

Supplement to the *Paleopathology Newsletter*

**PALEOPATHOLOGY ASSOCIATION
SCIENTIFIC PROGRAM & ABSTRACTS
ANNUAL MEETING (NORTH AMERICA)**

ALBUQUERQUE, NEW MEXICO
APRIL 13-14, 2010

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PALEOPATHOLOGY ASSOCIATION

37th Annual Meeting (North America)

Albuquerque, New Mexico

April 13-14, 2010

SCIENTIFIC PROGRAM

TUESDAY, APRIL 13TH

Morning Session (9:00am – 12 noon)

1) WORKSHOP Jesper Boldsen and George Milner: **PALEOEPIDEMIOLOGY**

2) SYMPOSIUM: **PALEOEPIDEMIOLOGY WITH SPECIAL EMPHASIS ON EGYPTIAN AND MIDDLE EAST POPULATIONS** Chair: Joseph Molto

- 9:00 Symposium Introduction and Welcome (J Molto)
- 9:05 Paleoepidemiology Research in Egypt with Emphasis on Research Problems Arising from Work in the Dakhleh Oasis, Egypt (J Molto)
- 9:20 Treponemal Infection in Skeletal Samples From Ancient Egypt and Sudanese Nubia*** (M Zuckermann, GJ Armelagos)
- 9:35 The Paleoepidemiology of Osteoporotic Related Hip Fractures in a Roman Period Population Sample from the Village of Kellis, the Dakhleh Oasis, Egypt (P Sheldrick, J Molto)
- 9:50 Tetracycline and Anemia in Ancient Sudanese Nubian Populations (G Armelagos, A Thompson, AR Campbell, J Edwards)
- 10:05 The Paleoepidemiology of Oral Health in the Children from Kellis 2, Dakhleh, Egypt (S Shkrum, SM Wheeler)
- 10:20 Epidemic Disease at Amarna, 18th Dynasty Egypt (J Rose, M Zabecki)
- 10:50 Paleoepidemiological Insights from the Valley of The Kings (J Cybulski, DP Ryan)
- 11:05 The Paleoepidemiology of Infectious Diseases as Elucidated by Microbial Biomarkers (H Donoghue, E Molto, M Spigelman,)
- 11:20 Bioarchaeology at Kellis 2, Egypt: Nutritional and Disease Stress of Juveniles During The Roman Period (SM Wheeler)
- 11:35 Isotopes and the Paleoepidemiological Intersection of Biology, Culture and Environment (C White, FJ Longstaffe)
- 11:50 Discussion (J Molto)
- 12 noon Lunch
- 12 noon STUDENT ACTION COMMITTEE MEETING
- Afternoon Session** (2:00 – 5:00 pm) Chair: Simon Mays
- 2:00 A 'New' Skeleton from Sir John Franklin's Last Expedition to the Arctic, 1845 (S Mays)
- 2:15 Initial Investigations into the Prehistoric Skeletal Collections of Canon Greenwell and J R Mortimer from the Yorkshire Wolds, England (K Whitaker)
- 2:30 Excavation Denied: The Potential of In-Situ Burial Analysis (C Whitley).
- 2:45 Description is Not Enough: Differential Diagnosis in The Repatriation Era (A Stodder)

- 3:00 Use of Histological Methods in Diagnosing Diseases in Poorly Preserved Archaeological Bones from Tell El-Dabha, Egypt (J Gretskey)
3:15 The Effects of Pathology on Inter- and Intra-Individual Nitrogen-Isotope Compositions of Bone Collagen from a Medieval Poorhouse*** (K Olsen)
3:45 Beyond Bare Bones: Palaeopathological Research of Parasitic Disease in Mummies (L Ferguson)
3:30 A Rare Case of Congenital Heart Malformation in an Ancient Peruvian Child Mummy (A Zink)
3:45 Ancient Leishmaniasis in the Old and the New World (R Bianucci)
6:00 PPA Reception / Annual Dinner and Business Meeting

WEDNESDAY, APRIL 14TH

Morning Podium Session (9:00 am – 12:00) Chair: Charlotte Roberts

- 9:00 An Ancient DNA Survey of Archaeological Tuberculosis in Europe (A Bouwman, C Roberts, T Brown)
9:15 The La Jolla Skeletal Population: Prehistoric Life on The Southern California Coast*** (TD Randall)
9:30 Understanding Iron Age Violence: The Effect of Mortuary Behavior on Patterns of Trauma*** (SS King)
9:45 am An Archaeological Paradox: A Coles Creek Period Analysis of Population Health and Archaeological Data from the Lake George (22YZ577) site, Yazoo County, MS*** (DN Cook)
1100 Prevalence of Arthropathy in the Shoulder Complex among Individuals in the George S. Huntington Anatomical Collection*** (K Pearlstein)
11:15 Adult Cortical Mass and Mechanical Strength: A Study of the Femur and Second Metacarpal in Nineteenth-Century European-Canadians*** (E Doyle, SK Pfeiffer, RA Lazenby)
11:30 Syphilis in 18th Century Copenhagen: comparing bone lesions to historical epidemiological data (N Lynnerup, N Rhee)
11:45 The Origin and Mobility of People with Venereal Syphilis Buried in Hull, England in the Late Medieval Period (C Roberts, A Millard, G Pearson, C Macpherson, G Nowell)
12 noon LUNCH / LET'S DO LUNCH

Afternoon Podium Session (2:00 pm – 5:00 pm) Chair: Susan Pfeiffer

- 2:00 Possible Scurvy in Subadults From A Fourche Maline Site Southeastern Oklahoma (S Rowe, L Rankin-Hill)
2:15 Multiple Myeloma Past and Present (E Miller)
2:30 Entesis Roughness in Documented Skeletal Remains (C Henderson)
2:45 The Long and Short of it: An Example of Brachydactyly in Ancient Egypt (T Dupras)
3:00 Pubic Symphysis Stress Injury in a Small-Bodied Holocene Coastal Forager, South Africa (SK Pfeiffer)
3:45 Hyperostosis frontalis interna – a Syndrome of the Rich? Evidence from the Bronze-age „high society“ of Qatna, Syria (S Flohr, C Witzel)
4:00 Paleopathological Analysis of the Individuals from the Pre-Columbian Site of Cambridge Hill (Jamaica) (AL Santos, D Gray, M Braham)

- 4:15 Dental Health Among Nineteenth-Century-Born African Americans and Euro-Americans (C de la Cova)
4:30 Early Terminal Classic Period Maya Pathology: From Teacher to Student? (P Mitchell)

POSTER PRESENTATIONS

(number refers to poster board number)

Poster Session I (Wednesday morning, 10:00 – 11:00 am)

77. Localized Enamel Hypoplasia of the Primary Canine at Kellis 2, Dakhleh Oasis, Egypt (S Shkrum, SM Wheeler)
78. Nutritional Stress at Tel-El Amarna, Egypt (N Fumo, S Lee)
79. Evaluation of the Person Years Construct as a Method of Examining Disease Prevalence in The Nubian Population*** (KB Anderson, MK Zuckerman, GJ Armelagos)
80. Diagnosis of Schistosomiasis in Nubian Mummies: Comparing Circulating Anodic Antigen Assays using Cranial Content and Skin*** (H Olivier, A Campbell, GJ Armelagos)
81. Dental Pathology in a Neolithic Sudanese Population (L Holcomb, M Judd)
82. Stafne Cavity on a 7th c. BC Klazomenean Hoplite Warrior (A Agelarakis, B Cohen, K Barde)
83. Childhood Growth Disruption in Bronze Age Population: Enamel Hypoplasias in Deciduous Canines*** (ME Timm, JL Thompson, DL Martin)
84. Preliminary Dental Pathology of Promtin Tai, Thailand (S Kirkland)
85. Vestiges of Probable Tuberculosis in the Middle Ear, Skull Vault and the Ribs - A Case Report*** (S Klingner, M Schultz)
86. The Co-Occurrence of Treponematosis with Other Health Conditions*** (JD Minsky-Rowland, DW Steadman)
87. Osteochondritis Dissecans as Evidence of a Labor Intensive Adolescence? (AM Agnew, HM Justus)
88. Gold Deposition on Hair by Bacteria: Forensic and Archeological Implications (G Phillips, F Reith, C Qualls, M Spilde, O Appenzeller)
89. The Occurrence of Costovertebral Osteoarthritis in Medieval English Populations: Possible Aetiological Factors and its Associations with Other Pathological Conditions of the Skeleton*** (K Plomp, A Boylston)
90. Displaying the Dead: Drilled Cranial Fragments from Iron Age Scotland (F Tucker)
91. Histological Investigations on Articular Surface Defects in the Third Metatarsal and Third Cuneiform (J Gresky, M Schultz)
92. Accessory Navicular: Frequency and Form of a Heritable Accessory Bone of the Human Foot*** (AM Offenbecker, DT Case)
93. Differential Survival of Development Assaults: Health and Diet in the Ancient Middle East (J Bennett-Bradshaw)
94. The Causes of Cribra Orbitalia: Always Simply Anemia?*** (K Koel, J Gresky, M Schultz)
95. Patterns of Inflammatory Orbital Lesions in a Modern Anatomical Sample (CA Wilczak, V Zimova Hopkins)
96. Diffuse Idiopathic Skeletal Hyperostosis on an Individual from the Xindian culture in Qinhai Province, China*** (M Hernandez, D Wei, H Zhu)

97. TA ΟΣΤΑ ΜΙΑΟΥΝ: Preliminary Analyses of Classical and Hellenistic Period (490-146 BCE) Burials from Athens, Greece*** (KE Marklein, SC Fox, MK Zuckerman, GJ Armelagos, T Kokkoliou)
98. The Pathological Lesions Observed on the Osteological Remains from the Site of Sanjan, Valsad District, Gujurat State, India (M Gauri, A Pitale, A Dutt, S Bhattacharya)
99. Mysterious Cases of Pseudo-Harris lines in Australian Aboriginal Skeletal Remains (MR London, JC Dudar, J Hinton, G Cocks)
100. Pelvic Fractures in Two Medieval Populations from Central Europe (MI Hofmann, C Papageorgopoulou, T Böni, FJ Rühli)
101. Cases of Cranial Vault Pathology in the Robert Terry Collection (K Pearlstein, D Hunt, B Frohlich, D Kraitchman, T Ehtiati, P Brown, T Kessler)

Poster Session II (Wednesday afternoon, 3:15 – 3:45 pm)

102. Social and Physical Control of Massacre Victims: Hobbling and Torment at Sacred Ridge (AJ Osterholtz)
103. Interpretation of the Causes of Cranial Injuries in a Post-Medieval Population from Plonkowo, Poland (G Jakubowska, T Kozlowski)
104. Broken Child: A Probable Case of Child Abuse from Norman Gloucester (B Manifold)
105. Mastoidectomy from a Late Nineteenth-Early Twentieth Century Ossuary in Chiavari, Italy*** (G Vercellotti, LL Williams, SD Stout)
106. Scurvy and Childhood Leukemia in a Northern New Mexico Prehistoric Population (NJ Akins)
107. Lung Lesion Biopsy of 19th Century West Virginia Mummy*** (J Woodward, R Gonzalez, R Beckett, G Conlogue, C Cool, S Groshong)
108. What's in Your Basement? Interesting Cases from the "Forgotten" Skeletal Sample at the Museum of Fine Arts, Boston*** (DC Martin)
109. Septal Aperture Rates Among the Pee Dee of Town Creek Mound, MT. Gilead, North Carolina (SL Cunningham)
110. An Evaluation of the Relationship Between Dental Caries and Dental Attrition in Four Windmill Culture Sites from Prehistoric Central California (KE Kolpan, EJ Bartelink)
111. Congenital Abnormalities of the Foot Skeleton at Pueblo Bonito, Chaco Canyon*** (K Marden, DT Case, DR Hunt)
112. A Probable Case of Acromegaly from the Windmill Culture of Prehistoric Central California (EJ Bartelink, NA Willits, KL Chelotti)
113. Exploring Patterns and Causes of Morphologically Invisible Stress Using Cortisol and Isotopic Analyses of Archaeological Hair from Nasca, Peru.*** (E Webb, C White, F Longstaffe, R Gow, M Rieder, G Koren, S Van Uum)
114. Death as an Act of Creation: Exploring Meaning and Symbolism Through Paleopathology At Huaca Norte, Peru (H Klaus, J Luce, JE Perez, F Saldaña, C Wester)
115. Health Status of Sacrificial Victims at Huaca Norte: Paleopathological Perspectives on Ancient Identity, North Coast Peru (J Luce, H Klaus, JE Perez, F Saldaña, C Wester)
116. Paleopathology of Human sacrifice at Huaca Norte: Throat Slitting, Heart Removal, and Late Pre-Hispanic Ritual Complexity, North Coast Peru*** (JE Perez, H Klaus, J Luce, F Saldaña, C Wester)
118. All Is Not Equal: Auricular Surfaces of the Moche Giants (A Cordy-Collins, RA Tyson)
119. Paleopathology of Prehistoric Hunter-Gatherers from The Northern San Francisco Bay Area: Health and Nutritional Status at The Encinosa Site (CA-SOL-451) (L Bright,

- EJ Bartelink, K Carpenter)
120. Differential Diagnosis Among Pathology, Regional Population Variation, and Taxonomic Uniqueness (RB Eckhardt, A Weller, M Henneberg)
 121. “R” versus “CR”: What a Difference a “C” Makes (G Conlogue, T Blyth, J Li, A Dhody, R Beckett, R Lombardo)
 122. Revealing Her Secrets One Imaging Modality at a Time (G Conlogue, T Blyth, J Li, R Beckett, A Dhody, R Gonzalez, F Cerrone, M Schlenk, D Lindisch)
 123. Gradient Changes in Computed Radiography Systems (O’Brien)
 124. The Current Postmortem Condition of a Century Old Mummy: A Pictorial Assay Based on MDCT and Radiographic Findings (E Hamid, G Conlogue, V Henoch, H Pierson, J Finger, R Beckett)
 125. Learning from the Past – Lessons for the Future (E Hamid, G Conlogue, V Henoch, J Finger, R Beckett)

*** *Entry for the Cockburn Student Award*

ABSTRACTS

SECTION 1: WORKSHOP

PALEOEPIDEMIOLOGY

Boldsen, Jesper (University of Southern Denmark)

Milner, George (Penn State) (ost@psu.edu)

The Workshop focused on basic concepts of epidemiology and diagnosis, including basic problems due to the nature of archaeological assemblages, the osteological paradox and age-at-death determination. The Workshop built upon actual paleopathological data, such as investigations on leprosy, trauma and violence.

SECTION 2: PALEOEPIDEMIOLOGY SYMPOSIUM:

PALEOEPIDEMIOLOGY WITH SPECIAL EMPHASIS ON EGYPTIAN AND MIDDLE EAST POPULATIONS

Chair: Molto, Joseph (emolto@uwo.ca)

University of Western Ontario, London, Ontario, Canada

TETRACYCLINE AND ANEMIA IN ANCIENT SUDANESE NUBIAN POPULATIONS

Armelagos, George J¹ (antga@learnlink.emory.edu), Thompson, Amanda², Campbell, Amber R¹ and Jeffery Edwards¹

¹ Emory University ² UNC, Chapel Hill

Widespread consumption of tetracycline, a broad spectrum antibiotic, in ancient Sudanese and Egyptian populations has been shown to have had a significant biological impact on these populations. Tetracycline labeling in skeletal material has been associated with a reduction in infectious lesions and has inhibited age related trabecular bone loss in Sudanese Nubian populations from the Wadi Halfa area. Previously, a difference in mean percent tetracycline labeled bone of individuals with and without porotic hyperostosis was noted and attributed to reduced iron bioavailability associated with tetracycline consumption (Thompson & Armelagos 2000). However, Walker and colleagues (2009) have successfully argued against

iron-deficiency anemia as the cause of porotic hyperostosis and instead suggest hemolytic or megaloblastic anemias as more likely proximate causes of porotic hyperostosis in archaeological populations due to their ability to produce marrow hypertrophy. In this paper we discuss the evidence for the ability of long term tetracycline exposure to produce such anemias. This evidence of anemia in these populations has implications for the interpretations of Wapler et al. 2009.

