

Canadian Association for Physical Anthropology Conference

forensic anthropology

primatology

paleoanthropology

bioarchaeology

human biology

38th Annual CAPA Conference

October 27 - 30, 2010 Saskatoon, SK
Radisson Hotel Saskatoon



Website: <http://www.medicine.usask.ca/che/capa-conference>





PROGRAM FOR THE
THIRTY-EIGHTH
ANNUAL MEETING
OF CAPA

The organizing committee for the 38th annual meeting of the Canadian Association for Physical Anthropology would like to offer thanks to our sponsors and volunteers.

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SESSION SPONSORS



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Note: Volunteers will be wearing GREEN nametags

ORGANIZING COMMITTEE

David Cooper

Angela Lieverse

Diana Fedosoff

Sylvia Abonyi

Ernie Walker



PROGRAM AT A GLANCE

Wednesday October 27, 2010	
4:00 - 9:00	Registration (Da Vinci Ballroom)
7:00 - 10:00	Welcome Reception (hors d'oevres and cash bar in the Da Vinci Ballroom)
Thursday, October 28, 2010	
<i>All sessions will take place in the Michelangelo A room</i>	
8:00 - 8:30	Poster Set-Up (Crush Lobby)
8:00 - 8:45	Registration (Da Vinci Ballroom)
8:45 - 9:00	Welcome and Introductions (Michelangelo A)
9:00 - 10:10	Session 1: Forensic Anthropology (Session Chair: Cheryl Hennig)
10:10 - 10:30	Break
10:30 - 12:00	Session 2: Primatology (Session Chair: Michael Schillaci)
12:00 - 1:30	Lunch
1:30 - 2:55	Session 3a: Human Health and Disease (Session Chair: Sylvia Abonyi)
2:55 - 3:15	Break
3:15 - 4:15	Session 3b: Human Health and Disease (Session Chair: Linda Larcombe)
4:15 - 5:15	Poster Session (Crush Lobby)
6:00 - 10:00	Pub Social (Winston's Pub, Hotel Senator, 243 21st Street East)
Friday, October 29, 2010	
8:00 - 8:45	Registration (Da Vinci Ballroom)
9:00 - 10:10	Session 4a: Skeletal Biology / Bioarchaeology (Session Chair: Angela Lieverse)
10:10 - 10:30	Break
10:30 - 12:00	Session 4b: Skeletal Biology / Bioarchaeology (Session Chair: Treena Swanston)
12:00 - 1:30	Lunch
1:30 - 2:55	Session 4c: Skeletal Biology / Bioarchaeology (Session Chair: Ernie Walker)
2:55 - 3:15	Break
3:15 - 4:15	Session 4d: Skeletal Biology / Bioarchaeology (Session Chair: Ernie Walker)
4:15 - 5:15	CAPA Business meeting (Michelangelo A)
6:30 - 10:00	Banquet (Top of Inn, Sheraton Cavalier Saskatoon Hotel, 612 Spadina Cres E)
	6:30 - 7:00 - Cash Bar
	7:00 - 8:00 - Banquet
	8:00 - 9:00 - Keynote Speaker (Dr. Ernie Walker)
Saturday, October 30, 2010	
8:00 - 8:45	Registration (Da Vinci Ballroom)
9:00 - 10:25	Session 5: Illuminating Anthropology: Advanced Imaging Applications (Session Chair: Yasmin Carter)
10:25 - 10:45	Break
10:45 - 12:00	Keynote Presentation for Stones, Bones and Photons (Chair: Matthew Dalzell)
1:00 - 4:00	Synchrotron Satellite Workshop
1:00 - 4:00	Wanuskewin Heritage Site Tour



PODIUM PRESENTATIONS

Thursday, October 28, 2010

Session 1: Forensic Anthropology (Session Chair: Cheryl Hennig)

8:45	Welcome and Introductions (Michelangelo A)	
9:00	Hennig C and D Cooper.	The Relation between Standard Error of the Estimate and Sample Size of Histomorphometric Ageing Methods
* 9:15	Cahn J.	You are what you do....or are you? Using musculoskeletal stress markers in personal identification through correlations with occupation type.
* 9:30	Engel N.	Geographic variation of stable isotopes in the tissues of western Canadians
9:45	Lywood V.	Who is John Doe?: An unconventional method of two dimensional facial approximation as a possible answer to one of Canada's most enduring mysteries.

BREAK (10:10 - 10:30)

Session 2: Primatology (Session Chair: Michael Schillaci)

10:30	Colquhoun I.	Establishing the Southwestern Limits in the Geographic Distributions of <i>Eulemur coronatus</i> and <i>E. Sanfordi</i>
10:45	Evans KJE, Hartwell KS, Pavelka MS, and H Notman.	The effect of infant age on male infant attraction, tolerance and handling in black-handed spider monkeys (<i>Ateles geoffroyi</i>)
11:00	Mosdossy K, Fedigan L and M Hajibabaei.	DNA barcoding and Next-Generation Sequencing of a Capuchin Fecal Sample to Identify Insects in the Diet
11:15	MacDonald LJ and P Sicotte.	Infant Development and Suckling Patterns in <i>Colobus vellerosus</i>
11:30	Schillaci M, Lee B, Castellini JM, Reid M and T O'Hara.	Hair Lead Concentrations in <i>Macaca fascicularis</i> from Singapore

LUNCH (12:00 - 1:30)

Session 3a: Human Health and Disease, Past and Present (Session Chair: Sylvia Abonyi)

* 1:30	Blackburn A.	Bilateral Asymmetry of the Humerus Throughout Growth and Development
* 1:45	Decter K.	Immunogenetic Variation in Manitoba Aboriginal Populations: Preliminary Analyses
2:00	Tripp L and L Sawchuk.	A Health Advantaged Population and Community Resilience: The Jews of Gibraltar
* 2:15	Stoops M.	The media representation of the term "pandemic" during the 2009 H1N1 pandemic.
* 2:30	Ludlow N.	Deadly Occupations Examining Historical Demographic and Epidemiologic Patterns in Two Canadian Single Industry Communities

BREAK (2:55 - 3:15)

Session 3b: Human Health and Disease, Past and Present (Session Chair: Linda Larcombe)

3:15	Larcombe L, Singer M, Orr P and P Nickerson	No Shelter from the Storm: housing and tuberculosis in Lac Brochet
3:30	Chadwick S, Amarra S, Moffat T and W Wilson.	From knowledge to practice: infant feeding and vitamin D supplementation among Canadian-born and New Canadian mothers and children in Hamilton, Ontario and Calgary, Alberta
3:45	Galloway T, Chateau-Degat ML, Egeland GM and K Younk.	The Relationship between sitting height and body mass index in Canadian Inuit: results from the 2007-8 Inuit Health Survey
4:00	Wilson WM, Bulkan J, Piperata B and K Hicks.	Secular trends in growth among adult Makushi Amerindians of Guyana

SESSION ENDS (4:15)

* Eligible for CAPA Student Presentation Award

Friday, October 29, 2010

Session 4a: Skeletal Biology and Bioarcheology (Session Chair: Angela Lieverse)

* 9:00	Merritt C.	The influence of body size on adult age estimation in small-bodied skeletons.
* 9:15	Holland E.	Growth of a Canadian Inuit Population
9:30	Toyne JM, White CD, Verano JW, Uceda S, Hewitt B and FJ Longstaffe.	An Oxygen Isotopic Examination of Moche Sociopolitical Complexity Using Residential Histories of the Huacas de Moche People
9:45	Harrington L.	Quantitative analysis of enamel development across a dentition

BREAK (10:10 - 10:30)

Session 4b: Skeletal Biology and Bioarcheology (Session Chair: Treena Swanston)

10:30	Drapeau M, Raguin É, Lazenby RA and MA Streeter.	Modeling-remodeling comparisons in bones of the human hand
10:45	Pitre M, Mayne Correia P, Mankowski PJ, Klassen J, Day MJ, Lovell NC and RS Currah.	Biofilm Growth in a Human Skeletal Collection from Bronze Age Syria
11:00	Mayne Correia P and MC Pitre.	Challenging Museum Standards for Skeletal Material
11:15	Scott A, and T Betsinger.	The Vampires of Drawsko: A Bioarchaeological look at the Undead

LUNCH (11:45 - 1:30)

Session 4c: Skeletal Biology and Bioarcheology (Session Chair: Ernie Walker)

* 1:30	Jessup E.	Burial Practices and Identity in the Roman-period at Sodo, Italy
* 1:45	Whitaker K.	The prehistoric sites of Staxton Beacon and Melton on the Yorkshire Wolds, England.
2:00	Gloux S and A Gonciar.	Insights into the investigation of Late Bronze Age populations in Transylvania
* 2:15	Macintosh A.	Factors Affecting the Incidence of Septal Aperture in Two Neolithic Hunter-Gatherer Populations of the Cis-Baikal, Siberia

BREAK (2:40 - 3:00)

Session 4d: Skeletal Biology and Bioarcheology (Session Chair: Ernie Walker)

3:00	Lieverse AR, Stock JT, Katzenberg MA and CM Haverkort.	The Bioarchaeology of Habitual Activity and Dietary Change in the Siberian Middle Holocene
3:15	Liston M.	Quackenbush Revisited: Two Additional Skeletons from Intramural Graves
* 3:30	Sawchuk E.	Bioarchaeology of the Mlambalasi Rock Shelter, Tanzania: Excavation and Analysis of Possible Later Stone Age Remains
* 3:45	Semple D.	Reexamination of the Nature and Purpose of Macramallah's Rectangle, a First Dynasty Cemetery at Saqqara, Egypt

SESSION ENDS (4:10)

* Eligible for CAPA Student Presentation Award

Saturday, October 30, 2010

Session 5: Illuminating Anthropology: Advanced Imaging Applications (Session Chair: Yasmin Carter)

* 9:00	Jaagumagi A.	An Examination of Vertebral Compression Fractures in an Inca Population from the North Coast of Peru
9:15	Nelson A and A Wade.	IMPACT - A Collaborative Mummy Database Project
9:30	Hallgrímsson B, Parsons TE, Schmidt E, Boughner J, Young N, Martinez N, Jamniczky H, Trpkov C and R Marcucio.	Imaging and Brain Face Interactions in Vertebrate Development and Evolution
9:45	Lazenby R, Skinner M, Kivell T, Sidhu S, Hublin JJ and C Boesch.	Lack of Structural Asymmetry in Pan Metacarpals 1, 2 and 5
10:00	Carter Y, Chapman D, Wysokinski T, Belev G, Thomas CDL, Clement JG, Peele A, Hannah K and D Cooper.	Testing Pits: what do cellular spaces tell us about human bone?

BREAK (10:25 - 10:45)

Keynote Presentation for Stones, Bones and Photons (Chair: Matthew Dalzell)

10:45	Introductions	
11:00	Roy Wogelius	Archaeopteryx chemistry fully revealed via synchrotron techniques.
11:45	Closing comments and farewells	

* Eligible for CAPA Student Presentation Award

SATURDAY AFTERNOON: WORKSHOP & TOURS

Saturday, October 30, 2010 (Afternoon Workshop & Tours)

Synchrotron Satellite Workshop

1:00	Tour bus departs the Radisson	
1:30	Opening remarks	
1:45	Cooper D, Carter Y and H Britz	Investigation of Bone Microarchitecture by Synchrotron X-ray Techniques at the CLS
2:00	Robertson E and R Blyth.	Synchrotron-based hard and soft x-ray characterization of heat-treated archaeological toolstone
2:15	Monsalve MV, Christensen C and L Quaroni.	Cellular and biochemical analyses of tissue samples from Kwäday Dän Ts'ínchi
2:30	Harvey T, Wyzokinski T, Belev G and LD Chapman.	Imaging Ancient Artefacts - Greek and Roman Bronze Coins and Egyptian Faience Amulets
3:00	Synchrotron Tour	
4:00	Tour bus departs Synchrotron	

Wanuskewin Heritage Site Tour (Led by Dr. Ernie Walker)

1:00	Tour bus departs the Radisson	
3:45	Tour bus departs Wanuskewin	



POSTER PRESENTATIONS

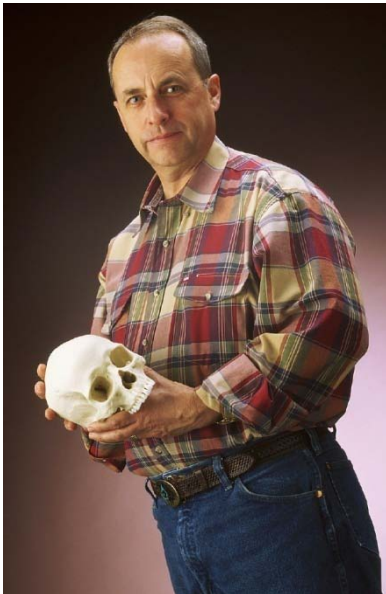
Forensic Anthropology		
1a	Yuzwa T and A McKeown.	The Nose Knows: A Statistical Classification of Ancestry from Craniofacial Measurements
* 1b	Waterhouse K.	Issues in Burnt Bone Terminology
1c	Nelson A, Lywood V and R Beckett.	Facial Reconstruction of an Anga Mummy
1d	Lywood V, Nelson AJ, Wade AD, Nguyen N, Friedman SN, Granton PV, Cunningham IA, Mahoney G and M Ewanchyna.	Hetep Bastet: Dual energy segmentation techniques, RP skull models and forensic facial approximation reveal the face of UQAM's Egyptian Mummy.
Primateology		
2a	Parr N, Fedigan LM and SJ Kutz.	Preliminary Survey of the Parasites of Wild White-faced Capuchins (<i>Cebus capucinus</i>) in Costa Rica
* 2b	Last C.	Chimpanzee Nest Construction in South-West Cameroon
Stable Isotopes and Microtechnique		
3a	Waters-Rist AL, Bazaliiskii VI, Weber A, Goriunova OI, Salev'ev N and MA Katzenberg.	Sulphur Isotopes in Ancient Human Bone Collagen from the Lake Baikal Region of Siberia: Freshwater Ecosystem Variation as a Residence Tracer
3b	Holobinko A, Kemp HF, Meier-Augenstein W, Prowse T and S Ford.	2H Stable Isotope Analysis of Tooth Enamel: A Pilot Study
3c	Desrosiers E, Morland F and I Ribot.	Stable isotope analyses of a historical Euro-Quebecois population (Notre-Dame cemetery, Montreal, 1691-1796): preliminary paleonutritional interpretations.
3d	Dolphin A, Dundas SH, Kosler J and H Meyer Tvinnereim.	A comparison of LA-ICP-MS and micromill/solution ICP-MS methods for elemental analyses of tooth enamel
Skeletal Biology and Paleopathology		
4a	Brickley M, Watamaniuk L., Prowse T, Kahlon B and R Adams.	Disuse Osteopenia: A Bioarchaeological Investigation of a Skeleton from Wadi-Fidan, Jordan
4b	McKenzie H, Puckett C and A Popov.	A metric study of artificial cranial modification from the Boisman II hunter-gatherer cemetery (~5300-6000 BP), Russian Far East
4c	Prowse T, Brickley M, Adams R, Kahlon B, Edwards J and A Oh.	Poked, Sliced, and Jabbed: Multiple Traumatic Lesions in a Skeleton from Wadi Fidan 1, Jordan.
4d	Shykoluk N.	Enhancement of Scott's Molar Wear Scoring Method
4e	Lovell N.	Habitual activity indicators on human teeth from ancient Mendes, Egypt
4f	Roksandic M and J Lindal.	Behavioural modernity: a not so good concept in human evolution
Imaging		
5a	Varney TL, Cooper DML, Coulthard I, George GN, Pickering IJ and AR Murphy.	A preliminary investigation of lead contamination in a Napoleonic era naval cemetery in Antigua, W.I.
5b	Morgan J, Lynnerup N and RD Hoppa.	Sex Determination from Head to....Well Just the Head: A Validation of Methods Using the Petrous Portion of the Skull from CT Data
5c	Gamble J and RD Hoppa.	Congruence of Metric and Morphological Approaches to Determination of Sex in the Real, Virtual and 3DP Pelvis.
5d	Wade A and A Nelson.	Heart treatment in ancient Egyptian mummification
Population Health		
6a	Boutilier D, Larcombe L, Nickerson P and P Orr.	Health and Housing in a Northern Manitoba Community: A Preliminary Report
6b	Nepomnaschy P, Altman R and R Watterson.	Urinary cortisol excretion across the menstrual cycle
* Eligible for CAPA Student Presentation Award		



