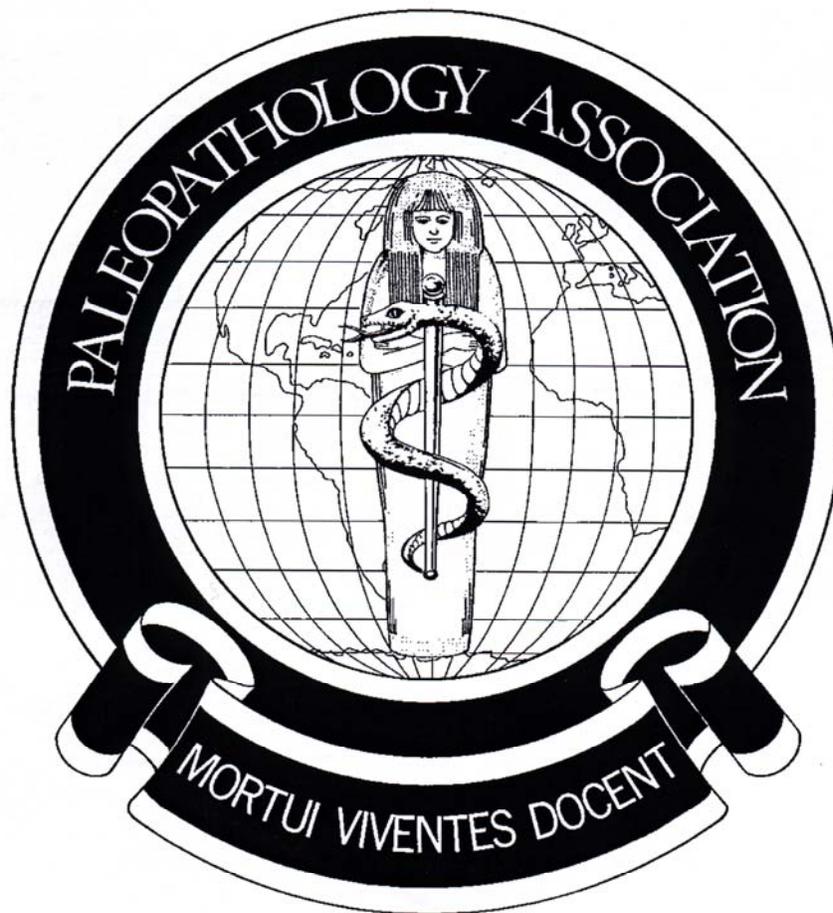


Supplement to *Paleopathology Newsletter*

PALEOPATHOLOGY ASSOCIATION

SCIENTIFIC PROGRAM
THIRTY-THIRD ANNUAL MEETING
(North America)



7-8 MARCH, 2006

ANCHORAGE, ALASKA

PALEOPATHOLOGY ASSOCIATION
33rd Annual North America Meeting
March 7 & 8, 2006
Anchorage, Alaska

SCIENTIFIC PROGRAM

TUESDAY MARCH 7TH

Morning Session (9am to 12 noon): Workshop

Standardizing the *Standards*: Computerized Documentation of Skeletal Pathology at the Smithsonian Institution (Stephen Ousley, J. Christopher Dudar, Erica Jones, Marilyn London, Gwyn Madden, Dawn Mulhern, and Cynthia Wilczak)

12-1:20pm: Let's Do Lunch, Snow Goose Restaurant

Afternoon Session I (1.30pm To 3.00pm) Chair: Dr. Christine D. White

1.30pm Announcements and session opening

1.45pm **Charlotte Roberts and Sarah Ingham** - Qualitative Analysis of Published Research Using aDNA Analysis to Diagnose Disease in Human Remains from Archaeological Sites: Potential and Problems to Address

2.00pm **Etty Indriati and Teuku Jacob** - The Dentition of the Rampasasa Pygmy and the Liang Bua Remains, Flores

2.15pm **Martin Smith and Megan Brickley** - "As Many Arrows Loosed Several Ways Come to One Mark" (Shakespeare) – Improving Identification of Lithic Projectile Trauma through Experimentation

2.30pm **Heather Gill-Robinson and Jonathan Elias** - The Palaeopathology of Pesed and Ta-Irty: Using Image Analysis to Examine and Interpret Two Wrapped Mummies from Ptolemaic Akhmim

2.45pm **Niels Lynnerup** - Bog Body (Pseudo) Pathology

3.00pm **Break for Refreshments**

Afternoon Session II (3.50pm To 4.45pm) Chair: Pat Lambert

3.15pm **Pia Bennike** - The Variation of Bone Changes in Syphilitic Skulls

3.30pm **Piers D. Mitchell and Rebecca Redfern** - Diagnostic Criteria for Developmental Dislocation of the Hip in Human Skeletal Remains

3.45pm **Simon Mays** - Age at Occurrence and Prevalence of Spondylolysis in an English Mediaeval Population

4:00pm **Tanya von Hunnius** - Paleohistopathology of Faunal Remains

4:15pm **T. Jacob, E. Indriati, D. W. Frayer, R. B. Eckhardt, A. J.**

Kuperavage, A. Thorne, M. Henneberg - A Case of Secondary Microcephaly from Liang Bua, Flores, Indonesia

5:00 Close of Session

The Chart Room

6:00-7:00 pm

Cocktails (Cash Bar)

7:00-8:30 pm

Social Dinner and Cash Bar

8:30-9.00 pm

Business Meeting, Closing Remarks, and Cash Bar

WEDNESDAY MARCH 8TH

Morning Session (8.50am To 10.15am) Chair: Dr Pia Bennike

- 8.50am Announcements
- 9.00am **Frank J. Rühli, Gisela Kuhn** - Human Bone Microarchitecture in Cases of Tuberculosis and its Differential Diagnoses - Visualized by Micro-CT
- 9.15am **Jessica A. Newnam and Megan A. Perry** - A Possible Calcified Undescended Testicle from 4th-5th Century A.D. Aqaba, Jordan
- 9.30am **Jennifer E. Spence, Shamsi Daneshvari and Heather J.H. Edgar** - A Rare Atlas Anomaly from Jemez, New Mexico
- 9.45am **Handan Üstündağ-Aydin** - A Possible Case of Scheuermann's Disease from Akarcay Höyük, Birecik, Urfa, Turkey
- 10.00am **Tori D. Heflin** - An Overview of Infectious Disease in the Hrdlička Paleopathology Collection at the San Diego Museum of Man

10.15am **Break for Refreshments**

10.20am- 12 Noon **Poster Session (authors to be present with their posters during this time for questions)**

12-1.30pm PPA Student Action Committee - Annual Meeting

12-1.30pm Lunch

Afternoon Session I (1.30pm To 2.45pm) Chair: Dr Simon Mays

- 1.30pm **Anagnostis Agelarakis** - Paros Polyandria and Paleopathological Inferences
- 1.45pm **Amy W. Farnbach, Alicia K. Wilbur, and Jane E. Buikstra** - Nutrition and the Paleopathology of Infectious Disease
- 2.00pm **Christine D. White, Jay P. Maxwell, Jocelyn S. Williams, and Fred J. Longstaffe** - Diet, Disease, and Ecology of Coastal Maya Following the Collapse
- 2.15pm **Patricia M. Lambert** - Infectious Disease among Enslaved African Americans at Eaton's Estate, Warren County, North Carolina, 1825-1850
- 2.30pm **M. Cassandra Hill** - Bioarchaeology and Human Osteology at the Hammonds Site, 1DK71, Fort Payne, Alabama

2.45pm **Break For Refreshments**

Afternoon Session II (3.00-4.30pm) Chair: Dr Frank J. Rühli

- 3.00pm **Rachel K. Wentz and Bryan D. Tucker** - Gauging Differential Health Between the Sexes at Windover (8br246) using the Western Hemisphere Health Index
- 3.15pm **Maria A. Rosado and Jessica Vernacchio-Wilson** - Paleopathology and Osteobiography of the Peoples of Penuelas, Chile's Semiarid North
- 3.30pm **Julia Fan** - Schmorl's Nodes: Implications for Occupational Stress and Gendered Division of Labor in a Late Medieval Population from York, England
- 3.45pm **Rebecca A Storm** - Medieval Deviants: Cranial Fluctuating Asymmetry Population Outliers*
- 4.00pm **Jerry C. Rose** - Paleopathology of the Commoners at Tell Amarna, Egypt, Akhenaten's Capital City
- 4.15pm Close of Meeting

*** Entry in the 2006 Cockburn Student Award Competition**

ABSTRACTS

SECTION 1: WORKSHOP

STANDARDIZING THE STANDARDS: COMPUTERIZED DOCUMENTATION OF SKELETAL PATHOLOGY AT THE SMITHSONIAN INSTITUTION

Stephen Ousley, J. Christopher Dudar, Erica Jones, Marilyn London, Gwyn Madden, Dawn Mulhern, and Cynthia Wilczak, Smithsonian Institution, USA

An important goal in paleopathological analysis is assessing relative measures of health and disease among groups. Having a common core group of observations is the key to establishing these comparisons, as is well illustrated in *The Backbone of History* (Steckel and Rose 2002). Buikstra and Ubelaker (1994) established scoring procedures for frequently encountered pathological conditions in their *Standards for Data Collection from Human Skeletal Remains*, written with repatriation concerns in mind. For over ten years, the staff of the Repatriation Osteology Laboratory in the National Museum of Natural History, Smithsonian Institution, has been entering skeletal data from Native Americans using a computerized data entry system for pathological conditions based on the *Standards*. The *Standards* emphasized description rather than diagnosis, and this general philosophy has been followed, or even extended, as in the recording of hyperostosis and porotic lesions on the cranium. As the analysis of remains at the Smithsonian has progressed, the system features have evolved based on the wide variety of pathological conditions encountered.

