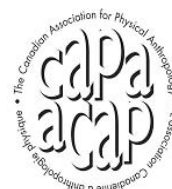




CANADIAN ASSOCIATION FOR PHYSICAL ANTHROPOLOGY  
L'ASSOCIATION CANADIENNE D'ANTHROPOLOGIE PHYSIQUE

# Newsletter



## Message from the President

**Dr. Tina Moffat**, *Department of Anthropology, McMaster University*

Happy 40<sup>th</sup> Birthday CAPA! We had a wonderful celebration at the 40<sup>th</sup> annual CAPA meeting in Victoria. Dr. Chris Meiklejohn, emeritus professor, Department of Anthropology, University of Winnipeg enlightened and entertained us with the origins and development of the Association in his keynote lecture, "From Lawrence, Kansas to Victoria in 40 years. Some thoughts on the history of physical anthropology in Canada, CAPA and a career in bioarchaeology". If you missed the talk, stay tuned for it to appear as a video clip on the CAPA website.

We had a wonderful time in Victoria: great papers, great company and great weather! For those who have hosted a CAPA meeting, you will know all about the hard work and preparation that goes into running a high quality meeting. Special thanks to Helen Kurki, Richard Lazenby, Yin Lam, Lisa Gould, and the student volunteers from the University of Victoria, who organized and ran the meeting so well that it seemed effortless, though we know it wasn't!

The guidelines for applying to the new **Shelley R. Saunders Thesis**

**Research Grant for PhD student members of CAPA** are posted on the CAPA website. Briefly, there will be up to three \$800 awards for doctoral fieldwork, given to PhD students who are members of CAPA in good standing. The award results will be announced on May 1, 2012. At the end of the second year following the year of the award, or upon completion of the degree (whichever comes first), a brief report (2 pages) explaining the use of the funds should be sent to the Secretary/Treasurer and the President of CAPA. Students are only eligible to receive this grant once.

In other news... at the CAPA business meeting in Victoria the attendees voted to try **online membership** through paypal (credit card) payment. You do not need to have a paypal account to do this, just a credit card. You will find this service on the membership page of the CAPA website. Right now we are doing a trial run with paypal, so the service is free, but after January 2013, there will be a 2.9% paypal transaction fee on top of the membership fee. The mail option is

also available if you prefer not to use a credit card. We hope that this

online membership payment service will encourage members to keep their membership status up-to-date and encourage new members to join, especially those from other countries who previously needed to obtain a certified cheque or money order in Canadian dollars. We also agreed to offer our retired members a reduced lifetime membership of \$300.00.

**The next annual CAPA meeting will be in Toronto at University of Toronto Scarborough Campus, October 17-20.** Please mark it on your calendars!

I wish you all the best for the upcoming holiday season and as always look forward to hearing from you regarding any news, concerns, or fresh ideas for CAPA.

- Tina Moffat

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Megan J. Highet

**NEWSLETTER EDITOR**

Email: [meganz@ualberta.ca](mailto:meganz@ualberta.ca)

## MEMBER NEWS

### *McMaster University*

#### Nexus Journal Re-launched!

We are pleased to announce the call for papers for the newly re-launched peer reviewed anthropological graduate student journal, **Nexus**. For more than thirty years, Nexus has served as a graduate student journal of anthropology. The journal is freely available online. The editorial staff is seeking submissions from all four subfields at any level of graduate work to be considered for publication in the upcoming issue.

Manuscripts can be submitted at <http://digitalcommons.mcmaster.ca/nexus/>; guidelines and instructions are also available on the Nexus website.

Feel free to contact us at [nexusjournal@gmail.com](mailto:nexusjournal@gmail.com) with any questions. We look forward to continuing this long tradition of showcasing Canadian academic excellence.

Your editorial staff,

Kyle Freund, Laura Lockau, and  
Lelia Watamaniuk

### *McMaster University*

Ann Herring's Course Book, *Cholera: Hamilton's Forgotten Epidemics*, now available in digitized form.

Ann Herring, Professor in the Dept. of Anthropology, McMaster University has digitized her fourth-year capstone course's book "The Anthropology of Infectious Disease". Each student researched an epidemic

in the 19<sup>th</sup> or 20<sup>th</sup> century that affected the local Hamilton community. In the Winter 2012 session, students conducted research on cholera; for some, the original research led them to primary sources such as Anglican burial registers found in the University Library's Archives and Research Collections. By the end of the course, each student had written an article and become one of the proud authors of the book [Cholera: Hamilton's Forgotten Epidemics](#).

This most recent book is one of six to originate from Dr. Herring's course over the years. A small number of copies are printed and sold at Titles Bookstore; copies are also placed in the collections of the University Library, the Hamilton Public Library and the National Library of Canada. Primary exposure, however, is through the Digital Commons at McMaster University. The online copies can be searched and accessed using popular search engines such as Google and Google Scholar and databases such as WorldCat. According to Dr. Herring, the Digital Commons helps showcase student research and makes it widely available, which may be beneficial when applying for graduate schools, scholarships and jobs. Most important, it makes the information available at no cost to the people of Hamilton. The course puts into practice a "very important part of the training and ethics in anthropology which involves giving information back to the community." She adds that "so much can be done with the Digital Commons in terms of putting up material and making it available." In order to keep track of the usage of each book, Dr. Herring relies on the monthly emails that she receives automatically via Digital Commons.

### *John Abbott College*

**Edwin W. Holland** writes: The Anthropology and Sociology Department of John Abbott College, Ste-Anne-de-Bellevue, Quebec, is pleased to announce the addition of Sarah Bean (McGill) and Sabrina Gloux (U de Montreal) to our Anthropology section, joining Jimena Marquez, Robbyn Seller, and Edwin Holland. Their youthful energy and their expertise in osteoarchaeology, human evolution, and museology will ensure the continued development and expansion of our program.