PALEOEPIDEMIOLOGICAL INSIGHTS FROM THE VALLEY OF THE KINGS

Cybulski, Jerome S¹ (Jerome.Cybulski@civilisations.ca) and Donald P. Ryan²

¹Canadian Museum of Civilization ²Pacific Lutheran University

For human remains, the Valley of the Kings is noted principally for the royal mummies investigated by Grafton Elliot Smith and later by James Harris and colleagues. Those studies, while of great Egyptological interest, have provided minimal fuel for paleoepidemiological fodder. Potential data from other types of remains have usually been ignored. We excavated and studied the largely skeletonized remains of mummies in four undecorated tombs as part of the Pacific Lutheran University Valley of the Kings Project. While the tombs had been known to luminaries such as Auguste Mariette and Howard Carter, they received little attention, possibly because they had been ransacked and repeatedly damaged by flash floods. The human remains in the four tombs were disturbed. They ranged in sample size from three in KV28 to 13 in KV44. KV44 provided an intriguing demographic profile and associated pathological component that may have epidemiological implications for the New Kingdom target population or “group of interest.” In contrast to the occupants in the other tombs, only females were represented among three adults and one adolescent. In addition, there was a child and eight infants. These remains are thought to date from the 18th Dynasty. At least three of the infants and, possibly, one adult exhibited lesions characteristic of scurvy. We discuss the changes and their distribution in the social context and consider other potential New Kingdom data for epidemiological inference.

THE PALEOEPIDEMIOLOGY OF INFECTIOUS DISEASES AS ELUCIDATED BY MICROBIAL BIOMARKERS

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Paleoepidemiology of infectious diseases includes studying populations of human remains and estimating the frequency and distribution of disease. Using specimens from the Dakhleh Oasis, Egypt, the pre-pottery Neolithic Atlit Yam in the Eastern Mediterranean, and the Sudanese Nubian remains of Kulubnarti, we sought ancient DNA (aDNA) of *Mycobacterium tuberculosis* and/or *Mycobacterium leprae*, and their specific cell wall lipid biomarkers. Disease can be identified in specimens with limited if any paleopathological lesions. This is not surprising as only ~5% of active tuberculosis cases result in bony involvement. Detection of MTB biomarkers in bones indicates a generalized infection and cannot be confused with latent infection. In leprosy, typical paleopathology occurs in multi-bacillary disease so microbial biomarkers can detect other clinical presentations and dispersed infections. We have reported co-infections of tuberculosis and leprosy in specimens from the Dakhleh Oasis and elsewhere. Therefore microbial biomarkers can significantly change estimates of prevalence and frequency

of disease. Paleoepidemiology also includes understanding the origin of infectious diseases, changes in the host/pathogen relationship over time, reservoirs of infection, latency and transmission. For example, microbial biomarkers have illustrated the establishment and spread of leishmaniasis from Nubia into ancient Egypt. Linking molecular fingerprinting with phylogenetics shows that *M. tuberculosis* has co-evolved with humans over millennia and the lineages that infect humans are more ancestral than *Mycobacterium bovis*. Similarly, our understanding of the origins and spread of leprosy around the globe have been elucidated by characterizing the aDNA of *M. leprae* extinct strains from Egypt and Europe.

PALEOEPIDEMIOLOGY RESEARCH IN EGYPT WITH EMPHASIS ON RESEARCH PROBLEMS ARISING FROM WORK IN THE DAKHLEH OASIS, EGYPT

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Few regions of the world have had as much exposure to bioarchaeological research as has Egypt, particularly with regard to the study of ancient diseases. While for the most part the emphasis has been on mummy research and the diseases of Pharonic Egypt's royalty, in recent decades the population approach to disease, which is fundamental to a paleoepidemiological perspective, has been in vogue. Paleoepidemiology has similar but different goals than traditional paleopathology and requires not only a different mindset but also it has extremely different demands in terms of sample preservation, technological services and hypothesis testing procedures. This paper outlines the paleoepidemiology program that has been conducted over the past two decades in the Dakhleh Oasis Egypt, highlighting some of the key findings on disease presence (e.g. brucellosis, leprosy, TB) and prevalence in the Oasis and how these can be incorporated into understanding the paleoecology of disease in Egypt's past.

EPIDEMIC DISEASE AT AMARNA, 18TH DYNASTY EGYPT?

Rose, Jerome C¹ (jcrose@uark.edu) and Melissa Zabecki²

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²University of Arkansas, Fort Smith

Ancient epidemics are frequently reported in the historical records, but few can be independently verified. The Amarna Letters (18th Dynasty Egypt) contain a complaint from the King of Cyprus that Egyptians brought an epidemic that killed most of his workers, while King Mursilis II of the Hittites writes a lament to his god that blamed Egyptians for bringing a scourge that raged for 20 years, killing his father, brother, and many of his people. The South Tombs Cemetery at Amarna was used for only 15 years and offers evidence for endemic/epidemic disease that could have then spread to other areas, causing widespread death. The first line of evidence is an abnormally high frequency of death between five and 20 years of age, when mortality should be low. The skeletons in this young age group exceed those in the 20-35 age group by 30%. The high frequency of multiple burials of two and three individuals further suggests high mortality. The difficulties of life at Amarna are also documented in below normal growth rates and small adult statures, in addition to frequent cribra orbitalia and other deficiency conditions.

THE PALEOEPIDEMIOLOGY OF OSTEOPOROTIC RELATED HIP FRACTURES IN A ROMAN PERIOD POPULATION SAMPLE FROM THE VILLAGE OF KELLIS, THE DAKHLEH OASIS, EGYPT

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Of the many scars of human evolution, the vulnerability of the femoral neck to fracture in later life due to loss of bone density is now a significant and growing health problem in the ecology of contemporary western society. The vulnerability of the femoral neck stems from the compromises this region undergoes as an adaptation to our bipedal gait and is particularly prevalent in females because of their dramatic loss of bone supporting hormones in the perimenopausal period and because of their lower bone density relative to males.

Paleoanthropologists and paleopathologists rarely report hip or femoral neck fractures mainly because in early populations the number of people surviving beyond the 5th decade of life when the incidence of this fracture steadily increases because of menopause was generally too small to warrant an epidemiological analysis. This paper presents data alternative to this view as approximately 17% of peri- and postmenopausal females in the Roman Period village of Kellis in the central part of the Dakhleh Oasis had healed or unhealed hip fractures. This prevalence mirrors hip fracture data for contemporary western populations in the age cohorts under investigation (50-70 years). This is despite the fact that this Christian Egyptian population had continuous exposure to vitamin D (via sunlight) on an annual basis and a diet that was generally adequate in terms of nutritional supplements needed to reduce the risk of osteopenia and osteoporosis. This suggests an unfortunate evolutionary legacy for our contemporary populations. Noteworthy is the fact that no older Kellis males suffered osteoporotic related hip fractures, a point of some significance since modern data show an increasing incidence of osteoporosis in older males. Reasons for this epidemiological pattern are advanced in this paper.

THE PALEOEPIDEMIOLOGY OF ORAL HEALTH IN THE CHILDREN FROM KELLIS 2, DAKHLEH, EGYPT

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This paper discusses the oral health of children in a Roman period population sample from the Kellis 2 cemetery in the Dakhleh Oasis, Egypt. A number of dental pathological conditions are used to examine subadult oral health at different ages, factors that contribute to dental disease development (e.g. host resistance, diet, weaning practices) and implications to overall health. The prevalence data for each dental condition are divided into well-defined age cohorts, an approach unusual for bioarchaeological studies of subadult dental health. A significant difference in dental disease experience is found among the age cohorts. These differences are attributed to a number of interrelating factors during childhood development, including prenatal health, a cariogenic weaning diet, nutritional stress, food preparation techniques, immunological susceptibility and exposure to an agricultural diet high in fermentable carbohydrates. Although diet is a significant factor, the role of dental disease as a contributing factor to morbidity and mortality is unequivocal.

BIOARCHAEOLOGY AT KELLIS 2, EGYPT: NUTRITIONAL AND DISEASE STRESS OF JUVENILES DURING THE ROMAN PERIOD

Wheeler, Sandra M (paleosandra@gmail.com) Allentown, PA.

Bioarchaeologists use skeletal health indicators to measure how ancient populations adapted to their physical, environmental, and biological circumstances. Skeletons of infants and children are rarely included in these kinds of analyses because of factors such as poor preservation, small sample size, incomplete recovery, or research design. In this study, skeletal remains of juveniles (N=238, under the age of 15 years) from the site of Kellis 2, a Romano-Christian (ca. A.D. 50-450) cemetery in Egypt, are analyzed to shed light on how infants and children adapted to Roman policies during the early years of the Christianization of the Egyptian landscape. Non-specific indicators of physiological stress (cribra orbitalia, enamel hypoplasia, and osteoperiostosis) and patterns of trauma are analyzed and interpreted in the context of the changing political, economic, and ideological landscapes. Results from these analyses suggest moderate levels of stress indicators and low levels of skeletal trauma, with a marked improvement in general health from pre-Roman times. Social status at Kellis 2 does not appear to play a role in the presence and frequency of non-specific stress indicators, suggesting all juveniles were equally affected by their physical and biological environments. This study contributes to a better understanding of juvenile paleoepidemiology and mortuary practices in Egypt during the Roman period, particularly in the wake of changing political, economic, and ideological landscapes.

ISOTOPES AND THE PALEOEPIDEMIOLOGICAL INTERSECTION OF BIOLOGY, CULTURE AND ENVIRONMENT

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Factors influencing epidemiological patterns past and present derive from both cultural behavior and characteristics of the physical environment. The intersection of biology, culture and environment can be examined with isotopic analysis of human tissues, which are a direct reflection of environmental experiences (food, climate, geological settings) throughout the lives of individuals. Most isotopic research thus far has been directed at reconstructing cultural behaviors that have environmental components, e.g., food selection, social and economic organization, inter-regional interaction, mobility and migration. All of these behaviors can influence epidemiological patterning. Although the use of stable isotopes in paleopathology is currently quite undeveloped, we promote its use in paleoepidemiology by reviewing perspectives that it can provide in understanding food as risk factor in disease (i.e., availability and selection), physiological influences on health, the social distribution of disease, and the relationship between geographical mobility and the spread of disease. We also explore roles for stable isotopic analysis in expanding holistic approaches to paleopathology research designs, and suggest stable isotopic methodologies that can provide more detailed biological data and be less destructive than many conventional methodologies. It is hoped that these techniques can advance the goal of informing modern clinical medical research with a deeper historical understanding of the epidemiological and pathogenic dynamics of disease.

TREPONEMAL INFECTION IN SKELETAL SAMPLES FROM ANCIENT EGYPT AND SUDANESE NUBIA ***

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Skeletal samples from North Africa have played a pivotal role in the development of bioarchaeology and paleopathology and in contributing to a growing body of knowledge on the evolution of infectious disease and the biosocial determinants of health inequalities in the past. However, despite decades of exhaustive study samples from this region, they have yet to make a significant contribution to one of the most long standing and virulent debates in physical anthropology: the question of the origins, antiquity, and phylogenetic relationships of the treponematoses. Inventories of tens of thousands of ancient human remains from Egypt and Sudanese Nubia have yet to produce confirmed cases of treponemal disease. Likewise, as of this time the few published pre-Columbian cases present issues of uncertainty in the diagnosis or assigned chronological dates; published post-Columbian cases are equally scarce. Intriguingly, this contradicts genetic evidence suggesting that treponemal disease was likely present in these areas stretching into the ancient past as well as clinical evidence that endemic syphilis was prevalent in more recent decades. This study discusses the implications of this contradiction and the role of negative evidence in the continuing debate over the distribution of treponemal disease in the Old World. Further, this study addresses the current state of bioarchaeological and paleopathological research in North Africa and its role in both understanding the evolution of infectious disease and in further unearthing the geographical and chronological history of the treponematoses.

SECTION 3: PODIUM PRESENTATIONS

ANCIENT LEISHMANIASIS IN THE OLD AND THE NEW WORLD

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Ferroglio, Ezio²; Fornaciari, Gino³; Giuffra, Valentina³; Iachetta, Lucia⁴; Matheson, Carney⁵;

Costa, Maria Antonietta⁶; Llagostera, Augustin⁶ and Otto Appenzeller⁷

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Leishmaniasis is an emergent infectious disease. Widespread in antiquity, visceral leishmaniasis has, hitherto, been identified only in mummies from Ancient Egypt and Upper Nubia [1]. Molecular identification of *Leishmania* aDNA in four female skulls from San Pedro de Atacama, northern Chile (1,000-1,500 AD), has been reported. PCR-sequenced analyses of

bone fragments confirmed the diagnosis of oronasal leishmaniasis in the Chilean cases [2]. Immunological identification of IgG anti-*Leishmania infantum* was successful in skeletons of three Medici family members (16th century AD) [3]. Italy, where the Medici resided, has been an area of endemicity, while Chile and Uruguay, have always been free of *Leishmania*. Comparison with modern databases suggested that the Chilean organism was *L. donovani*. However, this parasite is limited to the Old World. Similarly, *L. infantum* could have been causative but it did not arrive until after the Spanish conquest. Our experimental Chilean sequences did not match 100% published sequences; the resultant confirmation was, therefore, only genus, but not species-specific. The most likely organism was, therefore, *L. braziliensis* [4]. Here we collect evidence for three cases of ancient visceral leishmaniasis from the Old World and four cases of ancient mucocutaneous leishmaniasis from the New World. Climate change, immigration, trade and tourism have contributed to the spread of leishmaniasis in the Old World to areas northwards and to higher altitudes [5]. We show that, factors now shaping the epidemiology of the disease in the Old World were present in ancient times in the New World.

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AN ANCIENT DNA SURVEY OF ARCHAEOLOGICAL TUBERCULOSIS IN EUROPE

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Osteological investigation of skeletal remains is often undertaken to identify diseases in past populations. However, many diseases are either invisible or ambiguous in the skeletal record. Ancient DNA (aDNA) has been used as a diagnostic tool to back up osteological and archaeological interpretations. Not all pathogen DNA survives the archaeological record but *Mycobacterium sp.* DNA is either better preserved or more widely distributed within the skeleton, allowing for a number of successful genetic studies on archaeological tuberculosis and leprosy. We are undertaking a detailed and extensive survey of archaeological European tuberculosis, comparing genetic differences in the pathogen both geographically and temporally. We have collected and screened over 500 samples from 130 sites across Europe dating from the Iron Age up until the end of the 19th Century CE. Screening was achieved by amplifying DNA from the repeat sequence IS6110 using a novel and more specific polymerase chain reaction (PCR) system that reduces false positives, which we believe has been a problem in previous

research. Clinical PCR systems exist to distinguish between different strains and lineages of *M. tuberculosis*, but they simultaneously amplify environmental bacterial DNA. We are currently re-designing them to be more specific. With these systems we will be get a clearer idea of the evolution and past distribution of the pathogen in Europe and, potentially, across the world. Here I shall present the initial results of this ongoing study, showing that aDNA research, when undertaken carefully by specialists, can give a deeper understanding of diseases in the past.

