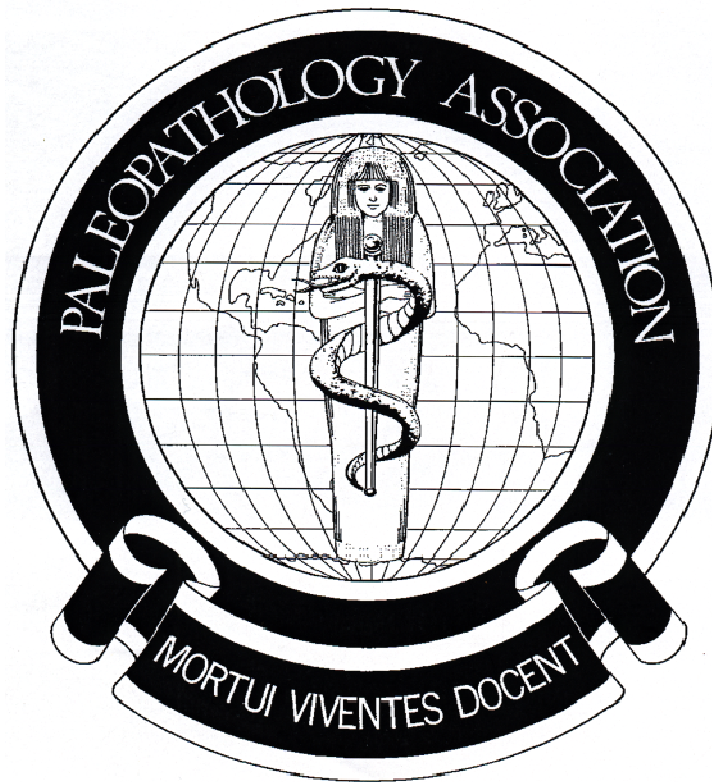


Supplement to the *Paleopathology Newsletter*

PALEOPATHOLOGY ASSOCIATION

SCIENTIFIC PROGRAM & ABSTRACTS



38TH ANNUAL MEETING (NORTH AMERICA)

MINNEAPOLIS, MINNESOTA

APRIL 11-13, 2011

TABLE OF CONTENTS

	Page
Meeting Schedule.....	2
Workshop Abstract.....	6
Podium Presentation Abstracts.....	6
Poster Presentation Abstracts.....	22
Author Index.....	48

*** Entry for the Cockburn Student Award

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PALEOPATHOLOGY ASSOCIATION

38th ANNUAL MEETING (NORTH AMERICA)

MINNEAPOLIS, MINNESOTA

APRIL 11-13, 2011

SCIENTIFIC PROGRAM

TUESDAY, APRIL 12TH

Morning Session (9:00am – 12 noon)

WORKSHOP: Paleopathology Workshop: Don Ortner, Chris Dudar and Dave Hunt

12 noon Lunch

Afternoon Podium Session (2:00 – 5:30 pm) Chair: Albert Zink

- 2:00 Late Prehistoric Diet in The Central Illinois River Valley, A Comparison Between Oneota and Middle Mississippian Populations *** (RM Tubbs)
- 2:15 Infants from Late Neolithic Shir, Syria (J Gresky)
- 2:30 Romanization, Religion, and Health in Roman Britain *** (LL Jenny).
- 2:45 Unsanitary Urbanism?: Rethinking Pathology in Imperial Rome (K Killgrove)
- 3:00 A Palaeopathology of the Great Irish Famine: The Kilkenny Union Workhouse Mass Burials (J Geber)
- 3:15 Determining Relative Health from Comparative Skeletal Studies: An Assessment of Indicators of Health from the Milwaukee County Institution Grounds Cemetery (C Milligan)
- 4:00 Ancient Tuberculosis Revealed by Next Generation Sequencing (A Bouwman)
- 4:15 A Multi-Technical Approach of Ancient DNA and Results of Tuberculosis of Bone Samples from Slave Burials on Guadeloupe (18th/19th CENTURY) *** (MR Kim)
- 4:30 The Identification and Characterization of Mycobacterium Tuberculosis Complex DNA at Yokem Mounds, Pike county, Illinois *** (G Millward)
- 4:45 Methodological considerations Regarding Reassociation of Human Remains *** (K Marden)
- 5:15 Student Action Group Meeting: Guest Speaker, Mark Cohen
- 6:30 PPA Reception / Annual Dinner and Business Meeting

WEDNESDAY, APRIL 13TH

Morning Podium Session (8:30am – 12noon) Chair: Simon Mays

- 8:30 Rhinomaxillary Changes in Leprosy: Comparing Clinical and Paleopathological Data (Hospital-Colony Rovisco Pais, Tocha, Portugal, and St. Jorgen's Medieval Cemetery, Odense, Denmark) (V Matós)
- 8:45 A Critical Examination of Cranial Depression Fractures Among 10th-11th Century Amerindians of West-Central Illinois *** (S Dale Spencer)
- 9:00 Prevalence of Healed Hip Fractures and Other Impact-Related Injuries Among the Crew of the Mary Rose: Potential Markers of Occupation? *** (R Drew)
- 9:15 Evidence for Medicine at the 7,000-Year-Old Windover Site (R Wentz)
- 9:30 Evidence of Accidents and Pregnancy Problems in Portuguese Ex-Votos from 18TH to 20TH Centuries AD (AL Santos)
- 10:45 Did Scurvy Precipitate the Loss of Sir John Franklin's Last Expedition to the Arctic

1845-48? (S Mays)

11:15 Radiological Study of Body Cavity Treatment in Ancient Egyptian Mummification
(A Wade)

11:30 Pigs and People at Amarna – Punishment of Ritual (1352-1336 BCE)? (J Rose)

11:45 Epidemiology and Prevalence of Atherosclerosis in Royal Egyptian Mummies (A Zink)

12 noon LUNCH / LET'S DO LUNCH

Afternoon Podium Session (2:00 pm – 5:00 pm) Chair: Jerry Rose

2:00 Dental Pathologies in LB1 from Liang Bua Cave, Flores, Indonesia (M Henneberg)

2:15 Liang Bua Mandibles, Maxilla, and Dentition: Distinguishing Gnathic Pathology from
Normal Regional Variation in Flores Populations, Past and Present (R Eckhardt)

2:30 Anomalous Wear Facets in the Sima de los Huesos Dental Sample (Atapuerca, Spain)
(A Gracia)

2:45 Dental Modification: Evidence of African Origin Only? (SM de Souza)

3:00 Root Hypercementosis in the Atapuerca-Sima de los Huesos Hominin Sample:
Incidence and Implications (L Martín-Frances)

3:15 Severe Dental Lesions in the First Hominin in Europe: A Case of Strong Compensatory
Eruption in the Sima del Elefante Mandible (Atapuerca, Spain) (M Martín-Torres)

4:00 History of Paleopathology: Exploration Through Archaeological Case Studies (R Russell)

4:15 The Future of Paleopathological Research: The Need for Databases of Curated Skeletal
Collections (C Roberts)

4:30 Celebrity Paleopathology: The Exhumation of the Danish Astronomer Tycho Brahe
(N Lynnerup)

4:45 Presenting Paleopathology to the Public: Balancing Science and Visitor Interest
(H Gill-Frerking)

POSTER PRESENTATIONS

(number refers to poster board number)

POSTER SESSION I (Wednesday morning, 9:45 – 10:45 am)

101. Skeletal Evidence of Treponemal Infection in PreColumbian Societies from Northwestern
Argentina (H Drube, S Salceda, S Martínez)

102. Identification of Early Manifestations of Skeletal Tuberculosis in Infants and Young
Children: Comparative Case Studies from Peru and Sudan *** (SJ Marsteller, BJ Baker)

103. Re-Evaluation of a Proposed Possible Case of Prehistoric Congenital Syphilis in the
Mississippi Delta *** (C Davis, M Danforth)

104. A Quantitative Analysis of Residual Rickets Prevalence in Early Modern London***
(KM Meyers)

105. Diagnosing, Contextualizing and Exploring the Implications of Possible Scurvy in a
Subadult Skeletal Assemblage from La Cueva de los Muertos Chiquitos, Mexico ***
(JJ Crandall, DL Martin, JL Thompson)

106. Accessory Sacroiliac Articulations: Applications of M. Trotter's Methods to Tell Abraq,
UAE (2200-2000 B.C.) Human Skeletal Population *** (MB Timm, J Vilos, D Martin)

107. Spondylopathy in La Tene Period Population from Central Europe (Czech Republic)
(L Cervenkova, J Likovsky)

109. A Pain in the Neck: What is and What is Not Klippel-Feil Syndrome *** (JL Funkhouser,

- K Shuler, S Chappell Hodge, N Musselwhite, KE Smith)
110. Complete Sagittal Cleft Vertebra in an Early Medieval Polish Population (JM Justus, AM Agnew)
 111. Myositis Ossificans and Pseudarthrosis in a Late Bronze Age Adult from the Athenian Agora in Athens, Greece (S Kirkpatrick Smith, M Liston)
 112. Bony Ankylosis of the Wrist: Four Cases from the Terry and Huntington Skeletal Collections *** (K Pearlstein, K Adia, D Hunt)
 113. Complications of Childbirth: Evidence of Birth Trauma from the Dakhleh Oasis, Egypt (TL Dupras, SM Wheeler, LJ Williams)
 114. Unusual Teeth in Unusual Places: Criteria for Identifying Dental elements from Teratomas *** (AJ Foley, BD Ragsdale)
 115. Indicators of Physiological Stress in early Prehistoric Southeast Asia During Agricultural Intensification (A Clark, S Halcrow, N Tayles)
 116. Demography, Paleopathology and Health Status of the Moche Remains in Humanbacho, Nepena, Peru: A Comprehensive Osteological Analysis (E Grace)
 117. Non-Specific Indications of Stress in Puebloan Subadults from New Mexico *** (K Krasnec)
 118. Examining the Role of Environmental Stress in the Etiology of Skeletal Defects *** (AM Offenbecker)
 119. Occupational and Activity Markers on Skeletal Remains Discovered in the Northern Highlands of Peru (L Walther, C Gaither, K Koschmieder)
 120. Porotic Hyperostosis and Cribra Orbitalia in an Etruscan Skeletal Series Dating from 800 to 200 BC (EM Crockford-Peters, RR Paine, M Cataldi, F Trucco, R Vargiu)
 121. A Study of Transition Analysis Applied to Korean Skeletal Samples from the Joseon Dynasty Period *** (J Kim, DW Steadman, S Pak, DH Shin)
 122. Sex Estimation in Native Americans from the Midwest and Southeast: Utilizing Femur Head Diameter *** (KD Lubsen)
 123. New insights into the pathological bowing of the WLH 106 humerus (A Durband, ES Crockford-Peters)
 124. Age at Death for Women During the Early Colonizing of sandwich, Massachusetts *** (ML DeMello)
 125. Stature and Long Bone Lengths in 19th Century-Born African American and Euro-American Males (CM de la Cova)
 126. From Head to Toe: The Biomechanical Effects of a Limp Resulting from a Tibial/Fibular Fracture (L Williams, A Norris, T Dupras)
 128. Bring Me More Beer: Haversian System Formation Rates for a Nubian Population and Intervals Between Periods of Tetracycline Ingestion *** (A Winburn, GA Armelagos)

POSTER SESSION II (Wednesday afternoon, 3:30 – 4:00 pm)

129. Tales from the Crypt: Preliminary Findings of a Digital Radiographic Study of Skeletal Remains Under St Bride's Church in London, England (G Conlogue, M Viner, M Farmer, D Gulliver, J Bekvalac, K Eggleton)
130. Development of a Dry Bone CT Scanning Protocol for Archaeological Craina (G Conlogue, AD Wade)
131. Radiological Revelations: Paleopathological Findings in a Skeleton from Wadi Fidan, Jordan (TL Prowse, M Brickley, R Adams, B Kahlon, L Watamaniuk, J Edwards, A Oh)

132. Comparison of Conventional Radiographic and Computed Tomograph Images for a Trepanated Cranium from Medieval Torun, Poland *** (GL Jakubowska, T Kozlowski)
133. A Case of Dilaceration in a Hong Kong Skeletal Collection: Possible Causes and Explanations *** (WNJ Chan, G Tipoe,)
134. A Facial Tumour in the Mummy of a Child from South America (H Gill-Frerking, W Rosendahl)
135. A Differential Diagnosis Using Periosteal and Endosteal Reaction Patterning *** (SC Kindschuh, K McCormick, A Marx, D Wolfe Steadman)
136. Metastasizing Carcinoma in a Roman Skeleton from Metaponto (Southern Italy, II C. CE) – A Preliminary Study (RJ Henneberg, L Giardino, M Henneberg, A DeSiena)
138. Antemortem Dental chipping in the Prehistoric Inhabitants of Carriacou (West Indies) (A Heller)
139. Trauma at Prehistoric Point Hope, Alaska (GR Dabbs)
140. Fracture Patterns in the Robert J. Terry Anatomical Collection (R Coolidge, DR Hunt)
141. The Frequency of Fractures of the Locomotor Apparatus in Different Periods of the Middle Ages in Central Europe (Oskobrh, Czech Republic (Z Krupova, J Likovsky)
142. Paleopathology of Suicide – Rare Cases of Self-hacking (F Kanz, DU Risser)
143. Evidence of Tribal Warfare Among the Anga of Papua New Guinea – Trauma Patterns (RG Beckett, AJ Nelson)
145. Status and Health at the Mississippian Period Averbuch Site (C Mick)
146. Waking the Dead: The Human remains from Mainistir Chiarain, Inis Mor, Ireland (C Lerwick, K Blue)
147. Health, Identity, and Burial Patterns in the Middle Sican Culture: Paleopathology of Social Organization from Huaca las Ventanas, Peru (JD Luce, HD Klaus, J Pinilla, C Elera)
148. Diagnostic Conundrums from the New Colored Burial Ground, Newburgh, New York (KC Nystrom, JL Muller)
149. Concha Bullosa, A Neglected Condition in Palaeopathology (S Mays, S Vincent)
150. A Possible Case of Acromegaly: The Viking Chieftain Buried in the Gokstad Ship, Norway (OM Pearson, K Krasnec, S Daneshvari, P Holck)
151. A Trephination in a Medieval Individual from the Alcáçova do Castelo Necropolis in Mértola, Portugal (C Umbelino, S Assis, R Monteiro, C Rodrigues)
152. Microcephaly in a Middle Woodland Adolescent from Illinois (D Collins Cook)

*** Entry for the Cockburn Student Award

ABSTRACTS

WORKSHOP

PALEOPATHOLOGY WORKSHOP NO. 21: DESCRIPTION, PATHOGENESIS, AND DIFFERENTIAL DIAGNOSIS OF SKELETAL DISORDERS, WITH AN INTRODUCTION TO DATA ENTRY USING THE OSTEOWARE SOFTWARE.

Don Ortner, Chris Dudar and Dave Hunt

Department of Anthropology

National Museum of Natural History

Smithsonian Institution

The focus of the workshop was on description, pathogenesis and differential diagnosis of skeletal disorders. As in previous workshops, there were twelve cases of skeletal abnormality available for review by the participants. The cases were selected to illustrate different disease processes and particularly those processes that contribute to differential diagnosis. An introduction by Don Ortner about the objectives of the workshop was followed by a brief presentation by Chris Dudar about the latest version of Osteoware, the software used by the Repatriation Laboratory at the National Museum of Natural History to record data on osteology and paleopathology in archaeological human remains being considered for repatriation and reburial. The latest version of the software and support documents can be downloaded from the following website [<http://math.mercyhurst.edu/~sousley/Software/Osteoware/?C=N;O=D>]. After the examination period each case was reviewed by Don Ortner or Dave Hunt.