BANQUET KEYNOTE ADDRESS

Friday, October 29, 2010 (8:00 -9:00 pm)
Top of the Inn, Sheraton Cavalier Saskatoon Hotel
612 Spadina Crescent

We are pleased to have Dr. Ernie Walker as this year's Banquet Speaker, with his presentation entitled, "The Lady in the Well: Saskatoon's Oldest Known Homicide"



Dr. Walker is a professor in the Department of Archeology and Anthropology at the University of Saskatchewan. As a biological anthropologist, Dr. Walker has been very active in research concerning human skeletal remains from archaeological contexts. In addition, Dr. Walker has been very active in forensic investigations for over 25 years for a variety of law enforcement agencies. He is a Special Constable with the R.C.M.P., an Associate Member of the Forensic Laboratory Services Division of the R.C.M.P., and a coroner with the Province of Saskatchewan. Dr. Walker is also an Adjunct Faculty member in the Forensic Sciences Program at the British Columbia Institute of Technology, Burnaby, British Columbia.

Dr. Walker has also been actively involved with Saskatchewan's First Nations for many years in the areas of cultural expression and post-secondary education for Aboriginal students. He has worked extensively with elders and members of the senate of the Federation of Saskatchewan Indian Nations. Dr. Walker is an Honorary Chief among Saskatchewan's First Nations with the traditional name "Miko Peyasew" or Red Thunderbird. He helped develop Wanuskewin Heritage Park, a National Historic Site located near the city of Saskatoon, through which he continues to host an annual archaeological field school and run of one of the largest archaeological research projects in Canada.

His many contributions have been recognized with numerous prestigious awards at the University of Saskatchewan, in the province, and nationally. These include the University of Saskatchewan Distinguished Researcher Award, the Students' Union Excellence in Teaching Award, the Alumni Award, and the national 3M Master Teacher Award. In 2001, he was awarded the Saskatchewan Order of Merit for service to First Nations communities and law enforcement agencies across the Province. In 2004, he was invested as a Member of the Order of Canada.

Seating is limited. If you did not purchase a ticket in advance, but wish to join please ask at the registration table about late availability



PODIUM ABSTRACTS



SESSION 1: FORENSIC ANTHROPOLOGY

The Relation between Standard Error of the Estimate and Sample Size of Histomorphometric Ageing Methods

Hennig C and D Cooper.

Session 1: Forensic Anthropology; October-28 at 9:00 AM

Histomorphometric ageing methods report varying degrees of precision (measured through standard error of the estimate or SEE). These techniques have often been developed on variable samples sizes (n) and the impact of this parameter on SEE is poorly understood. This paper explores the relationship between n and reported SEE through a review of the literature (abstracts, articles, book chapters, theses, and dissertations) and a mathematical simulation. Thirty-eight studies reporting n and SEE in years were included in the current study. Reported SEE values were highly variable ranging from 2.58 to 16.00 years (Mean: 8.51; Stdev: 3.56). To examine the probabilistic relationship between n and SEE we generated a simulated population of 50,000 individuals where histomorphometric 'ages' were assumed to reflect normally distributed random error about chronological age. SEE values were calculated for randomly selected subsamples of varying size. This simulation revealed that in large samples (>100) SEE converges on the level of variation present in the population; however, in smaller samples SEE becomes increasingly variable. In general, this pattern matched the observed pattern of published SEE values. While numerous sources of variation exist between different methods, the impact of insufficient sample size should not be overlooked. Notably, while SEE values as low as 2.58 years have been reported, studies which exceed 150 individuals report a mean SEE value of 11.05 years (Stdev: 1.91). Meaningful comparison of the precision of different approaches requires larger samples than are frequently used and would ideally be based upon standardized samples.

You are what you do....or are you? Using musculoskeletal stress markers in personal identification through correlations with occupation type.

Cahn J.

Session 1: Forensic Anthropology; October-28 at 9:15 AM

Victim identification through skeletal remains is a primary goal among forensic anthropologists. According to the United States Federal Bureau of Investigation, 86% of victims know their killer; therefore the identification of the victim may facilitate the apprehension of the assailant, as well as bring closure to grieving families. Determining the occupation of the deceased would assist in identification by narrowing the pool of potential matches from missing persons databases. Habitual, occupational and recreational activities of an individual during life have been shown to cause morphological changes in bone. A specific class of changes, musculoskeletal stress markers (MSMs) was analyzed in order to investigate for any correlation between MSM expression and occupation type. It was hypothesized that MSM expression would show a positive correlation with the degree of physical activity of an occupation. Five muscle insertion sites of the upper arm were scored for MSM expression according to the Hawkey and Merbs method, on a sample of individuals of known occupation from the Luís Lopes skeletal collection housed at the Natural History Museum in Lisbon, Portugal. Occupation type did not show any correlation with MSM expression magnitude. There was a lack of consistent difference between the bone morphology of the two occupation types tested (physically strenuous and non-strenuous). Although anecdotal relationships persist in the literature, predicting occupation type from MSM expression patterns lacks the accuracy and precision required for use and admissibility in a forensic context. Variables such as body size, age, and handedness complicate the occupation determination process.

Geographic variation of stable isotopes in the tissues of western Canadians

Engel N.

Session 1: Forensic Anthropology; October-28 at 9:30 AM

Stable isotope analysis of forensically significant human remains is a relatively new addition to the methods used for forensic identification. Current research in this area seeks to establish baseline data for populations worldwide and to observe any useful geographic trends. The aim of this study is to examine the viability of stable isotope analysis to determine geographic origin of human remains in western



Canada. This is achieved through stable carbon, nitrogen, sulfur and strontium isotope analysis of hair, nail and teeth of people living in Chilliwack, British Columbia and Calgary, Alberta. Intra-population variation is examined to understand the baseline for each location. Dietary differences (i.e. amount of animal protein) account for most of the variation within populations. Inter-population differences may be due to dietary differences between regions, perhaps reflecting different sources of food and water between the study locations. Discriminant functions are developed that successfully classify 84.3% of participants using the original sample and 79.5% using a cross-validation sample. The success of these functions demonstrates the potential of this identification technique in western Canada and supports the presence of regional variation despite a tendency towards a globally homogenized diet. The isotope ratios obtained in this study will contribute to the utility of stable isotope analysis in forensic investigations by providing the foundation of a reference database for comparison with human samples of unknown geographic origin. Such 'like-to-like' comparisons are preferable to comparisons with geological or climatological proxy data as the isotopic relationships among such samples are often very complex.

Who is John Doe? : An unconventional method of two dimensional facial approximation as a possible answer to one of Canada's most enduring mysteries.

Lywood V.

Session 1: Forensic Anthropology; October-28 at 9:45 AM

Blind study of an unidentified cranium circa 1900 -1920. Two dimensional (2d) facial approximation, drawing facial features over a photograph of the skull, has been used for decades to approximate the appearance of the unknown individual as he appeared in life for the purpose of generating new leads to the discovery of identity. An unconventional method of 2d facial approximation is used here to reconstruct the appearance of the subject in life for comparison with life photos. Drawings reveal likeness to subject photo and cranial anomalies depicted show morphological details in life photos and offer a possible answer to one of Canada's most enduring mysteries. This method of reconstruction using minimal but vital craniofacial landmarks can be utilized as a method to revisit cold cases or depict historic faces when only photos of the skull exist and the skeletal remains are no longer available.

SESSION 2: PRIMATOLOGY

Establishing the Southwestern Limits in the Geographic Distributions of *Eulemur coronatus* and *E. sanfordi*

Colquhoun I.

Session 2: Primatology; October-28 at 10:30 AM

There is little doubt among primate biologists that nonhuman primate populations are in decline in almost all regions where they are found. While this clearly raises conservation concerns, the conservation of nonhuman primate populations is hampered by a lack of definitive information regarding the precise geographic distributions of species of concern. The situation is particularly acute in Madagascar, where the endemic lemuriform primates have very restricted (but incompletely known) geographic distributions. Fieldwork in 2008 and 2010 at, and around, the KOFAMA community-protected conservation area south of Ankarana National Park led to some clarification on this count. Fieldwork conducted in 2008 established that the southwestern biogeographic limit of the crowned lemur (*Eulemur coronatus*) must likely be the right (north) bank of the Mahavavy Nord River – crowned lemurs were heard and observed on the massif immediately north of the Mahavavy Nord River; no suitable habitat for lemurs existed on the south side of the river. In 2010, a concerted effort was made to find the southwestern extent of Sanford's brown lemur (*E. sanfordi*). It had not been observed at KOFAMA in 2008, although local people did report its recent presence. During a survey north of the KOFAMA site, vocalizations attributable to *E. sanfordi* were heard. This site was outside Ankarana National Park, but north of where crowned lemurs occur. Thus, both these lemurid species occur to the southwest of Ankarana National Park, but the area of occupation of *E. sanfordi* is presently more closely tied to the large protected area of Ankarana National Park.



The effect of infant age on male infant attraction, tolerance and handling in black-handed spider monkeys (*Ateles geoffroyi*)

Evans KJE, Hartwell KS, Pavelka MS, and H Notman.

Session 2: Primatology; October-28 at 10:45 AM

Typically other females are most interested in infants, however in black handed spider monkeys (*A. geoffroyi*) males have been observed to engage in infant handling, even though infants younger than 6 months of age spend most of their time either on or in close proximity to the mother. We examine whether the age and sex of the infant affects male infant attraction, tolerance and handling in *A. geoffroyi*. All occurrence data was collected from January 2007 to July 2010 on a community of 35 wild spider monkeys at Runaway Creek Nature Reserve, Belize. During 884 hours of observation, 102 infant handling bouts, 12 infant handling attempts, and 27 infant tolerance bouts were recorded. Large juvenile, sub-adult and adult males handled infants the most [N=76, 75% of all bouts]. Male infants were handled more often than female infants [Pearson $\chi^2=5.263$, $df=1$, $p<0.05$] and younger infants were handled more often than older infants [Pearson $\chi^2=3.853$, $df=1$, $p<0.05$]. At less than 6 months male and female infants were handled equally, but at greater than 6 months male infants were handled significantly more often [Pearson $\chi^2=12.448$, $df=1$, $p<0.01$]. Overall, infants appear to be more attractive to males when they are younger and the continued interaction with male infants more than 6 months may be related to the strong bonds among closely related adult males that characterize spider monkey society. This may reflect kinship-based affiliation or bond formation.

DNA barcoding and Next-Generation Sequencing of a Capuchin Fecal Sample to Identify Insects in the Diet

Mosdossy K, Fedigan L and M Hajibabaei.

Session 2: Primatology; October-28 at 11:00 AM

White-faced capuchins are omnivorous, allocating 50% of their foraging time to insect consumption. It is nearly impossible for field observers to identify each insect species consumed by the capuchins. This problem has been resolved in other mammal research by using the DNA barcoding method and single-species samples. Now next-generation sequencing can identify multiple species in homogenates or fecal samples. We conducted a pilot study to evaluate the accuracy and applicability of this process to the identification of insect species found in a capuchin fecal sample. Fecal samples were collected between September and December 2009 from four habituated capuchin groups in Sector Santa Rosa (SSR) in the Area Conservación Guanacaste (ACG), a Costa Rican tropical dry forest. One fecal sample was analyzed in this pilot study using the conserved mitochondrial gene, cytochrome c oxidase 1. Lepidoptera were the most abundant insect species identified in the fecal sample, and smaller samples of Hemiptera and Diptera were also identified to the species level. Some unidentifiable arthropods and protists were sequenced and few sequences were unidentified. A large portion of the homogenate proved to be capuchin, however, a primate block was installed via primate primers. We conclude that next-generation sequencing is an appropriate tool to identify otherwise unidentifiable insect species consumed by capuchins. Further research will analyze insect nutrition, improve primate sequence blocking and increase the ACG insect species library. This is the first study to examine the insect content of the capuchin diet via genetic, species-level identification.

Infant Development and Suckling Patterns in *Colobus vellerosus*

MacDonald LJ and P Sicotte.

Session 2: Primatology; October-28 at 11:15 AM

Infancy is a sensitive period of development spanning from birth to weaning. Lactation in *Colobus vellerosus* typically surpasses twelve months, however the exact age at which infants are weaned is unknown. The overall goal of this study was to acquire preliminary data on the life stage of infancy by documenting infant development from birth to weaning. Since suckling patterns have been shown to influence lactation and weaning age, I examined whether nursing behavior varied with age. Data on 24 infants were collected ad libitum and focal animal sampling from May-November 2008 at Boabeng-Fiema Monkey Sanctuary, West Africa. Suckling patterns were determined using three measures: ventral contact, on nipple and actual suckling. Actual suckling data was obtained using a spotting scope (20-60x). Over 189 h of focal data were analyzed by age/coat color (white, grey, black and white). Results for

white and grey infants showed little variation in suckling patterns during early development. Black and white infants nursed more frequently and for longer durations than white and grey infants. Similarly, average rate of nipple contacts/bout was highest when infants were black and white, thereby increasing with infant age. Interruptions during nursing bouts were initiated predominantly by infants (84%). Mothers did not interrupt actual suckling, regardless of infant age. Milk transfer appears to occur at an average rate of 2:1 (2 jaw movements/sec). Cessation of nursing was documented for four infants (range: 60-83wk). Further documentation of nursing behavior in this population will allow us to confirm weaning age in this species.

