



# PALEOPATHOLOGY ASSOCIATION

## SCIENTIFIC PROGRAM & ABSTRACTS

35<sup>th</sup> ANNUAL MEETING (North America)

COLUMBUS, OHIO

APRIL 8 AND 9, 2008

**PALEOPATHOLOGY ASSOCIATION**  
35<sup>th</sup> ANNUAL MEETING (NORTH AMERICA)  
COLUMBUS, OHIO  
APRIL 8 and 9, 2008

**SCIENTIFIC PROGRAM**

**TUESDAY, APRIL 8<sup>th</sup>**

MORNING SESSION (9:00am – 11:30am)

WORKSHOP 1 - Ortner and Ragsdale Workshop: **Too Much, Too Little, Wrong Size, Wrong Shape: Description and Diagnosis of Abnormalities in Bone**

WORKSHOP 2 - Richard Steckel: **Materials and Methods of the Global History of Health Project**

STUDENT ACTION COMMITTEE MEETING (12:00-1:00 pm)

AFTERNOON SESSION (1:20 – 5:00 pm) - Anne Grauer, Chair

1:15 pm *ANNOUNCEMENTS AND SESSION OPENING*

1:20 pm MORTUARY PRACTICES AND COMMUNICABLE DISEASE RISK: IMPLICATIONS FOR TUBERCULOSIS TRANSMISSION IN PRECOLUMBIAN NORTH AMERICA (Jennifer A. Raff, Frederika A. Kaestle, Della Collins Cook)

1:40 pm TUBERCULOSIS AT MORTON MOUNDS, FULTON COUNTY, ILLINOIS (Georgia Millward\*\*\*)

2:00 pm PALEOPATHOLOGY DURING THE POSTCONTACT ADAPTIVE TRANSITION: INDIGENOUS MOCHICA HEALTH AND DISEASE IN THE COLONIAL LAMBAYEQUE VALLEY, PERU (AD 1536-1750) (Haagen D. Klaus and Manuel E. Tam\*\*\*) *Winner of the Cockburn Student Award for Podium Presentation*

2:20 pm MUTE BONES SPEAK: INTERPRETATIONS OF THE ABDERA/POLYSTYLON ANTHROPOLOGICAL RECORD. (Anagnostis P. Agelarakis)

2:40 pm MUSCULOSKELETAL STRESS MARKERS: A NEW RECORDING SYSTEM? (Charlotte Y. Henderson)

3:00 pm *BREAK*

3:20 pm INFLAMMATORY ORBITAL LESIONS FROM THE CHANNEL ISLANDS, CALIFORNIA (Cynthia A. Wilczak and Zsuzanna Jeney)

3:40 pm DIAGNOSIS OF CHRONIC OTITIS MEDIA IN ARCHAEOLOGICAL SKELETAL REMAINS: AN UNSOLVED PALEOPATHOLOGICAL PROBLEM (Stefan Flohr and Michael Schultz)

4:00 pm FRONTOETHMOIDAL ENCEPHALOCYCLE IN AN ANCIENT BRAZILIAN CHILD (Della Collins Cook)

4:20 pm TRAUMA IN MORTON MOUND 14 (Allison Foley\*\*\*)

- 4:40 pm PATTERNS OF DEGENERATIVE JOINT DISEASE AMONG MALES AND FEMALES AT WINDOVER AND THEIR RELATIONSHIP TO TYPES AND DISTRIBUTION OF GRAVE GOODS (Rachel K. Wentz)  
5:00 pm POSTERS  
6:15 pm PPA Reception, Annual Dinner and Business Meeting

**WEDNESDAY, APRIL 9<sup>TH</sup>**

MORNING SESSION (8:15 am – 12:00) – Simon Mays - Chair

- 8:15 am *ANNOUNCEMENTS*  
8:20 am POSSIBLE DIFFERENTIAL DIAGNOSES OF COSTAL CHANGES CAUSED BY PATHOLOGICAL CONDITIONS. (Pia Bennike)  
8:40 am A PALAEOPATHOLOGICAL INVESTIGATION OF THE THIRD INTERCONDYLAR TUBERCLE OF PARSONS (Simon Mays & Lisa Cooper)  
9:00 am ‘SEVERE CLEAVAGE OF THE SKULL’: THE POTENTIAL OF SECONDARY AND TERTIARY FRACTURES FOR INTERPRETATION OF CRANIAL TRAUMA (Martin Smith and Megan Brickley)  
9:20 am PHYSICAL STRESS IN LIUSHIU – ORTHOPEDIC DISEASES IN XINJIANG, WEST-CHINA, FROM THE END OF THE BRONZE AGE TO THE BEGINNING OF THE IRON AGE (Julia Gresky, Tyede H. Schmidt-Schultz, Michael Schultz)  
9:40 am DOES TRABECULAR HYPERGROWTH IN A MIDSHAFT OFFER MECHANICAL BENEFIT? (Rose Drew\*\*\*)  
10:00 am *BREAK & POSTER SESSION* (10:00 – 10:40) – Michele Buzon, Chair  
10:40 am OLDEST KNOWN PROSTATE CANCER IN A SCYTHIAN KING (7<sup>TH</sup> CENTURY BC): RELIABLY DIAGNOSED BY MICROSCOPY AND BIOCHEMISTRY (Tyede H. Schmidt-Schultz and Michael Schultz)  
11:00 am EVIDENCE-BASED ANCIENT MUMMY RESEARCH (Heather Gill-Robinson and Frank J. Rühli)  
11:20 am DENTAL PATHOLOGY AMONG THE POPULATION OF ARGOS (GREECE) FROM THE PROTO-GEOMETRIC AND GEOMETRIC PERIOD (Laurence Haplot\*\*\*)  
11:40 am DEATH IN A FIRE: AN IRONAGE TRAGEDY (Niels Lynnerup, Lise Harvig, Jens Nielsen)  
12 noon LET’S DO LUNCH

**WEDNESDAY, APRIL 9<sup>th</sup> (Continued)**

POSTER SESSION (1:40 – 2:00 pm)

AFTERNOON SESSION (2:00 pm – 5:00 pm) – Tosha Dupras, Chair

- 2:00 pm HIGH INCIDENCE OF DEVELOPMENTAL HIP DYSPLASIA IN A MEDIEVAL ALPINE POPULATION FROM SWITZERLAND. (Christina Papageorgopoulou and Thomas Böni)  
2:20 pm JUST CUT IT OFF: AMPUTATION IN ANCIENT EGYPT (Tosha Dupras, Stevie Mathews, Marleen De Meyer, Christoph Peeters, and Bart Vanthuyne)

- 2:40 pm LOCATIONS OF SPONDYLOLYSIS SEPARATIONS AS DEMONSTRATED IN TWO INUIT POPULATIONS FROM POINT HOPE, ALASKA (Mary Beth Timm\*\*\*)
- 3:00 pm *BREAK/ POSTERS*
- 3:20 pm VIRGINS OF THE SUN AND SYPHILIS AT MACHU PICCHU? UNLIKELY ON BOTH COUNTS (John W. Verano)
- 3:40 pm THE SYPHILIS ENIGMA: BONES OF CONTENTION (Paolo S. Ocampo, Kristin N. Harper, Molly K. Zuckerman, and George J. Armelagos)
- 4:00 pm THE ORIGIN AND ANTIQUITY OF SYPHILIS REVISITED: AN APPRAISAL OF OLD WORLD PRE-COLUMBIAN EVIDENCE FOR TREPONEMAL INFECTION (Molly K. Zuckerman\*\*\*, Kristin N. Harper, Megan L. Harper, Anthea Boylston, and George J. Armelagos)
- 4:20 pm THE SYPHILIS ENIGMA: SCIENCE BY DOCUMENTARY (George J. Armelagos, Molly K. Zuckerman, and Kristin N. Harper)
- 4:40 pm THE ORIGIN OF THE TREPONEMATOSES (SYPHILIS, YAWS, AND ENDEMIC SYPHILIS): A PHYLOGENETIC APPROACH. (Kristin Harper, Molly Zuckerman, Hsi Liu, Bret Steiner, Robert George, Michael Silverman, Shelly Bolotin, Allan Pillay, Nigel Saunders, Paolo Ocampo, and George Armelagos)
- 5:00 pm CLOSING REMARKS AND ANNOUNCEMENTS:  
Winners of awards: Cockburn Student Award and Eve Cockburn Mentorship Award  
Installation of new officers (President-elect and Secretary)  
CASH BAR

### **POSTER PRESENTATIONS**

- AM Agnew, HM Justus, and SD Stout – EVIDENCE OF SCURVY IN MEDIEVAL EASTERN EUROPE – A POSSIBLE CASE FROM GIECZ, POLAND \*\*\*
- R Beckett, J Posh, C Czaplinski, G Conlogue, L Quarino, J Kishbaugh, A Bonner – MOVING TOWARD FIELD APPLICATION OF PERCUTANEOUS NEEDLE BIOPSY IN MUMMIFIED REMAINS USING A NON-GRAVITY DEPENDENT NEEDLE SCRAPE/ASPIRATION TECHNIQUE WITH CT AND ENDOSCOPIC GUIDANCE – A PRELIMINARY STUDY
- MR Buzon and MA Judd - INVESTIGATING HEALTH AT KERMA: SACRIFICIAL VS. NONSACRIFICIAL INDIVIDUALS
- L Collier - A COMPARISON OF TRAUMA PATTERNS BETWEEN NEANDERTHALS AND SELECT MODERN ATHLETIC SAMPLES\*\*\*
- G Conlogue, R Beckett, Y Bailey, and J Li – A PRELIMINARY RADIOGRAPHIC AND ENDOSCOPIC EXAMINATION OF 21 MUMMIES AT THE “MUSEO DE LAS MOMIAS” IN GUANAJUATO, MEXICO AND THE IMPORTANCE OF A TEAM APPROACH TO IMAGE INTERPRETATION
- DJ Cope and TL Dupras - SKELETAL DYSPLASIA FROM THE DAKHLEH OASIS, KELLIS 2 CEMETERY SITE\*\*\*
- CM de la Cova - FISTICUFFS AND FIREARMS: AN ANALYSIS OF TRAUMA IN 19TH-CENTURY- BORN AFRICAN AMERICANS AND EURO-AMERICANS\*\*\*

- SP Dougherty and NC Sullivan - BROKEN BONES, BROKEN LIVES: FRACTURE PATTERNS IN AN EARLY 20TH CENTURY PAUPER CEMETERY
- J Gresky, S Flohr, EN Stifter and M Schultz - DISEASES OF THE PARANASAL SINUSES AND THEIR CORRELATION TO LIVING CONDITIONS IN TWO EARLY MEDIEVAL POPULATIONS FROM GERMANY
- M Hernandez, E Pechenkina, and F Wenquan - A POSSIBLE CASE OF ATELIOLIC DWARFISM IN NEOLITHIC CHINA
- MA Judd - OSTEITIS PUBIS: EVIDENCE FOR STRENUOUS ACTIVITY AT HIERAKONPOLIS (EGYPT)
- HM Justus, AM Agnew and SD Stout - DIFFERENTIAL DIAGNOSIS FOR AN UNIDENTIFIED ORBITOFRONTAL DEFECT IN AN EARLY MEDIEVAL (XI-XII C) CEMETERY IN GIECZ, POLAND\*\*\*
- DA Kasson-Jones and S Kirkpatrick Smith - MASTOIDITIS IN CRETAN CRANIAL REMAINS FROM THE 1<sup>ST</sup>-2<sup>ND</sup> CENTURY A.D. \*\*\*
- S Klingner and M Schultz - CRANIAL SURGERY IN THE EARLY NEOLITHIC OF GERMANY – A PROBABLE TREPANATION
- K Koel, E May, and M Schultz - CAUTERIZATION –PROOF OF MEDICAL CARE IN LATE MEDIEVAL GERMANY\*\*\*
- KED Kulhavy, JE Buikstra, L Wright and J Brown - PALEOPATHOLOGY OF AN EARLY ARCHAIC SKELETAL SAMPLE FROM KOSTER MOUNDS, LOWER ILLINOIS RIVER VALLEY
- N Lynnerup, S Riddersholm, and OF Nielsen - ECHINOCOCCOSIS IN AN 18th CENTURY GRAVE IN NORTHERN NORWAY
- FC Madimenos and GC Nelson - OBELIONIC CRANIAL DEFORMATION IN THE AMERICAN SOUTHWEST
- SA Martin, HD Klaus, and ME Tam - PALEOPATHOLOGY OF SYSTEMIC BIOLOGICAL STRESS: AN EXAMINATION OF LINEAR ENAMEL HYPOPLASIA IN THE LATE PRE- HISPANIC AND COLONIAL LAMBAYEQUE VALLEY COMPLEX, PERU (AD 900-1750)
- SL Mathews and TL Dupras - ANENCEPHALY IN THE DAKHLEH OASIS, EGYPT\*\*\*
- S Mays - A SCAPULA DEFORMITY IN TWO BURIALS FROM MEDIAEVAL ENGLAND
- BM Morgan and AL Grauer - PERIOSTEAL REACTION IN MEDIEVAL POPULATIONS FROM ENGLAND: ISSUES OF SEX AND GENDER
- M Pitre - SACRAL VARIABILITY IN A HISTORIC BRITISH SKELETON\*\*\*
- W Potter and H Edgar - IDENTIFICATION OF PSEUDOPATHOLOGY USING SCANNING ELECTRON MICROSCOPY AND ENERGY DISPERSIVE SPECTROSCOPY\*\*\*  
*Winner of the Cockburn Student Award for Poster Presentation*
- J Schanandore and H Gill-Robinson - USING 3D IMAGING TO IDENTIFY CURVATURE OF THE SPINE OF A GERMAN PEAT BOG BODY AS PATHOLOGIC OR PSEUDOPATHOLOGIC\*\*\*
- SJ Schermer, RM Lillie, EA Hargrave, and KM Hedman - A MIDWESTERN PERSPECTIVE ON RITUAL USE OF HUMAN BONE
- SD Spencer - A SHAPE ANALYSIS OF CALVARIA PRESENTING THE SURPAINIAC FOSSA\*\*\*
- CF Taboas - DIABETES IN PALEOPATHOLOGY: EVIDENCE FOR PERIPHERAL NEUROARTHROPATHY IN A MIDDLE WOODLAND POPULATION FROM KLUNK MOUND

A Thompson - DIFFERENTIAL DIAGNOSIS OF A NINETEENTH CENTURY BURIAL FROM MISSISSIPPI

JM Toyne - POSSIBLE CASES OF SCALPING FROM PREHISPANIC HIGHLAND PERU

E Trainor - LSAMAT AMONG NEOLITHIC NUBIANS: A METHOD FOR RECORDING PRESENCE AND DEGREE OF WEAR\*\*\*

CB Whitley - BAKERS' EARLY MANIFESTATIONS OF TUBERCULOSIS, IS IT WORTH RECONSIDERATION? \*\*\*

## ABSTRACTS

### SECTION 1: WORKSHOPS

#### **TOO MUCH, TOO LITTLE, WRONG SIZE, WRONG SHAPE: DESCRIPTION AND DIAGNOSIS OF ABNORMALITIES IN BONE.**

Donald J. Ortner (Smithsonian Institution) and Bruce D. Ragsdale (Arizona State University)

The purpose of this workshop is to review the basic types of abnormalities that affect bone to provide the participants with the descriptive tools needed to attempt a diagnosis of a skeletal disorder in an archaeological burial. As in previous workshops, Ortner and Ragsdale will provide a brief introduction to skeletal pathology that is particularly relevant to the cases of pathology that will be featured during the workshop. Participants will then be given time to review the cases, assign descriptive categories and attempt a diagnosis of each case. After this review, all of the cases presented in the workshop will be discussed by Drs. Ortner and Ragsdale.