PODIUM PRESENTATIONS

ANCIENT TUBERCULOSIS REVEALED BY NEXT GENERATION SEQUENCING.

Bouwman, Abigail¹; Muller, Romy¹; Roberts, Charlotte² and Terry Brown¹

¹Faculty of Life Sciences, Manchester Interdisciplinary Biocentre, University of Manchester, UK, ²Department of Archaeology, Durham University, UK

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In 2008 there were an estimated 20 million cases of tuberculosis (TB) with 1.82 million deaths. TB is thought to infect one-third of the world's population. As a result, much work has been undertaken on the genetics of modern *M. tuberculosis* isolates to differentiate strains. We are working with European skeletal remains from 1000BCE up to the end of the 19th century CE in order to examine the bacterial aDNA in skeletal remains to study the evolution of TB in Europe over the last 3000 years. We have designed specific tests and used these to screen bone samples from 488 skeletons from 136 European sites, the largest sample ever studied in this way. Positive results for TB aDNA were obtained for 144 skeletons (29.5%). One hundred and ten of these samples are now being examined using a new methodology for aDNA sequencing which allows for the simultaneous examination of over 250 polymorphisms in any one sample (next generation sequencing). This will allow us to compare modern and ancient strains directly, and to test different hypotheses regarding the spread of TB in Europe over around two thousand years, the differential evolution of the disease in urban and non-urban regions, and the relationship between European TB and the less virulent disease present in the New World before Contact.

This study is funded by the UK Natural Environment Research Council (Grant 210035) and the University of Manchester.

PREVALENCE OF HEALED HIP FRACTURES AND OTHER IMPACT-RELATED INJURIES AMONG THE CREW OF THE *MARY ROSE*: POTENTIAL MARKERS OF OCCUPATION? ***

Drew, Rose University of York/Mary Rose Trust UK rose@stairwellbooks.com

Injury and age-at-death patterns are noted on skeletal remains excavated from the Tudor great ship *Mary Rose*, which sank in 1545 during a battle between the English and the French. Almost 500 crew died; approximately 179 individuals are represented by recovered materials. Ninety-two skeletal assemblages are numbered as ‘Fairly Complete Skeletons’ and may represent one discrete individual. Preliminary work shows 45% (41/92) have trauma consistent with impact injury, with 22% (9 of 41) enduring injuries (for example, acetabular rim fractures) severe enough to limit strenuous activity. By considering assessed age at death and the nature of the injury, assumptions about possible role on board ship have been made: 24% (10/41) are adolescents.

Originally assessed by Stirland (1991; 2005), this work corroborates many of Stirland’s original findings, and ongoing research allows for fresh interpretation. For example, recent work on metabolic disease suggests widespread Vit D deficiency among the crew (Brickley et al 2010). The presumed sex of individuals, their known cause and manner of death, and the historical certainty of the time period and likely occupations add to the significance of this collection.

References

Brickley M, Mays S, Ives R. 2010. Evaluation and Interpretation of Residual Rickets Deformities in Adults. *IJO* 20: 54-66.

Stirland A. 1991. Diagnosis of occupationally related pathology: can it be done? Ortner and Aufderheide (eds) *Human Paleopathology: current synthesis and future options*. Smithsonian. 40-47.

Stirland AS. 2005. *Raising the Dead: The Skeleton Crew of King Henry VIII’s Great Ship, the Mary Rose*. Stroud

LIANG BUA MANDIBLES, MAXILLA, AND DENTITION: DISTINGUISHING GNATHIC PATHOLOGY FROM NORMAL REGIONAL VARIATION IN FLORES POPULATIONS, PAST AND PRESENT

Eckhardt, Robert B¹ and Maciej Henneberg²

¹ Laboratory for the Comparative Study of Morphology, Mechanics & Molecules, Pennsylvania State University, USA; ² Biological Anthropology & Comparative Anatomy Research Unit, University of Adelaide, Australia.

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In their comprehensive overview of the diagnostic problem posed by the human skeletal remains recovered from Liang Bua Cave, Flores, Indonesia, Jacob and colleagues (2006) analyzed the LB1 maxilla, mandible, and dentition. Principal gnathic evidence involved two matters of observation. First, the maxilla was abnormal in anatomical orientation to the skull base, with published measurements conservatively indicating a 4°-5° deviation from the midline. Second, the mandible was normal in its structure; with lack of an externally salient chin being a morphology encountered commonly in various Australomelanesian populations, including those still living on Flores. Subsequently, these observations have been misrepresented for several years in a curious process of inversion. The maxillary abnormality was “normalized” by being ignored until the re-analysis by Kaifu, et al. (2009), whose measurement of midline deviation

(6°) actually exceeded that of Jacob, et al. (2006), confirming abnormal development although offering an untenable explanation for it. In contrast, the mandible, lacking an external chin structure, was held to be not regionally normal but instead primitive, explicable only by derivation from various hominin antecedents including *Homo erectus*, early *Homo*, or even australopithecines. Brown and Maeda (2009) showed a radiograph of a single unidentified Australomelanesian, which they used to argue for general absence of negative chins in the Rampasasa and regionally. Here, expanding on the work of Hastuti, et al. (2007) we present extensive radiographic evidence for the relationship between the internal bony chin and its external soft tissue covering in the Rampasasa. Normality and pathology are objectively distinguishable.

A PALAEOPATHOLOGY OF THE GREAT IRISH FAMINE: THE KILKENNY UNION WORKHOUSE MASS BURIALS

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Human remains dating from the Great Irish Famine were discovered within the grounds of the former union workhouse in Kilkenny City, Republic of Ireland in 2005. These were made subject to an archaeological excavation in 2006, during which 63 mass burials containing the skeletons of 970 individuals were found. The burials have presented the opportunity to explore a new aspect of the Famine, through the study of the skeletons of those who did not survive this catastrophe.

The aim of the research is to explore the human experience of the Famine, through a biocultural perspective. The Great Famine (1842-52) is a watershed in Irish history, which resulted in the death of one million people. While the potential of applying the archaeological method to research of the period has previously been explored (Orser 1996), this project is the first where a palaeopathological research perspective is undertaken.

The analysis of the skeletons has revealed a population under severe stress, indicated by skeletal indicators of infectious and metabolic disease. The population is also characterized by a high proportion of non-adults, likely to be a reflection of both the mortality risks and the underlying demography of the workhouse institution.

This paper highlights the potential in palaeopathological research for the purpose of obtaining further understandings to the realities of the Famine. The study also focuses on the health and living conditions of the pauper and lower classes in 19th century Ireland, a social stratum which were very poorly treated by the contemporary Victorian society.

Reference

Orser CE. 1996. Can there be an archaeology of the Great Famine, pp. 77-89 in Morash, C. and Hayes, R. (eds), *Fearful realities*, *New perspectives on the Famine*. Blackrock: Irish Academic Press.

PRESENTING PALEOPATHOLOGY TO THE PUBLIC: BALANCING SCIENCE AND VISITOR INTEREST

Gill-Frerking, Heather and Wilfried Rosendahl

German Mummy Project, Reiss-Engelhorn Museums, Mannheim, Germany

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In July 2010, an exhibition of more than 50 human and animal mummies opened at the California Science Center in Los Angeles. Although some of the mummies had previously been displayed in European museums or exhibitions, others were displayed for the first time, and this

was the first time that any of these mummies had been displayed in the United States. The German Mummy Project, as a major cooperation partner of the exhibition, is responsible for on-going scientific research on all specimens in the exhibition and provides or reviews the information presented in exhibition case labels, wall panels, interactive activities, media and general publications. The scientific research generates significant data about pathology and trauma in many of the mummies and it was critical that this information was included in the exhibition for the benefit of museum visitors.

This paper presents some of the challenges of making complex methods used for the analysis of trauma and pathology, and interpretations of the analyses, accessible to science center and museum visitors in visual and interactive displays, while retaining responsible scientific accuracy and avoiding pressure to "dumb down". The paper will also discuss some of the initial visitor response to the presentation of paleopathology in exhibition during its run at the Los Angeles venue.

ANOMALOUS WEAR FACETS IN THE SIMA DE LOS HUESOS DENTAL SAMPLE (ATAPUERCA, SPAIN)

Gracia A^{1,2}, Martín-Francés L³, Martín-Torres M³, Martínez I^{1,2}, Bermúdez de Castro, JM³, Arsuaga JL¹

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Ideally, the study of dental wear can provide important information regarding age, diet, masticatory habits and activity patterns. In particular, the pattern of dental abrasion can be a source of behavioural and/or cultural information. This paper provides a macro and microscopic (scanning electron microscope) analysis of anomalous interproximal wear facets in the Sima de los Huesos (SH) population. The SH site (Sierra de Atapuerca, Spain) has provided more than 5000 fossil remains assigned to at least 28 human individuals. This large sample, which includes individuals of both sexes and covers an age range of 3 to 40 years old, provides an unparalleled opportunity for the study of the health status and adaptation of a Middle Pleistocene population. In our study, we identified a high prevalence of interproximal grooves in the SH postcanine dentition. The gross size, shape and orientation of the marks together with an assessment of the microstriae on their surface are employed in the interpretation of activity-induced marks. We believe that these anomalous abrasive facets are a consequence of a continuous and reiterative process of insertion and retraction of a probe as a tooth-pick. Associated dentognathic pathologies are also considered in the differential diagnosis about the idiopathic, therapeutic or cultural/occupational aetiology of the wear facets in this Middle Pleistocene population.

INFANTS FROM LATE NEOLITHIC SHIR, SYRIA

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The settlement of Shir, western Syria (7000 BC), was characterized by permanent water supply, fertile soils and Mediterranean climate. However, a lot of diseased children were found. Infant burials were located next to the walls and under the floors. Up to 43 skeletons were

investigated. Two individuals were adult, two juvenile, one Infans II and two Infans I. The remaining 36 individuals died before the age of 12 months. The distribution shows a maximum in the age between 0 to 2 months (n = 12), followed by the age between 2 to 6 months (n = 19). In the age between 6 to 12 months, 12 individuals died. Two individuals died as a fetus. The infants showed different pathological changes of the bones, mostly related to deficiency diseases. On the lamina externa changes due to anemia occurred (n = 6/14). Most common changes of the internal lamina were vestiges due to bleeding (n = 8/13). In the older children changes of the lamina externa were rare (n = 1/5). The internal lamina was affected more often (n = 3/5) due to hemorrhagic processes. Dental diseases occurred in a low frequency but all of them had calculus and transversal hypoplasias of the enamel. The high frequency of young children in Shir goes with the usual mortality distribution in a population without medical care. The interment in the houses seemed to protect the burials and made it possible to have a view even on the youngest groups of this population.

DENTAL PATHOLOGIES IN LB1 FROM LIANG BUA CAVE, FLORES, INDONESIA

Henneberg, Maciej¹; Eckhardt, Robert B²; Flohr, Stefan³ and Julia Gresky⁴

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In LB1 carious lesions are present on labial sides of the necks of lower right canine and first premolar (P3). They are shallow, ~ 2 mm broad and surrounded by calculus, as visible in Figure 5 in Brown and Maeda (2009). There also is *ante-mortem* loss of the lower right P4 and both upper third molars. According to Brown and Maeda (2009), the upper right M3 has not been developed regularly but is represented by a small odontoma. We doubt this diagnosis since (1) odontomas are rare tumors (Hegyí and Jundt 2008) and (2) are mostly located in the posterior lower jaw (complex odontoma) or the anterior segment of the upper jaw (compound odontoma) (Damm and Bouquot 1995, Kaneko et al. 1998). More likely is the interpretation that the crown and roots have been decayed and only a small remnant of the one of the roots remained in the jaw. The alveolus of the left upper third molar is present, indicating that the tooth originally had been erupted. Moreover, signs of remodeling at the alveolar process indicate that the tooth was lost *intra vitam*, short time before death. The adjacent structures including the second molar seem to be unaffected by any kind of trauma. There is also no evidence of trauma for the lower right P4. The dental caries and loss of several teeth possibly also due to caries make exceedingly unlikely the assignment of LB1 to a purported early *Homo*, presumably hunting and gathering, population.

ROMANIZATION, RELIGION, AND HEALTH IN ROMAN BRITAIN ***

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This study examines the relationships between Romanization, religious organization, and population health. Romanization has been studied in comparison to Iron Age populations but there has been little research on its relationship with religion, especially conversion to Christianity in the fourth century AD. Scholars of the Early Christian church have speculated

that the mass conversion to Christianity would have improved population health because the Church offered food and healthcare to the poverty stricken as a means to increase membership. While identifying Christian burials in the fourth century is problematic, the Butt Road cemetery from Colchester, UK, has been speculated to represent an Early Christian community. A stratified random sample of 180 skeletons from the Butt Road cemetery was selected and analyzed, including sex, age and indicators of stress and infection. The Butt Road sample was compared to the data available through the Museum of London's Centre for Human Bioarchaeology website for the Western Roman cemetery (N=137). Results indicate that the Butt Road sample prevalence rates are nearly half that of London Roman West for cribra orbitalia, LEHs, and periostitis. Odds ratios indicate that the London sample was more likely to express indicators of stress and infection. Both London and Colchester represent Romanized urban communities. However, a majority of the Butt Road sample dates to the fourth century while London West includes burials ranging from 43AD to 410AD. This suggests a shift in health in the 4th century AD, which may be related to changes in religious organization.

UNSANITARY URBANISM? RETHINKING PATHOLOGY IN IMPERIAL ROME

Killgrove, Kristina

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The historical record of ancient Rome depicts city life as crowded, unsanitary, and violent, especially for the lower classes. It is reasonable to assume that, with a high population density and significant influx of people from around the Empire, the inhabitants of Imperial Rome would demonstrate elevated frequencies of pathological conditions, particularly as compared with skeletal populations from the countryside. Contrary to this expectation, however, are the human remains from the lower-class cemeteries of Casal Bertone and Castellaccio Europarco in Rome. This presentation details the paleopathological analysis of 183 skeletons from these two Roman cemeteries.

Neither population produced conclusive evidence of infectious diseases (e.g., tuberculosis), and only one individual presented with osteomyelitis. The pathologies reported most frequently in past Roman bioarchaeological literature include porotic hyperostosis, trauma, osteoarthritis, and enamel hypoplasias. Both study populations had significantly lower frequencies of these issues than did previously-published populations. The frequency of cribra orbitalia, for example, is 14-18%, compared to 50-80% in other Roman populations, and enamel hypoplasias affect only 2% of the studied teeth, whereas reported frequencies from other populations consistently exceed 35%.

The people buried at Casal Bertone and Castellaccio Europarco present very few indications that their health was adversely affected by life in a large urban center. The dramatically lower frequencies of porotic hyperostosis and enamel hypoplasia in particular, suggest that the people of Rome were not homogeneous in their exposure to pathogens, physiological stress, and health outcomes.

A MULTI-TECHNICAL APPROACH OF ANCIENT DNA AND RESULTS OF TUBERCULOSIS OF BONE SAMPLES FROM SLAVE BURIALS ON GUADELOUPE (Cemetery in Anse Sainte-Marguerite, 18th/19th CENTURY)***

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From 1997 until 2002, several burials on Guadeloupe located in Anse Sainte-Marguerite were excavated and examined. Archaeological and anthropological investigations identified these graves as slave burials from the period of American colonization during the 18th and 19th century.

The morphological study of the osseous remains of 148 individuals revealed signs of typical bone tuberculosis in a high frequency. Skeletal lesions are presently observed in about 1% of all patients infected with TB – prevalence was about 3-5% during the pre-antibiotic era. In this case skeletal TB reached 12% (18/148). Eleven of these bone samples were analyzed methodologically for ancient DNA with various techniques. Once extracted according to established procedures, we investigated the samples on the cytoplasmic multicopy β -Actin gene by PCR and got two positive results with the size of 202 base pairs. We also obtained an amplification product for the *Mycobacterium-tuberculosis-complex* DNA (IS 6110) with the size of 123 base pairs. The specificity of the result was confirmed by sequencing. Additional tests such as high molecular DNA tests, quantitative measurements of the DNA concentration and UV-fluorescence, radiological imaging and spoligotyping of the bones were performed. The latter method could not show positive results at all.