Hair Lead Concentrations in *Macaca Fascicularis* from Singapore

Schillaci M, Lee B, Castellini JM, Reid M and T O'Hara.

Session 2: Primatology; October-28 at 11:30 AM

Nonhuman primates are excellent sentinels of environmental toxicants because they share a similar physiology and life history with humans. The purpose of this report is to present the results of an analysis of lead concentrations in hair from macaque monkeys in Singapore. The results of laboratory analysis indicate a comparatively low level of environmental exposure to lead in monkeys, suggesting the threat to human public health may be minimal. Hair lead concentrations varied both within social groups and by geographic location, with the highest concentrations observed in monkeys residing within an area containing a small-arms firing range and a manufacturing facility. Although lead exposure in this area appears to be relatively low, additional monitoring and possible remediation may be warranted. Our study is important to anthropology because it is among the first to illustrate how primates can serve as effective sentinels of environmental toxicants such as lead.

SESSION 3: HUMAN HEALTH AND DISEASE: PAST AND PRESENT

Bilateral Asymmetry of the Humerus Throughout Growth and Development

Blackburn A.

Session 3a: Human Health and Disease, Past and Present; October-28 at 1:30 PM

One of the most distinctive characteristics of humans is our population-level preference for right-handedness. It is well established that the majority of humans are right-handed, meaning they use their right hand for most one-handed tasks. However, the process through which handedness develops in children remains somewhat unclear, with many children exhibiting a preference for the left hand early in life. Even less clear is how hand preference is reflected in the bones of non-adults. This paper investigates morphological variation and bilateral asymmetry of the humerus in past human populations for evidence of the development of hand preference in childhood. A large skeletal sample of non-adults from British archaeological sites was examined in order to detect when handedness appears in the human skeleton. Traditional measurements were combined with 3D data in order to provide a comprehensive picture of bilateral asymmetry. Results of this work indicate a striking trend from symmetry/ left-handedness to right-handedness during growth and development. Interestingly, this trend is consistent with what has been observed behaviourally in children, suggesting that biomechanical forces strongly influence bilateral asymmetry in the upper limb bones.

Immunogenetic Variation in Manitoba Aboriginal Populations: Preliminary Analyses

Decter K.

Session 3a: Human Health and Disease, Past and Present; October-28 at 1:45 PM

This study investigates the extent of immunogenetic variability in Manitoba's Aboriginal groups and explores how genetics, and the unique cultural histories, may contribute to differential disease resistance and/or susceptibility. Interleukin-12 (IL-12) is analyzed due to its role as a pro-inflammatory cytokine that modulates the adaptive immune response by favouring the generation of a Th-1 (cell-mediated) over a Th-2 (humoral) immune response. The lower production of the IL-12p40 subunit has been previously associated with a suppressed ability to generate the Th-1 immune response, a response that is optimized to eradicate invading *M. tuberculosis*. A total of 313 samples from three aboriginal communities were included, representing the Dene, Cree and Ojibwa/Saulteaux people of Manitoba as well as a Caucasian population. Blood and buccal samples were taken from non related individuals to be evaluated through



PCR and RFLP methods. At exon 8 3'-untranslated region there is a SNP (A-C) at position 16974, the preliminary results show that the aboriginal populations have a higher frequency of C alleles at 16974, which is associated with a lower production of the IL-12p40 subunit, than the Caucasian cohort. The Dene have the highest frequency of C alleles, followed by the Cree, followed by the Ojibwa/Saulteaux, who approach the A allele favouring frequency of the Caucasian cohort. These results have identified genetic variations in key immunological pathways between Aboriginal and Caucasian groups as well as within the Aboriginal cohorts. The unique cultural histories of these people have likely influenced their immunogenetic profiles, which may contribute to differential disease susceptibility.

A Health Advantaged Population and Community Resilience: The Jews of Gibraltar

Tripp L and L Sawchuk.

Session 3a: Human Health and Disease, Past and Present; October-28 at 2:00 PM

The nature of the Jewish health advantage was evaluated by comparing life expectancy among the Gibraltarian nineteenth century Jewish population, co-residing Roman Catholics and Roman Catholics that lived only with Roman Catholics. The period life table and decomposition method were conducted to compare life expectancy between the Jews and Roman Catholics. The second stage of research examined the mortality differentials at the residential level and during different states of ecological stress: high ecological stress (HES) and low ecological stress (LES). The Jewish population experienced a survivorship advantage relative to the Roman Catholics (6.2 year difference); where the under-5 years of age bands and the 35-44 year interval contributed the most to the disparity in life expectancy. The diarrheal complex was the cause of death that contributed most to this disparity (51%). During times of LES, a 7.5 year difference was observed between the Jews and the Roman Catholics that lived by themselves. During times of HES, the life expectancy of the Jewish community remained stable whereas the Roman Catholics suffered a marked depreciation in life expectancy; the Jews on average lived 11-12 years longer than the Roman Catholics. We conclude that the health disparities observed among the populations were attributed to economics and its interaction with water security, domestic hygiene and social capital. The Roman Catholics that co-resided with the Jews appear to have benefited from the Jewish lifestyle. Furthermore, health disparities at the population level appear to be ecologically contingent, in that during times of HES the Jews displayed enhance community resilience compared to the Roman Catholics.

The media representation of the term "pandemic" during the 2009 H1N1 pandemic.

Stoops M.

Session 3a: Human Health and Disease, Past and Present; October-28 at 2:15 PM

In April 2009, a novel strain of influenza A/H1N1 was identified in North America. The virus quickly spread, leading to the declaration of a pandemic in June 2009 until August 2010 by the WHO. Despite meeting the official criteria, which is based on geographic spread, there has been widespread criticism that H1N1 was not a "real pandemic" since it was relatively mild. The media is one source blamed for linking a pandemic with increased severity. This study examines the media representation of the pandemic which differs from the official definition. The results are preliminary findings of a case study of the epidemic narrative in the local and national newspapers distributed in Saskatoon, SK. Based on social representation theory, representations for new events are developed through the process of "anchoring" to known historical events, metaphors, and symbols. The "anchors" that are used help to define the new phenomenon, in this case the influenza pandemic, and may distort the perception based on what is emphasized or omitted. During the outbreak, the severity was the defining feature for comparisons between previous flu pandemics and seasonal flu. The 1918 Spanish flu was used as the standard example for pandemics. Overemphasize on the number of deaths gave the false impression that pandemics always result in high mortality rates. H1N1 was also compared and contrasted to seasonal influenza which caused confusion over the difference between seasonal flu and pandemic flu. The comparisons that are used can affect the perception and expectations for a disease outbreak.



Deadly Occupations Examining Historical Demographic and Epidemiologic Patterns in Two Canadian Single Industry Communities

Ludlow N.

Session 3a: Human Health and Disease, Past and Present; October-28 at 2:30 PM

This research is a comprehensive study of Canadian occupational health in the past using a demographic and epidemiological model. Working age males (15-64 years of age) from two single-industry communities (Sydney & Glace Bay) were chosen to examine how occupation affected mortality patterns during the Canadian industrial era (turn of the 20th century). Archival death registry data and census data was collected for the study period (1909-1917) and used in the analyses. Major demographic findings reflected patterns associated with company town structure. Key mortality patterns revealed that tuberculosis and accidents significantly impacted a number of variables like: occupation, age at death, place of birth, and place of residence. This research exposed the affects of occupation in causing health insults for a specific cohort, in turn reflecting the importance of occupation as a factor in heightening morbidity and mortality in a population. Biological anthropologists working in archival research have produced a large body of work, which this study adds to by examining the impact of occupation on human historical health patterns. Occupation, being a fundamental part of the human experience, crosses many sub-disciplinary boundaries in anthropological research from skeletal morphology to socio-cultural/political organization. The research presented here encapsulates the experience of miners and steel workers at a point in time where insults to health were a part of daily life. By adding to current anthropological literature, this research hopes to increase the understanding and importance of occupation when examining demographic and epidemiological population trends whether current, historic, or in antiquity.

No Shelter from the Storm: housing and tuberculosis in Lac Brochet

Larcombe L, Singer M, Orr P and P Nickerson

Session 3b: Human Health and Disease, Past and Present; October-28 at 3:15 PM

Researchers from the University of Manitoba have partnered with Northlands Denesuline First Nation to investigate the genetic, social and environmental conditions that are risk factors for tuberculosis infection and disease. At the request of the Chief and Council we undertook a detailed housing assessment that involved the collection of qualitative and quantitative data about the conditions of the housing stock in the community. This 10 minute video was developed at the community's request to visually present the shocking housing conditions and to express their concerns, in their own words, about the impact on health. The results of the housing study have been used by the Chief and Council for advocacy and education at numerous meetings locally, provincially and nationally and the researchers have been called upon to support advocacy and educate on their behalf.

From knowledge to practice: infant feeding and vitamin D supplementation among Canadian-born and New Canadian mothers and children in Hamilton, Ontario and Calgary, Alberta

Chadwick S, Amarra S, Moffat T and W Wilson.

Session 3b: Human Health and Disease, Past and Present; October-28 at 3:30 PM

This research investigates whether New Canadian mothers and their children may be more vulnerable to vitamin D deficiency compared to their Canadian-born counterparts. We explored mothers' knowledge, practice and beliefs about vitamin D supplementation. Focus groups composed of either New Canadian or Canadian-born mothers were held with 37 mothers, recruited through the Ontario Early Years Centres in Hamilton and 35 mothers, recruited through the Refugee Health Clinic and the Alberta Network of Immigrant Women in Calgary. Almost all of the mothers supplemented their breastfeeding infants with vitamin D, though in practice supplementation was not always daily or easy. Knowledge of vitamin D varied; most mothers understood the basic role of vitamin D in bone health, but there was some confusion about synthesis from sunlight and dietary sources. With the exception of the Sudanese refugees, all mothers took a prenatal multi-vitamin during pregnancy; however, only a few Canadian-born mothers supplemented with additional vitamin D during pregnancy, despite current thinking that even 1000 IU of vitamin D daily supplementation for pregnant women may not be sufficient for mother and fetus. For New Canadian mothers, husbands and grandmothers are key players in their social support network and should be included in health messaging. The most consistent source of vitamin D



information is mothers' support groups, an important access point for health and parenting resources. Though these mothers are quite health literate, there still remains some confusion about vitamin D nutrition. Parents require more detailed information and clear prenatal and age-based recommendations for supplementation.

The Relationship between sitting height and body mass index in Canadian Inuit: results from the 2007-8 Inuit Health Survey

Galloway T, Chateau-Degat ML, Egeland GM and K Younk.

Session 3b: Human Health and Disease, Past and Present; October-28 at 3:45 PM

High sitting height ratio (sitting height/height [SHR]) is a characteristic commonly associated with Inuit morphology. Since the 1870s, in both narrative and anthropometric sources from across the circumpolar world, Inuit are described as having shorter leg lengths and higher trunk-to-stature proportions than European populations. The phenomenon of high SHR is thought to be associated in some way with the limited metabolic changes observed in obese Canadian and Greenland Inuit. It may be that cutoffs for obesity derived from European populations do not adequately describe thresholds of risk among Inuit. The present study presents Inuit stature and obesity data and investigates the relationship between SHR and body mass index (BMI). Subjects are 2168 individuals (837 males and 1331 females) from 36 Inuit communities in the Canadian Arctic. We use multiple regression to examine the extent to which age, sex, height, sitting height and SHR influence BMI. We then evaluate the efficacy of the relative sitting height adjustment as a method of correcting observed BMI to a standardized SHR reflective of the European populations from which BMI cutoffs are derived. The results of stature analysis reveal Inuit adults exhibit standing heights 6-9 cm lower than that observed in the general Canadian population. Mean BMI is significantly higher than among non-Inuit Canadians and obesity prevalence is extremely high, particularly among Inuit women. In the regression (adjusted $R^2=.090$) only age (Beta standardized=.213, $p=.000$) and sex (Beta standardized=.280, $p=.000$) are significant predictors of BMI. Contrary to observations in non-Inuit subjects, we find no consistent relationship between SHR and BMI. There is substantial agreement between overweight and obesity prevalence values using observed and corrected BMI. However sitting height correction did result in the classification of lower numbers of individuals in the overweight and obese categories and greater numbers of individuals in the underweight category, a finding that has implications for health screening. The distribution of SHR in this population is quite broad and mean SHR is consistent with values in the US population. Results suggest the unique anthropometric and metabolic profile observed in Inuit arises from factors not yet delineated, among them unique patterns of fat and lean mass and tissue density arising from physiologic and dietary adaptations. The present study underscores the need for imaging studies in Inuit.

Secular trends in growth among adult Makushi Amerindians of Guyana

Wilson WM, Bulkan J, Piperata B and K Hicks.

Session 3b: Human Health and Disease, Past and Present; October-28 at 4:00 PM

Background: The mean height of adults in a population reflects the social, economic and political conditions under which those people live. Hence, a study of age related trends in adult body size have the potential to enhance our understanding of how the conditions experienced by a population have changed over time. There are, however, very few such studies for indigenous peoples of South America's lowland tropics. Aim: The purpose of this study is to analyze cross-sectional anthropometric data from Makushi adults born between 1920 and 1980. Subjects and methods: Dependent variables include height, BMI, and Cormic index for 230 females and 112 males, 20-90 years of age. The independent variable is the year of birth. Makushi data are compared with those of other indigenous peoples of South America's lowland tropics, international growth references, and data collected for the Makushi in 1921. Pearson's correlation is used to assess the potential relationship between year of birth and height, BMI, and Cormic index. The Wilcoxon signed-rank test was used to compare Makushi height in 1921 and 2000-2001. Results: The mean height of Makushi adults was largely consistent with other indigenous populations of South America's lowland tropics. A secular trend is evident in both Makushi height and Cormic index. Stratified by year of birth, height has increased and Cormic index decreased between 1920-1980. Conclusion: The observed secular trends between 1920-1980 may be due to public health measures initiated by the British colonial authorities and, possibly, genetic admixture. Funding: Wenner-Gren Foundation (WMW), U. Calgary (WMW).