AN ARCHAEOLOGICAL PARADOX: A COLES CREEK PERIOD ANALYSIS OF POPULATION HEALTH AND ARCHAEOLOGICAL DATA FROM THE LAKE GEORGE (22YZ577) SITE, YAZOO COUNTY, MS***

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The Coles Creek phase (AD 700-1200) of the Lower Mississippi Valley has long challenged archaeologists as it spans the transition from semi-sedentary foraging to maize agriculture, which was accompanied by the rise of complex chiefdoms. Consequently, it does not fit well with the rigid political and economic classification categories established for the prehistoric Southeastern U.S. The Coles Creek component at the Lake George site (22YZ577) in the southern Mississippi Delta represents one of these transitions and offers a potential paradox (Kidder 1992). The Lake George site is a multi mound center with a surrounding earthen wall and outer moat, situated near the confluence of Lake George and the Sunflower River. Analysis for this project involved revisiting past studies of both the population health and archaeology of the site conducted by Listi (2007), Kidder (1992), Rose (1984) and Williams and Brain (1983) as well as conducting original evaluation of 39 individuals from Mound C. Indicators considered included caries, anemia, and infection. Dental pathology patterns suggest adequate nutrition with dependence on wild food resources instead of a maize diet. However, other health markers, such as levels of periostitis and presence of cranial deformation, are more consistent with heavier population density and presence of established elite. Results are compared with those seen at other Coles Creek sites in the region, including Mt Nebo and Greenhouse. These findings suggest that this intermediate culture poses more questions than gives answers, opening up new avenues of future research that have currently been overlooked.

DENTAL HEALTH AMONG NINETEENTH-CENTURY-BORN AFRICAN AMERICANS AND EURO-AMERICANS

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Dental pathology can provide insight into the health of past populations. This study examines the dental health of African American and Euro-American males (n = 611) of low socioeconomic status from the Cobb, Hamann-Todd, and Terry anatomical collections born between 1832 and 1877. All individuals with skulls or teeth present were macroscopically examined for antemortem tooth loss (AMTL), caries, enamel hypoplasia (EH), and dental restoration. Persons were separated into and statistically analyzed by ancestry, birth (Antebellum, Civil War, and Reconstruction), combined ancestry/birth, and collection cohorts to determine if ethnic and temporal differences existed. Results indicated that Euro-Americans had the highest rates of AMTL, caries, and enamel hypoplasia; African Americans had larger frequencies of abscesses. The Civil War cohort possessed the highest rates of caries and edentulous persons, but the antebellum period had the most cases of AMTL and abscesses. EH

increased through time with the Reconstruction cohort containing the largest frequencies. Results of the dental restoration analyses indicated that Euro-Americans had higher rates when compared to African Americans. Collection analyses demonstrated that Cobb possessed the largest frequencies of AMTL, Terry had more caries and dental work, and Hamann-Todd contained the largest frequencies of EH and abscesses. These findings imply that nineteenth century-born Euro-Americans suffered from more biological stress and dental pathology when compared to African Americans. They also suggest fluctuations in the socioeconomic status of some individuals who may have had access to dental care.

ADULT CORTICAL MASS AND MECHANICAL STRENGTH: A STUDY OF THE FEMUR AND SECOND METACARPAL IN NINETEENTH-CENTURY EUROPEAN-CANADIANS***

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The high incidence of osteoporosis among modern European and North American populations is associated with urban industrial lifestyles. Measuring bone mass and architecture in past populations may help to clarify the effects of long-term social and technological trends on skeletal health. Characterizing the normal course of bone aging at the population scale is key to understanding inter- and intra-population variability. This study estimated age-related variation in the mid-diaphysis femur and second metacarpal in a sample of 143 (M=87, F=56) nineteenth-century European-Canadians with estimated ages at death ranging from 17 to 88 years. Use of multiple measurement sites allowed testing for intra-skeletal variation in aging patterns. Bone area was measured as an indicator of cortical bone mass, and the second moment of area (SMA) as an indicator of strength. Age-related patterns of bone geometry were quantified using least-squares linear regression and analysis of variance (ANOVA). Area and strength appear to track differently across age groups; in both elements, area exhibits a negative slope against age, while strength is conserved. Loss of bone area may be greater in the metacarpal; differences in element structure and mechanical role are implicated. Results suggest that estimates of bone mass and strength impart different information regarding patterns of bone health and applied fracture risk, and that mechanically and structurally distinct skeletal elements may provide divergent estimates of systemic skeletal health. Use of a multi-element, multi-variate approach may benefit understanding of pathological versus normal age-related variation in bone status.

THE LONG AND SHORT OF IT: AN EXAMPLE OF BRACHYDACTYLY IN ANCIENT EGYPT

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Brachydactyly, literally translated from the Greek as “short finger”, refers to a disproportionate shortness of the fingers and toes. There have been 13 types of brachydactyly described in the literature, and almost all of these are inherited as a dominant trait. Brachydactyly usually appears as an isolated dysmelia, but it can also occur as part of many congenital syndromes. The ancient Egyptian site of Dayr al-Barshā, located 270 km from Cairo, has revealed an individual (ca. 2055–1650, Middle Kingdom) with a myriad of pathological conditions, including notable brachydactyly of the right metacarpals. Differential diagnosis

suggests that this individual's brachydactyly can be classified as Type E, where there is variable shortening of metacarpals, with more or less normal length of the phalanges. Type E brachydactyly has been linked to a mutation in the HOXD13 gene, and is inherited as a dominant trait. Interestingly, this individual also shows many pathological characteristics which we have diagnosed as representing Type II diabetes mellitus. This paper explores the possible link between diabetes mellitus and brachydactyly in this individual, and the possible use of brachydactyly to explore familial relationships in this population.

BEYOND BARE BONES: PALAEOPATHOLOGICAL RESEARCH OF PARASITIC DISEASE IN MUMMIES

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The study of mummified human soft tissue offers information beyond the data gained through skeletal analysis alone, permitting a more comprehensive picture of disease and disease processes in the ancient past. This is especially true with respect to parasitic disease. Identifying parasitic diseases in ancient populations through histological and biomolecular analysis, researchers are able to trace the etiology and evolution of diseases that remain a threat to human health today. Knowledge of past trajectories of diseases can be applied to treatment and management strategies in current populations and may help to predict future trajectories. This paper reviews research conducted on mummies to illustrate the relevance of such research, its applicability to our current understanding of disease and disease processes, and its future potential.

Areas of further research are identified. Palaeoepidemiological studies on large regionally-focused populations of mummies can inform us about the impact of diseases on populations, rather than on individuals, revealing a range of determinants of human health and sickness. Research into ancient parasitic DNA can provide evidence of parasitic mutations and adaptations to human hosts, potentially aiding in treatment strategies in current human populations. While mummies initially represented an exotic curiosity, modern biomedical research techniques enable us to pursue scientific analysis of these specimens — furthering our knowledge of human life in the past and positively impacting human health in the present and future.

HYPEROSTOSIS FRONTALIS INTERNA – A SYNDROME OF THE RICH? EVIDENCE FROM THE BRONZE-AGE „HIGH SOCIETY“ OF QATNA, SYRIA

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In 1719 Morgagni described a condition, today known as hyperostosis frontalis interna (HFI), as one symptom within a triad consisting of HFI, virilism and obesity. The condition has been linked to metabolic disorders. The etiology of HFI, which today is predominantly found in older women, is, however, unclear. HFI is consistently reported to be rare in the archaeological record. The frequency of HFI is thought to have increased during the 19th and 20th centuries and today prevalence of the condition ranges between about 1% and 50% depending on the studied groups. We present preliminary results on the occurrence of HFI in the commingled human bone assemblage from “tomb VII” discovered in 2009 underneath the Bronze Age king's palace of the ancient city of Qatna. An MNI of at least 70 has been estimated for the as yet not fully analyzed skeletal remains. Skull fragments of six individuals exhibit endocranial new bone formation

consistent with HFI. A seventh case of HFI is ambiguous. The cases were classified according to Hershkovitz et al. (1999). Rarity of stress indicators in the skeletons and dentitions along with the rich grave goods suggest a high social status and good living conditions of the individuals. The relatively high prevalence of HFI in the studied sample compared with other ancient populations might be related to such favorable conditions and acquired metabolic disorders. Alternatively, it could be speculated that the buried individuals were close relatives and that a shared genetic disposition is responsible for the high incidence of HFI.

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USE OF HISTOLOGICAL METHODS IN DIAGNOSING DISEASES IN POORLY PRESERVED ARCHAEOLOGICAL BONES FROM TELL EL-DABHA, EGYPT

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Archaeological bones excavated in the Delta of northern Egypt, mostly show a very poor state of preservation due to the relatively wet soil. However, the intensive agriculture in northern Egyptian farmlands is an important contributor to the conditions of archaeological bones, located within the plow-zone. The archaeological site Tell el-Dabha is located in the eastern Delta and represents Avaris (capital of the Hyksos) as well as the southern part of Piramesse (Delta residence of Ramses II). The investigated population is represented by 136 individuals from a Ramesside cemetery (18th Dynasty). The state of preservation of the bones ranges from small fragments of smashed bones to larger long bone fragments and skulls. Most of the skulls were deformed by postmortem soil pressure. But even more preserved skulls or larger bone fragments were difficult to examine due to the excavation method. Brittle bones were taken out of the burial pit after reinforcement with layers of glue and the whole skeleton was plastered to prevent the breaking of the bones. Therefore, in this material, the macroscopic diagnosing of diseases is particularly challenging. Using microscopic methods, a number of diseases can be diagnosed in the sample: scurvy, periosteal changes of the long bones, meningeal reactions, tumorous lesions and changes due to a chronic heart-lung disease. These diseases characterize the people from the Ramesside site of Tell el-Dabha apparently as a low health status population. Thus, even in poorly preserved bones, a paleopathological investigation is worthwhile and many diseases can be identified using microscopic techniques.

ENTHESIS ROUGHNESS IN DOCUMENTED SKELETAL REMAINS

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Enthesal remodelling, in the form of musculoskeletal stress markers (MSM), has been used to study activity-related stress in archaeological populations. However, few quantitative studies have been undertaken on documented skeletal collections: collections with documented age-at-death, sex and occupation. The aim was to determine whether the 'roughness', as quantified using standard engineering measures of roughness, of three entheses was age-related and whether there was a difference in roughness between the manual and non-manual workers. Skeletons from three sites in London were used: Chelsea Old Church, St. Benet Sherehog and

St. Bride's Fleet Street, with the majority from the latter site. Only males (n=47) were included, because of the lack of evidence for occupations for the females. Skeletons were divided into two groups: manual and non-manual workers based on the occupation listed at their time of death. The presence of diseases which cause bone formation at entheses was assessed based on the presence of sacro-iliac joint and spinal ligament ossification. Those with definite or possible cases of these diseases (n=10) were removed. Small sample size was a major problem, with only 10 individuals identified as manual workers. Differences in roughness were found between the manual and non-manual workers. Age was found to correlate with roughness, particularly for the right biceps brachii insertion. Entheses are complicated structures and are affected by many factors: not just activity-related stress. This is a major limitation of using them as indicators of activity, especially if age-at-death is not known.

UNDERSTANDING IRON AGE VIOLENCE: THE EFFECT OF MORTUARY BEHAVIOUR ON PATTERNS OF TRAUMA***

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There is a long-standing debate about the prevalence and scale of violence and warfare in the British Iron Age. Discussions hinge on the extent the instruments of violence (i.e. swords, spears, hillforts) are functional tools of war or merely symbolic devices. Human remains provide valuable insight because they provide direct evidence for weapon-related trauma. However, interpretations of trauma in the human skeleton are not without problems. The complex nature of the mortuary behavior during this period- that often results in fragmented and disarticulated human remains- obscures patterns of skeletal trauma.

In order to address this debate, this study analyzed patterns of trauma present in two areas of Britain with different and distinct mortuary practices, East Yorkshire, in the North of England, and Hampshire in the South. Large cemeteries associated with settlements and used over long periods of time characterize the Iron Age of East Yorkshire. Contexts for human remains in Hampshire are variable, ranging from burial in cemeteries and pits to isolated fragments in settlements and middens. The majority of traumatic lesions in both areas are healed fractures most likely from accidental origins. However, evidence for interpersonal violence in the East Yorkshire material is predominantly healed, whereas the Hampshire sites have a higher frequency of perimortem violence-related trauma. At first glimpse this may indicate higher rates of violence in the south, but the associated mortuary data is more complex and could indicate that those individuals exhibiting perimortem trauma may have been buried in special contexts making them more visible archaeologically.

SYPHILIS IN 18TH CENTURY COPENHAGEN: COMPARING BONE LESIONS TO HISTORICAL EPIDEMIOLOGICAL DATA

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The material on which this report is based is 60 individuals who died from plague in 1711, within one or two months, in Copenhagen. These individuals died from the disease without regard for age and social status. They probably reflect a normal distribution analogous to the background population; the material can thus be seen as a unique cross section of the then population. We analyzed the skeletal material for signs of syphilis, a chronic disease which was known to be endemic at that time.

In our study 6.5% of the investigated subjects presented syphilitic bone lesions. Clinical studies have shown that the number of clinically verifiable individuals affected by syphilis is roughly 1.5 times bigger than the number of subjects with syphilitic bone lesions. Thus, our frequency may suggest that roughly 9.8% of the Copenhagen population were infected with *T. pallidum*. This prevalence is indeed consistent with historical sources.

We present the background for proposing that this material is indeed cross-sectional, and how observable bone lesions are compared to historical epidemiological sources.

EARLY TERMINAL CLASSIC PERIOD MAYA PATHOLOGY: FROM TEACHER TO STUDENT?

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The purpose of this presentation is to reach out to the professional community for feedback on an interesting pathology and its circumstance. Burial BV-88-B4 is dated to the Early Terminal Classic Period at Buenavista del Cayo in western Belize and contained the remains of three individuals. The primary individual, a youth of royal lineage, and a second older individual both showed evidence of the same pathology on their distal ulnae. It was described as tendinous ossification for lack of a better term, and was observed in the area of pronator quadratus muscle above the wrists, likely developed to this stage as a result of a repetitive grasping motion. Strontium stable isotope readings showed that the younger individual was from Buenavista, and the older individual was from an area closer to Calakmul, and suggesting that perhaps the older individual served as an instructor for the younger royal individual. This type pathology is not seen in any of the other royal burials from Buenavista or its associated palace at Cahal Pech 6 km away, so this may be a new activity to the area other than paddling activities, hand-to-hand combat, or spear-throwing. Archery is a slight possibility. The inland Maya did not have this technology until the Post-Classic but it was used earlier in the Vera Cruz area. No stone points were recovered during the excavations but this does not rule out the possibility of wooden points, which would not have survived in the acidic soil at Buenavista.

A 'NEW' SKELETON FROM SIR JOHN FRANKLIN'S LAST EXPEDITION TO THE ARCTIC, 1845

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Sir John Franklin's expedition to the Canadian Arctic set off from England in 1845 to explore the Northwest Passage. They never returned. The reasons for the loss of the expedition have been debated ever since. In 1869, an American adventurer recovered a human skeleton from a shallow grave on King William Island, in the southern part of the Canadian Archipelago. The bones were brought back to England, and were examined by Thomas Henry Huxley in 1872, who tentatively identified them as one of the officers aboard HMS Erebus. The remains were interred beneath the Franklin Memorial in the Old Royal Naval College in Greenwich in 1873. In 2009, renovations to the Painted Hall at the Old Royal Naval College entailed moving the Franklin Memorial, and this provided an opportunity for scientific examination of the human remains and associated artifacts. This is the only complete skeleton of a member of the Franklin

expedition that has been available for modern scientific examination. The aims of the work are twofold: firstly to attempt to confirm the personal identification made by Huxley in 1872 and secondly to attempt to shed light on the reasons for the loss of the expedition. This paper describes the human remains and the artifacts interred with them, and some of the preliminary scientific results.

MULTIPLE MYELOMA PAST AND PRESENT

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Multiple myeloma is rare in modern populations, with an incidence of only two to five cases per 100,000 in the United States. The condition generally occurs in older patients; of the patients diagnosed in the United States between 2001-2005 the mean age at diagnosis was 70 years. There is a higher incidence of multiple myeloma in men than in women.

The literature on disease in past populations was scrutinized for evidence of multiple myeloma. Each possible case of multiple myeloma was examined through published descriptions, published photographs, or gross examination for diagnostic indicators. A total of 20 cases (7 males, 10 females, and 3 individuals of unknown sex) were reported for prehistoric samples around the world. The occurrence in the archaeological samples is higher in females than in males. The mean age of occurrence in the archaeological samples presented is 38.67 years, with all individuals likely under 50 years of age.

