a lower $\delta^{15}\text{N}$ ‰ compared to the earlier sites ($P = < 0.0001$). Conclusion: Gender differences started in infancy in respect to proteins consumed, or female infants were breastfed longer than males. People at the Late Intermediate Period site may have consumed lower trophic level proteins due to climate stresses of the time, or perhaps they weaned sooner than the earlier sites. Future testing between these groups will calculate weaning ages based on this data and compare between groups.</p>
45	<p>Elements of diet or diagenesis? Multi-sited pXRF analysis of ablated archaeological teeth from Arequipa, Peru. ASHLEY BACKUS*, FAITH HAVENS*, CAMILA ALVAREZ*, JUAN MARTINEZ-LOPEZ* and BETH K. SCAFFIDI. University of California, Merced.</p> <p>Background: This project entails scanning for trace elements in tooth enamel, revealing information about the diet, movement, and health of the involved individuals. These teeth originated from multiple sites in Peru, the preliminary data was taken from a few sites in the Nasca and Majes regions. Methods: The teeth were first cleaned and ablated, some being sectioned for other tests within the lab. Using the SciAps X-505 portable XRF analyzer, we scanned each tooth's enamel. First using Hydroxyapatite as a standard, a baseline was established with four scans (two soil and two mining) to begin and end a session, also rescanning standards every ten samples. Each tooth was then scanned with the soil and mining setting. We tested for normality and ran a student t-test to compare select elements between sex and site based groups (Calcium, Iron, Zinc, Strontium, etc.). Results: Between the Nasca and Majes sites, Iron, Zinc, and Strontium were found to have a statistically significant difference. Nasca teeth lead in both Iron ($p=0.0305$) and Zinc ($p=0.0038$), with Mojes leading in Strontium ($p<0.0001$). Conclusion: The differences in elements we do see between sites could be due to different levels of diagenetic contamination. To control for this, next steps involve analyzing more of the elements on a larger group of sexed individuals from more sites to see if there are further differences. This will also be done on a larger suite of evidence, comparing soil and mining data. This project will hopefully shed light on biological and diagenetic processes in a non-destructive way, opening doors to more non-destructive analysis in biological anthropology.</p>
46	<p>Maternal mortality in urban and rural communities in 19th-century Upstate New York . EMILY J. REARDON* and SHARON N. DEWITTE. University of Colorado Boulder.</p> <p>Background: We examine urban vs. rural maternal mortality in the context of increasing urbanization in late 19th-century upstate New York. Access to medical care and the transition to medicalized childbirth can exacerbate poor pregnancy outcomes. Historically, prior to the adoption of antisepsis procedures in routine obstetric care, childbirth in health care facilities could increase the risk of puerperal fever (sepsis). Methods: We assess trends in maternal mortality using data ($n = 6241$) from Federal and State census records c. 1850-1880 for towns in primarily rural Madison County and from the city of Syracuse (Onondaga County). We use Kaplan-Meier survival analyses to assess differences in survivorship between 1) urban and rural communities, and 2) males and females. Results: We find no significant difference in the recorded proportions of deaths attributable to maternal causes between Syracuse and Madison Co. However, we do find significantly lower survivorship in Syracuse overall. Further, in Syracuse, but not in Madison Co., males ages 15-40 experienced better survivorship than females, but females had better survivorship than males after age 40. Conclusion: The survivorship results suggest that, in Syracuse, male health was better than that of females during reproductive ages, but female health was better</p>

	<p>at post-reproductive ages. This might indicate the negative effect of maternal mortality on female health patterns in general that are not detected in the cause of death data. The lack of this trend in rural Madison Co. might suggest that both sexes experienced equal levels of health across all adult ages.</p> <p>Funding: This research benefited from administrative and computing support through the University of Colorado Population Center (CUPC) funded by Eunice Kennedy Shriver National Institute of Child Health & Human Development of the National Institutes of Health (P2CHD066613).</p>
47	<p>Vitamin D deficiency at Lisht. MATTHEW D. HARRINGTON* and ALYSON CAINE. Dickinson College.</p> <p>Background: Rickets or bowing in long bones is the most common feature of vitamin D deficiency associated with the skeleton; however, genu valgum or “knock knees” is much less represented in paleopathology. Here, our research examines the prevalence and severity of possible genu valgum in the form of tibial torsion in a minimum of 39 individuals from the Egyptian Middle Kingdom period (2050–1650 B.C.E) site of Lisht. Methods: Using photographs of tibiae derived from the 39 individuals at the site, we determined the severity of genu valgum through examining and measuring the tibiofemoral angle: 0° to 11° normal, 12° to 20° slight genu valgum, 21° to 30° severe genu valgum. These angular measurements were replicated and executed both in person using a physical protractor and online, through a digital protractor Google Chrome extension. Age and sex were also associated, where possible, to understand how this alteration is impacting males and females as well as adults and non-adults. Analysis of the data was conducted using Microsoft Excel. Results: Of the 104 tibiofemoral measurements, 83 were severe and 21 were moderate. Concerning sex distribution, 51 tibiae were possible female (PF), 9 F, 27 possible male (PM), and 3 NA. Conclusion: These results help to provide insights to the distribution of genu valgum in the Lisht skeletal collection and support future research on the influence of genu valgum on the experience(s) of disability for ancient Egyptians at Lisht, including potential instances of healthcare. These results provide a more holistic view on the Middle Kingdom period and the individuals from Lisht.</p>
48	<p>Genetics, seasonality, and skin reflectance: Evaluating pigmentation assumptions in two South African groups. LILY HEALD*, MIMI LI, JIAN KANG, ABHIMANYU ABHIMANYU, ANNA K. COUSSENS, CELESTE E. NAUDE, GEORGE CHAPLIN, LAUREL N. PEARSON, RENE GOLIATH, MARK D. SHRIVER, ROBERT J. WILKINSON, NINA G. JABLONSKI and TINA LASISI. University of Michigan.</p> <p>Background: Skin pigmentation is a complex trait influenced by genetic and environmental factors, with facultative pigmentation reflecting the skin’s response to UV exposure. Traditionally, inner arm pigmentation is used as a proxy for constitutive pigmentation, while the forehead-inner arm difference is assumed to represent facultative pigmentation, but these assumptions remain untested in diverse populations. Methods: To explore this, we collected skin reflectance data from 103 individuals from two South African groups, Cape Mixed and Xhosa. We measured skin color on the forehead and inner arm using a DSMII colorimeter, analyzing different color spaces (CIElab, RGB) as well as melanin and erythema indices. We also used genetic PCA to compare ancestry between groups and conducted statistical analyses, including PCA and t-tests, to examine seasonal and group differences. Additionally, we collected data on participants’ sun exposure habits. Results: Genetic PCA showed that Cape Mixed individuals were more spread out in PCA space compared to Xhosa individuals, which likely reflects their higher levels of genetic admixture. T-tests revealed significant differences in inner arm melanin ($p < 0.001$) and erythema ($p < 0.001$) indices between groups in both winter and summer. Across seasons, pigmentation measurements varied significantly, challenging the assumption that inner arm pigmentation is a stable measure of constitutive pigmentation. Additionally, in some cases, forehead pigmentation was lighter than inner arm pigmentation, which contradicts the expectation that the difference between these two areas consistently represents facultative pigmentation. Conclusion: These findings suggest that single-timepoint measurements of skin pigmentation may not fully capture an individual’s tanning potential. Instead, longitudinal data and sun exposure history should be considered when studying facultative pigmentation. This study contributes to anthropology by questioning long-standing assumptions about pigmentation proxies and emphasizing the need for population-specific research on skin color variation.</p> <p>Funding: Support for this research came from funds from the Guggenheim Foundation, the Stellenbosch Institute for Advanced Study, the Academy of Science (SA), the UK Medical Research Council, and the Wellcome Trust.</p>

