PALEOPATHOLOGY ASSOCIATION

SCIENTIFIC PROGRAM

42nd Annual North American Meeting
ST. LOUIS, MISSOURI
March, 2015
PALEOPATHOLOGY ASSOCIATION
42nd Annual North American Meeting
ST. LOUIS, MISSOURI
March 24 & 25, 2015

SCIENTIFIC PROGRAM

Monday, March 23

Registration (6:00pm – 9:00pm)  Hilton Lobby

Tuesday, March 24

Registration (7:45am – 5:00pm)  Gateway Foyer

Student Group Raffle (7:45am – 5:00pm)

Morning Session (8:30 – 11:30am):

Workshop I.  Gateway Ballrooms 1/2
8:30 – 11:00  Rigor in Paleopathology.  Organized by Jane Buikstra

8:30 – 8:50  INTRODUCTION.  THE IMPORTANCE OF RIGOR: TERMINOLOGY AND
DIFFERENTIAL DIAGNOSIS.  Jane Buikstra, Keith Manchester, and Della Cook
8:50 – 9:10  DIFFERENTIAL DIAGNOSIS.  A PERSPECTIVE FROM ANIMAL
PALEOPATHOLOGY.  Dennis Lawler
9:10 – 9:30  DIFFERENTIAL DIAGNOSIS.  A CASE STUDY ON SCURVY.  Haagen Klaus
9:30 – 9:50  DIFFERENTIAL DIAGNOSIS.  TREPANATION.  John Verano
9:50 – 10:10  DIGITAL DATA RECORDING STANDARD IN MUMMY SCIENCE.  Ron Beckett
10:10 – 10:30  Break
10:30 – 10:50  RIGOR IN PALEOPARASITOLOGY.  Karl Reinhard
10:50 – 11:10  JUDICIOUS USES OF HISTORICAL SOURCES.  Piers Mitchell
11:10 – 11:30  DISCUSSION PANEL.

Workshop II.  Grand Suites 2/3
8:30 – 10:10  What in the World?  Case Study Pathology Puzzlers.  Organized by Larissa Collier

Special Presentation.  Grand Suites 2/3
10:30 – 11:30  NSF INFORMATION SESSION.  Rebecca Farrell, NSF Physical Anthropology
Program Director

Lunch (11:30am - 1:30pm)
Afternoon Session (1:30 – 5:00pm)

Special Presentation.  *Gateway Ballrooms 1/2*
1:30  THE HISTORY OF THE PALEOPATHOLOGY ASSOCIATION.  Michael Zimmerman

Podium Presentations.  *Gateway Ballrooms 1/2*
Part I (2:00 – 3:00pm)  Chair:  Shannon Hodge
2:00  *MYCOBACTERIUM TUBERCULOSIS* GENOMES FROM THE PRE-COLUMBIAN NEW WORLD SUGGEST A MARINE ROUTE OF DISEASE TRANSMISSION.  Kirsten I. Bos, Kelly M. Harkins, Alexander Herbig, Mireia Coscolla, Jane E. Buikstra, Sebastien Gagneux, Anne C. Stone, and Johannes Krause  +++
2:15  AN ISOTOPIC ANALYSIS OF PALEODIET AND PALEOMOBILITY OF COMMINGLED REMAINS FROM LOS PINCHUDOS, PERU.  J. Marla Toyne, Warren B. Church, Jose Luis Coronado Tello, and Ricardo Morales Gamorra
2:30  TOWARD A PALEOPATHOLOGY OF BURNS:  EXAMPLES FROM WESTCENTRAL ILLINOIS.  Della Collins Cook
2:45  THE SKELETAL MANIFESTATION OF MALARIA: A CLINICAL CASE-CONTROL STUDY.  Nicole E. Smith  ***

3:00 – 3:30  Break

Part II (3:30 – 4:45pm)  Chair:  Anne Titelbaum
3:30  PERIOSTEAL NEW BONE FORMATION AND BIOLOGICAL STRESS:  A CRITICAL VIEW FROM PATHOPHYSIOLOGY, MOLECULAR BIOLOGY, AND CLINICAL PRACTICE  Haagen D. Klaus
3:45  THE CO-OCCURRENCE OF SCURVY AND RICKETS IN INFANTS AND YOUNG CHILDREN:  A MACROSCOPIC, RADIOGRAPHIC, AND MICROSCOPIC STUDY.  Annabelle Schattmann, Benoit Bertrand, William Devriendt, Sophie Vatteoni, and Megan Brickley  ***
4:00  THE HITTITE PLAGUE OF 1322 BCE, A MULTIDICIPLINARY DIAGNOSIS.  Jerome Rose and Nicole Smith
4:15  TAPHONOMIC CONSIDERATIONS FOR THE ANALYSIS OF PARASITIC ORGANISMS FROM ARCHAEOLOGICAL CONTEXTS.  Johnica J. Morrow, Dario Piombino-Mascali, and Karl J. Reinhard  ***
4:30  YOU ARE WHAT YOU ATE:  USING PALAEOPATHOLOGY TO PROMOTE HEALTHY EATING.  Jo Buckberry, Alan Ogden, Vicky Shearman, and Iona McCleery.

Student Group Events (5:00 – 6:30pm).  *Grand Suite 3*

5:00 – 5:45  Discussion Panel.  Chair:  Chris Stantis
THE INTERACTIONS BETWEEN PALEOPATHOLOGY AND THE COMMUNITY.
Panelists:  Hallie Buckley, Jane Buikstra, and Tina Jakob.

5:45 – 6:30  Business Meeting.  Chair:  Amanda R. Harvey

*** - Entrant for the Cockburn Student Prize  +++ - Entrant for the Early Career Prize
**Association Business Meeting and Dinner (6:30 – 8:30pm).** *Lindbergh*
Cash bar, followed by buffet

**Wednesday, March 25**

**Registration (8:00 – noon)  Gateway Foyer**

**Student Group Raffle (8:00am – 5:00pm)**

**Morning Session (8:00 – noon)  Ballpark 1/2**
**Symposium. Exploring the Theme of Migration in Paleopathology: Past, Present, and Future.** Organized Alison Caine and Heidi Shaw.

**Part I (8:00-9:20am)  Chair: Heidi Shaw**

8:00  INTRODUCTION. Heidi Shaw

8:05  THE IMPACT OF MIGRATION ON HEALTH. PAST PALAEOPATHOLOGICAL PERSPECTIVES AND FUTURE PROSPECTS. Charlotte Roberts and Becky Gowland

8:20  MOVING ON UP? MIGRATION, STATUS, AND STRESS IN SAN PEDRO DE ATACAMA. Sharon Buck, Mark Hubbe, Christina Torres-Ruff, and Will Pestle ***

8:35  MIGRATION AND VITAMIN D SUSCEPTIBILITY. A CALL FOR AN EXAMINATION OF THE ARCHAEOLOGICAL RECORD. Khrystyne Tschinkel

8:50  ASSESSING LEPROSY STIGMATA IN MEDIEVAL ENGLAND (AD 11TH-15TH CENTURIES). Kori Lea Filipek-Ogden and Charlotte Roberts ***

9:05  THE RELATIONSHIP OF HEALTH AND MIGRATION IN THE CALIFORNIA GOLD RUSH. Heidi Shaw

9:20 – 10:35  **Break & Poster Session I  Archive Ballroom**

Posters in place all day but authors of odd numbered posters will be present during this break. Poster titles and authors listed at the end of the program.

**Part II (10:35 – 11:50am)  Chair: Alison Caine**

10:35  MIGRANT HEALTH. AN ANALYSIS OF PREHISTORIC HEALTH IN RELATION TO MOBILITY IN A WADI SUQ POPULATION AT RA’S AL-KHAIMAH, UAK. Alyson Caine, Charlote Roberts, Janet Montgomery, and Derek Kennett

10:50  THE ROAD TO WELLVILLE. INVESTIGATING THE RELATIONSHIP BETWEEN MIGRATION AND LEPROSY IN THE DAKHLEH OASIS, EGYPT. Amanda Groff, Tosha Dupras, and John Krigbaum ***

11:05  TRAUMA IN A CLASSIC PERIOD (AD 250-900) MAYA MASS GRAVE. Amanda Winburn and Tiffany Tung ***

*** - Entrant for the Cockburn Student Prize  
+++ - Entrant for the Early Career Prize
11:20 MOBILITY, DIET, TRAUMA AND DISEASE IN PREHISTORIC FIJI. Christina Stantis, Sian Halcrow, Rebecca Kinaston, Michael Richards, and Hallie Buckley ***

11:35 DISCUSSION. Alyson Caine

12:00 – 1:55 Lunch – Let’s Do Lunch (location TBA)

Student Group Silent Auction (2:00 – 5:00pm)

Afternoon Session I (2:00 – 4:45pm) Ballpark 1/2

Part I (2:00 – 2:45) Chair: Molly Zuckerman
Podium Presentations

2:00 CARE FOR THE AFTERLIFE? A BIOARCHAEOLOGICAL INVESTIGATION OF A ROMANO-BRITISH DECAPITION BURIAL. Nivien Speith
2:15 CORRELATING THE FOSSIL LIPID BIOMARKER RECORD WITH THE TRANSITION FROM ANCESTRAL TUBERCLE BACILLI TO MODERN BIOTYPES. David Minnikin, Oona Lee, Vijayashankar Nataraj, Monika Jankute, Gurdyal Besra, Apoorva Bhatt, and Helen Donoghue
2:30 PREHISTORIC SCHISTOSOMIASIS AT THE CHALCOLITHIC SETTLEMENT OF TELL ZEIDAN ON THE EUPHRATES RIVER IN SYRIA. Piers D. Mitchell, Eyilena Anastasiou, Kirsi O. Lorentz, and Gil J. Stein

2:45 – 4:00 Break & Poster Session II Archive Ballroom

Posters in place all day but authors of even numbered posters will be present during this break. Poster titles and authors listed at the end of the program.

Part II (4:00 – 5:00pm) Chair: Mary Lucas Powell
Special Session: The Bioarchaeology of the St. Louis Region

4:00 THE BIOARCHAEOLOGY OF KAMPSVILLE. Jane E. Buikstra
4:30 THE BIOARCHEOLOGY OF CAHOKIA. George R: Milner

5:00 Closing Remarks and Announcements, Award of Cockburn Student Prize and Early Career Prize, Announcement of SAC Raffle and Silent Auction Winners. George Milner

*** - Entrant for the Cockburn Student Prize
+++ - Entrant for the Early Career Prize
POSTER PRESENTATIONS

(Number refers to poster board number) An author of the poster should be present at the poster during their assigned poster session. Authors of odd numbered posters should be present at the first poster session (Wednesday, March 25, 9:20 – 10:35am), and those of even numbers posters should be present at the second session (Wednesday, March 25, 2:45 – 4:00pm).

1. **VARIATION IN LONG BONE LENGTH AMONG THE ANCIENT CHACHAPOYA OF PERU.** Armando Anzellini, Elizabeth Mills, Lori Epstein, and J. Marla Toyne. ***

2. **VARIATION IN LONG BONE LENGTH AMONG THE ANCIENT CHACHAPOYA OF A CUT ABOVE: AMPUTATION, DISEASE AND DIGITAL RADIOGRAPHIC ANALYSIS OF LONG BONES FROM THE WORCESTER ROYAL INFIRMARY, ENGLAND.** Jelena Bekvalac and A.G. Western.

3. **SKELETAL INDICATORS OF STRESS, TRAUMA, AND INFECTION IN AN ARCHAIC POPULATION FROM THE BROGLIO SITE (11WM80), ILLINOIS.** Aimée E. Carbaugh and Amanda Headley. ***

4. **PALEOPATHOLOGICAL POSSIBILITIES WITH PARTIAL POORLY PRESERVED HUMAN REMAINS.** Megan Brickley and Jo Buckberry.

5. **“FILL ALL THY BONES WITH ACHES.” A BIOARCHAEOLOGICAL STUDY OF MEDICAL CARE AND TREATMENT OF LONG BONE FRACTURES.** Tyler Cargill and J. Christopher Dudar. ***


7. **POSITIONAL CLUB FOOT AND BILATERAL ASYMMETRY RELATED TO CEREBRAL PALSY OR PARALYTIC POLIOMYELITIS IN THE ROMANO-BRITISH CEMETERY OF KINGSHOLM, GLOUCESTER.** Laura Castells-Navarro, Keith Manchester, and Jo Buckberry. ***

8. **PROBABLE NUTRITIONAL HYPERPARATHYROIDISM AND SEVERE FIBROUS OSTEODYSTROPHY IN TWO JUVENILE ORANGUTANS, PONGO ABELII AND PONGO PYGMAEUS.** Stephanie L. Canington and David R. Hunt.

9. **FACING SCURVY HEAD-ON: SCURVY AND ANEMIA COMORBIDITY IN A PERUVIAN JUVENILE’S CRANIAL REMAINS.** Tony Chamoun. ***


*** - Entrant for the Cockburn Student Prize       +++ - Entrant for the Early Career Prize

12. DEGENERATIVE JOINT DISEASE AND TRAUMA AT TELL EL-AMARNA. Heidi S. Davis.


15. PHYSIOLOGICAL EVIDENCE OF INEQUALITY IN MISSISSIPPIAN AND ARCHAIC BURIAL ASSEMBLAGES IN TENNESSEE. Barbara Forman. ***


17. COMPARATIVE ANALYSIS OF PROLIFERATIVE LESIONS BY MACROSCOPIC EXAMINATION AND COMPUTED RADIOGRAPHY. Sierra Greiner, Edward Bormann, Lesley Gregoricka, Jaime Ullinger, and Gerald Conlogue. ***

18. NOT YOUR AVERAGE HOLES IN THE HEAD: RE-EVALUATING HRDLICKA’S FINDING OF TREPANATIONS ON ALASKAN REMAINS. J. Christopher Dudar.

19. DEVELOPMENT OF ROBUSTICITY AND ENTHESIOPATHY IN THREE HISTORIC POPULATIONS. Heather Guzik and Kristrina A. Shuler. ***

20. TWO POSSIBLE CASES OF RHEUMATOID ARTHRITIS FROM THE DAKHLEH OASIS, EGYPT. Tosha L. Dupras, Kaitlin East, Peter Sheldrick, Lana Williams, and Sandra Wheeler.

21. SKELETAL EVIDENCE FOR DISEASE AND TRAUMA IN THE EARLY BRONZE AGE OF NORTHEASTERN SERBIA. Katherine Haas, Amy Karabowicz, and Katherine Castello. ***

22. OPTIMIZATION OF DNA EXTRACTION PROTOCOLS FROM HISTORIC FORMALIN-FIXED SOFT TISSUES FOR PALAEOMICROBIOLOGICAL STUDIES. Giada Ferrari, Frank J. Rühli, and Abigail S. Bouwman.

23. NEW EVIDENCE OF TUBERCULOSIS IN NORTHERN PERU: CONTEXT, DIFFERENTIAL DIAGNOSES AND INTERPRETATION OF LATE PRE-HISPANIC AND COLONIAL ERA MYCOBACTERIAL INFECTION. Hilarie K. Huley and Haagen D. Klaus. ***

*** - Entrant for the Cockburn Student Prize     +++ - Entrant for the Early Career Prize


27. **BACK TO BLUEGRASS: VERTEBRAL PATHOLOGY IN A MIDDLE-LATE ARCHAIC SITE IN SOUTHWEST INDIANA.** Alesia King and Robin Quataert. ***


29. **SITE 117: RECONSTRUCTING THE LIVES AND DEATHS OF THE DECEASED AT NUBIA’S EARLIEST KNOWN CEMETERY.** Casey L. Kirkpatrick. ***

30. **“THEY LIE LIKE PIECES OF A CHILD’S PUZZLE” – INSIGHTS INTO SUB-ADULT HEALTH FROM A MID-19TH CENTURY PRIVATELY-OWNED BURIAL GROUND IN BETHNAL GREEN, LONDON, UK.** Rachel Ives.

31. **SEM OF INTERPROXIMAL GROOVE INDICATIVE OF THERAPEUTIC PRACTICE AT PETE KLUNK MOUNDS, ILLINOIS.** Savannah G. Leach. ***

32. **DISEASES OF AFFLUENCE IN A HIGH-STATUS POST-MEDIEVAL POPULATION FROM AMBEL, ZARAGOZA, NORTH-EAST SPAIN?** Tina Jakob and Joe Wallace Walser III.

33. **EXPLORING THE RELATIONSHIP BETWEEN DIET AND OSTEOPOROSIS IN MEDIEVAL PORTUGAL USING STABLE ISOTOPE ANALYSIS.** Sharla Luxton. ***

34. **EARLY CHILDHOOD DIET DURING THE 19TH CENTURY COPENHAGEN.** Marie Louise S. Jørkov, Darren Grocke, and Anne Lokke.

35. **OSTEOARTHRITIS IN THE ANDES: PREVALENCE AND PATTERNING OF DISEASE AMONG PRE-COLOMBIAN AGRO-PASTORALISTS FROM KUELAP.** Zorina Manoni and J. Marla Toyne. ***

36. **TESTING FOR CORRELATION AMONGST TWO PERIODONTAL DISEASE DIAGNOSTIC PROTOCOLS.** Sarah A. Lacy.

*** - Entrant for the Cockburn Student Prize

+++ - Entrant for the Early Career Prize
37. **BENDING OUR UNDERSTANDING: CONSIDERING THE EFFECT OF RICKETS ON DIETARY ISOTOPES THROUGH INCREMENTAL DENTINE ANALYSIS.** Courtney Miller, Janet Montgomery, Rebecca Gowland, and Julia Beaumont. ***

38. **A 5500 YEAR OLD BOG OFFERING IN DENMARK.** Niels Lynnerup, Marie Louise S. Jørkov, Chiara Villa, Lene Hagedorn, and Thomas Jørgensen.

39. **HOW ‘STRESSED’ IS ‘STRESSED’? THE CO-OCCURRENCE OF BIOLOGICAL STRESSES IN A LATE PREHISTORIC SKELETAL SAMPLE.** Jocelyn D. Minsky-Rowland. ***

40. **UNVEILING THE EVIDENCES OF NEOPLASM IN THE COIMBRA AND LISBON REFERENCE SKELETAL COLLECTIONS.** Carina Marques, Vitor Matos, Albert Zink, and Eugenia Cunha

41. **GROWING UP AT THE 4TH CATARACT: PREADULT GROWTH AND MORBIDITY AT THE GINEFAB SCHOOL SITE.** Annie Laurie Norris, Allisen Dahlstedt, and Brenda J. Baker. ***

42. **EVALUATION OF PATHOLOGICAL CONDITIONS IN THE CLAVICULAR RHOMBOID INSERTION MORPHOLOGY FOUND IN THE ROBERT J. TERRY ANATOMICAL SKELETAL COLLECTION.** Molly Martell and David Hunt.

43. **PATTERNS OF OSTEOARTHRITIS IN MIDDLE AND LATE WOODLAND POPULATIONS: THE PETE KLUNK MOUNDS.** Olof D. Olafardottir. ***

44. **BURNT AND MUTILATED HUMAN REMAINS FROM A MEDIAEVAL VILLAGE.** Simon Mays.

45. **FISHING OR FARMING: A BIOCULTURAL MODEL OF ENTHESIAL CHANGES TO THE CLAVICLE AT BRONZE AGE TELL ABRAQ, UAE.** Amber E. Osterholt and Debra L. Martin. ***

46. **SUBADULTS IN TRANSITION: ANALYSIS OF ANCIENT MOCHE HEALTH THROUGH COMPARATIVE SKELETAL DEVELOPMENT AND PATHOLOGY DURING THE EMERGENCE OF STATEHOOD.** Callie Rawlins, Celeste Gagnon, D. Troy Case, and Emily Griffith.

47. **PALEOAMERICAN PARASITISM: INFECTIONS THAT SIGNAL THE ORIGIN AND ROUTE OF MIGRATION.** S. Elizabeth Racz, Karl J. Reinhard, Scott L. Gardner, and Dennis Jenkins. ***


*** - Entrant for the Cockburn Student Prize    +++ - Entrant for the Early Career Prize
49. **A MOUTHFUL OF TEETH: THE DIFFICULTIES IN DIAGNOSING A SYNDROME CHARACTERIZED BY SUPERNUMERARY TEETH.** Lita Sacks. ***

50. **OVERDISPERSION: TESTING WHETHER A KEY PARASITOLOGICAL PRINCIPLE IS EVIDENCED IN ARCHAEOLOGY.** Karl Reinhard

51. **A RARE CASE OF OS ODONTOIDEUM FROM AN EARLY INTERMEDIATE PERIOD TOMB AT THE HUACAS DE MOCHE, PERU.** Anne R. Titelbaum and Santiago Uceda Castillo. +++

52. **MYOSTITIS OSSIFICANS AND RELATED AILMENTS.** Laura Sophia Schwartz and Julia Gresky.

53. **IDENTIFYING DISEASE IN COMMINGLED HUMAN SKELETAL REMAINS FROM AN OSSUARY AT KUELAP IN CHACHAPOYAS, PERU.** Vu Tran. ***

54. **LICE PALEOEPIDEMIOLOGY OF THE MOQUEGUA RIVER VALLEY, SOUTHERN PERU.** Nicole Searcey and Karl Reinhard.

55. **DIABETES IN THE HAMANN- TODD COLLECTION.** Charity F. Upson-Taboas. ***

56. ** PATTERNS OF CO-MORBIDITY OF STRESS MARKERS A COLONIAL MAYA POPULATION FROM TIPU, BELIZE.** Sally Skelton and Amanda R. Harvey.

57. **PLEURAL RIB LESIONS IN A SOUTH AFRICAN CADAVER-DERIVED SKELETAL SAMPLE.** Thivviya Vairamuthu and Susan Pfeiffer. ***

58. **TUBERCULOSIS-ASSOCIATED LESIONS IN MODERN SKELETAL REMAINS FROM SOUTH AFRICA.** Maryna Steyn and Jenifer Buskes.