Handling of ancient DNA requires special attention. The fragmentation of DNA strands through time and external influences like climate and soil conditions challenge scientists. Transferring to the historical issue of slavery on Guadeloupe we confirm the first aDNA result of tuberculosis among slaves in the Caribbean. In future studies we want to investigate more samples and the strains of the *mycobacterial* DNA we found.

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CELEBRITY PALEOPATHOLOGY: THE EXHUMATION OF THE DANISH ASTRONOMER TYCHO BRAHE

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The circumstances of performing a paleopathological case study may be difficult when the case is a “celebrity” individual. We have recently documented the skeletal remains of the Danish astronomer, Tycho Brahe, who died in 1601 in Prague. As part of an archaeological reappraisal, permission was gained from the Czech authorities to access his coffin in the church crypt, and carry out physical anthropological and paleopathological analyses (among others) over one week. Of special interest was a more detailed analysis of the facial skeleton, since Tycho Brahe had part of his nose cut off in a duel.

While we briefly will touch upon the paleopathological observations, this presentation will focus on the circumstances of the investigation. There was a massive media coverage right from the extraction of the coffin from the crypt to the analyses carried out in a laboratory and at a hospital. The media did not always understand, e.g., the necessity of securing specimens for aDNA under controlled circumstances to avoid contamination, nor the fact that not all questions relating to the human remains could be answered right away. There thus may be the paradoxical situation that even though thorough planning has gone before the actual examination, massive and intrusive media presence may derail or encumber the scientific process.

In “celebrity” cases we recommend that rigid protocols should be defined a forehand, and that the media be informed about these protocols a forehand, to minimize the risk of turning a serious investigation into a media event.

METHODOLOGICAL CONSIDERATIONS REGARDING REASSOCIATION OF HUMAN REMAINS ***

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In working with archaeological collections of human skeletal remains, it is common to encounter breakage and commingling, particularly when studying assemblages that were excavated in the late 19th or early 20th century. Whether commingling reflects the condition of the remains *in situ* or results from collection and curation mishaps, intermixed human remains impede interpretation of the distribution of skeletal lesions, which is critical for accurate identification of paleopathological conditions. Pathological processes are best understood by examining the complete individual, rather than isolated or commingled elements. Moreover, analysis of the number of individuals present, the demographic composition of the assemblage, and the distribution of disease amongst the burial population can be significantly hindered by commingling. Although time- and labor-intensive, broken skeletal elements should be refit, and commingled human remains re-associated into discrete individuals as much as possible in order to conduct a comprehensive analysis of pathological conditions. Using the Chaco Canyon skeletal series as a case study, this paper will examine the utility of re-associating commingled human remains in understanding demographic profile and paleopathological conditions. This paper describes conflicts between previous analyses of the Chaco skeletal series that did not involve re-association of the remains, and discusses how re-association allowed analysis of the distribution of otherwise nonspecific pathological changes, both within individuals and across the burial population. This information permitted identification of specific pathological conditions and clarified the number of individuals affected in the assemblage, providing a more accurate understanding of this assemblage and of the culture it represents.

ROOT HYPERCEMENTOSIS IN THE ATAPUERCA-SIMA DE LOS HUESOS HOMININ SAMPLE: INCIDENCE AND IMPLICATIONS

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Hypercementosis has been defined as the process of cementum production beyond the physiologic limits of the tooth (Pinheiro et al. 2008). Despite being widely noted in fossil and archaeological samples, its aetiology remains obscure. This condition has been associated with different processes: several pathological conditions such as miscellaneous diseases (i.e. Paget's disease), traumatic occlusion and severe dental wear or lack of function. In this paper, we present a detailed study of the hypercementosis incidence per dental class, sex and individual in the Atapuerca-Sima de los Huesos (SH) dental sample. This site has provided the largest hominin sample from a single Middle Pleistocene site providing an exceptional insight into the palaeobiology and palaeopathology of a Pleistocene population. This study was carried out using both macroscopic and microscopic techniques such as microtomography. In order to investigate its aetiology we obtained variables such as cementum thickness, morphology and degree of root involvement. Our study reveals a high incidence of hypercementosis in the SH hominin sample, with a major prevalence in adult and young adult individuals. All dental classes are affected and its expression tends to be restricted to the inferior apical third of the root. Possible aetiologies are discussed in the light of its distribution pattern and other dental and mandibular pathological signs (i.e. severe occlusal attrition, anomalous wear facets, calculus).

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SEVERE DENTAL LESIONS IN THE FIRST HOMININ IN EUROPE: A CASE OF STRONG COMPENSATORY ERUPTION IN THE SIMA DEL ELEFANTE MANDIBLE (ATAPUERCA, SPAIN)

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We present the palaeopathological study of the hominin mandible ATE9-1 from Sima del Elefante site (Atapuerca, Spain). This fossil represents the earliest hominin remains from Western Europe with an age of ca. 1.3 Ma. Our study reveals pervasive dental lesions such as generalized hypercementosis, significant alveolar root exposure, mild periodontal disease, tooth dislocation, and anomalous occlusal plane in combination with severe dental attrition. We have also identified calculus, two cystic lesions and an anomalous wear facet suggesting tooth pick use. Despite the substantial root exposure, the periodontal affection is mild. We conclude that the *compensatory eruption* in response to the severe attrition is the major cause of the ATE9-1 teeth extrusion. The generalized and massive hypercementosis would have also favored movement and dislocation of the teeth. These lesions indicate heavy and/or traumatic masticatory habits in this individual and serve as a basis for inferring adaptation in this early population. Despite the severity of the lesions, occlusion was at least partially functional so it was unlikely to affect this individual's survival. Together with the edentulous skull from the 1.8 Ma site of Dmanisi (Georgia), ATE9-1 is one of the few specimens with severe and pervasive dento-gnathic lesions identified in the Early Pleistocene. Thus, ATE9-1 becomes an important

piece in the debate about the possibilities of survival of impaired hominins during the Pleistocene.

RHINOMAXILLARY CHANGES IN LEPROSY: COMPARING CLINICAL AND PALEOPATHOLOGICAL DATA (HOSPITAL-COLONY ROVISCO PAIS, TOCHA, PORTUGAL, AND ST. JØRGEN'S MEDIEVAL CEMETERY, ODENSE, DENMARK)

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“*Facies leprosa*” and “*rhinomaxillary syndrome*” are widely used (sometimes indiscriminately) to diagnose leprosy. However, there are no studies reporting the prevalence of the bone changes underlying these paleopathological concepts. This research aimed to correlate clinical and paleopathological data concerning rhinomaxillary changes. Two samples were analyzed: a) 300 clinical files, from both sexes (aged 4 to 93 years old), screened between 1947-1985 at the Hospital-Colony Rovisco Pais (HCRP), Portugal; b) 191 skeletons, from both sexes, adults and non-adults, from St. Jørgen’s leprosarium (13th-16th/17th centuries), Odense, Denmark. They were macroscopically observed. In medical diagnosis there is no need to report in detail changes in the nasal and oral cavities. Thus, nasal changes were present in 43 (14.6%) of the HCRP patients and nasal bone destruction described in 1.7% (5/295). Dental loss and palatal destruction were not mentioned. In the Odense sample, nasal changes were found in 69.6% (133/191) of the skeletons. The most common finding in the piriform aperture was the resorption of the anterior nasal spine (56.0% [84/150]). Inside the nasal cavity the most observed pathological changes were in the nasal surface of the palatine process (40.4% [76/188]). Hard palate changes and resorption of the anterior maxillary alveolar process occurred respectively in 23.0% (44/191) and 48.8% (88/182) of the individuals. When rhinomaxillary changes were combined, 38.7% presented “*facies leprosa*” while the “*rhinomaxillary syndrome*” prevalence varied between 14.1% and 72.8%, depending on the number of changes included. These discrepancies, allied to the uncertain pathognomonic value of rhinomaxillary lesions, suggest caution when diagnosing leprosy.

DID SCURVY PRECIPITATE THE LOSS OF SIR JOHN FRANKLIN'S LAST EXPEDITION TO THE ARCTIC 1845-48?

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In 1845, an expedition under the command of Sir John Franklin set sail from England bound for arctic Canada. Its purpose was to discover the northwest passage. In September 1846, the ships became beset in ice in the Canadian archipelago. A note left in a canister on King William Island in May 1847 stated that all was well, but in the following 12 months, 21 crewmembers died, and in April 1848 the remainder abandoned the ice-locked ships and attempted to reach safety on the Canadian mainland. All died in the attempt, less than 100 miles from the ships. Although the ultimate cause of deaths in the final march toward the mainland was starvation, the deaths prior to the abandonment of the ships show that there were problems before this that likely contributed to the expedition’s loss. Ever since the mid 19th century, scurvy has been suggested as a major cause of morbidity and mortality among Franklin’s crew. The current work uses documentary sources and skeletal evidence to evaluate this possibility. The former indicate that scurvy was a well-recognised threat and steps were taken to prevent it on the expedition. The skeletal remains from crewmembers show scant evidence for scurvy. The

evidence is not conclusive, but there is little to support the idea that scurvy was a major factor in the loss of the expedition.

DENTAL MODIFICATION: EVIDENCE OF AFRICAN ORIGIN ONLY?

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Comparative descriptions of dental modifications in the cemetery of the first Brazilian Cathedral (Salvador) belonging from the XVIII and XIX centuries, and dental modifications found in the African Burial Ground of the slaves market (Pretos Novos cemetery) in Rio de Janeiro are described and discussed based on the technique of dental modification. Other dental modifications were described in about 10% of African slaves traded to Brazil. Their identification in dental remains from some burial grounds generally point to an African origin, as exemplified by Silva et al (2002) and Machado (2006) interpretations for Salvador and Rio de Janeiro cemeteries of the XVIII to the XIX centuries. Otherwise, ethnographic and archaeological data point to the persistence of dental modification among some Brazilian native groups after contact with slaves. On the other side, some Brazilian communities along the XIX and also the XX century, were documented keeping that practice, decades after slavery had an end. Inspired in the African practices, such ethnic sculpture of identity on the body persisted in Brazil. Archaeological findings of dental modification must be discussed and analysed in detail, before any inference about African origin of skeletons can be proposed. In the present paper, some Brazilian cases are presented; practices of dental modification in the Brazilian communities and native groups are used for comparison, confirming different origins for the true African techniques, and peculiar techniques adapted in Brazil.

DETERMINING RELATIVE HEALTH FROM COMPARATIVE SKELETAL STUDIES: AN ASSESSMENT OF INDICATORS OF HEALTH FROM THE MILWAUKEE COUNTY INSTITUTION GROUNDS CEMETERY

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The Milwaukee County Institution Grounds Cemetery represents the burial grounds for many of the city of Milwaukee's impoverished. Representing both an institutional and public cemetery, those interred on county grounds lived during a timeframe where the city's increasing efforts towards public health reform was a prominent concern. This study examines the health of the most vulnerable members of an urban center once given the distinction of 'America's Healthiest City'. A sample of 531 adults and 392 subadults from the MCIG cemetery #2 (1882-1925) was used to examine several skeletal indicators of health, including both infectious and degenerative processes.

While the prevalence of pathology in the MCIG sample is high, with over 90% of the sample exhibiting some form of pathology, the comparison of the Milwaukee sample to other 19th century urban samples shows that the MCIG cemetery differs significantly from comparative samples in regards to developmental and nutritional stress. The objective of this presentation is to highlight the patterns seen between selected comparative skeletal samples in regards to the interaction of nutritional and developmental stress and disease-related stress. Building upon Wood et al.'s 1992 article, *The Osteological Paradox*, recent studies have examined how relative health is assessed from skeletal remains. This presentation also looks at

the definition of health in comparative skeletal studies, and how descriptions of “healthy” or “unhealthy” samples are applied to skeletal studies.

THE IDENTIFICATION AND CHARACTERIZATION OF *MYCOBACTERIUM TUBERCULOSIS* COMPLEX DNA AT YOKEM MOUNDS, PIKE COUNTY, ILLINOIS ***

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The absence of skeletal evidence for tuberculosis at the Yokem Mounds despite the high frequency of tuberculosis lesions at the contemporary Schild Cemetery nearby has been a puzzle for three decades. Using ancient DNA methods, we identified the presence of *Mycobacterium tuberculosis* complex (MTC) DNA in three individuals from the Mississippian Yokem Mound 2 (AD 1430 ± 100). In each case, there were few to no pathognomonic lesions that would have engendered a diagnosis of tuberculosis. In this report, we present DNA sequence data on ancient MTC strains recovered from the ribs of these three individuals, focusing on portions of the *gyrase B*, *16S rRNA*, and other relevant genes. We explore the origin and pattern of infection in ancient New World tuberculosis by comparing our MTC sequence data with that of other ancient and modern members of the MTC. Our findings build upon previous evidence for the presence of tuberculosis in the Lower Illinois River Valley during the Mississippian period.

THE FUTURE OF PALEOPATHOLOGICAL RESEARCH: THE NEED FOR DATABASES OF CURATED SKELETAL COLLECTIONS

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A recent paper considered the study and restudy of human skeletal remains in museums and other institutions that curate human remains from archaeological sites in the UK (Roberts & Mays 2011). A consideration of 258 papers dealing with skeletal remains from UK archaeological sites published from 1990-2009 in the *J. Archaeological Science*, *J. of Paleopathology*, *American J. of Physical Anthropology*, and *Int. J. of Osteoarchaeology*, 352 instances of the use of a skeletal collection were identified. Seventy-nine per cent of the papers were based on skeletal samples in five geographic areas with some sites commonly being reused. Reasons for this concentration of research are suggested. It was recommended that the ‘use load’ should be better and more evenly spread around skeletal samples in other geographic areas of the UK in order that knowledge is not limited just to a few skeletal collections. In addition, it was suggested that a centralised database of skeletal collections curated by different institutions would contribute to this aim. This was one of the recommendations of the Department of Culture, Media and Sport in 2005. This paper builds on this study to recommend that databases for skeletal remains should be developed in all regions of the world so that skeletal remains can be better utilized and selected to test hypotheses and answer specific questions about the history of human health and disease. Unless this is done, we will acquire a biased view of the history of human disease as the same skeletal collections are continually restudied.

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PIGS AND PEOPLE AT AMARNA - PUNISHMENT OR RITUAL (1352-1336 BCE)?

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Amarna, the capital city built by Akhenaten, Egypt's most (in)famous King, has been producing intriguing findings for more than a decade. Luff and Brothwell (1997) report on an Amarna pig skull that lived some time after a severe head wound and they suggested the notion of a ritual practice. Tony Legge has completed examining the animal remains and reports wounds on pig bones that were inflicted long before death that clearly did not have the intent to kill, but to punish and cause pain. He reports three scapulae pierced by a spear or sword, one mangled femur, and six skull fragments showing deliberated wounds (2010). In 2008 a 35-39 year old male was found to have multiple weapon wounds indicating three combat events with death following the last from infection (Dabbs and Schaffer 2008). This discovery prompted the careful search for more wounds and one category discovered was healed penetration of the scapula that did not damage the ribs in three individuals: male 25-29 years; female 40-50 years; and probable male 38-55 years. After discovery of the healed pig trauma a detailed comparison between the healed scapula lesions of the pigs and the healed wounds of the human scapula showed great similarities. Are both pigs and humans being punished by inflicting wounds that would cause great pain but not death or is there a ritual function to this activity?