49	<p>A geometric morphometric approach for estimating group size from fossil footprint assemblages. ALLISON J. RUTLEDGE*, MICHAEL L. COLLYER and KEVIN G. HATALA. Chatham University.</p> <p>Background: Recent discoveries of multiple ~1.5 million year old fossil hominin footprint sites in the Turkana Basin of northern Kenya have advanced knowledge and raised new questions regarding anatomy, locomotion, and behavior in our fossil relatives. In addition to preserving direct evidence of Pleistocene hominin bipedalism, these sites may hold valuable information on group behavior in hominins that lived roughly 1.5 million years ago. As an important step towards understanding potential evidence for group behavior, we sought to develop a new quantitative approach for estimating how many individuals were responsible for making a given assemblage of fossil footprints. Methods: We used 2-D geometric morphometric methods to quantify footprint morphology in a large sample of experimentally-produced modern human footprints, including multiple footprints from the same research subjects. Using a discriminant analysis with leave-one-out cross-validation (LOOCV), we calculated the posterior probabilities of subject classification, to see how well individual footprints could be assigned to the subjects that made them. We also performed K-means clustering analyses for 2 to 50 hypothetical clusters, to ascertain whether clusters in morphospace might be used to estimate the total number of subjects. Results: We observed 83% correct classification of individual footprints in discriminant analysis, suggesting strong potential for this approach. The K-means analyses, which were naive to subject identity, suggested a range of 18-30 subjects was a reasonable estimate for group size and the true total of 25 research subjects was near the center of that range. However, hypothetical clusters and true subject clusters did not always directly correspond, as multiple sets of research subjects showed similarity in foot size and shape. Conclusion: This methodology shows promise for applications within paleoanthropology and paleontology. Continued development of this approach will enable greater detail and accuracy in reconstructing patterns of group behavior from fossil footprints.</p> <p>Funding: (NSF DEB-2146220) (NSF BCS-2335894) (NSF SMA-1409612) (NSF BCS-1232522).</p>
50	<p>Temporal relationship between mechanical properties in aging human femora. OLIVIA R. ÁRES*, STEVEN E. CHURCHILL and SARAH E. LITTLE-LETSINGER. Duke University.</p> <p>Background: Studying bone health in aging populations is crucial to improving quality of life and reducing mortality. Within four years following a hip fracture, patient mortality was three-fold higher than the general population regardless of cause-of-death (Panula et al. 2011). Fracture risk is elevated by age-related changes in bone mineral density and bone remodeling (i.e. bone resorption and bone formation) that negatively impact bone strength. Here, we ask whether age-related declines in bone mineral density temporally coincide with changes in cortical geometry, specifically periosteal expansion and endosteal resorption. Methods: Measures of structural (i.e. periosteal and endosteal perimeter) and material (i.e. bone mineral density: BMD) mechanical properties at the mid-diaphyseal femur were quantified in a sample (n=32) of males and females between the ages of 40-75 and of varied ancestries and socioeconomic backgrounds. Computed tomography scans were acquired from the New Mexico Decedent Image Database and imported into Dragonfly, where femora were isolated and material properties quantified. Results: Periosteal perimeter and endosteal perimeter both increased with age, indicating migration of the cortical shell further away from the neutral axis. These changes reflect a compensatory mechanism to maintain bone strength, here calculated as the cortical radius raised to the fourth power. BMD declined with age, falling sooner and steeper in females than in males, and began to decline before periosteal expansion and endosteal resorption. Conclusion: Our data show that age-related loss of BMD precedes changes in cortical geometry, suggesting that they are distinct processes. Further research will determine whether periosteal expansion and endosteal resorption can compensate for loss of bone mineral density to preserve fracture strength, as well as consider the relationship of demographic variables, including sex and ancestry.</p>
51	<p>Does posture affect arch index?. T. COLE MCFARLAND*, ASHE L. GOODEN and STEVEN G. LAUTZENHEISER . University of Tennessee.</p> <p>Background: Humans modify locomotor patterns in response to a change in substrate and external factors. Utilized by military, marching bands, and drill teams, in-line marching allows for smooth yet quick movements while maintaining an isolated upper body. Characterized by a vertical posture and lower steps, this movement allows individuals to appear identical to their group. It is not well understood how postural changes affect foot shape, specifically the longitudinal arch. Methods: Footprint shape can be used to understand how foot shape changes while walking. Arch index (AI), a</p>

	<p>proxy for arch height, quantifies the amount of sole-to-substrate contact in the midfoot relative to the entire foot. Twenty members (ages 18-23) of University of Tennessee's marching band participated in this study. Mass, stature, leg lengths, foot lengths, and navicular heights were measured for each individual. Unshod footprints were captured of each participant during quiet double (DS) and single stance (SS) and walking at their comfortable walking velocity. Each trial was repeated utilizing the in-line marching technique. AI for each footprint was calculated using ImageJ. Normality was assessed with the Shapiro-Wilks W test and Wilcoxon sign rank tests were used to detect differences between static and dynamic conditions. Results: Individuals' velocity was consistent between normal and marching dynamic conditions ($p=0.5$). Comparison across normal and marching conditions of DS and dynamic footprints showed statistical differences (all p's<0.05). Conclusion: These findings suggest a correlation between postural changes and the arch height. Furthermore, the findings indicate plasticity of the arch depending on the locomotive pattern.</p>
52	<p>Sex, gait, and load position: Understanding the energetics of loaded locomotion. YU-JIN YOUN*, ELOISA NGUYEN* and CARA WALL-SCHEFFLER. Seattle Pacific University.</p> <p>Background: Load carriage is a human universal and is predominantly carried by women globally; the presence of certain types of sexual dimorphism suggests that women are more effective carriers than men (due to their lower center-of-mass). Additionally, while several studies have compared the energetic costs of head-load placement (HLP, i.e., headload carrying) and center-of-mass load placement (COM, i.e., backload carrying), the costs associated with gait changes due to posture and arm swing caused by each load carrying method, are less understood. Methods: Here, we assess the relationship between load position and gait changes, comparing the energetic expenditure of females and males utilizing these carrying methods. Cost of Transport (CoT) was measured in females (N=6) and males (N=6) who walked in the following randomized conditions: unloaded (UL), back loaded (BL), back-loaded-with-empty-bucket (BEB), and head (i.e., bucket) loaded (HL). All loaded conditions consisted of the exact same added mass (7.3kg). Results: We found that the addition of a load significantly increased CoT regardless of load position and sex ($p<0.001$); however, the CoT significantly differed between all three loaded conditions ($p<0.001$), with a significantly greater CoT in HLP conditions than COM conditions ($p<0.001$). Furthermore, females exhibited a significantly lower CoT than males in all conditions ($p<0.013$). Conclusion: These findings suggest that gait changes associated with HLP, including loss of arm swing and rigid posture, cause greater energetic perturbations than load position alone, and illustrate the importance of having a lower center of mass for reducing metabolic costs of loaded locomotion.</p>
53	<p>Load carriage and load position: How placement influences gait . ELOISA NGUYEN* and CARA WALL-SCHEFFLER. Seattle Pacific University.</p> <p>Background: Load carriage is a human universal used to transport children and other resources (e.g., water) and load placement (e.g., back or side) can vary, which influences an individual's gait. Previous studies have assessed the energetic cost of center-of-mass placement (COMP) and head-load placement (HLP), but the kinematic changes during combined loads are less understood. Methods: Lumbar bending and arm swing amplitude were collected from participants (N=19) using OpenCap as they walked for four load conditions: unloaded (UL), back-loaded (BL), back-loaded-with-empty-bucket (BEB), and head-loaded (HL). All loaded conditions were 7.6kg, approximately 10% of the participant's mass. Conditions were differentiated as COMP (BL) or HLP (BEB and HL). Participants were not habitual head load carriers and used one arm to support HLP (one arm swing). Normal arm swing was maintained for COM conditions. Results: Using a multifactorial ANOVA, COM induces lumbar flexion while HLP induces lumbar extension ($p=0.011$). Additionally, a difference in arm swing amplitude was found ($p=0.058$). Normal arm swing (COM) had low swing amplitude while one arm swing (HLP) had a high amplitude, with the highest arm swing occurring during BEB. Conclusion: These findings imply that even when loaded mass is the same, different load positions are associated with kinematic changes that will have important energetic impacts and the potential for changes in skeletomuscular changes particularly via lumbar extension. These data are specifically relevant to understanding the demands placed on individuals around the world who carry water and/or children for long distances, particularly in places experiencing extreme drying during climate change.</p>
54	<p>The Influence of incline and load on speed, and energy expenditure. YEOGYEONG KIM* and CARA WALL-SCHEFFLER. Seattle Pacific University.</p> <p>Background: Walking is a key form of exercise and transportation in daily life; however, walking surfaces are not always flat! Studies have shown that changes in surface incline can significantly impact walking speed, energy expenditure, and gait patterns. Despite this, the interactive effects of incline and load remain underexplored. Here we aim to increase our understanding of the influence of incline on pedestrian speed and cost of transport</p>