59. **PALEOPATHOLOGY AND MEDICAL DECISION-MAKING: EVIDENCE OF DISEASE IN HUMANS AND IN TEXT, AND HOW DOCTORS DECIDE.** Katherine Van Schaik and Frank Ruhli. ***

60. **PREHISTORIC TRAUMATIC INJURY IN WEST-CENTRAL ILLINOIS: A PALEOPATHOLOGICAL ANALYSIS OF TWO LATE WOODLAND POPULATIONS.** Robert R. Taylor.


62. **HYPERTROPHIC OSTEOPATHY WITH INTRA-ARTICULAR LESIONS IN A 13th CENTURY DOG: INSIGHTS INTO PATHOGENESIS.** Elizabeth W. Uhl and Jeffrey P. Blick.

*** - Entrant for the Cockburn Student Prize

+++ - Entrant for the Early Career Prize
63. **SHOT THROUGH THE HEART, BUT WHO’S TO BLAME?: PROJECTILE TRAUMA IN LATE PREHISTORIC PENNSYLVANIA.** Robyn Wakefield-Murphy. ***

64. **METABOLIC CHILDHOOD STRESS IN ISLAMIC PERIOD BURIALS AT ‘AYN GHARANDAL.** Jessica Walker.

65. **PARADOX AND PAQUIMÉ: INTERPRETING NON-SPECIFIC STRESS IN BIOARCHAEOLOGY.** Kyle Waller and Adrianne Offenbecker. ***

66. **EXAMINING RELATIONSHIPS BETWEEN DEGENERATIVE JOINT DISEASE AND OCCUPATION.** Alison Welser.

67. **DISRUPTIONS IN ENAMEL FORMATION DURING WEANING: EVIDENCE FOR A COMPLEX STRESS HISTORY DURING CHILDHOOD IN RURAL NORTHERN JORDAN.** Teresa V. Wilson. +++

68. **A DEFECT OF THE FIRST CERVICAL VERTEBRAE FROM PUYE, NEW MEXICO: A POTENTIAL CRADLEBOARDING INJURY.** Cynthia Wilczak

69. **METOPIC SYNOSTOSIS IN PREHISTORY: A DIFFERENTIAL DIAGNOSIS AND EVALUATION OF AGING METHODS.** Paige Wojcik. ***

70. **A POSSIBLE CASE OF POLIOMYELITIS FROM A 19th CENTURY CEMETERY IN CENTRAL KENTUCKY.** Heather Worne.

71. **A SYNTHETIC DIAGNOSIS OF CRANIOFACIAL FIBROUS DYSPLASIA IN HUMAN REMAINS FROM JINGGOUZI, A BRONZE AGE CEMETERY SITE IN NORTH CHINA.** Qun Zhang, Zhangzhen Shi, Mocen Li, Zhichao Sun, Ningning Lian, Tao Han, Xiaofang Gao, and Quanchao Zhang. ***

72. **PALEOPATHOLOGICAL INVESTIGATIONS OF THE DRA’ ABU EL-NAGA COMPLEX K93.12 IN THEBES WEST, EGYPT.** Albert Zink, Negahnaz Moghaddam, Alice Paladin, Estelle Hower-Tilmann, and Sandra Losch.

73. **PRELIMINARY FINDINGS FROM THE PREHISTORIC AKLIS SITE, ST. CROIX, U.S. VIRGIN ISLANDS.** Molly K. Zuckerman, Derek Anderson, and Nicholas Herrmann.*** - Entrant for the Cockburn Student Prize      +++ - Entrant for the Early Career Prize
ABSTRACTS

WORKSHOP – RIGOR IN PALEOPATHOLOGY

Buikstra, Jane E. (Arizona State University), Manchester, Keith (University of Bradford), and Cook, Della Collins (Indiana University)

INTRODUCTION: THE IMPORTANCE OF RIGOR: TERMINOLOGY AND DIFFERENTIAL DIAGNOSIS

This presentation will introduce the symposium, emphasizing the interdisciplinarity inherent in our field(s) of study, which range from archival research to bioinformatics. We then turn to the need for scientific rigor in paleopathology. Alternative approaches to differential diagnosis will be considered, with reference to clinical and population-based perspectives, as applied to the study of ancient diseases and health. The tension between clinical and paleopathological approaches to standardized terminology is also addressed, with particular reference to taphonomic terms that introduce ambiguity into descriptions of archaeological materials.

Beckett, Ron (Quinnipiac University)

DIGITAL DATA RECORDING STANDARD IN MUMMY SCIENCE

A brief historical overview of imaging in mummy sciences is presented. The role and contribution of collected imaging data to bioarchaeological interpretation efforts is described. The rigors of digital data recording are discussed considering the image acquisition phase, interpretational phase, and standards development evolution. The importance of context in imaging studies is explored. The limitations of digital imaging methods are discussed considering both data collection and interpretation pitfalls including unilateral diagnosis. Digital archiving and the significance for research as well as informed diagnosis by consensus are presented. Future directions of digital recording in mummy science are discussed.

Klaus, Haagen (George Mason University)

DIFFERENTIAL DIAGNOSIS: A CASE STUDY ON SCURVY

Scurvy represents a key paleopathological variable in the study of ancient human nutrition, subsistence, and metabolic stress, but has long been understudied or misdiagnosed. Over the last two decades, major advances in the study of its skeletal manifestations have occurred. However, greater rigor yet still can be applied to the description and differential diagnosis of scurvy. In this paper, case studies from Peru highlight the variability of cranial and postcranial lesions that can be produced from chronic vitamin C deficiency. They emphasize the need for precise anatomical descriptive terminology, pathophysiological understandings of lesion formation, and more rigorous differential diagnoses in cases of subadult and adult scurvy.

*** - Entrant for the Cockburn Student Prize
+++ - Entrant for the Early Career Prize
Lawler, Dennis F., DVM, FNAP (Illinois State Museum)

DIFFERENTIAL DIAGNOSIS: A PERSPECTIVE FROM ANIMAL PALEOPATHOLOGY

Differential diagnosis seeks underlying cause(s) of a condition, based on a spectrum of possible causes. It is orderly, beginning with patient assessment and history, continuing to physical examination, and creating a problem list. Possible causes are noted from body systems knowledge. Diagnostic tests screen possible causes to establish a definitive diagnosis or a narrowed possibilities list.

In archaeology, initial steps are considered from geography, taphonomy, climate, culture, spatial relationships, ecology, and species. Possible causes are noted from information synthesis and body systems knowledge. Applied diagnostics are conducted by orderly selection. A common final outcome is a narrowed differentials list.

Mitchell, Piers D. (University of Cambridge)

JUDICIOUS USE OF HISTORICAL SOURCES IN PALEOPATHOLOGY

The texts written by people living in the past can be used to help us understand health and disease in those populations. Written sources can give us information that will never be available from archaeology. However, it is key that we know how to use these sources safely and rigorously. We will discuss the ways in which ancient written texts can be used to study paleopathology, and discuss many of the pitfalls in their use with anonymised examples based upon manuscripts submitted to the IJPP since its foundation.

Reinhard, Karl J. (University of Nebraska)

RIGOR IN ARCHAEOPARASITOLOGY

Minimizing false negative and false positive diagnoses hinges on five areas. First, the key principle of parasite “overdispersion” must be considered in all stages of analysis. Second, one must understand the history of a collection to determine if cross contamination of samples occurred. Third, using tried and true quantification methods is essential. Fourth, one must consider vertical and horizontal transport of microfossils in sites. Finally, taphonomy of parasite remains must be understood. Decomposition of parasite remains depends on biological, chemical and soil factors. These five principles are basic to understanding parasite data from mummies, skeletons, coprolites, and sediment samples.

Verano, John (Tulane University)

DIFFERENTIAL DIAGNOSIS OF HOLES IN THE HEAD

Not all holes in skulls are trepanations. Developmental defects, trauma, infection, neoplasm, and taphonomic damage can all mimic trepanation openings. Particularly when evaluating a possible
trepanation in an isolated skull without medical history or firm archaeological context, a thorough
differential diagnosis is essential. The simplest cases are unhealed trepanations, where tool marks
provide direct evidence of surgical intervention. A confident diagnosis is more difficult in healed
defects of the skull, where the mechanism that produced a hole may be obscured by bone remodeling.
Finally, postmortem damage to skulls (breakage, erosion of bone, carnivore or rodent damage) is
common in archaeological material, and may result in defects that mimic trepanations.

**SYMPOSIUM – EXPLORING THE THEME OF MIGRATION
IN PALEOPATHOLOGY: PAST, PRESENT, AND FUTURE**

Buck, Sharon (The Ohio State University), Hubbe, Mark (The Ohio State University and
Universidad Católica del Norte), Torres-Rouff, Christina (Universidad Católica del Norte and
University of California, Merced), and Pestle, William J. (University of Miami)

**MOVING ON UP? MIGRATION, STATUS, AND STRESS IN SAN PEDRO DE ATACAMA,
CHILE**

The Middle Horizon (AD 500-1000) in northern Chile’s Atacama oases is characterized by
increasing relations between local and foreign groups, especially the Tiwanaku, a complex polity
centered in the Bolivian Altiplano. Studies of the San Pedro region have focused on the degree to which
these interactions influenced the exchange of people, goods, and ideology. To test the hypothesis that
Tiwanaku presence (ideological or physical) in San Pedro de Atacama resulted in the creation of distinct
status groups displaying different paleopathological profiles, we undertook a bioarchaeological analysis
of 299 individuals from three Middle Horizon cemeteries. We proposed that individuals associated with
Tiwanaku had better physiological health, as well as lower risk of trauma. Markers of diet, nutrition, and
injury during life would then differ based on cultural affiliation, as determined through analysis of
mortuary goods (local vs. foreign). Carious lesions, abscesses, and antemortem tooth loss were used as
physiological stress markers, while fractures in the skull were quantified as evidence of violence.
Results show individuals associated with Tiwanaku grave objects (n=28) have a higher prevalence of
trauma, but better oral health, suggesting cultural affiliation carried differential benefits and risks.
Variation in paleopathological profiles likely results from social buffers protecting individuals from poor
oral health and/or providing preferential access to resources. The association of these profiles with
cultural affiliation probably stems from a combination of foreign migration into the oases and the
exchange of goods and ideology between regions promoting the establishment of well-defined local
social hierarchies.

*** - Entrant for the Cockburn Student Prize         +++ - Entrant for the Early Career Prize
Caine, Alyson (Durham University), Roberts, Charlotte (Durham University), Montgomery, Janet (Durham University), and Kennet, Derek (Durham University)

MIGRANT HEALTH: AN ANALYSIS OF PREHISTORIC HEALTH IN RELATION TO MOBILITY IN A WADI SUQ POPULATION AT RA’S AL-KHAIMAH, UAE

Migrant health is a topic of recurring interest throughout bioarchaeological research. The aim of this study is to understand the affects the process of migration has on the human body of second millennium B.C. migrants in the United Arab Emirates utilizing a combination of pathological analysis and stable isotope analysis. This paper will specifically address dental development, metabolic, and infectious disease to highlight the responses of the body, while comparing the isotope ratios of strontium and oxygen in one cemetery, Qarn al-Harf in the Emirate of Ra’s al-Khaimah. A total of 207 individuals comprise the study sample, with four separate tombs representing the Wadi Suq (2,000-1,300 B.C.) population.

Prevalence of cribra orbitalia, linear enamel hypoplasia, and non-specific new bone formation varied in these four tombs with QAH 6 exhibiting the highest frequency (33%, 5%, 9%), respectively. Mean δ18O ratios QAH 5 (27.8 ±1.0‰) and QAH 6 (28.1 ± 0.5 ‰) did not differ significantly neither did the mean 87Sr/86Sr ratios for QAH 5 (.70910 ± .000015) and QAH 6 (.70904 ± .000015). These results suggest that disparities observed in the disease prevalence between these tombs are not a result of migration patterns. Differences in subsistence strategies may result in the differences observed instead. However the limited sample size for these tombs may also result in a misrepresentation of the health and migration patterns of these individuals. While results are inconclusive for this study, continued research in health and migration is important to past and present populations.

ASSESSING LEPROSY STIGMA IN MEDIEVAL ENGLAND (11th-15th CENTURIES AD) ***

Leprosy is one of the few specific infectious diseases that can be studied in palaeopathology due to its characteristic debilitating and disfiguring skeletal changes. Leprosy has been, and continues to be, one of the most socially stigmatising diseases in history, over-riding all other aspects of social identity for the sufferers and frequently resulting in social exclusion. This study examines the stable isotopic evidence of mobility patterns of children, adolescents, and young adult individuals with the lepromatous form of leprosy in late Medieval England (11th – 15th centuries AD) to test the hypothesis that individuals buried with the disease were non-locals, possibly stigmatized by their communities of origin and ostracized. Enamel samples from 29 individuals from the St. Mary Magdalen Leprosy Hospital, Winchester, Hampshire (UK) and the St. John Timberhill parish cemetery, Norwich, Norfolk (UK) were selected for strontium (87Sr/86Sr) and oxygen (δ18O) stable isotope analysis based on age at death (<30 years), the presence of bone changes associated with lepromatous leprosy, and the underlying geology of their burial locations. The results from these data are forthcoming (early 2015) and will be used to elucidate and test some of the broader historical notions and identities associated with the movements of those infected with the disease in late Medieval England.

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Groff, Amanda (University of Florida), Dupras, Tosha (University of Central Florida), and Krigbaum, John (University of Florida)

**THE ROAD TO WELLVILLE: INVESTIGATING THE RELATIONSHIP BETWEEN MIGRATION AND LEPROSY IN THE DAKHLEH OASIS, EGYPT**

Stable oxygen isotope analysis of bone apatite and tooth enamel from adults afflicted with leprosy from the Kellis 2 cemetery (50-450 AD) in the Dakhleh Oasis allows for greater insight into social perceptions of disease stigma during the Roman-Christian era. Results from five adult males and one adult female who suffered from leprosy are compared against δ¹⁸O values from three contemporaneous sites and one New Kingdom site located along the Nile Valley. The average δ¹⁸O_{vsmow} value for the Nile Valley sample is -31.61‰ ± 1.84, while δ¹⁸O values for individuals (n=80) recovered from the Dakhleh Oasis average -26.86‰ ± 1.31. δ¹⁸O values from four of the six afflicted individuals (average δ¹⁸O_{vsmow} -31.21 ± 1.24) indicate they spent a significant portion of their youth in the Nile Valley and migrated to the Oasis just prior to death. Previous research suggests that leprotic individuals were banished to the Dakhleh Oasis; however, we argue that these individuals may have been migrating to the Dakhleh Oasis to gain access to a mineral called alum (hydrated sulfate). The Oasis was known in ancient times as an important and exclusive source for alum as it is found naturally in the artesian water. Alum, documented in the ancient medical texts as a treatment for leprosy, works as an astringent and treats infections. The combination of interdisciplinary evidence from stable isotopes, geology, and ancient literary sources provides a compelling argument that the Dakhleh Oasis was a place of healing and not punishment for those who suffered from leprosy.

Roberts, Charlotte (Durham University) and Gowland, Rebecca (Durham University)

**THE IMPACT OF MIGRATION ON HEALTH: PAST PALAEOPATHOLOGICAL PERSPECTIVES AND FUTURE PROSPECTS**

The World Health Organization indicates that there are currently one billion global migrants and a clear association between poor health and populations ‘on the move’ (WHO 2013). The predisposing factors for migration today are multiple, and were likely similar in the past. They include seeking work, escaping war torn areas, natural and human-made disasters, and climate change, leading to compromised subsistence economies. Each circumstance ultimately presents different health risks and needs. Palaeopathological research in this field has been surprisingly limited, to date, in spite of the increased use of mobility stable isotope analyses to track the migration of people.

The aim of this paper is to present an overview of past research on migration and health in the archaeological record, with the aim of suggesting fruitful avenues for future research. Two case studies will be presented that explore: people buried at the early medieval site of Bamburgh, Northumberland, England, and people excavated from Roman London and the wider Roman Empire. It is argued that an understanding of population mobility is crucial to interpreting palaeopathological data. This is particularly true for those stress indicators that originate in childhood (e.g. enamel hypoplasia and cribra orbitalia), and hence are not necessarily indicative of the environment at the place of death. A multidisciplinary approach, including bioarchaeological, historical, epigraphic, archaeological and isotopic evidence, in addition to the integration of data from studies of contemporary migrants, is paramount to the accurate assessment of the relationship between mobility and health in the past.

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THE RELATIONSHIP OF HEALTH AND MIGRATION IN THE CALIFORNIA GOLD RUSH

The Gold Rush (1848-1860) brought many things to California, including statehood, wealth, and prominence, but most noticeably it brought people. With relatively few readily available resources and limited access to ‘modern’ health care, early occupants of Shasta County faced considerable health risks. Primary sources from this period serve to highlight the health risks associated with this early period of Shasta County history, including tuberculosis, scurvy, cholera, malaria, and other obscure ailments. However, it is yet unclear how the tribulations of migration may have contributed to these health risks. The well-documented California Gold Rush in Shasta County, therefore, presents a unique opportunity to explore the relationship of health and migration.

The aim of this study was to investigate evidence for health in the absence of skeletal evidence and to identify how migration may have contributed to the disease presence and prevalence in this region during the Gold Rush. A health profile was produced for the population of Shasta County during the Gold Rush (8,306 individuals; males=7046, females=1260; age ranging from 1-85 years) through the systematic analysis of census records, historic cemetery records, death records, newspapers, physician’s accounts, and anecdotal information. Specific migration-related health risks were identified and analyzed based on modern public health investigative models, including GIS and disease ecology. This presentation showcases the current results of this study and the future direction of the project to further understand the relationship of health and migration in Shasta County during the Gold Rush.

Stantis, Christina (University of Otago), Halcrow, Sian E. (University of Otago), Kinaston, Rebecca L. (University of Otago), Richards, Michael P. (University of British Columbia and Max Planck Institute for Evolutionary Anthropology), and Buckley, Hallie R. (University of Otago)

MOBILITY, DIET, TRAUMA, AND DISEASE IN PREHISTORIC FIJI (C. 750-150 BP)

This study aims to explore the impact of movement, interpersonal violence, and health (and interactions between these) in prehistoric Fiji, Pacific islands. During the Vuda Phase (900–150 BP), maritime interactions between the archipelagoes of Fiji, Tonga, and Samoa were facilitated by the close proximity of the islands and sophisticated sailing and navigation technology. There was comparatively less contact between communities within the island of Viti Levu, the main island of Fiji, due to environmental and social factors (increased aggression and fortification) during this era. However, some trade and internecine warfare between coastal and inland communities are recorded in oral traditions and the archaeological record. Skeletons from the coastal site of Bourewa (750–150 BP) on Viti Levu were analyzed in this study. These 28 individuals were examined for skeletal evidence for trauma and infection along with isotopic evidence of mobility ($^{87}$Sr/$^{86}$Sr) and diet ($\delta^{13}$C, $\delta^{15}$N).

Periosteal reactions, possibly indicating infection, affect a large proportion of individuals (CPR of 50%; n=10/20). Conversely, there was very little trauma (CPR of 10%; n=2/20), which is unexpected given the ethnohistoric literature and paleopathological findings from other geographically proximate islands. There was one non-local female as evidenced by low $^{87}$Sr/$^{86}$Sr values, suggesting she was from an inland rather than coastal area. Paleodietary analyses of bone and dentine suggests a marine-dependent diet for the assemblage, but three individuals appear as non-locals by their strongly terrestrial...
diet. Dietary patterns may be as indicative of mobility and childhood location as $^{87}\text{Sr}/^{86}\text{Sr}$ in prehistoric Fiji.

Tschinkel, Khrystyne (Durham University)

**MIGRATION AND VITAMIN-D DEFICIENCY SUSCEPTIBILITY: A CALL FOR AN EXAMINATION OF THE ARCHAEOLOGICAL RECORD USING MODERN STUDIES**

When people migrate from their ancestral homelands, their skin pigmentation may no longer parallel their new environment. Underexposure to UV light creates a lack of vitamin-D production, posing serious developmental and health risks. Often there is a lack of skeletal evidence related to vitamin-D deficiency in the archaeological record because the affected individual needs to survive for a long period of time for bony changes to occur; they are the most severe changes and rarely seen (Brickley and Ives 2008; Wood et al. 1992). The aim of this paper is to utilize the impact modern migration has on vitamin-D deficiency to infer the influence migration had on vitamin-D deficiency in past populations. By analyzing similar health changes and symptoms reported by individuals in modern studies, bioarchaeologists can elucidate the effects migration and vitamin-D deficiency had on past populations with analogous migratory changes. This study uses one hundred articles on the relationship between vitamin-D deficiency and migration. Research suggests that vitamin-D deficient patients experience exhaustion, general bone and muscle pain, weakness, limited mobility, anxiety, depression, or infections (including tuberculosis) (Armstrong et al. 2007; Pearce and Cheetham 2010; Wilkinson et al. 2000). These symptoms can affect the migratory journey as well as life upon arrival, which this paper will discuss in detail. A comparison will be made between the health implications of the modern populations and two archaeological populations with a likely risk of vitamin-D deficiency related to migration from Asia and South America.

Winburn, Amanda (Vanderbilt University) and Tung, Tiffany (Vanderbilt University)

**TRAUMA IN A CLASSIC PERIOD (A.D. 250-900) MAYA MASS GRAVE**

Classic Period (A.D. 250-900) Maya states were characterized by regional migration, dietary variation, and socioeconomic stratification. Cancuén, an archaeological site in Guatemala, was a trading port for maritime routes between the Maya highlands and lowlands. The city was attacked ca. A.D. 800, and the high-status individuals (adult males, adult females, and children) were violently killed and left in two mass graves and one shallow burial, while commoners were killed and scattered across the site. The city was then abandoned. The coterminous nature of these skeletal remains indicates that this assemblage represents a cross-section of society at a single point in time. In this paper, we present data on trauma from one of the mass graves, and compare it with data from carbon and oxygen isotope analyses of dental enamel. Our results indicate that the mass grave contains high-status individuals who were massacred, dismembered, and beheaded, and some of these individuals had likely migrated to Cancuén from other regions.