HISTORY OF PALEOPATHOLOGY: EXPLORATION THROUGH ARCHAEOLOGICAL CASE STUDIES

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Human paleopathology is important in determining diseases within and between populations, and the effects environment and culture have on the human body. In this paper, I present a history to the study of human paleopathology, by looking at archaeological case studies. I chose archaeological case studies because paleoepidemiology, as explained by Armelagos in "Disease in Ancient Nubia" (1962), links archaeology and paleopathology throughout processual and postprocessual thought. I look at how the different archaeological theories have influenced paleopathology as those theories have changed through time. I start by looking at the descriptive period (1840-1914). Next, I examine the culture history period (1914-1950) using case studies by Hooton (1930) and Lewis and Kneberg (1946). Third I explore processual (1960-present) and postprocessual (1980-present) theories and their influences on current paleopathology. I conclude that archaeology and human paleopathology have been intertwined since the modern study of human paleopathology began around 1930, with Hooton's study of the Pecos Pueblo Indians.

EVIDENCE OF ACCIDENTS AND PREGNANCY PROBLEMS IN PORTUGUESE EX-VOTOS FROM 18TH TO 20TH CENTURIES AD

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Paleopathology examined secondary evidence such as iconographic representations. Among them are the *ex-votos*, latin abbreviation of *ex-voto suscepto* (the vow accomplished), a

devotion or faith artifact associated with religious expression, particularly to its popular character that acknowledges the so called miracles and promises. The *ex-voto* expresses artistically and ritually the exchange with the divine. This practice is common in different epochs and cultures. In this work will be explore the *ex-votos* from the collection housed at the University of Coimbra with the aim to identify the events that represented accidents/trauma and pregnancy problems. The cases were selected by the analysis of the iconography and associated legends. The votive tablets selected were painted in wood, canvas and tin plate and dated from the 18th to early 20th centuries. The accidents reported are related to carts, falls and the 1755 Lisbon earthquake. Trauma is a common condition reportable in skeletons from past populations. However, the event that caused the bone damage cannot usually be identified. Nevertheless, the *ex-voto* allows the visualization of daily life situations that caused accidents. In opposition, the second set of *ex-votos* rarely leaves marks in the archeological records. The risk of life for both mother and baby related to pregnancy and birth was a big toll for bringing life. All the situations reported were solved and thus all have a happy end but the information given by the *ex-voto* show the habits and the context of the epoch allowing the obtainment of elements subsidiary for the research in paleopathology.

A CRITICAL EXAMINATION OF CRANIAL DEPRESSION FRACTURES AMONG 10th-11th CENTURY AMERINDIANS OF WEST-CENTRAL ILLINOIS***

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Perimortem and antemortem cranial fractures and depressions were examined on 235 crania from the Schild site ranging in age from infants to old adults from two cemetery components that span the Late Woodland to Mississippian transition (ca AD 1000). A high frequency of antemortem cranial depressions was observed (~21.7%); however, multiple lines of evidence undermined an interpretation of all cranial depressions as “depression fractures.” These include the absence of perimortem pond fractures, absence of healed fracture lines, shallowness of depressions, and lack of endocranial involvement. Expected patterns of injuries related to sex, status and temporal component were not exhibited. Depressions were associated with increasing age with 87% among adults over 30 years.

Differential diagnoses for depressions were pursued that included biparietal thinning, depressions of the sutures, chronic porotic hyperostosis, dermoid cysts, and healed stellate scars from treponemal disease. The examination of the postcranial skeleton proved critical for the diagnosis of depressions as disease or injury-related. Depressions related to treponemal disease accounted for 3.4% of the depressions, and a more conservative frequency of injury-related depressions was produced (7.2%). Cranial depressions related to anomalies, cranial development, and disease processes were located in areas with a tendency for injury; frontal, occipital squama, and parietals superior to the temporal lines. Interpretations regarding accidents, senescence, disease, blood-letting and trepanation were explored. Equifinality of cranial depressions cast doubt on their usefulness as a proxy for violence. A more conservative use of the term “depression fracture” should be adopted and reserved for instances when fracture lines are visible.

LATE PREHISTORIC DIET IN THE CENTRAL ILLINOIS RIVER VALLEY, A COMPARISON BETWEEN ONEOTA AND MIDDLE MISSISSIPPIAN POPULATIONS ***

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Examining changes in food choice following a migration presents information regarding how the migrant population interacted physically and culturally with their new environment. The migration of Oneota peoples to the Central Illinois River Valley around A.D. 1300 presents a unique opportunity to assess Oneota subsistence, and by proxy cultural identity, in an area otherwise inhabited by maize-reliant Middle Mississippian people. This region and time period was marked by interpersonal violence and it is hypothesized that the Oneota migrants worked to maintain their established cultural identity following their migration to the central Illinois River valley by maintaining a traditional Oneota diet. Anticipating significant difference in diet between the Oneota and Middle Mississippian people during the late prehistoric, analysis of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values was performed on remains from the Bold Counselor phase Oneota cemetery, Norris Farms 36 (A.D. 1250-1400), and compared to remains from the Spoon River Middle Mississippian habitation and mortuary site, Orendorf (A.D. 1150-1250). The data revealed high intrasite variability, suggesting food choice during the late prehistoric was complex.

RADIOLOGICAL STUDY OF BODY CAVITY TREATMENT IN ANCIENT EGYPTIAN MUMMIFICATION

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Descriptions in the popular and academic literature, of the evisceration process, organ treatment, and body cavity treatment as part of the Egyptian mummification tradition, are derived largely from accounts by Herodotus and Diodorus Siculus. Our reliance on these normative descriptions obscures the wide range of techniques practiced, and so stifles the study of geographic, chronological, and social variations in the practice and their causes.

Using published descriptions in the literature and 3D reconstructions from computed tomography data, this study compares empirical data with classical descriptions of evisceration, organ treatment, and body cavity treatment. This empirical data is drawn from two samples: (1) a literature-based sample of 150 adequately described mummies, and (2) a sample of 7 mummies examined directly using computed tomography.

Techniques for accessing the body cavity, removal and treatment of the organs, and treatment of the eviscerated body cavity vary between time periods, sexes, and statuses, and are discussed in relation to their treatment in the literature and their radiological appearance.

In spite of the high degree of variability apparent in the literature as an aggregate, researchers continue to focus on stereotypes rather than on the rich variability in the Egyptian mummification tradition as it evolved across Egypt over the course of more than three millennia. In particular, the dogmatic contention that the heart was universally retained *in situ*, or replaced if accidentally removed, is greatly exaggerated.

EVIDENCE FOR MEDICINE AT THE 7,000-YEAR-OLD WINDOVER SITE

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In the mid-1980s, the well-preserved remains of 168 individuals were excavated from the Windover mortuary pond site (8BR246) located near the central eastern coast of Florida. Dating to over 7,000 years BP, these remains afford a glimpse into the genetic, cultural, isotopic, and paleopathological status of populations from Florida's Archaic period. This research applies an integrated analytic approach that utilizes botanical remains, material culture, and bioarchaeological data from the site to infer medicinal practices among these ancient Americans. Analysis of botanical remains identifies 19 of the 31 plants as having known medicinal applications, several of which were found within the abdominal regions of individuals exhibiting extensive pathology. The high percentage of well-healed, well-aligned fractures suggests they were splinting injured extremities. Wooden stakes associated with many of the burials shows they possessed the tools and knowledge to produce wooden artifacts. The material culture suggests women may have been responsible for the preparation and administration of medicines. The Windover site and its well-preserved skeletal, botanical and cultural materials may represent the earliest evidence for medicine in North America.

EPIDEMIOLOGY AND PREVALENCE OF ATHEROSCLEROSIS IN ROYAL EGYPTIAN MUMMIES

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In our study we focus on the severity of atherosclerosis in ancient Egyptian royalty by developing a novel grading system for this pathological condition by using computed x-ray tomographic imaging (CT) in mummies of the prosperous 18th to 20th pharaonic dynasties. We analyzed 18 royal mummies of the New Kingdom, of which 13 were part of the family of King Tutankhamun and five further royal mummies belong to the Ramesside period, including the famous Ramesses II and his father Seti I.

Our results clearly show that atherosclerosis was common in the royal families of the ancient Egyptian Empire. In contrast to previous work on atherosclerosis in mummies belonging to the "non-royal" Egyptian population, the members of the ancient royalty have developed atherosclerosis in a more extended and severe form. Our new grading system clearly defined the severity of the condition as "high" (7 out of 8 affected persons). The results indicate that the elevated life style as shown by wall inscriptions in the temples and tombs of the kings with plenteousness of food and meat really mirrors their real everyday life and has contributed to the high incidence of atherosclerosis. This is further supported by the presence of obesity in the mummies of the noble person Sitra-In and Queen Hatshepsut. Moreover, it is surprising to see that such a high prevalence of atherosclerosis is seen in a population in the absence of tobacco smoking tradition. We speculate that wrong nutrition habits and a genetic predisposition mainly contributed to the severity of this pathological condition.

POSTER SESSION PRESENTATIONS

EVIDENCE OF TRIBAL WARFARE AMONG THE ANGA OF PAPUA NEW GUINEA – TRAMUA PATTERNS

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The purpose of this study was to verify claims made in the ethnographic record regarding the warfare attributes of the Anga of Papua New Guinea. This research was part of a larger study of the Anga mummies of the Aseki region. This study reports on the examination of 32 mummified and skeletal remains or partial remains from in and around the Aseki region of Papua New Guinea. We report on 23 remains from Koke village, 3 from Oiwa, 5 from the Imauka cave, and 1 from Yeakunga. Methods included direct observation, wound measurements, endoscopic evaluation, and photographic documentation. The examination resulted in a graphic validation of the manner of combat and retaliation present in the pre-missionary Aseki region. Eleven crania had enough of the vault preserved and bone exposed to allow an assessment of whether or not the individual had suffered a depressed cranial fracture. Of those 11, 5 had depressed or penetrating cranial fractures. In addition, 2 of the individuals from Oiwa demonstrated perimortem slashing wounds to the skin. Artifact analysis was conducted with the majority of artifacts being weapons. These weapons were examined to determine if they might be implicated in the trauma observed. Therefore, there is abundant evidence for a very high prevalence for violent trauma among these individuals validating the early ethnographic reports.

SPONDYLOPATHY IN LA TÈNE PERIOD POPULATION FROM THE CENTRAL EUROPE (CZECH REPUBLIC)

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The most commonly occurring pathological findings seen in archaeologically derived human skeletal remains are diseases of the spine and vertebrae. The spine can provide a large scale of information about health, physical condition, lifestyle and living conditions of people living in different prehistoric periods. This study is focused on the population from La Tène period (400 BC – 0) in Bohemia and Moravia (Czech Republic). The skeletons of 334 individuals were studied (127 males, 55 females and 152 individuals of undetermined sex). We examined 1301 vertebrae and 59 sacral bones. Each spinal element was examined for degenerative disease, congenital defect and infectious disease. Special focus was given to incidence of spondyloarthritis between adult males and females. The four segment method (Stloukal – Vyhnánek 1976) was used for evaluation of the incidence of spondyloarthritis. The incidence of spondyloarthritis in this population is considered as moderate. Apophyseal osteoarthritis was recorded mostly in the cervical region of the spine. Scheuermann disease was found in 1,94% and osteochondrosis disci in 0,94% of all vertebrae. Several cases of congenital defects were present, especially canalis sacralis apertus and transitional vertebrae. One case of

DISH and one case of lumbar spondylolysis were recorded. The results were compared with other studies conducted in medieval population groups from Bohemia and Moravia territory. Our results are similar to the conclusions of these works. This research also shows the state of preservation of skeletal material and highlights the limits of palaeopathological and paleoepidemiological study of skeletons dating back to the La Tène period.

A CASE OF DILACERATION IN A HONG KONG SKELETAL COLLECTION: POSSIBLE CAUSES AND EXPLANATIONS***

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Dilaceration is the bending of a tooth crown and is an extremely rare occurrence in both living and skeletal populations, with most cases reported in dental literature only (Lin, 1999; Yeung et al., 2003). The direct causes of dilaceration are still largely unknown, but researchers have suggested that trauma or disease during tooth development can cause this phenomenon. Dilaceration often occurs in adult dentition when trauma occurs to the deciduous tooth whose apices lie next to the permanent germ cell (Yeung et al., 2003). This paper presents a case of dilaceration found in a Hong Kong skeletal collection.

Two hundred and twenty seven intact and complete skulls from the University of Hong Kong Department of Anatomy's collection were studied. All the individuals were ethnically Chinese adults and died during the 1978-1983 period. Many of the individuals were from a lower socioeconomic class and had died trying to swim to Hong Kong from mainland China. Since most individuals were from lower socioeconomic classes, many were in poor health and had little to no dental care. One individual from the collection showed evidence of dilaceration of the front central upper incisor. This was a male individual that died in 1980 and was 42 years old at death. The cause of death is unknown.

The maxillary area surrounding the tooth shows no sign of antemortem trauma; if trauma was the cause of dilacerations, it was most likely to the tooth itself or the surrounding soft tissue. The dilacerated tooth never erupted and had grown back into the hard palate. There are no signs of orthodontic work or attempts at correcting the tooth. The neighboring tooth shows a normal eruption pattern, with no evidence of trauma.

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INDICATORS OF PHYSIOLOGICAL STRESS IN EARLY PREHISTORIC SOUTHEAST ASIA DURING AGRICULTURAL INTENSIFICATION

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This paper examines patterns of health and physiological stress in prehistoric Southeast Asians. Studies of human skeletal remains from elsewhere in the world have demonstrated that

as agriculture intensifies, levels of poor health and physiological stress increase. Current research in Southeast Asia suggests that this trend is not universal. However, the human biological responses to the intensification of a rice based subsistence strategy are not well understood compared with other modes of agriculture. Here the hypothesis that levels of health and stress are more stable in prehistoric Southeast Asian populations compared with Western populations during agricultural intensification is tested using a large prehistoric adult sample from Ban Non Wat, Thailand. The skeletal sample spans the Neolithic and Bronze Age, from 1750 B.C to 500 A.D., when rice agriculture intensified.

Individual dentition was scored for linear enamel hypoplasia (LEH), as an established measure of physiological stress in early childhood. Adult stature was estimated as another general measure of health in early childhood. The relationship between individual stature and prevalence of LEH is explored and differences between males and females are tested. Initial results indicate an increase in stature for both males and females, and no significant change in the prevalence of LEH over time. Overall, this evidence supports theories that health does not decline and stress does not increase during the intensification of rice agriculture in prehistoric Southeast Asia.

FRACTURE PATTERNS IN THE ROBERT J. TERRY ANATOMICAL COLLECTION

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Researchers visiting the Robert J. Terry Anatomical Collection often remark on the large number of nasal fractures they encounter during their research. These remarks inspired a survey of the collection to determine if sex differences exist in the prevalence, location, and co-occurrence of skeletal fractures of individuals within the collection. Following the work of Walker (1997) and Brickley and Smith (2006), this study focused on nasal bones and other skeletal elements often associated with violence related injury. One-hundred fifty males and 150 females ages 18-49 years were examined for the presence or absence of healed fractures of the cranial vault, mandible, face, ribs, metacarpals, radius, and ulna. Overall fracture prevalence was surprisingly high, with 66% of males and 56% of females having at least one fracture. The nasal bones were the most commonly fractured element for both sexes (52% of males; 46% of females), followed by the ribs (15% of both sexes). Twenty-eight percent of males and 27% of females had two or more fractures. The most common pattern for both sexes was the co-occurrence of a craniofacial fracture with another craniofacial fracture (12% of males; 14% of females); of these, the most common pairing for both sexes was nasal-zygomatic (6% of males; 8% of females) followed by nasal-frontal (5% of males and females). Additional data from the survey will be presented along with a discussion of the findings in relation to clinical data on injuries related to various mechanisms of trauma including interpersonal violence, motor vehicle accident, and falls.