Given the data available in the literature, it appears the incidence of multiple myeloma was either completely different in the past than today, or is grossly overestimated in the past, maximally in the age groups under 55 years. The possible reasons for these perceived differences are discussed in light of modern data on multiple myeloma.

THE EFFECTS OF PATHOLOGY ON INTER- AND INTRA-INDIVIDUAL NITROGEN-ISOTOPE COMPOSITIONS OF BONE COLLAGEN FROM A MEDIEVAL POORHOUSE***

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This research addresses the interpretive limitations on human bone collagen nitrogen-isotope compositions arising from the influence of pathological states. Differences in nitrogen-isotope compositions ($\delta^{15}\text{N}$) are traditionally interpreted as indicators of dietary variability even though physiological processes likely play some role in inter-individual variation. Here, nitrogen-isotope analysis is used to investigate the relationship between disease and inter-individual and intra-individual collagen compositions. The sample selected for analysis derives from a medieval period (12th - 16th century) poorhouse cemetery in Regensburg, Germany. Poorhouse tenants were unable to care for themselves because they were either destitute or unhealthy. This community included pregnant women, the elderly and the infirm. Individuals who displayed no osteological evidence of pathology (n=36) were sampled along with unhealthy

individuals (n = 69). All of the major categories of pathological conditions (trauma, infection, cancer, vitamin deficiencies, congenital and degenerative disorders) are represented among the unhealthy individuals. Whenever possible, both the lesions and unaffected areas were sampled within the same individual. Preliminary results indicate that $\delta^{15}\text{N}$ values are generally high in individuals with pronounced pathologies but much more variable among individuals without visible evidence of pathology. These data are considered in light of bone's low sensitivity to disease processes and within the context of body nitrogen turnover during periods of illness and recovery.

PREVALENCE OF ARTHROPATHY IN THE SHOULDER COMPLEX AMONG INDIVIDUALS IN THE GEORGE S. HUNTINGTON ANATOMICAL COLLECTION***

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Rotator cuff disease represents a range of pathological conditions involving the shoulder complex, including subacromial impingement, subcoracoid impingement, and other cuff-tear arthropathies. Although a degree of degenerative change is linked to age progression, previous studies report an association between repetitive heavy use of the shoulder complex and patterns of lesions. Most of the current literature addresses shoulder arthropathy in clinical settings; however, several authors report evidence of rotator cuff disease in osteological material. The purpose of the present study is to evaluate the prevalence of rotator cuff disease or shoulder arthropathy in the known occupational laborers of the George S. Huntington anatomical skeletal collection, housed at the National Museum of Natural History in Washington, D.C. A sample of 90 individuals was selected based on recorded occupation and availability of skeletal material. Degenerative changes were recorded for seven surfaces of the shoulder complex, including articular and non-articular locations. The majority of the selected sample shows changes in three or more observed locations, most often the acromioclavicular facet, the facet of the lateral clavicle, and the lesser tuberosity of the proximal humerus. These changes occur over a wide range of recorded ages and therefore might be associated with repetitive and heavy use of the shoulder complex due to occupation-related work. Evaluating evidence of shoulder arthropathy in the Huntington Collection provides a better understanding of the health and working conditions of this late nineteenth century urban population.

PUBIC SYMPHYSIS STRESS INJURY IN A SMALL-BODIED HOLOCENE COASTAL FORAGER, SOUTH AFRICA

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Osteitis pubis, or pubic symphysis stress injury, is clinically associated with difficult childbirth and with vigorous athletic activities. The assumption of natural selection for obstetric adequacy would predict the occasional discovery of skeletal evidence for inadequacy, yet such cases are rare. In a well preserved skeleton from ca. 2000 B.P., stress injuries to the pelvic ring are associated with a slightly misshapen pelvis that may have their developmental basis in the partial agenesis of the right sacral ala. The skeleton is of a small, middle aged woman who pursued a physically vigorous life as a coastal forager on the South African Cape coast. The six articular faces of the asymmetrical pelvis all show coarsely porous new bone remodeling and extensive eburnation. The left pubic face has shifted dorsally, making contact with the ventral

aspect of the right pubis. The sacrum is asymmetrical, the right ala being about 5 mm narrower than the left. There is incomplete fusion of the first and second sacral elements. Adjustments to the altered pelvis include erosions and osteophytes at sites of ligament attachment, and prominent bilateral insertion areas on the tibiae for the iliotibial bands. Various behaviors may have exacerbated the joint breakdown. Childbirth may have introduced joint instability, exacerbating the skeletal changes. This case may illustrate the type of mechanisms through which natural selection for pelvic size and shape characteristics occurred.

THE LA JOLLA SKELETAL POPULATION: PREHISTORIC LIFE ON THE SOUTHERN CALIFORNIA COAST***

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The La Jolla skeletal collection is made up of 87 individuals, and is housed at the San Diego Museum of Man. Skeletal indicators of pathology and trauma contribute to our knowledge of the past by illuminating the general health and behavior of the population. Every skeletal specimen was observed carefully to detect any nutrition and health status indicators that were apparent, as well as any additional paleopathological evidence which would help reconstruct the lives of the La Jollans.

Within the La Jolla skeletal population, indicators of dietary deficiency and stress, dental disease, interpersonal violence, osteoarthritis and trauma, and occupational/behavioral skeletal markers were all observed. In general, it is apparent that dental attrition, osteoarthritis, and squatting facets have relatively high occurrence rates, which corresponds with assumptions that the La Jollans were subject to harsh conditions as a result of their coastal lifestyle, and that they relied on marine food, shellfish, and food ground on manos and metates. While it would be expected to find a high percentage of La Jollan individuals displaying auditory exostosis, it is not frequently observed in the collected data, which suggests that only certain segments of the population practiced the gathering of shellfish and/or fishing and diving. Temporal as well as sex differences have also been analyzed. Males and females have relatively similar frequencies of occurrence with regard to paleopathological indicators, and porotic hyperostosis is the only pathology which has a statistically significant difference over time, indicating more stress in recent times.

THE ORIGIN AND MOBILITY OF PEOPLE WITH VENEREAL SYPHILIS BURIED IN HULL, ENGLAND IN THE LATE MEDIEVAL PERIOD

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Clinical research highlights the impact of infectious disease on people who “travel”, but little bioarchaeological research has explored this relationship. This paper uses stable isotopic analysis to study mobility histories of early sufferers of venereal syphilis in Britain buried at the medieval friary of Hull Magistrate’s Court (1316-1450 AD), Humberside, England. The cemetery was located next to the River Humber, directly connected to the North Sea. The hypothesis tested was that they originated outside England. The objectives were to identify whether those with VS were born and raised outside Hull and whether they moved significantly

during their lives. While it would be impossible to confirm whether they brought syphilis to Hull (via trade), or developed it when they lived there, the data produced extends the use of stable isotope studies from beyond questions of general mobility to considering the role of mobility in the transmission of infectious disease. Combined O- and Sr-isotope analysis was applied to six individuals with bone lesions of venereal syphilis and six individuals with no lesions as controls. A second premolar, second molar or third molar tooth from each individual was analyzed. The data were combined with extant archaeological and historical data on Hull's place within trade and contact with the continent and the rest of Britain to assess the possible impact of mobility on VS occurrence in Hull. The strontium data so far show that the people studied were born and raised locally, but oxygen data will confirm or refute these findings.

POSSIBLE SCURVY IN SUBADULTS FROM A FOURCHE MALINE SITE SOUTHEASTERN OKLAHOMA

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The Oklahoma Akers site is a black midden mound excavated by the WPA in 1941. The burials from the Akers site are currently undergoing paleopathological assessment with permission from The Caddo Nation and The Wichita and Affiliated Tribes. The WPA reported recovery of 203 individuals with 11 "children". Current analysis indicates approximately 222 individuals with 33 subadults. All age ranges, from neonatal through elderly are represented, including two probable fetal-mother burials. Examination of subadult paleopathological lesions reveals an unusual pattern consisting of low rates of porotic hyperostosis, high rates of cribra orbitalia, and moderate rates of perisoteal lesions. This suggests a nutritional stressor. A possible diagnosis of Vitamin C deficiency in subadults is supported by strong evidence for a diet that relies heavily on hickory nuts. A diet dominated by hickory nuts would have provided good amounts of carbohydrates, fat, and protein, but very little iron and almost no Vitamin C. It is proposed that a weanling diet that relied on hickory nut mush produced a transient Vitamin C deficiency in many subadults, resulting in the pattern of paleopathological lesions observed in the subadults from the Akers site. Research currently underway on adult paleopathology will hopefully further elucidate patterns of nutritional stress.

PALEOPATHOLOGICAL ANALYSIS OF THE INDIVIDUALS FROM THE PRE-COLUMBIAN SITE OF CAMBRIDGE HILL (JAMAICA)

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The site Cambridge Hill (OC1), in St Thomas, was identified in 1946 by C.B. Lewis, Director of Institute of Jamaica and member of the Jamaica National Trust Commission. From this "burial cave" Lewis recovered human remains together with pottery vessels and a miniature *duho* made of *Lignum vitae*. The aim of this study is to analyse the pathological conditions of the individuals from this site, comparing the material currently housed at the Jamaica National Heritage Trust with the handwritten inventory in a notebook presumably from Lewis as well as later comments by succeeding researchers (R.R.Howard and W.F.Harper), namely in relation to the evidence of intentional modification. The commingled nature of this material prohibits a full description at an individual or group level. However, the good state of preservation and an excellent distribution of cranial and post-cranial remains, from both juveniles and adults, enable a minimal number assessment of 20 individuals and a broad view of the population. Skulls are

artificially modified, a characteristic common in Tainos. One skull displays a sizable neoplastic lesion, while another presents possible evidence of trepanation. Oral pathology, degenerative joint conditions and traumatic lesions are also analysed. Among these remains are two fragments, one of the humerus and the other from a metacarpal, with the shaft, apparently, intentionally narrowed resulting in a pencil-sharpened like appearance. All these conditions will be discussed in order to contribute to the understanding of the Pre-Columbian Taino, namely from Jamaica, where this site is of major importance.

DESCRIPTION IS NOT ENOUGH: DIFFERENTIAL DIAGNOSIS IN THE REPATRIATION ERA

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This paper addresses the challenge of creating archives of skeletal data that will be of lasting value in the era of repatriation. Bioarchaeology (and paleopathology) in the U.S. is subject to compliance with laws and memoranda which dictate the context, time frame, and nature of skeletal analysis and documentation. A year is usually the maximum time allowed until repatriation, and photography, radiography, and illustrations may not be permitted. The recording data protocol in *Standards* exhorts us to record skeletal responses on multiple regions and aspects of every bone. While some instances of abnormal bone fit into patterns associated with known diseases, the majority fall into the huge gap between the narrow range of pathognomonic lesions for specific conditions and the array of bone changes we record. Considering the conservative ethos of paleopathology and the constraints on data collection, are we creating the best possible data archive? Have we replaced the 'old boxes of bones in museum storerooms' with gigabytes of data waiting for the unlikely revelation of retroactive differential diagnosis? Our analysis suggests that best-practice for paleopathologists in time-limited work contexts might include a structured exercise in pattern matching classification of bone changes based on the formulation of "decision tables". These tables, incorporating recent work on lesion types and distributions associated with conditions, might assist researchers in recognizing the presence of conditions including scurvy, rickets, tuberculosis, leprosy and treponemal syndromes.

INITIAL INVESTIGATIONS INTO THE PREHISTORIC SKELETAL COLLECTIONS OF CANON GREENWELL AND J R MORTIMER FROM THE YORKSHIRE WOLDS, ENGLAND***

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The Yorkshire Wolds, an upland chalk region in the East Riding of Yorkshire, has been occupied almost continuously since the Mesolithic and thus has attracted antiquary and archaeological attention from early Victorian times. The Canon Greenwell Collection, housed at the Natural History Museum in London is represented by over 150 individuals from 10 sites. The J R Mortimer Collection, housed at the Hull and East Riding Museum in Hull contains over 100 individuals representing 8 sites. Due to their lack of archaeological education and their predominant interest in craniometrics before and during the turn of the century, Greenwell and Mortimer only excavated and removed skulls and occasional post-cranial elements. This has obviously resulted in less than complete osteological collections; however, due to their relative scarcity as prehistoric remains they must be analysed. There is a clear disparity between the

number of published burials and those actually present in the collections, the reasons behind this difference are examined. Although Greenwell and Mortimer were excavating in the same geographic region and were both collecting remains attributed to the Neolithic, Bronze and Iron Ages, there were marked differences in cranial morphology, pathology and dental defects. As the dating and geographic locations they ascribed to the remains were determined to be reliable, reasons behind these striking variations will be discussed and future plans to answer these questions will be explored.

EXCAVATION DENIED: THE POTENTIAL OF IN-SITU BURIAL ANALYSIS

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NAGPRA has significantly changed the practice of bioarchaeology in the United States. In this era of repatriation, the opportunity to excavate remains and perform analysis is limited by compliance with various laws and with agreements crafted between archaeologists, tribes, and government agencies. Burial treatment plans that allow the bioarchaeologist to expose remains and record information, but do not allow removal from their in-situ position are becoming increasingly common.

This paper addresses the challenges associated with in-situ analysis, and the need for standardized methods and new techniques for working in this type of situation. Examples from experimental excavations provide evidence of the feasibility of recording accurate measurements, assessing sex and age-at-death, and paleopathological information. Data was collected on bodies buried in skeletonized and tissue form that were excavated after a 10-12 month period. Initial results indicate that it is possible to take accurate measurements of some smaller bones in-situ, such as the clavicle, radius, ulnae, and calcaneus, but that new tools must be developed to measure femora, tibiae, and humeri. Generally, sex is easily identified because the pelvic girdle is intact while obfuscation of the pubic symphyses and auricular surfaces makes age-at-death estimates more problematic. Body position and the degree to which soil can be removed from the remains are the major determinants of the type and amount of data collected, specifically limiting pathological observations. Significant challenges are associated with in-situ analysis and additional studies are needed, but initial results indicate it is possible to obtain reliable data from appropriate analyses in these contexts.

A RARE CASE OF CONGENITAL HEART MALFORMATION IN AN ANCIENT PERUVIAN CHILD MUMMY

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In a close collaboration between the German Mummy Project and the EURAC-Institute for Mummies and the Iceman, several mummies from different geographic regions that were part of the exhibition “Mummies-the dream of an Eternal Life” were investigated. This paper presents the results of a CT scan investigation of a Peruvian child mummy that is originally housed in the State Museum of Detmold, Germany. The mummy is radiocarbon dated to 4504-4457 cal BC. The examination was performed at the Central Hospital of Bolzano with a Sensation 16 multislice computer tomograph and Leonardo Leo Syngo 2004A VD10B work station (Siemens Erlangen). The CT investigation revealed an age of death of the child mummy

of approximately 8 to 10 months. Several pathological conditions were detected, such as turricephaly with probable hydrocephalus, a fracture of the right parietal bone, Vitamin D deficiency and a severe abscess-forming pneumonia. Moreover, the infant suffered from a congenital heart malformation shown by a large atrial septal defect and right-sided hypertrophy. The heart defect has caused a flooding of the lungs and has most probably led, in combination with the pulmonary infection, to the death of the young child.

POSTER PRESENTATIONS

STAFNE CAVITY ON A 7th c. BC KLAZOMENEAN HOPLITE WARRIOR

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This paper reports on the rare Stafne cavity among ancient Greek populations affecting a 7th c. BC 60 year old male individual retrieved from the “*Akpinar*” necropolis of Klazomenai, one of the twelve cities of the Ionian Confederacy in Asia Minor / Chios and Samos islands (Herodotus *Historia*: A:142). The individual involved showed very robust skeleto-anatomic structures and a plethora of cranio-dental and infracranial paleopathologic degenerative, acquired and post-traumatic conditions, strongly suspected to reflect on participation in long term hoplitic military activities.