### *Western University*

**Rhonda Bathurst** writes:

The new Ancient Images Laboratory at Sustainable Archaeology, Western is equipped with a Nikon Metrology microCT scanner and Faxitron digital x-ray. Since July, the equipment has contributed to several projects by Western graduate students. The Faxitron was used by PhD candidate Zoe Morris to complete radiographs of 95 white-tailed deer mandibles to determine the dental mineralization sequence, contributing to her study of seasonal subsistence behavior of animals to investigate human alteration of landscapes. The microCT has been used by several students, including Jenn Morgan, for her PhD project, to complete scans of archaeological cranial samples exhibiting cribra orbitalia and/or porotic hyperostosis in order to assess whether the microCT is a more effective tool than thin section analysis to study the etiology, activity and healing of

the lesions; MA student Arthur Klages, for his thesis project, to compare the frontal sinuses and the incisive canal complex of extant apes and monkeys in order to evaluate the morphological similarities and differences between species as a potential tool for tracing the evolution of extinct primates; and by PhD candidate Renee Willmon to study the use of the microCT as a means to examine perimortem trauma to the cervical vertebrae from the remains of hanged men from the Peterborough County Jail, presented as a poster at the 2012 CAPA Meeting.

Imaging work completed on the microCT by Dr. Andrew Nelson of Western University was also presented at the 2012 CAPA Meeting. Dr. Nelson's collaborative study non-destructively documents the 'afterlife' of Yes the Cat, a domestic cat who died of natural causes, and was mummified in the Western's Department of Anthropology eight years ago.

For more information on Sustainable Archaeology and the Ancient Images Laboratory, please contact lab technician Zoe Morris at [zmorris@uwo.ca](mailto:zmorris@uwo.ca), Sustainable Archaeology Operations Manager, Dr. Rhonda Bathurst at

[rhonda.bathurst@uwo.ca](mailto:rhonda.bathurst@uwo.ca) or visit [www.sustainablearchaeology.org](http://www.sustainablearchaeology.org).

### *University of Alberta*

Sandra Garvie-Lok was proud to see students Brian Leslie (MA) and Nicole Burt (PhD) complete their degrees. She welcomes a new PhD student, Ligang Zhou, and two new co-supervised students, Lacey Fleming (PhD) and Gemma Calgie (MA). She continues to supervise Hillary Sparkes (PhD) and Courtney McConnan Borstad (MA) and to co-supervise Kalyna Horocholyn (MA). Her own current research focuses on health and dietary transitions in the medieval Peloponnese; she is also site osteologist at Helike, Greece. Some of her recent work is summarized in an article in *Viewing the Morea: Land and People in the Late Medieval Peloponnese* (Dumbarton Oaks), to be appearing early in the new year.

Lesley Harrington joined our department on July 1st, 2012 as a tenure-track Assistant Professor specializing in bioarchaeology. Lesley completed her Ph.D. in 2010 at the University of Toronto, and comes to us following a SSHRC postdoctoral fellowship at the Natural History Museum, U.K. and teaching at the University of Winnipeg. She will add an upper level dental anthropology course to our offerings and continue her research program which is focused on growth and development.

Nancy Lovell took early retirement on July 1st but will teach part-time on a contract basis for two years. She was thrilled to have MA students Christopher White, Dyan Semple, and Erin Jessup successfully complete their degrees, and looks forward to working with Sean Brown, a new MA student in Classics, who will be examining skeletal material in Italy. Nancy presented recently at a workshop (Palaeopathology of Egypt and Nubia: A Century in Review) at the British Museum of Natural History, and will use some of her "spare" time to complete publication of her research on ancient Egyptian skeletal remains.

Pamela Mayne Correia is pleased to be co-supervising MA students Kalyna Horocholyn and Rajitha Sivakumaran as they develop their theses. She is continuing to explore the effects of biofilms on bone in storage with alumni Dr. Mindy Pitre of St. Lawrence University, Canton NY. Recently the results of their research were published in the *Journal of Archaeological Science* and were displayed as part of an exhibit at the Brush Art Gallery ([http://www.stlawu.edu/gallery/exhibitions/f12morpho.php?keepThis=true&TB\\_iframe=true&height=500&width=920](http://www.stlawu.edu/gallery/exhibitions/f12morpho.php?keepThis=true&TB_iframe=true&height=500&width=920)) in Canton NY. As well, Pamela is working with alumna Elizabeth Sawchuk (PhD program -- University of Toronto) to explore new methods of transporting and storing fragmentary skeletal remains.

## UPCOMING MEETINGS OF INTEREST

[American Academy of Forensic Sciences, Washington, DC: February 18-23, 2013](#)

[Human Biology Association, Knoxville, TN: April 8-9, 2013](#)

[American Association of Physical Anthropologists, Knoxville, TN: April 9-13, 2013](#)

[American Anthropological Association, Chicago, IL: November 20-24 2013](#)

## MESSAGE FROM THE STUDENT REPRESENTATIVE

**Amy Scott**, *Department of Anthropology, University of Manitoba*

With another successful CAPA-ACAP conference behind us, I must say how impressed I was with the student turn-out to celebrate our 40<sup>th</sup> year. As CAPA-ACAP continues to grow as an association, the student representation also continues to mature, demonstrating the immense talent of the up and coming graduate and undergraduate students here in Canada and internationally. With the majority of our new memberships being held by students, the importance of CAPA-ACAP in fostering new research partnerships and showcasing new talent cannot be underestimated. As a young scholar myself, what I have come to value most about our annual meeting is our research sustainability. With the continued increase and reappearance of student presenters each year, the meeting program is more akin to a high school yearbook, where we are all updated on each other's research accolades over the past year. This tangible camaraderie is arguably the foundation of CAPA-ACAP and the motivation for so many of us students to

continually attend the annual meeting and share with our colleagues and mentors the work we invest so much time into over the course of the year. As always, the hope for CAPA-ACAP in the coming months is to retain and recruit further student members, though a wide-scale advertisement of the association and the forthcoming meeting to anthropology student groups. Additionally, in anticipation of the 2013 meeting there is hope to facilitate a student-oriented workshop/seminar aimed at further integrating graduate and undergraduate students into the CAPA-ACAP community and the larger academic sphere. As I said, Victoria was an excellent venue to celebrate the 40<sup>th</sup> year of CAPA-ACAP and no doubt helped to retain our current student membership. It will be from this excellent showing of student presenters and attendees that I hope to keep our momentum rolling until we have our next academic research reunion in 2013.