#### **MATERIALS AND METHODS OF THE GLOBAL HISTORY OF HEALTH PROJECT**

Richard Steckel (Ohio State University)

This workshop will present methods used to collect data for the Global Health Project. There will be a brief presentation followed by some coding of skeletons and use of the web link to upload and analyze results.

### SECTION 2: PODIUM PRESENTATIONS

#### **MUTE BONES SPEAK: INTERPRETATIONS OF THE ABDERA/POLYSTYLON ANTHROPOLOGICAL RECORD**

Anagnostis P. Agelarakis (Adelphi University, USA)

Archeo-anthropologic research at the ancient city of Abdera/Polystylon in the Northern Aegean Thracian coast of Greece, unearthed three cemetery sites spanning the Byzantine periods from the 6<sup>th</sup> to the 14<sup>th</sup> centuries. All cemetery sites had been allocated at the proximity of church buildings at both *extra* and *intra mural* contexts sequential to stratigraphic phases of diminishing activity areas and spatial reductionism, reflective of the city's decline from power and geo-political dominance which characterized it during earlier antiquity. Whereas archaeological anthropology studies of the cemetery sites yielded valuable behavioral aspects regarding burial customs and funerary practices, paleopathologic and archeometric study of the osseous remains provided insightful views regarding the demographic, paleopathologic and epidemiologic profiles of the population samples involved. Hence, in conjunction with the archeological record, the paleopathologic study of the human skeletal remains was critical in substantiating and elucidating features of the daily life conditions in this Byzantine city, allowing for a better understanding of its historical developmental transformation until terminal antiquity.

**References:**

- "Cemeteries of Polystylon / Abdera: On Burial Customs and Practices in the Rhodopes", (Co-author with Charalambos Bakirtzis), *Rhodopica*, 1998, V: 57-68, Smolyan, Bulgaria.
- "Excavations at Polystylon (Abdera) Greece: Aspects of Mortuary Practices and Skeletal Biology", *Archaologiko Deltio*, 1997, V: 47.
- "The Palaeopathological Evidence, Indicators of Stress and Dietary Evaluations from two Skeletal Populations, a Middle and a Late Byzantine, from Polystylon Abdera, Greece", (Co-author with Argyro Agelarakis), *Byzantinische Forschungen*, V.(XIV), 9-26, 1989.

**THE SYPHILIS ENIGMA: SCIENCE BY DOCUMENTARY**

George J. Armelagos, Molly K. Zuckerman, and Kristin N. Harper (Emory University, USA)

The expectation of a scientific documentary is that it will present the results of peer-reviewed research. However, the PBS documentary *Secrets of the Dead: The Syphilis Enigma* (2002) seems to introduce a new genre wherein critical evidence is presented without a peer-review vetting. This documentary reviews historical and archaeological evidence for Pre-Columbian treponemal disease and syphilis in the New World and from Metaponto, Pompeii, and prominently, the Hull Magistrate's site in the Old World. However, personal communication with leading researchers featured in the documentary and re-evaluation of the presented archaeological and historical data has revealed that much of the evidence presented in *The Syphilis Enigma* has been misrepresented, misconstrued, and sensationalized. Unfortunately, particularly as pivotal evidence of possible treponemal disease from the Hull site has not been comprehensively reported upon, evidence and arguments reported in *The Syphilis Enigma* have frequently been integrated into the continuing debate on the origins of syphilis. In particular, our data suggest a reduction in the reported prevalence of possible treponemal disease and a correction to the reported use of dendrochronological dating at the Hull Magistrate's Site. Additionally, the authors oppose the documentary's misleading characterization of the Columbian hypothesis as an argument for the presence of venereal syphilis in the pre-Columbian New World and corollary implications of promiscuity among New World populations.

**Reference:**

*Secrets of the Dead: The Syphilis Enigma*. 2002. New York: Thirteen/WNET New York. Educational Broadcasting Company.

**POSSIBLE DIFFERENTIAL DIAGNOSES OF COSTAL CHANGES CAUSED BY PATHOLOGICAL CONDITIONS**

Pia Bennike (University of Copenhagen, Denmark)

Costal ribs are often the most neglected part of skeletal studies. It is probably due to different factors such as poor preservation, a high rate of fragmentation and a rather time consuming recording of the many intact or fragmented ribs of each skeleton. Some important studies have, however, already proved the significance of studying ribs in relation to trauma and infectious diseases even though conditions such as lung infection and TB cannot clearly be differentiated. Other studies have demonstrated microscopic changes which may be related to possible tumors. This paper gives a survey of previous cases and presents a number of selected cases with various rib changes from the Danish skeletal collection. They are from various periods; a possible case of tuberculosis from the Neolithic, two cases (Medieval and 19<sup>th</sup> century) with possible *actinomycosis*, and finally a case of DISH which was previously diagnosed as TB.

## **FRONTOETHMOIDAL ENCEPHALOCELE IN AN ANCIENT BRAZILIAN CHILD**

Della Collins Cook (Indiana University, USA)

In 1876 João Batista Lacerda, Brazil's pioneering physical anthropologist, published a craniometric study in which he commented on a facial defect in one of the skulls. MN 317 is an adolescent female cranium from Caverna de Babilônia, Rio Novo, Minas Gerais. Mummified human remains from the cave have been dated to A.D. 1350. MN 317 has a large opening between the orbits that communicates with the anterior cranial fossa, and the orbits are high and narrow. Location of the defect, small cranial vault, and lack of evidence for rapid expansion support a diagnosis of frontoethmoidal encephalocele rather than enthesioneuroblastoma, angiosarcoma or other tumors. The inclusion of this individual in the first craniometric study of Brazilian Indians raises interesting questions about the history of methodology in our field. Data on this individual were included with normal adult female crania in statistical analysis. Later commentary on dimorphism and variability fails to recognize the effect of this strikingly dysmorphic person on means and standard deviations in a small series, leading to innovative but erroneous inferences on mate exchange systems. Little has been written about the origins of the practice of excluding the grossly abnormal individuals from morphological studies. The inclusion of this person in a mortuary context suggests that the deformed were treated as full members of the community and has interesting connections to the ethnography of lowland South America.

## **DOES TRABECULAR HYPERGROWTH IN A MIDSHAFT OFFER MECHANICAL BENEFIT?**

Rose Drew (University of York, UK)\*\*\*

This is a novel interpretation of trabecular bone, and asks: does the presence of abnormal trabeculae in absence of obvious disease act as an indicator of *in vivo* mechanical loading; or is this an indicator of subclinical disease? Abnormal bone growth signals disease, trauma, or perhaps activity. In typical long bones the shaft resembles a hollow cylinder, containing a tissue of fat and marrow during life; allowing passage of blood vessels. A medullary canal filled by abnormal trabeculae is an indicator of treponemes, among other diseases; a lack of trabeculae associated with osteoporosis, other metabolic disorders, increasing frailty. Trabecular bone is also an indicator of mechanical adaptation to loading, a concept continually explored. To some researchers, trabecular bone architecture and growth is *always* a response to mechanical loading. I compare apparently syphilitic remains from a S. Florida ossuary, apparently non-pathological remains from two medieval British collections plus undated North Yorkshire remains, now repatriated. Visual inspection and micro-CT scans show trabeculae in upper-limb mid-shafts in the British remains and in forearms of diseased North American prehistoric long bones. It is suggested classic presence of trabecular bone in syphilitic midshafts represent mechanostatic response to the mere usage of the pathological limb to average daily loads. It is further conjectured that the abnormal trabeculae in the British remains is an indicator of extremely strenuous mechanical loading; this bony response may *possibly* be restricted to British and/or European populations.



## **JUST CUT IT OFF: AMPUTATION IN ANCIENT EGYPT**

Tosha Dupras<sup>1</sup>, Stevie Mathews<sup>1</sup>, Marleen De Meyer<sup>2</sup>, Christoph Peeters<sup>2</sup>, and Bart Vanthuyne<sup>2</sup>

<sup>1</sup> University of Central Florida, USA

<sup>2</sup> Katholieke Universiteit Leuven, Belgium

It is known that ancient Egyptians were skilled medical practitioners, and that they had developed surgical techniques for trauma and illness. Although not specifically mentioned in the medical papyri, there is little archaeological evidence to suggest that amputation and prostheses were among the techniques used to deal with trauma. Skeletons from three individuals from the site of Dayr al-Barsha show evidence of amputation, and the potential use of prosthetics. Two of these individuals (one dated to the Old Kingdom/First Intermediate period, the other Middle Kingdom period) show bilateral amputation of their feet through the metatarsals. Both cases show extensive healing and the deformed shape of the feet suggest continual binding with either cloth or prosthetic devices. Differential diagnoses indicate that these pathologies were likely due to trauma and not disease. It is not surprising that such trauma occurred at Dayr al-Barsha, as this site is well known for its deep stone burial shafts and stone quarries, both of which required dangerous occupations. A third individual (date unknown) who suffered extensive perimortem trauma, displays cut marks on his right humeral shaft. These cut marks are placed directly over a perimortem butterfly fracture. The cut marks and the position of the right arm bones in the burial indicate that the arm was amputated before death. The bioarchaeological evidence from this site supports the idea that ancient Egyptians performed amputation as a medical procedure.

## **DIAGNOSIS OF CHRONIC OTITIS MEDIA IN ARCHAEOLOGICAL SKELETAL REMAINS: AN UNSOLVED PALEOPATHOLOGICAL PROBLEM**

Stefan Flohr and Michael Schultz (University of Goettingen, Germany)

In pre-antibiotic times otitis media (OM) could have led to life threatening complications. Most studies in paleopathological investigations on this topic focus on hypocoellularity of the mastoid process or changes in its pneumatized cells as indirect indicators for OM. However, osseous changes due to inflammations in the tympanic cavity sometimes directly reflect OM. In the following study, 326 tympanic cavities from 215 individuals from three early medieval cemeteries in Germany were examined using endoscopic, light and scanning-electron microscopic techniques. Altogether 186 cases (57.1%) exhibited no pathological changes, 57 cases (17.5%) showed vestiges of OM. In 83 tympanic cavities (25.5%) a diagnosis was not possible. The main reason for the latter was the enormous morphological variability in this region which makes it difficult to distinguish between “normal” and “diseased”. The results contradict those of examinations of the mastoid air cells that show vestiges of mastoiditis in 70 to 90% of the cases. OM affects the bone less severely than mastoiditis because of the fundamental anatomical differences in the tympanic cavity and the mastoid air cells concerning the possible outflow of pus and exudate. Moreover, too little is known about typical vestiges of OM in the bone structures of the tympanic cavity. This leads to the conclusion that diagnosing OM indirectly by examining the mastoid process leads to much more valid epidemiologic results than examining the tympanic cavity.

## **TRAUMA IN MORTON MOUND 14**

Allison Foley (Indiana University, USA)\*\*\*

Skeletal specimens from the Mississippian component of the Morton Mound 14 (11F°14) were examined for signs of skeletal trauma. The Morton site is a complex of habitation areas and mortuary mounds located in the Central Illinois River valley. The most extensive mortuary structure is Morton Mound 14 (N=117) which, according to Strezewski's recent study of mortuary practices, is dated to approximately 1275 AD. This time period straddles the interaction between the Larson and Oneota cultural phases and therefore represents a critical period of cultural change. Trauma was examined in respect to sex and age and interpersonal violence, accidental injury, and stress/activity-related injury are differentiated. External force and impact directionality that would have caused skeletal injury are also considered. This analysis provides a site-specific analysis and catalogue of skeletal trauma. The patterns of trauma in this population are used to create a Morton-specific model of injury that is comparable to other contemporary cemetery sites in the region such as Norris Farms 36.

## **EVIDENCE-BASED ANCIENT MUMMY RESEARCH**

Heather Gill-Robinson<sup>1</sup> and Frank J. Rühli<sup>2</sup>

<sup>1</sup>North Dakota State University, USA

<sup>2</sup>University of Zurich, Switzerland

Applying evidence-based criteria to the study of historic specimens is a brand new concept (Rühli and Gill-Robinson, accepted). Evidence-based ancient mummy research, drawing its principle from evidence-based clinical medicine, seeks to develop sustainable, science-based methods of analysis and interpretation for preserved ancient human and animal remains. Unlike clinical medicine where methods, body landmarks and research protocols are clearly defined, the analysis of mummies has previously relied upon the highly-variable approach of individual researchers. The aim of this presentation is, for the first time ever, to specifically address guidelines which shall be met in any future paleopathological study of mummified remains based, in part, on a review of major previous mummy studies (n=138; listed in Pubmed®). We propose that the following questions must be addressed as part of any planned study of mummified remains: Is the sample free from bias and thus representative? Is the method used sustainable in terms of a profound "risk-benefit" analysis (ethical invasiveness versus diagnostic impact)? Has the diagnostic validity of a particular technique (in terms of both sensitivity and specificity) been evaluated specifically for ancient tissue analysis against established methodological benchmarks? We found that to increase the diagnostic accuracy and to address methodological validity in the study of ancient morphology and pathology, the concepts taken from evidence-based medicine must be applied. Standardized guidelines on how to best analyze ancient corpses are currently lacking and will also be proposed in this presentation.