The nearly circular 13.37 mm wide cavity marked the left postero-lingual mandibular ramus below the inferior dental nerve canal and superior to the alveolar mandibular border, revealing uncompromised cortical walls and diagnostically differentiated from a hemorrhagic-traumatic cyst or tumorous lytic lesion. Whereas both the etiology and manifestation description-terms vary in the literature, clinically the defect is asymptomatic and benign and if not idiopathic in nature then possibly developmental due to submandibular salivary gland pressure in the case of the posterior variant of the manifestation with significant predilection to males past the end of their 4th decade and at a 0.10%-0.48% clinical prevalence, diminishing with increased latitudinal geolocation due possibly to environmental parameters.

In this case study, a *sutura metopica persistens* combined with an overall lack of sutural synostosis, except at the postero-dorsal *sagittalis*, may reflect on intramembranous ossification difficulties which should be considered in clinical oral studies which otherwise selectively focus on mandibulo-maxillary imaging on the diagnosis and etiologies of Stafne cavity. Further, a valuation of the manifestation as an expression of pleiotropic genetic action of discontinuous nature should also be considered.

OSTEOCHONDRITIS DISSECANS AS EVIDENCE OF A LABOR INTENSIVE ADOLESCENCE?****

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Osteochondritis dissecans (OCD) is characterized by an osteochondritic defect on an articular surface, most often at the knee or elbow joint. In skeletal remains, active OCD is identified by a clearly defined circular lesion in subchondral cortical bone with exposure of underlying trabeculae. The etiology of this condition is incompletely understood, but genetics, traumatic events, and/or overuse are likely contributors. Specifically, adolescents with a history of repetitive overuse are at high risk. The presence of OCD has been suggested to be related to stress from occupational trauma and agricultural activities in archaeological populations. From

the medieval cemetery in Giecz, Poland (site Gz4), five adolescent (10-20 years of age) skeletons exhibit osseous defects consistent with OCD. The prevalence of this condition is 15.6% in the adolescent sub-sample (n=32) of the Giecz Collection. High rates of stress-related trauma suggest the adult population at Giecz experienced a rigorous workload associated with agricultural and military activities. The frequency of OCD in adolescents from Giecz implies that they too labored intensively and perhaps were considered adults in their community.

SCURVY AND CHILDHOOD LEUKEMIA IN A NORTHERN NEW MEXICO PREHISTORIC POPULATION

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Recent excavations at a Coalition and Early Classic period (A.D. 1290-1375) site in northern New Mexico recovered a 12 to 18 month child with pervasive small osteolytic lesions in virtually all body parts. Some of the lesions are typical of scurvy and possibly rickets (Ortner 2003). Other lesions and the overall pattern of lesions suggest a more serious illness combined with one or more deficiencies.

Significant numbers of infants and children from this site have cranial and postcranial changes consistent with scurvy (Brickley and Ives 2006). However, the presence and distribution of “massive numbers of 1-3 mm superficial solitary and coalescing pits” (Rothschild and Martin 2006:157) found in this child support a diagnosis of childhood leukemia. Also consistent with this diagnosis is evidence of a relatively rapid onset and that it was acute, possibly lasting six months or less (e.g. Aufderheide and Rodriguez-Martin 1998). Contrasting the lesion form and distribution observed in this child with another child who has lesions more suggestive of severe scurvy, highlights the distinctiveness of the disease processes present in this child.

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EVALUATION OF THE PERSON YEARS CONSTRUCT AS A METHOD OF EXAMINING DISEASE PREVALENCE IN THE NUBIAN POPULATION***

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Many epidemiological analyses have attempted to elucidate the effects of skeletal age on the prevalence of health disparities within skeletal samples. Such emphasis on age exists as it has been essential to basic paleoepidemiology, and as it is a confounding variable of prevalence data. In the majority of studies this is evaluated by matching the mortality profiles of each sample against the distribution of pathological lesions, trauma, and skeletal stress indicators. Use of this approach, however, can neglect the potential for an increase in the exposure to various health risks over time, resulting in misinterpretations of the data. As a proposed remedy

to this issue, this study evaluates the potential for employing the ‘person-years construct’ as a more accurate way of gauging age-adjusted prevalence of indicators of overall health, specifically skeletal stress indicators, within skeletal samples. This method measures the length of exposure for each individual as well as the mortality profile of a given sample, while also attending to the potentially confounding effect of these two factors on the prevalence of pathology and stress indicators. To evaluate the utility of this alternative approach, the frequency of porotic hyperostosis in relation to skeletal age for several well-studied skeletal samples from Sudanese Nubia (250BC-1350AD) was determined using three different calculations: prevalence, age-adjusted prevalence, and person-years adjusted prevalence. Results have implications for improving the accuracy of interpretations of age-related patterns in overall health, trauma, and evidence of disease in skeletal samples.

A PROBABLE CASE OF ACROMEGALY FROM THE WINDMILLER CULTURE OF PREHISTORIC CENTRAL CALIFORNIA

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The endocrine disorder known as acromegaly is characterized by the enlargement of bone and soft tissues, and is the result of a pituitary gland tumor that increases secretion of growth hormone. The onset occurs after epiphyseal fusion, a trait that distinguishes it from gigantism, resulting in sub-periosteal enlargement rather than linear bone growth (Aufderheide and Rodriguez-Martin 1998). Additional characteristics include mandibular prognathism, dental malocclusion, widening of the nasal aperture, enlargement or deterioration of the sella turcica, elongation of tubular bones of the hands and thickening of vertebral centra (Morse 1969; Aufderheide and Rodriguez-Martin 1998). This study focuses on a nearly complete skeleton excavated from the Blossom Mound site (CA-SJO-68), located in the mid-Central Valley of California. Time sensitive artifacts associated with the burial provided an age estimate of 3750-3950 B.P. (Early Period). The assessment of osteological features of the pelvis and skull indicated that the individual is an adult male (30-40 years of age), with a stature of approximately 171.7 cm (61.7"). The skeleton showed evidence of severe crowding and malocclusion of the anterior dentition; elongation of the mandibular ramus; pronounced development of the mental eminence, glabellar region, and supraorbital arches; and robust diaphyseal shafts. In our differential diagnosis, we considered acromegaly, gigantism, and a number of fibro-osseous conditions that affect the facial bones. The robust and enlarged features of the face compare most favorably with acromegaly. This poster will discuss the osteological manifestations of acromegaly, and will evaluate current criteria for the paleopathological diagnosis of this condition.

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DIFFERENTIAL SURVIVAL OF DEVELOPMENT ASSAULTS: HEALTH AND DIET IN THE ANCIENT MIDDLE EAST

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This study investigates the relationship between health and diet in the ancient Middle East through dental and osteological analysis. The crania and mandibles of twenty-five individuals from Tepe Hissar, Iran were examined. This site is located in the Damghan Plain and dates from before 4000 BC to *ca.* 2000 BC. Diet and health are examined through analysis of the following cranial and dental pathology: cribra orbitalia, dental abscesses, antemortem tooth loss, wear, caries prevalence and hypoplasias - both number and timing. Two cases of cribra orbitalia were found; one individual *ca.* 12 – 15 years had active lesions in both orbits and one adult female had healing lesions in one. Three individuals exhibited one abscess each and six others had multiple abscesses. One hundred-sixty teeth were lost pre-mortem. Three males and two individuals of indeterminate sex had hypoplastic lines. Timing for all five ranges from 2.57-5.57 years. The earlier events may relate to weaning while the later events may indicate malnutrition or childhood illness. Differential causes of pulp exposure were categorized as either from dental caries or wear. Both were calibrated using the caries correction factor. Dental caries prevalence rate was 21%: females 40%, males 0% and individuals of indeterminate sex 44%. Pulp exposure from wear was 19.8%: females 20%, males 9.1% and individuals of indeterminate sex 22%. These data indicate that females were eating a more cariogenic, abrasive diet than males. In any case, age at death was affected in those experiencing assaults during childhood. They died relatively younger than others.

PALEOPATHOLOGY OF PREHISTORIC HUNTER-GATHERERS FROM THE NORTHERN SAN FRANCISCO BAY AREA: HEALTH AND NUTRITIONAL STATUS AT THE ENCINOSA SITE (CA-SOL-451)

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Understanding patterns of health and nutritional status in prehistory is a major goal of bioarchaeological research. To date, only a handful of bioarchaeological studies have examined indicators of health in the prehistoric northern San Francisco Bay Area. This poster presents an analysis of a sample (N=33) of late Holocene (*ca.* 4050-830 B.P.) hunter-gatherers excavated from the Encinosa Site (CA-SOL-451), located in Vacaville, California. Data collection focused primarily on common bioarchaeological indicators of health, including osteoarthritis, periosteal bone reaction, cribra orbitalia, porotic hyperostosis, linear enamel hypoplasia (LEH), oral pathology, and stature.

The sample consists of fourteen males, seven females, six nonadults, and six individuals of indeterminate sex. Pathological conditions present include: osteoarthritis (39% of adult sample); vertebral osteophytosis (46.7% of adult sample); tibial periosteal reactions (left = 25%, right = 28.6%); cribra orbitalia (31.2% of crania); porotic hyperostosis (28% of crania); linear enamel hypoplasia (23.5% of dentitions); and dental caries (35.3% of dentitions). Only two fractures (Colles' fracture, spondylolysis) and one possible muscle injury (possibly myositis ossificans) were observed in the sample. One individual had a large auditory exostosis in the right ear canal which may have been associated with long-term exposure to cold water.

The prevalence of nutritional and disease-stress indicators is moderately high in the Encinosa sample, but is similar to that found in many other archaeological sites in central California. We examine the prevalence of these skeletal and dental health indicators in light of data collected from sites throughout the greater San Francisco Bay Area.

“R” VERSUS “CR”: WHAT A DIFFERENCE A “C” MAKES

Conlogue, Gerald¹ (gerald.conlogue@quinnipiac.edu); Blyth, Tania¹; Li, Jiazi¹; Dhody, Anna²; Beckett, Ronald¹ and Robert Lombardo¹

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The aim of the presentation is to compare the application of conventional or plane film radiography and digital radiography in paleoimaging. The two distinct digital systems, direct digital radiography (DR) and computed radiography (CR) will be presented. In addition, the rationale for selecting an industrial CR over a medical CR system for a field setting application will be described. The study was conducted on the mummy known as the Soap Lady in the Mütter Museum, College of Physicians of Philadelphia in Philadelphia, Pennsylvania. In order to present the advantages and disadvantages of each imaging modality, an in depth account of the process used to acquire the images will be discussed. A comparison of the resulting images will demonstrate the increased resolutions and latitude available with the industrial CR system. However, the drawbacks of the CR approach, increased radiation dose and cost will be considered.

REVEALING HER SECRETS ONE IMAGING MODALITY AT A TIME

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The aims of the presentation are to view the imaging studies conducted on the *Soap Lady* in the Mütter Museum over the past 23 years to demonstrate the changes that have occurred in paleoimaging and how the evolution of the image process has modified our perceptions of the individual. In addition, the radiographs have documented possible structural changes that have occurred within the remains over the study period. Although the 1986 study, conducted with a 1950's vintage portable x-ray unit and conventional radiographic film, revealed facts that help establish when the individual was buried, it suggested that no internal organs had survived the mummification process. In 2001 the remains were reexamined with a computed tomography unit that was brought into the museum. The advanced imaging modality not only documented the presence of internal organs, such as lungs and heart, but also the presence of what appeared to be a gall stone and possibly a kidney stone not previously visualized. Finally a 2007-08 study was undertaken, in part, to create an updated exhibit of the remains. A new high frequency generator x-ray unit was used with several types of recording media including Polaroid

photographic film and computed radiography. The light-weight radiographic unit made it possible to acquire a series of the high resolution images that could be assembled to produce a single image of the entire mummy.

ALL IS NOT EQUAL: AURICULAR SURFACES OF THE MOCHE GIANTS

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A recent suggested diagnosis for the Moche Giants' (excavated in Peru, 1997-2000) skeletal pathology is Aromatase Deficiency (Cordy-Collins, EPPA poster, 2009, Copenhagen). This condition presents with continued bone growth and delayed epiphyseal closure, resulting from a lack of estrogen. Previously, epiphyseal closure, as well as other standard methods, argued for an age-at-death of 17 to 22 years. If Aromatase Deficiency or another estrogen-restricting condition is causal, that estimate is probably wrong. Therefore, the authors re-aged the five skeletons using the auricular surface method. Auricular surfaces change with wear, not growth, and thus afford an independent aging method. Because the skeletal material is in Peru, work was conducted there, and the auricular surfaces were cast using dental alginate and dental stone. Thus, the authors were able to export the evidence for examination by other paleopathologists. The new results are at odds with the previous aging methods, and indicate greater ages for all five individuals (25-45 years). Independent confirmation or refutation of the results is crucial for a correct age estimate. If the authors' interpretations are supported, an estrogen-deficiency, such as aromatase, is also supported.

SEPTAL APERTURE RATES AMONG THE PEE DEE OF TOWN CREEK MOUND, MT. GILEAD, NORTH CAROLINA

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Septal apertures are characterized by complete openings within the olecranon fossa of the distal humerus and can vary in size from small to very large foramina (Bass 2005). This non-metric trait has a very low frequency among archaeological European groups, fewer than 11% (Mays 2008, Wells 1980) and modern US whites at 4.3% (Trotter 1934). It appears to be more common in American Indian archaeological samples as adult incidence rates at two sites (Utah and Arizona) were found to be 23.5% and 33.6%, respectively (Hrdlicka 1932). A sample of 85 individuals from the prehistoric Pee Dee group at Town Creek mound in North Carolina was scored for the presence of septal apertures. This effort was undertaken during master's thesis research to shed light on the trait's prevalence within the population and to add to the understanding of the trait's occurrence as a whole. The trait was collected based on the appearance of a foramen surrounded by smooth, rounded bone. Incomplete humeri with mostly intact fossa were scored. Close attention was paid to humeri with broken fossa so as to not mistakenly include fracture damage. Due to preservation issues, 40% of the humeri were unscorable, while 31.76% had at least one septal aperture. As in many previous septal aperture studies, higher rates were found in females at 18% (males, 11%) and left side humeri at 25% (right side, 15%). This frequency places the Town Creek group within the understood range of American Indian septal aperture rates.

DIFFERENTIAL DIAGNOSIS AMONG PATHOLOGY, REGIONAL POPULATION VARIATION, AND TAXONOMIC UNIQUENESS

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The reputed taxon *Homo floresiensis* is based on a numerically uncertain skeletal sample; published estimates range sporadically from 6 to 16 individuals, comprising a single skull, second unassociated jaw, and assortment of limb bones, many fragmentary or incomplete. Attributes, most notably the extremely small and unusually asymmetrical skull of the supposed *species* are chiefly those of the type *specimen*, LB1. Consequently, statements such as “[A]ttempts to dismiss the hobbits [sic] as pathological people have failed repeatedly because the differential medical diagnoses of various dwarfing syndromes and microcephaly bear no resemblance to the unique anatomy of *Homo floresiensis*” are misleading.

Unique is not a scientifically acceptable synonym for unusual, and now all of the supposedly unique diagnostic features of the hypothetical taxon have been matched in extant humans. As a medical sign, microcephaly occurs in hundreds of syndromes, many also manifesting markedly short stature and elevated asymmetry, documented (Jacob, et al., 2006) but long ignored, denied, or misrepresented until confirmed independently in extent (Kaifu, et al., 2009). Our research group has not portrayed the Liang Bua Cave *population* as a pathological *people*. Here we show new evidence that the LB1 *individual* presents various pathologies: dental lesions unexpected in hunter-gatherers, craniofacial asymmetries that markedly exceed established population norms, and carpal developmental variants that are matched in extant humans (Eckhardt and Henneberg, 2009). Pervasive dental, gnathic and other skeletal attributes clearly associate the Liang Bua skeletons with extant regional populations, despite continuing attempts to conflate abnormal and normal variation (Brown and Maeda, 2009).