- Amy Scott

## CAPA SHENANIGANS!

Photo courtesy of Dr. Tracy Galloway



Several CAPA-goers took time out from their busy schedules to visit the Royal BC Museum. Pictured here, visiting the Veterans Affairs Canada's Remembrance Day exhibit, are: Dr. Sylvia Abonyi, Associate Professor and Canada Research Chair in Aboriginal Health, Dept. of Community Health and Epidemiology, University of Saskatchewan; Dr. Tracey Galloway, Assistant Professor, Dept. of Anthropology, University of Manitoba; and, you guessed it, Dr. An Herring, Professor, Dept. of Anthropology, McMaster University.

## CONGRATULATIONS 2012 STUDENT PRIZE WINNERS!

**Catherine Merritt** (University of Toronto) - Oschinsky-McKern prize for best podium presentation

**Laura Bolt** (University of Toronto) - Davidson Black prize for best poster presentation



# Membership Form

## Canadian Association for Physical Anthropology L'Association Canadienne D'Anthropologie Physique

**New Member** [ ] or **Renewal** [ ]

**Full Membership** \$50.00 [ ] (Canadian or US funds)

or **Student** \$25.00 [ ] (Canadian or US funds)

**Institution** \$60.00 [ ] (Canadian or US funds)

**Life Member** \$750.00 [ ] (Canadian or US funds)

*Please make your cheque or money order payable to:*

**CAPA (Cdn Assoc for Phys Anthro),**

*and forward, with completed Membership Form, to:*

*Dr. Ian Colquhoun*

*Secretary-Treasurer, CAPA-ACAP*

*Dept. of Anthropology, U. of Western Ontario*

*1151 Richmond Street*

*London, Ontario, CANADA*

*N6A 5C2*

*(Questions? Sec-Treas. email: colquhou@uwo.ca)*

Name: \_\_\_\_\_

Mailing Address \_\_\_\_\_

\_\_\_\_\_

Postal Code: \_\_\_\_\_

Affiliation and department (if different from mailing address): \_\_\_\_\_

email: \_\_\_\_\_

publish email with membership list [ ]

/do not publish with membership list [ ]

phone: \_\_\_\_\_

publish with membership list [ ]

/do not publish with membership list [ ]

fax: \_\_\_\_\_

publish with membership list [ ]

/do not publish with membership list [ ]

Academic information: (will not be published in membership list, for tracking membership trends only):

**Research Fields** (please indicate primary and secondary research interests/activities)

1. \_\_\_\_\_

2. \_\_\_\_\_

If you are an **instructor / professor**, what is your rank? \_\_\_\_\_

If a **student**, please give level and year. **Undergraduate** [ ] year (e.g., 3rd) [ ] or **MA** [ ] year [ ],

or, **MSc** [ ], year [ ]; or **PhD** [ ] year [ ]

If a **Postdoctoral Fellow** [ ], position funded by: \_\_\_\_\_

If none of the above: \_\_\_\_\_

# Abstracts of the 40th Annual Meeting CAPA/ACAP (2012)

*Victoria, British Columbia*

(\* indicates student prize eligibility)

## **Spina bifida in a pre-Columbian Cuban population: a paleoepidemiological study of genetic and dietary risk factors.**

Armstrong, S.<sup>1</sup>, Cloutier, L.<sup>2</sup>, Arredondo, C.<sup>3</sup>, Roksandic, M.<sup>4</sup>, and C. Matheson<sup>2</sup>

<sup>1</sup>Dept. of Anthropology, University of Manitoba; <sup>2</sup>Dept. of Anthropology, Lakehead University; <sup>3</sup>Dept. of Animal and Human Biology, University of Havana; <sup>4</sup>Dept. of Anthropology, University of Winnipeg

A holistic approach is necessary to investigate health in archaeological populations. Molecular techniques, particularly multiplex PCR and SNaPshot minisequencing, can be used with paleopathology and dietary analysis (stable isotope, starch, zooarchaeological analyses) to understand aspects of population health. This article demonstrates how spina bifida, a multi-factorial disease characterized by the midline separation of vertebrae, can be investigated with this approach. Based on skeletal evidence, this disease was prevalent in a pre-Columbian Cuban population from the archaeological site of Canimar Abajo. Molecular paleopathological techniques were employed to examine disease potential in this preliminary study, examining 18 individuals for five single nucleotide polymorphisms associated with spina bifida. The combined effect of these polymorphisms, as well as dietary factors, determines the risk of the population for spina bifida, and these factors came together to create the observed high disease prevalence. We demonstrate how molecular paleopathology, corroborated by dietary analyses, can be used within a paleoepidemiological framework to understand population health and disease.

## **Female dominance ranks do not affect natal attraction and infant handling rates in wild ursine colobus (*Colobus vellerosus*) at Boabeng-Fiema, Ghana**

Bădescu, I.<sup>1,2</sup>, Wikberg, E.C.<sup>2</sup>, Ting, N.<sup>3</sup>, and P. Sicotte<sup>2</sup>

<sup>1</sup>Dept. of Anthropology, University of Toronto; <sup>2</sup>Dept. of Anthropology, University of Calgary; <sup>3</sup>Dept. of Anthropology, University of Oregon

Infants are often interesting to non-mothers (natal attraction), who may hold and carry infants (infant handling). The dominance ranks of the mother and infant handler can affect infant survival and female fitness. For instance, low-ranking mothers may be unable to retrieve their infants from high-ranking females, which can compromise infant survival. Low-ranking females who handle the infants of higher-ranking mothers may later benefit from this through received coalitionary support, grooming, and tolerance from the mother while feeding. We examined the effect of adult female dominance on rates of natal attraction and infant handling in *Colobus vellerosus* – a species that shows facultative dispersal and individualistic female dominance hierarchies of intermediate strength. Between 2008-2010, we collected 1224 hours of focal data from 12 infants and 49 females in eight groups. Our total data set includes 66 infants and 51 females, which accounts for individuals who interacted with our focal animals. *C. vellerosus* infants are born white and gradually darken to black-and-white. Standardized dominance ranks were calculated using Elo-ratings. We compared ranks to rates for white/grey infants, as well as for white/grey and black-and-white infants combined, using GEE analysis. Female dominance ranks did not influence rates of natal attraction (white/grey:  $p=0.136$ ; white/grey and black-and-white:  $p=0.133$ ) or infant handling (white/grey:  $p=0.220$ ; white/grey and black-and-white:  $p=0.327$ ). Given its gentle nature, infant handling may be a female bonding mechanism, exchanged between *C. vellerosus* females of all ranks to strengthen relationships.