The most efficient method for comparing data among groups using multiple criteria is to use a relational database, rather than a simple spreadsheet. The data should also ideally be organized in a hierarchical fashion, so pathology categories can be queried at various levels of specificity. The challenge to these ideals is getting information into a database while minimizing data entry errors. In our system, errors are minimized largely through selecting text descriptions in a computer data entry screen rather than writing numerical codes on paper forms, as in the *Standards*. The bone or bone group (e.g., cervical vertebrae) is chosen by name, as are the side, aspects, and sections of bone affected. Pathological conditions are entered by mouse-clicking full text labels with either radio buttons (in which, as a group, only one may be checked; e.g., focal or diffuse), or checkboxes (which allow multiple selections; e.g., kyphosis AND scoliosis in the vertebral column). Our system incorporates a hierarchical scoring system necessary for group comparisons as well as the flexibility to record unique descriptive information for each lesion or condition. These descriptions are enabled through an unlimited length memo field, and a possible diagnosis can also be entered in the field too. No paleopathological data entry system may ever be “finished”, and this system is extensible in that new codes and text can be added. Also, pathological conditions not covered by the system can be entered using an “other” category and described.

The pathology data entry is part of an integrated system, which includes skeletal inventory, age and sex estimates, taphonomic observations, cranial and postcranial measurements, dental morphology traits, dental inventory/pathology/wear, skeletal nonmetric traits, macromorphoscopies, cultural modifications, and general summary information. We hope to make this system available soon to anthropologists at no cost. This workshop includes lectures with illustrative examples and discussion, and scoring of pathological conditions. Lecture topics will include: Overview, Size and Shape/Bone-Specific Anomalies, Vertebral Anomalies, Abnormal Bone Formation, Porotic Hyperostosis, Abnormal Bone Loss, Arthritis, Trauma, and Summary.

References

- Buikstra JE, Ubelaker DH. 1994. *Standards for Data Collection from Human Skeletal Remains*. Fayetteville: Arkansas Archaeological Survey.
- Steckel RH, Rose JC. 2002. *The Backbone of History: Health and Nutrition in the Western Hemisphere*. New York: Cambridge University Press.

SECTION 2: PODIUM PRESENTATIONS

PAROS POLYANDRIA AND PALEOPATHOLOGICAL INFERENCES

Anagnostis Agelarakis, Adelphi University, USA

Soldiers' remains found in two polyandria (burial urns containing remains of multiple individuals) at the cemetery near the ancient harbor of Paroikia, the chief city of the island of Paros, offer evidence of a forgotten battle fought around 730 B.C. The soldiers' burials offer some clues about the society of Paros and contemporary Greek cities. The remains of 120 individuals were deposited as single and/or multiple interments in decorated funerary vases. They were all males, aged 18 to 45 years at death. Despite bone fragmentation sustained during cremation and subsequent cultural and taphonomic processes, some of the remains show paleopathological manifestations including perimortem trauma on cranial and infracranial loci, some of which still preserve iron fragments embedded into endosteal surfaces. These collective burials, the earliest known in the ancient Greek world, provide testimony to the social conditions at the dawn of city state formation. That the dead were interred as a group rather than in individual family graves (the usual practice) suggests a state supported funeral of the sort first described by Thucydides in Athens 300 years later. This indicates their status as citizens and their inclusion in the workings of the city. Two of the burial vases show the earliest evidence of citizen soldiers fighting in cohesive units, in a phalangeal hoplitic formation. Clearly, Paros displayed the community identity and centralized decision-making processes characterizing an organized state by 730 B.C.

Reference

Zafeiropoulou, F, Agelarakis, A 2005. "Warriors of Paros". *Archaeology* 58 (1):30-35

THE VARIATION OF BONE CHANGES IN SYPHILITIC SKULLS

Pia Bennike, University of Copenhagen, Denmark

A study of 35 skulls in a 19th century collection of syphilitic patients from Denmark presents a wide variation of bone changes. Apart from the typical gummatous changes, which are most often illustrated in palaeopathological textbooks, there are also several cases of rather atypical bone changes. If the skulls were not known to come from syphilitic patients, differential diagnoses of some of the skull changes, such as healed traumatic lesions, tumours or unspecific osteitis/osteomyelitis would probably be suggested. The facial bone changes in some of the syphilitic skulls have furthermore been compared to the variation of facial bone changes in medieval leprosy skulls and to a single skull with changes due to lupus (skin tuberculosis). The similarities and dissimilarities are described and discussed.

SCHMORL'S NODES: IMPLICATIONS FOR OCCUPATIONAL STRESS AND GENDERED DIVISION OF LABOR IN A LATE MEDIEVAL POPULATION FROM YORK, ENGLAND

Julia Fan, University of Massachusetts, USA

The pathogenesis and prevalence of Schmorl's nodes (SN) were examined in an adult sample (n=65) from the late medieval cemetery of Fishergate House, York. Schmorl's nodes have traditionally been attributed to activity-related stress and used as a skeletal marker for occupational stress by anthropologists without consideration of their complex etiopathogenesis. An evaluation of potential causative factors for SN and intra- and inter-site differences in Schmorl's node prevalence and distribution suggest sex differences in SN frequency and distribution observed in the Fishergate House skeletal sample are not the result of biological sex differences. As gendered division of labor between males and females is well documented for medieval York, it is argued that the sex differences in frequency and distribution of Schmorl's nodes in the vertebral column between males and females from Fishergate House reflect sex differences in activity patterns for this late medieval population. These results support the use of Schmorl's nodes in studies of behavior and occupational stress.

NUTRITION AND THE PALEOPATHOLOGY OF INFECTIOUS DISEASE

Amy W. Farnbach, Alicia K. Wilbur, and Jane E. Buikstra, Arizona State University, USA

Within- and among-individual skeletal lesion prevalence due to infectious disease represents the confluence of a broad range of factors affecting the course and outcome of infectious processes. These comprise multiple influences both internal and external to the human body, including ecology, occupation, diet, nutrition, immune function, and genetics of both pathogen and host—many of which may be assessed through the archaeological record. Here, we explicitly explore the relative contributions of nutrition and immune function with respect to tuberculous skeletal lesions, reviewing recent clinical literature on two micronutrients pertinent to the course and outcome of tuberculosis (TB) infection, vitamin D and iron. We discuss the roles of vitamin D and iron in the immune response to TB, with particular emphasis on the ways in which each may influence the metastasis of TB bacilli to the skeleton and the formation of the lytic lesions characteristic of this disease in the paleopathological arena. We present hypotheses informed by this interplay among nutrition, immune function, and infectious disease, with the hope that such an interdisciplinary approach will enable us to better understand past cycles of disease, and better predict those in our future.

THE PALAEOPATHOLOGY OF PESED AND TA-IRTY: USING IMAGE ANALYSIS TO EXAMINE AND INTERPRET TWO WRAPPED MUMMIES FROM PTOLEMAIC AKHMIM

Heather Gill-Robinson, North Dakota State University, and Jonathan Elias, Akhmim Mummy Studies Consortium

To date, the Akhmim Mummy Studies Consortium (AMSC) has identified no fewer than twenty-five Akhmimic individuals in American and Canadian collections. The ancient names of many of these persons are known, and their genealogical profiles can often be reconstructed. As part of a larger program of research, several mummies from the city of Akhmim, Egypt have undergone Computed Tomography (CT) scanning. Analysis of the images of these mummies is providing insight into the age, sex and health of these individuals. This paper presents the preliminary assessment of the image analysis of two wrapped mummies from Ptolemaic Akhmim. Preliminary image analysis involved examination of the two-dimension CT images for sex determination, age estimation and basic overview for evidence of palaeopathology. Virtual and physical three-dimensional models were constructed to examine aspects of palaeopathology in more detail. A physical model of the skull of each individual was created to use as a base for facial reconstruction. The images and models assisted in the non-invasive identification spinal pathologies, antemortem femoral fractures and substantial antemortem maxillary tooth loss in both bodies.

AN OVERVIEW OF INFECTIOUS DISEASE IN THE HRDLIČKA PALEOPATHOLOGY COLLECTION AT THE SAN DIEGO MUSEUM OF MAN

Tori D. Heflin, San Diego Museum of Man

Skeletal evidence for infectious disease in South America can be divided into four major classifications: bacterial, viral, fungal, and parasitic. The Museum of Man holds specimens displaying evidence of bacterial infections. Tuberculosis has been documented in the Peruvian Hrdlička Paleopathology Collection by Merbs (1980). He describes circular, smooth-walled lytic lesions in a cranium from Pachacamac; three fused lumbar vertebrae from the Valley of Chicama; three sets of fused lumbar vertebrae, an innominate, and two sacra from Chilca; and a pair of innominates from Huarochirí. Merbs (1980) also documents treponematosis such as yaws or endemic syphilis in the Hrdlička Collection. He describes two crania from the Nasca region, one with partial destruction of both nasal bones and another with destruction of the palate. From Huacho there is a cranium with lytic lesions and stellate scars and a facial portion with stellate scars and periostitis. From Ica there is an occipital fragment with lytic lesions and stellate scars, and from Chaviña an occipital bone exhibits lytic lesions. In the postcranial material,

Merbs (1980) describes four tibiae from Huacho and a pair of tibiae from Ancón with characteristics of treponemal disease.

Reference

Merbs, Charles F. 1980. Description of pathological cases. In: Tyson, RA, Alcauskas, ESD, editors, *Catalogue of the Hrdlička Paleopathology Collection*. San Diego: San Diego Museum of Man.