NUTRITIONAL STRESS AT TEL-EL AMARNA, EGYPT

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Despite artistic depictions, the paleopathological record of the Amarna period in Egypt (1353-1335) provides evidence of a less than prosperous kingdom where life was difficult for those of common birth. Frequent episodes of poor sanitation, food shortage, and insufficient nutrient intake likely occurred, even over the short period of time that the site was occupied. To further investigate the presence and significance of metabolic stress, a sample juvenile population (n=36) was examined. Presence, degree of severity and remodeling were noted for porotic hyperostosis and cribra orbitalia, and recorded according to the protocols established by *Standards*. Long bone measurements and dental eruption were recorded and used to calibrate a growth and development curve. These data were then statistically compared to archaeological populations in the region and a healthy modern population. Results indicate that 61% of subadults displayed porotic lesions, but that the growth curve did not differ significantly from a modern population.

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HISTOLOGICAL INVESTIGATIONS ON ARTICULAR SURFACE DEFECTS IN THE THIRD METATARSAL AND THIRD CUNEIFORM

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Articular surface defects in the third metatarsal and third cuneiform are seen in many populations (MH Regan et al. 1999, AK Wilbur 1996, JM Tenney 1991). The alteration ranges from an irregular surface in the plantar third of the proximal articulation surface of the third metatarsal and the distal facet of the third cuneiform to deep holes combined with thick newly built bone formations. Various etiologies are discussed, like trauma, infectious diseases, arthrosis, tarsal coalition and overstrain of ligaments. Samples from different populations were investigated by scanning electron microscope and histological methods. The samples show necrotic lesions probably due to tears of ligaments. The assumption of this defect to be a skeletal nonmetric trait should be completed by the suggestion the lesion to be an active process and to occur in its special shape because of physical stress in the foot.

THE CURRENT POSTMORTEM CONDITION OF A CENTURY OLD MUMMY: A PICTORIAL ASSAY BASED ON MDCT AND RADIOGRAPHIC FINDINGS

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Conventional radiography has been the standard method of imaging mummies at excavation sites. The portability of conventional technique makes it the method of choice to avoid potential damage to the archeological remains during transport to a specialized imaging facility. While plain film radiography is still a necessary first step to document the initial state of a given mummy at or near its original context, the information obtained from this type of exam is very limited when compared to the information obtained after subjecting the same mummy to more advanced imaging modalities. In this report we take the data collected after examining one of the accidental mummies of Guanajuato by conventional radiographic technique and compare them to data acquired after running the same mummy through a multi-detector computed tomographic (MDCT) 64-slice scanner. Data collected include both detailed anatomic and paleopathologic findings. The exponential improvement in the quality and quantity of data obtained by MDCT over conventional technique leads us to conclude the imperative and inimitable role this advanced imaging modality ought to play in mummy research. Our data supports the value of making a portable MDCT scanner available at archeological sites when possible in spite of the added expense. Advancing technologies to secure mummy packing and transport is an alternative way of imaging the mummies at far sites after the risk of transport related damage has been significantly reduced. Despite what we believe to be an imperative role of MDCT in mummy research, we still think that using additional paleoimaging techniques such as conventional radiography and endoscopy at excavation sites is essential to attain an all inclusive view of each mummy.

LEARNING FROM THE PAST – LESSONS FOR THE FUTURE

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The scientific value of the accidental mummies of Guanajuato is not by any means separated from their patrimonial and vitrine worth. The aim of this research project is to demonstrate how computed tomography guided virtual autopsy (CTGVA) can provide insuperable data on the fine anatomic details of a mummified body. By studying the radiographic sculpture of each of the Guanajuato mummies, we may shed some light on both the mummy's life and death. The data collected could eventually help resurrect an image of how these individuals lived and interacted in a dynamic community. The virtual portrait we provide for each of these mummies may become an instrument of appreciation and understanding of the history and culture of Guanajuato. In the current report we use the CTGVA work performed on a male Guanajuato mummy to establish a methodological approach to study one mummy at a time before a bigger picture could emerge. The CTGVA process will be discussed in detail from collecting raw two-dimensional axial CT data to performing a knifeless dissection of the three-dimensional virtual sculpture of the mummy.

DIFFUSE IDIOPATHIC SKELETAL HYPEROSTOSIS ON AN INDIVIDUAL FROM THE XINDIAN CULTURE IN QINHAI PROVINCE, CHINA***

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This case study focuses on an individual from a Xindian culture (3000 BP) site in Qinhai Province, China. Several fragments of the thoracic and upper lumbar spine were found in a box, along with other commingled skeletal elements. From an initial assessment of the material, an ossification of soft tissue joining several vertebrae to the exclusion of intervertebral discs is apparent. Further examination suggests that the soft tissue occurs only on one side of the spine and may display a healed pathological lesion. No bony protuberances emanating from vertebral bodies can be discerned in any of the fragments. A diagnosis of Diffuse Idiopathic Skeletal Hyperostosis (DISH), which includes new bone formation along the anterolateral aspect of the thoracic spine and ossification in the anterior longitudinal ligament is tentatively given, after a review of clinical and anthropological case studies. This condition occurs in contrast with ankylosing spondylitis, which is a type of inflammatory arthritis with a genetic component and produces "bamboo" spine.

PELVIC FRACTURES IN TWO MEDIEVAL POPULATIONS FROM CENTRAL EUROPE

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Pelvic fractures are considered, even in the modern medical literature, uncommon and difficult to treat. Serious and eventually life-threatening associated injuries may occur, requiring emergency abdominal, vascular or neurologic surgery. Pelvic fractures can also be managed non-operatively; however, a great dispute exists on the suitable management strategy. The treatment and healing of such injuries in the bioarchaeological record, is therefore of great interest for anthropological and medico-historical studies. Fractures of the pelvis are rarely reported in the anthropological literature either due to poor preservation of the innominate bone or lack of adequate examination. We present here two cases of pelvic fracture observed on two adult male individuals from two European medieval sites (ca. 11th-15th century AD). They differ in severity and in the pattern of healing. They are both adequately healed and probably had no life-threatening consequences, revealing the medical knowledge and means of management of past populations.

DENTAL PATHOLOGY IN A NEOLITHIC SUDANESE POPULATION

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This study evaluates dental pathology in adults from the Neolithic site of R12, located in the Northern Dongola Reach of present-day Sudan. Teeth were available for 70 adults (34 males and 36 females) and sockets were scorable in 51 adults (24 males and 27 females). All teeth were examined and scored using the following methods: dental wear (Smith 1984); calculus (Dobney and Brothwell 1987); and dental caries, abscess, periodontitis, and dental enamel hypoplasia (Buikstra and Ubelaker 1994). Pathology rates were calculated by individual and by tooth or socket. Dental wear was observed to be quite heavy, particularly in the anterior teeth. Calculus was present in 48% of individuals (18% of teeth) and in most cases was slight. Dental caries was less common, observed in 13% of individuals (1% of teeth). Abscesses were also relatively infrequent, appearing in 22% of individuals (2% of sockets). Periodontitis was much more frequent, occurring in 57% of individuals (10% of sockets). The etiology of these diseases is discussed, and the pathology rates considered in the context of archaeological evidence for mixed subsistence in the region.

INTERPRETATION OF THE CAUSES OF CRANIAL INJURIES IN A POST-MEDIEVAL POPULATION FROM PLONKOWO, POLAND

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One hundred and seventy adult skeletons from a post-medieval (late XIII – early XIX centuries) population in Plonkowo, Poland were examined for evidence of cranial trauma. Parish records and other historical documents indicate that Plonkowo has been a small village with predominantly agricultural focus for several centuries. Based on this information, the authors postulated that the nature and prevalence of cranial injuries would be related to the agricultural lifestyle of the site's inhabitants, and not to interpersonal aggression. Macroscopic examination of adult crania shows that 2.35% (4/170) of the population suffered from cranial injury. Based on pelvic and cranial morphology, three individuals were designated as male/probable male,

while the sex of the fourth one was undetermined. Three individuals exhibit well-healed ante-mortem injuries, while the fourth one exhibits a peri-mortem injury. All of the ante-mortem injuries are depressed fractures of various lengths and widths, located on the frontal and/or parietal bones. This type of trauma is caused by direct force impacting a small area at a relatively low speed. The peri-mortem injury is a gunshot wound, with clear entrance and exit, indicating that some level of violence did occur in this population. The prevalence of cranial injuries among the adult individuals of Plonkowo is low, suggesting that this population generally did not suffer from high levels of work-related accidents.

PRELIMINARY DENTAL PATHOLOGY OF PROMTIN TAI, THAILAND

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The aim of this presentation is to further understand the effect of rice agriculture on dental health in Thailand and Southeast Asia. An analysis of dental pathology frequencies were conducted using recently excavated remains from the Iron Age site of Promptin Tai in Thailand. Carious lesions, attrition, antemortem tooth loss, and abscessing were scored and the frequency rates were then compared to other sites within Thailand. Because of the low rate of pathology at Promptin Tai, only carious lesions and attrition could be used for comparisons. Preliminary work suggests that caries and attrition rates are lower at this site than other known sites within Thailand. The total caries rate of 0.5 percent at Promptin Tai represents a statistically significant difference in total caries rates between the coastal, central, and Khorat Plateau regions of Thailand. Because this is the first site in the central region to be analyzed for dental pathology, comparisons can only be made to sites from the Khorat Plateau (Eastern Thailand) and coastal Thailand of a similar time period. This new analysis may give insight about how the transition to rice agriculture affects the dentition and furthers the knowledge of dental health within Iron Age Thailand and Southeast Asia.

DEATH AS AN ACT OF CREATION: EXPLORING MEANING AND SYMBOLISM THROUGH PALEOPATHOLOGY AT HUACA NORTE, PERU

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Paleopathology is currently exploring a range of methods, analytical scales, and approaches towards interpretation spanning descriptive case studies to population biology. Here, we propose a formal theoretical model – with paleopathological variation as its center – that unifies diverse lines of contextual evidence in the study of behavior, politics, and symbolism. We compare the Huaca Norte case study with traumatic injury, health, and archaeological contexts spanning 2000 years of north coast history, written accounts, and ethnographic analogies. In this vein, violent trauma at Huaca Norte reflects a ritual template of the first millennium Moche, but following the collapse of that belief system, Muchik descendents – seeking ideological distance – innovated chest opening, heart offering, and child sacrifice. Taphonomic perspectives of the Huaca Norte victims show that despite violent death, they were buried with reverence and venerated. Variation in paleopathological markers of health status among the victims indicates persistent selection of healthy local people for sacrifice. Yet, female sacrifice is unprecedented, and may be related to cosmological roles of women as observed in

pre-Hispanic contexts. Ultimately, paleopathological data lead us to conclude blood sacrifice of children and women and burial into a pyramid was a thoroughly generative form of violence involving: (1) attempts to harness distinct forms of fertility relating to water; (2) Muchik identity conservation during times of foreign rule, and (3) political goals including maintenance of local ideological autonomy. This synthesis indicates how paleopathology can be contextually deployed to examine population biology, identity, ritual, gender, and cognition on broad regional and temporal scales.

Grants to H. Klaus from the Utah Valley University's Center for Engaged Learning, College of Humanities and Social Sciences Summer Research Fellowship, Scholarly and Creative Opportunities Program, Presidential Scholar Award, and Department of Behavioral Science generously funded this research from 2008-9.

VESTIGES OF PROBABLE TUBERCULOSIS IN THE MIDDLE EAR, SKULL VAULT AND THE RIBS - A CASE REPORT***

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Tuberculosis is an infectious bacterial disease and is mainly caused by *Mycobacterium tuberculosis* (Kornew 1957, WHO). Tuberculous processes are chronic specific inflammations such as, for example, syphilis, leprosy and actinomycosis. Usually the lungs are attacked by tuberculosis, but the central nervous system, the lymphatic system, the circulatory system, the genitourinary system, the gastrointestinal system, bones, joints and the skin can also be affected (Kornew 1957, WHO).

The investigated individual was a young adult woman, who lived in the early Neolithic in Central Germany. She belonged to a linear pottery culture population (Linearbandkeramik, LBK) in Wandersleben (Thuringia). The skull and ribs were studied macroscopically, by low power microscopy, radiologically and by scanning electron microscopy. The internal lamina of the base of the skull shows vestiges which are pathognomonic for tuberculous meningitis. Above the apex of the right mastoid process there is a hole due to destruction of squamous cells, retrossinous cells and pyramid cells of the petrous bone caused by an aggressive inflammatory process. The external acoustic meatus and the pterygoid process of the right hand side are also nearly completely destroyed by an aggressive inflammatory process. The upper part of the right ramus of the mandible is thickened due to an osteomyelitic process. Nine out of 24 preserved ribs show vestiges of an inflammatory process with a hemorrhagic component. Due to the morphology of the bones it can be postulated that these inflammatory processes were specific tuberculous inflammations of the middle ear, the meninges and the ribs.

THE CAUSES OF CRIBRA ORBITALIA: ALWAYS SIMPLY ANEMIA?***

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Cribræ orbitalia, identified macroscopically as circumscribed areas of pitting and porosity on the surface of the orbital roof, is one of the most commonly reported pathological conditions. For many decades the most likely reason about the causes of cribræ orbitalia is the Anemia-Hypothesis (e.g. iron-deficiency anemia, thalassemia or sickle cell anemia). But other causes could as well produce these porotic or sieve-like lesions, like scurvy, rickets and also inflammatory processes (compare Wapler, Crubézy & Schultz 2004; Schultz 2001). In the two European

skeletal collections of “Harting” (Middle Ages; Germany; n = 110 skeletons) and “Jelšovce” (Bronze Age; Slovakia; n = 267 skeletons) cribra orbitalia is a frequent pathological finding in infants, children, juveniles and adults. In most of the cases the porosities are clearly due to inflammatory processes. The inflammation of soft tissue (e.g., the periosteum of the orbital roof) leads to hyper vascularisation and an increase of the blood flow with dilation of the blood vessels, which can cause the porosity marks of the orbital bone. The inflammatory processes of the orbital roof are mostly linked to inflammations of the surrounding bones of the orbit, the nasal cavities, the facial bones or the endocranium, which could all have infected the orbital roof. Inflammatory processes are the common explanation for cribra orbitalia in these two populations. Therefore, it is very probable that this might also be the cause for cribra orbitalia in other populations. The frequency of cribra orbitalia does not necessarily reflect the frequency of anemia, other causes should also be considered.

AN EVALUATION OF THE RELATIONSHIP BETWEEN DENTAL CARIES AND DENTAL ATTRITION IN FOUR WINDMILLER CULTURE SITES FROM PREHISTORIC CENTRAL CALIFORNIA

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There is an ongoing debate regarding the effects of dental attrition of the occlusal surface on the rates of dental caries. Some researchers have suggested that dental attrition and dental caries are opposing processes, indicating that greater wear results in lower caries rates. However, some studies have found the opposite trend, in which high attrition rates are found with high rates of dental caries. Clearly, the relationship between these two processes affects accurate interpretation of paleodiets.

In this study, we evaluate the dentitions of 149 individuals excavated from four Windmillers sites (CA-SJO-56, -68, -142, CA-SAC-107) from the mid-to-late Holocene Central Valley of California (ca. 4500-2500 B.P.) to assess the relationship between dental caries and attrition. These samples exhibited relatively high rates of dental caries and severe dental wear. The molar mean wear scores for all four populations exceeded 20 (Smith 1984), with the M1 exhibiting a mean wear score of 30+ at all four sites. When males and females were compared (with the exception of the M2 at SJO-142), females always exhibited lower rates of wear and statistically higher rates of dental caries ($\chi^2=10.253, p=0.001$). Our preliminary results suggest that higher rates of dental attrition result in lower rates of dental caries in these populations.