TALES FROM THE CRYPT: PRELIMINARY FINDINGS OF A DIGITAL RADIOGRAPHIC STUDY OF SKELETAL REMAINS UNDER ST BRIDE'S CHURCH IN LONDON, ENGLAND

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The present study considers the preliminary findings of a filmless radiographic study of skeletal remains with biographical data, curated and retained in St. Bride's Church in London, England. Although film has been the principle recording media for remote location radiography for more than 100 years, a number of disadvantages, such as the need to wet process the exposed film that reduced the number of images that can be obtained over a given period, provide a less than satisfactory solution. Recent developments in digital radiographic imaging have resulted in smaller less expensive systems that might be transported to where the skeletal or mummified remains are stored. Although the urban setting of the church was not a very remote site, working in the crypt did simulate conditions encountered in a crypt in Popoli, Italy, and caves in the Kabayan jungle in the Philippines. Over a total of eight days in June 2010, 748 images were obtained of the complete skeletal remains of the 14 sub-adults and the skulls and mandible of 70 adults that are part of the total of 227 individuals. The logistics, protocols and procedures developed to acquire the images will be described. In addition, the advantages and disadvantages of the imaging system will be considered and suggestions for future efforts will be discussed.

DEVELOPMENT OF A DRY BONE CT SCANNING PROTOCOL FOR ARCHAEOLOGICAL CRANIA

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This poster discusses the development of a multi-detector computed tomography (MDCT) scanning protocol for dry bone skulls, using a Toshiba Aquilion 64-slice scanner at Quinnipiac University, in North Haven, Connecticut. Unfortunately, for individuals working in paleoimaging, the preset image manipulation factors have been developed for hydrated living tissues. Three likely preset protocols were selected as the initial starting place for the dry bone study in preparation for a potential large sample scanning session of skulls from Peabody Museum of Natural History at Yale University. Each protocol had specific raw data acquisition parameters and algorithm, mathematical manipulations of the raw data, intended to produce a particular effect on the resulting displayed images such as edge enhancement or beam hardening correction. The effects of these subtle data manipulations will be discussed and demonstrated. Finally, although the protocol was developed on a Toshiba unit, the manipulation factors presented can be employed as, at least a starting point, for the optimization of image quality while reducing the magnitude of data collected.

MICROCEPHALY IN A MIDDLE WOODLAND ADOLESCENT FROM ILLINOIS

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The controversies surrounding the interpretation of the Flores hominid have called attention to the variety of conditions that result in microcephaly. A 12-14 year old from the Pete Klunk Mound Group in west-central Illinois is microcephalic and has complete closure of the sagittal suture without scaphocephaly. Endocranial features are poorly marked. Tibias are bowed and bone density is low, suggesting mild rickets or other metabolic disease. There is asymmetrical dental reduction. Clinical models for syndromic and non-syndromic craniostenosis are used to suggest possible diagnoses (DeLeon and Richtsmeier 2009; Currarino 2007). One plausible candidate is hypophosphatemic rickets.

This burial, 11C40-92, was unusual, although the field report presents interpretive problems (Perino 1968). The juvenile was interred flexed and head-to-foot in the fill of the subfloor pit burial, ordinarily a marked status location, containing a prone, elderly male. The adult had been partially cremated in situ. Double burial, prone burial and cremation are all uncommon at this site, and may suggest that both these persons had unusual social identities.

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DIAGNOSING, CONTEXTUALIZING AND EXPLORING THE IMPLICATIONS OF POSSIBLE SCURVY IN A SUBADULT SKELETAL ASSEMBLAGE FROM LA CUEVA DE LOS MUERTOS CHIQUITOS, MEXICO***

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Bioarchaeologists have taken the lead in exploring the causes and implications of metabolic bone disease in ancient skeletal remains. While cases of scurvy have been identified across time and space, few paleopathological studies have used such data to address larger questions about the nutrition, lifestyle, and behavior of people in communities where scurvy would have been an observable health problem. A contextualized analysis of four possible cases of infantile scurvy from the La Cueva de Los Muertos Chiquitos, northern Mexico (AD 600-1430), is used as a case study to address larger questions about morbidity, mortality and mortuary treatment of more than 17 infants interred at this ritual burial site. The presentation includes differential diagnosis of the condition, archaeological data on the assemblage and interpretation of the presence of scurvy and other markers of malnutrition (5 cases of cribra orbitalia, 7 cases of porotic hyperostosis and a 60% prevalency rate of non-specific periosteal lesions).

Several alternative hypotheses are discussed that explain the presence of an inadequate diet in a population with a reportedly nutritious and diversified diet. By utilizing archaeological data in conjunction with paleopathological analysis, we suggest that inadequate nutrition present in the community is likely the result of preparation for ritual sacrifice rather than stress due to a

marginal environment or poor subsistence strategy. Such an approach demonstrates the potential paleopathology has to contribute to larger bioarchaeological questions.

POROTIC HYPEROSTOSIS AND CRIBRA ORBITALIA IN AN ETRUSCAN SKELETAL SERIES DATING FROM 800 TO 200 BC

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The Etruscans were an early Italian community from the 1st millennium BC. Although debated, most agree that the Etruscans directly developed from the earlier Villanovan community who settled this region in 1100 BC-800 BC, bringing iron technology to Italy. Very little is known about the biology and health of the Etruscans. This paleopathological assessment of Etruscan burials, housed at the National Etruscan Museum of Tarquinia offers a chance to alleviate this lack of information. The samples used in this project date to 800-200 BC. We focus specifically on the frequency of porotic hyperostosis (PH) and cribra orbitalia (CO). Of the 278 Etruscan specimens examined, 52 females and 78 males had at least part of the cranial vault that could be assessed and 25 females and 30 males had at least one eye orbit present. Frequencies of PH and CO were compared between males and females. Sex specific patterns of these lesions are also explored. Both Etruscan sexes had similar frequencies of PH and CO. For example, males and females had the same frequency of PH (30.8%). While males had a higher frequency of CO (16.7%) than females (4%); this difference was not significant ($p=0.1812$). Males between the ages of 40-49 have slightly higher frequencies of PH than do females (males 31.3% and females 25%) but these are not significant ($p=0.5046$). The Etruscan data is then compared to Imperial Roman burials from Urbino, Italy. In general, the Etruscans show lower frequencies of porotic hyperostosis than do the Urbino burials.

TRAUMA AT PREHISTORIC POINT HOPE, ALASKA

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This study examines differences in the frequency and pattern of traumatic injury of two prehistoric populations from Point Hope, Alaska. The Ipiutak (100BCE-400CE) were a seasonally migratory hunting group focused mainly on exploitation of the vast caribou herds of the north Arctic. The Ipiutak ($n=77$) lived at Point Hope during the spring and summer months. The Tigara (1200-1700CE) were an open-water whale hunting Thule culture population occupying Point Hope year round. The economic base for the Tigara ($n=305$) was nearly exclusively sea mammals, including bowhead whale, seal, and walrus. Macroscopic examination of the skeletal remains from Point Hope reveals several differences between the rates and patterns of trauma between these two groups. The Tigara have statistically significantly higher rates of average number of fractures per person ($p=0.001$), number of individuals with fractures ($p=0.003$), and number of individuals with multiple fractures ($p=0.0016$). This variation likely arises as a result of differential hardships endured during the economic activities, and that the Tigara have higher levels of injury may correspond to increased

danger associated with close contact hunting of large sea mammals (whales), as opposed to more distant hunting of caribou. The pattern of fractures observed, including substantial frequencies of spondylolysis (Tigara 35.6%), and fractures of the ribs (18.9% overall) and clavicles (5.9% overall), suggests there is need for adjustment to the categories of trauma considered for the Mark I Health Index being used for the Global History of Health Project. Currently, none of these traumas is included in the MIHI calculation.

**RE-EVALUATION OF A PROPOSED POSSIBLE CASE OF
PREHISTORIC CONGINITAL SYPHILIS IN THE MISSISSIPPI DELTA*****

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Differential diagnosis, one of the most challenging aspects of paleopathology, involving evaluation of a variety of indicators to identify the most likely disease etiology, was applied to a suggested case of prehistoric congenital syphilis from the Mississippi Delta. Burial 20 is a 13-15 year old adolescent recovered from the Austin Site (22TU549) dating to the Late Woodland-Early Mississippian transition. Lesions used in support of the proposed diagnosis include the presence of numerous caries and heavy attrition on the permanent molars, osteomyelitis on several long bones, lesions in the nasal region, and bowing of the tibiae. Although these conditions can be associated with congenital syphilis, a number of traditionally diagnostic criteria were lacking. No Hutchinson's incisors were present, and although occlusal enamel quality was poor, the morphology of the first permanent molars are not consistent with moon's molars. Periosteal build-up was limited to only the distal portion on the only tibia available, and the area around the nasal aperture showed normal sub-adult bone formation. The location of the well-healed osteomyelitic lesion on the ulna is not typically associated with hematogenic infection but instead may have possibly resulted from trauma. Although the heavy attrition on the molars is unusual, a re-evaluation of the skeletal evidence suggests the lesions are not consistent with congenital syphilis. Instead, these skeletal indicators as well as several others, including short diaphyseal length and porotic hyperostosis suggest burial 20 was more likely nutritionally stressed increasing susceptibility to disease and infection during early childhood.

**STATURE AND LONG BONE LENGTHS IN 19TH-CENTURY-BORN
AFRICAN AMERICAN AND EURO-AMERICAN MALES**

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The examination of long bone lengths and stature can provide insights into the health of past groups. The current study analyzed the femoral and humeral lengths of a sample of 19th-century-born African American and Euro-American males (n = 626) from the Hamann-Todd, Terry, and Cobb anatomical collections. Previous studies of these collections have revealed that most of the African Americans in these samples were Southern-born, which also provided an opportunity to examine differences among enslaved and liberated African Americans. The purpose of this research was to determine if ethnic and temporal differences existed with regard to long bone length and stature. Individuals were separated into ancestry (African American and Euro-American), birth (Antebellum, Civil War, Reconstruction), combined ancestry/birth, liberated/enslaved (Enslaved African American, Antebellum-Civil War White, Reconstruction White, and Liberated African American), and by collection (Cobb, Hamann-Todd, and Terry)

cohorts and statistically analyzed to determine if differences existed in long bone length and stature. Results indicated there were significant differences in long bone length among African Americans and Euro-Americans, with African Americans having longer measurements than Euro-Americans. Enslaved African Americans also had significantly longer femora and humeral measurements when compared to Antebellum-Civil War-born Euro-Americans. The combined ethnicity birth cohorts continued this trend with Civil War-born African Americans having significantly longer limb measurements than Antebellum and Civil War-born Euro-Americans. Genetic and environmental factors related to the stresses of war, enslavement, and industrialization are discussed to contextualize and explain the findings.

AGE AT DEATH FOR WOMEN DURING THE EARLY COLONIZING OF SANDWICH, MASSACHUSETTS ***

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The Colonial period of American History ranged from the 1600s to 1763. Within this time period, women were treated as valuable commodities due to the small amount that were present in the colonies. The psychosocial stresses associated with moving to a foreign land, coupled with adapting to harsh weather conditions, which decreased natural resources, caused many people to die within the first years of colonization. It is hypothesized that women would have an expected higher age at death, due to their value as a limited resource. Differential age at death between males and females will be tested through the demographic analysis of the “Old Burying” Cemetery in Sandwich, MA, with comparative research from the Sandwich Town Archives. Data was collected by examining the tombstones of the “Old Burying” Cemetery, with a sample size of 109 individuals (50 female, 58 male, 1 unidentified), which included information about gender, age at death, and death date. Out of the 109 individuals, 24 were children and infants. The range of age at death varied considerably for the women, with the lowest being 16 years, and the highest being 88 years. Statistical analyses reveal that the average age at death for adult females was approximately 50 years of age. The males had an age at death range from 20 to 92 years, and have a mean age at death of approximately 58 years. Analyses reveal a lack of statistical significance between mean ages at death for males and females.

SKELETAL EVIDENCE OF TREPONEMAL INFECTION IN PRECOLUMBIAN SOCIETIES FROM NORTHWESTERN ARGENTINA

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The presence of treponemal infection among pre-Columbian societies in the Americas has long been confirmed by the abundance of reported paleopathological data from skeletal series representing different populations in North and South America. However, the incidence of this infectious disease is practically unknown in ancient populations of northwestern Argentina, as there are no records of this disease in the area in prehispanic times. The purpose of this report is to present evidence of bone lesions caused by bacteria of the genus *Treponema*, found in human remains recovered in archaeological sites in the plains of Santiago del Estero, in the northwest region of Argentina. The archaeological and chronological context of these prehistoric sites represents the Late Period of the ceramic sequence in the area, which spans

between X and XVI AD. The skeletal series includes twenty five individuals. Diagnosis of treponemal infection was based on macroscopic and radiographic examination of skeletal lesions. The diagnostic criteria, which considered other infectious diseases, was based on the characteristic pattern of bone disease described in Steinbock (1976), Ortner (2003) and Powell and Cook (2005). Six individuals show lesions which are probably manifestations of treponemal pathology. The observed lesions include saber shin tibiae, caries sicca and bilateral inflammation affecting long limb bones. The cases of skeletal pathology presented in this study are relevant to the history of human disease because they mean that a disease causing lesions resembling those of treponemal infection was present in northwestern Argentina during pre-Columbian times.

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COMPLICATIONS OF CHILDBIRTH: EVIDENCE OF BIRTH TRAUMA FROM THE DAKHLEH OASIS, EGYPT

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Skeletal birth trauma, or any injury that occurs to the fetus during delivery, may be caused by large fetal size, prolonged labor, abnormal fetal position, or compression and traction forces during the birth process (Lewis, 2007). In archaeological populations birth injuries may have contributed to the typical high infant mortality rate. An examination of these kinds of injuries may help us to understand birthing practices in past populations. Located in the Dakhleh Oasis, Egypt, the Kellis 2 cemetery (Christian mortuary practices dated to the 3rd/4th centuries AD) has revealed several individuals of various ages who show traumatic signs relating to birth injury. This presentation will explore injuries, including cases of humerus varus deformity, and fractures of the ribs, clavicles, humeri and cervical vertebrae, in relation to infant morbidity and mortality. The majority of these birth injuries recorded in individuals from the Kellis 2 cemetery are most likely due to prolonged labor, and compression and traction forces during the birth process. Previous research on the fetal and infant population from Kellis 2 has demonstrated that the perinate individuals are not large in size by modern standards, and as such future research will explore birth trauma as it relates to female obstetrical measurements.

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NEW INSIGHTS INTO THE PATHOLOGICAL BOWING OF THE WLH 106 HUMERUS

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The Pleistocene Australian individual Willandra Lakes Hominid (WLH) 106 was discovered in 1977 adjacent to the ancient lakebed of Lake Garnpung in the Willandra Lakes system, at the site Garnpung/Gogolo 16 (Webb, 1989). The right humerus of WLH 106 presents an unusual medially-directed bowing of the humeral shaft. Webb (1989, 1995) analyzed radiographs of this specimen in an attempt to diagnose the specific pathology responsible for the bowing. The cortical bone thickness is within the normal range for this fossil series and the medullary cavity is unobstructed. Aside from the bowing no other pathological response is evident. Webb (1989, 1995) suggests congenital deformation, metabolic disorders, endemic non-specific bowing and a developmental response to injury or accident as possible origins of the pathology, but did not offer a final diagnosis.