## **Making sense of the epidemic emergence of poliomyelitis in early 20th-century Ontario, Canada: Then and now**

Battles, H.\*

Dept. of Anthropology, McMaster University

Poliomyelitis puzzled many observers when it emerged in epidemic form in the late 19<sup>th</sup> and early 20<sup>th</sup> centuries. Even today, with the poliovirus on the verge of global eradication, models to explain its changing patterns and impact continue to be revised. Using both quantitative and qualitative sources such as death registrations and newspaper accounts, I compare Ontarians' contemporary understandings of polio and its new epidemic status with current models and

explanations. I examine the ways in which people interpreted this 'new' disease, particularly during the initial 1910 epidemic in Hamilton, Ontario, and how it challenged existing ideas about infectious disease and expectations regarding 'progress'. Doctors struggled to diagnose it, creating problems for treatment and control as well as difficulties for historical research today. I also explore the current 'hygiene hypothesis' and intensive-exposure explanations for epidemic and severe polio, including their shortcomings, such as a focus on one of polio's two modes of transmission (fecal-oral and droplet) over the other, and how they inform our understandings of polio's epidemic shift in southern Ontario. By tending to attack those typically seen as having a lower risk for infectious disease, including those of higher rather than lower socioeconomic status and living outside the dense inner cities, polio defied accepted wisdom and experience. The recent introduction of the intensive-exposure model along with new historical and laboratory research on polio continue to challenge our ideas about disease today.

### **3D Drawsko: The possibilities and problems with digitizing post-medieval crania in Poland**

Blackburn, A.<sup>1</sup>, Scott, A.<sup>1</sup>, and T. Betsinger<sup>2</sup>

<sup>1,2</sup>Department of Anthropology, University of Manitoba, <sup>3</sup>Department of Anthropology, SUNY College at Oneonta

The recent development and use of three-dimensional skeletal scans in archaeological populations has become an important analytical tool in biological anthropology. In situations of poor preservation, limited resources, and time constraints, the use of three-dimensional scanning provides an opportunity to capture detailed images of the human skeleton indefinitely for study. The goal of this research is to establish a three-dimensional database of the Drawsko, Poland material to assess various aspects of this unique post-medieval sample (17<sup>th</sup>-18<sup>th</sup> centuries). The pilot study for this database project focuses on population affiliation and the deviant "vampire" burials at this site. Cranial measurements were taken on 10 adult individuals (5 males, 5 females) and 1 late adolescent female to assess the cranial variability between individuals in this population and whether the two deviant individuals fell within normal or expected population parameters. It is hypothesized that the two deviant individuals would show cranial disparity when compared to the remainder of the sample, possibly explaining why they were afforded deviant status after death. However, results show a large amount of overall cranial variation within this population, and not just between the two deviant individuals. This overall variation is unexpected, suggesting that Drawsko may have had more genetic admixture than previously assumed, or that this variability is highly influenced by inherent imaging biases. While this study is preliminary in nature, it provides an important theoretical and methodological foundation for the digitization of the Drawsko skeletal sample.

### **The Polish Army in Canada and the 1918 Influenza Pandemic**

Bogaert, K.<sup>1</sup>, van Koeven, J.<sup>2</sup>, and D.A. Herring<sup>1</sup>

<sup>1</sup>Dept. of Anthropology, McMaster University; <sup>2</sup>Information and Media Studies, University of Western Ontario

The First World War was a time of unprecedented human mobility as millions of military personnel, along with the civilians who provided supplies and services to them, moved within and between continents and across oceans in support of the war effort. Between 1914 and 1919 in Canada alone, an army of 600,000 was raised and 400,000 men were transported across the country and on to Europe. Their story has become a defining element in the emergence of the modern Canadian state. Foreign troops also passed through Canada en route to the European theatre of war. From 1917-1919, some 22,000 volunteer soldiers for the Polish Army in France were transported from the USA to train in the southern Ontario town of Niagara-on-the-Lake. They unwittingly carried the 1918 influenza pandemic from the USA to Canada. This paper discusses how the Polish Army was mobilised in the USA, the routes by which the volunteers travelled to Niagara-on-the-Lake, the central role the soldiers played in the spread of influenza to Canada, and the curious pastiche of remembering and forgetting that surrounds the Polish Army in Canada.

### **Squealing rate indicates dominance rank in male ring-tailed lemurs (*Lemur catta*) at Beza Mahafaly Special Reserve, Madagascar**

Bolt, L.\*

Dept. of Anthropology, University of Toronto

Squeals are sharp and forceful short-range vocalizations used as aggressive or submissive agonistic signals by many mammalian species. The female-dominant strepsirhine *Lemur catta* has a male-specific squeal call with proposed male-male agonistic functions that have never been empirically tested. The goal of my study was to clarify why *L. catta* males squeal at other males, and to assess how the dominance rank of individual males may relate to squealing rate. From March-July 2010, 600 hours of focal data were collected on 25 males aged 3 and older at Beza Mahafaly Special Reserve, Madagascar. Squealing rate was higher during times of male-male agonism when compared to times without male-male agonism (Wilcoxon test:  $z = -3.81$ ,  $n = 25$  males,  $p = 0.0001$ ), and males with higher dominance ranks had higher squealing rates (Spearman's rank correlation:  $r_s = 0.65$ ,  $n = 25$  males,  $p = 0.0001$ ). Further, males who squealed during intra-sexual agonistic encounters were more likely to win that encounter (binomial test:  $z = 2.07$ ,  $n = 85$  squeals,  $x = 52$  squeals,  $p = 0.05$ ). My results suggest that the male squeal is an aggressive agonistic signal when used in male-male interaction in *L. catta*. A male's high squealing rate indicates both his high dominance rank and his likelihood of winning in agonistic interactions with other males. Squealing in the context of male-male agonism indicates aggression, rather than submission, in *L. catta*.