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CONTRIBUTED PAPERS

Anzellini, Armando (University of Central Florida), Mills, Elizabeth (University of Central Florida), Epstein, Lori (Haun and Associates, Honolulu), and Toyne, J. Marla (University of Central Florida)

VARIATION IN LONG BONE LENGTH AMONG THE ANCIENT CHACHAPOYA OF PERU

Human morphology reflects a range of cultural, genetic, and environmental factors that influence the shape and size of long bones among populations. Being poorly understood in the Andes, we explore appendicular bone morphology in a sample from the Late Intermediate Period (AD 900-1470) mortuary complex of La Petaca, Peru. Initial observations of long bones identified an unusual range of variation for a single population sample, but the commingled nature of the context only allowed evaluation of isolated elements. Metric data (length, articular surfaces, and midshaft diameters) from humeri (n=52), femora (n=87), tibiae (n=73), and calcanei (n=22) were collected and compared to complete skeletons of known sex from the contemporaneous site of Kuelap. Disparities in bone size observed at La Petaca exceeded expectations, and various pathological conditions were considered (e.g. dwarfism, scurvy, malnutrition). Measurements were continuous with no clear outliers and no bi-modal distribution, suggesting that disparities are not explained by specific conditions or sexual dimorphism. Moreover, such a distribution, in conjunction with the commingled mortuary context and lack of stress indicators (e.g. periostitis), rule out distinctive health disparities. Comparative analysis demonstrated a similar range (humeral lengths produced ranges of 77mm and 84mm, for La Petaca and Kuelap respectively) indicating that this variation is typical in the Chachapoyas region. This wide range of intra-sample variation more likely reflects normal human biology rather than health disparities. This study underscores the need for baseline metrics when exploring the impact of health inequalities and stress on body shape and size in ancient populations.

Bekvalac, Jelena (Museum of London) and Western, A. G. (Museum of London)

A CUT ABOVE: AMPUTATION, DISEASE AND DIGITAL RADIOGRAPHIC ANALYSIS OF LONG BONES FROM THE WORCESTER ROYAL INFIRMARY, ENGLAND

Recent excavations at the 19th century Worcester Royal Infirmary led to the discovery of a large assemblage of modified skeletal remains including a sample of 134 long bones, some of which displayed evidence of gross pathology and transection. The aetiology of many diseases at this time was unknown and in the absence of anaesthesia, surgery was limited to amputation as a last resort. Infirmaries often also served as teaching hospitals, where morbid and anatomical dissection took place alongside specimen preparation. Whereas some long bones exhibited gross pathology, others did not. In order to establish true prevalence rates of disease and investigate the relationship of the nature of pathological lesions to the presence of modification by transection, Direct Digital Radiography (DDR) was undertaken. Non-specific changes were recorded using radiological classifications for both intraosseous and periostitic lesions. The radiographic evidence revealed that some transected elements exhibited previously unobserved pathological changes. Aggressive or acute/sub-acute as well as chronic stages of disease were observed, possibly relating to ascending infection following gangrenous limb ischaemia or

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haematogenous spread. Although the affected sample size was small, aggressive intraosseous lesions were frequently accompanied by the more aggressive types of periostitis in comparison to more chronic intraosseous lesions co-occurring with more benign types of periostitis, suggesting that DDR and radiological methodology can be successfully applied to detect and identify earlier stages of disease in skeletal populations. Other rare conditions were detected using DDR, proving it to be a critical tool in the assessment of skeletal disease in the past.

Bos, Kirsten I. (University of Tuebingen), Harkins, Kelly M. (University of California, Santa Cruz), Herbig, Alexander (University of Tuebingen), Coscolla, Mireia (Swiss Tropical and Public Health Institute), Buikstra, Jane E. (Arizona State University), Gagneux, Sebastien (Swiss Tropical and Public Health Institute), Stone, Anne C. (Arizona State University), and Krause, Johannes (University of Tuebingen and Max Planck Institute for History and Sciences)

MYCOBACTERIUM TUBERCULOSIS GENOMES FROM THE PRE-COLUMBIAN NEW WORLD SUGGEST A MARINE ROUTE OF DISEASE TRANSMISSION  +++)

The success of ancient DNA capture and genomic reconstruction as applied to bacterial pathogens shows promise for their use in addressing outstanding questions concerning the evolutionary history of many diseases. An open question in paleopathology, for example, is the phylogenetic placement of putative Mycobacterium tuberculosis strains from the pre-contact New World. Comparative genomics indicate that modern M. tuberculosis strains currently circulating in the Americas are of European origin. This observation, however, is incompatible with both archeological evidence for the disease in the Americas before the 15th century, and models that support a worldwide distribution of the disease via human migrations during the Pleistocene. Here we report on three complete Mycobacterium tuberculosis genomes from South American skeletal material that pre-date Columbian contact. Our results are discussed within a phylogenetic and phylogeographic framework, and support an unexpected contribution from marine mammals in transmitting the disease to humans in the New World.

Buckberry, Jo (University of Bradford), Ogden, Alan (University of Bradford), Shearman, Vicky (Wakefield Museums Service), and McCleery, Iona (University of Leeds)

YOU ARE WHAT YOU ATE: USING PALAEOPATHOLOGY TO PROMOTE HEALTHY EATING

The You Are What You Ate project was a collaboration between historians, archaeologists, museum officers, medieval re-enactors and food scientists. We aimed to encourage public debate and personal reflection on modern eating habits through exploration of the dietary choices of the medieval and early modern periods. We engaged with the public via festival stalls, museum exhibitions, public lectures, school and youth activities, medieval cooking workshops and osteology workshops. This paper will discuss the osteology workshops, aimed at adults or at school children (10 to 11 years).

Archaeological examples of diet-related conditions, including dental disease, scurvy, rickets and gout, plus those associated with obesity such as osteoarthritis and DISH, were used to help the public visualise how dietary choices can affect the body. This information was delivered via an introductory

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talk and carefully monitored bone handling sessions. For the children, this included the laying out and analysis of a plastic skeleton modified to display pathological conditions.

Evaluation data showed that the majority of participants felt they learnt something new during the sessions, and that this led them to think about healthy eating. The inclusion of examples of dental caries and calculus promoted dental hygiene to school children, although it was not one of our primary aims. It is difficult to assess if these short-term experiences translate to long-term knowledge gain or to changes in eating behaviour, but the evaluation data suggested we promoted self-reflection.

This project was supported by a Society Award from the Wellcome Trust, Grant No. 092293.

Brickley, Megan (McMaster University) and Buckberry, Jo (University of Bradford)

PALEOPATHOLOGICAL POSSIBILITIES WITH PARTIAL POORLY PRESERVED HUMAN REMAINS

With pressures on time and resources available to those undertaking research in paleopathology, poorly preserved archaeological human remains can often receive limited attention or be completely excluded from the analysis of archaeological sites. Although incomplete skeletons often yield minimal demographic information and can complicate the diagnosis of some pathological conditions, this is not universal. Significant information can be obtained even in partial remains on metabolic bone diseases (where, by definition, the whole skeleton is involved), and for conditions such as osteoarthritis and fractures which can be diagnosed in isolation. We present an example of a highly incomplete skeleton which provided valuable new information on pathological changes associated with osteomalacia, a condition that has been little studied to date in paleopathology. This skeleton also contributes to our understanding of the factors surrounding the classification of fractures, and provides new insight into the full range of circumstances in which eburnation can develop. The example discussed demonstrates the value of including partial and poorly preserved skeletons in paleopathological analysis, and the extent of information that can be obtained.

Byrnes, Jennifer F. (University of Hawai‘i, West O‘ahu), Allen, Kathryn G. (University at Buffalo), and Muller, Jennifer L. (Ithaca College)

‘PLEASE SIR, I WANT SOME MORE’: MALNUTRITION AND CHRONIC ILLNESS OF A CHILD FROM THE ERIE COUNTY POORHOUSE CEMETERY

Archaeologists have recently conducted a series of salvage excavations at the former Erie Country Poorhouse Cemetery, in Buffalo, New York. Of the 376 individuals exhumed since 2008, bioarchaeological analyses identified seven juveniles. Of these, a child aged 8-11 years was remarkably well preserved. This skeleton displays osseous changes associated with long-term malnutrition and stress, including cribra orbitalia, porotic hyperostosis, scurvy, and multiple enamel hypoplasias. Additionally, lytic destruction of the vertebral bodies and periosteal reactions on the ribs indicate a differential diagnosis of tuberculosis. Further supporting evidence is observed in the hand and foot bones, with bony changes indicative of the possibly rare tuberculosis variant spina ventosa. In the late-1870s the New York State “Children’s Law” mandated that boys and girls between the ages of two and sixteen should be removed from poorhouses. However, this law did not apply to children who were considered disabled or unhealthy. Thus, we can begin to gain insight into how social policy influenced
the lives of juveniles buried in historic New York State poorhouse cemeteries. This case study draws on documentary and bioarchaeological data to investigate the life of one of the anonymous late-19th century children who was left behind in the Erie County Poorhouse.

Canington, Stephanie L. (Smithsonian Institution) and Hunt, David R. (Smithsonian Institution)

PROBABLE NUTRITIONAL HYPERPARATHYROIDISM AND SEVERE FIBROUS OSTEODYSTROPHY IN TWO JUVENILE ORANGUTANS, *PONGO ABELII* AND *PONGO PYGMAEUS*

Fibrous osteodystrophy is a metabolic disease frequently associated with primary and secondary hyperparathyroidism. It is reported in human and non-human species, but reports of this disease in Hominidae are lacking in the literature. In the Smithsonian collections, a severely pathological orangutan was encountered and a second specimen was known to exist in the alcohol collections. These two cases of probable nutritional hyperparathyroidism from the National Museum of Natural History are presented.

Case one is a skeletonized juvenile male *Pongo pygmaeus* exhibiting extensive bilaterally enlarged mandible and maxillae with only fibrous matrix present. Teeth are present but no alveolus secures them. Bony expansion extends up the nasal region and throughout the cranial vault. The mandibular mental region and ascending ramus have lost distinguishable shape. Fibrous replacement of the cortical bone is observed in all postcranial elements, the flat bones more severely affected.

Case two, is an alcohol-preserved juvenile male *Pongo abelii* specimen exhibiting similar pathological features. Computed Tomographic study reveals severely enlarged maxillae and mandible with fibrous replacement of cortical bone throughout the cranium and postcranial elements. Both of these specimens had similar life histories, being wild caught - turned to zoo animals. It is hypothesized that these individuals received inadequate diets eliciting the hyperparathyroidism / Albright's disease. The young, developing bones of these individuals were especially vulnerable to the reduction of calcium deposition, formation of fibrous connective tissue tumors associated with this disease. These findings are supported with anecdotes of early ape husbandry, where survival of captive orangutans was rare.

Capece, Matt (Quinnipiac University), Ullinger, Jaime (Quinnipiac University), and Sheridan, Susan Guise (University of Notre Dame)

LINEAR ENAMEL HYPOPLASIA IN THE PEOPLE OF JERICHO

Skeletons from the site of Jericho (located in modern-day West Bank) were excavated in the 1950s, but have received little attention since that time. Earlier research conducted on tombs housed in Australia suggested that some of the Middle Bronze Age inhabitants of Jericho experienced a number of health issues, including degenerative joint disease, non-specific infection, and malnutrition. This project increased the understanding of health at Jericho by identifying linear enamel hypoplasias, another indicator of generalized stress, in individuals from the tombs housed at the Duckworth Laboratory at Cambridge University. Skeletal material from the Jericho tombs (Middle Bronze Age; ca. 2200-1550 BCE) was fragmentary and occasionally commingled. As a result, defect data were collected by tooth type. LEH were observed on casts coated with chromium under a Dino-Lite AD413ZT digital microscope. Defects were identified macroscopically as horizontally depressed grooves on the enamel.

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surface, and microscopically by sequences of wider perikymata spacing followed by a cervical wall of normally-spaced perikymata. Of 29 canines examined, 16 exhibited linear enamel hypoplasias (55.2%). Of those, 8 had single defects and 8 canines had multiple episodes of physiological stress. Canines from Jericho were compared with other sites from the region, including Middle Bronze Age Pella, Jordan (n=47). Canines from Jericho had similar high levels of LEH as their contemporaries from Pella (35/47; 74.5%) ($\chi^2 = 2.21; df = 1; p=0.13$). Overall, the inhabitants of Jericho likely experienced a significant amount of physiological stress as children.

Carbaugh, Aimée E. (University of Illinois, Urbana-Champaign; Illinois State Archaeological Survey), and Headley, Amanda (Illinois State Archaeological Survey)

SKELETAL INDICATORS OF STRESS, TRAUMA, AND INFECTION IN AN ARCHAIC POPULATION FROM THE BROGLIO SITE (11WM80), ILLINOIS ***

The Broglio Site (11WM80) is a multi-component site in south-central Illinois. The site consists of a Late Middle Archaic to Late Archaic mortuary component superimposed by an Early to Middle Woodland occupation. Twenty-one individuals were recovered from the burial cluster, ranging in age from perinate to old adult, nearly equal numbers of males and females were recovered. This poster discusses the pathologies observed among these individuals, with a closer look at Individual 10 in particular. General indicators of stress among the individuals observed include healed periostitis (n=8), porotic hyperostosis (n=5), and linear enamel hypoplasias (n=8). Degenerative changes were minimal and include lipping on the margins of the articular surfaces of the long bones (n=4), osteophyte growth on the vertebral bodies (n=3), and pitting of the vertebral articular facets (n=3). Ind. 10, a possible female 40+ years old, has a healed depression fracture on the frontal bone. The right wrist appears to have been fractured; all the carpals are completely fused together and MC2-5 are fused to the carpals. Secondary osteoarthritis is present. The distal third of the radii and left ulna have thickened cortical bone and a bony callus is present on the distal diaphysis of the left radius. In addition, the right tibia and left fibula are inflamed with new bone deposition increasing the thickness. There is also expansion and fusion of the left MTs and tarsals. A diagnosis of osteomyelitis is unclear; therefore a tentative diagnosis of osteitis has been assigned.

Cargill, Tyler (Smithsonian Institution) and Dudar, J. Christopher (Smithsonian Institution)

“FILL ALL THY BONES WITH ACHES.” A BIOARCHAEOLOGICAL STUDY OF MEDICAL CARE AND TREATMENT OF LONG BONE FRACTURES ***

Trauma analysis of skeletal series can reveal past occupational hazards and lifeways. Studying the characteristics of successful or unsuccessful medical intervention in fracture treatment can assist in the understanding of access to, and quality of health care in the bioarchaeological record. In this study fracture resolution was quantified and comparisons made between successful and poorly healed fractures utilizing criteria developed by Roberts (1988) and Grauer and Roberts (1996). This methodology requires both gross morphological observation and radiographic evaluation of the fractured long bones. The primary focus of this study involves upper limb fractures and the exploration of biomechanical processes in which proximal and distal ends alter during the healing process.

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Collections curated at the Smithsonian Institution were used for this study including the Native American archaeological skeletal series and the Huntington anatomical collection. In addition, archaeologically recovered French fur traders and Pioneer Upper Canadian remains were utilized for comparison. The individuals from the Huntington collection are more likely to have been treated by advances in 19th century western trauma care compared to two archaeological samples whose treatments may have been different (e.g., a splint as opposed to a plaster cast with traction). All three collections showed cases of successful and poorly healed fractures along the diaphysis utilizing Robert’s (1988) methodology; however, several individuals showed well healed fractures on the difficult to treat proximal and distal ends of the long bones. This study explores the biomechanics and processes of proximal and distal end fractures.

Castells-Navarro, Laura (University of Bradford, Manchester, Keith (University of Bradford), and Buckberry, Jo (University of Bradford)

POSITIONAL CLUB FOOT AND BILATERAL ASYMMETRY RELATED TO CEREBRAL PALSY OR PARALYTIC POLIOMYEYLITIS IN THE ROMANO-BRITISH CEMETERY OF KINGSHOLM, GLOUCESTER ***

This paper presents the re-evaluation of K131, a young adult male from the Romano-British cemetery of Kingsholm, Gloucester. His palaeopathological analysis had been already reported by Roberts et al (2004) as an example of clubfoot deformity. The authors suggested that the clubfoot was a primary condition, with asymmetry of the limbs being secondary to the deformity. The individual displays significant bilateral asymmetry in the upper and lower limbs, affecting the size of the bones and the development of entheses. Our re-analysis revealed lateral wedging in the lumbar vertebral bodies, with the right side systematically shorter in the supero-inferior axis, indicative of scoliosis. The absence of other vertebral deformities suggests a compensatory origin of the scoliosis. The cranium is also asymmetric, since there are no signs of craniosynostosis or congenital muscular torticollis, it is probably of positional origin. The right ilium shows a wider blade and a thicker iliac crest compared to the left, suggesting muscle strength discrepancy. The femoral collo-diaphyseal angles are unequal, the right being varus and the left valgus. This widespread skeletal asymmetry affecting the whole body indicates disuse atrophy of the left side, possibly associated with paralysis. Finally, the articulation of the left tibia, talus and calcaneus shows an abnormal adducted and slightly inverted accommodated posture yet there are no signs of either equino or cavus deformities. We suggest that this case of clubfoot is of postural, not congenital, origin and is related to a congenital or acquired neuromuscular condition such as paralytic poliomyelitis or cerebral palsy.

Chamoun, Tony (Florida Atlantic University)

FACING SCURVY HEAD-ON: SCURVY AND ANEMIA COMORBIDITY IN A PERUVIAN JUVENILE’S CRANIAL REMAINS ***

This presentation’s objectives are to (1) report a case of probable scurvy and likely anemia comorbidity in an archaeological Peruvian juvenile skull of unsecure provenance, and (2) present a differential diagnosis flow-chart that scholars may use and modify to facilitate diagnosis in cases of

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suspected cranial scurvy. This case is significant in that there are few publications concerning potential cases of juvenile Peruvian scurvy in the English language literature (i.e., Klaus, 2014; Melikian and Waldron, 2003; Ortner et al., 1999). I believe this individual is the first reported juvenile case from Peruvian antiquity to display signs of scurvy and anemia comorbidity. The constructed flow-chart bolsters my diagnosis and reflects anatomical, pathological, and epidemiological data.

This individual (Peabody object number: 80-61-30/23985.0) is housed at the Peabody Museum of Archaeology and Ethnology at Harvard University, Cambridge, Massachusetts. Age is estimated at 6 years ± 24 months based on mandibular tooth eruption (Buikstra and Ubelaker, 1994). Pathologies are described following Ortner’s (2003) guidelines for pathological description and diagnosis. Pathologies include bilateral porosity of the greater wings of the sphenoid bones, temporal bones, and parietal bones. There is porosity and bone apposition on the frontal bone, diploic hypertrophy in the left orbital roof, porous and hypertrophic lesions of the occipital bone with hypertrophy engaging the parietal bones symmetrically and bilaterally, and vascular impression lesions (some raised and anastomosed) throughout the outer surface of the cranial vault. This latter feature is scantly reported. Differential diagnosis candidates include rickets, anemia, scurvy, infectious disease, and infantile cortical hyperostosis.

Collier, Larissa (Alabama College of Osteopathic Medicine)

A MODEL OF VIOLENCE: QUALITATIVE AND QUANTITATIVE ASSESSMENT OF VIOLENCE IN PREHISTORY

The increase in recent conflict events, foreign or domestic, has driven the movement in popular culture to gain an “academic understanding” of violence as well as explanations as to why violence is perpetrated on such varying levels. Previous research has looked at how violence has been measured or defined for prehistoric societies. The aim was to assess the relationship between trauma and violence by creating a model that contextualized potential changes in the frequency of trauma over time. This model was based on qualitative data and focused on the frequency of trauma within different types of violence, such as conflict or structural violence, and how that frequency could change over time.

The current project will draw on prehistoric and historic skeletal data sets with narrow dating intervals and written accounts of cultural violence to create a stronger and more quantitative model to assess the relationship between trauma and violence in the past. The framework of this project will include a discussion on aspects of political and religious violence, conflict and warfare, and daily and/or domestic intra-group violence. By looking at each line of evidence for violence (skeletal, defensive structures, weapons, etc.) separately and collectively as well as potential cultural motivations for engaging in violent practices, a more nuanced ‘framework of violence’ can be built and potentially adapted to other societies and cultures. Perhaps researchers can begin to understand how the concept and reality of violence has changed and been adapted over time by historic and modern societies.
Cook, Della Collins (Indiana University)

TOWARD A PALEOPATHOLOGY OF BURNS: EXAMPLES FROM WESTCENTRAL ILLINOIS

Survived burn injuries have received little attention from paleopathologists. This deficit reflects the grounding of our didactic literature in bone pathology. In clinical context, soft-tissue burns are unlikely to be diagnosed from the bone lesions they may eventually produce. The clinical literature on burn injuries in bone is largely found in specialized chronic care journals that are not integrated with the literature on bone pathology.

A review of epidemiological and ethnographic sources suggests that survived burns must have been common among most ancient peoples. As with other kinds of trauma, burns have interesting relationships with such technologies as hunting, cooking, housing, and food storage. Burns may also result from intergroup or interpersonal violence. Survived burns may result in considerable disability.

Three cases from westcentral Illinois are presented in which survived burns should be considered in differential diagnosis. Ledders 1-137 is an adolescent male with two circumscribed areas of necrotic bone on the lateral aspect of the distal fibula. These are surrounded by zones of resorption and a 2 centimeter cuff of poorly consolidated perioseal new bone, indicating peripheral soft tissue injuries that were survived for several months. KL 46 and KL 47 are fused middle and distal hand phalanges from an adult, probably from the Pete Klunk Mounds, unfortunately no longer associated with a particular skeleton. While unreduced dislocation must be considered, this lesion can result from scarring in soft tissue burn injuries. SA 117, a 25-30 year old male from the Schild Site, has been published as a hand amputation. The radius and ulna on the affected side show extensive irregular, sclerotic cortex and greatly expanded medullary cavities. Heterotrophic calcification of scar tissue greatly limiting movement in the radius and ulna and loss of the injured hand could have resulted from a burn that was survived for many years. The three cases illustrate plausible early, middle and late bone lesions resulting from survived soft tissue burns.

