



ABSTRACTS

PODIUM PRESENTATIONS

Picking up the Pieces: The Need for Accuracy in the Investigation of Human Skeletal Remains

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Bioarchaeologists and forensic anthropologists are acutely aware of the need for strict protocols during the investigation of human skeletal remains. These professionals receive training in methodological procedures that provide a level of accuracy that is sometimes missing from similar investigations performed by local law enforcement officials. The need for accuracy in these investigations highlights the need for cooperation between local law enforcement and the professionals trained in these methods. Here, we present a case study from Union County, Illinois illustrating the need for trained personnel during the survey and excavation of sites that contain human skeletal remains.

In September, 2011, the authors were contacted by the Illinois Historic Preservation Agency (IHPA) regarding the discovery of human remains eroding from a site in Union County along the Mississippi River in extreme Southern Illinois. An initial investigation by the Illinois State Police led to the determination that the material was not of forensic significance and jurisdiction was transferred to IHPA. This paper will compare and contrast the investigation performed by the Illinois State Police with the survey and excavation performed by the authors, highlighting the need for professionals trained in archaeological survey methods and human skeletal excavation.

Sex Estimation from the Clavicle: A Discriminant Function Analysis

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The development of methods for sex estimation using post-cranial remains other than the *os coxa* is imperative for physical anthropology to improve the reliability of biological profile estimates in cases of incomplete or fragmentary skeletal remains. As the last skeletal element to complete fusion, the clavicle has the most time to develop sexually dimorphic features, making it an ideal skeletal element for use in sex estimation. Sexual dimorphism in the clavicle was assessed using 18 measurements of the left clavicle of 265 (132 females; 133 males) individuals from the Hamann-Todd Collection. Independent samples t-tests with Bonferroni correction show males and females differ at a statistically significant level for all 18 variables ($p < 0.05$). Discriminate function analyses using the stepwise method (0.05 to enter, 0.10 to exit) produced a six variable model with cross-validated accuracy of 89.4%. A holdout sample ($n=30$) similar in demographic character to the calibration sample was tested using the six variable model. The accuracy on the holdout sample was 90.0%. Six single variable models developed to accommodate fragmentary remains also have high predictive power (72.5-82.6% cross-validated; 73.3-90.0% hold-out).

Congenital Scoliosis in Early Medieval Wales

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This presentation presents an instance of a congenital condition rarely encountered in bioarchaeology from a small, rural cemetery in early medieval Wales. Skeletal material from Wales is, likewise, rare, due to acidic soils which results in poor preservation. Despite preservation issues, a case of congenital scoliosis was documented in an adult female (aged 20-35) from a site along the Bristol Channel in south Wales. Congenital defects within the lower cervical and upper thoracic vertebrae resulted in a lateral curvature of the spine. The left ribs appear to have been secondarily affected. Minimally, the skeletal anomalies likely resulted in physical deformity and impacted lung capacity. It is also possible that the skeletal manifestations were only part of a more serious condition, such as Klippel-Feil syndrome. Despite physical limitations, the lack of dental pathology and hypoplastic defects suggests that Burial 737 was a relatively healthy individual until her death and seemingly did not suffer increased stress due to her condition.

The prevalence of fusion of the anterior longitudinal ligament (DISH) in Precolumbian Tennessee

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Diffuse idiopathic spondylar hyperostosis (DISH or Forrester's disease) is a pathological condition of unknown etiology characterized by the exuberant ossification of anterior spinal ligaments. The signature pattern of the ossification is its resemblance to dripping candle wax. Clinical data indicate that this is a progressive pathology which becomes evident in middle age. It is more common in males and has been associated with Type II diabetes and obesity. Archaeological examination of the prevalence of DISH has been almost exclusively European and primarily of monastic samples. The total sample frequencies of combined (males and females) ranges 2.3 to 8 percent. There are no equivalent data on the prevalence of DISH in pre-Columbian samples from North America. The present study establishes baseline information on two late Prehistoric (AD 1300-1600) samples (N=231) from the Mid South. The results indicate a much lower total sample frequency of 1.3 percent.