	<p>(CoT), with a particular focus on whether these variables are further impacted by load. Methods: Twelve participants (six females and six males) walked along a 300m loop with a 20% incline out and a 20% decline back, in both loaded (back and head) and unloaded conditions. A repeated measures ANOVA was used to determine the interactive changes in speed and cost caused by incline and load. Results: As the incline increased, speed significantly decreased ($p=0.004$) and being loaded made the impact of incline slightly more extreme, with speeds slowly even further with head loads ($p=0.09$) than other conditions. In regards to CoT, both load and incline significantly increased cost ($p<0.001$ for both), but given that the direction was always the same, there was no significant interaction between these two challenges ($p=0.2$). Conclusion: These results suggest that while cost is influenced by both variables, it is gait characteristics specifically where we see these variables interact. Given the surge of interest in human populations moving into new niches, these interactions are ever more important for us to understand.</p>
55	<p>Does texting while walking really make you more efficient? The energetics of texting while walking under variable load conditions. MEGAN SIDES* and CARA WALL-SCHEFFLER. Seattle Pacific University.</p> <p>Background: As cell phones have become increasingly portable and handheld, an unexpected consequence may be our inefficiency while walking. Many studies have shown that the restriction of torso rotation, arm swing, and other slight movements can substantially increase the energy cost of walking, so we investigated whether the elimination of arm swing while texting increases the cost of transport (COT) under different types of load placement. Methods: Twelve participants walked under 4 different load conditions including unloaded (UL), baby loaded (BL), baby and empty bucket (BEB), and head loaded (HL) to find the COT. Under each condition, participants walked 320 m and during the last 140 m of this, participants typed with both hands while walking. A T-test was used to compare COT between all load placements and texting v.s. no texting. Results: COT while texting was found to increase under UL ($p=0.005$) and BL ($p=0.015$) conditions, but COT did not change between texting and no texting for BEB and HL (BEB $p>0.6$; HL $p>0.9$). The two conditions that restrict arm swing (BEB and HL) remain unchanged between texting and not texting illustrates that restricted arm swing is correlated with higher cost of transport. Conclusion: The practice of walking with preoccupied hands has become widespread in our mobile society, so understanding that this can take tolls on our already busy lives is critical to understanding our history and future as bipedal walkers.</p>
56	<p>The distracted stride: How phone use changes the way we walk. ELIZABETH DELGADO*, GURSAGAR SINGH*, ELOISA NGUYEN and CARA WALL-SCHEFFLER. Seattle Pacific University.</p> <p>Background: We live in a modern age where phones are constantly integrated into daily life, influencing the way humans move and interact with their surroundings. The increasing use of cellular devices has altered natural gait patterns, often restricting arm swing and leading to changes in stability. Methods: We measured stride length, step times, and speed using OpenCap as each participant walked a straight 30 m course. A total of 18 participants completed randomized walking conditions: arm swing (AS), no arm swing (NAS), and reading from a phone. A repeated measures ANOVA was conducted to analyze differences in gait parameters across all walking conditions. Results: The results revealed that gait speed significantly decreased when participants read from a phone ($p<0.001$) however, no sex differences were observed ($p=0.516$). A trend emerged in step width, as female participants narrowed their step while walking with a phone, whereas male participants widened their step width during NAS ($p=0.192$). Step length symmetry differed by sex, with males exhibited greater asymmetry under AS conditions, while females showed greater asymmetry during NAS conditions ($p=0.020$). Conclusion: Overall, the findings suggest that holding a phone introduces biomechanical changes that impact stability and movement patterns that alter gait greater than restricting arm swing, regardless of sex. This highlights the importance of understanding modern behaviors, such as smartphone use that can drive subtle yet significant changes to habitual locomotion.</p>
57	<p>The development and transmission of nut-cracking and stone-knapping skills in young children . HEATHER SALMONS* and SHELBY S. J. PUTT. Illinois State University.</p> <p>Background: One of humanity's defining features is the ability to transmit skills and behaviors through social learning, starting from a young age. The archaeological record of stone toolmaking offers some insights into the evolution of this feature; however, there is little research done on children's stone toolmaking abilities. Methods: A sample of 14 preschool-aged children participated in a study focusing on two stone tool-related tasks involving the extraction of a toy prize: a puzzle box , requiring a knapped flake to open, and an artificial nut, requiring a hammerstone to crack it open. The</p>

	<p>children were assessed on their working memory capacity and the effect this had on how they solved each task under three different learning conditions (insightful problem solving, reverse engineering, and imitation). Results: Productivity, efficiency, and expediency at each task were used to measure success in relation to their working memory size. Participants were successful at the nut-cracking task under each learning condition, and working memory size had no detectable effect on their performance. However, there was significant improvement on the knapping task between the asocial and social learning conditions, and there was a significant positive correlation between knapping task success and working memory size. Conclusion: Therefore, social learning may be necessary for hominins with a limited working memory size to successfully transmit knapping behaviors due to the complexity of the task. These results support an early emergence of complex social learning in human evolution.</p> <p>Funding: I was awarded the FIREbird award from Illinois State University that granted me \$1,500 for student research funding. The funding was used for hourly wages when I was collecting data for the study.</p>
58	<p>The relationship between maternal pre- and postpartum oxytocin levels and significant childhood adversity in human mothers. PAIGE B. WAGSTAFF*, KATIE KING, ALLISON HAYS, ALICIA ALLEN, LINNEA LINDE-KRIEGER, LELA RANKIN and STACEY R. TECOT. University of Arizona.</p> <p>Background: Expecting parents undergo physiological changes that are critical for caring for and bonding with their infant, but early childhood adversity can affect physiological responses in the body throughout an individual's life. Therefore, it's important to determine the effects of early life adversity on the physiological response in parents caring for their infants. Methods: To better understand how early life experiences can influence parenting as adults, we explored the relationship between early life adversity and concentrations of oxytocin (OT), a hormone known for its role in bonding, over time. We analyzed data from 29 participants enrolled in the study "Observing Relationships between Caregiving and Hormones after Infant Delivery" (ORCHID). During the first study visit, pregnant participants completed the Adverse Childhood Events (ACEs) survey and provided a baseline saliva sample. Postpartum, participants provided saliva samples each week for 12 weeks, and in months 4 and 5 (N=174 OT samples). Results: Using a regression model, ACE score significantly predicted mean early postpartum OT concentrations ($\beta = 0.44$, $p = 0.016$) and the average change in OT across postpartum weeks one through five ($\beta = 0.41$, $p = 0.028$). Conclusion: Although we predicted that those with higher ACEs would have a smaller increase and lower average OT concentrations after the birth of infants, OT and ACE scores were positively correlated, such that those with higher ACE scores had higher OT concentrations and a greater increase in OT. If higher OT levels act as a compensatory mechanism to overcome lower OT receptor function, this result may reflect resilience in parents with early life adversity.</p> <p>Funding: This research was supported by National Institutes of Health grant number 1DP2HD105541, the UArizona School of Anthropology, and the UArizona Undergraduate Biology Research Program.</p>
59	<p>Sex estimation from the arm in a contemporary American population. CAMILLE ROTHSCCHILD*, STACEY BRANDENBURG*, KIANA HUNSAKER* and CASSADY URISTA. Radford University.</p> <p>Background: Sex is a key part of a biological profile used to identify a decedent. Traditionally sex estimations are done using the skull or pelvis, however, these elements may sometimes be missing. This means there is a need for sex estimation techniques that use other bones. In this study, we examine the accuracy of Albanese's (2013) sex estimation method that uses the bones of the upper limb for sex estimation on a contemporary American population. The original method was formulated on the Terry Collection and the Coimbra Collection. Methods: We measured the clavicles, humeri, radii and ulnae from 90 individuals from UTK Donated Skeletal Collection housed at the University of Tennessee of Knoxville. We took the measurements following the directions in Albanese's 2013 article using digital calipers and an osteometric board. We then used the discriminant function formula provided by Albanese to obtain an estimation of the individual's sex. A subset of individuals were measured a second time to test for interobserver error. Results: The Albanese sex estimation method had one discriminant function formula with an accuracy rate of 97.7%, and 11 other formulae with accuracies ranging between 86.6% and 95.5%. Most of the individual measurements had low observer error, but there were a couple that had higher error. Those measurements were also the ones that were used in the least accurate of the discriminant function formulae.</p>

	Conclusion: Overall, the Albanese method worked well with this contemporary American population and is a good sex estimation method to use if the required elements are present.