Davis, Heidi S. (University of Arkansas)

DEGENERATIVE JOINT DISEASE AND TRAUMA AT TELL EL-AMARNA

In 1353 BCE, during the reign of Akhenaten, a new capital city was created for Egypt in the area currently known as Tell el-Amarna. The South Tombs Cemetery (STC) at Amarna represents a large skeletal population of well-preserved individuals who perished during the city’s short 17 year occupation, which was a period of extreme workload requirements and extensive socio-cultural change. The sample for this study is 200 adult individuals from the STC for which age and sex could be reliably estimated, yielding a sample of 116 females and 84 males. Previous analysis determined there were not significant differences between fracture and degenerative joint disease rates for males and females, indicating that both sexes experienced similarly high levels of physical stress. The purpose of the current analysis is to further investigate these results by examining patterns of traumatic injury by element location and associated degenerative joint disease in this population to better understand patterns of injury. Fractures of the vertebral column are the most common area of injury and DJD involvement for both sexes. After spinal injuries, for males the most commonly fractured bones are the ribs, ulna, hand, and foot, while for females it is fractures to the ulna, followed by the ribs and hand.

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The people of Akhenaten’s city appear to have experienced high levels of occupational stress for both sexes, however, examining the interaction and variation in skeletal stress indicators provides a more accurate and comprehensive picture of health experiences and activities at Amarna.

Douglas, Paige (University of Central Florida), Toyne, J. Marla, (University of Central Florida), Honores Reyes, Alan (Museo de Túcume, Peru), and Delgado, Bernarda Elías (Museo de Túcume, Peru)

ANCIENT SURGERY, MEDICINE AND CARE: A CASE STUDY OF PRE-INCAN AMPUTATION

Amputations provide a unique insight into the medical knowledge of past cultures. This poster presents a brief history of amputations in the archaeological record as well as a case of amputation from Túcume, Peru. Previous researchers have differentially diagnosed amputation through the analysis of bone modification, inflammation, and remodeling. In the ancient Andes there are only four documented cases of amputation, all occurring during the Moche period (AD 100-750) defined by both skeletal evidence as well as artistic representations. At the archaeological site of Túcume, the skeletal remains of Burial 1 from Huaca Las Abejas (AD 1100-1470) demonstrate unique evidence consistent with the intentional removal of the left foot. The individual was estimated to be a mature adult female, 35-49 years of age with the left foot amputated at the distal portion of the tibia and fibula. The articular surfaces of both the tibia and fibula exhibit a minor healed inflammatory response but significant remodeling consistent with long-term survival. Wear patterns indicate subsequent use of the end of the appendage in ambulation. The initial motivation for amputation, whether pathological, accidental injury, or intentional (punitive or ritual), is unclear. In spite of this potentially disabling and disfiguring condition, she was not socially marginalized and was interred with associated grave goods suggesting she may have been an accomplished weaver. This unique case, the second documented female amputation, provides invaluable bioarchaeological information on medical and surgical practices within late Andean pre-Columbian coastal societies.

Drennan, Trisha M. (Honolulu, HI), and Zuckerman, Molly K. (Mississippi State University)

A POTENTIAL CASE OF TREPONEMAL DISEASE FROM HAWAI`I

Here we reexamine the case study of the skeleton of a 22 to 25 year old female found at Barber's Point, Hono`uli`uli, ʻEwa, Oʻahu who presents numerous pathologies and skeletal stress indicators, including lesions suggestive of treponemal disease. Characteristics of the surrounding archaeological site and the mortuary context of the burial suggest that the individual was likely of indigenous Hawaiian ancestry. We provide findings from a full osteological and pathological inventory, evaluating the observed pathologies against standardized, empirical, and established diagnostic criteria for treponemal disease. The findings are contextualized in current research on treponemal disease, the origin and antiquity of syphilis and the other treponematoses, as well as in relation to archaeological, ethnographic, and historical evidence on contemporary colonial and indigenous cultures in Hawai`i. In light of new research on treponemal disease, together with a reexamination of the literature within historical context.

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and traditional wisdom, this case study may shed light on colonial era disease-scapes and the existence and spread of treponemal disease in relation to European contact in Hawai‘i.

Dudar, J. Christopher (Smithsonian Institution)

NOT YOUR AVERAGE HOLES IN THE HEAD: RE-EVALUATING HRDLICKA’S FINDING OF TREPANATIONS ON ALASKAN REMAINS

During the 1930’s Aleš Hrdlička excavated and published on human remains from numerous sites across Alaska, including five cases of trepanation from pre-Russian contact Kodiak Island (Hrdlička 1941). Trepanation is a surgical procedure involving the cutting, drilling, or scraping away of a bone’s cortex to produce a hole into the inner space, usually but not limited to, the cranial cavity. This procedure was practiced in prehistory and continues to be utilized in modern trauma care to relieve intracranial pressure. These Kodiak Island cases were used, in part, as a basis for inferring traditional methods of surgery among indigenous Alaska natives (Fortunine 1985). An additional case of possible trepanation was discovered on Attu Island (part of the Aleutian archipelago) by Alan May, one of Hrdlička’s trusted field hands. While the Unangan people were known to have had special knowledge of anatomy and medical practices (Marsh and Laughlin 1956), May acknowledged in his field notes that, “such a case [of trepanation] has never been heard of from this district” (Veltre 2013:141). Only one of Hrdlička’s cases and the May’s example are available for reappraisal; the other four individuals were repatriated in the 1990’s under the federal legislative requirements of the National Museum of the American Indian Act, the precursor to NAGPRA. Detailed macroscopic examination of the extant cases, and previous documentation of the repatriated cases, revealed bone surfaces not consistent with the cut or scraped surfaces of trepanation from other cultures, calling into question whether the procedure was ever practiced in Alaska.

Duignan, Sarah E., Gough, Hillary, Gamble, Julia A., Boldsen, Jesper, Fayek, Mostafa, Halden, Norman M., and Hoppa, Robert D.

A TALE OF TWO ISOTOPES: INTERPRETING MEDIEVAL DANISH MOBILITY USING TWO LINES OF ISOTOPIC EVIDENCE ***

During the Medieval period of Denmark, economic and trade relations grew inter-regionally, with culture, ideas and products being transferred on a more regular basis throughout the 11th to 13th centuries. By the 14th century, the population underwent a period of decline, though burial patterns remained constant, with all members of the community being buried in the same cemetery. Beginning around 1050 AD and lasting until AD 1536, the country faced drastic climatic changes, shifting economic and agricultural practices, disease outbreaks, most notably the bubonic plague. Human enamel samples from two medieval sites around Horsens, Denmark were explored: the rural site of Sejet and the urban site of Ole Wormsgade, both used throughout the 12th to 16th centuries. A previous study of the samples investigated δ¹⁸O values, using isotopic compositions of meteoric water to determine local proxies. Three of twenty-seven individuals were found to have lower oxygen isotope values, which could be due to individual movement between Scandinavian regions. As a second line of evidence, this study analyzed variations in ⁸⁷Sr/⁸⁶Sr ratios from these samples. Such ratios represent local bedrock baselines of strontium, which are slightly different between eastern and western Denmark. This provides

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a complementary source for interpreting mobility within these samples. The extent to which mobility was used as a response to famine and disease during this turbulent period will be explored. The results are discussed with respect to temporal differences within and between the two populations.

Dupras, Tosha L. (University of Central Florida), East, Kaitlin (University of Central Florida), Sheldrick, Peter (DOP Project), Williams, Lana (University of Central Florida), and Wheeler, Sandra (University of Central Florida)

TWO POSSIBLE CASES OF RHEUMATOID ARTHRITIS FROM THE DAKHLEH OASIS, EGYPT

While the etiology of rheumatoid arthritis (RA) is unknown, current research demonstrates that certain genes increase the risk for developing RA. In addition to increased risk based on genetics, environmental triggers, such as exposure to silica, smoke, and chronic periodontal disease, are reported to increase the risk for developing RA, all of which are commonly found in the ancient environment of the Dakhleh Oasis, Egypt. Excavations of one room within North Tomb 1 in the ancient village of Kellis, Dakhleh Oasis, revealed burials of two adult males, B10 and B12, with ages estimated at 45 and 27 years, respectively. Both individuals show multiple pathological conditions; however, of particular interest is that both show extensive arthritic changes in their joints, advanced osteoporosis in legs and feet, and bilateral ankylosing of tarsals and metatarsals. Advanced osteoarthritic changes associated with B12 are surprising given his young age. Original diagnoses suggested Madura foot or a paralyzing condition such as poliomyelitis as likely causes, resulting in changes to the feet, loss of leg use, and subsequent upper body changes related to compensation for this loss. These diagnoses, however, do not fit well with the presentation of these pathological changes. We suggest an alternative diagnosis of RA in both cases given the pathological characteristics, burial context in association with the possible genetic link in RA development, and the prevalence of environmental triggers for RA.

Ferrari, Giada (University of Zurich), Rühli, Frank J. (University of Zurich), and Bouwman, Abigail S. (University of Zurich)

OPTIMIZATION OF DNA EXTRACTION PROTOCOLS FROM HISTORIC FORMALIN-FIXED SOFT TISSUES FOR PALAEOMICROBIOLOGICAL STUDIES

Palaeomicrobiological studies allow to reconstruct the epidemiology of infectious diseases in the past, and therefore play a fundamental role in the study of the evolutionary genetics of pathogens, immunity and host-pathogen co-evolution. Understanding the epidemiology and host-pathogen interactions of past infections, and how virulence has evolved is of particular relevance in the context of the emergence and re-emergence of infectious diseases. The most data on past pathogens can be obtained from the isolation of ancient DNA and while many studies on skeletal remains have yielded sequences and even complete genomes of various pathogens, studies using ancient and historic soft tissues are clearly underrepresented. Whereas mummified soft tissues are rare and difficult to access, archival tissue samples such as formalin-fixed wet specimens provide an extensive disease- and tissue-specific pathology archive for retrospective molecular investigations. However, while formalin fixation successfully preserves tissue integrity, formaldehyde creates cross-links between nucleic acids and

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proteins, which makes the DNA unavailable for downstream applications and also results in its degradation to short fragments. In this study we compared different protocols described in the literature and present an improved extraction protocol that allows to obtain amplifiable DNA from formalin-fixed soft tissues. By optimizing the quality of DNA than can be obtained from these specimens, it is possible to unlock the potential of archival soft tissues for palaeomicrobiological studies.

Forman, Barbara (University of Tennessee)

PHYSIOLOGICAL EVIDENCE OF INEQUALITY IN MISSISSIPPIAN AND ARCHAIC BURIAL ASSEMBLAGES IN TENNESSEE

The osteological paradox brought the concepts of demographic nonstationarity, selective mortality and hidden heterogeneity in risk of disease and death (Wood et al., 1992) to the attention of paleopathologists and bioarchaeologists. The presence or absence of peristosis on skeletal remains, most commonly the tibiae, has been used as a measure for the latter two (Šlaus, 2008; DeWitte and Wood, 2008; Wheeler, 2012). DeWitte (2014) proposes that active peristosis and total absence of the condition may be a better indicator of frailty than the presence of sclerotic, healed bone.

This project examines the presence of inequality as hidden heterogeneity of risk in adult females from two Mississippian and four Archaic burial assemblages from Tennessee. The null hypotheses assumed equal probabilities for the presence, absence and type of peristosis on the tibiae. Likewise predicted were equal probabilities for the distributions of dental enamel hypoplasia (DEH), dental caries, and antemortem tooth loss. The actual frequencies were examined by Chi-Square analysis. Each of these distributions was found to be statistically significant at the 0.05 level indicating hidden heterogeneity of risk.

Results of Chi-Square analyses indicate presence of healed peristosis suggests good health and a survival advantage. The presence of multiple DEH suggests increased frailty. Presence of caries was more common in the Mississippian period, which is not surprising. That it was especially common among young women of the Mississippian period suggests increased frailty in those most dependent upon a corn-based diet. Each of these results is suggestive of the presence of societal inequality.

Fuchs, Katharina (Christian-Albrechts-University) and Gresky, Julia (German Archaeological Institute)

COMPARATIVE ANALYSES OF THE MANDIBLE: PATHOLOGICAL CASE STUDIES FROM THE PREHISTORIC NORTH CAUCASUS AND TURKEY

Forming a pronounced area of the human face and comprising part of the masticatory apparatus, the bones of the jaw often bear recognizable abnormalities. For instance, those conditions can reflect pathological changes due to dental diseases, the masticatory system, or related soft tissues such as the tongue and gums. This paper discusses a number of different pathological cases diagnosed in the lower jaw of prehistoric individuals.

Skeletal remains from several different sites of the North Caucasian Bronze Age (3500-1400 BCE) (N=11) and Neolithic period (9000-8000 BCE) (N=7) in Turkey were comparatively examined as part of a multi-methodological approach. In particular, an individual from the site “Kudachurt 14”

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located in the Caucasus had some of the most interesting pathological changes of the lower jaw. The mandible of the mature woman shows an aggressive osteolytic lesion with sharp margins and remnants of severe bleeding on the lingual surface. One possible diagnosis is a tumorous process in the sublingual salivary gland. Additionally, the investigated material exhibits a high variety of diagnoses which can be related to different causes of illness. These include trauma, specific and unspecific inflammation, dental disease and genetic or growth-related disorders. For example, there are several cases of healed fractures, Stafne defect, and severe abscesses/osteomyelitis.

This presentation will give an overview of providing differential diagnoses through macroscopic, histological and radiological investigations as well as CT-scans. We also focus on the mandible as a skeletal element that is underrepresented in paleopathological discussions.

Greiner, Sierra (University of South Alabama), Bormann, Edward (Quinnipiac University), Gregoricka, Lesley (University of South Alabama), Ullinger, Jaime (Quinnipiac University), and Conlogue, Gerald (Quinnipiac University)

COMPARATIVE ANALYSIS OF PROLIFERATIVE LESIONS BY MACROSCOPIC EXAMINATION AND COMPUTED RADIOGRAPHY

Cortical thickening of unknown etiology affecting the long bones of an unidentified, modern human adult male skeleton (donated to the University of South Alabama by the Mobile Medical Examiner’s Office) was examined both macroscopically and using computed radiography (CR) and multi-detector computed tomography (MDCT) as a means of comparing resultant differential diagnoses. Gross observations of proliferative bone formation, with bilateral diaphyseal thickening affecting both femora as well as the right tibia, were thought to indicate healed periosteal lesions, particularly given the absence of a cloaca. However, computed radiographic imaging technology – similar to conventional radiography but using a photostimulable phosphor plate to translate and digitize the image and MDCT – identified the deposition of excess cortical layers of bone with a reduced medullary cavity and increased bone density, lending support to the interpretation of this pathology as infectious in nature. Together, these perspectives were used to propose a potential diagnosis of remodeled periosteal reactions with non-supporative sclerosing osteomyelitis. This case study illustrates the utility of CR and MDCT imaging technology to support and enhance interpretations of pathological conditions in human skeletal remains.

Gresky, Julia (German Archaeological Institute) and Berezina, Nataliya (Research Institute and Museum of Anthropology, Moscow State University)

PATHOLOGICAL CHANGES OF THE SPINE IN BRONZE AGE PEOPLE FROM NORTHERN CAUCASUS

The vertebral column is a very frequently stressed part of the skeleton. Both degenerative changes and a large number of traumatic injuries were observed in the spines of 119 adults dated to the Bronze Age from Northern Caucasus. These individuals were buried in fourteen kurgan sites dating from 4200 to 2100 BC, located in the steppe region and piedmont area of Northern Caucasus. Only a few previous paleopathological investigations on the life conditions of the people in this area exist. They
were supposed to have ridden horses, worked hard physically and been engaged in bronze processing. Some burials included wagons, suggesting that the interred individuals were involved in driving wagons pulled by oxen.

Differences between age groups with regards to the degenerative changes of the spine were evident, whereas fractures were distributed more evenly. Arthrosis of the vertebral joints (spondylarthrosis) and vertebral bodies (spondylosis) was visible on all parts of the spine, from cervical to sacral. Herniated vertebral disks were frequently observed, in one case even leading to eburnation of the ground- and endplate of the vertebral bodies. Fractures of vertebral joints as well as vertebral bodies were visible to various degrees. A broken dens axis was detected on the spine of one of the oldest known wagon drivers. Spondylolysis, Schmorl’s nodes and a small amount of inflammatory processes were also observed. The issues addressed include whether wagon drivers had a higher frequency or different patterns of pathological changes of the spine as compared to non-drivers.

Guzik, Heather (University of Southern Mississippi) and Shuler, Kristrina (Auburn University)

DEVELOPMENT OF ROBUSTICITY AND ENTHESIOPATHY IN THREE HISTORIC POPULATIONS ***

Upper limb entheseal patterns were explored in three historical archaeological series: French fur traders from Ft. Michilimackinac, Michigan, U.S. (N=19; 1715-1781), enslaved Africans from the Newton Plantation, Barbados (N=19; 1660-1880), and colonial Maya from Tipu, Belize (N=30; 1568-1638). Populations were genetically distinct and engaged in widely different subsistence and daily activities; thus, we anticipated distinct patterns of entheseal pathologies and use. Skeletons displaying any periosteal reaction or trauma were excluded from study. Robusticity, osteophytic (OF), osteolytic (OL) markers were scored by applying Mariotti (2004, 2007) to shoulders and upper limbs. OF and OL are generally considered enthesopathies and not part of normal development, which was scored as Robusticity. Differences were measured through one-way ANOVA at p=.05. Robusticity varied significantly at 6 attachment sites for males and 5 for females. For pathological lesions, OF differed significantly in these series at 12 attachment sites in males and 8 in females. Mean OL measures differed significantly at 13 attachment sites in males and none in females. Overall, males displayed not only greater frequencies of pathologies in the form of microtraumas at these attachments, but also greater bilateral involvement, which suggests a wider range of lifetime activities. We discuss entheseal pathologies and development by functional muscle groups and compare these patterns with historical and archaeological data to reveal greater insight into past health and lifetime activities in three historic groups.

Haas, Katherine (University of Pittsburgh), Karabowicz, Amy (University of Pittsburgh), and Castello, Katherine (University of Pittsburgh)

SKELETAL EVIDENCE FOR DISEASE AND TRAUMA IN THE EARLY BRONZE AGE OF NORTHEASTERN SERBIA

The Early Bronze Age (EBA; ca. 2800-1500 BCE) in the Carpathian Basin is characterized by emerging social inequality. However, there is little evidence as to how these societal changes affected *** - Entrant for the Cockburn Student Prize +++ - Entrant for the Early Career Prize
individual morbidity and mortality. We present data from 122 adults (18-to-50+ years-at-death) and 80 subadults (neonate to 18 years-at-death) from the EBA Maros cemetery at Ostojićevo, Serbia. Skeletons were examined for non-specific, stress-induced pathology (porotic hyperostosis, cribra orbitalia, and dental enamel hypoplasias), dental disease (caries, antemortem toothloss, alveolar abscesses), and trauma. Compared to prehistoric Hungarian (Ubelaker and Pap, 1996; 1998; 2006; 2009) and EBA Serbian populations (Rega, 1995), we observed higher frequencies of non-specific stress markers and dental disease at Ostojićevo. At Ostojićevo, these pathologies affected adult females at a rate of 1.5 to 3 times that of males. Apart from the remarkable but singular instances of trephination, unhealed blunt-force trauma to the left frontal bone, and trauma-induced osteomyelitis to the left shoulder and forearm, evidence of trauma in the Ostojićevo population was rare, i.e. primarily minor injuries that had largely healed at death. These results are consistent with low frequencies of sharp-force and blunt-force trauma reported for prehistoric populations in the region. There was considerable variation in morbidity between prehistoric populations in the Carpathian Basin. Further research is needed to determine how factors such as the physical environment, subsistence practices, and social change may have led to differential health profiles in European prehistory.

Hodge, Shannon Chappell (Middle Tennessee State University)

**BIOARCHAEOLOGICAL OBSERVATIONS OF THE NASHVILLE ZOO CEMETERY**

In 2014, an unmarked historic era cemetery was removed from the grounds of the Nashville Zoo, located on the site of the Grassmere Historic Farm (1810-1985). This cemetery was unmarked, and does not appear in any historic records. Due to the location of this cemetery on a former slaveholding, and the known location of the white landowners’ cemetery near the main house, it was speculated that this unknown cemetery might represent the enslaved African American community held on the property. Following the removal of the cemetery, the Nashville Zoo requested mtDNA analyses on this sample to assess ancestry, and bioarchaeological analyses, including estimation of skeletal ancestry. This poster reports on the paleopathological investigations on a sample of nine adults, including observations of general health, nutrition, infectious disease, trauma, infection, genetic disease, and dental health. Results indicate that these individuals worked hard and died relatively young (all before age 50), but were generally well nourished and healthy. Of the nine adults, eight were complete enough to gauge ancestry by skeletal markers; of these, five appeared skeletally to be of African ancestry, and three were of probable African ancestry. Mitochondrial DNA assessment of three adults yielded mixed results. One individual was of an unknown haplogroup, another was clearly from Haplogroup L (African descent), and the third was from Haplogroup H (European, Southwest Asian or North African descent).
Huley, Hilarie K. (George Mason University) and Klaus, Haagen D. (George Mason University and Museo Nacional, Sicán, Peru)

NEW EVIDENCE OF TUBERCULOSIS IN NORTHERN PERU: CONTEXT, DIFFERENTIAL DIAGNOSES AND INTERPRETATION OF LATE PRE-HISPANIC AND COLONIAL ERA MYCOBACTERIAL INFECTION

Over the last two decades, paleopathological study of tuberculosis has advanced through new understandings of its evolution, improvements in differential diagnoses, and development of molecular diagnostic methods. In particular, recent studies of skeletons from Peru shed new light on this disease in Central Andean South America, but also generated many new questions regarding its prevalence, geographical distribution, and natural history in the Andes. In this poster, we present five new cases of probable tuberculosis infection from the north coast of Peru. One case originated from the late pre-Hispanic Jequetepeque Valley (site of Dos Cabezas, Chimú period, A.D. 1270-1350). The other four cases date to the Early/Middle Colonial period in the Lambayeque Valley (mission church of Eten, ~A.D. 1536-1620).