BIOARCHAEOLOGY AND HUMAN OSTEOLOGY AT THE HAMMONDS SITE, 1DK71, FORT PAYNE, ALABAMA

M. Cassandra Hill, Jacksonville State University, USA

Over five years of fieldwork and laboratory analysis have been devoted to the excavation of the Hammonds site in Fort Payne, Alabama, as a consequence of a state and federal highway project. Intensive laboratory analyses by numerous specialists currently are underway. The site appears to have been a "special place" mortuary facility that was utilized for several thousand years. As such, it is among the most significant sites excavated in the southeastern United States in the last fifty years. This presentation highlights the extensive fieldwork and the discoveries from the analysis of human remains, as well as significant observations concerning the site itself.

THE DENTITION OF THE RAMPASASA PYGMY AND THE LIANG BUA REMAINS, FLORES

Etty Indriati and Teuku Jacob, Gadjah Mada University, Indonesia

We examined the dentition of 43 pygmy individuals, 25 female and 18 male, from Rampasasa village, and the dentition of Liang Bua remains LB1 and LB3 from Liang Bua cave, Flores. The Rampasasa pygmies live in the Rampasasa village, about 1 kilometer south of the Liang Bua cave. The pygmy stature ranges from 133 cm to 149 cm (mean 148 cm). The dentition of the Rampasasa pygmies shows a high degree of metric variation and dental traits present in the Liang Bua remains, including: ninety degree rotation of premolars, a shift in the lower molar longitudinal fissure away from the bucolingual axis, tendency for absence of the lower second molar hypoconulid, spaces between teeth, a squarish lower molar outline, an upper molar rhomboid outline, four-cusped lower second molars, and a lower third premolar broad lingual dimension. These phenotypic similarities raise questions between LB and the Rampasasa pygmies, even considering the small sample size of the living population. Are there genetic affinities between the living pygmies from Rampasasa and the Liang Bua remains? Though they are separated by a considerable time period, they are located only one kilometer away from each other spatially. The dental traits in LB 1 and LB3 that are shared by the living pygmies suggest that they might have shared genetic affinities. The high degree of variation in both dental metrics and morphology within such a small sample of the living pygmies suggests a unique gene pool, inbreeding, and a human group rapidly decreasing in number.

A CASE OF SECONDARY MICROCEPHALY FROM LIANG BUA, FLORES, INDONESIA

Teuku Jacob, Gadjah Mada University, Indonesia; Etty Indriati, Gadjah Mada University, Indonesia; David W. Frayer, University of Kansas, USA; R. B. Eckhardt, Pennsylvania State University, USA; A. J. Kuperavage, Pennsylvania State University, USA, A. Thorne, Australian National University, and Maciej Henneberg, University of Adelaide, Australia

The holotype of *Homo floresiensis* comprises a nearly complete adult skeleton (Liang Bua1 - LB1) with extremely low estimates of stature and endocranial volume. We propose that LB1 is drawn from a pygmy *Homo sapiens* population, but individually shows signs of secondary microcephaly. Review of 184 syndromes in which microcephaly appears shows that body size reduction is also common. Associated signs include facial asymmetry, dental anomalies, trunk/limb disproportions, overtubulated bones, and

indications of paresis in the postcranial skeleton. We quantified craniofacial asymmetry for LB1 to the extent possible in its state of preservation. Gauged by anthropometric and clinical standards, LB1 exhibits a degree of asymmetry exceeding normal levels. Long bones of LB1 are unusually short, but wide; robusticity indices (R humerus 24.3, R femur 25.7, L femur 25.9) exceed those for most extant *H. sapiens*, despite mid-shaft cortical bone being very thin (approx. 2mm on CT). On the humerus, the entheses are very weakly marked. Similarly, on the femora, the *lineae asperae* are indistinct and very short (about 30 mm). The intertrochanteric crests on the femora are highly asymmetrical (larger on the right side) and the sizes and positions of the lesser trochanters differ between sides. These features indicate severe and asymmetric muscle hypotonia during life. Additional skeletal remains from the site do not contradict the proposition that LB1 is derived from a local *Homo sapiens* pygmy population.

INFECTIOUS DISEASE AMONG ENSLAVED AFRICAN AMERICANS AT EATON'S ESTATE, WARREN COUNTY, NORTH CAROLINA, 1825-1850.

Patricia M. Lambert, Utah State University, USA

Human skeletal remains from the 19th century cemetery at Eaton's Ferry on the Roanoke River, North Carolina, offer a glimpse into the health risks faced by enslaved African Americans in the rural South in years leading up to the Civil War. The 17 individuals excavated from this cemetery, though probably only a small sampling (10-20%) of those enslaved on the Eaton estate during the cemetery's use from 1825-1850, include infants, children, and adults. Many bear signs of the afflictions that troubled them in life and that in some cases likely led to their death. Foremost among these are two infectious diseases known to have wrought havoc more broadly in American populations of the time: syphilis and tuberculosis. In particular, dental indicators of congenital syphilis in a child and a young adult document both the presence and intergenerational impact of syphilis, and rib lesions and a spinal lesion suggest that tuberculosis also found susceptible hosts in this marginalized population. In addition, cranial and postcranial lesions in several infants document the role of infectious disease—and possibly also predisposing conditions such as rickets—in infant death. Overall, both lesion frequency and severity appear greater than this researcher has seen in other human remains from the Americas, and suggest that heavy biological costs were part of the burden of slavery.

BOG BODY (PSEUDO) PATHOLOGY

Niels Lynnerup, The Panum Institute, Denmark

Several well preserved bog bodies have been found in Denmark. Some were found almost 100 years ago, while others were found more recently in the 1950's. During the past five years, we have participated in a multidisciplinary study of these bog bodies, including the use of modern imaging technology. Earlier analyses of the bog bodies with X-ray were equivocal in determining fractures. Aside from the state of X-ray equipment of the time, this ambiguity is due to a marked loss of mineralization due to taphonomic processes, rendering the bony structures difficult to assess. We have applied CAT-scanning, a well documented, modern, medical imaging technique, in order to reassess these individuals. The visualisation problems may be somewhat countered by special software, which enables editing of single CAT-scan slices. We have thus been able to visualise (in both 2-D and 3-D) many of the skeletal structures, clearly showing the taphonomic effects of the bog. Indeed, we find that taphonomic influences may account for what previously had been interpreted as fractures. The presentation will focus on three bog bodies: how we performed the image analyses and interpretation of the associated taphonomic changes and pseudopathologies.

AGE AT OCCURRENCE AND PREVALENCE OF SPONDYLOLYSIS IN AN ENGLISH MEDIAEVAL POPULATION

Simon Mays, English Heritage Centre for Archaeology, England

Spondylolysis is studied in a series of juvenile and adult skeletons, ranging in age at death from 28 weeks gestation to over 50 years of age, from the Mediaeval village of Wharram Percy, England. Only individuals with complete lumbar spines were studied, so that the presence/absence of lumbar spondylolysis can be properly assessed. A large number of such individuals (140 juveniles, 201 adults) were available and there are written sources for the period that provide evidence for peasant community activity regimes. Prevalence of spondylolysis in juveniles is 0.7%, and the prevalence in adults is 12%. Closer analysis of age-related patterning suggests that the age of occurrence of spondylolysis in this population was probably generally during late adolescent /early adult life. This contrasts with a published study of a modern reference group unselected for activity patterns or medical complaints which reported that in most cases spondylolytic defects had already formed by 6 years of age. The Wharram Percy group appeared to resemble more the pattern seen today in those involved in strenuous activities such as competitive sports, both in the relatively late age of occurrence of defects and in the eventual high prevalence. This may be consistent with the observation that during adolescence, individuals in Mediaeval rural communities were beginning to take on physically strenuous adult tasks. However, it is unclear why individuals from Wharram Percy did not also form defects in early childhood as modern children appear to do.

DIAGNOSTIC CRITERIA FOR DEVELOPMENTAL DISLOCATION OF THE HIP IN HUMAN SKELETAL REMAINS

Piers D. Mitchell, Imperial College London, and Rebecca Redfern, Museum of London Specialist Services, England

Dislocation is the most severe form of developmental dysplasia of the hip (DDH). It impairs hip function in the young, and may lead to debilitating early onset osteoarthritis in adults. To our knowledge no thorough study of a large skeletal population has ever been undertaken to determine the wide range of diagnostic criteria for this condition in dry bone specimens. To identify these criteria we have analyzed the cases of developmental dislocation from a large series of 7,000 individuals (14,000 hips) from the medieval cemetery at Spitalfields in London, UK. We describe the changes at the true acetabulum, and have created a four-stage classification of the false acetabulum. The skeletal response to the altered biomechanics and limb shortening that occurs in developmental dislocation is described in the pelvis, lower limb and spine. This includes asymmetric growth in childhood, and asymmetric degenerative change in adulthood. We conclude with a discussion of the clinical literature on developmental dislocation of the hip that will aid palaeopathologists in estimation of the symptoms that an excavated individual may have experienced during their lifetime.

A POSSIBLE CALCIFIED UNDESCENDED TESTICLE FROM 4TH-5TH CENTURY A.D. AQABA, JORDAN

Jessica A. Newnam, University of Arkansas, USA, and Megan A. Perry, East Carolina University, USA

In 1996 a calcified object was discovered in the pelvic region of an adult male within an ancient cemetery in Aqaba, Jordan. The cemetery dates to the middle 4th to early 5th century A.D. and is associated with the Byzantine-period marine trading center of Aila located on the Gulf of Aqaba in the Red Sea. The oblong calcification consisted of linearly-aligned tubules within a thin shell. Twenty-eight possible conditions potentially resulting in calcification within the pelvic region were considered. Of these, five were retained as possible diagnoses due to the object's location and size and the presence of a thin shell and fully calcified tubules. In the end, the object appears to be a calcified undescended (cryptorchid) testis, although an echinococcal cyst, a large-cell calcifying Sertoli cell tumor, or a gonadoblastoma remain probable alternatives.