A Diachronic Examination of Stature at Tombos: The Effects of Sociopolitical Changes on Growth

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The archaeological site of Tombos, in northern Sudan, spans the time periods (~1,550BC – 664BC) during which Egypt occupied Nubia (New Kingdom), the fall of Egypt (Third Intermediate Period) and the era when Nubia succeeded in ruling Egypt as the 25th Dynasty of Egypt (Late Period). Because of the stresses that revolve around socioeconomic changes, this project examines the stature of those within the Tombos site to determine if any of the changes to the state affected growth. The goal of this research is to study the variation in stature at Tombos during these time periods using the femur and humerus. Comparative data from Kerma, Pharaonic, and C-Group samples are used to understand the variation in Nubia. Analysis reveals that there are no significant differences between the stature estimates using the femur or humerus for the Tombos females through time and when compared with the Kerma, Pharaonic, and C-group samples. Male comparisons revealed that Tombos New Kingdom individuals are significantly shorter than Napatan individuals. This statistically significant shorter stature for the Tombos New Kingdom males could be attributed to the presence of more Nubians from further south or other stressors affecting population stature and growth.

Rethinking Trauma: Observations from the Morton trauma analysis

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The Morton mortuary complex, located in the Central Illinois River Valley, was used throughout the Late Archaic/Early Woodland and Mississippian periods and contained over 200 burials. This long use, coupled with such a wealth of available osteological data, presents an excellent backdrop for examining biocultural change in a site-specific context. However, while other sites in the region, most notably the nearby trauma-heavy site of Norris Farms 36, have been the subject of comprehensive paleopathological analyses, the Morton Site has never been systematically examined in this regard. This project represents the first systematic inventory and analysis of skeletal trauma at Morton, noting injuries related not only to interpersonal violence and captive-taking, but also highlighting the high frequency of occupational and accidental injuries, as well as bone fractures secondary to other pathological conditions. The extraordinarily high frequency of trauma (nearly 50% in adults) provides a regional and population-specific exhibition of injury patterns, their variation over time, and their relationship to sociopolitical and cultural changes in the region.

“Surfer’s Ear” in pre-Columbian East Tennessee

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Auditory exostoses are pathological overgrowths of bone in the external auditory meatus. The primary clinical etiology of auditory exostoses is frequent exposure to cold water and is often referred to as “surfer’s ear.” This presentation will discuss the prevalence of auditory exostoses in the Late Prehistoric (AD 1300-1600) skeletal samples from sites of Ledford Island and Citico located in the upper Tennessee River Valley of East Tennessee. The sites are located on river banks but in different reservoir areas of East Tennessee. Severity, sex and regional differences are observed. Cultural behaviors retrieved from ethnohistoric data which might account for the prevalence are discussed.

Applying Dental Microwear Texture Analysis to the Reconstruction of Ancient Human Diet: Preliminary Results from the Vindija and Krapina Neandertals

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Various techniques have been used to examine Neandertal diet. Much of this research has focused on the importance of meat, and stable isotope analyses have classified Neandertals as top-level carnivores. However, recent research by Henry on microfossils in Neandertal dental calculus revealed that they also made use of an array of plant foods. The goal of this study is to use dental microwear texture analysis to further elucidate aspects of Neandertal dietary behaviors. Previous research by El Zaatari using this technique demonstrated that there was ecogeographic variation in the texture values of Neandertal molars, and therefore in Neandertal diet. We examined occlusal surfaces of 24 molars (preferably the lower M2) from Krapina (n=20) and Vindija (n=4) using white light confocal microscopy. Complexity (Asfc), anisotropy (epLsar), and textural fill volume (tfv) were assessed via scale-sensitive fractal geometry using Toothfrax and Sfrax software. We present here the preliminary results of our analysis and discuss patterns of differences between the Krapina and Vindija samples.

Bone Where There's Not Supposed to Be Any: The Dubuque Third Street Cemetery

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The mid-19th century Third Street Cemetery, the first established Catholic cemetery in Dubuque, Iowa, suffered decades of neglect, multiple episodes of purposeful and inadvertent burial removal, and by the late 20th century was commonly believed to no longer exist. When the land was purchased by a local developer, the removal myth was quickly debunked. From 2007 through 2011, field excavations included the removal of over 900 burials, including previous disinterments. The 831 burials containing human remains represent 878 individuals. Poor record-keeping and the likely decomposition of wooden markers resulted in newer burials disturbing older interments, leading to stacked burials or, in some cases, the commingling of multiple individuals in one burial shaft while the cemetery was in active use. Cause of death inferred by different lines of evidence and some pathologies/anomalies will be presented.