60	<p>Accuracy of sex estimation techniques performed by undergraduate researchers. KIANA HUNSAKER*, STACEY BRANDENBURG*, CAMILLE ROTHSCCHILD* and CASSADY URISTA. Radford University.</p> <p>Background: Comparatively little has focused on accuracy of these measures when performed by undergraduate researchers. We wanted to understand if metric or morphologically based sex assessment techniques were more accurate for novice researchers. Methods: We tested 3 different sex estimation methods: a morphologically based estimator (morphopasse), a metric indicator (created by Alabnese 2013) and then a general assessment based on images and descriptions found in the Standards for Data Collection (Buikstra and Ubelaker 1994) to see which yielded the highest accuracy for novice users. We conducted this research using 90 known sex individuals from the UTK Donated Skeletal Collection housed at the University of Tennessee of Knoxville. Results: In our test Morphopasse had an accuracy rate of 100%. Assessment based on the descriptions and images in Buikstra and Ubelaker (1994) had an accuracy rate of 88.0% for the cranium and 90.4% for the pelvis. The Albanese sex estimation method had one discriminant function formula with an accuracy rate of 97.7%, and 11 other formulae with accuracies ranging between 86.6% and 95.5%. Conclusion: Morphopasse was the most accurate out of the three estimation methods used in the study. This may suggest that for novice researchers the instructions and ease of use of a method like Morphopasse may yield more accurate results than metric measures.</p>
61	<p>Analyzing sources of variation when estimating sex with postcranial skeletal measurements. MACKENZIE MURRAY* and LUIS CABO-PEREZ. Mercyhurst University.</p> <p>Background: Modern forensic databases can be a valuable source of quantitative human skeletal data for both paleoanthropological and bioanthropological applications. Datasets such as the Forensic Anthropology Data Bank (FDB), and its linked analytical software Fordisc 3.1, offer large comparative datasets of metric measurements from thousands of positively identified individuals of known age, sex, and self-attributed sample affinity ("ancestry" or "population affinity"), collected through highly consistent methodologies. However, the availability of the updated database only as integrated within the statistical package limits its application to a small subset of standard analyses (namely a series of DFA or Canonical Variate Analysis - CVA- models), which results in a black box model in which it is possible to infer approximate individual variable weights and precise output accuracy rates, but not which shape or size components are more influential in the final classification. Methods: In this study, we utilize a subset of adult males and females classified under the "Black" and "White" population labels in the FDB, and known demographic and overall physical characteristics, to assess on which main linear morphometric factors Fordisc's algorithm bases its postcranial sex and sample affinity classifications. We utilized Principal Component Analysis (PCA; variance/covariance matrix) to identify and define the main sources of variation in terms of size (including allometric size) and different components of size-free shape. The same dataset was then introduced and analyzed in Fordisc 3.1 (forward stepwise, Wilks-Lambda selection), to estimate the correlations between the Fordisc-generated discriminant functions and the principal components, in order to infer the main morphological basis of the DFA classifications. Results: Our results strongly suggest that, in their current form, Fordisc postcranial analyses can be useful for sex classification based primarily on body size, and maybe for populational comparisons of sexual size dimorphism (SSD), but not for estimates of sample affinity ("ancestry" or "population affinity") or populational distances, either of modern or past populations. Conclusion: Understanding what Fordisc characterizes as main sources of variation in postcranial measurements can be vital when comparing sex estimation results with those obtained from cranial elements. If there are contradicting estimations, it is important to know that body size was one of the primary classification factors used by the program for postcranial analyses, which may not hold consistent with all males being more robust and larger than females. Using PCA demystifies the black box model of Fordisc and helps to break down what is going on behind the scenes of sex estimation using DFA.</p>
62	<p>The creation of an Andean body. EMMA SHOWALTER*. Denison University.</p> <p>Background: Cultures are embodied through the systems individuals interact with when alive, and different states/political structures are known to create differences in embodiment (Pearson et al, 2015 and Michael et al, 2017). The Peruvian Andes are home to some of the first state builders including the Moche who inhabited Andean coastal and inland regions from 100-800 CE, and while much is known about the Inca, research is largely</p>

	<p>underdeveloped regarding their Moche predecessors, allowing for an opportunity to learn about variation in embodiment within the Andes. Methods: A meta analysis of bioarchaeology was constructed, compiling data from a variety of different published articles to determine how being a member of a Moche state was embodied and if there were differences in how embodiment occurred. Results: 1a) While food consumption between the sexes, specifically C4 isotopic signatures, remained similar, except for men having slightly higher values later on in state formation (Lambert et. al., 2012 and Gagnon, 2006), women suffered from greater instances of cavities than men (Two Sample t-test, $p = 0.0322$). 1b) As states develop over time, greater dependency on corn is observed isotopically (Lambert et. al., 2012 and Gagnon, 2006), and while statistical significance is not found, trends of increased cavities within the entire population are observed ($p = 0.2078$). 2a) Men show a greater prevalence of degenerative joint disease than women, and over 50% of men had cases of DJD compared to the less than 50% of women (Chi-square goodness of fit, $X^2 = 28.669$, d.f= 1, $p < 0.0001$). 2b) Ten Chi Squares with factors of sex and presence/absence were performed, and a sequential Bonferroni correction was run to avoid inflated experimental wide error rate from multiple tests, producing significant results that men had more cases of DJD in their lumbar joints (adjusted $p < 0.0001$). Trends were observed for men having more cases of DJD in the hip, knee, lumbar, and wrist, cervical, and elbow regions than women (Chi-square contingency test, $X^2 = 5.222$, d.f= 1, $p = 0.0230$., $X^2 = 4.126$, d.f= 1, $p = 0.0424$., $X^2 = 16.325$, d.f= 1, $p < 0.0001$., $X^2 = 5.262$, d.f= 1, $p = 0.0225$., $X^2 = 3.467$, d.f= 1, $p = 0.0633$., $X^2 = 3.380$, d.f= 1, $p = 0.0666$). Women with DJD showed signs in the thoracic, hip, lumbar, and knee joints, but there were no observed instances in the sample where they outnumbered the men. Conclusion: Chicha brewing, a traditionally feminine labor task could result in higher carious rates in females since corn is first chewed into a pulp before fermentation, showing the embodiment of feminine labor through state established gender roles in increased cavities (Jennings and Chatfield, 2009: 201). Chicha was used by the states during feasts as payment for monument building done by men, which could explain higher male C4 signatures later in state development and the higher percent of DJD in the total male population as a result of the labor of state building. The introduction of gender roles by the state facilitated early state formation through specialization, and the embodiment of what it means to be a member of the Moche state society differs between the sexes, suggesting that differences in embodiment powers the development of a state.</p>
63	<p>Using machine learning algorithms for modern human sex estimation based on lateral cephalograms. ALI DAOUD* and MIRANDA KARBAN. Illinois College.</p> <p>Background: Machine learning has been used to estimate sex from CT scans and 3D skull models. One study achieved 90% accuracy using convolutional neural networks (CNN) with lateral cephalograms, without measurements. This study compares XGBoost (XGB), Random Forest (RF), and Logistic Regression (LR) for modern human sex estimation using lateral cephalometric measurements from the American Association of Orthodontists Foundation Craniofacial Growth Legacy Collection. Methods: A total of 289 subjects (48% female, 52% male, ages 14-23) were included. Significant measurements were identified through two-sample t-tests ($p < 0.001$). These variables were used in machine learning models, with performance evaluated using ROC curves, Precision-Recall curves (PRC), accuracy, F1-scores, and Matthews Correlation Coefficient (MCC). Results: Significant variables included Sella-Nasion-Point B Angle (SNB), Sella-Nasion Distance (SNDST), SN to Frankfort Angle (SNFHA), Total Face Height (TFHNP), Lower Face Height (LFHNP), Condyle-Point A Distance (COPAD), Condyle-Pogonion Distance (COPOD), and Saddle Angle (SADLA). XGB performed best with 95% accuracy, followed by RF 91% and LR (78%). XGB had the highest AUCs for ROC (0.98) and PRC (0.99), with the highest F1 score (0.96) and MCC (0.90). Conclusion: XGBoost outperformed RF and LR in sex estimation from lateral cephalograms, with high accuracy and reliability. SNDST was the most impactful measurement in all three prediction models, showing Sella-Nasion Distance to be a valuable measurement for sex estimation. This study suggests that machine learning models, particularly XGB, can be valuable for sex estimation in forensic and clinical settings.</p>