In each case, patterns of destructive and proliferative lesions affected multiple contiguous vertebral bodies consistent with a chronic infectious process. Following careful observation and recording of the characteristics and anatomical distribution of the lesions, we systematically evaluated multiple differential diagnoses including pseudopathology, brucellosis, ecchinococcus, paracoccidioidomycosis, osteomyelitis, and tuberculosis. Tuberculosis indeed represents the most likely diagnostic option in all five cases. These findings reinforce the notion that disseminated skeletal tuberculosis affected a very small minority of individuals on the north coast of Peru. Once again, the behavior of this particular mycobacterial pathogen appears to have produced destructive skeletal lesions only in hematopoietic tissue of vertebral bodies. These cases contribute key new information to the broader reconstruction of tuberculosis in the Andes.

Ives, Rachel (AOC Archaeology)

“THEY LIE LIKE PIECES OF A CHILD’S PUZZLE” – INSIGHTS INTO SUB-ADULT HEALTH FROM A MID-19TH CENTURY PRIVATELY-OWNED BURIAL GROUND IN BETHNAL GREEN, LONDON, UK

Sub-adult paleopathology can aid the better understanding of the experience of childhood in the past, even in cultures that are well-documented historically. This study aimed to investigate skeletal pathology among sub-adults from a privately-owned burial ground in Bethnal Green, East London, UK, in use between 1840 and 1855. By the mid-19th century, Bethnal Green was recorded as one of the poorest parishes in London during the Industrial period.

Sub-adults comprised 71% of the 1033 excavated burials, reflecting high childhood mortality rates. Peaks of sub-adult deaths occurred in infants (1-6 months) and in early childhood (1-3 years). Macroscopic analysis of 658 sub-adults revealed a large number (n=255) with skeletal developmental anomalies. One hundred and thirty-nine sub-adults had vitamin D deficiency rickets and 53 had vitamin C deficiency scurvy. One hundred and fifty-one sub-adults had sub-periosteal new bone formation potentially indicating non-specific infections, including endocranial and rib lesions. Ten sub-adults were affected by destructive lesions in the spine and/or hip suggestive of tuberculosis, including three

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examples of Pott’s disease. Sixteen sub-adults had fractures, 11 co-occurring with pathology (vitamin D deficiency rickets), and examples of probable birth injuries were identified.

Severe infectious lesions together with frequent metabolic indicators likely reflect on the overcrowded parish living conditions and poor quality of contemporary diets. Skeletal trauma indicates childhood accidents occurred but in some instances were exacerbated by an underlying or co-occurring illness. Continuing research on 396 surviving coffin plates offers scope to marry together contemporary records, including death certificates, with the identified paleopathology.

Jakob, Tina (Durham University) and Walser III, Joe Wallace (National Museum of Iceland)

DISEASES OF AFFLUENCE IN A HIGH-STATUS POST-MEDIEVAL POPULATION FROM AMBEL, ZARAGOZA, NORTH-EAST SPAIN?

This presentation aims to evaluate disease patterns associated with high social status in a skeletal population (n=41) from the Iglesia Parroquial de San Miguel de Ambel, dating to the 16th-18th century CE. The location of the burials in the nave of the church, close to the High Altar indicates their privileged status. The church of San Miguel served as burial ground of the Knights Hospitallers as well as the wealthy citizens of the village, who could afford burial in a this location.

Arguing that high social status would have led to increased life expectancy and better health, we hypothesized that the individuals from Ambel will show little evidence for non-specific stress indicators, while diseases associated with increased longevity would be more prevalent. In addition, access to carbohydrate-rich foodstuffs should lead to dental conditions such as caries and ante-mortem tooth loss.

The demographic composition of the sample revealed that only few (n=6) non-adult individuals were buried near the High Altar. The majority of adults were male (n=20), with 13 females and two adults of undetermined sex. Younger adults (18-35 years) and older adults (35+ years) were present in equal proportions. Macroscopic analysis confirmed that dental disease occurred in almost all individuals and many individuals showed evidence for joint disease. Unexpectedly, linear enamel hypoplasia occurred in half of the population, attesting malnutrition and/or childhood disease. The frequency of periosteal new bone formation was also higher than expected, indicating that social status was not necessarily an effective buffer against disease.

Jørkov, Marie Louise S. (University of Copenhagen), Gröcke, Darren (University of Durham), and Løkke, Anne (University of Copenhagen)

EARLY CHILDHOOD DIET DURING THE 19TH CENTURY COPENHAGEN

Conditions experienced in early childhood influence health and mortality later in life and early nutritional behavior is of vital importance. To date our knowledge of childhood feeding behavior in Denmark during the Industrial period has relied solely on the historical records. Since the majority of these records are statistical overviews or recommendations of feeding practices at the time they are not able to provide direct evidence of dietary behavior at an individual level. A recent excavation of the 19th and 20th century cemetery, The Assistens, in Copenhagen, has allowed the study of the skeletal remains of the people who lived in Copenhagen during this period. Stable isotope analysis of carbon and nitrogen has been performed on 54 subadult remains and gives new evidence of early childhood diets,
breastfeeding and weaning behavior. Here we present and discuss the results and how they relate to the archaeological, historical records.

Kelmelis, Kirsten (Boston University), Bethard, Jonathan (Boston University), Moore Tara (Boston University), and Boldsen, Jesper (University of Southern Denmark)

BURIED WITHIN THE ABBEY WALLS: PALEOPATHOLOGICAL EXAMINATION OF LEPROSY ***

This project presents data from the osteological analysis of the skeletal remains from the rural monastic site of Øm Kloster in the Central Jutland region of Denmark in order to establish disease frequencies between demographic subgroups and general disease prevalence in a regionally representative site. With a sample of 311 adult individuals, cranial and postcranial diagnostic criteria were utilized in order to determine the presence or absence of leprosy on individual skeletons. Each individual was analyzed and categorized by sex, age group, and social status based on burial location and this data was used to yield results on the demographic makeup of the sample and disease frequencies. Chi-square tests of independence were conducted to determine if there were statistically significant relationships between sex, age, social status, and leprosy. The results indicated that there were no statically strong relationships between these variables; however, it was evident that disease prevalence did increase with age and that there were significantly more males and lay people with leprous lesions than females and high status individuals. The results suggested that each individual had most likely carried the bacterium, but that there were no significant numbers of individuals affected at any one time. The results from this analysis were compared to those of the Tirup cemetery and were found to be compatible. This study reflects that disease may have been much more prevalent than was osteologically visible and that this rural community illustrated comparable data with other regional sites.

King, Alesia (University of Indianapolis) and Quataert, Robin (University of Indianapolis)

BACK TO BLUEGRASS: VERTEBRAL PATHOLOGY IN A MIDDLE-LATE ARCHAIC SITE IN SOUTHWEST INDIANA ***

Bluegrass (12w162) is a Middle- Late Archaic site from SW Indiana, where 70 burials were exhumed in varying degrees of completeness. Of the 70 burials, 49 were adults (22 females, 19 males, and 8 unidentified). Pathological conditions such as osteophytic lipping, presence of Schmorl’s nodes, spondylolysis, and osteoarthritis of zygopophyses were analyzed within the vertebral column using the guidelines established by Buikstra and Ubelaker in Standards (1994). Osteophytic lipping was expressed to some degree in 19/49 of the individuals: two young adults (20-35yrs), both male, 12 middle aged adults (35-50yrs), seven males and five females, and five old adults (50+yrs), three male and two female. Of the affected individuals, 17/19 had osteophytic lipping of the cervical, 13/19 displayed osteophytic lipping of the thoracic, and 14/19 had osteophytic lipping of the lumbar vertebrae. Primary osteoarthritis of the zygopophyses was expressed in 18/49 of the individuals: 12 males and six females. No individual had evidence of secondary osteoarthritis within the vertebrae. Only 11/19 expressed lipping in all three regions, and only one individual experienced osteoarthritis in the absence of osteophytic lipping. Eburnation was found in 7/19 individuals, most frequently in the thoracic vertebrae.
Prior research conducted by Berger (2002) on the Bluegrass site for osteoarthritis indicate that 18 individuals in the collection exhibit osteoarthritis, and 11 individuals in the present study that exhibit vertebral osteoarthritis also exhibit osteoarthritis in other synovial joints. The data from Bluegrass seem to support the supposition that osteoarthritis was prevalent among older individuals in Middle-Late Archaic populations in the region.

Kirkpatrick, Casey L. (Western University)

SITE 117: RECONSTRUCTING THE LIVES AND DEATHS OF THE DECEASED AT NUBIA’S EARLIEST KNOWN CEMETERY ***

Site 117 is Nubia’s oldest known cemetery and is most famously believed to be the world’s earliest possible evidence of large scale violence (or perhaps warfare). Excavation of this Upper Paleolithic cemetery revealed many skeletons with evidence of trauma, some with embedded lithics, and a total of 189 lithic artifacts found in direct or possible association with the burials. Site 117 was excavated through salvage archaeology by the ‘Combined Prehistoric Expedition’ prior to the completion of the Egyptian High Dam in 1970, which submerged the site in the resulting reservoir.

This study explores the lives and deaths of the individuals interred at Site 117 through a macroscopic analysis of the skeletal collection and a re-examination of archival materials stored at The British Museum. This re-analysis and reinterpretation of the available evidence focusses on archaeological and paleopathological factors indicating possible settlement patterns, subsistence methods, burial traditions, population morbidity and possible causes for the observed evidence of trauma.

The low prevalence of dental and skeletal indicators of physiological stress and malnutrition observed in this study does not support the hypothesis asserting that there was a long-term depletion of nutritional resources, which may have resulted in violent competition between tribes. More technologically advanced studies may, however, reveal additional evidence of physiological stress than that which is observable through macroscopic analysis. While it remains possible that the majority, if not all, of the individuals interred at the site were fatally injured, this study supports the hypothesis that this cemetery was revisited and reused.

Klaus, Haagen D. (George Mason University and Museo Nacional Sicán, Peru)

PERIOSTEAL NEW BONE FORMATION AND BIOLOGICAL STRESS: A CRITICAL VIEW FROM PATHOPHYSIOLOGY, MOLECULAR BIOLOGY, AND CLINICAL PRACTICE

Periostosis (or periostitis) has long been considered by most paleopathologists as a function of infection and biological stress, especially on the tibiae. Recently, an argument emerged that when the human body experiences biological stress, it is not physiologically possible for new bone to form and that periostosis, ultimately, is not a skeletal stress marker. This theoretic and conceptually driven paper integrates evidence from pathophysiology, molecular biology, and clinical medicine to further investigate this claim.

Evidence from these fields show that biological stress activates multiple mechanisms that greatly diminishes the body’s capacity to manufacture new bone. Despite these constraints, periosteo
new bone formation still occurs. Various bone-forming pathways (the Wnt gene; other bone morphogenic proteins) are expressed or even upregulated in settings of oxidative, inflammatory, and pathogen-mediated stress. Relationships between stress and bone formation are further demonstrated in paleopathological and clinical examples involving brucellosis, tuberculosis, hypertrophic osteoarthropathy, scurvy, and neoplastic diseases. In such disorders, new bone forms under conditions of significant stress, and highlights the importance of conceptualizing periosteal microenvironments in the study of skeletal lesions. Recent research also suggests that timing is important: pathological bone formation, such as that on the tibiae, may principally emerge in the latter stages of inflammation and the healing process. These data indicate that an argument that rejects periostosis as a stress marker is probably incomplete. Instead, rigorous description and differential diagnoses, grounded in physiological, molecular, and clinical perspectives, provide paleopathology new and nuanced approaches in the interpretation of skeletal stress markers and periostosis in particular.

Lacy, Sarah A. (University of Missouri)

TESTING FOR CORRELATION AMONGST TWO PERIODONTAL DISEASE DIAGNOSTIC PROTOCOLS

Multiple scoring techniques have been presented for diagnosing periodontal disease in skeletal material, each with their own limitations. Cemento-enamel junction to alveolar crest (CEJ-AC) distances are meant to convey the amount of alveolar bone loss from periodontal disease. This method is confounded by non-pathologically increasing CEJ-AC distances from supraeruption, dry bone shrinkage, or postmortem damage. Another method involves scoring the inter-dental septa with ordinal scores based on the presence of porosity and the shape of the septa (convex, flat, or concave). This method is less precise, and inter-dental septa shape is not consistent across tooth types within individuals. For this study, periodontal disease was assessed using both methods in multiple samples, including Late Pleistocene European fossils, Natufians, and Native Arctic (Point Hope) remains. Correlation was tested using Spearman’s rank order between both diagnostic assessments per tooth type (to avoid intercorrelation amongst data points) and individual diagnosis based on averages. Correlations were positive at every tooth type [ranging from 0.60 (p-value: <0.001) to 0.29 (p-value: 0.018); Ns vary per alveolus], but more so in posterior teeth over anterior ones and in the maxilla over the mandible. At the individual level, the two diagnostic protocols were highly correlated with one another [Spearman’s rho: 0.68 (p-value: <0.001); N=188]. This study suggests that though both methods have drawbacks, they generally produce systemic error—as opposed to random error—that allows the diagnostic differences between individuals to be fairly consistent.

Leach, Savannah G. (Indiana University)

SEM OF INTERPROXIMAL GROOVE INDICATIVE OF THERAPEUTIC PRACTICE AT PETE KLUNK MOUNDS, ILLINOIS

Interproximal grooves are smooth and often polished indentations found between adjacent teeth. They are cylindrical in shape and usually have characteristic sharp margins, parallel striations along their interior and most frequently occur near the cemento-enamel junction (CEJ). Interproximal grooves

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have multiple etiologies, including regular picking with a dental probe or abrasive dietary grit. Dental probing is used to either massage painful gingiva or to habitually clean food particles left between teeth. This poster presents the occurrence of an interproximal groove in a male, greater than 50 years of age, from Pete Klunk Mounds in Calhoun County, Illinois. This individual was from Mound 11, on the southern edge of the site and part of the Middle Woodland component. After examining other individuals from this component of Klunk, no other interproximal grooves were identified. The groove is located on the distal side of the right second maxillary molar along the cervical region. The therapeutic relief hypothesis for the groove is supported by the location of an interproximal caries at the CEJ at the lingual edge of the groove, which may have resulted in consistent pain. Other than minor bone resorption and the caries on the effected tooth, there is no other dental pathology. A scanning electron micrograph (SEM) was obtained to verify the diagnosis of a therapeutic interproximal groove and attempt to identify the type of material used to create it.

Luxton, Sharla (University of Alaska, Fairbanks)

EXPLORING THE RELATIONSHIP BETWEEN DIET AND OSTEOPOROSIS IN MEDIEVAL PORTUGAL USING STABLE ISOTOPE ANALYSIS  ***

This project investigates the relationship between health and diet in medieval Portugal by combining data on the occurrence of osteoporosis with information on past diet derived from stable isotope ratios. The aim of this project is to identify whether different sources of protein influenced the prevalence of osteoporosis in three populations. Individuals from three different regions of Portugal dating from the late 13th to early 17th centuries were previously evaluated for bone mineral density at the University of Coimbra, Portugal, and bone samples from 79 of these individuals underwent stable isotope analysis at the University of Alaska Fairbanks. Fourteen individuals were aged 20-29 years; 35 were aged 30-49 years; and 30 were over age 50 years; 19 had been diagnosed as osteoporotic/osteopenic. Collagen suitable for isotopic analysis was extracted from all individuals, and results indicated a negative correlation between bone mineral density (BMD) and nitrogen values for females at one site and a positive correlation for males at another site. These results, combined with the lack of a clear relationship between BMD and nitrogen values for the other subgroups, suggest a complicated relationship between dietary protein source and the occurrence of osteoporosis. While samples sizes are small, the data indicate that future analysis is warranted, particularly considering the high incidence of osteoporosis and the economic and individual strain of the disease.

Lynnerup, Niels (University of Copenhagen), Jørkov, Marie Louise S. (University of Copenhagen), Villa, Chiara (University of Copenhagen), Hagedorn, Lene (Museum Nordsjælland), and Jørgensen, Thomas (Museum Nordsjælland)

A 5500 YEAR OLD BOG OFFERING IN DENMARK

During the excavation for a new hospital North of Copenhagen, the Museum of North Zealand uncovered the skeletal remains of a human buried in the bog “Salpetermosen,” which used to be a lake. Radio carbon-14 analysis dates the remains to 3650-3500 BC. Next to the remains was found a stone spear head. The osteological analysis indicates that the remains are of a young adult male, c. 25-30

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years old, c. 165 cm tall, who, based on an unhealed sharp force lesion to the back of the head, may have been the victim of an offering. A stone axe, perhaps a flint dagger, could have induced the trauma. Although bog offerings have previously been found in Denmark, it is rare to find them dating as far back as to the early Neolithic period. The osteological analysis further revealed a healed depressed fracture on the left parietal. The young man may have been limping. The interosseous ligament had ossified with new bone formation on the right fibula (a possible Pott’s fracture) as well as healed periostitis on both right fibula and tibia which could have been caused by a trauma to the lower leg or ankle. CT scanning of the remains was carried out, allowing more detailed analysis.

Manoni, Zorina (University of Central Florida) and Toyne, J. Marla (University of Central Florida)

OSTEOARTHRITIS IN THE ANDES: PREVALENCE AND PATTERNING OF DISEASE AMONG PRE-COLOMBIAN AGRO-PASTORALISTS FROM KUELAP ***

Etiology of osteoarthritis, a multifactorial disease, is poorly understood. One major environmental factor associated with the development of osteoarthritis is the stress on load bearing joints, induced by activities associated with labor-intensive lifestyles. In modern populations, the prevalence of osteoarthritis is higher among the elderly and women. The aim of this study was to examine the prevalence of osteoarthritis among the pre-Columbian Chachapoyas at Kuelap in the eastern Andes of Peru. The prevalence is calculated by sex, age, and seven synovial joints bilaterally within a representative sample of 127 adult skeletons. Standard qualitative observations, including marginal lipping, osteophytosis, pitting, and eburnation, are used to assess the presence and development of osteoarthritis, and to categorize it as minor, moderate, or pronounced. Eighty-three individuals of the total sample presented evidence of osteoarthritic changes with overall prevalence higher in males (36.2%) than females (29.1%) especially among the young adults ($X^2=5.26, p=0.02$). Prevalence was also greater among males in five joints with the highest frequency in the knee and shoulder. These data suggest that the division of labor at Kuelap may have been established early in life and that males used both upper and lower limbs to perform more physically demanding activities associated with challenges of agro-pastoralism in the steep vertical environment. Unexpectedly, osteoarthritis does not appear to increase consistently with age as its prevalence is highest among middle-aged adults (39.3%) suggesting earlier mortality due to arduous lifestyle. Differing results on osteoarthritis from Kuelap and modern populations suggest that lifestyle significantly influences its development.

Marques, Carina (University of Coimbra), Matos, Vítor (University of Coimbra), Zink, Albert (Institute for Mummies and the Iceman. Italy), and Cunha, Eugénia (University of Coimbra)

UNVEILING THE EVIDENCES OF NEOPLASM IN THE COIMBRA AND LISBON REFERENCE SKELETAL COLLECTIONS

The reconstruction of the past history of oncology is a stimulating endeavor, however systematic studies on paleo-oncology are still very scarce, hampering a broader knowledge of these conditions on past populations. Based on the study of two Portuguese reference collections, we intend to discuss the

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limits, challenges and prospects on the identification of neoplastic conditions in human skeletal remains.

In the biographic files of the *Museu Bocage* Identified Skeletal Collection, Lisbon, and Coimbra Identified Skeletal Collection, neoplasms (malignant and benign) were recorded as the cause of death in 11.8% (91/769) and 8.9% (45/505) of the individuals, respectively. The cohort of malignant tumors under study (n=133) exhibits a female predominance [60.2% (n=80) females and 39.8% (n=53) males, \(p=0.02\)] and a higher frequency in older age categories (mean age at death= 59.8 years, SD=15.6 years). These individuals died between 1904 and 1969. According to the biographic files analysis, the most common primary organs affected were stomach (24.1% [n=32]), uterus (16.5% [n=22]) and intestinal tract (14.3% [n=19]). The macroscopic study of the observable cohort (n=131) revealed the absence of destructive and/or proliferative lesions in 18.3% (n=24) of the skeletons, while a pattern highly consistent with secondary bone tumors was observed in only 26 (19.8%) of the remaining cases. Our study suggests that in a cohort of individuals whose cause of death was malignant neoplasms, the number of skeletons presenting characteristic diagnostic features is relatively small, even in a well-preserved sample. This research brings new data to the discussion of presentation of oncological conditions in the past.

Martell, Molly (Johns Hopkins University) and Hunt, David (Smithsonian Institution)

**EVALUATION OF PATHOLOGICAL CONDITIONS IN THE CLAVICULAR RHOMBOID INSERTION MORPHOLOGY FOUND IN THE ROBERT J. TERRY ANATOMICAL SKELETAL COLLECTION**

This study investigates the expression of clavicular rhomboid insertion in the Robert J. Terry Anatomical Skeletal Collection at the Smithsonian Institution. Variation in the rhomboid insertion site is a natural occurrence and has been mistaken for a pathological anomaly. Evaluating the range of expression of this insertion site by age, sex, and ancestry can help decrease confusion between pathological versus normal variation. A systematic appraisal has not previously been explored in the Terry Collection.