### **Application of epiphyseal development to estimation of age-at-death in fragmentary and commingled human remains: findings from The Battle of Stoney Creek in Hamilton**

Brickley, M., Dragomir, A.-M., Gilmour, R., Lockau, L., Mant, M., and L. Watamaniuk

Dept. of Anthropology, McMaster University

During re-analysis of the disarticulated, fragmentary and commingled human remains excavated in 1998 and 1999 from the site of the Battle of Stoney Creek in Hamilton, recent developments in the application of epiphyseal formation and fusion were used to estimate age-at-death. Due to the condition of the human bone the auricular surface was previously used as this diagnostic area has good survival in fragmented remains. An estimate of age was produced for 15 individuals, with the youngest assigned to the 25-29 year category. There are, however, difficulties in systematically assessing the auricular surface, leading to a number of recent attempts to improve accuracy. Although anthropologists have long known that the formation and fusion of epiphyses can be used in the estimation of age-at-death, it was only following the synthesis of material by Scheuer and Black in 2000 that information became more accessible. Since this date additional data have been contributed from known skeletal collections and forensic work. In the current research epiphyseal development was used in addition to data from the auricular surface. Fusing epiphyses were recorded from many skeletal elements, but the element with epiphyses present, and the highest minimum number of individuals (MNI), was the innominate. Age-at-death estimates were produced for 17 individuals, with 13 assessed as being fewer than 34 years (5 likely being very young). Human remains recovered from conflict situations frequently involve younger individuals and assessment of epiphyses offers a useful method of age estimation, particularly for co-mingled and disarticulated remains.

### **The meaning behind the bone: an intra-population study of cribra orbitalia**

Brooks, S.K M.\*

Dept. of Archaeology, Simon Fraser University

For decades, cribra orbitalia has been a topic of inquiry and debate. Forming as porous openings of varying size and frequency in the orbital roof, the osteological condition has been associated with anemia and often used as a nutritional indicator of stress in past populations. However, expanding research has scholars suggesting there are numerous causes for the lesions. This poster examines morphology and frequency of cribra orbitalia in two subadult skeletal samples with differing subsistence strategies from two environments in the Zagros Mountains: Ganj Dareh (10,000 BC; MNI=10) and Seh Gabi (6,000 BC; MNI=17). Factors influencing lesion formation and possible interpretations are assessed.



Morphological examination included both laser and light microscopy. Visual and statistical analyses of the orbital lesions revealed a significant difference in the frequencies of cribra orbitalia, suggesting differences in health status between the populations. While the orbital roof porosity in Ganj Dareh children could be accounted for as being within the range of normal variation, the extensive porosity observed in Seh Gabi suggests a pathological origin of the lesions, such as scurvy or parasite infections. The marginal environment and comparatively unreliable subsistence strategy are explored as important factors influencing the poorer health status of the Seh Gabi children. In addition, the high frequency of lesions in Seh Gabi reveals that intensive agriculture in a marginal environment has the potential for adverse health outcomes. Further investigation of the orbital roof microstructure is needed to more confidently determine the cause of cribra orbitalia within the Seh Gabi population.

#### **A preliminary carbon and nitrogen isotopic investigation of bone collagen from skeletal remains recovered from a Pre-Columbian burial site, Matanzas Province, Cuba**

Buhay, W.M.<sup>1</sup>, Chinique de Armas, Y.<sup>2</sup>, Rodriguez Suárez, R.<sup>2</sup>, Arredondo, C.<sup>2</sup>, Smith, D.G.<sup>3,4</sup>, Armstrong, S.D.<sup>4</sup>, and M. Roksandic<sup>5</sup>

<sup>1</sup>Dept. of Geography, University of Winnipeg; <sup>2</sup>Dept. of Animal and Human Biology, University of Havana; <sup>3</sup>Dept. of Anthropology, University of Toronto Mississauga; <sup>4</sup>Dept. of Anthropology, University of Manitoba; <sup>5</sup>Dept. of Anthropology, University of Winnipeg

This preliminary study investigates the diet of a population of humans (n=28) recovered from a shell-matrix site of Canimar Abajo on the Canimar River, Matanzas Province, Cuba. The site is characterized by two cemetery levels separated by a layer of occupation/ ritual / midden activity that lasted 1,500 years. Stable carbon ( $\delta^{13}\text{C}$ ) and nitrogen ( $\delta^{15}\text{N}$ ) isotope analysis of human bone collagen samples obtained from individuals (7 infant/juveniles, and 21 adults) from both cemetery levels was conducted in order to reconstruct the diet of these two populations, investigate the relative importance of marine vs. terrestrial resources, and reveal any sex- and age-related distinctions in their food sources. Initial indications suggest that individuals from both cemetery levels consumed diets that were marine resource intensive but also supplemented with varied additions of terrestrial (mostly plant) resources. This supplementation is particularly evident in the later cemetery population. Though there are no significant differences in diet according to sex, there is a trophic level and terrestrial-based shift for breastfed and weaning infant/juveniles. The infant/juveniles showed evidence of being weaned through distinct  $\delta^{15}\text{N}$  enrichments and  $\delta^{13}\text{C}$  depletions over adult females.