SESSION 4: SKELETAL BIOLOGY AND BIOARCHEOLOGY

The influence of body size on adult age estimation in small-bodied skeletons.

Merritt, C.

Session 4a: Skeletal Biology and Bioarcheology; October-29 at 9:00 AM

Introduction: Estimating adult skeletal age-at-death is important to reconstruction of accurate life histories and demographic profiles. The most reliable and frequently used methods are based on changes to pelvic morphology, an area subject to loads that vary with body weight; however, the influence of body dimensions and mass on skeletal aging remains undetermined. This study assessed weight-bearing and non-weight-bearing skeletal surfaces of an archaeologically derived collection. Methods: Eight age estimation methods were applied to 64 Later Stone Age (LSA) southern African Holocene hunter-gatherers with an average stature and mass of 152cm and 45kg to assess patterns of age estimation within and between individuals. The pubic symphysis, auricular surface, and acetabulum represented the weight-bearing joints; the first and fourth ribs represented the non-weight-bearing sites. Results: Ranked non-parametric tests show that DiGangi et al.'s first rib age method consistently yields the youngest ages, while Buckberry and Chamberlain's auricular surface method consistently generates the oldest ages. When combined, the rib age methods consistently rank youngest, the auricular surface oldest, with the pubic symphysis and acetabulum in the middle. The range between the youngest and oldest ranks within individuals is generally greater than 15 years. Conclusion: Analysis of small-bodied skeletons suggests that there are different age-related patterns among weight-bearing and non-weight-bearing joints. Among the sites tested, the auricular surface, which supports most of the weight-load during life, shows the oldest ages, despite the low body mass of this sample. Work is underway to expand the study to include large-bodied skeletons with known at-death ages and weights.

Growth of a Canadian Inuit Population

Holland E.

Session 4a: Skeletal Biology and Bioarcheology; October-29 at 9:15 AM

Long bone growth is considered the single best indicator of an individual's health and nutritional status. As a result subadult long bones are useful tools to compare the growth between different populations either across time periods or geographical regions. The purpose of this research was to establish the growth profile of the Sadlermiut, a Canadian Inuit population from Southampton Island, Nunavut, to understand their health as a group and in comparison to other populations. Age was assessed using dental development and eruption for all individuals less than 20 years of age. Diaphyseal lengths of all six long bones were determined and mean bone lengths for age groups established. Mean long bone lengths were compared to the Arikara, a Californian Amerindian population, an Eskimo population, the Aleut from Alaska and a modern population of European descent. The results indicate a high prevalence of infant mortality among the Sadlermiut. The growth of the Sadlermiut was comparable to that of the Eskimo and Aleut from Alaska, yet less than that of modern children of European descent and other Aboriginal archaeological populations from North America. An understanding of the health and growth of this extinct Inuit group aids in developing a more accurate picture of their lives.

An Oxygen Isotopic Examination of Moche Sociopolitical Complexity Using Residential Histories of the Huacas de Moche People

Toyne JM, White CD, Verano JW, Uceda S, Hewitt B and FJ Longstaffe.

Session 4a: Skeletal Biology and Bioarcheology; October-29 at 9:30 AM

In this paper we use phosphate oxygen-isotope compositions to reconstruct the residential histories of Moche individuals interred in residential, tomb and sacrificial contexts from the prehispanic Peruvian site of Huacas de Moche. These data are used to address issues regarding Moche (AD 100-700) state formation by understanding urban population dynamics and community interaction on the Andean coast. During the rise of the Moche state densely populated, urban centers with monumental architecture were created. Their distribution and material culture have led to debate over the nature of the Moche state, i.e. did it develop into a single, centralized state, was it divided into northern and southern realms, or was it a coalition of autonomous valley-based polities? We reconstruct the relocation history of 34 individuals by comparing $\delta^{18}O$ values of enamel (formed during childhood) and bone



(continuously remodels), using the δ 18O values of local water sources as a baseline for their interpretation. There are no significant differences between bone and tooth δ 18O values in individuals from either residential compounds or platform mound tombs. In addition the δ 18O values of residential and tomb groups are the same as local water estimates, which confirms the existence of a local elite. One sacrificial group (Platform 3C) appears to be completely local but another (Platform 3A) appears to be comprised of individuals who grew up locally but spent a significant part of their lives elsewhere together before returning to become ritual offerings.

Quantitative analysis of enamel development across a dentition

Harrington L.

Session 4a: Skeletal Biology and Bioarcheology; October-29 at 9:45 AM

This paper demonstrates a new technique for visualising surface features of enamel. Infinite focus microscopy was used to quantify perikymata counts and spacing across multiple teeth from a single dentition of archaeological origin. Three-dimensional models of tooth surfaces were created, and surface roughness analysis software was used to identify perikymata. Perikyma groove depth and spacing were measured, allowing enamel defects to be quantitatively identified and matched across teeth within the dentition. This technique is an application of engineering surface metrology that offers improvements over SEM and other existing microscopy techniques for visualising tooth surfaces. Relatively quick and non-destructive techniques for studying enamel development offer the potential for expanding our understanding of variation in crown formation times across human populations. Enamel defects can be visualised in three-dimensions and measured in relation to normal enamel development within the tooth, or as episodes observable in multiple teeth. The developmental history for the enamel of one individual is presented here as a case study highlighting the bioarchaeological and ontogenetic significance of this approach when expanded to larger samples.

Modeling-remodeling comparisons in bones of the human hand

Drapeau M, Raguin É, Lazenby RA and MA Streeter.

Session 4b: Skeletal Biology and Bioarcheology; October-29 at 10:30 AM

It has been proposed that intracortical remodeling is a mechanism to repair microfractures, which naturally occur in loaded bones. This preliminary study tests the hypothesis that bones incurring greater loads will also be characterized by increased remodeling. We compare macroscopic and microscopic variables of the right and left second metacarpals of a human archaeological sample (n=32) from the 19th century St. Thomas cemetery, Belleville, Ontario. For each bone section, the osteon population density (OPD) was measured on the anterior, posterior, lateral and medial quadrants. The maximum and minimum second moment of area (I_{max} and I_{min}), moments about the anteroposterior and mediolateral axes (I_{ap} and I_{ml}) and the polar moment of inertia (J) were measured. Results for right and left bones are compared with paired t-tests. Relations between macro- and microscopic values are evaluated by first calculating percent right-left differences for all variables and then performing linear regressions. Right-left comparisons of macroscopic variables (I and J) are all significant, with the right side always being larger. However, right-left comparisons of OPD are not significant, except for the anterior quadrant that has greater OPD on the right side in females. All regressions between macroscopic variables and OPD are non-significant. These results suggest that metacarpals from the right hand incur greater loads than those of the left hand. However, against expectations, the greater load experienced by the right hand does not correlate with greater bone remodeling on that side. Caution is advised when using remodeling as an indicator of loading history.



Biofilm Growth in a Human Skeletal Collection from Bronze Age Syria

Pitre M, Mayne Correia P, Mankowski PJ, Klassen J, Day MJ, Lovell NC and RS Currah.

Session 4b: Skeletal Biology and Bioarcheology; October-29 at 10:45 AM

Investigators have long recognised the effects of microbial activity on archaeological bone. These investigators, however, have focused on single or groups of microbes rather than on complex microbial aggregates such as biofilms, a focus that has affected curatorial policies. In this paper, we report on the investigation of a biofilm in archaeological human bone from the site of Tell Leilan, Syria. Based on scanning electron microscopy, the results indicate that the biofilm is characterised by single cells and microcolonies of bacterial and fungal structures, as well as calcite crystals, all of which are embedded within extracellular polymeric substances. Using culture techniques and DNA sequencing, we isolated and identified several microbes from the biofilm including *Amycolatopsis* sp and *Penicillium chrysogenum*, along with species of *Aspergillus*, *Chaetomium*, and *Cladosporium*. This improved understanding of the biodeterioration of the bone from Tell Leilan allows us now to focus on conservation protocols designed to limit such microbial growth in human skeletal collections in the future.

Challenging Museum Standards for Skeletal Material

Mayne Correia P and MC Pitre.

Session 4b: Skeletal Biology and Bioarcheology; October-29 at 11:00 AM

Numerous publications are available that discuss best museum practices. This literature discusses the criteria for care and storage of the wide variety of items commonly held in museums – from insects to textiles and meteorites to marbles. Museum personnel dutifully adhere to these guidelines and practices with the intent to protect their collections from destruction. In this paper, we challenge the belief that the existing guidelines are effective in protecting skeletal collections from microbial destruction. Several researchers have identified fungal and bacterial growth within archaeological bone, but it is generally assumed that the damage occurred while buried, prior to excavation. Our ongoing research has highlighted the complexity of the microbial communities living within the bones and identified the problem of continued microbial activity in bones while in storage. We suggest that it is time to take a critical look at current practices associated with the storage of skeletal remains. Given the thousands of skeletal remains (both human and non-human) currently stored in our institutions, the threat from microbial destruction is very serious. We would suggest that, whereas conservators have identified this microbial destruction as a significant problem in the protection monuments and stone works stored outside, this problem is equally significant to the storage of skeletal collections. Although museum personnel acknowledge that it is crucial to collect and store skeletal remains using best conservation practices, in this paper we suggest that there is insufficient evidence to assess the success of current practices.

The Vampires of Drawsko: A Bioarchaeological look at the Undead

Scott A, and T Betsinger.

Session 4b: Skeletal Biology and Bioarcheology; October-29 at 11:15 AM

“Nosferatu,” “strigoi,” “nocturnus,” and “night stalker” are all colloquial terms for arguably, the most notorious mythical creature depicted throughout history: the vampire. Vampires and vampirism have an extended history in many cultures throughout the world and are still represented in contemporary society in a variety of media outlets. Recent archaeological work at the Drawsko 1 cemetery site in north western Poland suggests that the fear of vampires and vampirism were a reality during the late 17th and early 18th century. Based on historical and ethnographic records, it is known that the village of Drawsko experienced at least one cholera epidemic. Recent excavations of a possible epidemic cemetery reveal that anti-vampirism measures were part of burial practices, and specific individuals were interred as vampires, as a likely means to protect the village members from harm. Utilizing skeletal data, historical records, and archaeological data, we argue that four individuals, in particular, illustrate cases of ‘vampire graves.’ Additionally, we suggest that such notions of vampirism and the use of anti-vampirism practices by this population is likely the result of the cholera epidemic(s). While this study is preliminary, its purpose is to explore the bioarchaeological evidence of vampirism and the possibility of correlating this type of burial practice to dramatic health shifts within a population.



Burial Practices and Identity in the Roman-period at Sodo, Italy

Jessup E.

Session 4c: Skeletal Biology and Bioarcheology; October-29 at 1:30 PM

The Etruscan funerary tumuli at Sodo, Italy were constructed near the beginning of the sixth century BCE and served both as tombs for burying the dead and as visible reminders of the rigid local social structure. The fourth and third centuries BC saw re-use of these tumuli by the subsequent generations of elite principes. In recent decades, this Etruscan complex has yielded human remains that date to the late-Republican and early-Imperial Roman periods. Unlike the earlier burials, the Roman-period inhumations are associated with meagre grave goods and are not located within the burial chambers, but rather around the outside of the tumuli and the tombs-proper. Consideration of the progression of Roman conquest of Etruria and a comparison of Etruscan and Roman burial practices provide clues to the identity of these individuals. Specifically, the matter of Etruscan descent or Roman immigration is focused on and its implications for understanding the purpose of this funerary association is explored. Preliminary skeletal data will also be presented.

The prehistoric sites of Staxton Beacon and Melton on the Yorkshire Wolds, England.

Whitaker K.

Session 4c: Skeletal Biology and Bioarcheology; October-29 at 1:45 PM

The Yorkshire Wolds have had much archaeological and antiquarian interest over the past two centuries and currently two prehistoric sites are under investigation, Staxton Beacon and Melton. Staxton Beacon, located in the north-eastern Wolds, was excavated by Terry Manby in 1958-9 and skeletal remains belonging to people from the Bronze Age as well as partially burnt wooden structures were uncovered. Melton was more recently opened during a rescue excavation by On Site Archaeology (2004-5) in advance of a proposed road extension scheme. They found prehistoric skeletal remains spanning the Late Bronze Age to Late Iron Age along with round houses, a linear cemetery and two square barrows. Skeletal analyses were carried out at the University of York, while additional work, specifically stable isotope analysis was conducted at Vrije University in Amsterdam, through the Europlanet Research Infrastructure grant. This has allowed for a multi-faceted assessment to uncover the evidence of life histories and daily life through demographic profiles, paleopathology, non-metric traits and stable isotope analysis of these prehistoric peoples. The research aims include exploring the local versus non-local members of each site and their possible association or separation from the rest of the population through differing burial practices, pathologies and traumas and even diet. This snapshot of two sites on the Yorkshire Wolds is a detailed aspect of the doctoral thesis exploring multiple sites and time periods pertaining to our understanding of prehistoric continuity and change in the English region of East Yorkshire and how that relates to wider British prehistory.

Insights into the investigation of Late Bronze Age populations in Transylvania

Gloux S and A Gonciar.

Session 4c: Skeletal Biology and Bioarcheology; October-29 at 2:00 PM

Archaeology is well developed in Eastern Europe and helps acquire relevant information to better understanding the ways past populations lived and expanded throughout the European continent. While, in Romania, archaeology has done much in that sense, physical anthropology has been disregarded or limited to basic identification of sex and age. The ArchaeoTek osteology workshop program is part of a wider project focusing on the study of Late Bronze Age populations from the Noua-Sabatinovka-Coslogeni Complex (NSCC). This project focuses on the Transylvanian component of the Noua Culture. In this area, the Noua civilization is known mostly from the study of cemeteries. As a result, the Noua population is structurally invisible due to the absence of data regarding settlement, spatial organization and social structure. The study of the Noua graves has been done almost exclusively from an archaeological perspective. The scope of the project is to investigate a sample of the Noua population in terms of advanced morphology, DNA and stable isotope studies. The goal is to achieve a better understanding of these populations by examining who they were, where they were coming from, how they lived, and their geographic and cultural radiation. The osteological material being studied (135 individuals) is stored at the National Museum of History of Transylvania (MNIT) in Cluj-Napoca. The purpose of this paper is to present preliminary results from a 2 months investigation of 40 individuals. In

regards to the first set of analysis, the preliminary conclusions are encouraging and highly promising for the future of this project.

Factors Affecting the Incidence of Septal Aperture in Two Neolithic Hunter-Gatherer Populations of the Cis-Baikal, Siberia

Macintosh A.