QUALITATIVE ANALYSIS OF PUBLISHED RESEARCH USING ADNA ANALYSIS TO DIAGNOSE DISEASE IN HUMAN REMAINS FROM ARCHAEOLOGICAL SITES: POTENTIAL AND PROBLEMS TO ADDRESS

Charlotte A. Roberts and Sarah Ingham, Durham University, England

Within the last ten years, the application of biomolecular methods of analysis to human skeletal remains to answer questions about health and well-being has increased markedly. Although problems with these methods remain, they often form the focus of much current palaeopathological research. For example, ancient DNA analysis of specific disease organisms has enabled diagnosis of disease where there is no bone change and allowed diagnosis in an individual who died before bone changes could occur. However, for data to be accepted in the scientific community it must stand up to scrutiny. This paper presents an analysis of published research that used aDNA analysis to diagnose disease (66 papers). Using a variation on published criteria (Cooper and Poinar, 2000), this study found that few papers were explicit about the procedures/ methods used, that there appeared to be no change through time, and very few researchers used independent replication of results to verify their data. This paper makes a plea to palaeopathology as a discipline that we must not forget the basic non-destructive analytical methods that most of us use, before unnecessarily damaging our skeletal collections.

Reference

Cooper A, Poinar HN. 2000 Ancient DNA: do it right or not at all. *Science* 289:1139-1141.

PALEOPATHOLOGY AND OSTEOBIOGRAPHY OF THE PEOPLES OF PENUELAS, CHILE'S SEMIARID NORTH

Maria A. Rosado and Jessica Vernacchio-Wilson, Rowan University, USA

The Museo de La Serena, IV Region, Chile has collections of skeletal remains representing the agricultural Diaguita people of 500 years ago. These were excavated in the 1990s from the sites Penueles 21 and 24 of Chile's semiarid north. Their excellent preservation has permitted an osteobiographical and radiographic analysis to better understand the patterns of disease. This research continues the osteological analyses begun in 1989 by Rosado (1994, 2000) that seek to understand the impact of the transition to farming had on the health of prehistoric populations. Because of the significance of paleopathology in the understanding of cultural and biological adaptations, it has also become necessary to assess preservation status and design a conservation protocol to protect and document the remains. The objectives of this communication are to: (a) describe the on-going skeletal conservation efforts, (b) establish demographic patterns of the skeletal samples, and (c) identify skeletal diseases via radiographs and photography. Intentional cranial and dental alteration, limb and cranial fractures, and dental abscesses and caries are among the interesting paleopathologies so far documented. Intentional tabular erect cranial alteration is very common in both males and females. The high frequency of carious lesions indicates a diet that emphasized carbohydrates. Skeletal radiographs are available for several of the individuals in the sample and this has afforded a more detailed description of the paleopathologies originally documented via photography.

PALEOPATHOLOGY OF THE COMMONERS AT TELL AMARNA, EGYPT, AKHENATEN'S CAPITAL CITY

Jerry C. Rose, University of Arkansas, USA

The Egyptian King Akhenaten initiated worship of a single god, Aten, and established a new capital city (Akhetaten, now known as Tell Amarna) that was built and occupied only from 1350-1330 BCE. This single short occupation offers a unique opportunity to study a restricted short time period. The royal tombs have long been known and studied, but the location of graves for the common inhabitants has been an archaeological puzzle for more than 50 years. Recently, four cemeteries have been located and the analysis of commingled bones from the South Tombs cemetery is presented here. The ceramics produced a late 18th Dynasty date and the remains yield the following demographic profile: 53 adults with 19 females and 18 males, 14 juveniles between the ages of 5 and 17, and 3 infants. Analysis of arthritis and degenerative joint disease of the spine and joints indicates that DJD was not excessive. Only 2 to 8% of

the adult population exhibits arthritis. There are 3 healed fractures of the arm (2 to 8% of the adult sample). There is one healed compressed fracture of the skull suggesting violence. The adult infection rate is between 2 and 8% with 3 healed and 1 active case of periostitis and no severe infections. Childhood anemia is implicated by 23% of adult frontals exhibiting healed porotic hyperostosis. Life for the common residents of Amarna appears to have been unremarkable with no extremes of disease.

HUMAN BONE MICROARCHITECTURE IN CASES OF TUBERCULOSIS AND ITS DIFFERENTIAL DIAGNOSES VISUALIZED BY MICRO-CT

Frank J. Rühli and Gisela Kuhn, University of Zurich, Switzerland

Tuberculosis (TB) was, and is still in some parts of the world, the most common infectious cause of death. Today 30 % of the world population is infected with TB (WHO, <http://www.who.int/mediacentre/factsheets/fs104/en/>). Osteoarticular TB, 5-7 % of all TB cases in pre-antibiotic times (Steinbock 1976), can often not clearly be distinguished from bacterial or fungal osteomyelitis, sarcoidosis, tumors or - in children - osteochondrosis (Davidson and Horowitz 1970). Yet, with micro-computed tomography (μ CT) a relatively new method for the 3D visualization of the microarchitecture of bone (Feldkamp et al. 1989) is available. Surprisingly, the database Medline® contains no publication about μ CT visualization of osteomyelitis, syphilis, or TB. The aim of this project is to evaluate the changes in the microarchitecture of human bones affected by TB or possible differential diagnoses. Thirteen specimens from a 19th/20th century pathology reference series (Galler collection, Department of Pathology, University Hospital Zurich, Switzerland; Rühli et al. 2003) were analyzed by μ CT (Institute for Biomedical Engineering, ETH and University of Zurich; resolution 18 μ m, image processing: Gaussian filter / thresholding). Surprisingly, the bony microstructure of Tb cases appears completely different at adjacent localizations. Micro-CT images can hardly assess the extent of slow bone remodelling, yet severe changes on the bone surface are easy to evaluate by 3D-reconstructions. Also, we will present “fly-through” movies of the peculiar 3D-microarchitecture of TB-affected bone.

This study has been supported by HELEN-BIEBER-Grant of the University of Zurich.

References

- Davidson PT, Horowitz I. (1970). Skeletal tuberculosis. A review with patient presentations and discussion. *American Journal of Medicine* 48(1): 77-84.
- Feldkamp LA, Goldstein SA, Parfitt AM, Jesion G, Kleerekoper M. (1989). The direct examination of three-dimensional bone architecture in vitro by computed tomography. *Journal of Bone and Mineral Research* 4(1): 3-11.
- Rühli FJ, Hotz G, and Böni T. (2003). Brief communication: the Galler Collection: a little-known historic Swiss bone pathology reference series. *American Journal of Physical Anthropology* 121(1): 15-8.
- Steinbock, RT. (1976). *Paleopathological Diagnosis and Interpretation*. Springfield, IL: Charles C. Thomas.

“AS MANY ARROWS LOOSED SEVERAL WAYS COME TO ONE MARK”¹ IMPROVING IDENTIFICATION OF LITHIC PROJECTILE TRAUMA THROUGH EXPERIMENTATION.

Martin Smith and Megan Brickley, University of Birmingham-Edgbaston, England

Between the Upper Palaeolithic and the spread of metallurgy, stone-tipped projectiles were crucial both for subsistence and as a means of offence and defense. Whilst finds of embedded projectile points in human and animal bone are not uncommon, identifications of such wounds in the absence of embedded points are rare. Previous experimentation involving archaic projectiles has not examined the effects of stone-tipped arrows and spears on bone. This paper presents the results of experiments in which samples of animal bone were impacted with flint-tipped arrows in order to investigate the resulting defects. Methods used included both shooting arrows at bone targets and impacting bones with flint points using a charpy impact tester. The results demonstrate that positive identifications can be made, both grossly and

microscopically, of bony trauma caused by stone projectiles even where the artefact responsible is no longer present. In addition, flint projectiles are shown to often leave small embedded fragments, which can also be identified microscopically. These results compare well with archaeological examples of suspected 'arrow wounds' and this paper demonstrates the practical application of this data in identifying such injuries. By facilitating the recognition of projectile trauma these findings will have significance both for the investigation of hunting strategies and levels of conflict amongst earlier societies.

Reference

1. Shakespeare, *Henry V*, Act I.

A RARE ATLAS ANOMOLY FROM JEMEZ NEW MEXICO

Jennifer E. Spence, Shamsi Daneshvari, and Heather J.H. Edgar, University of New Mexico, USA

We present a unique case study with a rare atlas anomaly: the anterior portion consists of two distinct arches separated by a large congenital cleft of the posterior arch and an associated pseudoarthrosis of the anterior arch. The individual exhibiting this anomaly is an adult of unknown sex recovered during archaeological excavations of the Unshagi Pueblo in the Jemez area of New Mexico. The remains date to 604-401 B.P. The ends of the posterior atlas arch are smooth, suggesting a congenital defect; however, the anterior arch may be an additional congenital cleft or spondylolysis with pseudoarthrosis. The reported incidence of posterior arch defects in clinical cases is 4%; anterior arch defects are less common. Posterior defects appear to have a genetic component as they have been noted in a parent/offspring pair. Similar previously reported posterior arch defects are from asymptomatic patients with detection of the defect usually occurring after a traumatic event. In this individual both the atlantoaxial and atlantooccipital joints are characterized by active osteophytic growth around the dens and the articular surfaces, with a spur at basion, indicating possible compensatory bone growth for instability caused by the defect. Though a congenital cleft in the posterior arch may contribute to weakness and increased susceptibility to traumatic or stress fractures, most case studies describe an anterior midline cleft rather than fracture when a posterior cleft is present.