In the present study, we use Computerized Tomography (CT) scanning and 3D imaging of WLH 106 to visualize the topography of the medullary cavity and identify new evidence to explain the bowing. These scans reveal signs of a significant nonspecific infection along the medial border of the medullary cavity in the area of the bowing. In light of this new evidence, possible diagnoses for this pathology will be discussed.

UNUSUAL TEETH IN UNUSUAL PLACES: CRITERIA FOR IDENTIFYING DENTAL ELEMENTS FROM TERATOMAS***

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Teratomas are germ cell neoplasms that differentiate to varying degrees toward mature tissue types. While rare, they are diagnosed clinically at all ages, can be acquired in adulthood and can be found in gonadal and extragonadal sites in both female and males.

Teratomas are particularly interesting to paleopathology in their tendency to produce elements that withstand interment, specifically bone, though most commonly teeth. In this study, hard tissue structures from 14 clinically derived teratomas were examined. Of these, 10 contained dental elements. In this series, the number of teeth per teratoma ranged from 1 to 7, although co-author BDR has seen 125 in a single tumor. A dental inventory revealed a wide variety of tooth types present in the teratomas, some independent of, and others embedded within, bony matrices. In some cases these teratoma teeth are identical to their oral counterparts, exhibiting distinguishable types and sides. Others are malformed caricatures of teeth, or suggest intermediate types. As “normal” as some may appear, it is unrealistic to expect them to conform to normal types as they are pathological elements, no more remarkable genetically than mucus production by a colon polyp or melanin in a nevus. Precise identification of teratoma elements can be difficult; particularly when they are viewed bereft of their soft tissue context. The paleopathological risk is that such remnants may be mistaken for fetal parts. Thus, due to the dearth of teratoma teeth referenced archaeologically, we present some diagnostic criteria to aid paleopathologists in their identification and analysis of these unusual denticles.

A PAIN IN THE NECK: WHAT IS AND WHAT IS NOT KLIPPEL-FEIL SYNDROME ***

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Klippel-Feil Syndrome (KFS) is a rare genetic defect resulting from failure of segmentation in the cervical spine, and is clinically recognized as any congenital synostosis of the cervical vertebrae. We report on the differential diagnosis of a case of Klippel-Feil Syndrome in a 30-35 year old male skeleton from the Mississippian Period site of Kellogg in eastern Mississippi, and compare it to a case of traumatic cervical fusion in a temporally congruent adult male from the Castalian Springs site in Middle Tennessee. Using diagnostic criteria by Pany (2007), we find Kellogg Burial 7 to display such hallmarks of KFS as cervical fusion of the C3-4 segment, vertically oriented acoustic meati, and enamel defects. Other phenomena that would result in the fusion of the cervical vertebra are traumatic injury, infection, and ligament ossification. The individual from Castalian Springs displays partial occipito-atlantal fusion and the appearance of an overlap of the posterior margin of the squamosal suture, resulting in a slight pucker of the suture, suggesting post-traumatic synostosis. Comparison of these two crania allows for a differential exploration of Klippel-Feil Syndrome and other causes of cervical synostosis which might mimic KFS, or which true KFS might be mistaken for.

A FACIAL TUMOUR IN THE MUMMY OF A CHILD FROM SOUTH AMERICA

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A group of three mummies from South America, an adult woman and two children, are part of a collection of mummies at the Reiss-Engelhorn-Museen in Mannheim, Germany. As part of the work of the German Mummy Project, each of the mummies in the collection are being thoroughly examined, using primarily non-destructive methods. Through analysis of CT scans and 3D virtual modeling, the body of a young child, which currently rests on the abdomen of the woman in this group of mummies, was analyzed. A severe facial tumor, possibly a juvenile ossifying fibroma, was identified in the right orbit and maxillary region, along with the presence of a second, possibly related tumour in the left orbit. This paper presents the result of the analysis of the child mummy, including the identification and potential classification of the tumour and the apparent implications of the tumour as it related to the health and life of the child.

DEMOGRAPHY, PALEOPATHOLOGY, AND HEALTH STATUS OF THE MOCHE REMAINS IN HUMANBACHO, NEPEÑA, PERU: A COMPREHENSIVE OSTEOLOGICAL ANALYSIS

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My research entailed the osteological analysis of eleven individuals from nine Moche grave contexts at Huambacho, Nepeña, Peru. This research project included the analysis of demographic features (age, sex, stature), pathology, trauma (perimortem and

antemortem), and antemortem cultural modifications in order to provide insights about the health and social behavior of a once-thriving human culture. Methodology entailed the visual analysis of each bone in addition to detailed written, drawn, and photographic documentation of all bony elements assessed.

The results of this project indicate several revealing factors about the life and death of this small Moche group of individuals. The high frequency of arthritic lipping on these young adult individuals indicates a physically active lifestyle particularly strenuous on the lower limbs given the high frequency of severe lipping on the lumbar vertebrae, pelvic joint, and knee joint. Several of the adult individuals display antemortem healed fractures also indicating a physically active lifestyle. The dental caries, enamel hypoplasia, cribra orbitalia, porotic hyperostosis, and the unusual antemortem bowing of the long bones indicate nutrition stress. In addition, the adult individuals are all males of a young age category (25-35 years). Thus, based on this information, these individuals were active young men who participated in strenuous cultural activities (farmers, warriors). Culturally distinct practices of the Moche are also present in this specific burial population in the form of cranial deformation and trephination.

ANTEMORTEM DENTAL CHIPPING IN THE PREHISTORIC INHABITANTS OF CARRIACOU (WEST INDIES)

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Teeth can provide valuable insights into past human lifeways. For example, patterns in antemortem dental chipping may reflect diet composition, presence of gritstone in foodstuffs, or the use of teeth for non-masticatory purposes. Unfortunately, antemortem dental chipping is infrequently studied and few intersite comparisons exist from the same region. In this study we examined presence of dental chipping in prehistoric remains from Carriacou, an island in the Lesser Antilles of the southern Caribbean, for comparison with published sources. Antemortem dental chipping was examined in 266 teeth from a sample of 17 individuals with the aid of a 10X hand lens. Chip severity was recorded using a three-grade scale that considers both size and depth of the chip. Forty percent of 266 teeth exhibited antemortem dental chipping. Further analysis of a subset of eleven individuals (245 teeth) where at least eight teeth were present revealed no appreciable differences between dental arcades (40-42%) or anterior (39.4%) vs. posterior teeth (42.9%). In the ten individuals (228 teeth) where sex could be determined (M= 4, F= 6), males exhibited a slightly higher frequency of chipped teeth (41.1%) relative to females (37.0%), a smaller difference than previously reported in other Caribbean samples. The discrepancy is attributable to a higher frequency of dental chipping in the anterior dentition of males relative to females. This finding, coupled with more severe chipping in the anterior teeth of males, may suggest a sex-based differential use of the anterior dentition for non-masticatory behavior.

METASTASIZING CARCINOMA IN A ROMAN SKELETON FROM METAPONTO (SOUTHERN ITALY, II C. CE) – A PRELIMINARY STUDY

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Cancers are not common in archaeological skeletal collections and are usually difficult to diagnose for various reasons such as, among others, incompleteness of skeletons, easier postmortem damage of diseased bone, individual variation in pathological appearance, superimposition of signs of two or more diseases in one individual.

A case of probable metastasizing carcinoma in a female skeleton excavated within the main area (agora) of an ancient Greek city of Metaponto, and dated to the Roman re-occupation of the city, is reported. Most of the major bones are preserved including complete skull and major long bones, partially preserved pelvis and almost complete dentition. In the absence of pubic symphysis (damaged surface), the age estimate based on dentition is 25-35 years, stature, according to several formulae, ranges between 1550 and 1660 mm. Many delicate, but rather brittle bones are covered with similarly looking periosteal striations and pitting (on both femora, tibiae, ulna, clavicles, palate, ribs, and especially on the skull). Three large perforating lytic lesions are present on the skull (frontal bone - 23x16 mm diameter, right parietal - 31x29 mm diameter and occipital - 15.5 x 29 mm). Irregular edges of the lesions and diplöe destruction deeper than both outer and inner tables (larger diameter at diplöe level than at both external tables, a characteristic “undercut” look of the edges) are considered typical for metastasizing carcinoma (Strouhal, 1993, *Anthrop. Anz.* 51:97-115).

Differential diagnosis includes multiple myeloma, meningioma and some infectious diseases. Further studies are planned to verify the preliminary diagnosis.

COMPARISON OF CONVENTIONAL RADIOGRAPHIC AND COMPUTED TOMOGRAPH IMAGES FOR A TREPANATED CRANIUM FROM MEDIEVAL TORUŃ, POLAND ***

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Trepanations have been documented for numerous populations around the world (Lisowski 1967, Weber and Wahl 2006), and indicate early attempts at cranial surgery before anesthetics and antibiotics became available. During recovery excavations at the medieval church of St. Lawrence in Toruń, in north-central Poland, a human cranium with a single healed trepanation on the left temporal bone was discovered. Macroscopic examination indicated elongated and irregular shape, with well obliterated edges, indicating extensive healing and long-term survival of this individual. Additional examination with available radiological techniques was performed to obtain greater understanding of this procedure and possible reasons for executing it. Both conventional radiographic images and computed tomograph (CT) images of the cranium were obtained. Both methods have several advantages over macroscopic examination, however, they also have certain limitations. Conventional radiographs are

generally inexpensive, fast and easy to obtain; however, well healed skeletal traumas are more challenging to see and diagnose. CT images provide greater detail and contrast, thus providing better view of the skeletal trauma. However, the use of CT is much more expensive than that of conventional radiograph, and CT images need to be processed, which adds cost and time. Based on the authors' experience with the above techniques, it is advantageous to obtain CT images if funds for them are available. However, radiographs can provide substantial information regarding skeletal trauma, especially if the healing process has not been extensive. Whichever technique is used, presence of a skilled radiologist with experience in imaging bone is highly recommended.

COMPLETE SAGITTAL CLEFT VERTEBRA IN AN EARLY MEDIEVAL POLISH POPULATION

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Sagittal cleft vertebra has rarely been reported for archaeological remains and occurs less frequently than coronal clefts, even in modern populations. Some suggest that a complete sagittal cleft vertebra is incompatible with life (Schmidt et al., 1993). However, the case presented here, dating to Poland's early medieval period (11-12th c.), is that of a child who survived to about 6-9 years of age despite suffering from a complete sagittal cleft thoracic vertebra (probably T11). Sagittal cleft vertebra (also known as butterfly vertebra) is a notochord field defect, which occurs when the notochord fails to regress. The consequence is either partial union or complete nonunion of a vertebral body's lateral halves, therefore forming a bifid centrum. Severe involvement can result in abnormalities in the ribs and visceral defects in the gastrointestinal tract or central nervous system (Barnes, 1994). Diminished height of the anteriorly wedged vertebral body often produces kyphosis (Mann and Hunt, 2005). When minor, it can be asymptomatic and may go unreported (Barnes, 1994). The description of this exceptional case is a significant contribution to the paleopathological literature and to the understanding of such congenital conditions that exist today, as well as in the past.

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PALEOPATHOLOGY OF SUICIDE – RARE CASES OF SELF-HACKING

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Interpreting perimortal or postmortal skull lesions as a result of interpersonal or intrapersonal conflict is of crucial importance for the understanding of preceded interactions or cultural practices. Self-hacking to the head is a very rare form of sharp force suicide. Cases of

this kind of self-harm from the historic specimen collection at the Department for Forensic Medicine in Vienna were investigated in this study. Especially the descriptions of size and distributions of the lesions on the skulls as well as the search for distinct pattern compared to pattern associated with homicide, postmortal manipulations and animal activities.

The historic specimen collection built up over the last two centuries, hosts cranial skeletal remains from 261 individuals including 44 who committed suicide. From these 44 individuals, 37 experienced gunshot trauma, 1 blunt force and 6 individual sharp force traumas. Three of the sharp force induced traumata were caused by pointed objects (nails and awls), the remaining 3 by axes. All of these self-hacking suicide victims have been elderly women. This observation is supported by the few published comparable cases, also nearly exclusively postmenopausal women, all reported with massive psychic problems.

Typical cases of self-hacking leave (>20) parallel orientated testing lesions around one larger injury finally caused the individuals death through haemorrhage and air embolism. The mid-sagittal location and the distinctly oriented multiple testing inflictions around the final blow may serve as criterion for the differentiation from other possible causes, like interpersonal conflict involving mutilation, or postmortal damage through rodent gnawing.

A STUDY OF TRANSITION ANALYSIS APPLIED TO KOREAN SKELETAL SAMPLES FROM THE JOSEON DYNASTY PERIOD ***

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There have been numerous calls for testing age-at-death estimation standards developed on Western human skeletal samples to non-Western samples. However, finding and accessing documented non-Western reference samples, especially in Asia, has been very difficult. In response to this problem, this study provides precision tests by applying four different age-at-death estimation standards to Korean skeletal remains and seeks to quantify their consistency. The methods of the study involve: 1) an application of Transition Analysis (Boldsen et al. 2002), to a Korean human skeletal sample from the period of the Joseon Dynasty, spanning from approximately the mid 15th to the early 20th century, to compare to, 2) applications of traditional age-at-death estimation methods such as the pubic symphysis (Suchey-Brooks 1986), auricular surface (Lovejoy et al. 1985) and cranial sutures (Meindl & Lovejoy 1985). The statistical results for the comparisons of different mortality patterns, created from each of the methods, suggest that some of the pairwise comparisons between two methods render similar mortality patterns, although incongruency of all the methods as a whole is statistically significant. Thus, Transition Analysis provides a more realistic mortality pattern by yielding maximum likelihoods of age for individuals over 50 years while traditional age at death estimation methods provide open-ended age ranges. This study also presents unique osteomorphic variations of Korean skeletal remains that are not part of the traditional age-at-death estimation methods. These traits should be incorporated into future methods involving Korean samples, and perhaps broader Asian samples.

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A DIFFERENTIAL DIAGNOSIS USING PERIOSTEAL AND ENDOSTEAL REACTION PATTERNING ***

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This project presents a differential diagnosis of an individual (Bur. 80-25) from the Gold Mine ossuary (A.D. 775-885). Gold Mine is a site from northeast Louisiana assigned to the Troyville culture of the Baytown period (McGimsey, 2004). This site is somewhat unique based on the fact that it is an indigenous ossuary. This individual was an adult male estimated to be between 20-30 years old at death. Sex was assessed using standard osteological techniques and age-at-death was estimated using Transition Analysis (Boldsen et. al., 2002).

The nearly complete skeleton of this individual displays significant periosteal bone deposition on most long bone diaphyses and unorganized bone deposition in their respective medullary cavities. Injury-related infection was suggested as the cause for these reactions in the initial osteological analysis performed in 1983 (in McGimsey, 2004). This report described the presence of a small lithic flake embedded near the distal end of the anterior shaft of the right tibia. However, the presence of this flake was not confirmed through macroscopic and radiographic examination in the current study. A differential diagnosis is presented considering trauma, infectious diseases, neoplasms, or bone marrow disorders in an attempt to identify the etiology of this individual's periosteal and endosteal bone reactions.

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NON-SPECIFIC INDICATIONS OF STRESS IN PUEBLOAN SUBADULTS FROM NEW MEXICO ***

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The paleopathological record of Southwest Pueblos has been documented extensively but less has been done regarding the most susceptible group of individuals, subadults. Comparison between pre-contact subadult skeletal samples from two pueblos provides an impression of their health and nutritional status. To this end, age and pathology; cribra orbitalia (CO), porotic

hyperostosis (PH), both PH and CO, dental pathology (caries, LEH and root exposure), were evaluated in 106 juveniles from Jemez Pueblo and 16 from Tijeras Pueblo. No visible dental pathologies were present but 41% (n=43) of the Jemez juveniles exhibited one or more of the other lesions. 24.5% had PH, 7.5% had CO, and 8.4% had signs of both. Cordell's (1980) work on Tijeras subadults gave rates of 78% PH and 46% CO. The current research on the Tijeras juveniles affirms previous data, with 81% (n=13) individuals displaying visible pathologies. 32% (n=5) exhibited PH, 13% (n=2) CO, and another 13% displayed CO and PH. Three individuals (19%) displayed dental pathologies but no PH or CO, and one individual had dental and cranial pathologies. One individual displayed numerous lesions on interior surface of the cranium not associated with PH or CO.