#### **Ranging behaviour of gelada monkeys (*Theropithecus gelada*) at Guassa, Ethiopia: ecological and anthropogenic influences**

Burke, R.<sup>1</sup>, Moua, C.<sup>2</sup>, Nguyen, N.<sup>2</sup>, and P.J. Fashing<sup>2</sup>

<sup>1</sup>Dept. of Anthropology, University of Toronto; <sup>2</sup>Dept. of Anthropology, California State University at Fullerton

Despite the extent to which primate populations worldwide encounter human disturbance, most studies of ranging behaviour ignore the possible impact proximate anthropogenic activity might have on primate movement patterns. In the Ethiopian Highlands, increasing pressure on the landscape from indigenous peoples economically dependent on subsistence agriculture has increased interactions with gelada monkeys (*Theropithecus gelada*) in recent years. We investigated gelada ranging behaviour at Guassa, Ethiopia between Jan2007 and Apr2008. Guassa is a large, relatively ecologically intact Afroalpine grassland featuring an intact predator community in north-central Ethiopia. On 196 days over the 15-month study period, we recorded the location of the gelada study band at 30-min intervals between 0800 and 1730 using a handheld geographic positioning system. We also recorded weather conditions (e.g., temperature, wind speed) at 30-min intervals and encounters with potential predators (e.g., canids, hyenas) and with people on an ad libitum basis. The study band's mean daily path length (DPL) ( $2,882 \pm 693\text{m}$ ; range 690m – 4,766m) did not differ significantly between days marked by encounters with people (n=103) and days without human encounters (n=58) (ANOVA:  $F=0.6072$ ,  $p>0.05$ ). Mean monthly DPL was greatest during the 3 months (Sep-Nov) following the rainy season. These results highlight the complexity of factors influencing gelada ranging behaviour. We suggest an indigenous preservation initiative limits anthropogenic impact on ranging relative to other locations where geladas occur. More data are needed on anthropogenic and environmental factors and their interactions to better understand how the Guassa gelada population is responding to changing environmental conditions and increasing human presence.

**Stable isotope reconstruction of juvenile diet using ribs at Fishergate House, York, UK**

Burt, N.\*

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The goal of this work was to reconstruct the breastfeeding and weaning pattern at Fishergate House York, UK. This work is the first reconstruction of juvenile diet at the site. The cemetery's main period of use is between the mid-14<sup>th</sup> and mid-15<sup>th</sup> centuries. The Fishergate House individuals were members of the working poor and lived in an active urban environment. As York was a large trade center, a wide variety of foods would be available to the population regardless of socioeconomic status. The sample consists of 54 rib fragments from individuals aged from fetal to 5 - 6 years and 11 adult female rib fragments for comparison with the weaned individuals. Dietary reconstruction of the sample was done using stable isotope analysis (carbon and nitrogen) of collagen from rib fragments. The ribs were processed using standard stable isotope processing methods. The results show that weaning occurred around 2 years of age. The nitrogen values for the weaned children were unexpectedly high, higher than the adult females values. This enrichment was likely due to the consumption of more marine fish, which is considered a high status food in medieval Britain.

**Breaking new ground: developing a stepwise framework for the interpretation of skeletal fractures in past populations**

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In the field of paleopathology, significant advancements have been made toward the development of standardized protocols for the description and interpretation of fractures in past populations, however difficulties in assessing causation persist. While the importance of using standardized terminology is well documented, the potential benefits of employing both clinical and anthropological data in a stepwise framework of analysis have not been specifically addressed. Using fracture frequency data from clinical and anthropological literature, a large summary table was constructed, detailing common causes of fractures, and the bones and demographic groups most often affected. As evidenced in the table, some fractures are not as specific to certain causes as they are often characterized, necessitating the use of a more systematic approach for fracture interpretation. The use of a more deliberate and transparent iterative process for fracture interpretation: beginning with a narrow focus (e.g. fracture type, affected element), and gradually broadening the scope of inquiry to considerations of the skeleton as a whole, the demographic information of the individual, and ultimately his/her environmental and cultural context (e.g. available technology, physical terrain), allows for more reliable and defensible conclusions. Since interpretations of fracture patterns often have far-reaching implications for the characterizations of past peoples and their societies, all available information should be incorporated when making these assessments. A step-wise analysis framework based on fracture data from both clinical and anthropological studies provides a means of comprehensively incorporating the varied levels of available information into the decision making process, ensuring the most reliable interpretations possible.

**Habitual activity among San foragers from the lower Orange River Valley: an examination of cross-sectional geometric properties from an inland southern African population.**

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In the lower Orange River Valley of South Africa, studies have indicated that Khoi pastoralists, San foragers, and Bantu-speaking agriculturalists may have all occupied this inland region during the South African proto-historic period (Morris, 1992). This situation represents a unique opportunity to study the effects of local ecology, contact, and cultural dispersion on the habitual activities undertaken by past populations. This study includes 17 San forager skeletons (n=4m,13f), curated by the McGregor Museum in Kimberly, Northern Cape. Volitional habitual activity patterns were assessed for the San population using long bone cross-sectional geometry. Diaphyseal robusticity (J) and circularity (Ix/Iy and I<sub>max</sub>/I<sub>min</sub>) were quantified at the mid-distal (35%) location of humeri using the periosteal mould technique. Results were compared to data from forager skeletons from the South African Cape coast, an ecologically discrete region. J

values obtained for the inland San population are comparable to those found among Cape coast foragers. The circularity indices are similar between San males and females, unlike the Cape coast population, where males and females display distinct  $Ix/Iy$  values. San males and females may have participated in similar activity types, as  $Ix/Iy$  indicates the type of loading placed on the diaphysis, while coastal males and females undertook dissimilar activities. The different cross-sectional geometric properties of Cape coast and San foragers suggests that inland populations may have used different subsistence-related behaviours than coastal foragers, either reflecting ecological differences between these regions or the influence of contact with non-foraging populations on the San foragers.

### High resolution imaging of the aging human femur

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In recent years there has been growing interest in the way bone responds to aging, injury and disease at a microscopic level. This interest has, in part, arisen from the availability of increasingly high-resolution 3D imaging modalities such as synchrotron radiation (SR) micro-CT. Studies examining the effect of aging on osteocytes, the most abundant cell type found in bone, have been restricted due to their encasement deep within the bone matrix. Although the osteocytes themselves cannot be visualized using micro-CT the spaces in which they reside, lacunae, can be used as proxy. This presentation is an overview of research regarding the differences with sex and age in osteocyte lacunar abundance and morphology; potential applications to anthropological research in primatology and paleopathology will be highlighted. Image data from the Advanced Photon Source, Chicago will be used to illustrate the issues and successes of imaging lacunae. The visualization and characterization of cellular spaces within human bone is a relatively uncharted field, yet it is one with the potential to answer many questions and test entrenched hypotheses. Our findings demonstrate that the cellular level differences associated with age in both males and females can have functional and pathological interpretations.