### **Reference:**

Rühli F., Gill-Robinson H. (Eds) (accepted). Evidence-based research on Ancient Mummies. Cambridge University Press.

**PHYSICAL STRESS IN LIUSHUI – ORTHOPEDIC DISEASES IN XINJIANG, WEST-CHINA FROM THE END OF THE BRONZE AGE TO THE BEGINNING OF THE IRON AGE.**

J. Gresky, T.H. Schmidt-Schultz, and M. Schultz (University of Goettingen, Germany)

Paleopathological investigations on archaeological skeletons of the population from Liushui in Xinjiang, West China, dating from the Late Bronze Age to the Early Iron Age were carried out on 41 individuals. The settlement belonging to the population has not yet been found, therefore, information about the living conditions of the population can only be obtained from paleopathological findings. Up to now, 41 individuals have been examined: 7 subadults and 34 adults (14 females, 25 males and 2 individuals of unknown sex). Orthopedic diseases, for instance, ligamentopathia, myotendopathia, stress fractures and myositis ossificans as a result of ruptures of muscle fibers were diagnosed with a high frequency. This can be explained by very exhausting physical loads, which could be due to a nomadic way of life that required much strength and skill in riding.

**DENTAL PATHOLOGY AMONG THE POPULATION OF ARGOS (GREECE) FROM THE PROTO-GEOMETRIC AND GEOMETRIC PERIOD**

Laurence Hapiot\*\*\* (Paris 1 Pantheon-Sorbonne University, France)

Since the last decade, skeletons excavated from the most important archaeological sites of Argolid (Peloponnese, Greece) are the subjects of extensive anthropological studies. More precisely, the paleodontological study of osteological collections supplies essential knowledge concerning the lifestyle of ancient populations. Our research is based on the macroscopic examination of dentitions from the French excavations at Argos for the past 100 years. R.P. Charles had already studied some of those skeletons in the 1960's, mostly from a biometrical point of view, but paid little attention to the teeth. For this reason, and also because new burials have been discovered since that time, a complete anthropological and paleopathological examination of the entire collection was necessary. An important part has been given to the paleodontological study of which preliminary results are presented in this paper. The burials corresponding to the studied individuals are dated from the Proto-Geometric to the Late Geometric period (1050 – 700 BC) and are dispatched between several necropolises in the city. The aim of the present study is to link the dental diseases that affect those individuals with the nutrition, the lifestyle, and eventually with some hygienic practices. The diachronic approach of this research will give us an overview of the evolution of those different lesions during Argos' history. The information collected by the paleodontological study is then replaced in the historical background of the socio-economic development of Argos until it becomes the dominant city in the Argolid plain.

**References:**

- Charles R.P., Anthropological Study of the necropolises of Argos. A Contribution to the knowledge of Ancient Greek Populations. *BCH*, 1958, 82 (1) : 268-313. (In French).  
Charles R.P., Anthropological Study of the necropolises of Argos. A Contribution to the knowledge of Ancient Greek Populations. *Etudes Péloponnésiennes*, J. Vrin publisher, Paris, 1963. (In French).

## **THE ORIGIN OF THE TREPONEMATOSES (SYPHILIS, YAWS, AND ENDEMIC SYPHILIS): A PHYLOGENETIC APPROACH.**

Kristin Harper<sup>1</sup>, Molly Zuckerman<sup>1</sup>, Hsi Liu<sup>2</sup>, Bret Steiner<sup>2</sup>, Robert George<sup>2</sup>, Michael Silverman<sup>3</sup>, Shelly Bolotin<sup>4</sup>, Allan Pillay<sup>5</sup>, Nigel Saunders<sup>6</sup>, Paolo Ocampo<sup>1</sup>, and George Armelagos<sup>1</sup>

<sup>1</sup>Emory University, USA;

<sup>2</sup>Coordinate Center for Infectious Diseases, US Centers for Disease Control and Prevention, Atlanta, Georgia, USA;

<sup>3</sup>University of Toronto, Canada

<sup>4</sup>Department of Molecular Diagnostics, Ontario Ministry of Health and Long-Term Care, Etobicoke, Ontario, Canada

<sup>5</sup>Division of Sexually Transmitted Diseases Prevention, US Centers for Disease Control and Prevention, Atlanta, Georgia, USA

<sup>6</sup>Dept. of Microbiology, Mount Sinai Hospital, Toronto, Ontario, Canada

For the last 500 years, the origin of *Treponema pallidum* subsp. *pallidum*, the bacterium that causes syphilis, has been vigorously debated. Some researchers assert that syphilis originated in the New World and was brought to Europe by Columbus; others maintain that the disease arose in the Old World, long before. The evolutionary relationship of subsp. *pallidum* to the other *T. pallidum* subspecies, which cause yaws (subsp. *pertenue*) and endemic syphilis (subsp. *endemicum*), is also controversial. Due to the morphologic and genetic similarity between the three subspecies, it has been argued that all three diseases are caused by a single, protean pathogen. In order to address these problems, we sequenced 7 kilobases of the genome in 26 pathogenic *Treponema* strains. Using this sample, which is unprecedented both in size and geographic breadth, and which included strains obtained from non-human hosts, we performed phylogenetic analysis upon the non-recombining regions. Our data indicate that subsp. *pertenue* was the first member of the *T. pallidum* family to emerge, in either Africa or Asia. Subsp. *pallidum* diverged most recently, and it is most closely related to subsp. *pertenue* strains collected from an indigenous population in South America, consistent with the Columbian hypothesis.

## **MUSCULOSKELETAL STRESS MARKERS: A NEW RECORDING SYSTEM?**

C.Y. Henderson (Durham University, UK)

The aim is to present a simple, objective method of recording, analysing and storing information about the surface topography of entheses (the sites of soft tissue attachment to bone) and, furthermore, to demonstrate the applicability of the method to differentiate between enthesopathies and normal entheses. Visual methods in common use today suffer from a number of flaws: they are subjective, they are (frequently) based on an erroneous understanding of entheses morphology, and they do not allow for re-analysis of the sample after reburial. This new method uses a profile gauge, a row of movable prongs, which is pressed against the entheses to record the curvature. In the case of the entheses the recorded curvature was stored by drawing the resulting line on paper. Two measurements were taken which intersected at ninety degrees. These lines were digitized (and stored as bitmap files) separately and analysed separately. The characteristics of their curvature were calculated by nine roughness parameters commonly used in materials science. The method was tested on male skeletons from Fishergate House, York, UK. Three upper limb entheses were recorded using this method. They were also recorded for visual anomalies to ascertain whether the roughness parameters were successful at categorizing the entheses. Those used included measures of standard deviation and mean slope of the line.

Statistical analysis of their performance using discriminant function analysis demonstrated that normal and abnormal entheses were grouped separately. This indicates future potential.

**PALEOPATHOLOGY DURING THE POSTCONTACT ADAPTIVE TRANSITION:  
INDIGENOUS MOCHICA HEALTH AND DISEASE IN THE COLONIAL  
LAMBAYEQUE VALLEY, PERU (AD 1536-1750)**

H. D. Klaus<sup>1,2,3</sup>, and M. Tam<sup>4</sup> \*\*\*

<sup>1</sup>Department of Anthropology, The Ohio State University, USA

<sup>2</sup>Museo Nacional Sicán, Peru.

<sup>3</sup>Museo Nacional de Arqueología y Etnografía Brüning, Peru.

<sup>4</sup>Universidad Nacional de Trujillo, Peru.

Over the last 10,000 years, only a handful of major adaptive transitions have unfolded – the most recent and violent of which was contact between Native Americans and Europeans. This initial study of indigenous health in the historic Central Andes tests the hypothesis that indigenous Mochica morbidity increased following Spanish colonization. Paleopathological conditions were observed from 255 late pre-Hispanic and 459 Colonial-era Lambayeque Valley skeletons. As sample sizes and age structures differed, multivariate odds ratios were used to compare these data. Oral health data were evaluated via a *G*-test. Elevated rates of periosteal infection and porotic hyperostosis likely stem from population aggregation and dietary shifts. Greater prevalence and more severe expression of degenerative joint disease in arms and legs appear linked to Spanish labor extraction. Colonial women were particularly impacted by strenuous activity, which correlates to paleodemographic findings of decreased female fecundity. No change in traumatic injury was observed. A rise in carious lesions and antemortem tooth loss suggest a dietary shift involving greater exploitation of starchy cultigens. To our surprise, a lowered prevalence of enamel hypoplasia and unchanged adult stature indicate complex nutritional outcomes that are just beginning to be understood. Overall, these observations shed first light on an unprecedented turning point in the dynamic biocultural evolution of Lambayeque Valley populations. Further, we demonstrate context-embedded analysis of paleopathological conditions examining odds ratios by age cohort represent a highly accurate way to estimate and understand patterning of ancient diseases.

**DEATH IN A FIRE: AN IRON AGE TRAGEDY**

Niels Lynnerup<sup>1</sup>, Lise Harvig<sup>1</sup>, and Jens Nielsen<sup>2</sup>

<sup>1</sup>Laboratory of Biological Anthropology, Institute of Forensic Medicine, University of Copenhagen, Denmark;

<sup>2</sup>Aalborg Historical Museum, Denmark

A house dating to the older Iron Age was excavated in Denmark. The house had burnt to the ground. The remains of 19 animals, including cattle, horses, sheep and dogs, were found in groups, probably pertaining to how they had been tethered in the stable in the house. Furthermore, the remains of 4 humans, comprising an adult female, an adult male, and two juveniles, were found. Aside from the basic biological anthropological analyses of the burnt and cremated bones of the humans, we have also tried to reconstruct the actual posture of the humans, in order to see if they died due to asphyxiation during sleep, or if they died trying to get out, probably also trying to save their animals. In this sense, our investigation was carried out as a forensic examination of deceased individuals found in fires. We found that the humans did not lie in the habitation part of the house, nor in positions which would indicate that they lay in their sleeping quarters. Instead, in at least two cases, the reconstructed posture showed that the

individuals had tried to protect themselves, probably from falling timbers and burning straw from the thatched roof, while they were trying to save the animals.

### **A PALAEOPATHOLOGICAL INVESTIGATION OF THE THIRD INTERCONDYLAR TUBERCLE OF PARSONS**

Simon Mays<sup>1</sup> and Lisa Cooper<sup>2</sup>

<sup>1</sup>Ancient Monuments Laboratory, English Heritage, Fort Cumberland, UK

<sup>2</sup>School of Conservation Sciences, Bournemouth University, UK

The third intercondylar tubercle of Parsons (TITP) is a bony protuberance which is sometimes present on the tibial plateau. It corresponds to the insertion of the anterior fibres of the anterior cruciate ligament (ACL). Reasons why TITP is present in some knees and not others are at present unclear. TITP is studied in knee joints from 68 adult individuals from a Mediaeval cemetery. Associations are investigated with age, sex, knee osteoarthritis, clinical and subclinical DISH, and skeletal signs of trauma, with the aim of evaluating existing ideas on the causation of TITP. Only trauma showed an association with presence of TITP. The results offer support for the aetiology of trauma to the ACL in the formation of TITP.

### **TUBERCULOSIS AT MORTON MOUNDS, FULTON COUNTY, ILLINOIS**

Georgia Millward (Indiana University, USA)\*\*\*

One hundred seventeen individuals from the Mississippian component of mound 11F<sup>o</sup>14 were surveyed for skeletal indicators of the *Mycobacterium tuberculosis* complex (MTC). Rib and spine lesions are often associated with tuberculosis, but are not always present in infected individuals. These types of lesions cannot be offered as a definitive diagnosis when they are present because of their association with other diseases, such as pneumonia and brucellosis. Tuberculosis has been identified at other Fulton County sites, including Emmons Cemetery, Crable Site, and Norris Farms #36. Eighteen of the 117 adults and juveniles (15%) show skeletal lesions on their ribs and/or spine, and individual 11F<sup>o</sup>14-72 shows the most characteristic skeletal signs of tuberculosis. 11F<sup>o</sup>14-72 is a juvenile of 4 to 8 years with destructive lesions on vertebrae C6 and C7 and fusion of vertebrae C7 through T3. This individual also displays atrophied humeri and lesions on three rib fragments. Attempts to isolate MTC DNA will also be discussed.

### **THE SYPHILIS ENIGMA: BONES OF CONTENTION**

Paolo S. Ocampo, Kristin N. Harper, Molly K. Zuckerman, and George J. Armelagos (Emory University, USA)

Discussions of emerging diseases usually consider the impact of globalization in the modern context. We argue that in order to better understand the impact of emerging diseases on current medicine and society, there is value to understanding a disease that arose in Europe in the late 15<sup>th</sup> and early 16<sup>th</sup> centuries. The debate concerning the origin of syphilis has been a source of contention among historians and physicians for nearly 500 years. In the past century, geneticists and physical anthropologists have joined the argument, with aDNA analysis (Kolman, et al. 1999) and osteological diagnoses of treponemal infection providing other sources of data. Baker and Armelagos (1988) examined the documentary and skeletal evidence in an attempt to resolve this longstanding dispute. They proposed that *Treponema pallidum*, the spirochete that causes venereal syphilis, was brought to Europe from the New World by Columbus and his crew. Although there is little evidence of venereal syphilis in the New World before 1493, the vast cultural differences between Europe and the Americas may have been conducive to the spread of

a virulent, sexually transmitted infectious disease, allowing the treponemal bacterium to evolve into the modern venereal form. This study is a comprehensive review of recent historical, genetic, and to a lesser degree, skeletal evidence regarding the origins of the treponematoses and their spread throughout history and geography in the New and Old Worlds.

**References:**

- Baker, B.J., and G.J. Armelagos. 1988. The origin and antiquity of syphilis: paleopathological diagnosis and interpretation. *Current Anthropology* 29(5): 703-38.
- Kolman C.J., Centurion-Lara A., Lukehart S.A., Owsley D.W., and Tuross N. 1999. Identification of *Treponema pallidum* subspecies *pallidum* in a 200-year-old skeletal specimen. *Journal of Infectious Disease*. 180: 2060-3.