Session 4c: Skeletal Biology and Bioarcheology; October-29 at 2:15 PM

Sixty-six postcranial non-metric skeletal traits were documented in two Cis-Baikal populations, the early Neolithic (6800-4900 BC) Kitoi culture and the late Neolithic-early Bronze Age (4200-1700 BC) Isakovo-Serovo-Glazkovo (ISG) cultural complex. The two populations are separated in the archaeological record by a 700-year gap and the existing body of knowledge suggests that they are distinct and have considerably different adaptive regimes. Classification trees were used with the aim of examining population, side, sex, and age differences in trait expression for evidence of biological distinctiveness, differing activity patterns, divisions of labour, and interactions between genetic and environmental factors. Septal aperture was strongly representative of the ISG in analyses. Given this trait's probable association with skeletal robusticity, these results compliment previous work suggesting that the ISG were less robust than the Kitoi. The trait was also more common in females than in males, likely due to a mix of factors including robusticity and sex differences in elbow hypermobility. Septal aperture was most common in the youngest age group examined (15-20 year olds) and incidence decreased with age. This may reflect multiple factors like robusticity and changes in the angle of the olecranon process and joint mobility with increasing age. Not only does the incidence of septal aperture in these populations support previous research on robusticity, these results also demonstrate the importance of a comprehensive perspective when examining the etiology of skeletal traits.

The Bioarchaeology of Habitual Activity and Dietary Change in the Siberian Middle Holocene

Lieverse AR, Stock JT, Katzenberg MA and CM Haverkort.

Session 4d: Skeletal Biology and Bioarcheology; October-29 at 3:00 PM

Subsistence activities and associated mobility and habitual behavior are explored among hunter-fisher-gatherers from the Cis-Baikal region of Siberia. We analysed musculoskeletal stress markers (MSM) and diaphyseal robusticity as well as stable isotopes of carbon, nitrogen and strontium in skeletal remains of over 200 individuals from five cemetery samples. These samples represent two distinct cultural complexes, Kitoi (8000-7000/6800 cal. BP) and Isakovo-Serovo-Glasovo (ISG) (6000/5800-4000 cal. BP). Research questions include the relative reliance on terrestrial and aquatic resources, residential versus logistic mobility, and whether or not watercraft were used for subsistence activities and transportation. Results of morphological analyses are complementary, and indicate that the intensity of physical activity remained relatively constant among groups over time, while specific patterns of activity changed. Musculoskeletal stress markers suggest the use of watercraft and this is supported by long bone robusticity data for the humeri and femora. Paleodietary analyses indicate widespread reliance on aquatic resources but with a shift from shallow water to open water species, and varying reliance on terrestrial resources, in part, related to site location. Strontium isotope analyses, carried out on samples from three of the five sites, suggest some interesting variation between sites located along the Angara River and its tributaries versus a lakeshore site.

Quackenbush Revisited: Two Additional Skeletons from Intramural Graves

Liston M.

Session 4d: Skeletal Biology and Bioarcheology; October-29 at 3:15 PM

The Late Woodland site of Quackenbush, ON is perhaps best known for a mass grave, containing the primary burials of eight adults and four juveniles, and a secondary bundle burial of an adult female. As previously reported at CAPA 1999 (H. Cary and M.A. Liston), The adult skeletons exhibit extensive evidence of perimortem trauma, including fractures, sharp and blunt force trauma, mutilation, and scalping. A recent project at the University of Waterloo has undertaken the study of the cultural remains from excavations at Quackenbush and to reconcile the plans of numerous excavations. As part of this project, two additional skeletons now housed in the Royal Ontario Museum have been examined. One skeleton, an adult male, also exhibits extensive evidence of perimortem trauma, including cranial vault fractures, facial fractures, limb fractures and probable blade injuries. The second skeleton, a non-adult,



probably female, has extensive lytic destruction of the vertebral bodies, probably indicative of tuberculosis. These skeletons provide additional evidence for health status and warfare at this late prehistoric site in Ontario.

Bioarchaeology of the Mlambalasi Rock Shelter, Tanzania: Excavation and Analysis of Possible Later Stone Age Remains

Sawchuk E.

Session 4d: Skeletal Biology and Bioarcheology; October-29 at 3:30 PM

The Mlambalasi rock shelter in the Iringa region of southern Tanzania is a new site with human remains that may date to the Pleistocene Later Stone Age (LSA). The site possesses a rich archaeological record that spans the historic period, the Iron Age and the LSA. There are also Middle Stone Age (MSA) deposits on the slope in front of the rock shelter. Test excavations were carried out in 2002 by a Tanzanian team led by Dr. Paul Msemwa and in 2006 by a Canadian team led by Dr. Pamela Willoughby. Recently in 2010, Willoughby's team conducted a more thorough excavation. Fragmentary, commingled human remains were recovered during all three field seasons. Osteobiographical analysis of the remains recovered in 2006 revealed that two individuals were present: most of one adult and the manubrium of a juvenile. More of the same adult individual was recovered in primary context in 2010. The archaeological context of these skeletons suggests they belong to the LSA. Additionally, snail shells collected from the levels around the remains were AMS radiocarbon dated to 11,635 – 13,295 calibrated years BCE. The material excavated in 2002, housed at the National Museum of Tanzania, include the remains of another adult individual. Therefore, the minimum number of individuals at this site is three. This paper will discuss recovery of the skeletons as well as the preliminary results of my osteobiographical analysis. Ongoing bioarchaeological research at Mlambalasi suggests this site has great potential to increase our understanding of the East African Stone Age.

Reexamination of the Nature and Purpose of Macramallah's Rectangle, a First Dynasty Cemetery at Saqqara, Egypt

Semple D.

Session 4d: Skeletal Biology and Bioarcheology; October-29 at 3:45 PM

In this paper, I present a detailed reexamination of the spatial distribution, construction, and finds associated with Macramallah's Rectangle at Saqqara. While the excavator believed the cemetery represented a middle class group, later analysts have argued that it is appropriately interpreted as a simultaneous retainer burial during the funeral rites of King Den, possibly including a sacrificial ritual. While detailed palaeopathological records are not available, due to the large size of the cemetery (231 graves), I was able to conduct a focused inter-group comparison of the six burial clusters, and to compare the burial situations of males, females, youths, and juveniles throughout the cemetery. This reexamination has highlighted similarities and differences between Macramallah's Rectangle and more securely identified retainer and subsidiary burials of the First Dynasty at both Abydos and Saqqara. Most importantly, the relative spatial disorganization and lack of standardization at Macramallah's Rectangle differs from the typical highly organized rows of retainers. In combination with the unusual location of this cemetery relative to the Saqqara mastabas and enclosures, and the apparent gradient of wealth and status amongst the clusters, the characterization of Macramallah's Rectangle as a standard sacrificial retainer cemetery appears unlikely. In addition, the spatial distribution of the grave groups casts some doubt upon their interpretation as a simultaneous and highly coordinated event.

SESSION 5: IMAGING

An Examination of Vertebral Compression Fractures in an Inca Population from the North Coast of Peru

Jaagumagi A.

Session 5: Imaging; October-30 at 9:00 AM

A high incidence of vertebral compression fractures were observed a Late-Horizon Inca population from the site of Farfán, Peru. This population, which consists mostly of young women, has garnered specific interest as the burial platform they were recovered from has been interpreted as representing the interments of a religious institution. A multi-method analysis was performed on the remains in order to

identify the cause of the collapse. DXA, microCT and plain film radiography was used to examine microscopic changes in bone leading to identification of two conditions, Osteopenia and Scheuermann's Kyphosis, in the Farfàn population. This paper will build on a previous paper which discussed preliminary results through a review the identification of the cause of the collapse and a discussion the greater social implications of these conditions to this population.

IMPACT - A Collaborative Mummy Database Project

Nelson A and A Wade.

Session 5: Imaging; October-30 at 9:15 AM

Many advanced imaging applications involve the detailed analysis of one or a few images or objects. This is due to two main reasons: the time intensive nature of advanced image analysis and the difficulty of storing and accessing advanced image datasets. The storage and access issue is particularly true for the DICOM data sets derived from CT and microCT scanners. These datasets can be extremely large and they cannot be handled by regular database software. This paper reports on a project that is currently under development that is designed to create a large scale collaborative database of mummy studies using a radiological Picture Archive and Communication System. Mummy studies is a field that is characterized by case studies, or by studies of small series of mummies. This is largely due to the fact that few mummies have been x-rayed or CT scanned and the studies that do exist are very difficult to access. This project aims to establish a database of radiological studies of mummies by inviting individual scholars or institutions to contribute their individual studies and to collaboratively construct a much larger study sample than could be possible in any other way. In this paper we will explore the issues that need to be solved for this project to work. These issues fall into several categories – issues of a technical nature, issues of intellectual property and issues of control and access. The resolution of these issues will have important implications for the area of advanced image analysis in bioarchaeology.

Imaging and Brain Face Interactions in Vertebrate Development and Evolution

Hallgrímsson B, Parsons TE, Schmidt E, Boughner J, Young N, Martínez N, Jamniczky H, Trpkov C and R Marcucio.

Session 5: Imaging; October-30 at 9:30 AM

The mammalian skull is a highly integrated yet modular structure, suggesting that genetic variation may translate to phenotypic variation in a highly structured fashion. Understanding the developmental processes that contribute to this pattern, such as the relationship between the development of the brain and face, is therefore crucial to unraveling the evolution of the human skull. Here we review a series of studies we performed to better understand both the direct and indirect (epigenetic) relationships between the development of the brain and the rest of the skull. These studies are based on experimental embryology in chickens, comparisons of mutant strains of mice, and morphometric analyses of normal human skeletal material. Using advances in bone and soft-tissue imaging, we show that the relationship between the brain and the skull and, in particular, the face, is complex and occurs via multiple mechanisms. In particular, we show that the changes in the brain produce changes in the face and cranial base, and that changes in size produce allometric changes in cranial shape, partly via the integration of the brain and skull. These patterns of covariation suggest the vertebrate skull has predictable axes of selectable variation and thus have significant implications for understanding the evolutionary developmental biology of humans.

Lack of Structural Asymmetry in Pan Metacarpals 1, 2 and 5

Lazenby R, Skinner M, Kivell T, Sidhu S, Hublin JJ and C Boesch.

Session 5: Imaging; October-30 at 9:45 AM

The question of behavioural laterality among nonhuman primates has been the subject of much debate, especially among hominines (captive and/or free-living). Broadly speaking, there are two schools of thought: (1) a modest though definite population-level (cf. species) behavioural laterality exists in hominines, particularly chimpanzees (e.g., Hopkins et al), and (2) bias for hand use is observed within individuals but not at the level of the population / species (e.g., McGrew et al). In this study we examine structural asymmetry (whole bone and trabecular bone) from paired metacarpals in a small sample (n = 13) of free-living chimpanzees from West and Central Africa. Ethological data for hand preference is known for four of the West African animals. Whole bone data consist of lengths and epiphyseal and



midshaft breadths, and trabecular data comprise measures of bone volume fraction, connectivity, 'plate-ness', thickness, number and anisotropy. The latter are derived from micro-CT imaging of 4.5 mm volumes of interest centrally positioned within each head / base. No significant differences were found for any measure (McNemar's test for paired samples; combined sexes). As well, no pattern is apparent for directional asymmetry and known hand preference. These results stand in stark contrast to earlier findings for human metacarpals related to handedness, and support the position of an absence of population-level laterality among chimpanzees.

Testing Pits: what do cellular spaces tell us about human bone?

Carter Y, Chapman D, Wysokinski T, Belev G, Thomas CDL, Clement JG, Peele A, Hannah K and D Cooper.
Session 5: Imaging; October-30 at 10:00 AM

The way bone responds to aging, injury and disease are important areas of interest for anthropologists yet the focus has primarily been at a macro- rather than microscopic level. This presentation will be an overview of current hypotheses regarding the significance of osteocyte lacunar density and morphology and highlight potential applications in anthropological research. Osteocytes, the most abundant cell type found in bone, are housed within spaces known as lacunae. Previously, histological techniques were the only means of visualising lacunae; however, the introduction of Synchrotron radiation (SR) micro-CT with resolutions below 5 microns is now allowing these spaces to be visualised and quantified on a larger volumetric scale. Image data from the Advanced Photon Source and Canadian Light Source will be used to illustrate the issues and successes of imaging lacunae. The ability to measure lacunar distribution and spatial organisation within a specific region or unit of bone such as an osteon, will allow a more definitive answer to the question of whether cellular density changes in the normal aging process as well as in altered processes such as those that lead to osteoporosis. Studies on morphology help answer questions raised by many of the current hypotheses on bone's sensitivity to biomechanical stimuli including fluid-flow and strain theories. The visualisation and characterisation of cellular spaces within human bone is a relatively uncharted field in the human sciences, yet it is one with the potential to answer many questions and test entrenched hypotheses.

SYNCHROTRON SATELLITE WORKSHOP: STONES, BONES AND PHOTONS

Investigation of Bone Microarchitecture by Synchrotron X-ray Techniques at the CLS

Cooper D, Carter Y and H Britz

Synchrotron Satellite Workshop: Stones, Bones and Photons; October-30 at 1:45 PM

The advantages afforded by synchrotron-based x-ray imaging (including increased flux and monochromaticity) have led to growing interest in the use of this technology to assess biological hard tissues from both the present and the past. High resolution 3D imaging techniques (including synchrotron radiation micro-CT) are increasingly intruding into the realm of more destructive histological techniques, and the capability to map elemental distributions by x-ray fluorescence provides a powerful window on physiological phenomena. The enhanced perspective on the structure and function of bone afforded by these technologies holds the potential to improve our current understanding of this dynamic tissue. This, in turn, will enable better interpretation of functional adaptation, aging and disease of bone. This presentation will provide an overview of recent efforts by our group to characterize bone microarchitecture using synchrotron-based x-ray techniques at the Biomedical Imaging and Therapy (BMIT) beamline of the Canadian Light Source and outline our future plans to employ other beamlines to assess elemental distributions. Successes and challenges employing a variety of techniques including diffraction enhanced imaging, phase contrast micro-CT and k-edge subtraction CT will be discussed.

Synchrotron-based hard and soft x-ray characterization of heat-treated archaeological toolstone

Robertson E and R Blyth.