### Food producers or gatherers: Bioarchaeological evidence of cultivation at Canimar Abajo, Cuba

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The archaeological site of Canimar Abajo (Matanzas, Cuba) has been traditionally considered as a pre-Columbian hunter-fisher-gatherer site with no evidence of food production, which has since been disputed with the discovery of evidence of cultigens such as maize on artifacts recovered from the site. Undisputable evidence of maize and bean starches associated from human dental calculus from an early cemetery at the site and sweet potato starches from a later cemetery supports the early introduction of cultigens in this population and consequently in the island of Cuba. In order to better understand the importance of cultigens in the diet of these two successive cemetery occupations at Canimar Abajo, separated by 1000 years, we include results from carbon and nitrogen stable isotopes, as well as trace elements derived from bone, thereby more fully reflecting the prehistoric cultigens consumption in a small scale pre-contact society in Cuba.

### A novel application of isotope analysis: the identification of Canada's missing soldiers

Clegg, L.<sup>1</sup>, White, C.<sup>2</sup>, Longstaffe, F.<sup>2</sup>, and A. Nelson<sup>2</sup>

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In October 2003, the remains of two unknown soldiers from the First World War were discovered by a French construction crew outside the village of Avion, Pas-de-Calais, France. Found with the two soldiers were uniform badges from Edmonton's 49<sup>th</sup> Battalion. During one particular battle in June 1917, the 49<sup>th</sup> lost over thirty soldiers; the remains of 16 of whom were never recovered. Through historical research and anthropological and genetic analysis; the remains

of one of the soldiers, Private Herbert Peterson, was identified in February 2007. It would take another four years before his fellow soldier could be identified. With the second candidate, Avion 1, anthropological analysis could eliminate all but five of the candidates from the list of missing. From the list of five, mitochondrial DNA comparison between an extract from the remains and a profile from the maternal descendents of three of the candidates could eliminate all but two. The lack of dental and other records for each candidate – as well as an absence of mitochondrial DNA descendents, restricted the ability to move the case forward. The use of carbon, nitrogen and oxygen isotope analysis of the remains of the unknown soldier allowed the inclusion of one candidate and exclusion of the other- leading to the eventual identification of Avion 1 as Private Thomas Lawless. Isotope analysis may prove an effective means of reducing the pool of candidates for identification in future cases – particularly where the candidates lack substantive dental and genealogical records.

### **Comparison of the American and Canadian approach to the identification and interment of its missing war dead**

Clegg, L.<sup>1</sup> and D. Congram<sup>2</sup>

<sup>1</sup>Directorate of History and Heritage, Department of National Defence; <sup>2</sup>Central Identification Laboratory, Joint POW/MIA Accounting Command, Pearl Harbour, Hawaii

While we share many things in common, the United States and Canada have a remarkably different approach to the recovery, identification and burial of its missing-in-action soldiers, sailors and airmen. During and briefly following the First World, Second World and Korean wars, Canada undertook investigations into its missing and unidentified service personnel – but the investigations ceased sharply in the mid to late 1950's. The United States, on the other hand, has been actively involved in the discovery, recovery, identification and repatriation of its war missing since the Civil War. While Canada's approach – together with the rest of the Commonwealth Nations, was to 'let them lie where they fought, with whom they fought', the United States' approach was a mix between the above sentiment, and a wish to have the remains of its fallen returned to the United States for interment. Advances in genetic technology, combined with a change in the expectations of both the American and Canadian public has forced both organisations to find new, more efficient methods of remains-recovery and identification. In Canada's case, it has brought about the creation of a new investigative body within the Department of National Defence - complete with new directives and a push for permanent status. In the United States, there is a new mandate to nearly quadruple annual identification numbers by 2015. The presentation will highlight how the two countries approach the challenges of solving missing-in-action cases amidst changing public opinion and changing technology.

### **The ongoing crisis of lemur conservation in Madagascar: a review of recent developments**

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The year 2012 has not been good for Madagascar's lemuriform primates (i.e., infraorder Lemuriformes). Following a full conservation status assessment of all lemur taxa by the IUCN/SSC Primate Specialist Group, mid-July saw a handful of headlines declaring, "Madagascar's Lemurs Are the Most Threatened Mammal Species in the World". This was a significant deterioration of lemur species conservation statuses since the previous IUCN assessment in 2008. The 2008 assessment classified 8 lemur species "Critically Endangered", 18 "Endangered", and 14 "Vulnerable". By contrast, the 2012 assessment determined that 23 lemur species are "Critically Endangered", 52 are "Endangered", and 19 are "Vulnerable". Thus, 94 of 103 recognized lemuriform species (91%) now fall into an IUCN Red List threatened category. These dire conclusions by the IUCN were presaged in a December 2011 paper on bushmeat utilization in eastern Madagascar, showing many protected species, including lemurs, under unsustainable hunting pressure. Both the IUCN conservation assessment and the bushmeat paper received only passing media attention. This paper aims to: i) summarize the 2008 to 2012 shift in lemuriform conservation statuses; ii) examine how the IUCN assessment is reflected in the 2012-14 "Top 25" Endangered Primate Species list produced by the International Primatological Society, IUCN Primate Specialist Group, and Conservation International; and, iii) consider why the rapidly declining conservation statuses of lemuriforms has not received greater media attention, despite the current pop-culture popularity of both lemurs and Madagascar.



**Recovery and preliminary analysis of remains from a historic aircraft crash on a glacier**

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In November 1952, a U.S. military transport plane with 52 persons on board crashed into Mount Garnett, east of Anchorage, Alaska. A search and rescue team discovered the site two weeks later at 2,500 m elevation but found only parts of the plane buried in snow and no human remains. In June 2012, an Alaska National Guard helicopter crew spotted wreckage 18.5 kilometres downslope from the recorded crash site, at 140 meters elevation and only 500 meters from the toe of the glacier that was actively calving into a lake. This presentation will describe the recovery and analysis of human remains and material evidence from the site. Particular attention will be given to the spatial and temporal relationships of the evidence with respect to the glacial environment, how this has affected the quantity and quality of material recovered, and the interpretations that can be derived from these. Comparisons of the results of analysis of material, anthropological and biomolecular evidence demonstrate impressive consistency, strengthening conclusions drawn from the respective types of evidence. Finally, emphasis will be placed on the importance of transposing information derived from these analyses back onto the recovery scene. In doing this, post-crash dynamics can be reconstructed and it enables more informed planning for possible future recoveries at the same or similar sites.