We assessed the rhomboid ligament insertion in 228 individuals using classifications of -3 (fossa depth greater than 3 cm); 0 (flat bone); to +2 (osseous tubercles). The sample was divided into four groups: males and females and Blacks and Whites. Each of these groups was subdivided into four age categories: young (below 34), middle (35-49), old (50-64), and elderly (65+). Categories were compared - females show a more conservative range with only 4% of all females falling outside of the -1 to +1 range. In contrast, 24% of all males fell outside of this range and most of this occurrence was found in the -2 and -3 (fossa) categories. Both Black males and females had a higher prevalence of higher range expression (32% and 5%, respectively) than in White males and females (16% and 2% respectively). Age did not exhibit any obvious correlation or trends. These results reflect the expectation of greater manifestation of fossae and tubercles from activity-based stress in males than in females, but the lack of increased expression by age is notable.
Mays, Simon (English Heritage)

BURNT AND MUTILATED HUMAN REMAINS FROM A MEDIAEVAL VILLAGE

Disarticulated human skeletal remains representing a total of 6 adults and 4 subadults were excavated from a large pit from a domestic context at the settlement at Wharram Percy, a Mediaeval village in England. Radiocarbon determination showed they date from ca. AD1000-1200. Remains were subject to gross and microscopic examination. Some elements variously showed: knife-marks; black / brown discoloration due to exposure to fire; and some long bone shafts showed breaks whose morphology suggested they occurred soon after death whilst the bone retained its organic content. The location of the knife marks is suggestive of dismemberment (including decapitation); burning appears to have occurred after dismemberment but whilst the bone was still fresh. Employing a biocultural approach, documentary sources for the Mediaeval period are used to attempt to outline a range of possible behaviours that may have been responsible for producing this assemblage. Making any very firm interpretation is difficult, but cannibalism (perhaps in response to famine), and destruction of the integrity of corpses prompted by folkloric beliefs in revenants may be pertinent.

Miller, Courtney (Durham University), Montgomery, Janet (Durham University), Gowland, Rebecca (Durham University), and Beaumont, Julia (University of Bradford)

BENDING OUR UNDERSTANDING: CONSIDERING THE EFFECT OF RICKETS ON DIETARY ISOTOPES THROUGH INCREMENTAL DENTINE ANALYSIS ***

Often δ¹³C and δ¹⁵N values are interpreted based on the belief in a determinist relationship between diet and composition of the body alone, overlooking pathological and cultural influences. Incremental dentine analysis provides a unique opportunity to consider the fluctuations in δ¹³C and δ¹⁵N profiles during fetal and early life. Ten individuals were selected for incremental dentine analysis from the 18th to 19th century Quaker cemetery at Coach Lane in North Shields, England. The sample included adult and non-adult individuals, with and without skeletal evidence of rickets, allowing consideration of pathological, cultural and physiological influence. The results suggest a threshold in both δ¹³C and δ¹⁵N values between rachitic and non-rachitic individuals near the time of birth. In addition, the adults that suffered childhood rickets exhibited similar values after the age of 2.5-3 years to the adults that did not exhibit skeletal evidence of rickets, while the non-adults all died with δ¹⁵N over 13‰ and δ¹³C over 19.5‰. These results lend support to Barker’s Theory of fetal and early life nutritional programming. Furthermore, the results provide evidence for both breastfeeding and supplementary feeding practices based on the variation in the δ¹³C and δ¹⁵N profiles. Physiological influences such as growth velocity and catabolic states were also considered as potential causes of increases and decreases in the δ¹³C and δ¹⁵N profiles. Ultimately, this study highlights the unique possibilities incremental dentine analysis provides and the need for further research to understand the confounding factors, such as pathology and growth, which could be augmenting the dietary interpretation.

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Minnikin, David (University of Birmingham), Lee, Oona (University of Birmingham), Wu, Houdini (University of Birmingham), Nataraj, Vijayashankar (University of Birmingham), Jankute, Monika (University of Birmingham), Besra, Gurdyal (University of Birmingham), Bhatt, Apoorva (University of Birmingham), and Donoghue, Helen (University College, London)

CORRELATING THE FOSSIL LIPID BIOMARKER RECORD WITH THE TRANSITION FROM ANCESTRAL TUBERCLE BACILLI TO MODERN BIOTYPES

The evolution of modern tuberculosis is not a simple linear pathway. A consensus is developing that a diverse group of tubercle bacilli, currently labeled "Mycobacterium canettii" are pivotal ancestral strains, some of which are still extant. However, the transition to all lineages of modern human and animal tuberculosis appears to have involved a distinct “bottleneck” around 30 – 12ka BP (Supply et al. 2013 Nature Genetics;45:172). Clear DNA and lipid biomarker evidence has been recorded for modern human tuberculosis in 9ka BP skeletons from Atlit-Yam, Israel (Hershkovitz et al. 2008 PLoS ONE, 3, e3426). Skeletal and biomarker evidence also suggests the presence of tuberculosis in even older Homo sapiens from Dja’dé El Mughara (11.3 – 10.2ka BP) in Syria (Baker et al. 2014 Tuberculosis, in press).

Before the bottleneck, there is no evidence for the presence of tuberculosis in Homo sapiens, but disease in Pleistocene megafauna is evident, including a 17ka BP bison from Natural Trap Cave, Wyoming (Lee et al. PLoS ONE 2012, 7: e41923). A working hypothesis is that ancient tuberculosis has evolved in Pleistocene megafauna, with rapid human spread at the beginning of the Holocene. Distinct differences in lipid biomarker composition can distinguish "Mycobacterium canettii" from modern Mycobacterium tuberculosis so that it is possible to assign archaeological specimens to either side of the perceived bottleneck. It will be shown that the 17ka bison has phenolphthiocerol components similar to "Mycobacterium canettii" but these are absent in the 9ka Atlit-Yam skeleton. Long-chain "phthioceranic" acids are able to identify post-bottleneck human tuberculosis.

Minsky-Rowland, Jocelyn D. (University of Tennessee)

HOW ‘STRESSED’ IS ‘STRESSED’? THE CO-OCCURRENCE OF BIOLOGICAL STRESSES IN A LATE PREHISTORIC SKELETAL SAMPLE ***

Paleopathological research concerned with risk of death and selective mortality often utilizes individuals who exhibit antemortem biological stresses (i.e. linear enamel hypoplasias, porotic hyperostosis/cribra orbitalia, short stature, or other conditions). This project addresses the co-occurrence of linear enamel hypoplasias and porotic hyperostosis/cribra orbitalia in a combined skeletal sample from prehistoric west-central Illinois. Existing demographic and pathological data from Norris Farms (1275-1425 AD) and Orendorf (1150-1250 AD) were compiled for this study (Milner and Smith, 1990; Bauder, 2009; Steadman et al., 2009; Wilson, 2010). These skeletal samples share many similarities; including geographic location, date range and disease and warfare patterns. Thus, a combined sample is warranted. Previous research focused on risk of death from infectious disease. No statistically significant sex differences were found, nor were there any associations between biological stress and infectious disease (Minsky-Rowland, 2011).

A total of 172 adult individuals, who were skeletally complete enough to be previously analyzed for both stresses, were compiled. On average, those individuals with more than one biological stress had an earlier age at death than those individuals with one or no biological stress. Those individuals with multiple insults may have been more ‘stressed’ than those individuals with one or no stress, which in

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Mitchell, Piers D. (University of Cambridge), Anastasiou, Evilena (University of Cambridge), Lorentz, Kirsi O. (The Cyprus Institute), and Stein, Gil J. (University of Chicago)

PREHISTORIC SCHISTOSOMIASIS AT THE CHALCOLITHIC SETTLEMENT OF TELL ZEIDAN ON THE EUPHRATES RIVER IN SYRIA

Schistosomiasis (bladder fluke) is mankind’s most serious water based chronic disease with 240 million people infected in endemic regions today. The aim of this paper is to investigate whether this parasite could be detected in a prehistoric farming population in ancient Mesopotamia. The method involved analysis of soil from the pelvic region and control samples from 23 burials from a cemetery at Tell Zeidan, dating from 6500-6000 BP. This settlement was located on the banks of the Euphrates River. Our results showed one individual to be positive, and the egg appearance and dimensions are compatible with either S. haematobium or S. intercalatum. The identification of the parasite in ancient Mesopotamia, in a context prior to the Predynastic period in Egypt, suggests that human infection by Schistosoma sp. may have originated in Mesopotamia, at the dawn of the first complex societies, and not in Egypt as was previously thought. This is important because it is the oldest evidence for infection with Schistosoma sp. so far identified anywhere in the world, and demonstrates that schistosomiasis is a very early disease of civilization. Since crop irrigation was invented in Mesopotamia around 7500BP, and schistosomiasis is commonly spread by wading in irrigation channels today, it is possible the use of crop irrigation facilitated the spread of the parasite in these prehistoric populations.

Morrow, Johnica J. (University of Nebraska), Piombino-Mascali, Dario (Vilnius University), and Reinhard, Karl J. (University of Nebraska)

TAPHONOMIC CONSIDERATIONS FOR THE ANALYSIS OF PARASITIC ORGANISMS FROM ARCHAEOLOGICAL CONTEXTS ***

The archaeoparasitological analyses of mummified tissues, coprolites, and other remains present a variety of interpretational challenges. Such challenges arise from inherent differences in the taphonomy of parasite eggs within differing archaeological contexts. An evaluation of differential parasite egg preservation was conducted among samples from three geographically and temporally distinct regions. An analysis of abdominal contents collected from a historic Lithuanian mummy revealed infections with Trichuris trichiura and Ascaris lumbricoides. The results of this analysis illustrated taphonomic issues unique to the archaeoparasitological study of mummies. Coprolites collected from three Medieval burials in Nivelles, Belgium were examined for evidence of parasitic organisms. Samples from one of these burials demonstrated the highest concentration of T. trichiura eggs ever reported (approximately 1,577,679 T. trichiura eggs in this individual) in addition to presenting with approximately 202,350 A. lumbricoides eggs. The preservation of parasite eggs among the three burials and two types of parasites was affected by several biotic and abiotic factors. Embalming jars containing remains from members of Florence’s prominent Medici family were

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analyzed. No parasite eggs were recovered from these jars. An abundance of mites and dipteran puparia were recovered showing that arthropods may play a role in parasite egg preservation. Differential parasite egg preservation is discussed in light of variances in organismal biology, ecological interactions, and archaeological contexts. To better understand the archaeoparasitological significance of data collected from a range of archaeological contexts, it is vital for researchers to consider a diversity of taphonomic factors.

Norris, Annie Laurie (Arizona State University), Dahlstedt, Allisen (Arizona State University), and Baker, Brenda J. (Arizona State University)

GROWING UP AT THE 4TH CATARACT: PREADULT GROWTH AND MORBIDITY AT THE GINEFAB SCHOOL SITE ***

Preadult growth, morbidity, and mortality are explored at the Ginefab School site, a late Meroitic-Christian period cemetery (~0-1400 AD) located in the 4th Cataract region of northern Sudan. Data on non-specific stress indicators forming in childhood (linear enamel hypoplasias (LEH), cribra orbitalia, porotic hyperostosis) were collected in both adults and preadults in the sample. Localized hypoplasias of the deciduous canine (LHDC) and periosteal reactions were recorded in preadults only. Differences between dental and skeletal age estimates for preadults under the age of 15 years were compared with the occurrence of non-specific stress indicators to determine their impact on skeletal maturation. Results indicate a high degree of physiological stress, with 75% of observable individuals displaying at least one LEH, and 95% affected with either porotic hyperostosis, cribra orbitalia or both. Sixty percent of preadults with observable deciduous canines displayed at least one LHDC. In addition, preadults with porotic hyperostosis and/or at least one LEH experienced a statistically significant delay in skeletal maturation compared with dental age. Individuals without stress indicators did not exhibit a statistically significant difference between age estimates. In the adult sample, differences in maximum femur length between individuals who experienced more stress episodes as children and those who experienced fewer or no stress episodes were not found to be statistically significant. Although frequency of generalized stress indicators is high in this sample, many individuals were able to survive these stress events and live into adulthood. Implications for the osteological paradox are discussed.

Olafardottir, Olof D. (Indiana University, Bloomington)

PATTERNS OF OSTEOARTHITIS IN MIDDLE AND LATE WOODLAND POPULATIONS: THE PETE KLUNK MOUNDS ***

Arthritic conditions are widely prevalent in humans, not only today, but also in the past. Pathological changes involving the joints are therefore frequently seen in skeletal material examined by bioarchaeologists. The most familiar of these conditions is osteoarthritis (OA), caused by what has often been described as “wear and tear” on the joints, and is characterized by a focal loss of articular cartilage and subsequent bony reaction of the subchondral and marginal bone. Despite the fact that osteoarthritis is common and a well-known disease, universally accepted definitions of osteoarthritis have unfortunately proven elusive. Researchers have defined osteoarthritis in many ways, but any simple definition of the disease can be deceptive of the complexity of its pathogenesis and etiology. The present
research examines the prevalence of osteoarthritis during the Middle Woodland (150 BC-AD 400) and Late Woodland (AD 400-1000) periods in the Midwestern United States, more specifically at Pete Klunk Mounds in southern Illinois. One hundred and fifty individuals were evaluated for as many influences on the prevalence of osteoarthritis as possible, including age, sex, activity levels, diet, and status. Results showed that the pattern of osteoarthritis was not significantly different between the Middle Woodland and Late Woodland components at Pete Klunk Mounds. The most commonly affected joint was the knee during the Middle Woodland (74.79%) period and the shoulder (67.74%) and knee (67.74%) during the Late Woodland period. The similar patterns of osteoarthritis noted are not surprising given the similar subsistence technology between the two time periods at Pete Klunk Mounds.

Osterholt, Amber E. (University of Nevada) and Martin, Debra L. (University of Nevada)

FISHING OR FARMING: A BIOCULTURAL MODEL OF ENTHESIAL CHANGES TO THE CLAVICLE AT BRONZE AGE TELL ABRAQ, UAE

This study tests the Coimbra methodology for recording enthesial changes using a commingled collection, and investigates instances of osteoarthritis to the clavicle. Tell Abraq represents the largest prehistoric site on the southern coast of the Arabian Gulf, located approximately 100 meters from the ancient shoreline. The tomb at Tell Abraq is a Bronze Age Umm an-Nar type on the west coast of modern United Arab Emirates. It was utilized during a 200 year period between ca. 2200 - 2000 BC, and contained the commingled remains of at least 200 adults. Evidence suggests that marine resources such as fish and mollusks comprised a major component of the diet, however agricultural products like wheat, barley, and dates were also utilized. Prior research (Blau, 1996; Cope, 2007) has shown that fishing related activities impacted the lower arms, hands, and feet. Clinical and bioarchaeological literature show that farming and fishing also impact the shoulder, primarily the clavicle. For that reason, this study focuses on the remains of the clavicles at Tell Abraq (n = 25 complete and several fragments). Four entheses--the costoclavicular, trapezoid, and conoid ligaments and the subclavius--were chosen because they represent the most complete entheses on the clavicles and match those reported in the literature. A biocultural model is used to present evidence that enthesal changes to the clavicles are most likely caused by marine related activities rather than agricultural activities. Osteoarthritis was also investigated to understand the full impact of the mechanics of marine related activities to the clavicle.

Rácz, S. Elizabeth (University of Nebraska), Reinhard, Karl J. (University of Nebraska), Gardner Scott L. (University of Nebraska), and Jenkins, Dennis (University of Oregon)

PALEOAMERICAN PARASITISM: INFECTIONS THAT SIGNAL THE ORIGIN AND ROUTE OF MIGRATION

Intestinal parasites have been found in human mummies and coprolites. Hookworms (Necator and Ancylostoma), Trichuris trichiura, and other intestinal helminths require certain favorable environmental conditions to complete their life cycle. The study of parasites from archaeological sites reveals aspects of human behavior including migrations. Host-specific parasites of humans are especially important because their ecological requirements are well known and they infect only humans. Hookworms have very ancient, Old World origins. For decades, hookworms have been discovered in

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archaeological sites. Because hookworms are tropical and infect only humans, their repeated discovery challenged parasitologists to define migration routes through which tropical parasites could have passed from the Old World to the Americas. That research pointed to alternative migration routes other than the Bering Land Bridge. These parasites could not have been maintained in the human migrants during transcontinental migration in the cold climate prevailing in the northern region of America. Trans-Pacific or coastal migrations have been considered. Climate simulation based on hookworm extracorporeal requirements for infection suggested that the optimal period for a coastal migration existed before Clovis times. Recent discoveries of hookworm eggs from Paisley Caves support a coastal migration hypothesis that allowed for the establishment of hookworm infection in the region of Oregon by 9,000 years ago. In addition, a cluster of additional parasites including whipworm, giant intestinal roundworm and wireworm have been found in the prehistoric New World. Therefore, it is very likely that Paleoamericans arrived in the New World with a diverse community of persistent parasite infections.

Rawlins, Callie (North Carolina State University), Gagnon, Celeste (Wagner College), Case, D. Troy (North Carolina State University), and Griffith, Emily (North Carolina State University)

SUBADULTS IN TRANSITION: ANALYSIS OF ANCIENT MOCHE HEALTH THROUGH COMPARATIVE SKELETAL DEVELOPMENT AND PATHOLOGY DURING THE EMERGENCE OF STATEHOOD

This study examines the overall health of a subadult population (N=274) from the ancient Moche culture of the Moche River valley on the north coast of Peru. The sites of Cerro Oreja and Huaca de la Luna span from the Cupisnique Phase (1800-400 BC) through the rise and fall of the Moche state (200-750 AD) to the Chimu Empire (900-1470 AD). Four growth indicators (dental eruption, neuro-central vertebral fusion, femoral length and tibial length) are used in concert to assess overall development. Additionally, indicators of nutritional deficiency, trauma and infectious disease (cribra orbitalia, porotic hyperostosis, linear enamel hypoplasia, endocranial inflammation and periostitis) are observed to supplement developmental data and to evaluate the overall health of subadults during the shift to statehood. Linear regression is used to assess growth progression of the long bones and multivariate analysis of variance (MANOVA) is used to assess development of the selected growth indicators in unison. Posterior probabilities are also calculated for the pathological indicators by time period. Multiple factors and circumstances would have affected the health of the Moche subadults during these periods, including the rise of social stratification and differential access to resources, conflict, diet transition, and ritual social practices such as human sacrifice. These two burial sites offer a unique opportunity to observe a major social transition across time periods, and through the lens of the often overlooked area of subadult health, of one of the earliest and longest running state-level societies in the New World.
Reinhard, Karl (University of Nebraska)

OVERDISPERSION: TESTING WHETHER A KEY PARASITOLOGICAL PRINCIPLE IS EVIDENCED IN ARCHAEOLOGY

Poisson distribution of parasites among hosts is rarely observed in the modern day. In contrast, overdistribution can be found in all classes of parasites. Generally, 10% or less of the host carry the majority of parasites and most hosts are parasite free. Overdistribution has been demonstrated for ectoparasites in mummies but not for endoparasites from any context. Archaeoparasitologists should begin to assess endoparasitism for similar patterns. Focusing on pinworm (*Enterobius vermicularis*) remains in coprolites from the desert west of North America, egg per gram quantification will be used to assess the distribution of eggs between prehistoric individuals. At this point, it appears that overdispersion can be identified in prehistoric pinworm distribution. This could relate to prehistoric anthelmintic efforts to control infection. By focusing treatment on those individuals exhibiting obvious symptoms of infection, the threat of infection to others may have been diminished. Applying this to other parasite species may be the key to understanding why fecal-borne parasitism was so rare in the prehistoric Americas.

Rhodes, Jill A. (Drew University) and Mountjoy, Joseph B. (Universidad de Guadalajara and Centro Universitario de la Costa)

A CONGENITAL DEVELOPMENTAL DISORDER OF THE VERTEBRAL COLUMN: A POSSIBLE CASE KLIPPEL-FEIL IN THE MIDDLE FORMATIVE PERIOD WEST MEXICO

The partial remains of a young adult male were recovered from a Middle Formative Period (ca. 800 BC) site in Jalisco, Mexico. The skeleton was truncated; however the skull and partial vertebral column were recovered. This individual appears to have suffered from a congenital developmental condition of the vertebrae, noticed and marked in society by the grave inclusions of ceremonial objects on his neck and upper back. The first and second cervical vertebrae are unaffected. The remaining cervical vertebrae are fused through a segmentation failure or synostosis across the articular processes and the centra. Individual vertebral bodies are identifiable but the lack of intervertebral disc space suggests disc agenesis. The lack of new bone growth or osteophytes rules out a pathological ankylosis. The segmentation defect is not contiguous, with the first thoracic vertebra mobile both superiorly and inferiorly, but T2 – T4 are synostosed. Two fragments of neural arch recovered from the mid-lower thoracic region were also synostosed. While this case does not represent the typical morphology of Klippel Feil Syndrome, a literature review illustrates the range of variation in presentation of this congenital disorder and thus Klippel-Feil should be included in the differential diagnosis of this individual. Spondylocarpotarsal synostosis should also be considered, though a lack of postcranial remains impairs diagnosis. The identification of genetic developmental field defects in the archaeological record has the potential to inform on family grouping in the regional shaft and chamber tomb culture, as well as inform on gene flow and regional movements.
Rose, Jerome (University of Arkansas) and Smith, Nicole (University of Arkansas)

THE HITTITE PLAGUE OF 1322 BCE, A MULTIDICIPLINARY DIAGNOSIS

The Hittite King, Marsili II, pleaded with the Storm God to end an epidemic brought by Egyptian prisoners that had already lasted 20 years killing two previous kings and decimating his subjects (Singer 2002). Historians, physicians, epidemiologists, and paleopathologists published numerous arguments for and against 15 potential causes of the “Hittite Plague”. An 11 step multidisciplinary approach that combines method, theory, and data from history, archaeology, epidemiology, ecology, and paleopathology is presented. Each individual approach eliminates some, but not all of the possible causes of the Hittite epidemic, but when employed systematically in a multidisciplinary approach all are eliminated except malaria. Our unique contribution is the use of epidemiology of known epidemics to critically evaluate the historic narratives contemporaneous to this event in Hittite history. This multidisciplinary approach is then applied to the analysis of contemporaneous skeletons from Amarna, Egypt. The distribution of anemia indicators at Amarna is compatible with the location of these lesions in the skeletons of documented cases of malaria. Further, lesion distributions by age and sex are compatible with distribution of malaria induced anemia in documented populations. Amarna is abandoned and its population dispersed throughout the Egyptian Empire at just the right time for some of these people to be brought to the Hittite capital and the carriers and cause of the “Hittite Plague”.