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MYSTERIOUS CASES OF PSEUDO-HARRIS LINES IN AUSTRALIAN ABORIGINAL SKELETAL REMAINS

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The data presented provides new information for the interpretation of certain phenomena mimicking a pathological condition seen on radiographs of bones. During the analysis of

incomplete human remains from northern Australia, the condition of three long bones from different individuals presented a challenge to the osteology team at the Smithsonian Institution. An ulna from one adult and femurs from two others exhibited an unusual internal structure. The condition, very similar in all bones, was discovered on the standard radiographs. In each bone diaphysis, there was a series of radiodense horizontal lines, similar to those known as "Harris lines", but only on one extremity of the bone. If these lines actually represented growth arrest information, they should have been seen at both extremities near the growth plates. On all specimens, there was damage to the affected extremity, so that part of the medullary canal could be inspected with a light probe. This inspection revealed only solid walls of an unknown dark substance. The bones were further documented by CT scan. The results showed perforations through each of the horizontal walls within the diaphyses. Consultation with another department within the Museum and with colleagues in Australia verified that the lines were due to taphonomic changes caused by a local organism. PPA attendees are encouraged to determine the origin of the phenomenon by looking at our radiographic and CT scan results.

**HEALTH STATUS OF SACRIFICIAL VICTIMS AT HUACA NORTE:
PALEOPATHOLOGICAL PERSPECTIVES ON ANCIENT IDENTITY, NORTH
COAST PERU*****

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Traditions of human sacrifice in the South American Andes are characterized by highly specific practices of victim selection. As emerging perspectives link skeletal variation to identity and lived experiences, this work attempts to determine the identity of the 33 sacrifice victims buried into Huaca Norte (A.D. 1375-1532, Chotuna Archaeological Complex, Lambayeque Valley, Peru). This approach is especially promising on the north coast of Peru where late pre-Hispanic identities are associated with distinct health outcomes. Victims were aged, sexed, and scored for enamel hypoplasias, porotic hyperostosis, and all forms of chronic skeletal infection, degenerative joint disease, trauma, oral health status, and artificial cranial deformation. Paleopathological markers of health status indicate a group of 22 subadults, seven females, two males, and two adolescents likely drawn from the local ethnically Muchik population. Prevalence data indicate just as the lower status Muchik, the victims (1) experienced high levels of acute childhood stress but were affected far less by chronic childhood and adult stress; (2) lived physically active lives free of interpersonal violence, and; (3) consumed a diet high in starchy carbohydrates. Pervasive fronto-occipital artificial cranial deformation related to common forms of childcare and did not communicate identity. Paleopathological variation at Huaca Norte strongly refute a model of sacrifice involving interpolity raiding and prisoner-taking, but instead point to a local Muchik collective sacrificing their own people. In a methodological aspect, this study shows how appropriately contextualized paleopathological data can address questions of social identity, ritual, and politics through empirical study of ancient sacrifice.

Grants to H. Klaus from the Utah Valley University's Center for Engaged Learning, College of Humanities and Social Sciences Summer Research Fellowship, Scholarly and Creative Opportunities Program, Presidential Scholar Award, and Department of Behavioral Science generously funded this research from 2008-9.

BROKEN CHILD: A PROBABLE CASE OF CHILD ABUSE FROM NORMAN GLOUCESTER

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Child abuse is an umbrella term used to describe any non-accidental injury or illness to a child. There have been a few reported cases of child abuse from archaeological skeletal remains. This poster presents evidence of a possible case of child abuse from the multi-period site of St Oswald Priory, Gloucester. The case presented here is of an infant who exhibits a humeral diaphyseal fracture, a classic sign of abuse; as such a fracture is unlikely to occur in children less than 12 months. This infant also suffered from rickets; a metabolic disease due to a lack of vitamin D, which may indicate the infant, was also neglected.

CONGENITAL ABNORMALITIES OF THE FOOT SKELETON AT PUEBLO BONITO, CHACO CANYON***

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This paper presents preliminary data on the presence, form, frequency and co-occurrence of congenital anomalies of the foot skeleton among the Pueblo Bonito burial population. Meticulous reassociation of the commingled skeletal remains from the western and northern burial clusters of Pueblo Bonito has revealed both the presence and co-occurrence of several heritable skeletal defects of the feet. This research examines the biological implications of the frequency of these congenital anomalies in terms of understanding the relationships between the individuals buried in these rooms. The heritable defects observed in the Pueblo Bonito skeletal population include brachymetapody, polydactyly, pedal symphalangism, os intermetarseum, non-osseous tarsal coalition and osseous tarsal coalition. Several of these traits are known to be genetically determined, so that their presence and co-occurrence are indicative of biological affinity between the individuals buried within the walls of Pueblo Bonito. In this paper, we examine the frequency of heritable skeletal anomalies in relation to the location and treatment of individual skeletons, in order to test relationships between biological affinity and burial variation within the site. We also explore the cultural significance of the skeletal evidence for polydactyly at Pueblo Bonito. There are repeated motifs of polydactyl feet in Chacoan material culture, suggesting that the anomaly was either quite common among this population, or was considered quite important.

ΤΑ ΟΣΤΑ ΜΙΑΟΥΝ: PRELIMINARY ANALYSES OF CLASSICAL AND HELLENISTIC PERIOD (490-146 BCE) BURIALS FROM ATHENS, GREECE***

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The Classical period, between the 5th and 4th centuries BCE, in Ancient Greece is

recognized as a “Golden Age” and characterized by an influx of creative thought, artistic achievements, and economic prosperity. This cultural burgeoning and economic prosperity also resulted in a marked improvement in measures of overall health that continued into the Hellenistic period, preceding Greece’s eventual absorption into the Roman Empire. Analyses of contemporary skeletal samples suggest increases in nutritional diversity and longevity as well as a reduction in various skeletal stress markers. As a contribution to this growing body of knowledge, this study presents a synthesis of artifactual, stratigraphic, and skeletal evidence for eleven previously unpublished burials recovered from four Classical and Hellenistic-era archaeological sites in Athens that have been under continuous excavation for the past twelve years. These sites have yielded fragmentary (N=6) skeletal individuals dated to Classical period and both individual (N=2) and commingled remains (MNI=14) from the Hellenistic. Results are reported from macroscopic and radiographic analyses of growth patterns, skeletal stress indicators, and evident pathology. Interpretation of these findings in relation to historical material on contemporary Classical and Hellenistic Greece, and specifically on Athens, informs us that these skeletons fall within the historical norms of social, ecological, and demographic trends of the designated periods. By presenting novel osteological evidence from several Classical and Hellenistic sites, this study further contributes to the growing bioarchaeological literature on life and health in the ancient Greek world.

WHAT’S IN YOUR BASEMENT? INTERESTING CASES FROM THE “FORGOTTEN” SKELETAL SAMPLE AT THE MUSEUM OF FINE ARTS, BOSTON***

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The Museum of Fine Arts in Boston (MFA) houses one of the most extensive collections of ancient Nubian and Egyptian art and artifacts in the country. Occasionally, some of their specimens are misplaced, lost for a period of time, or arrive without sufficient information about them or their origin. This is the case with a collection of artifacts from George Reisner’s expeditions to Nubian and Egyptian archaeological sites during the early twentieth century. I will present five of the most intriguing “misplaced” cases from Reisner’s collection, which have lacked formal investigation by a physical anthropologist until now. The cases consist of: evidence of bone degeneration on the ribs and scapulae of an unidentified individual from the Nubian cemetery of el Kurru, the unsexed mummified head of *Djehutynakht* in Dier el Bersha, Egypt, a Greco-Roman period head found in the collection with possible trauma/ post mortem damage to the back of the skull, a second skull (“likely”) from the Greco-Roman period with trauma to the right facial bones, and an individual from el Kurru with a tumor-like growth out of the eye orbit. Each case will be presented separately with multiple photos of the specimens along with a list of differential diagnoses. This study will shed light on a forgotten sample of individuals and highlight the importance of studying collections of this nature.

THE CO-OCCURRENCE OF TREPONEMATOSIS WITH OTHER HEALTH CONDITIONS***

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This project documents the co-occurrence of treponematosi s with other specific and non-specific health conditions in the Orendorf skeletal sample (A.D. 1150-1250), a Middle-Mississippian site from west-central Illinois (Conrad 1991:132). We are interested in the co-

occurrence of treponematosi s and tuberculosis given the immunocompromising nature of tuberculosis. Twenty individuals who exhibit tibial/systemic periosteal bone formation and/or craniofacial lesions were examined. These individuals comprised six adult males, six adult females, two adults of unknown sex, two individuals of unknown age and sex and four juveniles.

A two-step diagnostic process was conducted. A comprehensive macroscopic study was performed first, followed by a radiographic analysis. The diagnostic criteria used to identify treponematosi s were based on Powell and Cook (2005) and Ortner (2003). Because this sample does not exhibit classic treponemal reactions (such as caries sicca and nasal perforation), other criteria were used including bilateral lesions, especially of the anterior tibia, as well as shaft expansion as noted by Smith (2006) and Ortner (2003). Eight individuals exhibit pathological reactions consistent with treponematosi s. Five exhibit pathological reactions consistent with iron-deficiency anemia, one of which is believed to display the co-occurrence of anemia and treponematosi s. Only one displays reactions consistent with tuberculosis but not treponematosi s. Other cases of tuberculosis exist in the collection but none exhibit treponematosi s. This project indicates that there may be co-occurrence of treponematosi s with iron-deficiency anemia but not tuberculosis at Orendorf. It is possible that childhood anemia increased the risk of acquiring infectious disease, a question that will be pursued in the future.

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Gradient Changes in Computed Radiography Systems

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The goal of this poster is to provide a better understanding of how changes in kVp and mAs during a radiographic examination of dried bones affects the gradient in computed radiography (CR) systems. Research was performed using a Konica Regius model 110 CR system and a Toshiba Kalare radiography/fluoroscopy unit. Location of the bones was kept consistent throughout the experiment by using a template. Source to image distance and collimation were also constant. After finding the optimal S# for each set of kVp and mAs combination, exposures with half and double the mAs were taken. Exposures were obtained in increments of 10 kVp from 40 to 110. The gradient changed at random from 2.36 to 2.40. Of the twenty-nine exposures, four changed from 2.36 to 2.40. All four exposures that had a change in gradient had an S# of 100 or lower. There is no definitive reason for the gradient changes. The gradient changed in ranges of kVp from 50 to 90. The gradient also changed in ranges of mAs from 1.0 to 576.

In conclusion, the results show that a CR system's gradient changes at random. However, the gradient change had no significant effect on the image. CR systems will

compensate for over or under exposed radiographs. The degree of latitude will change with different combinations of kVp and mAs. Despite this, no significant changes in image quality were able to be seen between the varying changes in gradient.

ACCESSORY NAVICULAR: FREQUENCY AND FORM OF A HERITABLE ACCESSORY BONE OF THE HUMAN FOOT***

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The accessory navicular is a supernumerary bone of the human foot located medial to the navicular tuberosity. It represents a secondary center of ossification that has failed to fuse to the main body of the navicular. Three forms of the accessory bone have been identified: type I is an independent ossicle that is often embedded within the tibialis posterior tendon; type II is a triangular accessory bone that attaches to the navicular tuberosity by means of a cartilaginous or fibrocartilaginous bridge; and type III represents a fused type II, which forms a hook-like protuberance extending from the tuberosity. The type II accessory navicular is the most common of the three forms and is the most readily identifiable in skeletal material since it causes the navicular tuberosity to become abnormally flattened and porous. The purpose of this study was to determine the frequency of this congenital defect among various populations and to assess its utility in identifying probable relatives in archaeological cemeteries. In total, the skeletons of 497 Danes, 460 Euro-Americans, 300 African-Americans, and 205 Europeans were examined for the presence of the type II accessory navicular. The frequencies for the four groups were statistically indistinguishable from one another, ranging from 2% in the African-American sample to 4.2% in the Danish sample. Since several family pedigrees have documented the accessory navicular as being an inherited defect, the relatively low frequency found in the present study makes this trait a potential indicator of intracemetery genetic relatedness.

DIAGNOSIS OF SCHISTOSOMIASIS IN NUBIAN MUMMIES: COMPARING CIRCULATING ANODIC ANTIGEN ASSAYS USING CRANIAL CONTENT AND SKIN***

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Analysis of preserved soft tissue from naturally desiccated mummies has proven to be useful in understanding the emergence and development of diseases that continue to impact contemporary populations. In order to develop a better understanding of the relative sensitivity of tests conducted on these tissue types, we have tested a series of matched skin tissue and cranial contents samples from the NAX group (350-550 CE) cemetery population from Wadi Halfa in ancient Nubia. Each sample was homogenized, dialyzed, and lyophilized, and an enzyme linked immunosorbant assay (ELISA) was performed to diagnose *Schistosoma mansoni* infection and antigen concentration present in tissue samples. Antigen concentrations found in matched tissues were analyzed to determine the relationship between antigen levels detected in these types of desiccated tissue. Physiological and taphonomic causal mechanisms for variation between them is examined. A general model for the relative prevalence of infections tested in these tissue types will be developed. Further study with a larger data set may lead to conclusions about minimum antigen concentrations detectable in preserved samples as well as the applicability of the relative prevalence figures presented here for other diseases.

SOCIAL AND PHYSICAL CONTROL OF MASSACRE VICTIMS: HOBBLING AND TORTURE AT SACRED RIDGE

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This presentation describes the damage to the foot and ankle bones of some of the individuals recovered from a Pueblo I (AD 700—900) pit structure at Sacred Ridge (5LP0245) in southwestern Colorado. The assemblage consists of disarticulated and fragmented remains of at least 33 individuals that generally exhibit a high degree of perimortem violence; the feet are no exception. Foot bones and bone fragments were examined for damage consistent with evidence of hobbling and/or torture inflicted upon the soles of the feet. Two principal types of damage are visible on the foot bones. Incapacitation of the individual is inferred by damage to the medial and lateral aspects of the calcaneus. Blows delivered to the medial and lateral aspects of the calcaneus could have destroyed multiple ligaments and destabilized the joint, making walking extremely difficult and painful, if not impossible. One (25%) of the loose calcanei and two (50%) of conjoins exhibit crushing in these areas. Also present are large amounts of crushing and one case of puncture wounds on the plantar surfaces of the bones more indicative of torture consistent with beating and/or stabbing the soles of the feet. Of the 52 fragments or conjoins with visible crushing, 30 (57.7%) have crushing on the plantar surface. Physical incapacitation through hobbling and torture by beating the soles of the feet provide a poignant illustration of the violence these individuals were subjected to prior to the death and deposition in the pit structure.

CASES OF CRANIAL VAULT PATHOLOGY IN THE ROBERT TERRY COLLECTION

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Thickening of the cranial vault is associated with hyper-vascularization and expansion of the cranial diploe, or hyper-calcification as a response to genetic, metabolic or endocrinological causes; but the etiology of many of these disturbances is unknown. The purpose of this study is to present examples of pathological cranial variation utilizing several different forms of evaluation and digital imaging. Four (4) cases of cranial thickening exhibited in individuals from the Robert J. Terry Anatomical Collection are presented and discussed; one exhibiting densification of the diploe and table thickening; one exhibiting diploe thickening, along with parietal thinning and the presence of massive frontal sinuses; one exhibiting Paget's-like features as well as suture stenosis; and one identified as Paget's disease with the expected Paget's-like characteristics. While some aspects of these cranial vault variations are obvious in visual observation, further evaluation is enhanced by the use of imaging technology. The illustration and description of the morphological features of these cases are from macroscopic evaluation, radiographic study by plain film, and CT study. The different imaging technologies illustrate how diagnosis of pathological conditions may be made through these various methods of observation. Diagnoses for the presented pathological conditions include; Paget's disease,

hypoparathyroidism, accelerated remodeling effects (with reference to stenosis), and morphological alteration from earlier episodes of anemic response.