MEDIEVAL DEVIANTS: CRANIAL FLUCTUATING ASYMMETRY POPULATION OUTLIERS

Rebecca A Storm, University of Bradford, UK*

The present study investigates the prevalence of fluctuating asymmetry in the human cranium and its usefulness in the detection of congenital conditions in skeletal populations. Fluctuating asymmetry has been demonstrated to be an advantageous instrument for osteological analysis as it detects disruptions in the developmental stability of osseous structures. These disruptions can subsequently be attributed to pathological processes including genetic predispositions, congenital abnormalities, environmental influences and biomechanical stresses. This study creates a database of twenty-two standardized measurements taken on 626 crania from four English skeletal populations dating from the late Anglo-Saxon to the late Medieval period. All measurements were checked for taphonomy, measurement error, trauma, and any directional asymmetry that might interfere with the results. Individuals were then assessed by the degree of deviation from normal population asymmetry. The results indicate that fluctuating asymmetry highlighted those individuals afflicted with congenital conditions, including multiple individuals with torticollis and premature cranial synostosis. Differences were also observed in the number of individual outliers between skeletal samples. This suggests potential differences in asymmetry connected with social status and in the case of the Chichester population, a Medieval leprosarium/almshouse, the possible segregation or care of those with congenital conditions, as over twenty of the outliers were found to be from this site. This study concludes that fluctuating asymmetry is a useful tool in detecting and differentially diagnosing morphological abnormalities that influence cranial size and shape.

***Winner, 2006 Cockburn Student Award Competition**

A POSSIBLE CASE OF SCHEUERMANN'S DISEASE FROM AKARCAY HÖYÜK, BIRECIK, URFA, TURKEY

Handan Üstündag-Aydin, Anadolu University, Turkey

Scheuermann's disease is a spinal disorder which has rarely been reported in paleopathological literature. It develops in adolescence and is characterized by kyphosis, vertebral body wedging (more than 5° at three or more adjacent vertebrae), anterior extensions of the vertebral bodies, and Schmorl's nodes (DiGiovanni et al. 1989, Scoles et al. 1991). The etiology is still unknown, but mechanical stress during the growth period and congenital predisposition are considered as main factors. The aim of this paper is to discuss the linkage between Scheuermann's disease and mechanical stress due to horse riding. Our example is a 25-years-old female who was buried with a horse. This burial is dated to the 13th century AD. We assume that this burial may have Turkic or Mongolian origins, as female horse-riders were common in central Asian tradition according to the historical and ethnographical resources. In our case study, three adjacent thoracic vertebral bodies were wedged more than 5° and had Schmorl's nodes. Several thoracic vertebral bodies had anterior extensions. There are irregularities of the upper and lower vertebral body rims on some thoracic and lumbar vertebrae. We also noted marginal anterior lipping and sclerotic changes on some vertebrae as secondary alterations of Scheuermann's disease. In our opinion, this sample may show a relation between mechanical stress due to horse riding and Scheuermann's disease.

References

- DiGiovanni BF, Scoles PV, Latimer BM. 1989. Anterior Extensions of the Thoracic Vertebral Bodies in Scheuermann's Kyphosis. An Anatomical Study. *Spine* 14: 712-716.
- Scoles PV, Latimer BM, DiGiovanni BF, Vargo E, Bauza S, Jellema LM. 1991. Vertebral Alterations in Scheuermann's kyphosis. *Spine* 16: 509-515.

PALEOHISTOPATHOLOGY OF FAUNAL REMAINS

Tanya von Hunnius, Toronto, Canada

The use of histology to estimate age, understand taphonomic history, and diagnose disease in human skeletal and mummified remains is well known. Even though nonhuman animals experience stress and disease like humans, microscopy is seldom if rarely applied to faunal remains. This paper presents histological results from a 16th-century Iroquoian dog which had previously been diagnosed by macroscopic and molecular methods with tubercular induced hyperpulmonary osteoarthropathy (Bathurst and Barta 2004). By emphasizing the utility of paleohistopathology in zooarchaeology, there is the potential to suggest new evolutionary models and indicate possible routes of transmission between humans and animals for some diseases and to assess not only the level of health in animals, but possibly human health as well.

Reference

- Bathurst RR, Barta JL, 2004. Molecular evidence of tuberculosis induced hypertrophic osteopathy in a 16th-century Iroquoian dog. *Journal of Archaeological Science* 31:917-25.

GAUGING DIFFERENTIAL HEALTH BETWEEN THE SEXES AT WINDOVER (8BR246) USING THE WESTERN HEMISPHERE HEALTH INDEX

Rachel K. Wentz, Tallahassee, FL, USA and Bryan D. Tucker, Gainesville, FL, USA

The application of the Western Hemisphere Health Index (Steckel and Rose, 2002) to a 7,000-year-old population from eastern central Florida provides a glimpse into life and health during the Archaic period in southeastern North America. The health index utilizes seven skeletal indicators of health, producing an overall score from which to gauge the quality of life of individuals and populations. The index was applied to the well-preserved remains of 133 individuals from Windover (8BR246). The adult population

was then divided by sex and scores were calculated for both groups. The results indicate better overall health among males, with higher overall health scores, increased stature, and lower rates of anemia, dental disease, and infection. Stable isotope analyses are underway to evaluate variation in diet. This study examines the causative factors involved in differential health among the sexes, including reproductive demands, host resistance, and access to resources within an Archaic hunter/gatherer population.

References

- Doran GH. 2002. *Windover: Multidisciplinary Investigations of an Early Archaic Florida Cemetery*. Gainesville: University Press.
- Larsen, CS. 1997. *Bioarchaeology: Interpreting Behavior from the Human Skeleton*. Cambridge: Cambridge University Press.
- Ortner DJ, Putschar WGJ. 1981. *Identification of Pathological Conditions in Human Skeletal Remains*. Washington: Smithsonian Contributions to Anthropology.
- Steckel, RH, JC Rose. 2002. *The Backbone of History: Health and Nutrition in the Western Hemisphere*. Cambridge: Cambridge University Press.
- Sullivan A. 2005. Prevalence and etiology of acquired anemia in Medieval York, England. *American Journal of Physical Anthropology* 128:252-272.

DIET, DISEASE, AND ECOLOGY OF COASTAL MAYA FOLLOWING THE COLLAPSE

Christine D. White, Jay P. Maxwell, Jocelyn S. Williams, and Fred J. Longstaffe, University of Western Ontario, Canada.

This paper examines the synergism among diet, disease, and ecology at two related coastal Maya sites in Belize (Marco Gonzalez and San Pedro) for the periods immediately following the Classic period collapse (Postclassic and Historic). Stable carbon and nitrogen isotope ratios in bone collagen and stable carbon isotope ratios in bone apatite were analysed for 65 humans and a wide variety of faunal species. There are no apparent differences in whole diets or degree of carnivory between individuals with lesions indicative of anemia and those without, but those with lesions appear to have consumed protein from lower trophic levels. Non-specific infection (periostitis) and vitamin C deficiency (scurvy) are also present in high frequencies and appear to co-occur with lesions indicative of anemia, particularly in childhood. These findings are discussed in light of: 1) the debate on the manifestation of anemia versus scurvy, 2) Spanish ethnohistoric descriptions of the poor state of Maya health at the time of contact, and 3) the Osteological Paradox. We suggest that although this coastal environment exacerbated morbidity because of possible parasitic infection, the inhabitants were probably able to survive physiological stresses better than either their inland contemporaries or their modern counterparts.

SECTION 3. POSTERS

PALEOHISTOLOGY OF BONE: STUDY OF TUMOUROUS DISEASES FROM ANCIENT MONGOLIAN NOMADS

Naran Bazarsad, Mongolian Academy of Sciences, Mongolia, and Michael Schultz, Georg-August Universität, Göttingen, Germany

This paper describes pathological lesions attributed to tumours in human skeletal remains from archaeological sites dating from Early Iron and Bronze Age (7th century BC) to 1st-2nd century AD contexts in Western Mongolia. The collections sampled for this presentation are from the Late Bronze site of Chandman, curated by the Department of Anthropology, Institute of Archaeology of the Mongolian Academy of Sciences. Both sexes and all age categories are represented in these materials. Neoplastic lesions in the sample show remarkably different appearances. We suggest that tumours appeared first during the ancient historical period in Mongolia when Nomadic populations emerged. The specimens were examined at the Zentrum Anatomie, Georg-August Universität, Göttingen (Germany)

using macroscopic, endoscopic, radiological as well as light and scanning-electron microscopic techniques.

THE LEGEND OF SYLVESTER: ONE TOUGH COWBOY

Ronald Beckett, Quinnipiac University; Gerald Conlogue, Quinnipiac University; John Posh, Zoom Imaging; Gary Double, Theo C. Auman Inc.; David Henderson, Trinity College; Mary Catherine Sonntag, Manchester, CT; and Aaron Guzik, Inland Imaging.