Sacks, Lita (Indiana University)

A MOUTHFUL OF TEETH: THE DIFFICULTIES IN DIAGNOSING A SYNDROME CHARACTERIZED BY SUPERNUMERARY TEETH

Developmental syndromes are rarely diagnosed in archaeological contexts due in part to the subtle manifestation of skeletal defects that may appear anomalous rather than pathological, the clinical focus on soft tissue pathology and patient care, and paleopathologists’ own misconceptions that “modern” factors (including advanced maternal age and widespread exposure to teratogens) are to blame for the current ubiquity of certain genetic disorders. One of the few syndromic traits discussed in the clinical literature that is identifiable in skeletal remains is supernumerary teeth. Although many paleopathologists consider supernumerary teeth to be an anomaly and take note of it more for the sake of thorough description than for diagnostic purposes, multiple supernumerary teeth, described clinically as the presence of five or more supernumerary teeth, is associated with a developmental syndrome in 99% of cases.

This poster describes the differential diagnosis of a young adult from Koster Mounds who exhibited multiple supernumerary teeth, retention of the metopic suture, femoral neck anteversion, and aplasia of the zygomatic arch. Diagnoses considered include Treacher-Collins Syndrome, the Oral-Facial-Digital Syndromes, Down Syndrome, and Tricho-Rhino-Phalangeal Syndrome. The purpose of the project is not to irrefutably diagnose the individual with a specific developmental syndrome. Instead, the aim is to call attention to the dearth of published material pertaining to diagnosis of syndromes in archaeological contexts and to urge further collaboration between paleopathologists and medical doctors specializing in developmental disorders in order to study the prehistoric impact of syndromes.

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Schattmann, Annabelle (McMaster University), Bertrand, Benoit (Université Lille), Devriendt, William (Préventive de la Communauté d’Agglomération du Douaisis), Vatteoni, Sophie (Direction de l’Archéologie Préventive de la Communauté d’Agglomération du Douaisis), and Brickley, Megan (McMaster University)

THE CO-OCURRENCE OF SCURVY AND RICKETS IN INFANTS AND YOUNG CHILDREN: A MACROSCOPIC, RADIOGRAPHIC, AND MICROSCOPIC STUDY

The medical literature contains multiple reports discussing disease interactions and co-occurrence. Despite this, co-occurrence of conditions has not yet been systematically investigated in paleopathology. In this study a detailed analysis of the pathological indicators for scurvy, rickets, and their co-occurrence was undertaken.

The collection from 16th to 18th century Douai, France consists of 48 individuals ranging from foetal to five years of age. Previous research indicated a number of potential cases of scurvy and rickets in the children (Devriendt et al. 2010). The current study identified 12 cases of possible co-occurrence based on macroscopic, radiographic and microscopic techniques.

The results are consistent with scurvy supervening upon rickets in cases of suspected co-occurrence. Macroscopic results indicate that porotic lesions associated with scurvy remain identifiable; vascular changes and locations they frequently occur at are not known to be directly affected by rickets. However, changes in the ribs occur in both conditions and cannot be differentiated. Changes in the long bones commonly found in rickets, such as bending deformities and growth plate changes were subtle, likely due to the expression of scurvy. Radiographic analysis was useful in identifying the dominant disease process and most expected features were observed. Rickets could be confirmed microscopically.

The study clearly demonstrates that cases of co-occurrence of scurvy and rickets are present and identifiable in paleopathology. Age of onset, sequence in which conditions develop, variable expression, and use of multiple techniques are important factors to consider when identifying cases of co-occurrence.

Schwarz, Laura Sophia (German Archaeological Institute) and Gresky, Julia (German Archaeological Institute)

MYOSTITIS OSSIFICANS AND RELATED AILMENTS

Myositis ossificans (MO), which is mostly induced by trauma, varies in frequency depending on its location in the body. Today it is a common finding in medical imaging but very often the MO is not directly attached to the bone so it is more likely to be missing in archaeological skeletal remains. In archaeological bone, MO is a rather infrequent macroscopic observation, which, because of its widely varying shape, may be confused with other diseases. MO is visible as a smooth, thickened, often fusiform structure on the shaft of long bones or as an irregular thickening at the attachment site of muscles. The former could be confused macroscopically with subperiosteal haematoma or periosteal osteosarcoma, the latter with ossification of entheses. To distinguish between MO and its differential diagnoses, microscopy was used. For example, the typical pattern of MO on the shafts of long bones is organized into three layers, an outer compact layer, a middle zone of trabecular bone and an internal zone with large cavities. This is clearly in contrast to the arcade-like structure of subperiosteal hematoma and the central calcification of osteosarcoma. Changes at the enthesis sites are more difficult.
to differentially diagnose. Selected samples of six femora and three humeri from sites in Kazakhstan and Russia, dating from the Bronze Age to the Middle Ages were used. Possible reasons for the changes on the bones will be discussed in light of the question of the differences between longer-term stress and acute trauma in the Kazakh nomadic people.

Searcey, Nicole (University of Nebraska) and Reinhard, Karl (University of Nebraska)

LICE PALEOEPIDEMIOLOGY OF THE MOQUEGUA RIVER VALLEY, SOUTHERN PERU

Archaeoparasitology is the study of archaeological remains for evidence of parasite infection. By linking evidence of infection with other archaeological data, the variation of infection may be linked to a variety of social and ecological determinants such as status, community size, food habits, environmental change, and seasonality. Data from lice infestations of 146 Chiribaya mummies (1000-1250 AD) from the Moquegua Valley of southern Peru were analyzed. There are three unique sites within the Moquegua Valley from which the study stemmed, two costal valley sites that represent economic extremes, and a middle valley site. Statistical analyses were performed to determine if (1) geographical distance between coastal and middle valley sites, (2) social status between the coastal valley sites, and (3) sex and age were associated with variations in louse infestation. Significant differences related to geography and status were found. In addition, automontage stereomicroscopy and scanning electron microscopy were performed to determine their value in paleoepidemiology lice studies. Methodologically, light microscopy is superior at determining maturation of louse eggs.

Shidner, Ashley E. (University of Arkansas)

SUBADULT MORTALITY AND HEALTH AT TELL EL-AMARNA

The South Tombs Cemetery at Tell el-Amarna is the largest cemetery associated with Akhenaten’s capital city, Akhetaten (c. 1353-1336 BCE). Excavations began in 2002 and were finished in 2013. Subadult age demographic profiles were examined in relation to location within the cemetery. Differences in subadult demographic profiles were seen between the Upper site and the Lower/Wadi Mouth site. The Upper Site showed a high percentage of adolescent individuals (12 to 18 years), whereas the Lower/Wadi site showed a high percentage of toddlers (1 to 3 years). Rates of skeletal stress markers were then examined as possible sources for the variation seen in the subadult demographic profiles based on location. Thirty-nine individuals from the Lower/Wadi Mouth site and twenty-three individuals from the Upper site ranging in age from 4.5 months to 16.5 years were used in this analysis. The indicators of stress: cribra orbitalia, linear enamel hypoplasias, and porotic hyperostosis were recorded as present or absent. Sixty percent of the subadults from the Upper site had at least one skeletal stress marker; whereas seventy percent of the subadults from the lower site had at least one skeletal stress marker. Cribra orbitalia had the greatest difference in occurrence between the two sites (Upper site: 52.2%, Lower/Wadi Mouth site: 66.7%). However, the differences in skeletal stress marker rates between the sites were not statistically significant. The use of the mortality profiles along with skeletal stress markers provided a more developed understanding of juvenile health at Tell el-Amarna.
Skelton, Sally (University of Southern Mississippi) and Harvey, Amanda R. (University of Nevada, Reno)

PATTERNS OF CO-MORBIDITY OF STRESS MARKERS A COLONIAL MAYA POPULATION FROM TIPU, BELIZE

This study explores the relationship among skeletal stress markers at the Colonial Maya site (AD 1541-1638) of Tipu, Belize. Previous studies have indicated prevalence of pathology is low, which suggests that this population was healthy despite European contact, but the low life expectancy values would indicate otherwise. Therefore it was tested to see if pathologies clustered in a particular segment rather than being evenly distributed within the series. The sample consisted of 49 adult males and 34 adult females with relatively complete skeletons. Stature was calculated based on femoral length. Robusticity was addressed using diameter of the humeral and femoral heads as well as long bone circumferences. Individuals were classified into two groups based on linear enamel hypoplasias (LEH), those with no or only very slight episodes and those with moderate to severe episodes.

Mean stature for males with LEH was 160.7 cm and those without, 162.9 cm. In contrast, the mean stature for females with LEH was 152.5 cm and those without, 152.6 cm. There was no correlation seen between robusticity measurements and presence of stress markers for either sex. A similar lack of patterning for porotic hyperostis and LEH was observed. These findings support comorbidity of certain health markers, but only among males. Possible explanations include greater immunological buffering in females, but favorable effects related to status as reflected by position within the cemetery are also explored. Future iterations of this study will look at additional health markers.

Smith, Nicole E. (University of Arkansas)

THE SKELETAL MANIFESTATION OF MALARIA: A CLINICAL CASE-CONTROL STUDY

Unlike some other infectious diseases, malaria’s skeletal manifestation has never been confirmed using a large sample from a clinical setting with known individual medical histories. To pinpoint evidence of malaria infection on ancient skeletal remains, this study compares skeletal lesions in a modern reference sample from Uganda where malaria is holoendemic to a similar modern sample from a malaria-free area. The malarial sample consists of 98 East Africans, separated by those who died of malaria or anemia and matched cases for age and sex. The non-malarial sample consists of 106 African Americans with estimated frequencies of sickle cell trait that are similar to those of Ugandans.

Five porous skeletal lesions are identified that appear more frequently in the malarial sample (p<0.01), especially in anemic individuals. These appear on the cranium, vertebral column, and humeral and femoral necks. Periostitis also associated strongly with individuals in the malarial sample (p<0.01); however, linear enamel hypoplasias showed the converse association (p=0.017). High rates of porous lesions in malarial individuals can be attributed to three potential causes from clinical observations: (1) severe malarial anemia causing expansion of marrow space; (2) an imbalance in bone remodeling due to chemical release during hemolysis; or (3) extramedullary erythropoiesis, which is known to cause cortical thinning and coarse trabeculation. Differential diagnoses are discussed including the potential for co-infection of malaria with other infectious diseases. These findings are pivotal in establishing diagnostic criteria by which we can identify the prevalence and impact of malaria on past populations.
Speith, Nivien (Bournemouth University)

CARE FOR THE AFTERLIFE? A BIOARCHAEOLOGICAL INVESTIGATION OF A ROMANO-BRITISH DECAPITION BURIAL

Interpretations of decapitation burials from Romano-British contexts are as manifold as the circumstances in which this funerary treatment is encountered in rural southern Britain (Boylston et al. 2000). However, the evidence rarely permits an association of age, impairing illness, and decapitation as a ‘healing rite’ (Philpott 1991), disengaging the act of decapitation from destructive notions of coercion or punishment and suggesting an agency of provision of ‘care’ extended to its limits, the transition to death and enablement in the afterlife.

This study offers a bioarchaeological perspective on this burial rite and a socio-cultural facet of its meaning using the case of a decapitation burial from a Romano-British mortuary enclosure near Winterborne Kingston, Dorset, UK. The skeleton of an elderly female, found in supine position with flexed knees and an anatomically correctly positioned skull in a furnished grave, presents peri-mortem lesions consistent with sharp-force trauma to the back of the neck region delivered by a large bladed weapon. Osteological analysis furthermore revealed age- and stress-related degenerative joint disease as well as necrotic lesions to the femoral neck consistent with potentially osteoporosis-related post-traumatic osteolysis. The contextual analysis shows a signature of decapitation in combination with the funerary treatment that differs from comparable burials in the region.

This burial provides physical evidence for an aspect of the decapitation rite comprising components of identity, severe frailty, and social practice in late Roman Britain, suggesting an interpretation of decapitation as a signifier for an act of relief and of care for integrity of the body.

Steyn, Maryna (University of Pretoria) and Buskes, Jenifer (University of Pretoria)

TUBERCULOSIS-ASSOCIATED LESIONS IN MODERN SKELETAL REMAINS FROM SOUTH AFRICA

Worldwide tuberculosis remains a major health problem and has again been indicated as the most common cause of death in South Africa. We have previously reported an increase in skeletal involvement in modern remains of patients dying from TB, specifically in the post-antibiotic era. This study reported on remains from the Gauteng region of South Africa, and found that in individuals dying before 1950 (presumed to have had no antibiotic intervention), 21.1% of individuals showed skeletal involvement. In those dying between 1950 and 1985 (presumed to have been treated with antibiotics) the corresponding figure was 38.2%, whereas it was 41.0% in those dying after 1985 where co-infection with HIV and drug-resistant disease emerged. Rib lesions were increasing, while spinal lesions were decreasing. In a follow up study in the Western Cape, skeletons of 58 individuals who have died from TB were assessed. In the group dying between 1950 and 1985 (n=29), 17.2% showed signs associated with TB, whereas this figure increased steeply to 58.5% in those dying after 1985 (n=29) (p<0.01). Throughout, an additional ± one third of individuals displayed non-specific periostitis elsewhere in the skeleton. Ribs were the most common region to be affected (29.3%), followed by the spine (13.8%). Of particular interest were the 6 individuals with cranial involvement (5 in the cranial fossae and one in the vault). The trend towards increased skeletal involvement was thus also seen in this group, suggesting that antibiotics will probably make patients live longer, but gives them more time to develop skeletal
lesions. This research bridges the gap between paleopathology and modern medicine and contributes towards our understanding of the evolution of this disease. It demonstrates that the manifestations of a disease can change with time as a result of varying interactions between the host, organism and environment.

Taylor, Robert R (Indiana University)

PREHISTORIC TRAUMATIC INJURY IN WEST-CENTRAL ILLINOIS: A PALEOPATHOLOGICAL ANALYSIS OF TWO LATE WOODLAND POPULATIONS

Skeletal trauma is one of the most commonly observed and reported conditions in paleopathological research. The analysis of traumatic injury to skeletal tissue provides useful information regarding inter- and intra-population interactions, as well as interactions with one’s environment. The goal of the present analysis is to integrate clinical, cultural and environmental information in order to better understand trauma etiology in two Late Woodland (250 – 1000 A.D.) populations from West Central Illinois.

A total of 227 individuals from the Late Woodland component of the Pete Klunk (35 individuals) and Koster (192 individuals) mounds were examined for signs of skeletal trauma. Macroscopic observations were recorded according to the specific bone involved, which side was affected, and the specific location of the injury. Trauma classifications that were considered during analysis included fractures, dislocations, scalping, as well as those resulting from stress and other pathologies. Frequencies of skeletal trauma were calculated according to sex and age groups. Compression fractures of the lower vertebral column were the most common type of trauma observed in these collections, followed by fractures of the femoral neck. Other injuries that were observed include rib and clavicle fractures associated with previous pathologies, as well as blunt force trauma to the skull. These traumatic injuries are discussed within the wider social context of Late Woodland populations from the Midwest.

Titelbaum, Anne R. (University of Arizona) and Uceda Castillo, Santiago (Proyecto Arqueológico Huaca de la Luna, Peru)

A RARE CASE OF OS ODONTOIDEUM FROM AN EARLY INTERMEDIATE PERIOD TOMB AT THE HUACAS DE MOCHE, PERU

Os odontoideum is an uncommon vertebral anomaly where the odontoid process is a smoothly corticated ossicle separate from the body of the second cervical vertebra. The condition may be congenital or acquired and it is often asymptomatic; however, the instability of the atlanto-axial joint may lead to vertebral artery injuries or myelopathy from spinal cord compression.

A rare example of os odontoideum was observed in an Early Intermediate Period skeleton excavated from a tomb in an elite Moche burial sector at the Huacas de Moche (Moche IV, AD 400-700). The affected individual was a middle adult male who presented additional developmental anomalies of the axial skeleton. This individual was interred with a middle adult female who also demonstrated developmental anomalies of the axial skeleton, including block cervical vertebrae (Klippel-Feil). Since there is no evidence for bone remodeling, it is suggested that the present example has a congenital etiology. Os odontoideum is rarely reported in the paleopathological literature. This

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case is the first to be described from the archaeological context of South America and one of few reported archaeological examples worldwide.

Toyne, J. Marla (University of Central Florida), Church, Warren B. (Columbus State University), Coronado Tello, Jose Luis (Universidad Nacional de Trujillo), and Morales Gamorra, Ricardo (Universidad Nacional de Trujillo)

AN ISOTOPIC ANALYSIS OF PALEODIET AND PALEOMOBILITY OF COMMINGLED REMAINS FROM LOS PINCHUDOS, PERU

Commimgled and disturbed archaeological contexts, especially burials, can be overlooked as decontextualized and assumed to be of little value. It is difficult to reconstruct individual life histories of assessing certain life history features, such as diet and residential mobility. The extremely looted elite mortuary complex of Los Pinchudos (Late Horizon, AD 1470-1536) in the high jungle of eastern Peru represents an opportunity to explore little known Chachapoyas regional dietary and mobility patterns. Stable carbon, nitrogen, and oxygen isotope values were characterized in bone and tooth collagen, and bone and enamel carbonate, demonstrating notable differences from published highland or coastal samples. Dietary signatures are more consistent with a C\textsubscript{3} plant-based diet and low proportions of terrestrial animals. At 2850 m.a.s.l., it would appear regional dietary resources focused more on tuber crops, beans and grains (C\textsubscript{3}) than maize (C\textsubscript{4}) plants as in other regions. Oxygen isotopic values demonstrate little variation overall even between paired tissues, suggesting a locally-based mortuary sample. These are the first isotopic data from a Chachapoya site and appear to support the relatively localized nature of the region’s inhabitants. While associated grave goods suggest Inca imperial influence, these data do not support the relocation of Inca people into the area.

Tran, Vu (University of Central Florida) and Toyne, J. Marla (University of Central Florida)

IDENTIFYING DISEASE IN COMMINGLED HUMAN SKELETAL REMAINS FROM AN OSSUARY AT KUELAP IN CHACHAPOYAS, PERU ***

Commimgling complicates analysis and interpretation of human skeletal remains, especially when reconstructing a paleodemographic profile or assessing frequency of pathological conditions. With no clear indication of which elements belong to which individual, reconstruction of past health is limited since age, sex, and overall distribution of disease in the skeleton cannot be determined. Pathological changes to the skeleton are important for reconstructing past health because they impact an individual’s biological and social well-being and can contribute to mortality. At the pre-Columbian site of Kuelap (AD 800-1535), commingled remains were analyzed to determine the Minimum Number of Individuals (MNI) and identify the range of pathological conditions. A MNI of 75 individuals was determined, including subadults and adults of both sexes. Pathological conditions were observed on various skeletal elements and included arthritis, osteochondritis, periostitis, fractures, and dental pathology. Antemortem traumatic injuries consisted of both cranial and postcranial elements. Antemortem tooth loss and caries were also present in maxillary and mandibular teeth. Comparison with remains from another Chachapoya mortuary complex, Los Pinchudos, revealed that some diseases were not present among individuals from the Kuelap ossuary. This study demonstrates the complex nature of examining

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fragmentary and commingled remains from secondary interments and how to systematically conduct analysis despite limitations. It also contributes to our understanding of disease experience among the Chachapoya as few studies have been published on paleopathology in the Amazonas Region.

Uhl, Elizabeth W. (University of Georgia) and Blick, Jeffrey P. (Georgia College and State University)

HYPERTROPHIC OSTEOPATHY WITH INTRA-ARTICULAR LESIONS IN A 13th CENTURY DOG: INSIGHTS INTO PATHOGENESIS

Lesions typical of Hypertrophic osteopathy (HO) also known as hypertrophic (pulmonary) osteoarthropathy (HOA, HPOA) were found in a dog skeleton recovered from Weyanoke Old Town, a prehistoric Native American village site in Virginia. Evaluation of the skeleton indicated the affected dog was a mature, older individual that lived between 1224 and 1296 AD. The HO lesions consisted of bilaterally symmetrical periosteal proliferation on the long bones of all four limbs extending from the scapulae and pelvic bones to the metacarpals and metatarsals. HO is most often diagnosed in humans and dogs, and has been described in paleopathological specimens. In modern dogs it is usually associated with metastatic pulmonary disease, but the most common cause, osteosarcoma, was ruled out based upon the lack of evidence for a primary tumor. This dog also had a chronic coxofemoral luxation and lesions of HO were present within the acetabulum, but not in the area where the femoral head was articulating with the ilium. Although intra-articular proliferative bone lesions have not been described in HO, and the lack of joint involvement in most cases has led to a move to replace HOA with HO, the presence of lesions in the acetabulum of the luxated joint are not incompatible with the current theories of HO pathogenesis. However, they do imply that the mechanical environment rather than the articular cartilage may be inhibiting the development of intra-articular lesions. This is an example of how even non-human paleopathological specimens can provide new insights into the pathogenesis of disease.