**HIGH INCIDENCE OF DEVELOPMENTAL HIP DYSPLASIA IN A MEDIEVAL ALPINE POPULATION FROM SWITZERLAND**

Christina Papageorgopoulou<sup>1,2</sup> and Thomas Böni<sup>2,3\*\*\*</sup>

<sup>1</sup>University of Basel, Switzerland

<sup>2</sup>University of Zurich, Switzerland

<sup>3</sup>Orthopedic University Clinic Balgrist

Developmental dysplasia of the hip (DDH), formerly referred to as congenital hip dysplasia (Kilsic, 1984), concerns the abnormal formation of the hip joint in which the femoral head is not stable in the acetabulum. Genetic, developmental, mechanical and physiological risk factors play a role in development of the condition. In modern populations DDH is present in 1% of newborns, with females showing a higher prevalence than males (Smergel et al 2004). In historic and prehistoric populations such cases have been only sporadically reported (Brothwell & Sandison, 1967) while a more systematic description has been only recently attempted concerning only cases of hip dislocation (Mafart et al, 2007; Mitchell and Redfern, in press). We present here the highest incidence of DDH without dislocation (2.1%) ever reported in archaeological skeletal material. The sample consists of 416 adult and subadult individuals from the medieval (11<sup>th</sup>-16<sup>th</sup> AD) cemetery of Tomils/Sogn Murezi, Switzerland. Aside from one bilateral case, all cases are unilateral, no difference has been observed between the left and the right side and males exhibit higher frequency than females. Besides the pathological-anatomical changes observed on the skeleton secondary to DDH, some of the individuals exhibit additional anomalies of the musculoskeletal system which may suggest a connection to specific syndromes. The purpose of this report is to systematically describe the cases of DDH and to examine whether these are associated with congenital syndromes present in this alpine medieval population.

**References:**

- Brothwell D, Sandison AT. 1967. *Diseases in Antiquity*. Thomas: Springfield.
- Kilsic PJ. 1984. Congenital dislocation of the hip: a misleading term. *J Bone Joint Surg*.71B:136.
- Mafart B, Kèfi R, Bèraud-Colomb E. 2007. Palaeopathological and Palaeogenetic Study of 13 Cases of Developmental Dysplasia of the Hip with Dislocation in a Historical Population from Southern France. *Int. J. Osteoarchaeol*.17: 26–38.
- Mitchell PD, Redfern RC. Diagnostic Criteria for Developmental Dislocation of the Hip in Human Skeletal Remains. *Int. J. Osteoarchaeol*. (in press)
- Smergel E, Losik B, Rosenberg Kotlus H. 2004. Sonography of hip dysplasia. *Ultrasound Quarterly* 20: 201-216.

**MORTUARY PRACTICES AND COMMUNICABLE DISEASE RISK: IMPLICATIONS FOR TUBERCULOSIS TRANSMISSION IN PRECOLUMBIAN NORTH AMERICA**

Jennifer A. Raff, Frederika A. Kaestle, Della Collins Cook (Indiana University)

It has long been suspected that certain aspects of mortuary rituals of prehistoric Southeastern societies required specialists, including the practice of corpse dismemberment, which occurred in Middle Woodland, Late Woodland, and Mississippian societies. Ethnohistoric accounts suggest that the handling of the corpses was limited to certain members of the community, who likely had extensive anatomical knowledge. However, little is known about these mortuary attendants. Here we investigate the relationship between this specialized practice and disease, examining both the potential risk of corpse handlers contracting infectious disease, such as TB, as well as their own understanding of pathology. We present several paleopathological cases from Woodland and Mississippian communities in West-Central Illinois, and review clues from the literature as to the identities of these mortuary attendants.

**OLDEST KNOWN PROSTATE CANCER IN A SCYTHIAN KING (7<sup>TH</sup> CENTURY BC): RELIABLY DIAGNOSED BY MICROSCOPY AND BIOCHEMISTRY.**

Tyede H. Schmidt-Schultz and Michael Schultz (University of Goettingen, Germany)

We have examined the skeleton of a Scythian ruler excavated at Arzhan, Siberia (Russia) dating to the 7<sup>th</sup> century BC. Up to now, this is the oldest case of prostate cancer diagnosed reliably by morphological and biochemical techniques. The results of the morphological and biochemical investigation proved that this mature male suffered for many years from and probably died of a carcinoma of the prostate. The morphological findings obtained by light and scanning-electron microscopy characterized the lesions in various regions of the skeleton as typical of an advanced metastasizing carcinoma of the prostate. It is well known that in the case of prostate cancer, the protein prostate specific antigen (PSA) is increased. We identified PSA in the extracellular matrix proteins of the bones of the Scythian ruler in Western Blot in the same way as in the control of a recent, clinically diagnosed case of prostate cancer. We could also show that in the state of high malignancy PSA in bone is complexed to 1-antichymotrypsin (PSA-ACT). The combination of microscopic and biochemical techniques opens up an avenue to obtain reliable diagnoses of ancient diseases. Thus, exciting perspectives in the field of the history and the evolution of diseases using these techniques are now possible.

**‘SEVERE CLEAVAGE OF THE SKULL’: THE POTENTIAL OF SECONDARY AND TERTIARY FRACTURES FOR INTERPRETATION OF CRANIAL TRAUMA.**

Martin Smith and Megan Brickley (University of Birmingham, UK)

Recent years have seen a growing interest in the identification of violence related injuries in skeletal samples. Cranial trauma is frequently the focus of such studies, which often concentrates on discerning mechanisms of injury through analysing the point of impact. In cases where the skull is struck with severe force, additional fractures may be produced away from the impact point. These include radiating fractures, which are linear and travel outwards from the site of contact and also concentric fractures, which form in an arc surrounding the impact point. Although such fractures are often noted as being present, they are not generally seen as a source of information in themselves regarding the traumatic events which produced them. This paper presents a series of examples of cranial trauma from prehistoric Britain which exhibit such fractures, some of which were misidentified by their original excavators. These are used to illustrate the mechanisms by which such indirect fractures are formed and also the factors which determine their morphology and positioning within the skull. Such secondary and tertiary



fractures are argued to be potentially informative in several ways including distinguishing blunt from sharp force head injuries and projectile trauma. The existence of such indirect fractures may also be of interest in fragmented material, as they are potentially diagnostic of perimortem trauma when the site of impact on the skull is absent.

### **LOCATIONS OF SPONDYLOLYSIS SEPARATIONS AS DEMONSTRATED IN TWO INUIT POPULATIONS FROM POINT HOPE, ALASKA.**

Mary Beth Timm\*\*\* (Western Michigan University, USA)

Spondylolysis has a high prevalence within North American Inuit populations. Within two populations from Point Hope, Alaska, the Ipiutak and the Tigarak, housed at the American Museum of Natural History, the separations occurred in several different locations. Spondylolysis is the unilateral or bilateral separation of the neural arch from the centrum in the pars interarticularis. While found in all vertebral units, it is most commonly found within the lumbar vertebrae. The Point Hope collection demonstrated separations that were inferior to the superior articulating facets, in the lamina, and lateral to the mid section of the spinous process. Even though the two populations lived in the same location, they had different subsistence patterns. The Ipiutak lived approximately from 2500 – 2100 BP and hunted caribou, seal, and walrus. In contrast, the Tigarak lived from approximately from 800 – 300 BP and hunted whales in addition to other large mammals. Data were collected from both populations noting presence, absence, and location of spondylolysis. A total of 30 Ipiutak individuals were evaluated with 26 % prevalence in males (5/19) and 9 % in females (1/11). A total of 92 Tigarak individuals were evaluated and demonstrated 50 % prevalence in males (21/42) and 60 % in females (30/50). This presentation will assess the frequency in location of separation between the two populations.

### **VIRGINS OF THE SUN AND SYPHILIS AT MACHU PICCHU? UNLIKELY ON BOTH COUNTS**

John W. Verano (Tulane University, USA)

Since the rediscovery of Machu Picchu by Hiram Bingham in 1911, various models have been proposed for the origins and function of the site. Bingham himself popularized the idea that Machu Picchu housed and served as a last refuge for Inca “Virgins of the Sun” who lived their lives out in obscurity, isolated and forgotten following the invasion and conquest of Peru by Francisco Pizarro. Bingham’s model found support in the osteological analysis of Machu Picchu burials conducted by George Eaton (Eaton 1916), who concluded that the vast majority of skeletons were female. Curiously, Eaton identified several cases of bone infection that he attributed to syphilis, contradictory as it might seem for Virgins of the Sun. In subsequent years, new archival, and archaeological research (Burger and Salazar 2004), as well as restudy of the Machu Picchu skeletal collection (Verano 2003), has led to substantial reinterpretation of Machu Picchu and the demography and life history of those buried there. Nevertheless, there has remained some question about the presence of syphilis, due in part to a 1967 publication by Charles Goff which lent support to Eaton’s diagnoses (Goff 1967). My own restudy of these putative syphilis cases has revealed problems resulting from mixing of skeletal remains from different individuals, as well as the diagnosis of skeletal lesions.

#### **References:**

Burger, R. L. and L. C. Salazar. 2004 *Machu Picchu : unveiling the mystery of the Incas*. Yale University Press, New Haven.

- Eaton, G. F. 1916. *The collection of osteological material from Machu Picchu*. [The Tuttle Morehouse & Taylor Company], New Haven, Conn.
- Goff, C. W. 1967. Syphilis. In *Diseases in Antiquity: A Survey of the Diseases, Injuries and Surgery of Early Populations*, edited by D. Brothwell and A. T. Sandison, pp. 279-294. Charles C. Thomas, Springfield, Illinois.
- Verano, J. W. 2003. Human Skeletal Remains from Machu Picchu: A Reexamination of the Yale Peabody Museum's Collections. In *The 1912 Yale Peruvian Scientific Expedition Collections from Machu Picchu: Human and Animal Remains*, edited by R. L. Burger and L. C. Salazar, pp. 65-117, and Appendix A. Yale University Publications in Anthropology 85, New Haven.

### **PATTERNS OF DEGENERATIVE JOINT DISEASE AMONG MALES AND FEMALES AT WINDOVER AND THEIR RELATIONSHIP TO TYPES AND DISTRIBUTION OF GRAVE GOODS**

Rachel K. Wentz, PhD (The Florida Public Archaeology Network, USA)

The Windover site (8BR246) is a 7,000-year-old mortuary pond located near the central/eastern coast of Florida. It produced 168 well-preserved individuals who have been the subject of numerous bioarchaeological studies. This research examines rates and patterns of degenerative joint disease (DJD) among males and females within the population using criteria from the Western Hemisphere Health Index. Females have elevated rates of DJD of the elbow and shoulder. Males have elevated rates of DJD of the spine, especially in the lumbar area. Overall, males had higher rates of DJD than females. These rates and patterns are then paired with mortuary analyses to correlate variability of grave goods by type and distribution with task division between the sexes. This research enables inference into activities during life and accounts for variations in rates and patterns of degenerative joint disease within this ancient population.

### **INFLAMMATORY ORBITAL LESIONS FROM THE CHANNEL ISLANDS, CALIFORNIA.**

Cynthia A. Wilczak<sup>1</sup> and Zsusanna Jeney<sup>2</sup>

<sup>1</sup>San Francisco University, USA

<sup>2</sup>University of Maryland, USA

Our study describes porous orbital lesions that do not conform to the typical pattern of cribra orbitalia in populations from the Channel Islands region of southern California. The atypical porosity extended posteriorly to the superior orbital fissure and was associated with vascular channels. Although porosity often included the anterior orbit, it was not concentrated in this region and both pore coalescence and marrow hyperplasia were absent. In a comparative analysis, we scored pore size, pore density, marrow hyperplasia, and vascular channel density separately for the anterior and posterior orbits. Populations from four of the Channel Islands and the coastal mainland were compared to populations from Chaco Canyon, New Mexico; Hawikuh, New Mexico; and Canaveral, Florida. Chi-square analysis showed a weak association between the presence of anterior and posterior lesions in the pooled sample ( $\Phi = 0.330$ ). Site comparisons based on presence/absence of anterior and posterior lesions showed a higher association with site for posterior lesions than anterior lesions ( $\Phi = 0.299$  and  $\Phi = 0.422$ ). Posterior lesions of any type were more frequent in Channel Island than non-Channel Island populations (46-75% vs. 18-33%). MANOVA analysis of the severity of individual lesion attributes yielded similar results with the Chumash showing a distinct pattern of posterior

lesions. We suggest that an inflammatory process originating in the periosteum, such as those described by Walper et al. 2004, as the cause of the posterior orbital lesions.

#### Reference

Wapler U, Crubézy E, and Schultz, M. (2004) Is Cribra Orbitalia Synonymous with Anemia? Analysis and Interpretation of Cranial Pathology in Sudan. *American Journal of Physical Anthropology*. 123: 333-339.

#### **THE ORIGIN AND ANTIQUITY OF SYPHILIS REVISITED: AN APPRAISAL OF OLD WORLD PRE-COLUMBIAN EVIDENCE FOR TREPONEMAL INFECTION.**

Molly K. Zuckerman<sup>1</sup>, Kristin N. Harper<sup>1</sup>, Megan L. Harper<sup>2</sup>, Anthea Boylston<sup>3</sup>, and George J. Armelagos<sup>1\*\*\*</sup>

<sup>1</sup>University of Emory, USA

<sup>2</sup>University of Missouri, USA

<sup>3</sup>University of Bradford, UK

This study presents findings from a review of the current skeletal evidence for Old World Pre-Columbian treponemal disease. For the last five hundred years, the geographic and chronological origins of venereal syphilis have been vigorously debated. In the last twenty-five years, a staggering number of skeletons bearing strong evidence for treponemal disease have been documented in the New World. Simultaneously, a number of skeletons with changes indicative of treponemal disease have emerged from the Old World archeological record, supporting arguments for the Pre-Columbian hypothesis. Critically, however, the Old World evidence has not been systematically evaluated. Consequently we reviewed the existing published reports (n=43) of Old World Pre-Columbian treponemal disease and congenital syphilis; the diagnostic, chronological, and epidemiological validity of the cases was evaluated according to standardized, pre-established criteria. Additionally, the skeletal evidence from England (n=11) was macroscopically re-evaluated. Results indicate that much of the Old World skeletal evidence is highly suggestive of treponemal disease. However, due to the margin of error and the marine effect on current radiocarbon and archaeological dates, the suggestive skeletal evidence can only be localized to the period surrounding 1500 AD, though intriguingly much of it falls late in this period. Our data support a modification of the Pre-Columbian hypothesis and indicate that archaeological evidence may be inadequate for determining the origins and antiquity of syphilis.