PALEOPATHOLOGY OF HUMAN SACRIFICE AT HUACA NORTE: THROAT SLITTING, HEART REMOVAL, AND LATE PRE-HISPANIC RITUAL COMPLEXITY, NORTH COAST PERU***

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Human sacrifice represented a vital element of pre-Hispanic Andean cosmology linking the living with the dead, ancestors, and the natural world. Thirty-three sacrifice victims of probable Muchik cultural origin, including 22 children, were recovered in an exceptional state of skeletal and soft tissue preservation from the pyramid of Huaca Norte (A.D. 1375-1532; Chotuna Archaeological Complex, Lambayeque Valley, Peru). This presentation defines and interprets late pre-Hispanic sacrificial complexity using paleopathological data. Each skeletal element was scored visually using 10x magnification for evidence of all forms of skeletal trauma. In 27 cases, multiple V-shaped cut marks consistent with the use of a metal knife were observed on the surfaces of anterior cervical vertebrae and the anterior thoracic region affecting multiple clavicles, manubria, and ribs. Also, perimortem fractures were observed on the costal ends, posterior shafts, and necks of multiple ribs. Synthesizing demographic information with regional/diachronic bioarcheological contexts, our data allow inference of complex forms of blood sacrifice at Huaca Norte relating to unique permutations of throat slitting and chest opening. Mummified thoracic contents in one subadult individual provides the first unambiguous evidence to indicate the motivation of late pre-Hispanic thoracic mutilation was indeed removal of the heart. Methodologically, interpretation was built upon multiple lines of information drawn from paleopathological understandings of sharp force trauma, fracture mechanics, and soft tissue anatomy extrapolated onto regional and diachronic levels to consider the evolution and diversity of ritual killing following the first millennium Moche culture to the end of the pre-Hispanic era.

Grants to H. Klaus from the Utah Valley University's Center for Engaged Learning, College of Humanities and Social Sciences Summer Research Fellowship, Scholarly and Creative Opportunities Program, Presidential Scholar Award, and Department of Behavioral Science generously funded this research from 2008-9.

GOLD DEPOSITION ON HAIR BY BACTERIA; FORENSIC AND ARCHEOLOGICAL IMPLICATIONS

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Hair analysis, a forensic technique, is also used in archeology. We show that soil bacteria deposit quantities of metal in the hair, *post mortem*, after burial, distorting hair analyses, hitherto, assumed to be proxy for metabolism and toxin accumulation during life. We buried hair in non-auriferous soil in the USA and in auriferous soil in Australia. We tested the soil bacterium *C. metallidurans* for its gold concentrating capabilities. We also embedded hair in soil to which gold (III)-chloride and bacterial cells had been added. We submerged the hair in growth medium containing gold (III)-chloride and bacteria. We examined the hair at 1, 3, 6 months after burial using scanning electron microscopy, confocal microscopy and Inductively Coupled Plasma-Mass Spectrometry (ICP/MS). Using ICP/MS, gold content increased with time ($P=0.038$), with added gold and bacterial cells ($P=0.009$) in all, separate, Australian experiments. There was more gold at 3 and 6 than at 1 month and more gold in hair in growth medium than in soil (mean=1188 vs. 161 in ppb, Fisher's least significance 0.001). The sulfur content, a measure of metabolism during life, did not change. Notably, the ratios of gold/sulfur increased with time (linear trend $P=0.02$) and with added gold and bacteria (linear trend, $P=0.005$), firmly implicating bacterial activity in the deposition of gold. Hair buried in US soil showed no change. Interactions of biota with buried materials may distort forensic and archeological evidence. Interpretation of buried hair analysis is constrained by soil metal content, by soil biota and duration of burial.

THE PATHOLOGICAL LESIONS OBSERVED ON THE OSTEOLOGICAL REMAINS FROM THE SITE OF SANJAN, VALSAD DISTRICT, GUJURAT STATE, INDIA

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The site of Sanjan located in state of Gujarat in India has yielded osteological remains dating to the 15th century A.D. This site represents a large city that existed between the 8th and 13th centuries A.D. and is probably one of the earliest locations on the Indian subcontinent where the Zoroastrian population settled after fleeing from Persia (Iran) due to Islamic persecution. In 2004, 40% of the mortuary site of Sanjan was excavated revealing around 140 skeletal remains. The osteological material recovered from this excavation is disarticulated and commingled and as such the analyses of the cranial, dental and post-cranial remains were carried out independently by Dutt, Bhattacharya and Pitale respectively to ascertain the type as well as the frequency of pathology present in this population.

On the whole, the analyses of the cranial and post-cranial remains have yielded non-specific pathology and thus reveal that by and large the populace at Sanjan was a healthy and a well-nourished one. The dental remains on the other hand have yielded an immense number of pathological lesions. This collection is particularly notable because these skeletal remains are those belonging to a well-defined endogamous group, corresponding to a concise temporal span. The goal of this study was to determine whether the Sanjan remains have pathology consistent with those known to characterize present day Zoroastrian Parsis. The analyses carried out by the

authors indicate pathology occurring in the Sanjan remains are present among modern day Zoroastrian Parsis but to a much higher degree.

THE OCCURRENCE OF COSTOVERTEBRAL OSTEOARTHRITIS IN MEDIEVAL ENGLISH POPULATIONS: POSSIBLE AETIOLOGICAL FACTORS AND ITS ASSOCIATIONS WITH OTHER PATHOLOGICAL CONDITIONS OF THE SKELETON***

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The present paper will discuss the occurrence of osteoarthritis on costovertebral joints in two medieval English populations from Chichester and Hereford. The costovertebral articulations are synovial joints, but only undergo a minimal degree of movement, making the costovertebral joints seem an unlikely area to be commonly affected by osteoarthritis. The aim of this research is to analyze the occurrence of osteoarthritis on costovertebral joints in order to identify possible aetiological factors. Individual joint surfaces were scored with a system developed to indicate the severity of osteoarthritic changes, including osteophyte formation, porosity, joint contour change, and eburnation. Comparisons of prevalence and patterns of any osteoarthritic changes were made between the two samples, between sexes, and between age categories in an attempt to identify possible aetiologies. It was found that costovertebral osteoarthritis increases with age, although young adults can still display severe changes. It was also more prevalent in men from young and old adult categories, but more frequent in females from the middle adult group; hence the patterning of severe arthritic changes on the rib cage differs between males and females. The pattern visible within the two populations may be interpreted as indicating that the aetiology of costovertebral osteoarthritis is biomechanical, and that constant repetitive physical activity on these joints may be the best explanation. This conclusion was not expected due to the strong framework of muscles and ligaments of the ribs stabilizing the joints and allowing for only minor movement.

LOCALIZED ENAMEL HYPOPLASIA OF THE PRIMARY CANINE AT KELLIS 2, DAKHLEH OASIS, EGYPT

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Enamel hypoplasia (EH) is a deficiency in enamel thickness caused by non-specific physiological stress during amelogenesis and is therefore a useful indicator of population health in bioarchaeological research (Halcrow and Tayles 2008). A type of EH specific to the deciduous dentition is localized hypoplasia of the primary canine (LHPC), which presents itself as a roughly circular area of thin or absent enamel on the labial surface. Although LHPC can provide information about maternal and early infant health, few bioarchaeological studies collect and report on this condition. LHPC is investigated in a sample from Kellis 2, a Roman Period (c. 50-450 AD) cemetery located in the Dakhleh Oasis, Egypt. The primary canine sample is comprised of a total of 228 deciduous canines, from 86 individuals. LHPC was observed and recorded at the individual and tooth level, and the results are presented. It was found that 25/86 (29.1%) of individuals and 41/228 (18.0%) of teeth had LHPC. No significant differences in prevalence by side and jaw were found. These findings are not consistent with other bioarchaeological and clinical studies that report a significantly higher prevalence of LHPC in

mandibular canines. Despite these inconsistencies, the prevalence of LHPC at Kellis 2 is comparable to modern values associated with lower socio-economic and health status populations.

Reference

Halcrow SE and Tayles N. 2008. Stress near the start of life? Localized enamel hypoplasia of the primary canine in late prehistoric mainland Southeast Asia. *Journal of Archaeological Science* 35: 2215-2222.

CHILDHOOD GROWTH DISRUPTION IN BRONZE AGE POPULATION: ENAMEL HYPOPLASIAS IN DECIDUOUS CANINES***

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Deciduous dentition from Tell Abraç, a Bronze Age site (c. 2200 BC) in the United Arab Emirates, provides data on the quality of early growth and development. The tomb contained 20 neonates, infants and children (MNI based on upper right deciduous canine). Deciduous canines were studied because their crown development spans the third trimester of fetal development through birth to c. 11 months of age. Therefore they provide an opportunity to assess juvenile and/or maternal health/nutrition from a developmental perspective. Fifty-eight canines were available for analysis. For the upper right deciduous canine, 40 % presented with hypoplastic pits, 5% with planar hypoplasia, and 60% show defects likely caused by fluorosis. Of the upper left canines (n=17), 29.4% had hypoplastic pits, 11.8% planar hypoplasia, and 65% displayed fluorosis defects. The lower canines show a similar pattern of fluorosis and hypoplastic pitting. Using a regression equation (Liversidge et al., 1993), age at occurrence of hypoplastic events was calculated. Eight individuals show hypoplastic defects that occurred in utero, 12 after birth, and 3 had defects that formed both before and after birth. These results suggest a poor gestational environment, a reflection of the mother's health, as well as poor infant health postpartum. High prevalence of fluorosis defects can be linked to high levels of fluoride in Arabian Peninsula ground water. This research project expands our understanding of infant and childhood morbidity and mortality during a cultural time period in the Near East for which little is currently known.

DISPLAYING THE DEAD: DRILLED CRANIAL FRAGMENTS FROM IRON AGE SCOTLAND

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Little formal funerary evidence exists for Iron Age Scotland, but disarticulated human remains have been recovered from a large number of settlement sites, where they often appear to have been circulated, modified, used and finally deposited. Whether these remains are those of enemies or ancestors is unclear, but they seem to reflect a belief that the power of human remains could be harnessed by the living. Four cranial fragments found on sites in this region have been drilled through. Examination has revealed that these bones have been worked from the inside as well as the outside, ruling out peri-mortem trauma or trephination as explanations. Instead, these cranial fragments seem to have been intentionally modified post-mortem. It is argued here that the reason for this modification was the wish to display these bones by suspension, but do these displayed remains reflect the trophies of violent head-hunting, the targeted collection of remains from excarnation sites, or the curation and ritual use of the remains of valued members of the group?

MASTOIDECTOMY FROM A LATE NINETEENTH-EARLY TWENTIETH CENTURY OSSUARY IN CHIAVARI, ITALY ***

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By the late nineteenth century, mastoidectomy was a relatively common surgical procedure in the treatment of acute ear infections such as mastoiditis and chronic otitis. The procedure involved surgical removal of the mastoid process in order to eradicate the infection. This study reports two possible cases of mastoidectomy from a recent ossuary from Chiavari, Italy. The ossuary contains the remains of several hundred individuals who lived in the city between the late 1800s and early 1900s. Two of the 105 crania examined to date exhibit signs of surgical treatment involving the mastoid process. In one case, the mid portion of the mastoid process was entirely removed, exposing the pneumatized air cells. Clear chisel marks and sharp lesion edges suggest that the individual might have not survived the intervention. In the second case, the anterior portion of the mastoid process and the posterior auditory meatal wall were removed. Evidence of bone remodeling indicates survival after the surgery. The location of the lesions and marks left by a sharp instrument on bone points to mastoidectomy as the most plausible explanation for the lesions observed. This diagnosis was corroborated by comparing the lesions observed in the Italian skulls with known cases of mastoidectomy from the contemporaneous Hamann-Todd collection. Furthermore, based on the comparison and historical accounts of mastoid surgery, it was possible to identify the two cases as simple mastoidectomy and modified radical mastoidectomy, respectively.

EXPLORING PATTERNS AND CAUSES OF MORPHOLOGICALLY INVISIBLE STRESS USING CORTISOL AND ISOTOPIC ANALYSES OF ARCHAEOLOGICAL HAIR FROM NASCA, PERU***

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This study illustrates the interpretive potential of integrating isotopic and cortisol data, archived in archaeological hair, to explore diet, stress, health, morbidity and aspects of cultural behavior in the months preceding death for 17 adults and 5 juveniles from Nasca, Peru (c. AD1-1000). Because hair retains a permanent, sequential record of physiological, environmental and dietary information, the combination of carbon- and nitrogen-isotope analysis with systemic cortisol levels enables increasingly detailed descriptions of individual experiences during the period of time represented by each hair sample (up to 34 months). Hair samples were analyzed in 1-cm segments, each of which represents one month. Inter- and intra-individual variation in diet indicates exploitation of a wide range of foods, as well as differences in access and means of acquisition. Cortisol levels indicate that the stress experienced by individuals is likewise highly variable in terms of intensity, expression and timing. Since both isotopic and cortisol datasets represent the same temporal period for each individual, the combined data provide a unique means of interpreting this variability (i.e., physiological/metabolic process or the social environment), which will significantly enrich our ability to reconstruct ancient life histories.

This study is the first to provide direct documentation of stress in ancient populations independent of gross morphology, and to posit a model for the causes of the stress indicated by the combined isotopic and cortisol results.

PATTERNS OF INFLAMMATORY ORBITAL LESIONS IN A MODERN ANATOMICAL SAMPLE

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The pattern of lesions in cribra orbitalia is commonly described in the literature as porosity and pitting with or without expansion of the diploë. A previous report described an atypical pattern of orbital lesions in both location (posterior/inferior orbit) and external appearance (vascular channels with or without fine, non-coalesced porosity) in four archeological samples (Wilczak and Jeney 2008). We suggested the atypical pattern represented inflammatory lesions, which may have a different etiology than the “classic pattern” of cribrotic changes. However, describing new observations on pathological changes in archeological remains based on macroscopic observations can be difficult due to possible confusion with taphonomic alterations.

To more reliably describe this pattern and help confirm their pathological status, we examined modern crania from the Spencer R. Atkinson Library of Applied Anatomy, Arthur A. Dugoni School of Dentistry, University of the Pacific, San Francisco. Provenience data on the collection is limited but most, if not all, are medical specimens that were not subjected to burial. We observed 106 crania from early infancy to 5 years of age. No orbital lesions were seen in 48 crania (45%) and 24 (23%) showed lesions with the classic anterior porosity and pitting of cribra orbitalia. In 34 crania (32%), the previously described inflammatory orbital lesions were observed. Twenty-one cases exhibited inflammatory lesions only and 13 cases co-occurred with classic cribrotic lesions. The inferior orbit (sphenoid and/or zygomatic) was involved in 19 cases. Similarities to the inflammatory lesions observed in the archaeological samples suggest they are not pseudopathologies.

Reference

Wilczak CA and Jeney Z. 2008. Inflammatory Orbital Lesions from the Channel Islands of California. Presentation for the 35th Annual Meeting of the Paleopathology Association, Columbus, OH. April 8/9.

LUNG LESION BIOPSY OF 19TH CENTURY WEST VIRGINIA MUMMY***

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The specific aims of the study was to first biopsy a lesion noted on plane radiographs and computed tomography scan taken in 2001 and then to rehydrate and examine the tissue for pathology. The procedure was done at the Barbour County Historical Society Museum in Philippi, West Virginia. In an attempt to visually locate the lesion, an endoscope was inserted into the chest cavity through a preexisting incision in the lower abdomen. Two spinal needles were inserted through the anterior chest wall on either side of the lesion and posterior anterior, PA, and lateral radiographs were taken with Polaroid film to document the position. A three

inch, 4-sided flap was cut into the left lower back directly below the twelfth ribs. Medium, angled forceps were inserted into the opening and used to pull out samples of the lesion and lung. Approximately half the lesion was removed for processing. The flap was closed and sealed using superglue. Minimal evidence of the procedure is visible. Samples were soaked 24 hours in a modified version of the Sandison technique to rehydrate. They were then placed in a tissue processor, embedded in paraplast x-tra, mounted on slides, and routinely stained with hematoxylin and eosin.

Outcomes: Severe Emphysema and moderate to marked Anthracosis were found. This may indicate the subject used a coal stove

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