We report on Sylvester, one of a unique group of mummies who traveled as side show attractions on the American carnival circuit in the late 19th and early 20th centuries. Legend states that Sylvester was a cowboy and a card cheat. He was caught cheating, and was shot. He was able to ride out of town where he later fell dead from his horse. The drifting desert sands near Gila Bend, Arizona, buried him. Sylvester was discovered mummified by two cowboys passing by. The legend suggests natural desiccation by the arid environment. New imaging was conducted, as previous CT data were lost. Our objectives were to assess the evidence supporting or refuting the legend surrounding the mummy, examine the ‘bullet wound’, assess the state of preservation, explore evidence of any injuries or pathologies, and ascertain the method/manner of preservation. Our methods included, photography, standard radiography computed tomography, videoendoscopy, and chemical analysis of tissue and pooled material within the display case beneath the mummy. Results indicated arsenic embalming rather than natural desiccation, excellent internal and external preservation, multiple projectile injuries, possible cause of death, non-projectile entrance to abdominal cavity, and evidence of femoral arterial embalming. Arsenic is an excellent preservation agent, allowing the detailed study of Sylvester. Pooled material gave rise to some concerns. Combined methodologies provided a comprehensive assessment.

A GOOD STORY VS. SCIENTIFIC FACT: EXPLORING THE MYSTERY OF “JAMES PENN”

Gerald Conlogue, Ronald Beckett, Quinnipiac University, USA; John Posh, Zoom Imaging, USA; Joel Neuman, Tom King, David Henderson, Henry Dephillips, Trinity College, USA; Gary Double, Theo C. Auman Inc.; Nicholas Bellantoni, University of Connecticut; and Mary Catherine Sonntag, Manchester, CT, USA.

This study examines the mystery surrounding the mummified remains of an individual embalmed in 1895. Newspaper accounts provide the only surviving information regarding the individual officially known as James Penn. A legend has grown up around Penn’s life and death. Several imaging modalities were employed to examine the well-preserved organs in order to substantiate or refute the stories surrounding this near mythical figure. In addition, a tissue sample and its constituents were subjected to chemical analysis to determine the composition of the embalming compound. Conventional radiographs provided the initial survey information, including age at the time of death and condition of the skeleton. X-rays also revealed a number of coins in the esophagus and a nail lodged under the tongue. Video-endoscopy conclusively identified the coins as US pennies and, along with fluoroscopy, proved invaluable in retrieving all the foreign bodies. Computed tomography demonstrated internal organs that were well preserved and lacked significant pathological changes. Ion chromatography indicated the presence of formate and sulfite as definite constituents of the embalming process. Fluorescence spectra analysis showed a substance might have been included in the embalming compound to add color to the cadaver. Finally, all the findings were considered in relationship to the stories regarding the circumstances that led up to his death.

SCURVY IN TENNESSEE: JUVENILES FROM ARCHAEOLOGICAL SITES IN THE SOUTHEASTERN UNITED STATES WITH EVIDENCE OF PROBABLE VITAMIN C DEFICIENCY

Elizabeth A. DiGangi, University of Tennessee-Knoxville, USA

Subadults from the Tennessee Valley Authority collection curated at the Frank H. McClung Museum in Knoxville, Tennessee were examined for evidence of probable scurvy. 50 individuals were selected, based on the relative completeness of their skulls. Most individuals (38) represent the Mississippian time period, with the remainder (12) representing either the Woodland or Archaic time periods. Each individual was examined for evidence of abnormal porosity resulting from chronic bleeding at various sites on the skeleton cited as part of the complex of scurvy (Ortner et al 2001; Brickley and Ives 2005). Of 31 individuals with evidence of abnormal porosity at any of these sites, 5 (2.5%) had sufficient evidence to include scurvy in the differential diagnosis. Four individuals exhibited bilateral abnormal porosity on the greater wing of the sphenoid and also had abnormal porosity in the region of the mandibular foramen. All 5 individuals had porous lesions on the roof and lateral wall of the orbit. Porosity on the interior surface of the zygomatic bone, the posterior maxilla, the parietal and occipital, was observed in 3 of the 5 individuals, with some traits being unobservable due to fragmentary remains. The low prevalence of scurvy seen in this sample is probably due to the wide variety of plants with a high concentration of ascorbic acid, such as goosefoot, included in the diets of native peoples in the Southeast.

References

- Ortner D, Butler W, Cafarella J, Milligan L. 2001. Evidence of Probable Scurvy in Subadults from Archaeological Sites in North America. *American Journal of Physical Anthropology* 114:343-351.
- Brickley, M., Ives, R. 2005. A lack of potatoes? Infantile scurvy in nineteenth century Birmingham, England. *Supplement to American Journal of Physical Anthropology* 126 S40: 78.

SCOLIOSIS: TAPHONOMY OR PATHOLOGY

James Gosman, Ohio State University, USA, and Tomasz Kozlowski, Nicholas Copernicus University, Poland

Curvature of the spine in the archaeological context may be secondary to taphonomic processes or indicative of structural scoliosis. The question to be investigated is how can the distinction between taphonomy and pathology be ascertained? The hypothesis of this project is that the morphological characteristics of the vertebral bodies allow the identification of structural scoliosis. The paleopathology literature has relatively few references to scoliosis, describing major curvatures. Recent clinical researchers have turned their focus on local vertebral morphology and morphometry in scoliosis, describing vertebral wedging, asymmetry, and pedicle anatomy. The morphological analysis of scoliotic vertebral elements demonstrates wedging of the apical vertebral body in the coronal plane, a bone drift of the vertebral body toward the concavity producing asymmetry, and asymmetry of the pedicles with the smaller pedicle on the concave side of the curve. These essential osteological criteria are used in this study for discriminating structural from taphonomic scoliosis.

Two adult skeletal series were examined: Late Roman/Byzantine burials from Catal Hoyuk in Turkey and Medieval burials from Gruczno in Poland. The study includes a review of excavation reports, maps, photos, and morphological analyses of selected vertebral elements. Results confirmed the identification of morphological attributes of vertebral elements characteristic of scoliosis and their significance in allowing the discrimination of structural scoliosis during life from taphonomic curvatures during death. This perspective contributes to the complete assessment of human remains and may have implications in terms of functional sequelae for life history, behavior, and capacity for physical activity.

POSSIBLE SCURVY IN SUBADULTS FROM BYZANTINE CHERSONESOS (CRIMEA, UKRAINE), 8TH-13TH CENTURY AD

Renata J Henneberg, University of Adelaide, Australia; Denis Ponomarev, National Preserve of Tauric Chersonesos, Ukraine; Adam Rabinowitz, University of Texas-Austin, USA; and Larisa Sedikova, National Preserve of Tauric Chersonesos, Ukraine

Recently proposed criteria for diagnosing subadult scurvy (vitamin C deficiency) in human skeletal remains (Ortner et al. 2001) were used during the examination of the skeletal sample from Chersonesos, southern Crimea. Founded by Greeks in the 5th century BC, the city served as a trading center through various political influences. Officially within the Byzantine Empire since the 9th century AD, the city functioned as its northernmost post until the major fire destroyed it in the 13th century. Five secondary multiple tombs within a small church dated to the Byzantine period were excavated. The total minimal number of individuals in the tombs was estimated at 125, and 67 (54%) of these were children aged 0-15 years. The bones were examined macroscopically. Characteristic fine pitting occurred bilaterally on three out of six pairs of the greater wing of the sphenoid (50%) and on 5 out of 17 isolated sphenoid bones (30%). In this sample (67 subadults), abnormal pitting occurred on the temporals, coronoid processes, pars laterales, pars basillares of occipital, palates, orbital plates, alveolar processes of maxilla, and on the parietals (also hypertrophic). Excessive porosity was observed bilaterally on tibiae (11/14), humeri (2/9), ulnae, radii, femora (1/5) within 0-5 year age group. The type of the abnormal porosity and the distribution of lesions within the skeleton suggest the presence of scurvy in this population.

Financial support of the Packard Humanities Institute is gratefully acknowledged.

Reference

Ortner D, Butler W, Cafarella J, and Milligan L. 2001. Evidence of Probable Scurvy in Subadults from Archaeological Sites in North America. *American Journal of Physical Anthropology* 114:343-351.

TWINS WITH PROBABLE CONGENITAL SYPHILIS FROM OPLONTIS NEAR POMPEII, VICTIMS OF THE 79 AD VOLCANIC ERUPTION

Renata J Henneberg, Maciej Henneberg, University of Adelaide, Australia; and Annamaria Ciarallo, Archaeological Superintendency of Pompeii, Italy

Excavations (1964-1991) in Oplontis, located 5 kilometres from Pompeii in the modern town of Torre Annunziata, uncovered two rural villas. In one of the villas, attributed to a wine merchant, 54 human skeletons were found in one of the rooms. The victims were covered with volcanic ash and died most probably of suffocation during the eruption of Vesuvius in August 79 AD. Among the victims were two 11-12 year old children both with similar dental enamel defects of the same severity. The crowns of upper and lower first molars of both individuals were diminished in size and the occlusal surfaces had many small cusps (mulberry molars). The upper 1/3 of the crown (near the cutting edge) of the incisors of both individuals was narrowed and covered with thinner enamel than the rest of the tooth. The remaining dentition of both individuals showed enamel with multiple hypoplastic rings and pitting inside and between the rings. In addition to dental hypoplasia, on the midshaft of a femur of one of the individuals there was a periosteal reaction. The presence of two individuals of the same age with the similar type and severity of dental defects among the individuals with no defects or with much milder, mostly linear hypoplasia, indicated that the individuals were twins. The type of the defects suggested congenital syphilis.

A POSSIBLE PREHISTORIC CASE OF SCURVY FROM ENGLAND

Simon Mays, English Heritage Centre for Archaeology, England

A possible case of scurvy is described in the skeleton of a child aged about 2 years. The skeleton is from a Bronze Age barrow from England and dates to around 2000 BC. There are several reasons for presenting this case. Firstly, it illustrates some of the difficulties in diagnosing scurvy in ancient remains. Secondly, it is the earliest case which has, to my knowledge, so far been identified from Britain. Thirdly, cases of scurvy are generally rarely reported in British remains. The extent to which this paucity of cases reflects poor survival of child remains, under- or misdiagnosis of the disease, or that scurvy was genuinely rare in early Britain will briefly be considered.