### **SECTION 3: POSTER PRESENTATIONS**

#### **EVIDENCE OF SCURVY IN MEDIEVAL EASTERN EUROPE- A POSSIBLE CASE FROM GIECZ, POLAND**

Amanda M Agnew<sup>1,2</sup>, Hedy M Justus<sup>1,2</sup>, and Sam D Stout<sup>1</sup> \*\*\*

<sup>1</sup>The Ohio State University

<sup>2</sup>The Slavia Foundation

Of the eighty-five subadult skeletons excavated to date at the medieval cemetery (XI-XII c.) in Giecz, Poland, only one exhibits bony changes consistent with scurvy. It is rare that cases of scurvy are reported in the paleopathological literature, as scorbutic lesions are often difficult to identify. Grave 14/06 is a five to six year old child exhibiting a distinct pattern of skeletal changes. Abnormal porosity is described on the temporal bones, greater wings of the sphenoid, palatine processes of the maxilla, and rami of the mandible. Minor cribra orbitalia and porotic hyperostosis are also present, along with bilateral ante-mortem tooth loss of the first deciduous mandibular molars. This possible case of scurvy, while exhibiting many indicators “classic” for the condition, was probably not one of extreme severity. The post-cranial skeleton is almost completely unaffected, with the exception of mild periostitis on the scapular spines. It is possible that this child also had other nutritional deficiencies which may have inhibited the expression of scurvy, although there is no direct evidence of this on the skeleton.

#### **MOVING TOWARD FIELD APPLICATION OF PERCUTANEOUS NEEDLE BIOPSY IN MUMMIFIED REMAINS USING A NON-GRAVITY DEPENDENT NEEDLE SCRAPE/ASPIRATION TECHNIQUE WITH CT AND ENDOSCOPIC GUIDANCE – A PRELIMINARY STUDY**

Ronald Beckett<sup>1</sup>, John Posh<sup>2</sup>, Craig Czaplinski<sup>2</sup>, Gerald Conlogue<sup>1</sup> Lawrence Quarino<sup>3</sup>, Janine Kishbaugh<sup>3</sup>, and Alyssa Bonner<sup>3</sup>

<sup>1</sup>Quinnipiac University, USA

<sup>2</sup>Imaging Center at Good Shepard, Allentown, PA, USA

<sup>3</sup>Forensic Science Program, Cedar Crest College, Allentown, PA 18104

The objective of this study was two fold. First, we wanted to determine if we could use a non-gravity method of specimen retrieval using a needle scrape and aspirate technique. This technique would allow specimen collection from mummified remains *in situ*. The initial part of the study was conducted on an arsenic embalmed late 19<sup>th</sup> century mummy using CT guided percutaneous needle biopsy with endoscopic direct visualization of needle direction. The liver was the target organ. A coaxial needle was used and found to be inadequate given the durable nature of the preserved liver. A bone marrow biopsy aspiration needle was then placed and verified by CT. The coaxial needle was passed through the bone marrow biopsy aspiration needle and used to scrape the internal hepatic environment. The coaxial needle was removed and a 20ml syringe was affixed to the bone marrow biopsy aspiration needle with scant hepatic substance being aspirated. The aspirate was examined in a trace element forensic laboratory. The second objective was to determine if we could pinpoint, with reasonable precision, a target organ or structure within the same mummified remains using a triangulation method with spinal needles and field standard radiography. The biopsy procedure was then repeated using the radiographs and endoscopy for guidance to the target organ. Additional scrapings were taken.

## **INVESTIGATING HEALTH AT KERMA: SACRIFICIAL VS. NONSACRIFICIAL INDIVIDUALS**

Michele R. Buzon<sup>1</sup> and Margaret A. Judd<sup>2</sup>

<sup>1</sup>Purdue University, USA

<sup>2</sup>University of Pittsburgh, USA

The ancient Nubian site of Kerma, situated in modern Sudan, was the location of the earliest state power that dominated Upper Nubia from ~2500-1500 BC. The cemetery at Kerma, which included a large mud brick temple that presided over massive circular tumuli, consisted of two distinct burial contexts: sacrificial and nonsacrificial. This poster examines the individuals dating to the Classic Kerma Period (~1750-1500 BC) from these two contexts in order to investigate heterogeneity in risks. Because the sacrifice victims did not die from natural causes, we hypothesize that these individuals would appear healthier. We assess health status through macroscopic indications of physiological stress: cribra orbitalia, dental enamel hypoplasia, tibial osteoperiostitis and femur length. The analysis presented here suggests that people interred in the sacrificial and nonsacrificial burial contexts had similar health profiles. A differential risk of death between these subgroups is not evident in the frequencies of nonspecific stress indicators. However, this differential risk of death may be blurred by our inability to examine nonadults for childhood disease. Additionally, these results suggest doubt regarding the validity of sacrificial status based on the archaeological evidence.

## **A COMPARISON OF TRAUMA PATTERNS BETWEEN NEANDERTHALS AND SELECT MODERN ATHLETIC SAMPLES**

Larissa Collier\*\*\* (Indiana University at Bloomington, USA)

Neanderthal populations demonstrate a high frequency of traumatic lesions that have been associated with occupational hazards during hunting. In their assessment, Berger and Trinkaus found the greatest relation in injury patterns to rodeo athletes due to their interaction with large ungulates. As the Spanish/Mexican sport of bullfighting also requires close proximity to large animals and employs a predation pattern similar to Neanderthals involving thrusting spears or javelins, the relation of injury patterns may be greater in bullfighters than in the rodeo athletes. The anatomical distribution of lesions in a sample of Neanderthal skeletons was compared to two modern athletic populations; American rodeo athletes and Spanish and Mexican bullfighters. The Rodeo sample demonstrated a high frequency of head and shoulder trauma while the Bullfighter sample was the opposite with the highest injury frequency in the lower limbs. The Neanderthal sample showed a higher rate of lower limb injury that relates to the injury pattern in bullfighters; however the head trauma in Neanderthals is more closely related to injury patterns in the Rodeo sample. These modern athletic populations engage in close contact with large animals in different ways. This difference in approach can account for the reverse nature of their injury patterns. The Neanderthals, in their interactions with these larger animals, may have employed a combination of both modern 'attack' strategies.

## **A PRELIMINARY RADIOGRAPHIC AND ENDOSCOPIC EXAMINATION OF 21 MUMMIES AT THE "MUSEO DE LAS MOMIAS" IN GUANAJUATO, MEXICO AND THE IMPORTANCE OF A TEAM APPROACH TO IMAGE INTERPRETATION**

Gerald Conlogue, Ronald Beckett, Yvette Bailey, and Jiazi Li (Quinnipiac University, USA)

The present study represented the initial phase of a much more comprehensive undertaking to examine the entire collection of 111 mummies at the "Museo de Las Momias" in Guanajuato, Mexico. The collection constitutes the largest group of naturally mummified

remains in the western hemisphere and consists of individuals that died over a one hundred year period. In order to minimize moving the potentially fragile remains, the 13 adult and 9 infant mummies were examined within the museum using portable radiography with Polaroid film and endoscopy. The resulting images were reviewed, on-site, by a physical anthropologist and a radiologist. The anthropologist not only provided expertise in osteology and the ability to recognize pathological lesions with bone-in-hand but also to contribute insights into factors such as funerary practices and mummification processes that may have altered the anatomy and therefore the radiographic appearance. The advantages of the radiologist being present included suggesting additional radiographic projects and the recognition of subtle changes, particularly in skeletal structures, to aid in the diagnosis. A fundamental concept in diagnostic radiology, the art of differential diagnosis, was demonstrated in two of the cases, an individual with diffuse idiopathic skeletal hyperostosis (DISH) and another mummy with calcified densities in the chest.

### **SKELETAL DYSPLASIA FROM THE DAKHLEH OASIS, KELLIS 2 CEMETERY SITE**

Darcy J. Cope, Tosha L. Dupras\*\*\*(University of Central Florida, USA)

Two fetal individuals from the Kellis 2 cemetery (Roman period circa 50 AD-450 AD), Dakhleh Oasis, Egypt, present skeletal anomalies that could potentially explain their sudden death. Both skeletons exhibit bowing of the long bones in addition to other skeletal deformities respective of each specimen, such as interrupted bone development and fractures. A differential diagnosis considers the following pathological conditions: campomelic dysplasia, osteogenesis imperfecta, hypophosphatasia, atelosteogenesis, infantile cortical hyperostosis, Melnick-Needles osteodysplasty, Schwarz-Jampel syndrome, Stuve-Wiedemann syndrome, and congenital rickets. Preliminary investigations are indicative of osteogenesis imperfecta as the pathological condition suffered by the fetal individuals. From the archaeological literature, Gray (1969) describes a strong case for osteogenesis imperfecta of a young child from Egypt (ca. 1000 BC). Two other archaeological cases are described by Wells (1965) and Ortner (2003). If final results from the differential diagnosis point towards osteogenesis imperfecta as the afflicting pathological condition for any one of the individuals, this will be the first reported paleopathological case of a fetal individual presenting with osteogenesis imperfecta and as a disease not yet identified at Kellis 2. Furthermore, a diagnosis of their pathological condition will aid in further understanding the disorders and health struggles that once afflicted the Kellis 2 population.

#### **References:**

- Gray PHK. 1969. A case of osteogenesis imperfecta, associated with dentinogenesis imperfecta, dating from antiquity. *Clinical Radiology* 20:106-108.
- Ortner, DJ. 2003. *Identification of pathological conditions in human skeletal remains*. San Diego (CA): Academic Press.
- Wells C. 1965. Osteogenesis imperfecta from an Anglo-Saxon burial ground at Burgh Castle, Suffolk. *Medical History* 9:88-89.

**FISTICUFFS AND FIREARMS: AN ANALYSIS OF TRAUMA IN  
19TH-CENTURY- BORN AFRICAN AMERICANS AND EURO-AMERICANS**

Carlina M. de la Cova\*\*\*(Indiana University at Bloomington, USA)

A sample of male African American and Euro-American skeletons (n = 655) born during the 19th century from the Hamann-Todd, Terry, and Cobb anatomical collections were macroscopically examined for trauma and statistically analyzed according to ethnicity, birth (Antebellum, Civil War, and Reconstruction), and combined ethnicity/birth cohorts. Chi square tests indicated that significantly more Euro-Americans than African Americans suffered from trauma of the skull, ribs, vertebrae, metacarpals, hand phalanges, tibiae, fibulae, metatarsals, and foot phalanges. The highest frequencies of cranial trauma were found in Euro-Americans from the Hamann-Todd Collection. Trauma also reached its peak in individuals born during the Civil War. Trauma frequencies for African Americans, in contrast, were not significantly higher than Euro-Americans for any skeletal element. The prevalence of gun-related trauma was also analyzed and results indicated that significantly more African Americans were the victims of bullet wounds, with the majority associated with the Reconstruction cohort and related to the Hamann-Todd Collection. In all cases, age analyses indicated that most affected individuals were between 60-100 years old at death. The presence of increased frequencies of facial trauma among Euro-Americans and high levels of bullet wounds in African Americans from the Hamann-Todd Collection compared to the other collections implies not only different ethnic patterns of interpersonal violence, but that both African Americans and lower class Euro-Americans experienced aggression in turn of the century Cleveland.

**BROKEN BONES, BROKEN LIVES: FRACTURE PATTERNS IN AN EARLY 20<sup>TH</sup>  
CENTURY PAUPER CEMETERY**

Sean P. Dougherty<sup>1</sup> and Norman C. Sullivan<sup>2</sup>

<sup>1</sup>Indiana University, USA

<sup>2</sup>Marquette University, USA

The Milwaukee County Institutional Grounds (MCIG) cemetery was the final resting place for the “unfortunates” of turn of the century Milwaukee, Wisconsin. The cemetery served as a place of interment for those individuals for whom a private burial could not be provided. These included not just the residents of the Milwaukee County Institutions, but also the working poor and the un-claimed dead of the city. From 1992 through 1994, the Milwaukee County Institutional Grounds cemetery (1882-1925) was excavated. Of the 1588 burials recovered, 1064 contained adult remains. Of these, 997 (748 males, 126 females, 123 unknown) were examined for evidence of antemortem fractures. A total of 417 fractures was identified among 247 individuals, 91.5% of which were males. Fractures were found within all anatomical regions, most commonly on the cranium (11.8%), hands (11.8%), and feet (12.9%). While the high frequency of cranial fractures does suggest a certain level of interpersonal violence, which is not unexpected, the overall pattern of fractures observed among the MCIG cemetery population is best linked to the hazards of the Industrial Age and a rapidly modernizing city.

## **DISEASES OF THE PARANASAL SINUSES AND THEIR CORRELATION TO LIVING CONDITIONS IN TWO EARLY MEDIEVAL POPULATIONS FROM GERMANY**

Julia Gresky, Stefan Flohr, Eva Nadine Stifter and Michael Schultz (University of Goettingen, Germany)

One of the main interests of paleopathological investigations is to draw conclusions about the living conditions of ancient populations by reconstructing individual health statuses. Inflammatory diseases of the respiratory tract, including the paranasal sinuses, are influenced by risk factors such as smoke from open fires, or cold and wet climates. They can be aggravated by an impaired immune system caused, for example, by nutritional deficiencies. We investigated the paranasal sinuses in 179 individuals from two early medieval populations from Rhens and Harting, Germany. Macroscopic, endoscopic, scanning-electron and light microscopic techniques were applied to yield reliable diagnoses. The frequency of pathological changes in the paranasal sinuses was much higher in the population from Harting than from Rhens. There was no obvious difference in the frequency between the sexes. Pathological changes in maxillary sinuses might also result from odontologic diseases, but these can hardly explain the population differences in the frontal, ethmoid, and sphenoid sinuses. Thus, differences in the frequencies of disease might reflect different living conditions. The subsistence economy of both populations was agriculture. However, archaeological results and geological aspects indicate that the people from Rhens lived in ecologically much more advantageous conditions than people from Harting. The paleopathological analyses and the archaeological data support the general assumption that living conditions strongly influence the general health status in ancient populations.