64	<p>Sex-based frequency variations in dental caries prevalence. EMMA ROACH*. Northern Michigan University.</p> <p>Background: Dental caries, defined as the focal demineralization of tooth structure caused by acidogenic bacteria over time (Figure 1), exhibit a significant association with biological sex. Various studies of modern and historic samples reveal a consistent increase in caries among females, contrasting with higher rates of periodontal disease in males. Methods: Utilizing the Osteological Research Database from the Museum of London, four distinct cemetery sites from both Medieval and Post-Medieval periods were individually analyzed to explore the interaction between biological sex and dental caries. The interpretation of findings revolves around the hypothesis of higher caries incidence among females, with consideration</p>

	<p>given to temporal and estimated age variations. Results: Upon completion of both Chi-squared tests , a significant relationship between sex and caries presence was identified. The frequencies at which male individuals exhibited caries were significantly higher than those of female individuals in both time periods. Specifically, in the Post-Medieval period, 34.8% of females and 54.5% of males exhibited caries, while in the Medieval period, 21.1% of females and 45.5% of males exhibited caries. Conclusion: Historically, increases in dental caries have been linked to shifts in human diets and subsistence strategies. Higher caries rates in males are uncommon and may reflect their overrepresentation in archaeological studies. Research indicates that males are more likely to develop periodontitis, while women are more susceptible to caries. Future studies should consider age, time period, and larger sample sizes, as age impacts preservation and caries frequency. Comparing different periods may reveal changes in caries rates related to technological advancements and help interpret data on unidentifiable individuals.</p> <p>Funding: ARISE Program.</p>
65	<p>Perikymata analysis and the casta system in colonial Mexico. AYLA TAYLOR*. University of New Mexico.</p> <p>Background: Perikymata is age determinate. By measuring perikymata it is possible to determine what age an individual was when they experienced stress. It is also possible to measure how frequent an individual experienced stress. Through comparing the remains from two different cemeteries belonging to separate casta it is also possible to measure if there is a divergence in experienced stress for independent casta. Methods: Photomontages are created with digital light microscopy, using a dino lite microscope at 100x magnification. Montages are analyzed using a modified method of z score in order to identify defects Results: Differences between two cemeteries and between two sexes established. Showing a relationship between casta and experienced stress. Statistical analysis not currently complete. Conclusion: If there is a relationship between casta and experienced stress. This can help us understand how castas and access to resources play a role in social determinates of health.</p>
66	<p>Sex differences in adult frailty at the Late-Terminal Classic (c. 750-1000 CE) Maya site of Lower Dover. ROSE RIOUX*, JULIE A. HOGGARTH, JOHN WALDEN, JAIME AWE and SAIGE KELMELIS. University of South Dakota.</p> <p>Background: While it has been suggested that the compounded effects of population growth and climatic pressures during the Terminal Classic (750-1000 CE) period led to a health crisis among the Maya, there is no current knowledge of whether there were significant sex differences in risks of mortality and frailty associated with metabolic stressors. This research assesses sex differences in frailty and mortality of adults (n=44) from the middle-level Maya polity of Lower Dover in the Upper Belize River Valley during the Late to Terminal Classic periods (600-1000 CE). Methods: Osteological methods of estimating age and sex were conducting using transition analysis and morphoPASSE. Metabolic indicators of frailty (LEH, Cribra Orbitalia, porotic hyperostosis, PNBf, and dental pathologies) were scored using criteria from Standards. Kaplan-Meier and Cox hazards analyses were used to examine survivorship and mortality differences associated with each frailty indicator across sexes and political statuses. Results: Results showed that commoner females had a 17.01% elevated hazard of death compared to their male age-peers and elite individuals had a 22.50% lower hazard risk. Survival analyses showed that there were no statistically significant differences between sexes in their risks of death with or without lesions; however, Cox hazards results indicated that individuals with lesions experienced a lower risk of death compared to their nonlesioned age-peers with the exception of males with PNBf. Conclusion: These results suggest that sex was not a strong predictor of frailty and mortality risks during the Late-Terminal Classic period in Lower Dover, whereas political status may have slightly buffered against metabolic stress.</p>
67	<p>Trepanation among mobile-pastoralists: Iron Age case study from the Kyrgyz Republic. LYDIA J. ROSE*, JACQUELINE T. ENG, MICHELLE HRIVNYAK and AIDA ABDYNKANNOVA. Western Michigan University.</p> <p>Background: Trepanation is an ancient surgical procedure, dating as far back as the Neolithic period, that involves removal of a piece of cranial bone. Trepanation has not been very widely recorded within mobile-pastoral populations of Inner Asia in comparison to other cultures across the world. This case study of an Iron Age individual with trepanation recovered from the Kyrgyz Republic provides an opportunity to examine trepanation from this region, including questions about methods used and demographic profile of those who underwent the procedure. Methods: The individual recovered from the site of Boz-Barmak, Kyrgyz Republic, likely dating back to the Saka Period (4th- 2nd century BCE). Standard osteological data guidelines were used to assess age and sex, as well as record pathological conditions. A review of literature provides comparative data about other</p>

	<p>cases from this region. Results: This individual was determined to be an adult male with trepanation on the left parietal. The lack of signs of extensive healing suggests it was likely performed perimortem. There is no notable lesion elsewhere on the cranium. The findings from the Boz-Barmak individual align with broader patterns observed in trepanation cases across Inner Asia, including those from Southern Russia and Mongolia which suggest that trepanation was primarily performed on adult males. However, there were many different parts of the cranium that were performed on and variation on trepanation techniques documented in these studies. Conclusion: The adult male individual from the Kyrgyz Republic with trepanation observed on the left parietal bone contributes to our knowledge about trepanation practices in Inner Asia. Comparative literature studies show the practice dates back to at least the early and middle Bronze Age in this region. This study will also examine potential reasons behind this procedure, including suggestions that it was used to treat physical/psychiatric conditions, or potentially as a ritual process.</p> <p>Funding: This study is based upon work supported by the National Science Foundation under Grant #2141844, 'Biological Implications of Gender Roles in Mobile Pastoralist Societies' awarded to Eng and Hrivnyak.</p>