Synchrotron Satellite Workshop: Stones, Bones and Photons; October-30 at 2:00 PM

Many archaeological cultures are thought to have prepared the fine-grained, silica-rich rock typically used to make flaked stone tools by subjecting it to heat treatment, a process which exposes it to temperatures of several hundred degrees Celsius for several hours to days. This improves the predictability with which the rock flakes, but the physical and chemical processes responsible for this

change are not well understood, despite previous studies using techniques like scanning electron microscopy and electron spin resonance. This is an interesting problem from a material science standpoint, but it also leaves archaeologists without a clear analytical means of definitively determining when heat treatment was used in the production of flaked stone artifacts.

Cellular and biochemical analyses of tissue samples from Kwäday Dän Ts'ınchi

Monsalve MV, Christensen C and L Quaroni.

Synchrotron Satellite Workshop: Stones, Bones and Photons; October-30 at 2:15 PM

In 1999 human remains were found frozen in a glacier in Tatshenshini-Elsek Park in British Columbia, Canada. The remains, called "Kwäday Dän T s'ınchi" (long ago person found) by the local First Nations, were carbon-dated at approximately 300 years-old. Our quantification of nitrogen and carbon in collagen of soft and hard tissues inferred good protein preservation. We consequently extracted and amplified mtDNA and identified ethnic origins of Kwäday Dän Ts'ınchi in a context of Native American mtDNA lineages. We used light and electron microscopy to evaluate preservation of the tissues' cellular components. Skeletal, connective, nervous and epithelial tissues were recognizable in some of the tissues. We identified eukaryotes and prokaryotes organisms in the arm muscle, heart and lung tissues. More recently we discovered anthracotic deposits in histological preparations of the lung. This finding confirmed an earlier examination of the corpse that attributed the carbon deposition to living with indoor fires. To gain insight into postmortem degradation in glacier-preserved tissues we analysed soft tissue from the remains using synchrotron based infrared spectroscopy. The Kwäday Dän Ts'ınchi remains displayed mid- infrared spectra that were similar to those of modern day tissue. There was no evidence of protein degradation in the Kwäday Dän Ts'ınchi. Interestingly our initial analysis indicated the potential presence in arm muscle of adipocere formation. This was confirmed with gas chromatography. Furthermore with additional experiments we were able to identify areas with high concentrations of polysaccharides, α -helical proteins, and high content of carboxylate-containing molecules. These findings were significant as the mid infrared analyses were able to confirm biochemical constituents identified in previously published reports and to locate them inside tissue with a resolution of a few micrometers. The use of synchrotron light allowed for additional biochemical identification over previously published work, due to the greater sensitivity (better signal to noise ratio) than non-synchrotron based techniques.

Imaging Ancient Artefacts - Greek and Roman Bronze Coins and Egyptian Faience Amulets

Harvey T, Wyzokinski T, Belev G and LD Chapman.

Synchrotron Satellite Workshop: Stones, Bones and Photons; October-30 at 2:30 PM

This abstract is for the "Stones, Bones, and Photons" workshop on Saturday, October 30, 2010. Over the course of the past several months, the Museum of Antiquities, in conjunction with CLS BMIT scientists, have been conducting experiments for the purpose of establishing imaging techniques for ancient artefacts that will provide valuable archaeological information in terms of artefact identification, as well as structural integrity and conservation. Our experiment dealing with imaging ancient bronze coins aims to reconstruct the surfaces of these objects which have been affected by corrosion, scale and general wear. Thus far, we have been able to isolate some images on our experimental coins. The results are promising and will potentially lead to the development of an imaging application that will be valuable to archaeologists who require the identification of coins for the purposes of dating and understanding the economic history of a site. Our analyses of ancient Egyptian faience amulets seeks to understand the structural integrity of this ancient ceramic material, as well as how and whether it deteriorates over thousands of years. We feel this information will be useful to both archaeologists and curators in their efforts to conserve these artefacts for years to come. Our presentation will also look at the potential of the BMIT beamline at the CLS for analyzing other material culture artefacts.





POSTER ABSTRACTS

FORENSIC ANTHROPOLOGY

1a: The Nose Knows: A Statistical Classification of Ancestry from Craniofacial Measurements

Yuzwa T and A McKeown.

The evolutionary history of South East Asia has been a topic of debate among academics for many years, and has produced significant research on lineage as traced through genetic haplotypes, craniofacial morphology, and recently, through advanced statistical models. FORDISC 3.0 (Jantz and Ousley, 2005) is a commonly used statistical program for the comparison of metric traits of unknown individuals to reference populations defined by nationality, tribe, etc.; however, the FORDISC model currently contains only a small number of regionally-encompassing populations, which have proven to be inappropriate standards for various subgroups. Indonesia would uniquely benefit from statistical profiling as mass graves of the 1965-66 Massacre begin to be exhumed for repatriation; hence, the objective of this poster was to determine the applicability of current statistical models to broader forensic contexts, such as mass fatalities. Discriminant function analysis in FORDISC 3.0 yielded poor classification of individuals from an Indonesian sample into any of the existing Forensic Database or Howell's populations; furthermore, cross-validation of canonical variables in other statistical programs, such as SAS, indicated significant population distances for the Indonesian sample, and the sample yielded the lowest error rate of classification compared with any reference sample, when the Indonesian sample was used as a reference population. The results indicate that "Indonesian" is a distinct population, and as such, the reference populations in current statistical models would provide inaccurate demographic information, contributing to a growing awareness that population-specific standards must be developed to provide the rapid, useful biological information for identification in repatriation and mass fatalities.

1b: Issues in Burnt Bone Terminology

Waterhouse K.

Precise, consistent and accurate use of terminology is essential in research and research communication, especially during the development of new research directions. Burnt bone investigation is one of these areas. Of particular import and interest to this topic are the terms "burnt", "calcined", "cremated" and "remains" which, although used frequently, are not always used with true dedication to their precise meaning. Subtle, and sometimes significant inaccuracies in the use of these terms can generate confusion and misunderstanding that could lead to errors in the analysis and interpretation of human remains found in a post-fire setting. By defining, comparing and identifying common misuses of these key terms, this poster highlights the need for caution in the use of burnt bone terminology and encourages precise and accurate reporting. The issue of lack of clarity and misunderstanding in burnt bone research also arises when describing the degree of burn damage to soft tissue, bone or complete individuals. Multiple, flexible terminological systems have been developed for this purpose, although real potential still exists for interpretation and description inaccuracies when clear definitions are not provided. Through outlining some of the systems of burn damage assessment this poster demonstrates the variability in the field as well as the potential for miscommunication and thereby emphasizes the importance of defining and utilizing clear and detailed descriptors.

1c: Facial Reconstruction of an Anga Mummy

NelsonA, Lywood V and R Beckett.

The Anga People of Papua New Guinea are known to have practiced an elaborate mortuary ritual that consisted of smoking the body of their loved ones in a special hut for a period of weeks. The mummified individuals were then placed on cliff faces overlooking their lineage's territory. The practice was halted by missionaries 40 to 50 years ago. The work reported on here arises from a 2010 expedition to study Anga mummies and to undertake an ethnographic study of the modern Anga people. The main rationale the modern people offer for the practice is that their ancestors wished to look on the faces of their people, so keeping their memory alive. Unfortunately, the ravages of time have led to the deterioration the mummy's faces. The project described here demonstrates the use of forensic techniques to reconstruct the face of one mummy. The mummy shown here is Moimango, a leader, warrior and shaman, whose descendants still live in the village of Koke. Standard anatomical photos and



measurements were taken of Moimango's skull. Tissue thickness depths, available from a 1903 study, and the photos and measurements were used to create lateral and frontal sketches of Moimango's head. The headdress and nose ornament were included as per family memories. Photos were taken of the Koke villagers for additional reference. This reconstruction will bring Moimango's face alive for his descendants, and represents an important development of the repertoire of techniques available for facial reconstruction.

1d: Hetep Bastet: Dual energy segmentation techniques, RP skull models and forensic facial approximation reveal the face of UQAM's Egyptian Mummy.

Lywood V, Nelson AJ, Wade AD, Nguyen N, Friedman SN, Granton PV, Cunningham IA, Mahoney G and M Ewanchyna.

Hetep Bastet is an Egyptian Mummy (ca. 600BC) housed in the Galerie de l'Université du Québec à Montréal. The osteobiographic analysis of this mummy was presented in Nelson et al. (2009). Here, the outcome of dual energy segmentation techniques is used to produce a model of the skull and the forensic techniques used to reconstruct the mummy's face. Standard facial reconstruction relies upon practitioner expertise and tissue depth data specific to each cranium. In this case atherosclerosis, advanced dental deterioration and other degenerative changes suggest an age of 60+, while the best tissue depth data for Egyptians favor an age range of 20-35 with subjects in good health with complete anterior dentition. Thus, this reconstruction required age adjustments to the soft tissue, to the underlying bony architecture or both. To depict the face of Hetep Bastet, 2 approaches were completed to better demonstrate her appearance:- age 60+, using the 3D print of the skull and applying standard age factors which occur naturally in the human face reducing artistic subjectivity to reveal her image prior to death.- age 25-35, utilizing the optimum recognition factor derived from modified skull structure and tissue depth measurements to reveal her face in the prime of life. This is the first elderly female clay Egyptian mummy facial reconstruction to incorporate standard aging factors to produce a second visage. Today, this forensic application of facial modification could offer additional leads to the identity of unknown remains by depicting the face at earlier stages of adulthood.

PRIMATOLOGY

Za: Preliminary Survey of the Parasites of Wild White-faced Capuchins (*Cebus capucinus*) in Costa Rica

Parr N, Fedigan LM and SJ Kutz.

Studies of primate-parasite relationships in the Neotropics have been limited mainly to ecological-specialist howling monkeys (*Alouatta* spp.). Capuchins (*Cebus* spp.) have omnivorous diets and use multiple levels of the canopy, including the forest floor. This dietary and behavioural diversity should expose capuchins to a plethora of parasite taxa. We examined parasite prevalence and species richness in four habituated groups of *Cebus capucinus* in the highly seasonal tropical dry forest of Santa Rosa Sector, Área de Conservación Guanacaste, Costa Rica. We analyzed 295 fecal samples from 95 individually-identified monkeys over 13 months between September 2007 and August 2009. Ten parasite species were recovered using fecal flotation, sedimentation, and immunofluorescence techniques: five nematodes (*Filaroides barreto*i, *Protospirura* sp., *Strongyloides cebus*., an unidentified subulurid and an unidentified strongyle), one cestode, one acanthocephalan (*Prosthenorchis* sp.), and three protozoa (*Giardia* sp., *Isospora* sp., and one unidentified protozoan cyst). A single necropsy confirmed the presence of the adult lungworm, *F. barreto*i. Prevalence of *S. cebus* and the unknown protozoan were highest in adult hosts as older animals have had greater exposure levels. *F. barreto*i and *S. cebus* prevalence was significantly affected by season, with wet conditions resulting in higher transmission rates. *S. cebus* prevalence was higher in females, possibly a result of high rates of social contact between members of this sex. Infected hosts tested positive for an average of 1.58 parasite species and parasite species richness was significantly affected by age. This study represents the first intensive sampling of endoparasites in *Cebus capucinus*.



2b: Chimpanzee Nest Construction in South-West Cameroon

Last C.

This paper examines variability in chimpanzee (*Pan troglodytes vellerosus*) nest construction at two forest sites (Bechati and Andu) in the Lebialem-Mone Forest Landscape (LMFL) in South-West Cameroon. It is hypothesized that nest locations (i.e., terrestrial versus arboreal) vary in relation to the density of human occupation, the frequency of hunting, and the cultural perceptions of primates in the region. During July and August 2010, a primate field survey at the sites of Bechati and Andu tracked the location and number of nests in two forest blocks within the LMFL. At Bechati, villages are densely populated and hunting of the chimpanzee is still prevalent despite government bans on the illegal bush meat trade. The perception of chimpanzees by the local villagers is negative because most view chimpanzees as impediments to agricultural expansion. At Andu, in contrast, villages were located far from primate populations in the LMFL, and no evidence of hunting (i.e. ground snare traps or shell casings) was observed throughout the field survey. The cultural perception of chimpanzees at Andu is also more positive, and the villagers are receptive to the primate conservation activity by local NGO's. The chimpanzees at Andu engaged in the relatively rare behaviour of constructing ground nests in the low valley regions, because they faced no threat from human predation. This evidence suggests that chimpanzee nest construction is a behavioural adaptation that varies in response to predation in human/non-human primate landscapes.

STABLE ISOTOPES AND MICROTECHNIQUE

3a: Sulphur Isotopes in Ancient Human Bone Collagen from the Lake Baikal Region of Siberia: Freshwater Ecosystem Variation as a Residence Tracer

Waters-Rist AL, Bazaliiskii VI, Weber A, Goriunova OI, Salev'ev N and MA Katzenberg.

There are clear differences in $\delta^{34}\text{S}$ among marine, terrestrial and freshwater ecosystems providing information about past diet and place of residence. The aim of this study is to explore $\delta^{34}\text{S}$ variation within a freshwater ecosystem along the western region of Lake Baikal, Siberia, Russian Federation. In this area there is substantial variation in the isotopes of carbon, nitrogen and strontium in humans from Holocene period archaeological sites due to underlying variation in the local geochemistry of different areas and dietary differences in the amount and type of fish that were consumed. $\delta^{34}\text{S}$ values from 70 well-preserved human bone collagen samples from 13 archaeological sites were obtained. $\delta^{34}\text{S}$ values range from 4.8 to 11.1‰. Within each site $\delta^{34}\text{S}$ values range by <2‰ suggesting a clear local isotopic signature is identifiable that can be useful in characterizing place of residence. A clear increase in $\delta^{34}\text{S}$ is observed as a function of distance from the lakeshore, with the highest $\delta^{34}\text{S}$ values located over 200kms west of the lake along the Lena River. There is no significant $\delta^{34}\text{S}$ variation by time period. These data provide the first step upon which a regionally specific baseline dataset can be constructed.

3b: 2H Stable Isotope Analysis of Tooth Enamel: A Pilot Study

Holobinko A, Kemp HF, Meier-Augenstein W, Prowse T and S Ford.

Stable isotope analysis of biogenic tissues such as tooth enamel and bone mineral has become a well recognized and increasingly important method for determining provenance of human remains, and has been used successfully in bioarchaeological studies as well as forensic investigations. Particularly, ^{18}O and ^2H stable isotopes are well established proxies as environmental indicators of climate (temperature) and source water and are therefore considered as indicators of geographic life trajectories of animals and humans. While methodology for ^2H analysis of human hair, fingernails, and bone collagen is currently used to determine geographic origin and identify possible migration patterns, studies involving the analysis of ^2H in tooth enamel appear to be nonexistent in the scientific literature. This pilot study sought to establish the feasibility of ^2H stable isotope analysis of ground tooth enamel using IRMS-TC/EA technology. Powdered enamel samples from a geographically diverse array of archaeological and modern teeth were analyzed under different experimental conditions, none of which significantly affected the observed ^2H isotopic composition of the tooth enamel. Samples with different provenance yielded the same $\delta^2\text{H}$ value of approximately -111.3 ± 2.3 ‰; no linkage was detected between the apparent dynamic range of enamel $\delta^2\text{H}$ -values and that of source water at known points of origins (4 ‰ and 40 ‰, respectively). While it is possible to measure ^2H isotopic composition of the hydroxyl fraction



of tooth enamel, the static nature of the 2H signature of tooth enamel is an inappropriate proxy for provenance, yet may have some utility in biogenic mineral studies.