## **A POSSIBLE CASE OF ATELIOLIC DWARFISM IN NEOLITHIC CHINA**

Mauricio Hernandez<sup>1</sup>, Ekaterina Pechenkina<sup>1</sup>, Fan Wenquan<sup>2</sup>

<sup>1</sup>Queens College/CUNY

<sup>2</sup>Henan Institute for Cultural Relics, China

Ateliotic dwarfism is a congenital condition caused by a monotropic deficiency of human growth hormone. Ateliotic dwarfs have normally developed crania, but retain juvenile skeletons, gracile in appearance with lack of, or minimal, epiphysal union. Here we report a human skeleton with a possible case of ateliotic dwarfism from Guanjia (burial M53), a Neolithic settlement in northern China, dated to the Middle Yangshao period (4000 – 3500 BC). Based on fully erupted wisdom teeth and moderate occlusal dental wear resulting in substantial exposure of dentine, we initially estimated age at death to be between 25 and 35 years. However, dimensions of the postcranial skeleton fall within the range typical for 11 to 13 year old children from the same population. Epiphyses of the long bones are minimally fused, but a lack of microporosity in the metaphyseal areas of these bones in proximity to growth plates indicates cessation of longitudinal bone growth. Because no signs of porotic hyperostosis, *cribra orbitalia*, periosteal lesions, or linear enamel hypoplasia were observed, the stunted growth of this individual was likely unrelated to nutritional deficiencies or systemic infection. Perimortem fractures of the first and second cervical vertebra are consistent with a broken neck, suggesting this individual did not die of natural causes. These unusual life and death circumstances are unique for this population and could provide some insight into the life of a disabled individual and their role within a Neolithic community.



### **OSTEITIS PUBIS: EVIDENCE FOR STRENOUS ACTIVITY AT HIERAKONPOLIS (EGYPT)**

Margaret A. Judd (University of Pittsburgh)

Strenuous physical activity leaves scars on the bones of individuals attesting to the demands of occupation, sport, aggression and recreation. During the assessment of 74 C-Group Nubians from Hierakonpolis (Egypt) dated to the Bronze Age (c. 2050-1700 BC) numerous muscle pulls along the ilia and ischia of 10 adults of both sexes were observed. These lesions were associated with extensive destructive and formative bone activity on the pubic symphyses and auricular surfaces. The changes were not age-related and in the case of one male, the pubic symphyses were completely eburnated. Differential diagnoses are discussed and osteitis pubis, usually attributed to sports or pregnancy, is proposed as the most likely cause of these osseous changes. The presence of these Nubians in Egypt during a period of political instability suggests that they made a unique contribution to the Egyptian culture. Activities and lifestyles indicated by the archaeological record at Hierakonpolis that may have contributed to these skeletal modifications are presented.

### **DIFFERENTIAL DIAGNOSIS FOR AN UNIDENTIFIED ORBITOFRONTAL DEFECT IN AN EARLY MEDIEVAL (XI-XII C) CEMETERY IN GIECZ, POLAND**

Hedy M. Justus, Amanda M. Agnew and Sam D Stout\*\*\* (The Ohio State University)

An unidentified lesion on the superior medial orbitofrontal of a skeleton from an early medieval (XI-XIIth century) cemetery in Giecz, Poland, is described. Skeleton 82/01 is an adult male with an estimated age of 35-45 years. The defect is a deep depression in the superior medial corner of the left orbit. It exhibits thick, inactive, smooth margins and a smooth inner wall. Upon gross examination, there is no indication that it continues into the inner table. However, radiographs reveal absence of a left frontal sinus in this location. Differential diagnosis based on a review of clinical and paleopathological literature is discussed. This includes cholesterol granuloma, epidermoid cholesteatoma, hydatid cyst, subconjunctival epithelial cyst, and congenital absence of frontal sinus. An additional lesion, healed possible blunt force trauma, is also present. This is an eraser-head sized depression on the left superior frontal. It is unknown if the defects are related, however, cholesterol granuloma and epidermoid cholesteatoma are most often a result of blunt force trauma to the skull.

### **MASTOIDITIS IN CRETAN CRANIAL REMAINS FROM THE 1<sup>ST</sup> - 2<sup>ND</sup> CENTURY A.D.**

Debra A. Kasson-Jones, Susan Kirkpatrick Smith\*\*\* (Kennesaw State University, USA)

An analysis of a human cranium from Agios Nikalous, Crete, Greece is described. This adult male had what appears to be a history of chronic mastoiditis. The right mastoid process demonstrates osteoclastic activity in the bone and the petrous portion exhibits signs of bone remodeling. This cranium also had three separate and distinct indentions, which did not appear to have any involvement with the mastoiditis. This case is interesting since the majority of cases of mastoiditis in the paleopathological literature are from juveniles, and not in adults. Funding for the research was provided by the Center for Excellence in Teaching and Learning at Kennesaw State University, Kennesaw, Georgia.

## **CRANIAL SURGERY IN THE EARLY NEOLITHIC OF GERMANY – A PROBABLE TREPANATION**

S. Klingner<sup>1,2</sup> and M. Schultz<sup>3\*\*\*</sup>

<sup>1</sup>Leipzig School of Human Origins – IMPRS, Germany,

<sup>2</sup>Institute of Prehistory, University of Leipzig, Germany,

<sup>3</sup>Department of Anatomy, University of Goettingen, Germany

Ever since the first correctly identified, interpreted and accepted trepanation - in the Inca skull which Squier discovered in Peru - from Broca in the 1860s, people have been fascinated by such cranial manipulations and their purposes. Trepanations have been found since the Natufien, in Palestine 12,000 years B.C. and later from all over the world (Arnott et al. 2003, Squier 1877). The population from Central Germany studied is the linear pottery culture (Linearbandkeramik, LBK) from Wandersleben (5600 B.C.) with 115 individuals. An early mature woman showed at least two traumas in her skull. One of them in the frontal bone is round and has a bulging rim. All the morphological features of this lesion are very suspicious of a surgical event.

In Europe, more than 400 cases of trepanations are known and most of them were found in France. The earliest European cases of healed trepanations date from the Mesolithic period in the Ukraine (Lillie 1998) and the early Neolithic period in France (Alt 1997, Probst 1991, Walkowitz 2003). This is together with the other known cases, one of the few earliest trepanations in Central Europe and the oldest trepanation in the first tillers in Central Germany.

## **CAUTERIZATION – PROOF OF MEDICAL CARE IN LATE MEDIEVAL GERMANY**

Katrin Koel<sup>1\*\*\*</sup>, Eberhard May<sup>2</sup> and Michael Schultz<sup>1</sup>

<sup>1</sup>University of Goettingen, Germany

<sup>2</sup>University of Braunschweig, Germany

The excavation of the imperial tomb of the emperor Lothar III in the church of Koenigslutter, Germany, has also brought four unknown late medieval skeletons to light. These skeletons were examined by macroscopic, endoscopic, radiological, light and scanning-electron microscopic techniques. This poster presents a description of one case of special interest. One old mature male skull has a depression in the region of the two parietal eminences which grooves the skull roof and led to an inflammation of the bone surface. The grooves have similar forms and sizes, they are oval and about 20 mm in diameter. The depth of the grooves is 4-5 mm. There is a smooth, rounded wall around each groove with new formation of bone and there are secondary signs of bone inflammation which clearly show that these changes did not cause the patient's death. These grooves do not represent a disease but rather an artefact. They are both marks of a cauterization. The part of the frontal bone which is close to the *Sutura coronalis*, and both parietal bones also show traces of an inflammatory process with a scarred newly built formation on the surface due to a healed inflammation of the *Galea aponeurotica*. The light microscopic analysis of bone samples shows that there was first an inflammation of the *Galea aponeurotica*, probably caused by wounds which were infected by bacteria. Secondly there was a cauterization which is proof of medical care in the late medieval period which led to the healing of this inflammatory process.

## PALEOPATHOLOGY OF AN EARLY ARCHAIC SKELETAL SAMPLE FROM KOSTER MOUNDS, LOWER ILLINOIS RIVER VALLEY

Kathryn E. D. Kulhavy<sup>1</sup>, Jane E. Buikstra<sup>2</sup>, Lori Wright<sup>3</sup> and James Brown<sup>4\*\*\*</sup>

<sup>1</sup>San Diego State University;

<sup>2</sup>Arizona State University;

<sup>3</sup>Texas A & M University;

<sup>4</sup>Northwestern University

The Koster Mounds site, located in Greene County, Illinois, was excavated in the 1970s by Gregory Perino. Horizon 11 (n=9), dated to 10,000 to 8,000 B.P., at Koster Mounds represents one of the oldest skeletal series in North America. In examining the paleopathological conditions of the individuals from this Horizon, it is possible to gain a better understanding of Early Archaic burial practices in the Lower Illinois River Valley. A detailed analysis of the paleopathology of these Early Archaic individuals indicates that their mortuary pattern is similar to that of the Middle Archaic period in the Lower Illinois River Valley. Nine individuals were assessed to determine their age, sex, and the presence of any pathological conditions. The five adults in the sample were all older adults (35+) with significant pathological lesions including extreme wear of the teeth, abscesses, osteoarthritis, periostitis and others which include a severe abnormality of the lower legs, perhaps due to trauma. The remaining four individuals in the sample were infants, all under the age of six months, one of which also exhibited pathological conditions. Analysis of these individuals gives evidence to support earlier research (Brown and Price 1985, Charles and Buikstra 1983, Wright 1988) of the differential burial treatments existing during the Early and Middle Archaic periods of the Lower Illinois River Valley.

### References:

Brown JA, Price TD. (eds.), 1985. *Prehistoric Hunter-Gatherers: The Emergence of Cultural Complexity*. New York: Academic Press.

Charles DK, Buikstra JE. 1983. Archaic mortuary sites in the central Mississippi drainage: distribution, structure, and behavioral implications. In *Archaic Hunters and Gatherers in the American Midwest*, edited by J. L. Phillips and J. A. Brown, pp. 117-145. New York, NY: Academic Press.

Wright L. 1988. *An Analysis of Early Archaic skeletal remains from Horizon 11 at the Koster Site, Illinois*. Unpublished paper, Department of Anthropology, University of Chicago.

## ECHINOCOCCOSIS IN AN 18th CENTURY GRAVE IN NORTHERN NORWAY

Niels Lynnerup, Signe Riddersholm, Ole F. Nielsen (University of Copenhagen, Denmark)

Evidence of echinococcosis was found in a grave of a young man dating to the 18th century. The burial was part of an early Saami Christian graveyard, located in the northernmost part of Norway. The man was probably 25 years of age at death. The bones of the cranial vault were quite thin, and there was some skewness associated with the skull. The skull had been opened by a saw, as seen in standard autopsy procedures. Remains of two rounded, calcified structures were found in the abdominal region. The concretions measured ca 2cm in diameter, and had a smooth, but lobular, outer surface, with a more irregular inner surface. Raman spectroscopy revealed that the main component was apatite, indicating that the concretions represent calcified tissue. We discuss several differential diagnoses for the concretions based on the morphology of the concretions and the chemical composition, but find that they most probably represent calcified cysts associated with *echinococcosis alveolaris*. Echinococcosis is present in Northern Scandinavia, with wolves and reindeer being sylvatic hosts.

## **OBELIONIC CRANIAL DEFORMATION IN THE AMERICAN SOUTHWEST**

Felicia C. Madimenos and Greg C. Nelson (University of Oregon, USA)

As a form of cranial deformation, obelionic flattening is rare. Originally named and described by Stewart (1939), based on a small sample from Florida, it has been little noted since. Previously (Nelson and Madimenos, 2007) we reported the discovery of two individuals from the Pueblo III Gallina site of Cañada Simon I who exhibit flattening of this type. Although technically undescribed in the Southwest prior to now there are tantalizing clues in the literature that it occurred in low frequencies at Pecos Pueblo (Hooton, 1930), Lowry Ruin (von Bonin, 1936), and other sites. To determine whether the obelionic flattening found at Cañada Simon I was isolated or an indication of a more widespread phenomenon we undertook a survey of crania from other Gallina sites, Chaco Canyon, and the literature (type of deformation can be determined on lateral photographs of crania properly positioned along the Frankfort Horizontal). Seventy-eight crania (57 Gallina, 21 Chaco) were examined firsthand of which five (all Gallina) exhibit obelionic flattening. Combining this with information gleaned from the literature it becomes clear that obelionic flattening should be added to the suite of cranial deformations that occur in the Southwest. Here we propose parameters by which obelionic flattening can be described and differentiated from the more common lambdoidal and occipital forms and suggest that the three types of flattening form a continuum of cradleboard induced deformation, although the exact mechanism for obelionic flattening remains elusive.

### **References**

- Hooton EA (1930) *The Indians of Pecos Pueblo: A Study of their Skeletal Remains*. New Haven: Yale University Press.
- Nelson GC and Madimenos FC (2007) Unusual cranial deformation in a Gallina skeletal series. Paper presented at the PPA annual meeting 2007.
- Stewart TD (1939) A new type of artificial cranial deformation from Florida. *J. Wash. Acad. Sci.* 29:460-465.
- Von Bonin G (1936) Skeletal material from the Lowry area. In PS Martin, *Lowry Ruin in Southwestern Colorado*. Chicago: Field Museum of Natural History, Anthropological Series, Vol. 23, No. 1, pp. 143-178.

## **PALEOPATHOLOGY OF SYSTEMIC BIOLOGICAL STRESS: AN EXAMINATION OF LINEAR ENAMEL HYPOPLASIA IN THE LATE PRE- HISPANIC AND COLONIAL LAMBAYEQUE VALLEY COMPLEX, PERU (AD 900-1750)**

S.A Martin<sup>1</sup>, H.D. Klaus<sup>1,2,3</sup>, M.E. Tam<sup>4</sup>

<sup>1</sup>The Ohio State University, USA;

<sup>2</sup> Museo Nacional Sicán, Peru;

<sup>3</sup> Museo Nacional de Arqueología y Etnografía Hans Henrich Brüning, Perú;

<sup>4</sup> Universidad Nacional de Trujillo, Peru

Teeth, in their structure and morphology, document a remarkable range of information of a human being's life history and experiences of their social world. Linear enamel hypoplasia (LEH) is a non-specific marker of systemic subadult metabolic stress recorded in the enamel of deciduous and adult dentition. Accordingly, LEH represents a critical investigative tool in bioarchaeological reconstructions of population health status. Here, we examine LEH prevalence patterns to test the hypothesis that European contact heightened morbidity among the indigenous Mochica population of the Lambayeque Valley, north coast Peru. LEH was scored among 175 late pre-Hispanic (AD 900-1475) and 154 Colonial Mochica (AD 1548-1751) adult individuals. As age structures differed between samples, multivariate odds ratios evaluated prevalence.