A POSSIBLE CASE OF BRUCELLOSIS IN ROMAN BRITAIN

Joshua Peck, Erica A. Tyler, Ohio State University, USA; Donald J. Ortner, Smithsonian Institution, USA; and Sam Stout, Ohio State University, USA

Brucellosis is a zoonotic infection typically caused by one of three species of the genus *Brucella*: *B. melitensis*, *B. abortus* and *B. suis*. The infection has a worldwide distribution coincident with animal domestication. It is primarily a disease of the reticuloendothelial system, with skeletal involvement present in 10-75% of cases. Organisms reach bone by hematogenous dissemination, frequently affecting the vertebrae and sacroiliac joint. We report a case of possible brucellosis in an adult male from the Romano-British site of Trentholme Drive, England (2nd – 4th century). This individual displays sclerotic vertebral lesions in the eighth through eleventh thoracic vertebrae as well as abscessing and reactive bone in the sacroiliac joint, indicating a chronic infectious disease. Extensive lytic cavitation in the corresponding end plates of the tenth and eleventh vertebral bodies is apparent with pumice-like formations and anterior syndesmophytes. The vertebrae show no signs of collapse, but joint space narrowing is evident, with ankylosis of the eighth and ninth thoracic vertebrae. A large circumscribed, lytic lesion and reactive bone are also observed in the sacroiliac subchondral bone surface of the right ox coxa. Tuberculosis and echinococcus are considered as possible diagnoses; however, the evidence most strongly supports a diagnosis of brucellosis. Brucellosis is an occupational disease associated with animal contact. Because of the intensive animal husbandry of the period, brucellosis would likely have been common in Roman Britain.

AN ASSESSMENT OF DENTAL MODIFICATION IN A CRANIAL SAMPLE FROM THE MORTON COLLECTION

Emily S. Renschler, University of Pennsylvania, USA

This poster explores the evidence for dental modification in a sample of crania from the Samuel G. Morton collection housed at the University of Pennsylvania Museum of Archaeology and Anthropology. Historic documents describe the study sample as representing individuals of African descent who died recently after arriving to Cuba around the turn of the 19th century. Dental analyses were performed on maxillary dentitions to assess development, health and wear patterns. These examinations revealed that 5 of 55 maxillary dentitions (9%) had at least one incisor removed prior to death. Given the age and good dental health of these individuals, it is not likely that the tooth loss was the result of pathological processes. These results are considered in light of ethnographic and bioarchaeological literature documenting dental modification in past and present African populations.

A CASE STUDY OF METASTATIC CANCER IN AN ADULT MALE FROM LATE BRONZE AGE ATHENS, GREECE

Susan Kirkpatrick Smith, Kennesaw State University, USA

Incidences of cancer in ancient skeletal samples are rather low, particularly in comparison to frequencies found in modern populations. This makes each case of cancer in skeletal remains important for our understanding of the frequencies and types of cancers present in the past. In order for future demographic analyses to be possible, we must continue to document the rare cases of ancient cancers. This case study presents details of the cancerous lesions of an adult male from the Athenian Agora Mycenaean cemetery. The adult male exhibits tumors and lesions on the skull, vertebrae, right ulna, and periosteal reaction on the femur. Due to the incompleteness of the skeleton, a specific diagnosis is not possible. However, it seems probably that this male suffered from prostate cancer that metastasized to bone.

THREE CASES OF TUBERCULOSIS OF THE KNEE IN MEDIEVAL NORTHERN FRANCE

Erica A. Tyler, Joshua Peck, Ohio State University, USA; and J. Marcus, Centre d'Etudes Paléopathologiques du Nord, France*

The prevalence of tuberculosis in continental Europe during the Medieval period is believed to have been minimal because of low population density. Because of its rarity, the presence of extraspinal skeletal tuberculosis may point to higher prevalence of tuberculosis than previously believed. Most skeletal tubercular infection affects the ribs and spine, with fewer than 50% of remaining skeletal cases affecting the knee. Tubercular infection of the knee most commonly occurs in children, but is known to occur rarely in adults. We report three cases of adult tubercular infection of the knee from three early Medieval sites in northern France. Lesions of the right femur and tibia were observed in individual 193 from the Merovingian cemetery of Saint Sauveur (A.D. 485-690). Individual 6062 from the site of Wandignies Hamage presents with Pott's disease, left femoral and tibial involvement, and lesions in other extraspinal sites. Individual 51 from Arras (A.D. 900-1100) displays lesions of the right tibial plateau as well as vertebral and extraspinal involvement. In all three cases, macroscopic periarticular lesions coinciding with joint capsule insertion sites indicate tubercular synovitis, and lesions on the joint surface demonstrate advanced infection. Radiologic imaging demonstrates well-defined hypodense epiphyseal lesions and histologic sections display both active and inactive erosions. These findings are significant because very few cases of skeletal tuberculosis are reported for this time period and region.

* Entry in the 2006 Cockburn Student Award Competition

List of Authors

Anagnostis Agelarakis (AGELARAK@adelpi.edu), Adelphi University, Garden City, New York 11530, USA
Naran Bazarsad (naraab@hotmail.com), Department of Anthropology, Institute of Archaeology, Mongolian Academy of Sciences, Ulaanbaatar-51, Mongolia
Ronald Beckett (ronald.beckett@quinnipiac.edu), Department of Cardiopulmonary Sciences & Diagnostic Imaging, Quinnipiac University, 275 Mount Carmel Avenue, Hamden, CT 06518 USA
Nicholas Bellantoni (nicholas.bellantoni@uconn.edu), Connecticut Archaeology Center, University of Connecticut, Storrs, CT 06269, USA
Pia Bennike (bennike@antrolab.ku.dk), Laboratory of Biological Anthropology/Institute of Forensic Medicine, University of Copenhagen, Blegdamsvej 3, DK-2200 Copenhagen N, Denmark
Megan Brickley (M.B.BRICKLEY@bham.ac.uk), Institute of Archaeology and Antiquity, University of Birmingham, Edgbaston, Birmingham, UK, B15 2TT, England
Jane E. Buikstra (buikstra@asu.edu), ASU School of Human Evolution & Social Change, PO Box 872402, Tempe AZ 85287-2402, USA
Annamaria Ciarallo (laboratorio.sap@virgilio.it), Archaeological Superintendency of Pompeii, Pompeii 1-80045, Italy
Gerald Conlogue (gerald.conlogue@quinnipiac.edu), Department of Cardiopulmonary Sciences & Diagnostic Imaging, Quinnipiac University, 275 Mount Carmel Ave., Hamden, CT 06518, USA
Shamsi Daneshvari (shamsi@unm.edu), Department of Anthropology, MSC01 1040, University of New Mexico, Albuquerque NM 87131, USA
Henry Dephillips (Henry.Dephillips@trincoll.edu), Department of Chemistry, Trinity College, Hartford, CT 06106, USA
Elizabeth DiGangi (edigangi@utk.edu), 1903 Jefferson Ave., Knoxville, TN 37917 USA
Gary Double (Gary.double@sci-us.com), Theo C. Auman Inc., 247 Penn Street, Reading PA 19601 USA
J Christopher Dudar (dudar.chris@nsmh.si.edu), Osteology Laboratory, Repatriation Office, Department of Anthropology, PO Box 37012, NMNH MRC 138, Smithsonian Institution, Washington, DC 20013-7012
RB Eckhardt (eyl@psu.edu), Laboratory for the Comparative Study of Morphology, Mechanics and Molecules, Department of Kinesiology, The Pennsylvania State University, University Park, PA 16802, USA
Heather JH Edgar (hjhedgar@unm.edu), Department of Anthropology, MSC01 1040, University of New Mexico, Albuquerque NM 87131, USA
Jonathan Elias (director@amscresearch.com), Akhmim Mummy Studies Consortium, P.O. Box 84, Harrisburg, PA 17108-0084, USA
Julia Fan (jfan@anthro.umass.edu), Department of Anthropology, University of Massachusetts, Amherst, Machmer Hall, Amherst, MA 01003, USA
Amy W Farnbach (amy.farnbach@asu.edu), PO Box 872402, Tempe AZ 85287-2402, USA