Lemonade from Lemons: Taphonomic Effects of Lawnmowers on Skeletal Remains

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A variety of taphonomic events can complicate the analysis of skeletonized remains in the forensic context. This study provides a descriptive analysis of the morphological changes produced by passing over skeletonized remains (n=4, *Sus scrofa*) with three common lawnmowers. Two skeletons were mowed over with a riding lawnmower set at multiple mowing heights (5.08cm, 7.62cm, 10.16cm). One skeleton was mowed over with each of two different gas powered push lawnmowers at the highest deck height (9.53cm) and the owner's most commonly used setting for normal lawn maintenance (6.35cm). Overall, skeletal elements projecting upward from the ground surface frequently exhibited a sheered morphology characterized by a smooth, flat cut surface (7.0-7.6% of elements). The push mowers yielded a higher frequency of undamaged bone than the riding mower (54.8-61.2% vs. 17.7%). The riding mower created more catastrophic damage to skeletal elements. Over 75% of the recovered elements from the riding mower trial were fractured, and the fragments were significantly smaller than those produced by the push mowers. It is likely these differences result from a combination of increased crushing weight of the mower plus rider, the additional mowing blades, and the overall increased power of the riding mower.

Forgotten Necropoli Down Range: A Preliminary Demographic Assessment of Cemeteries on the Military Reservation of Ft. Campbell, KY-TN

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Preservation of the cemeteries located on Military Reservations is vital to the personal history of the people from these areas whose ancestors inhabited the region prior to Federal land purchase. If these relatively minor cemeteries are forgotten and fall into disrepair without constant maintenance, their identity and location may be lost as formal documentation may not otherwise exist. This presentation provides an overview of homestead cemeteries on the wilderness preserve of Ft. Campbell, KY/TN. The information was compiled from the US Army's Cultural Resource Management (CRM) database. Preliminary demographic information regarding the longevity of the homestead era interred from Montgomery County, Tennessee is presented.

A Meta-analysis of a Unique Late Woodland Mortuary Practice in the Upper Midwest.

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Post-mortem deliberate perforation of human bone has been documented at a number of pre-contact Native American mortuary sites from northern Minnesota and the Great Lakes region. Preliminary data indicate regional variability in the pattern and manner of bone perforation. The characteristics of the Minnesota pattern (also referred to as mortuary tapping) are described for four Late Woodland (AD 900-1630/1700) mortuary sites: White Oak Point (21-IC-01), Osufsen (21-IC-02), Crookston (21-PL-09), and Noyse (21-PO-14). Initial osteological data was collected by Hamline University's Osteological Laboratory in the 1990s; the original skeletal material has been repatriated. The data for this study was collected from the site files at Hamline's Laboratory. The results indicate that not all individuals were subject to post-mortem bone perforations and there is no sex difference among those affected. Perforation occurs predominately on the proximal and distal ends of long bones and on the basilar surface of the cranium. Perforations are generally circular in shape and occur predominately on the anterior surface. Motives for this singular mortuary treatment will be discussed.

Taphonomy of Three Accidentally Discovered Graves from Tippecanoe County, Indiana

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In August 2011, archeologists from IUPUI Fort Wayne recovered skeletal remains representing a minimum of three adults eroding from the bank of the Wabash River near Lafayette, Indiana. Burial 1, the only skeleton excavated in situ, was found with hand wrought nails, indicating an early coffin burial. The other remains were found ex situ. The goal of the current study is to determine if the ex situ remains were buried in coffins (i.e., have coffin staining, coffin wear, stains from coffin hardware). Alternatively, the remains could have come from an adjacent prehistoric site. We found that the remains were stained as if buried in a coffin, but no coffin wear was found. Two isolated crania had green (copper/brass) staining on their lateral aspects, similar to Burial 1. It appears that the ex situ skeletons were interred in coffins and are likely associated with Burial 1; it is not clear at this time what caused the green staining. Biological profiles indicate at least two males, although ancestry is ambiguous. Dental texture analysis indicates significant food processing consistent with a contact period diet.