Contrary to our hypothesis, a significantly higher overall LEH prevalence was observed among the precontact group as LEH decreased over time into the Middle/Late Colonial period. Examination by sex reveals a trend towards greater childhood stress experienced by Colonial males. Given ethnohistoric understandings of chronic biosocial stress in Colonial Peru and a host of other bioarchaeological data indicating increased morbidity, LEH prevalence may not in fact represent improved health. We consider alternative hypotheses, including the possibility of biocultural adaptations to stress and the possible change from survivable precontact childhood insults to acute, epidemic-related postcontact stress in where the ill did not survive stress events to form LEH defects.

### **ANENCEPHALY IN THE DAKHLEH OASIS, EGYPT**

Stevie L. Mathews and Tosha L. Dupras\*\*\* (University of Central Florida)

The inclusion of human fetal skeletons in the archaeological record can reveal much about past cultures' perception of life and death. The discovery of a fetal skeleton from a Roman period cemetery (c. 150 AD – 450 AD) in the Dakhleh Oasis, Egypt, displays what are thought to be classic skeletal indicators of the neural tube defect, anencephaly. The preservation of fetal remains in the archaeological record is a rarity, and the discovery of pathological skeletons is even rarer. As of December 2005, a total of 643 individuals have been excavated, of which 78 are fetal/infant burials (Tocheri et al., 2005). The purpose of this study is to create a standard from which researchers can determine the presence of anencephaly in the archaeological record, thus ruling out trauma or taphonomic processes as reason for missing cranial elements. A comparative analysis of nine documented anencephalic skeletal remains housed at the Smithsonian Institute was conducted to determine if this individual did indeed have anencephaly. Gestational ages of the nine anencephalic fetuses analyzed for this study were verified using Scheuer and Black (2000). The comparative analysis supports the diagnosis of anencephaly in the skeleton from the Dakhleh Oasis, Egypt. Because children are a significant portion of a population's demography, the purposeful burial of a premature fetus born with alarming malformations, provides archaeologists with insight into cultural ideals of childhood.

#### **References:**

- Tocheri M, Dupras TL, Sheldrick P, Molto JE. 2005. Roman Period Fetal Skeletons from the East Cemetery (Kellis 2) of Kellis, Egypt. *International Journal of Osteoarchaeology*. 15(5): 326.
- Scheuer L, and Black S. 2000. *Developmental Juvenile Osteology*. London: Academic Press.

### **A SCAPULA DEFORMITY IN TWO BURIALS FROM MEDIAEVAL ENGLAND**

Simon Mays (Ancient Monuments Laboratory, English Heritage, Fort Cumberland, UK)

A scapula malformation is described in two burials from the site of the late Mediaeval Dominican friary at Ipswich, England. The changes appear most consistent with primary scapular neck dysplasia. One of the burials also showed clear signs of leprosy. The burials are of lay benefactors of the friary. The Ipswich Dominican friary had no known function as a leprosy hospital. Finding of burials of lepers other than in burial grounds of leprosaria is highly unusual in Mediaeval England. Scapular neck dysplasia has a strong genetic component in its aetiology. This, coupled with its rarity, suggests a close genetic link between the two burials. The findings suggest that in this case, family ties with the friary over-rode the normal Mediaeval custom of interring lepers in leprosy hospitals. This illustrates that even rare skeletal variants may convey useful biocultural information about past populations.

## **PERIOSTEAL REACTION IN MEDIEVAL POPULATIONS FROM ENGLAND: ISSUES OF SEX AND GENDER**

B.M. Morgan and A.L. Grauer (Department of Anthropology, Loyola University, Chicago, USA)

As an indicator of systemic or localized infection, inflammation, or hemorrhagic processes, periosteal reaction on long bones have often been used to infer the presence of stress within populations. Collecting reported incidences of periosteal reaction from 46 medieval archaeological populations in England, the goal of this study was to determine if lesion frequency differed between women and men, and if the data could be used to make inferences about the social roles and lives of women. The results indicate that out of 17,217 individuals included in skeletal reports 1910 (9%) were recorded as displaying periosteal reaction. Of the 362 individuals displaying periosteal reaction for whom sex could be determined (and was reported), 141 (39%) were female and 221 (61%) were male (statistically significant  $p < .0001$ ). Within each sex it appears that 15.8% (141/892) of all females displayed periosteal reaction, while 17% (221/1296) of all males displayed the lesion. Although sample sizes decrease appreciably when both age and sex of the skeletons are assessed alongside lesion frequency, it appears that the greatest difference between frequency rates occurs within the age-at-death category 18-25 years old, with 10% of all females in that age group, and 32% of all males in that age group displaying periosteal lesions. These data along with historical and archaeological records are used to infer the potential sources of stress within the populations, with emphasis placed upon the possible roles that gender, environment and social conditions might play.

## **SACRAL VARIABILITY IN A HISTORIC BRITISH SKELETON**

Mindy Pitre\*\*\* (University of Alberta, Canada)

An examination of skeletal remains from the Kingston-upon-Thames Quaker skeletal collection (1663-1814 CE) revealed an adult female who exhibited a mild form of a rare defect of the sacrum, likely either hemimetamere hypoplasia (wedge vertebra) or sacral agenesis, two developmental defects that occur during foetal growth. Whereas this defect is interesting from an embryological, genetic, and palaeopathological perspective, it would have resulted in few, if any, clinical symptoms for the individual. This case, which may be the first ever documented in the palaeopathological record, adds to our knowledge of sacral morphological variability and will aid in future diagnoses of these rare pathological conditions.

## **IDENTIFICATION OF PSEUDOPATHOLOGY USING SCANNING ELECTRON MICROSCOPY AND ENERGY DISPERSIVE SPECTROSCOPY**

Wendy Potter<sup>1</sup> and Heather Edgar<sup>1,2\*\*\*</sup>

<sup>1</sup>Department of Anthropology, University of New Mexico, USA

<sup>2</sup>Maxwell Museum of Anthropology, University of New Mexico

In any evaluation of the health status of individuals drawn from cemetery samples, it is important to determine if observed skeletal features represent the manifestation of pathological conditions or pseudopathology. This presentation will address the value of scanning electron microscopy and energy dispersive spectroscopy (EDS) for differentiating between taphonomic effects and pathological conditions. The skeletal remains of two individuals excavated from the historic Alameda Camposanto (Albuquerque, NM) exhibited similar features of unknown origin: a crystalline structure embedded on bony matrix. Upon gross examination, it was unclear whether they were adhering to or originating from bone. To further investigate their nature and potential origin, surface topography was scanned using a backscattered electron detector (BSE). Chemical elements composing the sample were identified and quantified using EDS (x-ray

microanalysis). BSE images of the feature indicated that the crystalline structures had distinct boundaries and were adhering to underlying cortical bone. EDS spectra identified elements suggestive of gypsum, sand, caliche, and clay. Based on these data, the features consisted of a matrix composed of typical New Mexico soil constituents and crystals adhering to and forming on irregular surfaces of bone (i.e. woven bone and/or foramina); such locales created a surface conducive to both the capture of particles in the depositional environment and larger than normal crystal formation. Results are consistent with taphonomic origin for these crystal formations, indicating pseudopathology rather than a pathological condition, developmental anomaly, or human artifact.

### **USING 3D IMAGING TO IDENTIFY CURVATURE OF THE SPINE OF A GERMAN PEAT BOG BODY AS PATHOLOGIC OR PSEUDOPATHOLOGIC**

James Schanandore and Heather Gill-Robinson\*\*\* (North Dakota State University, USA)

The objective of this research was to determine if a curvature evident in the spine of an Iron Age peat bog mummy is pathologic or pseudopathologic. Three-dimensional models created using medical imaging software shows that there is a lateral curve to the spine, but the cause of the curvature is unclear. Rendswühren Man is a well-preserved adult male body recovered from a peat bog in Schleswig-Holstein in 1871. Autopsy at the time of excavation failed to note evidence of the spinal curvature. Bog bodies are subject to severe taphonomic processes resulting in bone demineralization and distortion. The use of medical imaging to reconstruct individual vertebrae allowed an in-depth, non-invasive analysis of the spinal column of the Rendswühren Man. Initial analysis of the spine shows that abnormalities at the ninth thoracic vertebra, as well as the first and second lumbar vertebrae are present. It is suggested that the curvature of the spine of the Rendswühren Man may be pathologic in origin.

### **A MIDWESTERN PERSPECTIVE ON RITUAL USE OF HUMAN BONE**

Shirley J. Schermer<sup>1</sup>, Robin M. Lillie<sup>1</sup>, Eve A. Hargrave<sup>2</sup> and Kristin M. Hedman<sup>2</sup>

<sup>1</sup>University of Iowa, Office of the State Archaeologist

<sup>2</sup>University of Illinois, Illinois Transportation Archaeological Research Program

Isolated, culturally modified, human bone appears in the Midwestern United States as early as the Archaic and continues throughout the prehistoric period. Most studies have focused on modifications such as cut marks and decapitation as evidence of violence and trophy taking (Chacon and Dye 2007), or dismemberment associated with mortuary processing. Alternate interpretations can be offered for modifications such as polishing, etching, drilling, and cut-out rondels. Specific examples of these types of modifications are described and illustrated. Discussions of archaeological context, skeletal patterning, and ethnographic accounts suggest protective, ritual, or ornamental roles within the broader cultural context of the times. While this poster focuses on examples from Illinois and Iowa, the authors propose a broader regional perspective to examine the range and variation of culturally modified human remains.

#### **Reference:**

Chacon, Richard J. and David H. Dye (2007). *The Taking and Displaying of Human Body Parts as Trophies by Amerindians*. Springer, New York.

### **A SHAPE ANALYSIS OF CALVARIA PRESENTING THE SUPRAINIAC FOSSA**

Susan Dale Spencer\*\*\*(Indiana University, Bloomington, USA)

A single fossa present on the occipital above the external occipital protuberance goes by many names. Charles Snow (1948) referred to it as the median occipital fossa at Indian Knoll, T.D Stewart (1971, 1976) called it a supra-inion depression among Pueblo groups, and Neanderthal researchers have used the term suprainiac fossa since the late 1970s. Among anatomically modern humans the fossa has been considered a pathological marker from cradleboarding, while among Neanderthals the fossa has been considered a biological marker. The presence of this unique trait among artificially deformed skulls of prehistoric North Americans and Neanderthals suggests that occipital shape may contribute to its manifestation. A landmark-based analysis was undertaken using Procrustes fitted landmark-coordinate data on modern human calvaria in norma lateralis. A principal components analysis (PCA) was performed on the landmarks. Examination of relative warp visualization plots and thin-plate splines are discussed. No significant difference ( $p < 0.05$ ) in the shape of the calvaria was found in groups with and without the suprainiac fossa using MANOVA and CVA visualizations. These results imply that archaic and modern human fossae share a similar etiology, and that the presence of the fossa is due to the hyperostosis of the occipital around the attachment sites of the epicranium and trapezius muscles.

### **DIABETES IN PALEOPATHOLOGY: EVIDENCE FOR PERIPHERAL NEUROARTHROPATHY IN A MIDDLE WOODLAND POPULATION FROM KLUNK MOUND**

Charity F. Taboas (Indiana University, USA)

Symptoms of diabetes are well documented in medical history, but there is no known documentation of diabetes in paleopathology. Peripheral neuroarthropathy is the most common known cause of changes in the bone in people with type 2 diabetes. This paper aims to identify evidence of peripheral neuroarthropathy in a Middle Woodland (150 BC – AD 400) population from Klunk Mound. One elderly male from Mound 2 had osteopenia, osteoarthritis, periostitis, and reactive bone lesions on both feet, key symptoms of peripheral neuroarthropathy. The identification of type 2 diabetes in paleopathology will influence further evaluations of a prehistoric populations' health.

### **DIFFERENTIAL DIAGNOSIS OF A NINETEENTH CENTURY BURIAL FROM MISSISSIPPI**

Andrew Thompson (The University of Southern Mississippi, USA)

In February of 2007, isolated skeletal remains were excavated after being exposed by construction activity in southwestern Mississippi. This resulted in the recovery of an adult female, aged in her early to mid twenties, accompanied by a newborn child. Although the facial bones were badly damaged, the burial context suggests individuals most likely of African-American ancestry dating to the mid-to-late nineteenth century. Further examination of the adult's bones revealed the presence of numerous unusual pathological lesions. The most obvious of these was a 46mm shortening of the right tibia along with the right femur showing slight diaphyseal bowing and uneven condylar height, resulting in a valgus angle being formed under articulation of the leg bones. The right foot was also affected, displaying a withered appearance of the tarsals and metatarsals. Bowing was also present on the right radius, but there were no obvious signs of healing or angulation, even radiographically, that would suggest trauma. Throughout the spine there were misshapen and disproportionate articular facets, although the



most significant changes were seen in the cervical area. Slight lytic activity was noted on the left parietal, as well as a beveled lambdoidal suture that formed an extremely uneven ectocranial surface height when articulated with the occipital bone. Since there appears to be no obvious cohesion of all pathological elements, a differential diagnosis of trauma along with the possibility of an underlying neurological condition was concluded.

### **POSSIBLE CASES OF SCALPING FROM PREHISPANIC HIGHLAND PERU**

J. Marla Toyne (Tulane University, USA)

For years, the prehispanic Chachapoya of highland Northern Peru have been known as the “Warriors of the Clouds”. Recent scholarship and a more detailed look at newly excavated osteological samples from the area allow us to better evaluate this reputation. In this poster, I describe one individual with evidence of cranial vault modification consisting of a large area of active inflammatory response of the outer table and cut marks encircling the affected area. There appears to be a small area of healing indicating short term survival. The second fragmentary skull demonstrates more advanced healing. The location and patterning of the cut marks are consistent with skulls of North American Indian examples of prehistoric and historic cases of scalping. While there are various examples of scalping for North American archaeological sites, I present this as the first osteological evidence reported from a prehispanic Andean context. Along with other evidence of interpersonal trauma, and cases of trepanation, these examples of a scalped adult female and male provide additional evidence that conflict was prevalent in the Late Prehispanic Chachapoya region and in rare cases may have involved trophy taking. While some upper Amazonian tribes are described by early ethnographers as practicing scalping and head hunting, no direct evidence exists to suggest that the Chachapoya had any contact with them.