- David W Frayer (Frayer@ku.edu), Department of Anthropology, The University of Kansas, Lawrence, KS 66045, USA
- Heather Gill-Robinson (Gill-Robinson@nds.u.edu), Department of Sociology-Anthropology, North Dakota State University, Fargo, North Dakota 58105, USA
- James Gosman (jgosman@buckeye-express.com), Department of Anthropology, The Ohio State University, Columbus, OH 43220, USA
- Aaron Guzik (aaronguzik@inland-imaging.com), Inland Imaging, 5255 Cowley, Spokane, WA 18017, USA
- Tori Heflin (theflin@sandiego.edu), P.O. Box 91529, San Diego, CA 92169, USA
- David Henderson (david.Henderson@tricolledu.edu), Trinity College, Department of Chemistry, Hartford, CT 06106, USA
- Maciej Henneberg (Maciej.Henneberg@adelaide.edu.au), Department of Anatomical Sciences, Medical School, University of Adelaide, Adelaide, SA 5005, Australia
- Renata Henneberg (renata.henneberg@adelaide.edu.au), Department of Anatomical Sciences, The University of Adelaide, Adelaide 5005, Australia
- Mary Cassandra Hill (mchill@jsu.edu), Archaeological Resource Laboratory, Jacksonville State University, McClellan Center, 100 Gamecock Drive, Anniston, AL 36205, USA
- Etty Indriati (ettykurtz@idola.net.id), Laboratory of Biology & Paleoanthropology, Gadjah Mada University Faculty of Medicine, Yogyakarta 55281, Indonesia
- Sarah Ingham (s.l.ingham@durham.ac.uk), Department of Archaeology, Durham University, Durham DH1 3LE, England
- Teuku Jacob (teuku_jacob@hotmail.com), Laboratory of Bioanthropology and Paleoanthropology, Gadjah Mada University, Faculty of Medicine, Yogyakarta 55281, Indonesia
- Kent Johnson (kentjohnson@gmail.com), 2317 W. Norwood Place, Alhambra, CA 91803, USA
- Erica Jones, Osteology Laboratory, Repatriation Office, Department of Anthropology, PO Box 37012, NMNH MRC 138, Smithsonian Institution, Washington, DC 20013-7012, USA
- Tom King (tking@zoomimaging.com), Zoom Imaging, 3445 High Point Boulevard, Bethlehem, PA 18017, USA
- Tomas Kozłowski (kozlow@biol.uni.torun.pl), Department of Anthropology, Nicholas Copernicus University, Torun, Poland
- Gisela Kuhn (gisela.kuhn@anatom.unizh.ch), Institute of Anatomy, University of Zurich, Winterthurerstrasse 190, 8057 Zurich, Switzerland
- AJ Kuperavage (ajk186@psu.edu), Laboratory for the Comparative Study of Morphology, Mechanics and Molecules, Department of Kinesiology, The Pennsylvania State University, University Park, PA 16802, USA
- Patricia Lambert (plambert@hass.usu.edu), Anthropology Program, Utah State University, Logan, UT 84322-0730, USA
- Marilyn London (mlondon@hers.com), Osteology Laboratory, Repatriation Office, Department of Anthropology, PO Box 37012, NMNH MRC 138, Smithsonian Institution, Washington, DC 20013-7012, USA
- Fred J Longstaffe (flongsta@uwo.ca), Department of Earth Sciences, The University of Western Ontario, London, ON N6A 5C2, Canada
- Niels Lynnerup (n.lynnerup@antrolab.ku.dk), Laboratory of Biological Anthropology, The Panum Institute, Blegdamsvej 3, DK-2200 Copenhagen, Denmark
- Gwyn Madden (mumiyas@hotmail.com), Osteology Laboratory, Repatriation Office, Department of Anthropology, PO Box 37012, NMNH MRC 138, Smithsonian Institution, Washington, DC 20013-7012, USA
- J Marcus, Centre d'Etudes Paléopathologiques du Nord, 36 rue Jules Ferry, 59127 Walincourt-Selvigny, France
- Jay P Maxwell (jaymaxwell@hotmail.com), Department of Clinical Anatomy, The University of Western Ontario, London, ON N6A 5C2, Canada
- Simon Mays (simon.mays@english-heritage.org.uk), Ancient Monuments Laboratory, English Heritage Centre for Archaeology, Fort Cumberland, Eastney, Portsmouth PO4 9LD, UK
- Piers Mitchell (piers.mitchell@imperial.ac.uk), Imperial College London, 84 Huntingdon Road, London N2 9DU, UK
- Dawn Mulhern, Osteology Laboratory, Repatriation Office, Department of Anthropology, PO Box 37012, NMNH MRC 138, Smithsonian Institution, Washington, DC 20013-7012, USA
- Joel Neuman (jneumann@zoomimaging.com), Zoom Imaging, 445 High Point Blvd., Bethlehem, PA 18017, USA
- Jessica A Newnam (jnewnam@uark.edu), Department of Anthropology, University of Arkansas, Fayetteville, AR 72701, USA
- Donald J. Ortner (ortner@si.edu), Department of Anthropology, Smithsonian Institution, Washington, DC 20560-0112, USA
- Stephen Ousley (OUSLEYS@si.edu), Osteology Laboratory, Repatriation Office, Department of Anthropology, PO Box 37012, NMNH MRC 138, Smithsonian Institution, Washington, DC 20013-7012, USA

Joshua Peck (peck.107@osu.edu), Department of Anthropology, The Ohio State University, 244 Lord Hall, 124 W. 17th Ave., Columbus, OH 43210, USA

Megan A Perry (perrym@mail.ecu.edu), Department of Anthropology, East Carolina University, Greenville, NC 27858, USA

Denis Ponomarev, National Preserve of Tauric Chersonesos, Sevastopol, Ukraine

John Posh (john.posh@rcn.com), Zoom Imaging, 3445 High Point Blvd., Bethlehem, PA 18017, USA

Adam Rabinowitz (arabinow@mail.utexas.edu), Institute of Classical Archaeology, The University of Texas, 1 University Station C3400, Austin TX 78712, USA

Rebecca Redfern (rredfern@museumoflondon.org.uk), Museum of London Specialist Services, Mortimer Wheeler House, 46 Eagle Warf Road, London N1 7ED UK

Emily S Renschler (erenschl@sas.upenn.edu), Department of Anthropology, University of Pennsylvania, 3260 South Street, Philadelphia, PA 19104-6398, USA

Charlotte A Roberts (c.a.roberts@durham.ac.uk), Department of Archaeology, Durham University, Durham DH1 3LE, England

Maria A Rosado (Rosado@rowan.edu), Geography and Anthropology Department, Rowan University, 201 Mullica Hill Rd, Glassboro, NJ 08028, USA

Jerry C Rose (jcrose@uark.edu), Anthropology Department, Main 330, University of Arkansas, Fayetteville AR 72701, USA

Frank J Rühli (frank.ruhli@anatom.unizh.ch), Institute of Anatomy, University of Zurich, Winterthurerstrasse 190, 8057 Zurich, Switzerland

Larisa Sedikova (lora@pochta.ru), National Preserve of Tauric Chersonesos, Sevastopol, Ukraine

Martin Smith (m.smith.6@bham.ac.uk), Institute of Archaeology and Antiquity, University of Birmingham, Edgbaston, Birmingham, UK, B15 2TT England

Susan K Smith (ssmith1@kennesaw.edu), Department of Sociology, Geography, Anthropology, and Criminal Justice, Kennesaw State University, 1000 Chastain Road, Kennesaw, GA 30144, USA

Mary Catherine Sonntag (mcsontnt@hotmail.com), 42 Alexander Street, Manchester, CT 06040, USA

Jennifer E Spence (jespence@unm.edu), Department of Anthropology, MSC01 1040, University of New Mexico, Albuquerque NM 87131, USA

Rebecca A Storm (rstorm@bradford.ac.uk), Biological Anthropology Research Centre, Department of Archaeological Sciences, University of Bradford, Bradford West Yorkshire, BD7 1DP, UK

Sam Stout (stout.126@osu.edu), Department of Anthropology, 244 Lord Hall, 124 W. 17th Ave., The Ohio State University, Columbus, OH 43210-1364, USA

Jacob Teuku (teuku_jacob@hotmail.com), Laboratory of Biology & Paleoanthropology, Gadjah Mada University Faculty of Medicine, Yogyakarta 55281, Indonesia

A Thorne (thorne@coombs.anu.edu.au), Archaeology and Natural History, Research School of Pacific and Asian Studies, Australian National University, Canberra, ACT 0200 Australia

Bryan D Tucker (Brytuc@mindspring.com), 510 NW 15th Avenue, Gainesville, FL 32601, USA

Erica A Tyler (tyler.76@osu.edu), Department of Anthropology, The Ohio State University, 244 Lord Hall, 124 W. 17th Avenue, Columbus, OH 43210, USA

Handan Üstündag-Aydin (hustunda@anadolu.edu.tr), Anadolu University, Faculty of Humanities, Eskisehir, Turkey

Jessica Vernacchio-Wilson, Geography and Anthropology Department, Rowan University, 201 Mullica Hill Road, Glassboro, NJ 08028, USA

Tanya von Hunnius (vonhunnius@rogers.com), 605 Broadway Ave., Toronto, ON M4G 2S4 Canada

Rachel K Wentz (bones1012@hotmail.com), 402 Wilson Avenue, Apt. B, Tallahassee, FL 32303-6255, USA

Christine White (white2@uwo.ca), Department of Anthropology, The University of Western Ontario, London, ON N6A 5C2, Canada

Alicia K Wilbur (alicia.wilbur@asu.edu), ASU School of Human Evolution & Social Change, PO Box 872402, Tempe AZ 85287-2402, USA

Cynthia Wilczak, Osteology Laboratory, Repatriation Office, Department of Anthropology, PO Box 37012, NMNH MRC 138, Smithsonian Institution, Washington, DC 20013-7012, USA

Jocelyn S Williams (jswilliams90@hotmail.com), Department of Anthropology, The University of Western Ontario, London, ON N6A 5C2, Canada

Committee for the 33rd Annual Meeting (North America)

Christine Hanson (University of Alaska-Anchorage, AK)
Karl Reinhard (University of Nebraska-Lincoln, NE)

Session Chairs

Christine D. White (University of Western Ontario, Canada)
Patricia Lambert (Utah State University, USA)
Pia Bennike (University of Copenhagen, Denmark)
Simon Mays (English Heritage Centre for Archaeology, UK)
Frank J. Rühli (University of Zurich, Switzerland)

Volunteers

Sian Bishop
Nicole Cain
Kim Fleming
Diane Hanson
Bill Walton
Janice Walton
Eric Hanson
Rebecca Cabral

Meeting Report Editor

Mary Lucas Powell

Cover design originated by Patrick D. Horne