68	<p>Gastronomy in Gaul: Analyzing stable isotopes to research the dietary patterns of 2nd-5th century CE residents of Nîmes, France. ANNA RUNQUIST*, JANE HOLMSTROM, MARIE ROCHETTE and SYLVIE DUCHESNE. Macalester College.</p> <p>Background: Roman Gaul, present-day France, experienced significant societal and cultural shifts during the Roman Empire's reign, influencing residents' socioeconomic statuses and access to local dietary resources. In the 1st century BC, Nîmes became the regional capital and a large necropolis was established, with this study focusing on the earliest burials at 1 Rue Guynemer. Methods: Stable carbon and nitrogen isotope analysis was employed on bone collagen from 28 individuals (8 males, 14 females, and 6 non-adults) buried in the earliest portion of the cemetery (100-400 CE) to investigate diet. Preferred bone samples were collected from the cortical femur, however, if unavailable, samples were taken from the tibia, fibula, humerus, rib, or phalanx. Collagen was extracted using Longin's (1971) method, and isotopic analysis was performed at the Light Stable Isotope Mass Spectrometry Lab in the Department of Geological Sciences at the University of Florida. Results: Two samples were removed from final analysis. Isotopic results showed $\delta^{13}\text{C}$ values ranging from -19.8 to -18.6‰, and $\delta^{15}\text{N}$ from 10.0 to 13.7‰. Adult males (n=7) and females (n=12) had a mean $\delta^{13}\text{C}$ of -19.2‰ and $\delta^{15}\text{N}$ of 11.0‰. Non-adults (n=5) had $\delta^{13}\text{C}$ of -19.0‰ and $\delta^{15}\text{N}$ of 11.9‰. Conclusion: Carbon and nitrogen isotope values indicate an egalitarian diet for adult males and females, while non-adults have enriched nitrogen values, suggesting they were breastfeeding or in the process of weaning. This research provides valuable insight into the dietary trends of middle and lower-class citizens residing in Roman Gaul throughout the reign of the Empire.</p> <p>Funding: Funded by the Macalester College Spradley Summer Research Fellowship.</p>
69	<p>The use of anatomical variation, antemortem trauma, and pathology in human identification. AURORA VANA*, RHIANNON TOY and JOE ADSERIAS-GARRIGA. Mercyhurst University.</p> <p>Background: Forensic anthropologists can assist in achieving a positive identification of deceased individuals by examining the skeleton for various unique aspects, such as antemortem trauma, variations, and pathology. Methods: Twenty-five crania were examined from the Donated Skeletal Collection at Mercyhurst University to determine which cranial traits or conditions are more unique among this group of individuals, thus more valuable to human identification. The universal dental numbering system was used to record teeth pathologies. The frequency of six cranial variations were recorded: supraorbital foramen vs. notch, number of supraorbital foramina, number of infraorbital foramina, number of mental foramina, presence of the metopic suture, and the presence and number of Wormian bones. Evidence of antemortem trauma, such as healing fractures and surgical devices, was also recorded. Results: Results showed that antemortem trauma and pathology tend to be the most unique aspects of individuals. Of the 25 individuals, 8% of them had antemortem trauma present; 8% had evidence of periostitis; 4% had interior mandibular and maxillary tori (bony growth), and 8% had exterior mandibular and maxillary tori; 4% had an upper third premolar that had never erupted; 8% had third molars that never emerged. There were also various unique dental treatments noted, including restorations, ceramic crowns, and dental implants. The analysis of the cranial variations showed that the presence and number of Wormian bones was the most distinct feature out of the six cranial variations examined, with individuals exhibiting a wide range of variation in the number and location of these bones. However, a high</p>

	percentage of individuals had Wormian bones, thus it is not as unique of an identifier. Conclusion: These results support the conclusion that antemortem trauma and dental treatment are the most reliable means of identification, as they produce the most unique traits, which can be used to distinguish individuals with a high degree of accuracy. Forensic anthropologists and odontologists can use these findings to identify human remains and therefore assist in the closure process of the affected families.
70	<p>Osteobiography of Papdomb G-691. NINA NOWICKI*, KAITLYN MCKENNA, AMY THOMSON and BENNETT CUTHBERT*. University of California, Berkeley.</p> <p>Background: The Papdomb site in Transylvania, Romania provides a unique opportunity to examine 17th century juvenile remains through the lens of osteobiography. The purpose of this study is to reconstruct the life of G-691 through this theoretical framework. Methods: Individual G-691 was excavated from the Papdomb site in 2021, along with four other juveniles from the same trench, all of which were buried with headaddresses and similar burial positions. The skeletal remains of G-691 were analyzed using standardized bioarchaeological methods in July 2024. Historical sources were consulted to better understand the cultural context of 17th century Transylvania. Results: G-691 was estimated to be 7-8 years old and presents evidence of episodic stress due to the presence of linear enamel hypoplasia (LEH) observed in the dentition. In addition, developmental defects in the form of a cleft atlas and cervical rib were observed. Conclusion: This osteobiography is significant for understanding and reconstructing the lifestyle of children in 17th century Transylvania. Analyzing individual G-691 illuminates the importance of osteobiography applied to the bioarchaeology of children.</p>
71	<p>The osteobiography of life in medieval Hungary - The case of individual 823. NATALIE EVES* and KENDALL DUDDY. Southern Illinois University Carbondale.</p> <p>Background: Bioarchaeologists working in contexts around the world utilize the framework of osteobiography to better understand the lives of individuals from the past. This study leverages the tool of osteobiography to better understand the life of an individual recovered from a cemetery utilized for 800 years by a rural community in the Szekler region of Transylvania. Methods: Standard osteological methods were utilized to create a biological profile of Individual 823. Additionally, pathological analyses were conducted in Romania. Results: The analysis from the biological profile concluded that this individual was an older adult male. The analysis of the pathology resulted in observation of spinal conditions including Schmorl's nodes, spondylolysis, and osteoarthritis. Further, this individual demonstrates developmental defects such as lumbarization of the first sacral vertebra, sacralization of the coccyx, and a single-block thoracic vertebra. The skeletal remains also reveal evidence of significant trauma, including a mandibular condylar fracture, five left and two right fractured and remodeled ribs. Conclusion: These injuries and developmental defects, combined with other observed pathologies, suggest that Individual 823 may have participated in strenuous physical activities during their lifetime, potentially resulting in chronic back pain. The developmental defects of the spine and movement weakened the vertebral column, thus predisposing this individual to have notable spinal pathology. The analysis of Individual 823 provides valuable insight into the physical challenges of people in medieval Transylvania.</p>
72	<p>An osteobiography and reconstruction of the life: Individual G-821. SONYA GENTILE* and MARISSA COUMERILH*. Fort Lewis College.</p> <p>Background: This project developed an osteobiography to reconstruct what life might have looked like for an individual who lived in the Szekler region of medieval and early modern Hungary. Individual G-821 was recovered from the Papdomb site located in the historic village of Patakfalva. Bioarchaeological and historical data were synthesized to better understand the life of G-821 and broader aspects of Szekler life. Methods: Standard methods were used to estimate different aspects of G-821's biological profile (e.g., biological sex, age-at-death, and stature). In addition, the remains were radiocarbon dated at the University of Arizona in order to corroborate G-821's relative chronology estimated from the archaeological context. Historical sources were utilized to better understand the social context of the region during this time period. Results: Skeletal indicators suggest that G-821 was an older adult female with an estimated stature of 159.5cm. Results from radiocarbon dating suggest that the individual lived between the 16th - 17th centuries. Numerous osteological indicators provide evidence of advanced age and one instance of antemortem trauma was documented on the left radius. Analyses of historical sources revealed information about life stages, gender, occupation, subsistence practices, and social structure in the Szekler region of medieval Hungary. These historical sources enabled further understanding of the context of G-821's life. Conclusion: Research</p>

	<p>about the life G-821 is still ongoing; however, this study provides a glimpse of how the osteobiographical approach is useful in bioarchaeology. Future analyses could explore associated beads that were recovered with the individual. Limitations include time and lack of resources as many of the documents from this time were destroyed or lost over time.</p>