Diachronic Health Comparisons of the Hixon and Dallas Sites

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This paper presents a diachronic paleopathological analysis of two sequentially occupied sites from the middle to late Mississippian periods of East Tennessee: Hixon (A.D. 1200-1350) and Dallas (A.D. 1350-1450). Because the occupations of Hixon and Dallas overlap a cultural transition from the HiwasseeIsland phase to Dallas phase, they offer a unique opportunity to examine any co-associated biological shift in health bracketed by sociocultural changes of the middle to late Mississippian periods. Sullivan's (2007) analysis of Southeast Ceremonial Complex (SECC) materials shows a decline in the amount and variety of these artifacts from Hixon's latest phase of occupancy compared to earlier phases; this pattern continues at the Dallas site and terminates with the abandonment of the site following its burning. Paleopathological analysis reveals that as SECC items declined, a relative increase in skeletal stress accompanied it, with the Dallas site showing a statistically significant increase in cribra orbitalia, porotic hyperostosis, and non specific infection. This temporal trend suggests that a decline in political dominance in East Tennessee during the late Mississippian may have had health consequences for individuals living in the Chickamauga Reservoir.

Scalping in the Midwest: An Aztalan Case Study

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The Aztalan site is a nine hectare, palisaded Late Woodland/ Middle Mississippian (A.D. 1000-1200) archaeological site in southeast Wisconsin situated between present day Milwaukee and Madison. Located on the northern limits of the Mississippian landscape, evidence of intergroup hostility in the form of scalping, decapitation, ear removal, in-flesh burning and blunt and sharp force trauma at Aztalan inform about social interaction at the site during the Mississippian occupation. Over 2,500 scattered, isolated and processed human osteological specimens have been recovered from pits across the habitation area. Cut marks, chop marks and perimortem fracturing were recorded on men, women and children of all ages. Scalping was observed on 13 individuals from the site. Patterns related to the physical removal of the scalp and the type and frequency of secondary trauma on scalped individuals will be presented for Aztalan and other sites in the Midwest. Finally, material culture indications of scalping during the Mississippian people and ethno-historic reports of the motives behind scalping will be discussed.

Identification and Dental Pathologies of Infants from KausKozah, Syria

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KausKozah cave is a multicomponent site located on the western part of the Syrian Plateau, excavated by the Tübingen-Damascus Excavation and Survey Project. At the top of a Middle Paleolithic level, two infant burials have been recovered. Direct radiocarbon dates demonstrate that these specimens are just over 10,000 years old and thus are intrusive into the Middle Paleolithic deposits. They likely derive from Epipaleolithic deposits from the site, thus representing the first such burials from this part of the Middle East. We report here the process of recovery of these fragmentary specimens, and the documentation of dental developmental defects that may suggest a high level of populational stress during this broad period.

Late Archaic Period dismembered burials and warfare: a surprising connection

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Previous research on the pattern of intergroup violence in six Late Archaic (4000-1000 BC) Period sites in west-central Tennessee established the presence of trophy taking and differential site vulnerability relative to geographic location (main channel versus remote upland). Previous research in this sample also revealed the existence of modified human remains suggesting a post-mortem ritual use of skeletal elements. The Archaic sites of x and y included several multiple-individual articulated limb burials accompanied by exceptionally large caches of grave goods. The unusual mortuary context sparked further investigation relative to trophy taking and the post-mortem ritual use of the dead.

The disembodied elements are evidently reburials but the context provided a striking revelation about the meaning (and predictability) of differential site vulnerability to intergroup violence.

External Auditory Exostoses in a Southern Indiana Archaic Population

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External auditory exostoses (EAE) have been long associated with cold water aquatic activities such as surfing and diving. This paper will address the occurrence of EAE in an Archaic riverine population from the Elrod site (12C11) in Southern Indiana. It will examine the incidence of unilateral or bilateral EAE, as well as the occurrence of EAE with or without uni-/bilateral lesions of the articular eminence, a possible indicator of temporomandibular joint (TMJ) pathology.

POSTER PRESENTATIONS

Walk Right In, Sit Right Down: Proximal Femoral Morphology in the Illinois River Valley

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Wolff's law tells us that skeletal tissue will remodel itself under repetitive outside strain, force, or torsion. This property of bone has been employed for decades by physical anthropologist to understand variation in physical activities between archaeological populations. These changes are often referred to as markers of occupational stress (MOS). The present study examines the morphology of the proximal femur, an anatomical region known to be affected by posture and locomotion. Two prehistoric populations from the Illinois River Valley, Klunk Mounds and the Schild site, were compared using archaeological, ethnohistoric, and osteometric data and resulting analyses show both sexual and temporal variations. These results suggest differences in postural and/or locomotion habits between the two sites. In addition, the effects of age, recently argued to have the greatest impact on MOS, will be discussed.