In comparison to Tijeras, the Jemez subadults display reduced frequencies of pathologies, potentially the result of differences in diversity of diet, geography and resources, or other factors. The Jemez subadults were likely healthier than their counterparts 75 miles away or they experienced higher mortality prior to development of bony lesions.

THE FREQUENCY OF FRACTURES OF THE LOCOMOTOR APPARATUS IN DIFFERENT PERIODS OF THE MIDDLE AGES IN CENTRAL EUROPE (OSKOBŘH, CZECH REPUBLIC)

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Fractures, along with degenerative changes, count as the most frequent pathologies that are apparent on skeletal material. The frequency of fractures was studied in many European medieval populations, Great Britain in particular (*Roberts, Manchester 2007*). The aim of this study was to quantify fracture frequency of purely rural medieval population in middle Europe. Collected data originate from the medieval burial grounds of Oskobřh, Czech Republic. There has been 119 juvenile and 265 adult individuals classified in total from 13th-15th century, according to the archaeological situation it has been possible to split the specimens into two periods (115 individuals from 13th-14th centuries; 150 individuals from 14th-15th centuries). The five segment method (*Judd 2002*), modified according to the state of skeletal preservation (*Likovsky 2008*), was used for the fracture frequency evaluation; finds suspicious of the traumatic lesion were further verified using X-ray. Fracture frequency of both groups was relatively low (1,2%) and all fractures had accidental injury characteristics. Fracture frequency comparison of the specific bones without taking account of the laterality or localization, has shown increased radius afflictions. The difference in comparison with other bones is, however, not statistically relevant. Significant difference between the male and female specimens was not proved. The final fracture frequency was then compared to a variety of European medieval collections, originating from both rural and municipal environments, and its low value correlates positively with other authors findings, except for hospital adjacent graveyards (*Judd, Roberts 1998*), where the frequency is higher.

WAKING THE DEAD: THE HUMAN REMAINS FROM MAINISTIR CHIARÁIN, INIS MÓR, IRELAND

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Partially excavated in the late 1990s, the medieval monastery site of *Mainistir Chiaráin*, on the island of *Inis Mór* off the west coast of Ireland, revealed an unexpected cluster of human remains. Graves, even jumbled and disturbed ones, were not unexpected; but a disarticulated and a seemingly dumped aggregate of skeletal elements was not.

A wide range of osteological aspects came to light during examination of these remains. AMS dating placed a tooth in the 13th century CE. With an MNI of 12 people, the incomplete remains exhibited elements aged from birth to skeletal old age. Robusticity varied from the very robust to the very gracile. In general, entheses were quite marked, especially in the upper limb. Upper body osteoarthroses were also prevalent and not mirrored in the lower body. Unexpected for this type of population, several individuals displayed mandibular torus and incisor shoveling. Additional pathologies included possible tuberculosis, scurvy, and both premolar and molar hypoplasia.

The broad range of osteology could be entirely indicative of the native population, and the “dumped” nature of the remains could be merely a secondary burial of elements previously eroded to the surface. Archaeology in Ireland, especially western Ireland, is still in its relative infancy; however, the skeletons analysed from *Mainistir Chiaráin* display an unusually high level of pathology. It is possible that this skeletal find is representative of some sort of liminal burial of outsiders as yet unseen in Irish archaeology.

SEX ESTIMATION IN NATIVE AMERICANS FROM THE MIDWEST AND SOUTHEAST: UTILIZING FEMUR HEAD DIAMETER ***

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The utilization of estimated sex, based on the morphology of the skeleton, is pivotal for bioarchaeological research. The majority of these methods were borrowed from forensic anthropology and were initially developed on modern skeletal samples. Few methods have employed prehistoric samples for the development of population specific techniques of estimating sex. This project utilized femur head diameters from six prehistoric Midwestern and Southeastern Native American skeletal samples to develop sectioning points for sex estimation. First, the sectioning points were produced from sub-samples of these six Native American skeletal samples. Next, the sectioning points were tested, on hold-out samples, to cross-validate the accuracy of femur head diameter for estimating sex in these samples. Both sub-samples (i.e., development and hold-out sub-samples) were composed of the individuals that could most confidently be sexed using pelvic and cranial morphology. The results suggest that femur head diameter can be both static and variable through time. This temporal variation necessitated the development of separate sectioning points for the Archaic, Late Woodland, and Mississippian samples. The accuracy rate of the femur head diameter for estimating sex, in these samples, exceeded 90 percent.

HEALTH, IDENTITY, AND BURIAL PATTERNS IN THE MIDDLE SICÁN CULTURE: PALEOPATHOLOGY OF SOCIAL ORGANIZATION FROM HUACA LAS VENTANAS, PERU

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Paleopathology and bioarchaeology are increasingly concerned with exploring health, social organization, and identity in ancient complex societies. We present results from the study of 32 skeletons excavated at the elite monumental adobe platforms of Huaca Las Ventanas at the capital of Sicán, Lambayeque, Peru. The Middle Sicán culture (AD 900-1100) was a rigidly hierarchical multiethnic state; previous studies have shown that high status buffered against health stress among the elite. We hypothesize that the burials at Huaca Las Ventanas were members of the social elite – non-local ethnic Sicán – and experienced superior health when compared to their low-status ethnic Muchik subjects.

Data collection spanned paleodemography, adult and childhood biological stress, oral health, trauma, and degenerative joint disease (DJD) then integrated with mortuary patterns and biodistance data. The results indicate health status among the Las Ventanas burials accords well with a model of high status: very low prevalence of porotic hyperostosis, cribra orbitalia, enamel hypoplasias, non-specific infection, DJD, and trauma. Comparatively poor oral health is consistent with the cariogenic diet of low-status Muchik people. Moreover, dental phenotypes and explicit social messages encoded in burial patterns seem to strongly communicate ethnically Muchik identity. This paleopathological study provides new perspectives on Sicán social organization, including: (1) possibilities of ascribed vs. achieved high status for at least some ethnically Muchik peoples; (2) ethnic variation of diet; (3) the capital was not a necropolis exclusively for the ethnic Sicán ancestor cult, and (4) strategies of Middle Sicán power sharing with the local population.

IDENTIFICATION OF EARLY MANIFESTATIONS OF SKELETAL TUBERCULOSIS IN INFANTS AND YOUNG CHILDREN: COMPARATIVE CASE STUDIES FROM PERU AND SUDAN ***

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Prior to the age of antibiotics, the prevalence of skeletal tuberculosis in infants and young children was high, with spinal involvement more common in these age groups than any others. Paleopathological investigations of tuberculosis, however, often exclude subadults, and the infrequent reports are limited to extreme cases. A pattern of rib and vertebral lesions characteristic of early manifestations of skeletal tuberculosis in adolescents and adults from archaeological samples has been confirmed by DNA analysis, providing a potential means of identifying skeletal tuberculosis in infants and young children who died before more severe lesions could develop from chronic infection. The skeletal remains from the site of Lote B, affiliated with the Lima culture (c. AD 0-700) on the central coast of Peru, consist of nine infants and children with ages at death ranging from six months to seven years. These subadults were compared to an age-matched sample from 29 subadults under age 15 at the Ginefab School site (c. AD 0-1400) in the Fourth Cataract region of Nubia in northern Sudan. One adult from this site shows classic lesions of spinal tuberculosis. Subadults in both samples reveal lesions similar

to those considered characteristic of early manifestations of skeletal tuberculosis in adults. This pattern of lesions is discussed in conjunction with other pathological features observed in these children. The authors emphasize that infants and young children should be included in skeletal and biomolecular analyses of tuberculosis in archaeological samples and highlight the need to consider infectious and metabolic disease processes concurrently.

CONCHA BULLOSA, A NEGLECTED CONDITION IN PALAEOPATHOLOGY

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Concha bullosa is an anatomical variant of the middle turbinate, consisting of its pneumatisation via extension of the ethmoidal air cells. This results in enlargement of the middle nasal concha. It occurs frequently in modern populations. It is also of clinical significance as large concha bullosae may cause obstruction to the nasal airway, and be associated with deviation of the nasal septum, and sometimes with disease in the paranasal sinuses. It has been little studied in palaeopathology. This poster discusses the identification of concha bullosa in skeletal remains and illustrates the condition in a Mediaeval skull from England.

A QUANTITATIVE ANALYSIS OF RESIDUAL RICKETS PREVALENCE IN EARLY MODERN LONDON ***

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Rickets is the result of prolonged vitamin D deficiency in sub-adults caused either by a lack of sun exposure or poor nutrition. It was first recorded as a significant problem in London during the mid-17th century, where contemporary medical practitioners described it as epidemic. Analysis of the cultural and environmental changes during this period supports the recorded decrease in vitamin D synthesis. However, this epidemic is not substantiated by skeletal material from London during this era especially in adult material where residual markers were lower than expected. The study of residual rickets has historically relied upon visual methods of diagnosis as exemplified by Brickley, Mays and Ives (2010). Diagnosis is primarily made by the presence of bending deformities in the long bones, however this attribute is only found in the more extreme cases. A new method for quantitative diagnosis of residual rickets based on the presence of flaring in the distal epiphyses of the radii and femorae is proposed. Material was taken from four early modern archaeological sites from the Museum of London, and flaring as an indicator of residual rickets was assessed based on a number of measurements. This study shows that there is potential for this new method to identify more cases of rickets when diaphyseal bending is not severe enough to warrant diagnosis alone. The addition of new tools for measuring prevalence of vitamin D deficiencies can benefit historical analysis, as this disease is a direct reflection on the cultural and environmental context of the period.

STATUS AND HEALTH AT THE MISSISSIPPIAN PERIOD AVERBUCH SITE

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Social organization has been determined to influence nutritional health in a variety of different archaeological populations. The reconstruction of social organization utilizing mortuary analysis may be further substantiated by corresponding biological data. Theoretical principles guiding this goal of mortuary analysis emphasize a combination of structural and social traits. For Mississippian chiefdoms, these are largely based on Peebles and Kus' (1977) prescriptions. A test of these prescriptions is performed on the Tennessee Averbuch population, combining burial good mortuary data and the following nutritional health indicators: linear enamel hypoplasia frequencies, and the presence or absence of porotic hyperostosis and cribra orbitalia. Applying Goodenough's (1965) social role theory, burial good data are reconfigured into "diversity scores" which represent the variety of types of goods present. Diversity scores are evaluated to consider if higher social status afforded individuals any protection against nutritional stress under a Mississippian redistributive system. Some nutritional stress was observed across all diversity scores, but the highest social status individuals did not appear affected by the greatest stress levels. The Averbuch population appears to have been in poor health in general, but social status may have offered some defense against extreme nutritional stress. Social and structural organization at Averbuch does not conform to a Mississippian chiefdom designation as it is commonly assessed.

DIAGNOSTIC CONUNDRUMS FROM THE NEW COLORED BURIAL GROUND, NEWBURGH, NEW YORK

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In 2008, the Newburgh Colored Burial Ground was rediscovered during the renovation of the Broadway School in Newburgh, New York. Historical archives revealed that this cemetery served as an African American burial ground from the 1830's to the 1870's. The skeletal material recovered from the cemetery likely represents individuals who experienced enslavement at some point in their lifetime. Such samples are rare and provide a unique window into the particular biological stressors associated with transition from slavery to freedom, while also contributing to the broader understanding of the biological consequences of poverty and discrimination. They also provide insight into the effects of industrialization in a comparatively rural setting.

This presentation addresses the differential diagnoses of an unusual set of pathological indicators observed in two individuals. Burial #6 presents with bony fusion of L3-L5, bifurcation of two ribs, and extensive bony remodeling and enthesopathy development in both feet. The endocranial bones of Burial #66 exhibit proliferative growth and expansion of the diploe, abnormally thin cortical bone in long bones, and localized expansion of the endosteal surface. The pattern and form of these indicators are unique to these individuals in the sample and present a diagnostic challenge.

EXAMINING THE ROLE OF ENVIRONMENTAL STRESS IN THE ETIOLOGY OF SKELETAL DEFECTS***

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Frequencies of skeletal defects within families are noticeably elevated when compared with frequencies found in the general population, which indicates a strong genetic component in the etiology of these traits. Clinical studies, however, have demonstrated that certain environmental factors, particularly dietary deficiency and disease, may trigger or enhance the genetic predisposition for developmental defects. While it is likely that both genetic and environmental factors contribute to the etiology of skeletal defects, it is unclear which specific traits are most sensitive to environmental stress. The primary objective of this study is to examine whether environmental stress causes elevated levels of developmental defects within a population. To test this hypothesis, a total of 415 individuals from three archaeological cemeteries were examined for the presence of 45 skeletal defects. The samples are derived from temporally distinct Arikara sites whose inhabitants experienced varying levels of environmental stress over several centuries. Defect frequencies were calculated for each of the three sites and interpopulation differences were analyzed using Fisher's exact test. The only defects that varied significantly between samples were the os styloideum and vertebral shifting, which were more prevalent in the Mobridge sample, and the asterion bone, which occurred most frequently in the Leavenworth sample. These findings suggest that environmental stress has minimal influence in the etiology of developmental defects since the majority of skeletal defect frequencies were similar among the three samples examined for this study.

BONY ANKYLOSIS OF THE WRIST: FOUR CASES FROM THE TERRY AND HUNTINGTON SKELETAL COLLECTIONS***

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The purpose of the present study is to evaluate four cases of carpal and metacarpal fusion in the hand and wrist. The examples are collected from the Robert J. Terry and George S. Huntington anatomical skeletal collections at the National Museum of Natural History in Washington, D.C., and date to the late nineteenth and early twentieth centuries. All four cases exhibit fusion of the carpals and metacarpals, without obvious signs of trauma, periosteal reaction, or infection from the neighboring long bones. Radiographs show complete cartilage destruction and the narrowing of interosseous joint spaces, consistent with severe cases of septic and rheumatoid arthritis. The advanced stages of these conditions can include bony ankylosis; however, new bone formation is more frequently recorded as the result of septic arthritis. Septic arthritis is a condition of arthritic change caused by the introduction of an infectious agent to a synovial joint. Rheumatoid arthritis typically involves more than one joint and erosive lesions are often bilateral and symmetrical. Studies of septic and rheumatoid arthritis are rare in the paleopathology literature, due to low prevalence and/or the poor preservation of small, osteoporotic bones. This study presents a differential diagnosis for carpal-metacarpal fusion based on the osteological and radiographic evidence, and a review of the clinical and paleopathological literature.

A POSSIBLE CASE OF ACROMEGALY: THE VIKING CHIEFTAIN BURIED IN THE GOKSTAD SHIP, NORWAY

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A re-examination of the robust male skeleton buried in the Gokstad Viking ship by Holck (2009, Norwegian Archaeological Review 42: 40-49) suggested it might be a case of adult-onset acromegaly based on its extremely heavy limb bones, enlarged hypophyseal fossa, and moderately elevated stature (181 cm). We present further analysis of this interesting case.

The medical literature on adult-onset acromegaly indicates that key osteological changes occur in the brow ridges and nasal bridge, overgrowth of the mandible and increased height of the symphysis, malocclusion from rapid and continuing movement of the teeth, broadening of the articular surfaces of the hands and feet, osteoarthritis, vertebral column enlargement with osteophytosis, thoracic dorsal kyphosis with deformation of the rib cage, and lumbar hyperlordosis. Osteophytes at attachment sites for muscles and ligaments, cortical thickening, and modest weight gain are all common.