### **LSAMAT AMONG NEOLITHIC NUBIANS: A METHOD FOR RECORDING PRESENCE AND DEGREE OF WEAR**

Erin Trainor\*\*\* (University of Pittsburgh, USA)

Abnormal tooth use, as seen when teeth are used as tools, can cause distinct patterns of wear that differ dramatically from patterns produced by normal chewing. Lingual surface attrition of maxillary anterior teeth (LSAMAT) is a tooth wear pattern where the enamel on the lingual surfaces of the anterior maxillary teeth shows marked wear that diverges significantly from abrasions associated with chewing. Several cases of this condition have been found in prehistoric populations around the world including Brazil, Panama, Senegal, and China (Turner and Machado 1983; Irish and Turner 1987, 1997; Pechenkina et al. 2002). A recording method was developed using a collection from Sudanese Nubia dated to the Neolithic Period. From these data, various forms of LSAMAT were documented and a scoring system was created. LSAMAT was observed in 28% of the 65 individuals in the collection. This condition was found to vary in number of teeth involved, percentage of enamel abraded from the lingual surface of the tooth, and in the shape and direction of wear. Three main types of lingual attrition patterns were found: vertical, horizontal, and irregular. This research builds on previous knowledge of LSAMAT that may lead to determining the possible etiologies of LSAMAT. As of yet, a strong conclusion of how or why this occurs has not been established, but this research suggests possible manipulation of plant or animal material using the anterior maxillary teeth as the cause.

#### **References**

Irish JD, Turner CG. 1987. More Lingual Surface Attrition of the Maxillary Anterior Teeth in American Indians: Prehistoric Panamanians. *Am J Phys Anthropol* 73:209-213.

- Irish JD, Turner CG. 1997. Brief Communication: First Evidence of LSAMAT in Non-Native Americans: Historic Senegalese From West Africa. *Am J Phys Anthropol* 102:141-146.
- Pechenkina EA, Benfer RA, Zhijun W. 2002. Diet and Health Changes at the End of the Chinese Neolithic: The Yangshao/Longshan Transition in Shaanxi Province. *Am J Phys Anthropol* 117:15-36.
- Turner CG, Machado LM. 1983. New Dental Wear Pattern and Evidence for High Carbohydrate Consumption in a Brazilian Archaic Skeletal Population. *Am J Phys Anthropol* 61:125-130.

### **BAKERS' EARLY MANIFESTATIONS OF TUBERCULOSIS, IS IT WORTH RECONSIDERATION?**

Catrina Banks Whitley\*\*\* (Southern Methodist University, USA)

Evidence of tuberculosis is found at numerous prehistoric sites throughout the American Southwest (Roberts and Buikstra, 2003: 190-191). With a mean age at death of 24 years in prehistoric Southwest groups (Stodder, et.al., 2002), it is essential that the identification of early manifestations of tuberculosis be identified in order to fully assess the extent to which this disease affected those populations. Baker (1999) suggested that changes to the spine accompanied with periostitis of the ribs represent early manifestations of tuberculosis. Though there are alternative diagnoses of the spinal lesions identified by Baker (Roberts and Buikstra, 2003:127), the presence of lesions matching Bakers' criteria in a young adult male from Pot Creek Pueblo (A.D. 1200-1320) suggest that such skeletal manifestations need to be reconsidered and further investigations into the frequency of similar lesions be undertaken. Identifying such early manifestations through visual inspection will become increasingly important, particularly in North America, due to the increasing limitations on DNA and laboratory analysis of skeletal material of Native American descent. This poster will discuss the criteria designated by Baker (1999), and compare the lesions to those found in the young adult male from Pot Creek Pueblo.

#### **References**

- Baker BJ. (1999) "Early Manifestations of Tuberculosis in the Skeleton". In G Palfi, O Dutour, I Deak, and I Hutás (eds) *Tuberculosis: Past and Present*. Budapest/Szeged: Golden Book Publishers and Tuberculosis Foundation, pp. 301-307.
- Roberts CA and JR Buikstra (2003) *The Bioarchaeology of Tuberculosis: A Global View on a Reemerging Disease*. Gainesville, FL: University Press of Florida.
- Stodder ALW, Martin DL, Goodman AH, and DT Reff (2002) "Cultural Longevity and Biological Stress in the American Southwest". In Steckel RH and JC Rose (eds) *The Backbone of History*. Cambridge: Cambridge University Press, pp. 481-505.

**List of Authors**

Agelarakis, Anagnostis P. Adelphi University, USA. agelarak@adelphi.edu  
Agnew, Amanda M. The Ohio State University, USA and The Slavia Foundation.  
agnew.17@osu.edu  
Armstrong, George. Emory University, USA. antga@learnlink.emory.edu  
Bailey, Yvette. Quinnipiac University, USA.  
Beckett, Ronald. Quinnipiac University, USA. ronald.beckett@quinnipiac.edu  
Bennike, Pia. University of Copenhagen, Denmark. bennike@antrolab.ku.dk  
Bolotin, Shelly. Department of Molecular Diagnostics, Ontario Ministry of Health and Long-  
Term Care, Etobicoke, Ontario, Canada.  
Böni, Thomas. University of Zurich, Switzerland, Orthopedic University Clinic Balgrist,  
thomas.boeni@balgrist.ch  
Bonner, Alyssa. Forensic Science Program, Cedar Crest College, Allentown, PA, USA.  
Boylston, Anthea. University of Bradford, UK. A.Boylston@bradford.ac.uk  
Brickley, Megan. University of Birmingham, UK. m.b.brickley@bham.ac.uk  
Brown, James. Northwestern University, USA.  
Buikstra, Jane E. Arizona State University, USA. buikstra@asu.edu  
Buzon, Michele R. Purdue University, USA. mbuzon@purdue.edu  
Collier, Larissa. Indiana University at Bloomington, USA. lmcollie@indiana.edu  
Conlogue, Gerald. Quinnipiac University, USA. gerald.conlogue@quinnipiac.edu  
Cook, Della Collins. Indiana University, USA. cook@indiana.edu  
Cooper, Lisa. School of Conservation Sciences, Bournemouth University, UK.  
Cope, Darcy J. University of Central Florida, USA. djcope@mail.ucf.edu  
Czaplinski, Craig. Imaging Center at Good Shepard, Allentown, PA, USA.  
de la Cova, Carlina M. Indiana University at Bloomington, USA. kramanan@indiana.edu  
De Meyer, Marleen. Katholieke Universiteit Leuven, Belgium.  
Dougherty, Sean P. Indiana University, USA. sepdough@indiana.edu  
Drew, Rose. University of York, UK. mrd501@york.ac.uk  
Dupras, Tosha. University of Central Florida, USA. tdupras@mail.ucf.edu  
Edgar, Heather. Department of Anthropology, University of New Mexico, USA  
Maxwell Museum of Anthropology, University of New Mexico, USA.  
Flohr, Stefan. University of Goettingen, Germany. flohrs@uni-hildesheim.ed  
Foley, Allison. Indiana University, USA. ajfoley@indiana.edu  
George, Robert. Coordinate Center for Infectious Diseases, US Centers for Disease Control and  
Prevention, Atlanta, Georgia, USA.  
Gill-Robinson, Heather. North Dakota State University, USA. Heather.Gill-Robinson@ndsu.edu  
Grauer, AL. Department of Anthropology, Loyola University, Chicago, USA. agrauer@luc.edu  
Gresky, J. University of Goettingen, Germany. juliagresky@yahoo.de  
Hapiot, Laurence. Paris 1 Pantheon-Sorbonne University, France. lhapiot@yahoo.fr  
Hargrave, Eve A. University of Illinois, Illinois Transportation Archaeological Research  
Program, USA. ehargrave@uiuc.edu  
Harper, Kristin N. Emory University, USA. knharpe@emory.edu  
Harvig, Lise. Laboratory of Biological Anthropology, Institute of Forensic Medicine, University  
of Copenhagen, Denmark.  
Hedman, Kristin M. University of Illinois, Illinois Transportation Archaeological Research  
Program, USA.  
Henderson, CY. Durham University, UK. c.y.henderson@durham.ac.uk

Hernandez, Mauricio. Queens College/CUNY, USA. maurih00@gmail.com  
Jeney, Zsuzanna. University of Maryland, USA.  
Judd, Margaret A. University of Pittsburgh, USA. mjudd@pitt.edu  
Justus, Hedy M. The Ohio State University, USA and The Slavia Foundation,  
justus.26@osu.edu  
Kaestle, Frederika A. Indiana University, USA.  
Kasson-Jones, Debra A. Kennesaw State University, USA. debrakasson@bellsouth.net  
Kishbaugh, Janine. Forensic Science Program, Cedar Crest College, Allentown, PA, USA.  
Klaus, HD. Department of Anthropology, The Ohio State University, USA and Museo Nacional  
Sicán, Peru and Museo Nacional de Arqueología y Etnografía Brüning, Peru.  
klausha@uvu.edu  
Klingner, S. Leipzig School of Human Origins – IMPRS, Germany. Institute of Prehistory,  
University of Leipzig, Germany. Susan.Klingner@paleopathology.info  
Koel, Katrin. University of Goettingen, Germany. katrin.koel@arcor.de  
Kulhavy, Kathryn ED. San Diego State University, USA. Willow1567@aol.com  
Li, Jiazi. Quinnipiac University, USA. jiazi.li@quinnipiac.edu  
Lillie, Robin M. University of Iowa, Office of the State Archaeologist, USA.  
robin-lillie@uiowa.edu  
Liu, His. Coordinate Center for Infectious Diseases, US Centers for Disease Control and  
Prevention, Atlanta, Georgia, USA.  
Lynnerup Niels. Laboratory of Biological Anthropology, Institute of Forensic Medicine,  
University of Copenhagen, Denmark. n.lynnerup@antrolab.ku.dk  
Madimenos, Felicia C. University of Oregon, USA. fmadimen@uoregon.edu  
Martin, SA. The Ohio State University, USA. martin.1451@osu.edu  
Mathews, Stevie. University of Central Florida, USA. stevie.mathews@gmail.com  
May, Eberhard. University of Braunschweig, Germany.  
Mays, Simon. Ancient Monuments Laboratory, English Heritage, Fort Cumberland, UK.  
simon.mays@english-heritage.org.uk  
Millward, Georgia. Indiana University, USA. gmillwar@indiana.edu  
Morgan, BM. Department of Anthropology, Loyola University, Chicago, USA.  
Nelson, Greg C. University of Oregon, USA. gcnelson@uoregon.edu  
Nielsen, Jens. Aalborg Historical Museum, Denmark.  
Nielsen, Ole Faurskov. University of Copenhagen, Denmark.  
Ocampo, Paolo. Emory University, USA.  
Papageorgopoulou, Christina. University of Basel, Switzerland and University of Zurich,  
Switzerland. christina.p@anatom.unizh.ch  
Pechenkina, Ekaterina. Queens College/CUNY, USA.  
Peeters, Christoph. Katholieke Universiteit Leuven, Belgium.  
Pillay, Allan. Division of Sexually Transmitted Diseases Prevention, US Centers for Disease  
Control and Prevention, Atlanta, Georgia, USA.  
Pitre, Mindy. University of Alberta, Canada. pitre@ualberta.ca  
Posh, John. Imaging Center at Good Shepard, Allentown, PA, USA.  
Potter, Wendy. Department of Anthropology, University of New Mexico, USA.  
wpotter@unm.edu  
Quarino, Lawrence. Forensic Science Program, Cedar Crest College, Allentown, PA, USA.  
Raff, Jennifer A. Indiana University, USA. jkedzie@indiand.edu  
Riddersholm, Signe. University of Copenhagen, Denmark.

Rühli, Frank J. University of Zurich, Switzerland. frank.ruhli@anatom.unizh.ch  
Saunders, Nigel. Dept. of Microbiology, Mount Sinai Hospital, Toronto, Ontario, Canada.  
Schanandore, James. North Dakota State University, USA. James.Schanandore@ndsu.edu  
Schermer, Shirley J. University of Iowa, Office of the State Archaeologist, USA.  
shirley-schermer@uiowa.edu  
Schmidt-Schultz, TH. University of Goettingen, Germany.  
Schultz, Michael. Department of Anatomy, University of Goettingen, Germany.  
Silverman, Michael. University of Toronto, Canada.  
Smith, Martin. University of Birmingham, UK. m.smith.6@bham.ac.uk  
Smith, Susan Kirkpatrick. Kennesaw State University, USA.  
Spencer, Susan Dale. Indiana University, Bloomington, USA. sdspence@indiana.edu  
Steiner, Bret. Coordinate Center for Infectious Diseases, US Centers for Disease Control and  
Prevention, Atlanta, Georgia, USA.  
Stifter, Eva Nadine. University of Goettingen, Germany.  
Stout, Sam D. The Ohio State University, USA. stout.126@osu.edu  
Sullivan, Norman C. Marquette University, USA.  
Taboas, Charity F. Indiana University, USA. cupson@indiana.edu  
Tam, M. Universidad Nacional de Trujillo, Peru.  
Thompson, Andrew. The University of Southern Mississippi, USA.  
AndrewRThomp@gmail.com  
Timm, Mary Beth. Western Michigan University, USA. mbtimm@gmail.com  
Toyne, J. Marla. Tulane University, USA. jtoyne@tulane.edu  
Trainor, Erin. University of Pittsburgh, USA. emt19@pitt.edu  
Vanthuyne, Bart. Katholieke Universiteit Leuven, Belgium.  
Verano, John W. Tulane University, USA. verano@tulane.edu  
Wenquan, Fan. Henan Institute for Cultural Relics, China.  
Wentz, Rachel K. The Florida Public Archaeology Network, USA. wentzr@brevardcc.edu  
Whitley, Catrina Banks. Southern Methodist University, USA. cwhitley@mail.smu.edu  
Wilczak, Cynthia A. San Francisco University, USA. cwilczak@sfsu.edu  
Wright, Lori. Texas A & M University, USA. lwright@tamu.edu  
Zuckerman, Molly K. Emory University, USA.

**Committee for the 35<sup>th</sup> Annual Meeting (North America)**

Megan Brickley (University of Birmingham – United Kingdom)  
Anne Katzenberg (University of Calgary – Canada)  
Niels Lynnerup (University of Copenhagen – Denmark)  
Ann L.W. Stodder (University of Wisconsin-Madison – USA)  
Sam Stout (The Ohio State University – USA)

**Session Chairs**

Michele Buzon (Purdue University, Indiana – USA)  
Tosha Dupras (University of Central Florida – USA)  
Anne Grauer (Loyola University – Chicago, IL – USA)  
Simon Mays (English Heritage Centre for Archaeology – United Kingdom)

**Student Volunteer Chair**

Lara McCormick