Fluctuating molar asymmetry and linear enamel hypoplasia: a possible correlation among two Mongolian populations

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Teeth are largely controlled by genetics and because of this, any given tooth should be the same size as its antimere. However, environmental factors sometimes affect the size of teeth resulting in a disparity in size between the left and right sides of a pair of like teeth. This phenomenon can occur in either a directional or fluctuating manner. Fluctuating odontometric asymmetry has been used as evidence of stress encountered during the formation of permanent dentition in both archaeological and modern populations. Similarly, linear enamel hypoplasia (LEH) has commonly been used by bioarchaeologists as evidence of childhood stress. For this study, I test the possibility of a correlation between LEH and fluctuating molar asymmetry on an adult sample (n=70) from two Mongolian time periods: the Xiongnu Empire (209 BC – AD 155) and the Mongol Empire (13th and 14th centuries AD). Statistical results indicate that both of the time periods were relatively similar in the distribution and frequency of LEH and fluctuating molar asymmetry, so both samples were combined to test the correlation of the two variables. A very weak (and sometimes inverse) relationship existed between the two variables, confirming other studies and suggesting a separate etiology of the two **variables**.

Rediscovering Ancient Cahokia: New Insights from Old Collections

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Bioarchaeologists at the Illinois State Archaeological Survey (ISAS) have recently initiated a multi-faceted study of curated collections of human remains from early to mid 20th century excavations at Cahokia Mounds. The research potential of these collections has long been overlooked because of their fragmented condition and the absence of well-documented provenience. Cahokia is the largest prehistoric mound center in North America and was the epicenter of Mississippian culture from A.D. 1050-1350. The focus of ISAS research on the rise and fall of the Cahokia polity has mandated re-analysis of the recovered human remains using modern analytical standards. Evidence from osteological, stable isotope and strontium analyses, and AMS dating is now available to help re-establish temporal and social context, and to assess the heterogeneity of the large population that once occupied the urban mound center locale. Combined with a re-evaluation of available documentation, this newly acquired data offers insight into the health, diet and geographic origin for social groups and individuals, within and between mortuary sites at Cahokia.

"Up in the Air: A Pathological Puzzle"

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An isolated pathological specimen, a fused femur and *os coxa*, has been in the teaching collection at Central Michigan University for thirty years with no known contextual information. The pathology includes osteoarthritis and total fusion of the acetabular joint at an angle of approximately 125°. This would suggest that the individual must have been immobilized in a seated position for an extended period of time. We undertook a study to determine age, sex and possible pathologies to explain this condition. Osteometric and morphological analyses indicated that the individual was an adult male. Radiographs reveal that the fusion was complete with no evidence of trauma, though a traumatic dislocation cannot be ruled out. We also conducted a literature search of diseases that could cause this pathology and we present several likelihoods, which include: rheumatoid arthritis, Legg-Perthes' disease and septic arthritis. We also considered the possibility that this fusion may have been a symptom of an adjacent spinal pathology. Due to the lack of skeletal remains, an ultimate diagnosis may not be attainable, but we invite opinions regarding other possible causes of this unusual pathology.

The effect of cranial volume on the development of the occipital condyle is more pronounced in females than males

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The occipital condyle on the cranial base distributes the weight of the skull and passes it on to the first cervical vertebra. Development of the occipital condyle should reflect this weight-bearing role and it should be more pronounced in humans than non-human primates due to human encephalization. Here, we demonstrate that the volume of the occipital condyle, as estimated by the product of the maximum condyle length, width and height, is better correlated with cranial volume than it is with age in a sample of subadult human crania (n=43), but is better correlated with age than cranial volume in a sample of subadult baboon crania (n=115). The relationship, however, is more pronounced in human females ($r^2=0.625$ vs. 0.433) than it is in human males ($r^2=0.335$ vs. 0.232), suggesting that sexual dimorphism in adult occipital condyles observed by other scholars is not solely related to greater load stresses produced by greater head weight or increased muscle mass in adult males, but also is affected by differences during development.