The Gokstad skeleton lacks all hand and foot bones, vertebrae, mandible, and the superior portion of the cranial vault. This prevents examination of many of the diagnostic bones. The limb bones show an impressive development of osteophytes, supporting Holck's hypothesis. Given the increase in adult body mass, one might expect to see increased diaphyseal widths relative to bone length. We checked this via a series of equations to predict mass from postcranial dimensions developed by Daneshvari. The results indicate congruent predictions of mass in the humerus and femur; any enlargement of diaphyseal dimensions must have been subtle. Nevertheless, adult-onset acromegaly remains quite possible given the heavy bones and enlarged hypophyseal fossa.

RADIOLOGICAL REVELATIONS: PALEOPATHOLOGICAL FINDINGS IN A SKELETON FROM WADI FIDAN, JORDAN

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Investigation of early copper production at the site of Wadi Fidan in southern Jordan uncovered an elaborately-built stone burial cist dating to the first half of the 5th millennium B.C.. This cist contained the semi-articulated remains of one individual and the disarticulated limb bones of a second. The main skeleton was a 20-25 year old male displaying extensive pathology and antemortem, perimortem, and postmortem trauma.

Macroscopic analysis of the remains revealed postmortem puncture marks on the frontal bone, left innominate, vertebrae, foot bones, and the left humerus, radius, and tibia. The location of the damage and the absence of healing indicate that these occurred after death, are not due to taphonomic processes (i.e., scavenging), and may be associated with preparation for burial.

Radiographic and Micro-CT analysis of the bones revealed that this individual had disuse osteopenia, likely linked to loss of use of his left leg, as indicated by a double cortical line in the left acetabular roof and distal tibia. Radiographic analysis of the manubrium also indicated that a puncture wound on his manubrium was partially healed. Neither the disuse osteopenia nor the partial healing of the puncture wound was discernable to the naked eye.

Little is known about burial rituals and attitudes towards death in Chalcolithic Jordan, so this multi-faceted analysis provides intriguing evidence concerning the treatment of injury and paralysis during life, as well as attitudes towards the body after death.

MYOSITIS OSSIFICANS AND PSEUDARTHROSIS IN A LATE BRONZE AGE ADULT FROM THE ATHENIAN AGORA IN ATHENS, GREECE

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Myositis ossificans (MO) is a common condition seen in skeletal collections from archaeological sites and is normally the result of traumatic injury involving the periosteum. It may be associated with avulsion of soft tissue attachments or crush injury to muscles in proximity to bone. Many of the archaeologically known instances of this condition, however, are minor projections of bone protruding from long bones associated with localized trauma. It is rare to see MO in an archaeological skeleton that is as extensive as the more extreme examples recorded in the clinical literature, where extensive spinal involvement involving multiple vertebrae has been reported. An individual from a Late Bronze Age chamber tomb from the Athenian Agora excavations in Greece exhibits a case of MO of the *erector spinae* muscle spanning vertebrae L3 through L5. The extensive new bone formation resulted in the development of a pseudarthrosis in the ossified mass between L4 and L5. In this paper we explore the differential diagnosis of this condition, as well as the behavioral and social implications associated with traumatic injury and diminished mobility for this individual from a high status Mycenaean tomb.

ACCESSORY SACROILIAC ARTICULATIONS: APPLICATIONS OF M. TROTTER'S METHODS TO TELL ABRAQ, UAE (2200-2000 B.C.) HUMAN SKELETAL POPULATION***

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Mildred Trotter was a founding member of the American Association of Physical Anthropologists and its first female president. In a review of critical females within Bioarchaeology, her contributions are listed as important, but relatively unknown. Trotter was one of the first anatomists to publish accounts of accessory sacroiliac articulations. These are not usually found on the sacrum, but are extra features among some individuals. They increase in prevalence with age and are associated with carrying heavy loads low on the back. This study evaluated prevalence of accessory sacroiliac articulations within a Bronze Age human skeletal population from Tell Abraq, United Arab Emirates. Although diet included fish, domesticated sheep and goats, and cultigens (barley, wheat, and date palms), the biocultural costs of adapting to this environment are relatively unknown. Within the Tell Abraq population, we found that there is more variability in facet size, shape, and placement than what Trotter encountered. While she found most of the facets in women, we found them in both sexes. Tell Abraq males had higher prevalence of accessory sacroiliac articulations than females; however, the difference in prevalence by sex was not significant ($p > 0.05$). It is clear that cultural activities caused these facets, but the specific activities they engaged in are still being researched. Future analysis on

the Tell Abraq population will include comparisons of other skeletal elements to answer larger questions about differences in enthesopathy prevalence and the division of labor by sex.

A TREPHINATION IN A MEDIEVAL INDIVIDUAL FROM THE ALCÁÇOVA DO CASTELO NECROPOLIS IN MÉRTOLA, PORTUGAL

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Trephination is a surgical procedure, therefore an intentional process applied to the skull vault in order to remove a portion of the cranial bone. It is known since ancient times and presents a worldwide distribution. There are several explanations about it that range from purely therapeutic to that of magic-ritual ones.

Between 1978 and 2000, circa of 700 human skeletons were exhumed from the Alcáçova do Castelo (Mértola, Southern Portugal), a medieval necropolis dated from the 14th to the 16th centuries. The archaeological survey was carried out by CAM – Campo Arqueológico de Mértola and the osteological material is understudy at the Department of Life Sciences of the University of Coimbra, with nearby 200 skeletons already analyzed.

In the skeleton 629 which belongs to a male individual was observed a trephination in the right parietal bone, with approximately 42 mm in length and 24 mm in width, with well remodeled borders and a rectangular shape. The trephination is located 40 mm far from the sagittal and 43 mm from the lambdoidal sutures. There is no sign of bone infection meaning that this individual apparently had no complications during his recovery and the healed margins reveal a long-term survival.

In this work the techniques used to make the trephinations will be discussed as well as other conditions excluded that were considered in the differential diagnosis.

OCCUPATIONAL AND ACTIVITY MARKERS ON SKELETAL REMAINS DISCOVERED IN THE NORTHERN HIGHLANDS OF PERU

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From 2007 through 2010, archaeologist Klaus Koschmieder conducted a survey in the northern highlands of Peru in the province of Luya in the Department of Amazonas. An analysis of the human remains recovered from various archaeological sites was conducted by Catherine Gaither. This poster examines different activity-related skeletal changes in human remains recovered from these sites, which date from the Late Intermediate Period through the Early Colonial Period (Koschmieder 2010). Data were collected on arthritic changes, fractures, and both sharp and blunt force trauma. Data analysis demonstrates that out of 82 individuals, 36 demonstrated at least one of these changes to the skeleton. There were statistically significant differences among age groups for each category, with, as expected, individuals in older age categories demonstrating more evidence of skeletal changes. Females did, however, demonstrate a tendency to develop these problems earlier in life. Generally, the results indicate what would be expected of a population living in a rugged terrain, and it appears that the lifestyle took an

equal toll on both sexes. The trauma analysis demonstrated no statistical significance with respect to the frequency of traumatic injuries, but there were large differences when trauma was broken down by type. Females demonstrated nearly double the frequency of trauma associated with accidental causes (65% as compared to 35% in males), while males demonstrated more than double the frequency of trauma associated with interpersonal violence (68% to 32% in females). This poster will present the results of these analyses and discuss their implications.

FROM HEAD TO TOE: THE BIOMECHANICAL EFFECTS OF A LIMP RESULTING FROM A TIBIAL/FIBULAR FRACTURE

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Although various immediate treatments for major fractures of the leg are known from the preserved medical texts of Ancient Egypt, most individuals who received care still suffered from long-term effects such as chronic pain, weakness, neuromuscular imbalance, or skeletal deformity. Among the skeletal remains recovered from the Middle Kingdom tombs (ca. 2055–1650 BC) in the flood plains of Dayr al-Barsha, Egypt, one individual, an adult male approximately 35 years in age, exhibited a well-healed fracture of the distal tibia and fibula. However, as a result of this fracture, the individual suffered from a foreshortening of the left leg, which presented as an abnormality of gait. Asymmetrical skeletal indications, starting from the first and second vertebrae through to the calcanea, point toward the individual most likely having reduced dorsiflexion and using circumduction of the limb to compensate for the 3.5 cm foreshortening of the leg when walking. This manner of movement would cause the individual to assume an abnormal gait, where weakened musculature allowed the pelvis to tilt down and the torso to shift in opposition to maintain balance through the gait cycle.

BRING ME MORE BEER: HAVERSIAN SYSTEM FORMATION RATES FOR A NUBIAN POPULATION AND INTERVALS BETWEEN PERIODS OF TETRACYCLINE INGESTION ***

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The study summarized in this paper is two-fold in nature. Phase I demonstrates how the Haversian system formation rates for the Nubian Christian-group 21-R-2 cemetery (604 ± 46 C.E.) are determined, and analyzes potential variation of the rates based on sex and age at death. The information regarding Haversian system formation rates is then used in Phase II to address the discovery that the Christian-group exhibits tetracycline labeling bound into the cement of its osteons (Bassett et al. 1980). Phase II represents the development and application of new methods to determine the time intervals represented between identifiable tetracycline labels. The principles of modern-day tetracycline studies are applied to this archaeological population in order to determine the time intervals between tetracycline ingestion within the population. The two-fold nature of this paper, then, demonstrates a hybrid methodology that is new to the field of bioarchaeology.

Tetracycline, a modern-day antibiotic, is a fluorophor that binds with calcium during the mineralization phase of osteon production. Tetracycline's fluorescent nature allows it to be the basis for a method of determining Haversian system production rates in individuals when

ingested. The remains of the Nubian NAX-Group population (350 C.E. to 550 C.E.), have been found to have tetracycline markers bound into the cement of their osteons, thereby making it theoretically possible to use modern tetracycline-based methods on ancient remains to determine Haversian system production rates for the Nubian individuals. This study develops a hybrid method, incorporating both the modern-day tetracycline-based measuring methods and histology-based archaeological methods, to measure the Haversian system formation rates of the NAX-Group. To the authors' knowledge, this is the first time tetracycline has been used as a basis for calculating Haversian system formation rates in an archaeological population. Although the results and a discussion of such are currently forthcoming, the entire study will be completed by late January and will provide valuable insight into bone formation rates of the NAX-Group and the role of tetracycline in inhibiting bone loss among the elderly.

****Entry for the Cockburn Student Award*

AUTHOR INDEX

<u>Last Name</u>	<u>First Name</u>	<u>Page number</u>
Adams	R	44
Adia	Kathleen	43
Agnew	Amanda	35
Armelagos	George	47
Arsuaga	JL	9, 13, 14
Assis	Sandra	46
Baker	Brenda	40
Beckett	Ronald	22
Bekvalac	Jelena	25
Bermudez de Castro	JM	9, 13, 14
Blue	Kathleen	39
Bouwman	Abigail	6
Brickley	M	44
Brown	Terry	6
Bruzek	P	12
Burnett	Scott	33
Carbonell	E	14
Cataldi	Mariolina	27
Cervenkova	Lenka	22
Chan	Wing Nam Joyce	23
Chappell	Shannon	32
Clark	Angela	23
Conlogue	Gerald	25
Cook	Della Collins	16, 17, 26
Coolidge	Rhonda	24
Courtaud	P	11

Crandall	John	26
Crockford-Peters	Elizabeth	27, 31
Dabbs	Gretchen	27
Daneshvari	Shamsi	44
Danforth	Marie	28
Davis	Christopher	28
de la Cova	Carlina	28
DeMello	Marissa	29
DeSiena	Antonio	34
Drew	Rose	7
Drube	Hilton	29
Dudar	Chris	6
Dupras	Tosha	30, 47
Durband	Arthur	31
Dutour	O	11
Eckhardt	Robert	7, 10
Edwards	J	44
Eggleton	Kelley	25
Elera	Carlos	40
Farmer	Mark	25
Flohr	Stefan	10
Foley	Allison	31
Funkhouser	Lynn	32
Gaither	Catherine	46
Geber	Jonny	8
Giardino	Liliana	34
Gill-Frerking	Heather	8, 32
Gostner	Paul	21
Grace	Emily	32
Gracia	A	9, 13, 14
Gresky	Julia	9, 10
Gulliver	Deborah	25
Halcrow	Sian	23
Hawass	Zahi	21
Heller	Abigail	33
Henneberg	Maciej	7, 10, 34
Henneberg	Renata	34
Holck	Per	44
Hunt	Dave	6, 24, 43
Jakubowska	Gabriela	34
Jenny	Lindsey	10
Justus	Hedy	35
Kaestle	Frederika	17

Kahlon	B	44
Kanz	Fabian	35
Killgrove	Kristina	11
Kim	M	11
Kim	Jieun	36
Kindschuh	Sarah	37
Klaus	Haagen	40
Koschmieder	Klaus	46
Kozlowski	Tomasz	34
Krasnec	Katina	37, 44
Krupova	Zuzana	38
Legge	Tony	18
Lerwick	Ceilidh	39
Likovsky	Jakub	22, 38
Liryo	Andersen	16
Liston	Maria	45
Loesch	S	11
Lubsen	Kyle	39
Luce	Joseph	40
Lynnerup	N	12
Marden	Kerriann	13
Marshall	Charla	17
Marsteller	Sarah	40
Martin	Debra	26, 45
Martinez	I	9, 13
Martinez	Susana	29
Martin-Frances	L	9, 13, 14
Martinon-Torres	M	9, 13, 14
Martins	MR	18
Marx	Anna	37
Matos	Vitor	15
Mays	Simon	15, 41
McCormick	Kyle	37
Mendonca de Souza	Sheila	16
Meyers	Kathryn	41
Mick	Charlotte	42
Milligan	Colleen	16
Millward	Georgia	17
Miranda	MA	18
Monteiro	Ricardo	46
Muller	Romy	6
Muller	Jennifer	42
Musselwhite	Nicole	32

Nelson	Andrew	20, 22
Nerlich	AG	11
Norris	Annie	47
Nystrom	Kenneth	42
Offenbecker	Adrienne	43
Oh	A	44
Ortner	Don	6
Paine	Robert	27
Pak	Sunyoung	36
Pearlstein	Kristen	43
Pearson	Osbjorn	44
Pinilla	Jose	40
Prowse	TL	44
Pusch	Carsten	21
Raff	Jennifer	17
Ragsdale	Bruce	31
Risser	Daniele	35
Roberts	Charlotte	6, 17
Rodrigues	Clara	46
Romon	T	11
Rose	Jerry	18
Rosendahl	Wilfried	8, 32
Russell	Richard	18
Salceda	Susana	29
Santos	Ana Luisa	15, 18
Selim	Ashraf	21
Sheldrick	Peter	30
Shin	Dong-Hoon	36
Shuler	Kristrina	32
Smith	Kevin	32
Smith	Susan Kirkpatrick	45
Sola	C	11
Spencer	Susan Dale	19
Steadman	Dawnie	36, 37
Tayles	Nancy	23
Thompson	Jennifer	26
Timm	Mary Beth	45
Tipoe	George	23
Trucco	Flavia	27
Tubbs	Ryan	20
Umbelino	Claudia	46
Vargiu	Rita	27
Veleminsky	J	12

Vellev	J	12
Vilos	Jamie	45
Vincent	Stefanie	41
Viner	Mark	25
Wade	Andrew	20, 25
Walther	Lauren	46
Watamaniuk	L	44
Wentz	Rachel	21
Wheeler	Sandra	30
Williams	Lana	30, 47
Winburn	Amanda	47
Zabecki	Melissa	18
Zink	Albert	11, 21