73	<p>Testing for correlates of Wormian bones and human cranial vault asymmetry . MARISSA M. VESTAL*, ABBIE R. COKER*, NATALIE E. BROWN* and MONICA L. WAKEFIELD. Northern Kentucky University.</p> <p>Background: Wormian bones are small, irregular bones formed within or near sutures. Researchers have proposed an excess number of Wormian bones (greater than 10 present or abnormally large in size) can indicate the presence of pathology or cranial abnormalities; however, it is possible that Wormian bones are a non-pathological human variant. This remains an open question in human osteological research. Methods: The Northern Kentucky University Biological Anthropology Laboratory has 18 real human skulls (NAGPRA compliant) formerly used to aide in teaching biological anthropology and osteology to students. Our aim in this study was to survey the Wormian bones present and the relation of number of Wormian bones to cranial vault asymmetry. Studying these 18 skulls we noted the location, size, and number of Wormian bones present. We then measured and calculated cranial vault asymmetry index (CVAI) and cephalic ratio (CR) using a digital caliper. Results: All 18 skulls were found to have at least one Wormian bone. 159 Wormian bones were documented with 6 skulls having more than 10 Wormian bones. We found no correlation between the number of Wormian bones present and the CVAI ($p > .05$) or CR ($p > .05$). The majority of Wormian bones were present in the lambdoid suture (69.2%), but Wormian bones were also present in the squamosal (23.3%), coronal (4.4%), sagittal (1.9%), and frontozygomatic (1.3%) sutures. While Wormian bones can be found in facial sutures, including the frontozygomatic suture, this finding is extremely rare. Conclusion: In the past decade, Wormian bones have been increasingly studied and the study of Wormian bones present in a college collection and the relation to asymmetry builds on previous research by providing new results in the study of Wormian bones. Future research will include more craniometric variables with a larger sample size.</p> <p>Funding: Grants from the Northern Kentucky University College of Arts and Sciences given to the Department of Sociology, Anthropology, and Philosophy.</p>
74	<p>Chew on this: The impact of resistance training on jaw strength and performance. DAKOTA DEGENHARDT*, JULIE LAWRENCE, JARED STEELE and DANIEL LIEBERMAN. Harvard University.</p> <p>Background: The effects of mechanically demanding diets on the human masticatory system are well studied, but in recent years, online communities and start-up companies have tried to harness the effects of mechanical loading on jaw plasticity to alter masticatory anatomy ("looks maxing"). Does it work?. This study examines the physiological and functional effects of resistance training on the masseter muscle, bite force, and chewing performance in adult humans. Methods: Using a commercially available "jaw exerciser" (Jawliner) as a training tool, we assess how increasing daily mechanical demands on the masticatory muscles that mimic a more mechanically demanding diet influences the physiology and function of the masticatory system. Participants (n=10; 4 male, 6 female) underwent a structured training regimen (daily 5-minute bilateral chewing for 6 weeks), with assessments at baseline, week 4, and week 6, including bite force measurement, ultrasound imaging of the masseter muscle, chewing cycles and performance tests, and electromyographic (EMG) recordings. Results: Despite following the exercise regime suggested by Jawliner, participants did not report noticeable changes to the size or function of their jaw musculature. There were also no significant differences in the physiological and functional metrics between baseline and follow-up lab visits. Conclusion: Overall, participants' chewing behavior and anatomy were not affected by the resistance training of this study. Future interventions should involve increased daily chewing duration and a greater age range of participants to investigate variation in jaw plasticity at different life stages.</p>
75	<p>Stories change: A comparative assessment of the 3rd molar in the skeletal collection of mandibles at Illinois State University. RACHAEL KOOISTRA*. Illinois State University.</p> <p>Background: Illinois State University's skeletal collection consists of three kinds of collections: biological supply, casts, and biology skeletons. The mandibles of these skeletons are kept in differing storage situations based on the property of it, altering the traits observed by students in the third</p>

	<p>molar over time. Methods: This study investigates the different types of storage that the collections are in and how that impacts the presence of a third molar. Additionally, dental diagrams are utilized for each mandible to indicate if a third molar was lost due to prior trauma, like surgical removal, or postmortem trauma potentially due to storage. Results: Based on the different properties of mandibles, 0% of biology mandibles had 3rd molars and 46.6% of the biological supply mandibles had third molars. These two groups of mandibles, totaling to 22 mandibles (7 biology and 15 biological supply) are stored between three uncovered and crowded cardboard boxes. Meanwhile, of the 23 cast mandibles, over 70% of mandibles had their third molar(s). These casts are stored on shelves often with the respective skulls they were bought with. Additionally, there is several inches of distance between each skull, indicating no crowding of space. Conclusion: Overall, this study indicated that the best way to maintain the story of a specimen is to keep them separate and in their own space. This is a storage tactic that should be implemented for all properties of all skeletons as it is the ideal way to maintain the integrity of the specimens original stories.</p>
76	<p>Analysis of pre-colonial ancient American genomes for archaic introgressed alleles. MIA CHAW* and FERNANDO A. VILLANEA. University of Colorado, Boulder.</p> <p>Background: Ancient DNA now plays a critical role in unraveling recent historical events in human evolution, including the discovery of interbreeding between humans and several groups of archaic hominins, such as Neanderthals and Denisovans. In this study, we explore the extent of archaic hominin introgression in the genomes of Indigenous, pre-contact Americans, and to compare the percentage of admixture to other global populations and to look for specific genes or genome regions with uniquely higher levels of archaic ancestry. Methods: We collected 39 pre-Colombian ancient Indigenous genomes from the exiting literature, which we then called for Neanderthal and Denisovan ancestry. Results: We found comparable levels of archaic ancestry than modern Eurasian populations, including levels of Denisovan ancestry comparable to populations in East and South Asia. Conclusion: This is an impactful area of study because aDNA is a rapidly growing field, however, political barriers, technical difficulties, and sampling bias have all contributed to sparse sampling of ancient American genomes. Failure to include Indigenous stakeholders with sovereignty over ancient individuals, and Eurocentric allele screenings have impacted accessibility of usable Indigenous genetic data. This is, however, crucial to understand modern American populations, including cross-disciplinary understanding of ancient migration, archaic introgression patterns, and contemporary Indigenous American population structures. Additionally, because previous studies have found medically important genes have introgressed origins, there are potential medical applications to this research.</p>
77	<p>The initial migration into the Americas: An mtDNA perspective. SAMANTHA ROCKE*, NAIMA HUSSAIN*, EMMA RODRIGUEZ*, VIVIAN RODRIGUEZ*, SAMUEL WEISGERBER*, GEORGE GEORGATOS* and MICHEL SHAMOON-POUR. Binghamton University.</p> <p>Background: The American double-continent was the last to be inhabited by modern humans, with early theories, namely the Clovis-first theory, suggesting a migration approximately 13 thousand years ago (kya). With recent archaeological evidence challenging this timeline, phylogenetic analysis can be used to estimate coalescence times of mtDNA haplogroups and therefore give insight into the migration time, route, and divergences. Methods: In this study we analyzed a total of 463 complete mitogenomes in haplogroups D1 and D4h collected from previously published articles. The sequences were aligned then uploaded into BEAST for Bayesian analysis, allowing us to estimate times of most recent common ancestors (TMRCA) using two molecular clock rates (Fu et al., 2013 and Rieux et al., 2014). We produced several visuals including phylogenetic trees, Bayesian Skyline Plots, and a network to demonstrate population expansion and genetic relationships. Results: Using the more conservative rate (Fu et al., 2013), we calculated a TMRCA of 20.7 ± 3.6 kya for haplogroup D1 and 16.1 ± 1.8 kya for haplogroup D4h3a. Whereas for the more reThe more conservative rate (Fu et al., 2013), calculated a TMRCA of 20.7 ± 3.6 kya for haplogroup D1 and 16.1 ± 1.8 kya for haplogroup D4h3a. The more relaxed rate (Rieux et al., 2014) pushed these items back further, producing a TMRCA of 25.8 ± 4.4 kya for haplogroup D1 and 20.1 ± 2.1 kya for D4h3a. The phylogenetic tree depicts key geographic and genetic relationships between the subhaplogroups -- we found similar coalescence times of ~15 kya for subhaplogroups D1g and D1j which are found only in the Southern Cone of South America. Conclusion: These findings support a pre-Clovis coastal migration followed by population growth and rapid expansion southward, with populations in southern Argentina and Chile by approximately 15 kya. Bridging this gap in knowledge is essential for gaining a deeper appreciation of Native American culture, as well as a better understanding of the factors shaping haplogroup diversity across North and South America today.</p>