3c: Stable isotope analyses of a historical Euro-Quebecois population (Notre-Dame cemetery, Montreal, 1691-1796): preliminary paleonutritional interpretations.

Desrosiers E, Morland F and I Ribot.

Historical sources and previous (bio-)archaeological results both suggest that life was very difficult in Montreal between the 17th and 18th centuries, especially for the lower socioeconomic classes. Human remains found in the cemetery of Notre-Dame church correspond to this phase of urban development. Our objective is to expand current knowledge on nutritional behaviour (and past life style), particularly in relation to pre-industrial Quebec. Therefore, stable carbon and nitrogen isotopes were analysed (28 individuals < 18 years; 22 adults). These results were then compared with other North American populations. Firstly, concerning non-adults, two facts were observed : i) the weaning process seems to end progressively around 2 to 3 years of age, and ii) isotopic variability especially for the nitrogen is very high from 2 to 14 years of age. The latter could reflect different food habits between non-adults and adults, but this hypothesis needs to be explored with a larger sample. Secondly, concerning the population as a whole, the variation appears, as expected, very close to other pre-industrial Euro-Canadian samples, and very different from native North American populations. This suggests that the diet was mixed and based mainly on C3 resources with small amounts of C4 resources. So far, these observations confirm previous studies that indicated nutritional behaviour of Euro-Quebecois populations, recently landed at Montreal, matched closely the 'cultural' habits of their country of origin (e.g. France, Europe at large).

3d: A comparison of LA-ICP-MS and micromill/solution ICP-MS methods for elemental analyses of tooth enamel

Dolphin A, Dundas SH, Kosler J and H Meyer Tvinnereim.

Tooth chemistry can serve as an index of measurement for the purposes of evaluating the health of an ecosystem, species, population, community or individual. The recognition of teeth as bioindicators of changing health in both past and contemporary populations is reflected in several ongoing longitudinal studies. It is imperative that, when making comparisons between individuals and determining baseline standards for populations, equivalent regions of enamel (in terms of the timing of its secretion/mineralization) are being sampled. Micro-sampling techniques such as LA-ICP-MS have been used to document variations in the concentration of trace elements in teeth. However, there are questions about whether these data reflect true tissue concentrations. The research presented here compares the results of laser ablation ICP-MS and solution ICP-MS (via micromill) analyses of discreet regions of enamel sampled from 6 permanent premolars donated by Norwegian dental patients. Contents of Mg, Mn, Fe, Zn, Sr, Ba and Pb were studied using both techniques. The results were compared in terms of absolute concentrations measured and trends along the planes of enamel growth. Laser ICP-MS values were consistently lower than solution concentrations. Relatively good agreement was found between the LA-ICP-MS and the solution ICP-MS samples for Mg, Mn, Zn and Sr, while fair results were found for Ba, and agreement for Fe and Pb was poor. These results demonstrate that, if choosing to conduct solution analyses of teeth, micromilled samples are preferable over whole dissolution methods as they are able to capture temporal trends in the uptake of elements.

SKELETAL BIOLOGY AND PALEOPATHOLOGY

4a: Disuse Osteopenia: A Bioarchaeological Investigation of a Skeleton from Wadi-Fidan,

Brickley M, Watamaniuk L, Prowse T, Kahlon B and R Adams.

In the last twenty years increasing attention has been paid to age-related and postmenopausal bone loss and osteoporosis in bioarchaeological material, as the importance of these conditions for knowledge of past communities and our understanding of current health issues have been recognized. There are however a wide range of other reasons why osteopenia and potentially osteoporosis might develop, and limited attention has been paid to these. Causes include; immobility, secondary changes associated with pathology, and malnutrition. In particular, relatively little work has been done on possible causes and



consequences of immobility in bioarchaeology. Analysis of the skeleton of a young male excavated from the Chalcolithic site of Wadi Fidan, Jordan revealed extensive trauma (dealt with by Prowse et al.) and pathological changes. Amongst these was the presence of a 'double cortical line' (DCL) in the left acetabular roof and distal tibia joint. The presence of a DCL appears to occur as a result of intracortical bone resorption, and has been described as reliable sign of immobility-related osteopenia. No DCL was present in the left glenoid cavity of the scapula. Poor preservation of the skeleton (possibly linked to osteopenia) prevented detailed analysis of all concave joint surfaces, but the condition causing immobility certainly affected the man's left leg and likely persisted for several months. Not all immobile individuals develop DCL, but wider recognition of this and other features of disuse osteopenia would improve the understanding of how individuals or communities coped with the various challenges immobility brings.

4b: A metric study of artificial cranial modification from the Boisman II hunter-gatherer cemetery (~5300-6000 BP), Russian Far East

McKenzie H, Puckett C and A Popov.

Artificial cranial modification (ACM) is a widely distributed practice in both time and space, being found on every inhabited continent and in a variety of historic and prehistoric cultural contexts. As a permanent bodily modification that is applied to infants, ACM is one important method of symbolizing ascribed social identities and so can be useful for archaeological investigations into inter and intra-group social relations. Previous research (Chikisheva 2003) at the Boisman II hunter-gatherer cemetery (~5300-6000 BP) located on the Russian coast of the Sea of Japan has described a variety of forms of deformation in 11 of 17 observable crania, which represents among the earliest – if not the earliest – examples of the practice in Asia. The aim of the present study is to reevaluate the evidence for ACM at Boisman II using a recently developed discriminant function analysis designed to provide a more objective means of identifying deformed and undeformed crania (Clark et al 2007). Our results support Chikisheva's (2003) conclusion that ACM was used by Boisman peoples; however, our metric analysis identified only two crania as deformed, instead of the 11 previously identified. Further research is required to determine whether this discrepancy is a product of the conservative nature of the discriminant function, the potential that the discriminant function produces inaccurate results for crania from this population, or whether some of the initial assignments were mistaken.

4c: Poked, Sliced, and Jabbed: Multiple Traumatic Lesions in a Skeleton from Wadi Fidan 1,

Prowse T, Brickley M, Adams R, Kahlon B, Edwards J and A Oh.

Investigation of early copper production by Russell Adams at the site of Wadi Fidan 1 in southern Jordan uncovered an elaborately-built burial cist dating to the first half of the 5th millennium B.C., with five finely crafted flint axes deposited at the side of the grave. This cist contained the semi-articulated remains of one individual and the disarticulated lower limb bones of a second. Osteological analysis of the main skeleton revealed extensive antemortem, perimortem, and postmortem trauma. This individual was a young adult male (20-25 years), who lost use of his left leg prior to death (see poster by Brickley et al.) and had a partially healed circular puncture wound on his manubrium. In addition, he suffered perimortem sharp force trauma to the cranium and left scapula. One of the most intriguing aspects of this individual are the multiple postmortem puncture marks of different sizes found on the frontal bone, left innominate, multiple vertebrae, foot bones, and on the articular surfaces of the left humerus, radius, and tibia. The location of the injuries and the absence of healing indicate that these occurred after death, possibly associated with preparation for burial. Little is known about burial rituals and attitudes towards death in Chalcolithic Jordan, so this burial provides intriguing evidence concerning the treatment of the body after death. We hypothesize that the disarticulated limb bones of the second individual placed in this grave were intentionally provided to replace the paralyzed leg in the afterlife.



4d: Enhancement of Scott's Molar Wear Scoring Method

Shykoluk N.

A method is described for orienting maxillary and mandibular molars in order to standardize the reporting of wear scores on quadrants of the occlusal surfaces. The method, which was developed on an archaeological sample from ancient Mendes, Egypt, further requires that quadrant scores be reported individually and sequentially for each tooth, rather than summed, in order to identify more easily differential and directional wear patterns. Intraobserver and interobserver error was found to be negligible when the appropriate diagrams and instructions were consulted. Thus, observer error does not add further to the potential for error associated with Scott's original scoring method.

4e: Habitual activity indicators on human teeth from ancient Mendes, Egypt

Lovell N.

New York University's Institute of Fine Arts recovered human skeletal remains during excavations at Mendes in the 1960s. The remains were later shipped to the University of Alberta and the sample of three hundred and seventeen teeth from 26 individuals were examined for evidence of dental disease and tooth wear. The teeth exhibit normal occlusal wear from chewing food in preparation for swallowing and digestion, but thirteen individuals also display unusual wear patterns. These patterns can be classified as flat wear (i.e., wear that is perpendicular to the occlusal surface) of the root, of the labial surface of tooth crowns, and of the cemento-enamel junction; oblique wear of the facial, mesial, distal, and interproximal surfaces of tooth crowns; and saddle-shaped wear of the incisal edge of maxillary incisors. Antemortem chipping of the tooth crown also was observed. These macroscopically visible patterns of wear were examined by scanning electron microscopy and interpreted in the contexts of ethnographic parallels and patterns of ancient Egyptian life as reconstructed from archaeological materials. Results suggest that activities such as quid chewing, leather working, fiber or sinew processing, splitting of reeds and plant stems for basketry or weaving, and the crafting of stone tools are possible factors in the development of non-masticatory tooth wear at Mendes.

4f: Behavioural modernity: a not so good concept in human evolution

Roksandic M and J Lindal.

Paleoanthropologists have long recognized that human morphology is effectively "modern" roughly 150ky before there is evidence for "modern" human behaviours. In a reductionist attempt to explain this apparent discrepancy, some recent studies have focused on identifying genetic or neurological causes for this behavioural change. We reconsider the validity of "modern human behavior" concept and suggest that the "capacity for modern behavior" is a more appropriate term that does not allow us to pinpoint this imagined transition. Equating behavioural changes with genetic factors is not fundamentally wrong, and has a potential to lead to behavioural determinism that we hope biological anthropology left behind.

IMAGING

5a: A preliminary investigation of lead contamination in a Napoleonic era naval cemetery in

Varney TL, Cooper DML, Coulthard I, George GN, Pickering IJ and AR Murphy.

Lead poisoning has been suggested as being partially responsible for the 'demise' of the British military in the West Indies during the colonial era. Lead was pervasive in the colonial environment being employed in uses such as eating and cooking utensils, water catchments and alcohol distillation equipment. This preliminary study represents the first attempt to determine whether this suggestion has any validity. Bone samples taken from the remains an individual excavated from a cemetery associated with a Royal Naval Hospital cemetery (c. 1793-1822) near English Harbour, Antigua was used for initial testing. A control sample from an individual from a pre-contact site provided baseline/control data. Lead levels and distribution in the samples were mapped by X-ray Fluorescence (XRF) microprobe analysis on the Stanford Synchrotron Radiation Lightsource (SSRL). Preliminary results revealed that, as hypothesized, the precontact sample had little to no detectable lead, while that from the historic period did indeed have lead contamination. Further, within the historic sample, a secondary osteon was found to contain a high



level of lead relative to the surrounding bone, a result which strongly suggests a biogenic rather than diagenetic origin for the heavy metal. This preliminary study marks the first such application of this technology to the detection of lead in bone, and represents an exciting new potential tool for bioarchaeology and other disciplines with an interest in lead contamination.

5b: Sex Determination from Head to....Well Just the Head: A Validation of Methods Using the Petrous Portion of the Skull from CT Data

Morgan J, Lynnerup N and RD Hoppa.

This poster presents a validation study of three previously published methods of sex determination for the petrous portion of the temporal bone using CT scans. Using an independent data set of known sex, this study evaluated the previously published methods of determination of sex from the lateral angle (Akansel et al., 2008; Graw et al., 2005; Norén et al., 2005), diameter (Lynnerup et al., 2006), and length (Papangelou 1975) of the internal acoustic canal. A series of 55 post-mortem CT scans were used to examine the accuracy and reliability of each technique. The results did not demonstrate statistically significant differences between the sexes, possibly owing to the study sample being skewed toward more males (40 males, 15 females). However, consistency in the means and ranges of measurements between the current study and previously published results does suggest that computerized tomography (CT) is capable of reproducing direct anatomic measurements of the skull. Further analysis using more robust resampling strategies (ie bootstrapping) to compensate for the male bias in the sample, demonstrated a stronger relationship of some methods with respect to prediction of sex. Recommendations for these techniques in osteological studies are discussed in light of the observed results, including the limitations of measurement acquisition when using CT scans.

5c: Congruence of Metric and Morphological Approaches to Determination of Sex in the Real, Virtual and 3DP Pelvis.

Gamble J and RD Hoppa.

Increasingly, physical anthropology is seeing the use of a variety of digital technologies to capture, describe and analyse skeletal elements for a variety of purposes. The last ten years has seen a dramatic increase in the number of publications undertaking validation of osteological methods or techniques using CT data and/or virtual models. In the last few years, with the increasing availability of relatively low cost technological approaches to rapid prototyping (3DP), production of bone replicas and reconstructions has also gained popularity. However, only a handful of papers have explored the relative congruence of methods on real, virtual and 3DP models, with most focusing on the reproducibility of standard metrics or of landmarks. This paper presents the results of a small pilot study to explore congruence in metric and morphological methods for determination of sex from the pelvis. A variety of standard measurements and visual assessments were conducted on a sample of 29 distinct pelvises. The same data were then collected on 3D virtual models, and finally on a subsample of 3DP models. The primary focus of the pilot was not to assess accuracy of the individual techniques, but rather congruence of multiple methods on each of the three sources. Implications for future osteological studies are discussed.

5d: Heart treatment in ancient Egyptian mummification

Wade A and A Nelson.