Upson-Taboas, Charity F. (Indiana University)

DIABETES IN THE HAMANN-TODD COLLECTION ***

Diabetes mellitus is a complicated disease and is divided into two types – Type 1 and Type 2. Type 2 diabetes occurs most often, at around 95% of all diabetes cases. It is unclear how much of affect diabetes has on bone, or that either type of diabetes effect bones differently. Twelve musculoskeletal disorders (MSDs) associated with both types of diabetes have previously been identified in modern medical literature. These are hyperostosis frontalis interna, periodontal disease, adhesive capsulitis, limited joint mobility, flexor tenosynovitis, carpal tunnel syndrome, diffuse idiopathic skeletal hyperostosis, peripheral neuroarthropathy, gout, lower extremity amputation, osteoarthritis, and osteoporosis. Known diabetics (n=11) and age/sex/race matched controls (n=11) in the Hamann-Todd collection at the Cleveland Museum of Natural History were examined in order to evaluate the occurrence rate of each of the MSDs through gross examination. It was recorded whether the MSD was present, absent, or may be present. Using a Chi-Square Test, none of the MSDs reached significance and the null hypothesis of no difference between MSD rates of occurrence in diabetics and non-diabetics could not be rejected. The occurrences of diffuse idiopathic skeletal hyperostosis and osteopenia were two MSDs that did show some difference, but still failed to reach significance. A major consideration

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for lack of support for the hypothesis could be the small sample size. Looking at other known diabetic individuals in other collections may demonstrate whether the lack of difference continues or not.

Vairamuthu, Thivviya (University of Toronto) and Pfeiffer, Susan (University of Toronto)

PLEURAL RIB LESIONS IN A SOUTH AFRICAN CADÁVER-DERIVED SKELETAL SAMPLE ***

This study explores pleural rib lesions seen on a skeletonized cadaver collection from the apartheid era, Western Cape, South Africa: the Kirsten Collection of the Department of Anatomy at the University of Stellenbosch. The collection includes a high proportion of “coloured” individuals (mixed ancestry, predominantly Khoesan) (59% Coloured, 24% Black, 17% White; 65% males, 35% females). Leading causes of death are cancer, cardiovascular disease, tuberculosis and respiratory disease. Anterior to mid-rib sections that have been retained for histological study of 236 skeletons were examined (age range=12 to 90 years; mean=49.4; median=51). The pleural rib surfaces show surface bone abnormalities of periosteal new bone rarely, with three cases being especially notable. The three are all males: two Black and one Coloured. Causes of death and ages are: obstructive airways and pneumonia at 66 years, endocarditis at 20 years, and esophageal cancer at 54 years. These findings suggest that pleural rib lesions can be identified in the anterior to mid-rib area as well as the more commonly studied posterior region. While they may be indicative of tuberculosis as an underlying disease, they may also be non-specific.

Van Schaik, Katherine (Harvard Medical School) and Rühli, Frank (University of Zurich)

PALEOPATHOLOGY AND MEDICAL DECISION-MAKING: EVIDENCE OF DISEASE IN HUMANS AND IN TEXT, AND HOW DOCTORS DECIDE ***

Paleopathological evidence from the ancient Mediterranean (specifically, examination of the occurrence of cancer, malaria, and healed fractures) can shed light on the development of medical thought and practice. Study of how physicians make decisions regarding medical diagnosis and treatment is more important than ever before, as more US medical schools have opened in the last 20 years than in the preceding 50 years. Existing medical schools are radically revising curricula by placing students in full-time hospital-based training in their 13th month of coursework, instead of in the 22nd month. Proponents of these changes argue that students learn how to be physicians on the basis of the disease burden which is directly observed and treated. Such an assumption in turn suggests that the development of this central pedagogical process of teaching ‘clinical judgment’ may be more completely understood through an analysis of the burden of disease in past populations. Study of the diseases of the past, then, can teach us about the development and evolution of medical decision-making and how these skills are taught to physicians-in-training. Examination of cases of cancer reveals that definitions of disease are often contextual. Study of the occurrence of malaria supports arguments about how developments in diagnosis and prognosis are related to the observability of a given pathological condition. Finally, analysis of remains indicating successful setting of fractures and trephination indicates that, in cases of acute, readily observable pathology, treatment could be provided successfully.

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Wade, Andrew D. (McMaster University), Garvin, Greg J. (St. Joseph’s Health Care, London), Butler, John R. (Lawson Health Research Institute), Moran, Gerald (Siemens Canada), and Nelson, Andrew J. (University of Western Ontario)

MULTIMODAL IMAGING AND CHEMICAL CONFIRMATION OF MUMMIFIED HAEMATIN +++

This study presents medical imaging and chemical analyses to demonstrate that multimodal comparison of CT and MRI mummy imaging datasets produces novel information available in neither modality on its own, and provides a means by which to non-destructively identify haematin in a mummified thrombus or haematoma. While anomalous high-density material on radiographic examinations is non-specific, requiring specific identification through biopsy and histology, the comparison of radiographic results with magnetic resonance imaging may hold the key to non-destructive specific identification.

This study focusses on results from an experimental cat mummy, produced by the Western University Department of Anthropology in 2004, with the intent of tracking the change in radiological appearance of the remains over time. The cat was CT and MR scanned most recently in 2012, and the proposed mummified haematin was biopsied in 2014.

The identification of haematomata and thrombi provide important evidence of the presence and timing of trauma and other pathological conditions, relevant to both bioarchaeological and forensic investigations. Findings of this type have implications for perimortem trauma identification and for palaeopathological and forensic analyses of desiccated human and animal remains.

Wakefield-Murphy, Robyn (University of Pittsburgh)

SHOT THROUGH THE HEART, BUT WHO’S TO BLAME?: PROJECTILE TRAUMA IN LATE PREHISTORIC PENNSYLVANIA ***

During the Late Prehistoric Period (1000-1635AD), the Monongahela tradition was the primary archaeological culture of the Ohio Valley region in southwestern Pennsylvania. The Monongahela practiced intensive maize agriculture and were settled into semi-permanent villages consisting of houses arranged around a central axis, surrounded by stockades. While this tradition dominated the regional landscape, isolated sites in the region do not fit the diagnostic pattern for the Monongahela, such as the McKees Rocks Village site (Buker 1968).

This study examines projectile trauma from two Late Prehistoric sites from this region, Shippingport and McKees Rocks Village. Among the burials from the Shippingport site, one female aged 15-19 years exhibited perimortem projectile trauma to the posterior portion of the left 12th rib. This burial also contained the remains of a 24 week fetus (Mayer-Oaks et al. 1952). At the McKees Rocks Village site, a middle aged adult female was recovered in association with an infant (Buker 1968). Projectile trauma is evidenced in the adult, as an embedded projectile is present in the vertebral body of T12, with subsequent injury to L1. Additionally, cutmarks were observed on the frontal bone. Microscopic examination indicates these were inflicted perimortem. This study will discuss these injuries in detail and in relation to archaeological interpretations of site location and defense.
Walker, Jessica (University of Pittsburgh)

METABOLIC CHILDHOOD STRESS IN ISLAMIC PERIOD BURIALS AT ‘AYN GHARANDAL

Excavations conducted between 2013 and 2014 at an Islamic period cemetery overlying the 3rd — 4th century C.E. Roman fort at ‘Ayn Gharandal identified 28 individuals. Analysis of the human skeletal remains revealed high levels of childhood stress and mortality in the 19 subadult skeletons represented. Examination of the population mortality profile combined with assessments of long bone growth, incidence of cribra orbitalia, and age of occurrence for dental enamel hypoplasias provides a detailed understanding of subadult health at ‘Ayn Gharandal and informs on sociocultural factors related to weaning and childhood nutrition in this population of pastoral nomads.

Comparisons with nomadic populations from different environmental regions in Jordan support a diversified view of diet and health for Islamic period pastoralists. These differences may be related to the relative degree to which agricultural crops were integrated into the diet of nomadic groups living in different areas within and along the Jordan Valley. The population at ‘Ayn Gharandal demonstrated greater resilience prior to weaning and fewer overall incidences of cribra orbitalia and dental enamel hypoplasias than other nomadic groups which were more closely aligned with agricultural populations. Therefore, these results may also indicate the limitations of geographic mobility and interaction for different nomadic communities in this region.

Waller, Kyle (University of Missouri) and Offenbecker, Adrianne (University of Calgary)

PARADOX AND PAQUIMÉ: INTERPRETING NON-SPECIFIC STRESS IN BIOARCHAEOLOGY ***

Recent advances in paleoepidemiology, including the osteological paradox and shift away from inferring “health” have significant implications for interpreting skeletal lesions frequently referred to as non-specific indicators of stress. This study sought to contribute to ongoing discussions by applying emerging approaches to a large skeletal assemblage from the Casas Grandes region of northwestern Chihuahua, Mexico dating to A.D. 1200-1450. To do this, Gage and DeWitte (2009) were followed, treating mortality as an “absorbing state” to examine the impact of stress indicators on the age-at-death distribution.

Age-at-death was estimated using transition analysis of the os coxae and pubic symphysis. The maximum likelihood estimates were used to model the age-at-death distribution using Gompertz and Weibull hazard models. Linear enamel hypoplasias (LEH) and porotic hyperostosis (PH) were scored as presence/absence traits. The relationship between age-at-death and stress indicators was examined using Kaplan-Meier survivorship curves and the Usher model, which examines the impact of a covariate on the modeled age-at-death distribution.

The results suggest a complicated relationship between stress and survivorship. LEH appears selective for mortality, however, there were several individuals with LEH who survived into their 8th decade of life. These individuals appeared to be of elevated social status, possibly suggesting hidden heterogeneity in responses to childhood stress. Porotic hyperostosis is not selective for mortality at
Casas Grandes. The presentation concludes by discussing implications for paleoepidemiology, including data collection strategies and statistical techniques.

**Welser, Alison (North Carolina State University)**

**EXAMINING RELATIONSHIPS BETWEEN DEGENERATIVE JOINT DISEASE AND OCCUPATION**

This study examines potential relationships between physically taxing occupations and degenerative joint changes. There have been many similar studies, but studies that examine multiple regions of the body for degenerative change are limited. For this analysis, gleno-humeral osteoarthritis, rotator cuff disease, and intervertebral disc disease were selected for examination, as all have been associated with over-loading of the joints in anthropological or clinical literature.

The humeri, scapulae, and vertebrae of 196 individuals from the Robert J. Terry Anatomical Collection were examined macroscopically for evidence of the aforementioned diseases. All individuals with a specified occupation, a documented age-at-death between 30 and 88 years, and who were of African-American or European-American ancestry, were selected for analysis. Occupational stress – categorized as light, moderate, or heavy – was one of several etiological factors examined to assess which may actually contribute to disease development. Of the factors analyzed, the significant effects were as follows: ancestry and sex affect intervertebral disc disease development, ancestry and age affect osteoarthritis development, and age affects development rotator cuff disease development. When other components were controlled for, occupational stress was found to correlate only with intervertebral disc disease.

Joint diseases have been used in past literature to make inferences about many aspects of past civilizations, but in recent literature, many researchers have questioned the approach. Based on the findings of this study, relying less on osteoarthritis to derive the past seems justifiable, but perhaps intervertebral disc disease, which is not often utilized, may still prove useful to such investigations.

**Wilczak, Cynthia (San Francisco State University)**

**A DEFECT OF THE FIRST CERVICAL VERTEBRAE FROM PUYE, NEW MEXICO: A POTENTIAL CRADLEBOARDING INJURY**

This study describes a 17 to 21 year old female from Puye, New Mexico (A.D. 1325–1590) with a defect of the first cervical vertebrae. The C1 left lamina is unfused near the base of the lateral mass. The lamina is misaligned with the posterior end displaced 5 to 6 millimeters anteriorly and inferiorly to overlap a small laminar extension from the lateral mass. The posterior extension is atrophic with a minimum width of 2.6 mm versus 6.3 mm at the same location on the right side. There is no active remodeling. Barnes (1994) ascribed the unfused lamina to a developmental aplasia of unspecified etiology (pp. 266-267). When the C1 is articulated with the cranium, the alignment and appearance instead suggest cranial modification as a potential cause of the defect.

Posterior, tabular cranial modification is moderate with two planes of pressure: 1) vertical flattening above the superior nuchal lines and; 2) angled flattening from the inferior nuchal lines to the posterior quarter of the foramen magnum. The modification is consistent with pressure from a
cradleboard and the use of a pillow or pad under the neck. The second plane of pressure has reoriented the inferior occipital to face more posteriorly, exposing the posterior arch of C1. While an idiopathic failure of ossification center development or fusion is possible, the impingement of the deformation onto the posterior foramen magnum and the displacement of the C1 lamina suggests the defect was caused by traumatic injury directly related to the cranial modification.

Wilson, Teresa V. (Louisiana State University)

DISRUPTIONS IN ENAMEL FORMATION DURING WEANING: EVIDENCE FOR A COMPLEX STRESS HISTORY DURING CHILDHOOD IN RURAL NORTHERN JORDAN

This research looks at dental indicators of childhood stress of individuals who lived at five sites (Ya’amun, Sa’ad, Yasileh, Natfieh, and Waqqas) in rural northern Jordan from the Bronze Age to the Byzantine Period. Canine teeth were thin-sectioned and examined under a light microscope. Linear enamel hypoplasias (LEHs) and Wilson bands are enamel defects resulting from systemic stress during the formation of enamel. Each tooth crown was divided into ten equal parts that designate growth at ten different age ranges. The number of enamel defects in these fixed age groupings are indicators of increased physiological stress.

The results of this study show that the peak in LEH frequency (2.2-2.7 years) occurs slightly before the peak in Wilson band frequency (2.7-3.1 years), and the average number of LEHs begins to decrease and disappear before Wilson bands. The majority of LEHs seen in this sample are between 1.7 and 4.2 years, which is consistent with the initiation and completion of weaning activities. The average number of Wilson bands peaks around the time that weaning is entering completion. The high average of Wilson bands between 2.7 and 5.6 years may indicate an increased susceptibility to childhood diseases resulting in diarrhea and dehydration at the end of weaning. As the children became accustomed to their diets and immune systems develop, it is expected that early childhood illnesses would decrease. The large drop in the average number of Wilson bands after 5.6 years indicates that the children were no longer experiencing these subtle stress events.

Wojcik, Paige (Indiana University)

METOPIC SYNOSTOSIS IN PREHISTORY: A DIFFERENTIAL DIAGNOSIS AND EVALUATION OF AGING METHODS

Metopic synostosis, early fusion of the metopic suture, is rarely reported in archaeological contexts. In clinical literature, metopic synostosis constitutes approximately 15% of all cases of craniosynostosis (Lajeunie et al., 1998). This poster presents an early case of metopic synostosis from the Middle Woodland period (0 – 500 CE) in Schuyler County, Illinois. Individual Hopewell 157 consists of a nearly complete frontal bone with a mostly obliterated metopic suture. Due to the absence of other skeletal material, the orbital measurements of specimen Hopewell 157 were compared to other prehistoric Illinois infant crania to estimate the age of the individual at the time of death. Interorbital distance was also used to approximate the time of suture fusion. The results suggest that metopic synostosis was present at birth and that Hopewell 157 lived to approximately 2 months of age, but

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orbital metrics may have been constrained by early suture closure. The lack of postcranium elements makes it impossible to diagnose a specific syndrome, but falciform impressions on the endocranial surface of the bone imply typical brain growth, ruling out syndromes that cause microcephaly. Non-syndromic cases of metopic synostosis do not commonly result in death in infancy, even when surgical intervention is necessary (Kelleher et al., 2007). Therefore, the most plausible syndromic causes for this case of metopic synostosis include Jacobsen syndrome, Trisomy 13, Grieg cephalopolysyndactyly, and Opitz trigonocephaly C.

**Worne, Heather (University of Kentucky)**

**A POSSIBLE CASE OF POLIOMYELITIS FROM A 19th CENTURY CEMETERY IN CENTRAL KENTUCKY**

A possible case of poliomyelitis has been identified in the Eastern State Hospital Cemetery skeletal assemblage from Central Kentucky. Individuals interred in the cemetery were patients of the psychiatric hospital during the mid-19th century. Epidemics in North America of the viral infection poliomyelitis have been well documented during the early to mid 1900s; however, few cases have been reported prior to the 1900s.

Individual 34, a 14-16 year old non-adult, shows evidence of extreme atrophy of one arm and one leg, as well as skeletal changes to the spine and pelvis associated with disuse osteoporosis. Notable long bone length and diameter discrepancies were documented for the femora and humeri. Skeletal muscle markers suggest that the atrophied arm may have been fixed in the flexed position. Schmorl’s nodes in the lumbar vertebrae, shape changes to the hip joint, as well as a well healed fracture of an acetabular margin suggest weakened and unbalanced hip muscles as well as prolonged immobility. The mosaic and patchy distribution of affected muscles and bones, as well as possible osteoporosis of the spine due to disuse, are more suggestive of poliomyelitis, however the differential diagnosis includes traumatic injury, cerebral palsy, as well as other neural muscular disorders.

**Zhang, Qun (Jilin University), Shi, Zhangzhen (Jilin University), Li, Mocen (Jilin University), Sun, Zhichao (Jilin University), Liang, Ningning (Jilin University), Han, Tao (Jilin University), Gao, Xiaofang (Jilin University), and Zhang, Quanchao (Jilin University)**

**A SYNTHETIC DIAGNOSIS OF CRANIOFACIAL FIBROUS DYSPLASIA IN HUMAN REMAINS FROM JINGGOUZI, A BRONZE AGE CEMETERY SITE IN NORTH CHINA ***

This paper reports a synthetic diagnosis of craniofacial fibrous dysplasia on the human remains recovered from Jinggouzi (2500 B.P.), a Bronze Age cemetery site of an important ethnic group in ancient China. Through CT reconstruction and microscopic pathology techniques, the study aims to apply comprehensive modern medical techniques to improve the diagnostic accuracy of a rare ancient disease, fibrous dysplasia. The clinical features that can be observed with the naked eye are cranial asymmetry and facial deformity. A bulging growth in the right frontal bone and orbit can be observed clearly. CT imaging and three-dimensional reconstruction was accomplished by integrating multiplanar reconstruction (MPR), tissue transition projection (TTP), and maximum intensity projection (MIP) techniques. The lesion areas in CT images showed the characteristic amorphous, homogeneous ground

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glass appearance, which is the most common radiographic appearance of the internal structure of fibrous dysplasia in the present study. Microscopic and histopathological analyses were done by direct observation with a 3D Super Depth Digital Microscope, and examination of formalin-fixed, paraffin-embedded sections of lesion tissue stained with hematoxylin-eosin (H&E) with a medical microscope. The irregular trabeculae of woven bone lie in a monotonous Chinese character-like appearance, which is consistent with a confirmed modern case. The result of multiple methods indicates obvious medical evidence substantiating the diagnosis of fibrous dysplasia. Specimens exhibiting neoplastic bone disease are an exceptionally rare occurrence in archaeological contexts. The comprehensive use of medical methods provides us with a new window into the diagnosis of rare diseases.

Zink, Albert (EURAC Research, Italy), Moghaddam, Negahnaz (University of Bern), Paladin, Alice (EURAC Research, Italy), Hower-Tilmann, Estelle (University of Bern), and Lösch, Sandra (University of Bern)

PALEOPATHOLOGICAL INVESTIGATIONS OF THE DRA’ ABU EL-NAGA COMPLEX K93.12 IN THEBES WEST, EGYPT

The necropolis of Dra’ Abu el-Naga is situated ca. 700 km south of Cairo, opposite the modern city of Luxor in Upper Egypt on the western bank of the Nile. In this study we present the paleopathological analysis of the human remains from the rock tomb K93.12 that was originally built in the early 18th dynasty (c. 1500 BC). The tomb was later reused as a burial place until the 26th dynasty. The human remains of the different tomb areas were severely damaged due to extensive grave robberies. In the first step of the investigation, the minimum number of individuals (MNI) was estimated and age and sex of the individuals were determined. Subsequently, the human remains underwent a detailed paleopathological analysis. In total, skeletal remains of 79 individuals and 13 mummies could be reconstructed and studied. The paleopathological analysis showed a high prevalence of stress markers such as cribra orbitalia, and other pathological conditions such as dental diseases, osteoarthritis and trauma. Moreover, a male individual presented with an almost completely fusion of the spine, possibly representing a case of ankylosing spondylitis. The mummy of a mature male individual showed two cut marks on the right side of the throat and thorax that seemed to be caused perimortem. In another male mummy the first both phalanges of right and left index finger are missing. The forefingers were reconstructed during the mummification process, ruling out a postmortem damage. The study revealed important insights into the health conditions of this ancient Egyptian population.

Zuckerman, Molly (Mississippi State University), Anderson, Derek (Mississippi State University), and Herrmann, Nicholas (Mississippi State University)

PRELIMINARY FINDINGS FROM THE PREHISTORIC AKLIS SITE, ST CROIX, US VIRGIN ISLANDS

Preliminary results are presented from paleopathological and osteological analysis of a small skeletal assemblage (n=4), as well as portions of several commingled remains, recovered from the Aklis site (12VAm1-42), St. Croix, US Virgin Islands. Aklis is a prehistoric multi-component habitation, cemetery, and shell midden site located directly on the water on the southwestern aspect of St. Croix.
Encroaching erosion from rising sea levels necessitated the early stages of mitigation of the site in 2014, revealing four human burials. These individuals, three adults and a juvenile, were recovered in association with substantial quantities of worked shell, ceramics, beads, conch shells, and animal bones; a carved shell gorget was found in situ with one of the individuals. Commingled remains recovered from the surface of the site during previous years were also recorded and included. The adult individuals exhibit evidence of traumatic injuries on several elements, including a depressed cranial fracture and healing rib fracture, but none of the individuals manifest skeletal or oral skeletal stress markers. The evidence of overall health, mortality, and pathology, particularly traumatic injuries, in this small assemblage is interpreted in light of the site’s late prehistoric date, which directly abuts first contact with Europeans in the Caribbean, and the cultural change and conflict which characterized the very beginnings of the Columbian Exchange.