78	<p>Vaccination as a selective pressure: The evolution of SARS-CoV-2 alpha variant. DAISY PACHECO*, EVELYN TUCKER*, AISLYNN PINEDA*, LUKE VIGGIANO*, HAILEY JACK* and MICHEL SHAMOON POUR . Binghamton University.</p> <p>Background: The COVID-19 pandemic caused widespread shutdowns, many casualties, and long-term health problems. The evolution of SARS-CoV-2, a single stranded mRNA virus, has shown an increase in spike protein mutation rates, particularly in post mass vaccination strains, as a result of certain selection pressures. Methods: Over 500,000 B.1.1.7 sequences were downloaded from GISAID and organized into biweekly periods. After collection, the sequences were aligned using MAFFT 7 and trimmed to the spike protein region using the Wuhan reference sequence. MEGA 11 and UGene were used to delete any unusable sequences, defined as sequences with a gap of more than 50 nucleotides. The edited sequences were analyzed using MEGA 11, which calculated nucleotide diversity, theta, population stratification, and Tajima's D values. Results: Analysis revealed a linear correlation between mutation levels (represented by pi-values) and worldwide vaccination levels ($R^2 = 0.9821$). D-values stayed below -2 from November 2021 to July 2022, indicating that an outside selective pressure acted on the Alpha variant. While a direct causal relationship could not be determined, the increase in SARS-CoV-2 B.1.1.7 variant mutations occurring alongside the vaccination level increase led to the conclusion that vaccination distribution was most likely the aforementioned selective pressure. Conclusion: It is imperative to identify whether COVID-19 vaccination drove SARS-CoV-2 evolution to help predict future COVID-19 viral patterns and reduce the chance of another pandemic. In order to protect susceptible individuals, vaccines with reduced mutational pressure are necessary, as well as an improved vaccine distribution plan.</p>
79	<p>Population genetics of Ixodes scapularis tick: A mitochondrial DNA perspective . AMANDA NARIANI*, ALLEN AJAY*, JULIAN FLORES-KAPLAN*, ARTHUR ZHENG*, MORGAN ANDERSEN*, SARAH KENNEDY*, BRITNEY CHAN* and MICHEL SHAMOON-POUR. Binghamton University.</p> <p>Background: Ixodes scapularis, commonly referred to as the black-legged tick, is best known as a vector of several tick-borne pathogens in North America, including Borrelia burgdorferi, the causative agent of Lyme disease. The increased presence of tick-borne pathogens in the Northeast and upper Midwest regions of the United States is correlated with the abundance and movement of the species, which could be studied through phylogenetic analysis of I. scapularis mitochondrial DNA. Methods: The mitochondrial DNA sequences of I. scapularis samples collected using dragging in Binghamton, NY were extracted, and after, a segment of the 16S rRNA region was amplified through PCR and sequenced. Using MEGA, the collected sequences were aligned with data that was obtained from previous studies, and data analysis was conducted. Arlequin was used to yield values for Tajima's D test, Fu's FS test, nucleotide diversity, and FST. Aligned 16S rRNA sequences were sorted into individual haplotypes and constructed into a Median-Joining Network (Bandelt et al., 1999) using the program NETWORK 10. Results: Phylogenetic analysis revealed that the majority of ticks collected from Binghamton fell into the All-American clade, with a stark separation between clades displaying population expansion from south to north. Furthermore, it was found that populations in the Midwestern United States and Canada are undergoing high levels of population expansion compared to southern populations, which alternatively have high levels of genetic diversity. Conclusion: Analyzing the population genetics of I. scapularis and studying their movement patterns provides the scientific community with a better understanding of the recently increased presence of tick-borne pathogens in North America, allowing researchers to develop strategies to control tick populations and prevent the detrimental spread of Lyme disease. This also allows for better predictions of possible future population migration patterns, as well as a deeper understanding of why population migration and expansion are accelerating. Though a direct causation between tick migration and Lyme disease prevalence cannot be made yet, a correlation between the two is present, indicating the crucial need to study tick population genetics.</p>
80	<p>Co-occurrence of Rickettsia buchneri and human pathogens in blacklegged ticks in Binghamton, NY. LUKE ORGO*, BRYAN ENCARNACION*, RYANN JORDAN*, NICOLE HU*, SAMANTHA RENDA*, MARIAM MOUSSA*, BROOKE MISHKIN*, MICHAEL STASTNY and MICHEL SHAMOON-POUR. SUNY Binghamton.</p> <p>Background: The blacklegged tick is the most prominent vector within the United States known for the spread of Lyme disease and other human illnesses. Within our project, we wanted to determine if there was a significant relationship between the pathogens it carries and endosymbiont R. buchneri. Methods: Ticks were collected with a dragging cloth in Binghamton University and Lackawanna State Park, Pennsylvania. After cleansing, they were pulverized in preparation for DNA extraction. Using the NanoDrop spectrophotometer, each sample was quality checked for</p>

	<p>contamination and quantity of DNA obtained. . Pathogen testing for <i>I. scapularis</i> was done by performing a quantitative polymerase chain reaction (qPCR). Each extraction group was stored within qPCR tubes for amplification. When performing the qPCR, validated TaqMan assays detected specific pathogens. A melt curve analysis and SYBR green reverse transcriptase qPCR assay (applied as per manufacturer's instructions) were utilized to detect the presence of <i>I. scapularis</i>-borne pathogens. Results: It was found that <i>I. scapularis</i>, harbours the symbiont <i>R. buchneri</i> regardless of its life stage or sex (despite literature suggesting it being exclusive to females and nymphs). The symbiont was most prevalent in female than male ticks in both the presence and absence of other tick-borne pathogens. Our statistical analysis involved a χ^2 pair-test based on a pos/neg prevalence criteria that showed a statistically significant correlation only between <i>R. buchneri</i> and the human pathogen <i>A. phagocytophilum</i>. This suggests a possible relationship between the symbiont and pathogen likely resulting from their shared anatomical location in the salivary gland of <i>I. scapularis</i>. Conclusion: Tick-borne diseases, such as Lyme disease, are the most prevalent vector-borne illnesses in the U.S., with vaccination and pesticide efforts proving insufficient in curbing their spread. Analyzing microbial relationships of the blacklegged tick may provide medical researchers and the general public with a new avenue of information that can serve to prevent future tick-related diseases.</p>
81	<p>A bite of human history: A review of behavioral change. RUBY DIAZ*. University of California, San Diego.</p> <p>Background: Dentition is one of the most abundant hominin fossils remains that we have. Dental data retains a wealth of information about humans in the past and can shed light diet, phylogenetic relationships, behavior, and health. Methods: This thesis reviews previously published dental data and descriptions to map out the changes within hominin dentition throughout various taxa. The taxa of focus range from <i>Ardipithecus</i> to the genus <i>Homo</i>. Results: This thesis illuminates what evolutionary theory tells us about the emergence of the behavioral adaptation of plasticity in the dental fossil record. Preliminary findings of this review place the foundations for behavioral complexity well before the genus <i>Homo</i>, while highlighting the environmental factors, both ecological and social, that select for it. Conclusion: This thesis emphasizes the importance of dentition as highly flexible proxy data, as well as adding the perspective of dental evolutionary anthropology to the wider discussion of human behavioral evolution.</p>