Descriptions in the popular and academic literature of the evisceration process, organ treatment, and body cavity treatment, as part of the Egyptian mummification tradition, are derived largely from accounts by Herodotus, Diodorus Siculus, Porphyry, and Plutarch. Our reliance on these normative descriptions obscures the wide range of techniques practiced, impeding the study of geographic, chronological, and socio-political variations in ancient Egyptian mortuary practice and ideology. This line of inquiry, using detailed paleoanatomical analysis to examine mortuary practices and ideology, is part of ongoing research at the University of Western Ontario, in conjunction with the IMPACT radiological mummy database project. Using published descriptions and primary computed tomography data, this poster focusses on heart treatment in Egyptian mummification, comparing the classical descriptions with patterns apparent in empirical data. These empirical data are drawn from two samples: (1) a literature-based sample of 150 adequately described mummies, and (2) a sample of 7 mummies examined directly

using computed tomography. Retention, removal, and replacement of the heart varies between time periods, sexes, and statuses, and these treatments are discussed in relation to their place in the literature and their radiological appearance. In spite of a high degree of heterogeneity in the Egyptian mummification tradition, researchers continue to focus on modern and classical stereotypes rather than on its rich variability as it evolved across Egypt over the course of more than three millennia. In particular, the dogmatic contention that the heart was nearly universally retained in situ, or replaced if accidentally removed, is greatly exaggerated.

POPULATION HEALTH

6a: Health and Housing in a Northern Manitoban Community: A Preliminary Report

Boutillier D, Larcombe L, Nickerson P and P Orr.

Housing conditions in many northern Canadian Aboriginal communities have been characterized as drastically inadequate with issues of overcrowding, substandard construction and more recently, culturally inappropriate housing design contributing to this depiction. Documentation of the impacts that these conditions have on human health is also increasing. This poster presents an overview of on-going research that involves the assessment of housing conditions that are risk factors for infectious disease transmission in a northern Manitoba First Nation community. At the request of the community, factors including ventilation, air quality, mould and crowding in the homes was assessed. Health data related respiratory diseases, soft-tissue skin infections and general health conditions were collected. Preliminary results of the assessment are presented and discussed with respect to previously gathered data on housing conditions in the north. While still in the initial stages, this project represents another of an increasing number of collaborations and community-based research initiatives. The poster outlines the challenges and rewards of engaging in community-based, health-related research in northern Aboriginal communities and highlights the impacts of inadequate housing on health.

6b: Urinary cortisol excretion across the menstrual cycle

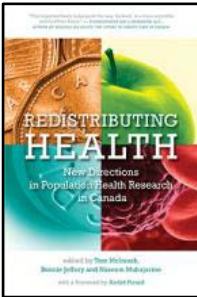
Nepomnaschy P, Altman R and R Watterson.

Cortisol is widely used as a marker of physiologic stress. There are however multiple arguments about its proper use and interpretation. A priori assumptions regarding the factors explaining within and between individuals' variations are at the center of most of those arguments. This is particularly important in the case of women, where the endocrine system is heavily influenced by their reproductive status. Cortisol levels in regularly cycling women, for example, are often assumed to vary independently from the day of the menstrual cycle. This is a critical assumption: if cortisol values were to depend on the day of the menstrual cycle, then lack of control of this covariate could lead researchers to erroneous interpretations of observed variation. Yet, the evidence on which the assumption of independence between cortisol and day of the menstrual cycle is based is scarce and based cross-sectional data and limited analytical methods, such as calculus of the area under the curve (AUC). Here we use a mix linear model to evaluate longitudinal variations in first morning urinary cortisol levels within and between women, accounting for differences in variability in both mean and standard deviations across individuals. We developed two alternative models based on the following assumptions: a. that cortisol does not vary with day of menstrual cycle, b) that cortisol depends on the timing of the menstrual cycle. We found some evidence that Models 2 fit better than Model 1 (p -values=0.037 and 0.083, respectively), suggesting that, while in cycles of regular length (28 days) cortisol may vary independently of the time of the menstrual cycles, this may not be true for long menstrual cycle cortisol levels. If these results are replicated with larger sample sizes protocols for the use of cortisol levels to assess stress will have to be modified.





www.spheru.ca



The Saskatchewan Population Health and Evaluation Research Unit is a leader in population health research with a mission to promote health equity by addressing population health disparities through policy-relevant research. Research focuses on three main themes: Northern and Aboriginal Health, Healthy Children, and Rural Health. We are proud to present our newest book entitled *Redistributing Health: New Directions in Population Health Research in Canada*.

NELSON
EDUCATION
Canada's Learning Advantage

The book cover for "A Human Voyage: Exploring Biological Anthropology" features a central image of a human skull in profile, facing right. To the right of the skull is a red and white DNA double helix. Below the skull is a green nautilus shell. In the bottom left corner, there is a compass rose and a green butterfly. The title "A Human Voyage" is written in a large, white, serif font, and "EXPLORING BIOLOGICAL ANTHROPOLOGY" is written in a smaller, red, sans-serif font below it. The authors' names, "Anne Keenleyside" and "Richard Lazenby", are listed at the bottom right of the cover.

Nelson Education is proud to publish
Dr. Anne Keenleyside and Dr. Richard Lazenby's

A Human Voyage

Exploring Biological Anthropology

First Edition

The first ground-up introductory book of its kind!





ORIENTATION

Accommodations

Directions to the Pub Social and Banquet

Local Transportation.

Food & Drink

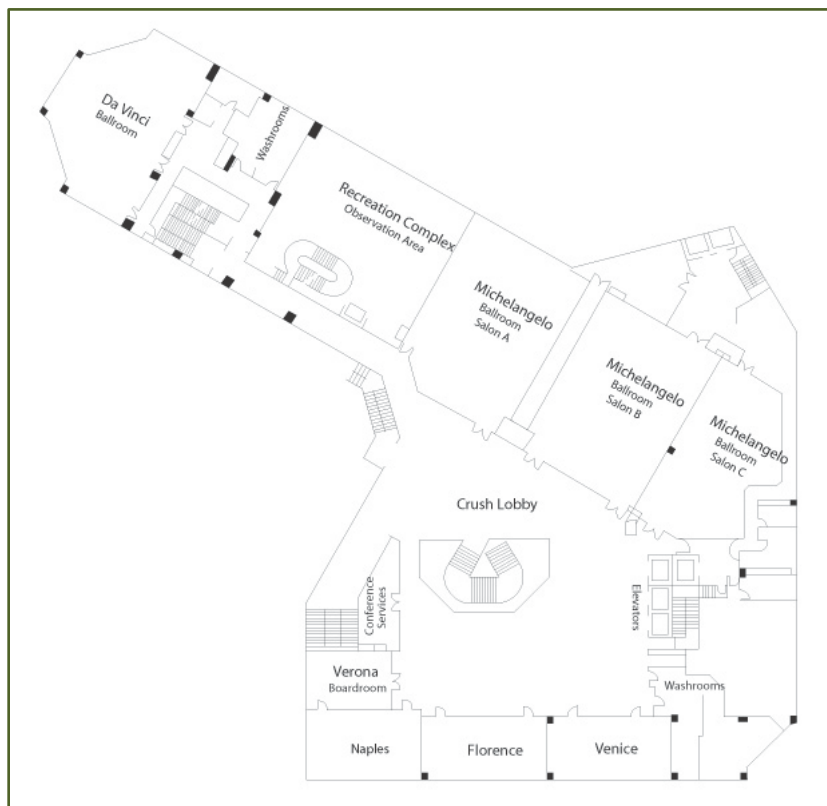


ACCOMODATIONS

Radisson Hotel Saskatoon

405 20th Street East
Saskatoon, SK S7K 6X6
Phone: 306.665.3322
Toll-Free: 1.800.395.7046
Fax: 306.665.5531

Most out-of-town participants will stay at the Radisson Hotel in downtown Saskatoon, overlooking the South Saskatchewan River and riverside Meewasin Valley Park. The hotel is close to a variety of attractions including Kiwanis Memorial and Rotary Parks, Meewasin Valley Centre, River Landing (park,



centre and eatery), Farmers' Market, Mendel Art Gallery, Diefenbaker Canada Centre and the Delta Bessborough Hotel. If you need to stretch your legs or just get out for some fresh air, take a walk or run on the Meewasin Valley Trail. It is a well designed trail which runs approximately 60 km along the river through Saskatoon and the RM of Corman Park.

Hotel Amenities:

High-Speed Internet
Aroma Mediterranean (restaurant/bar)
3-hour express laundry service available
BodyWorks fitness room
Business Center in main lobby

Heated underground parking
Room service
Piccadilly Place gift shop
WaterWorks Recreation Complex

Driving Directions to the Radisson from the Airport

Head southwest on Airport Drive
Turn left at 45th Street West
Turn left at Avenue C North
Take the ramp onto Idylwyld Drive N E (SK #11)
Turn left at 20th Street East. At the corner of 4th Avenue and 20th you will find the hotel.



PUP SOCIAL DIRECTIONS

Winston's Pub

Hotel Senator
243 21st Street East
6:30 - 10:00 pm

Cash Bar / Appetizers provided



Walking Directions from the Radisson to Winston's Pub (Approx 2 minute walk)

Depart the Radisson
Turn left and head west on 20th towards 3rd Avenue South (39 m)
Turn right onto 3rd Avenue S and walk north until you reach 21 Street East (180 m)
Turn left on 21 Street East and the Hotel Senator is on the left.

BANQUET DIRECTIONS

Top of the Inn

Sheraton Cavalier Saskatoon Hotel
612 Spadina Crescent East

6:30 - 7:00 pm	Cash Bar
7:00 - 8:00 pm	Banquet
8:00 - 9:00 pm	Keynote Speaker



Keynote Speaker: Dr. Ernie Walker, University of Saskatchewan
Title: The Lady in the Well: Saskatoon's Oldest Known Homicide.

Walking Directions from the Radisson to the Sheraton (Approx 4 minute walk)

Depart the Radisson
Turn right onto 4th Avenue S and walk (0.11 miles / 0.19 km)
Turn right onto 21st Street East and walk (0.06 miles / 0.1 km)
Sheraton Cavalier is on Spadina Crescent on the left (across from the Bessborough Hotel).



LOCAL TRANSPORTATION

Taxis

Fare from airport to downtown is approximately \$20.00.

United Blueline Cabs: (306) 652.2222

Blueline Taxi: (306) 653.3333

Saskatoon Radio Cabs: (306) 242.1221

Car Rentals

Airport rental vehicles are conveniently located in the parking lot across from the terminal building

Avis Car Rental: (306) 652.3434

Budget-Rent-A-Car: (306) 664.0670

Enterprise Rent A Car: (306) 664.4454

National Car Rental: (306) 664.8771 Ext. 5

Thrifty Car Rental: (306) 244-8000

Bus Routes

The Saskatoon Transit #40 Airport/Downtown bus goes right to the Airport. For routes and times go to the City of Saskatoon website at www.saskatoon.ca . (click on "Transit Click & Go" tab found on the far right menu)



FOOD AND DRINK

Coffee and snacks will be served at all breaks but you will be on your own for meals. You will find great dining in the hotel restaurant, “The Aroma Mediterranean Resto Bar” but you should also know that downtown Saskatoon offers a number of great coffee shops and restaurants within easy walking distance.

Nearby Coffee Shops

Starbucks	100 2 nd Avenue S (8 minute walk)
Strongfields Coffee	167 2 nd Avenue S (6 minute walk)
Broadway Roastery	614 Broadway Avenue (9 minute walk)

Nearby Restaurants

Souleio Foods	
Address:	265 3 rd Avenue South (3 minute walk)
Cuisine:	Bakery, European and Desserts/Ice Cream -
Menu/Website:	www.souleio.com

Tusq	
Address:	416 21 st Street East (3 minute walk)
Cuisine:	International and American
Menu/Website:	www.tusq.ca

Spadina Free House	
Address:	608 Spadina Crescent (4 minute walk)
Cuisine:	International and Bistro
Menu/Website:	www.thefreehouse.com

Truffles Bistro & Patisserie	
Address:	230 21 st Street East (4 minute walk)
Cuisine:	Desserts/Ice Cream, Bistro and Bakery
Menu/Website:	www.trufflesbistro.ca

St Tropez Bistro	
Address:	238 2 nd Avenue S (5 minute walk)
Cuisine:	Bistro, International and American
Menu/Website:	www.sainttropezbistro.ca

O'Sheas Irish Pub	
Address:	222 2 nd Avenue South (6 minute walk)
Cuisine:	Pub Food
Menu/Website:	www.osheasirishpub.ca

The Barking Fish Tavern	
Address:	154 2 nd Avenue (6 minute walk)
Cuisine:	International

2nd Avenue Grill	
Address:	10 – 123 2 nd Avenue South (8 minute walk)
Cuisine:	International and American
Menu/Website:	www.2ndavegrill.com



38th Annual CAPA Conference Evaluation Form

Overall Conference

Why did you choose to attend this conference? <i>(Check all that apply)</i>	<input type="checkbox"/> To gather information <input type="checkbox"/> To share information <input type="checkbox"/> To network with peers <input type="checkbox"/> Because of the conference theme <input type="checkbox"/> Because of individual sessions topics <input type="checkbox"/> Because of the invited speaker <input type="checkbox"/> Other (specify) _____																																				
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 16.6%;">Excellent</th> <th style="width: 16.6%;">Good</th> <th style="width: 16.6%;">Average</th> <th style="width: 16.6%;">Fair</th> <th style="width: 16.6%;">Poor</th> <th style="width: 16.6%;">N/A</th> </tr> </thead> <tbody> <tr> <td style="height: 20px;">What is your overall rating of the conference?</td> <td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td style="height: 20px;">Did the conference meet your expectations?</td> <td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td style="height: 20px;">Was the conference enjoyable?</td> <td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td style="height: 20px;">How would you rate the overall quality of knowledge you gained from the conference?</td> <td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td style="height: 20px;">Was the conference a valuable use of your time?</td> <td></td><td></td><td></td><td></td><td></td> </tr> </tbody> </table>	Excellent	Good	Average	Fair	Poor	N/A	What is your overall rating of the conference?						Did the conference meet your expectations?						Was the conference enjoyable?						How would you rate the overall quality of knowledge you gained from the conference?						Was the conference a valuable use of your time?					
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Poster Session

Did you attend the poster session?	<input type="radio"/> Yes	<input type="radio"/> No	
Did the poster session contribute to the conference?	<input type="radio"/> Yes	<input type="radio"/> No	
Was adequate time allotted to the poster presentations?	<input type="radio"/> Too much	<input type="radio"/> Adequate	<input type="radio"/> Too little

Conference Venue

<i>Please rate the following:</i>	Excellent	Good	Average	Fair	Poor	N/A
Quality of the hotel conference area and set-up						
Quality of the hotel accommodations						
Price of the hotel accommodations						
Quality of the snacks and refreshments during breaks						
Quality of the banquet meal						

Conference Organization

<i>Please rate the following:</i>	Excellent	Good	Average	Fair	Poor	N/A
Online registration procedure						
Conference website						
Conference promotional materials						
Ease of registration at conference venue						
Conference program (included in conference package)						
General organization during the event						