**New radiometric age determination for Bukwa, an Early Miocene fossil locality in Northeastern Uganda**

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Several Early Miocene fossil localities in East Africa document the early evolution of apes and cercopithecoid monkeys. One of the least known localities is Bukwa, a fossil outcrop located on the slopes of Mount Elgon in eastern Uganda. K-Ar radiometric dating from the 1960s indicated that Bukwa was 22Ma, making it the oldest of the East African complex of Miocene sites. This makes the site of some interest, despite the fact that only two fragmentary teeth of the catarrhine *Limnopithecus legetet* have been found. As part of a larger research program on the Ugandan Early Miocene, we have collected new fossils at Bukwa and re-dated the deposits. We conducted 2-3 step heating 40Ar/39Ar dating that yielded ages of 18.99 +/- 0.17 Ma and 19.27 +/- 0.20 (average 19.11 ± 0.13 Ma) from a lava overlying the fossil deposits, and 19.5 +/- 0.3 Ma from the base of the section. Our age estimate for Bukwa of 19.5–19.1 Ma is roughly 3 Ma younger than the original estimate, and is supported by our analysis of the mammalian fossil remains. The fauna from Bukwa is similar to those from Rusinga and West Turkana in Kenya, and samples lagomorphs, sanitheres, and large bodied ruminants, which are absent from other localities (Napak and Songhor). These faunal differences may be the result of age and/or habitat differences, but our radiometric dates from Napak indicate that it is slightly older (20Ma). Re-dating of the Early Miocene Kenyan sites would help to further refine the sequence.

**The forensic anthropology field school: an evaluation of current (best?) practices**

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The first generation of forensic anthropologists, in the days before there were academic programs devoted to the discipline, were trained as bioarchaeologists, who applied their knowledge of human skeletal anatomy to forensic investigations on an irregular case-by-case basis. They brought to the table, along with their skeletal expertise, years of experience in field recovery of skeletal and other archaeological materials. The new generation of forensic anthropology students, enrolled in dedicated forensic anthropology programs, receives extensive instruction in all aspects of skeletal analysis, but field recovery skills are often not emphasized, which may represent a significant gap in their training. Continuing education courses ("short courses") in the documentation and recovery of human skeletal remains are offered for law enforcement personnel at numerous institutions across the United States, but academic courses devoted to training anthropology students in forensic field methods are fewer in number, and more variable in their content. This paper compares forensic anthropology field school offerings at several academic institutions in the United States and

Canada in terms of length of course, topics addressed, skill sets emphasized, and student learning outcomes, with the ultimate goal of establishing “best practices” for training undergraduate and graduate students in forensic anthropology field recovery.

#### **Battles scars on the northern Northwest Coast**

Cybulski, J.

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Skeletal and mortuary data reflect a long tradition of warfare on the north mainland coast of British Columbia. Seven shell-midden cemeteries in the Prince Rupert Harbour region reveal 2000 years of evidence beginning at 1000 BC. Data from the Nass River Valley suggest battles around AD 500 to at least AD 750, possibly later. These timelines are from radiocarbon dated human bone samples, calendar calibrated with corrections for the marine reservoir effect. Healed depressed skull fractures (n = 35) may reflect the use in battle of two different styles of stone clubs and the common use of “skin” helmets. Two unhealed Prince Rupert examples may identify warriors killed in battle and returned home for burial. Both were young adult males with opened frontal lesions suggesting hand to hand combat. Two Nass River males exhibit unhealed comminuted fractures at the back and side of the skull suggesting blows received during a raid on their village. Perhaps they were ready targets unable to escape: one was an old male, the other a young male with congenital scoliosis. Contextual evidence in the Prince Rupert sites included a trophy head with a cache of weapons, trophy skulls with male burials, and human bone charms and manipulated corpses, potentially indicators of witchcraft in ritual preparations for battle. Decapitations at the Lachane site indicate a 1000 year-old raid in the Prince Rupert region possibly recorded in the *adwax* of the Tsimshian.

#### **Helping to rewrite the prehistory of St. Vincent: Preliminary results of the SVG Public Archaeology Program (2011-2012)**

de Guzman, M.<sup>1</sup>, MacKay, J.<sup>1</sup>, Corbett, S.<sup>2</sup>, and K. Crume<sup>3</sup>

<sup>1</sup>Circle CRM Group, Calgary; <sup>2</sup>Kansas Biological Survey, University of Kansas; <sup>3</sup>Bureau of Land Management, Wyoming

The SVG Public Archaeology Program stemmed from a necessity to rescue and record the highly significant site of Argyle 2 on the island of St. Vincent in St. Vincent and the Grenadines (SVG). This volunteer program attempted to bring both manpower and funding to St. Vincent in order to conduct professional mitigative excavations at the site of Argyle 2, where resources were otherwise lacking. Over its two seasons, The SVG Public Archaeology Program (also known as SVG Digs), recruited 17 volunteers from Canada, the United States and Greece, as well as countless local volunteers, identifying over 150 features and 33 burials, recovering numerous artifacts, including stone beads and diagnostic pottery sherds. The findings were highly significant in terms of age and rarity, as well as being the first reported deviant burials dating to the Saladoid period in St. Vincent, and perhaps in the Caribbean as a whole.

#### **Human evolution in Canadian public schools**

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One hundred forty-one years after the publication of Darwin's *The Descent of Man*, human evolution is still not a required topic in the vast majority of Canadian provinces. As it stands, evolution, the central topic of biology, is only present in grade 12 biology - an optional class at many schools. In 2008, only 39.8% of Canadians reported having taken a biology course, optional or otherwise. This study examines the frequency with which human evolution is mentioned in the provincial curricula, and the history of its presence in the Manitoba curriculum. Currently, only the Alberta curriculum contains guidelines for an anthropology course, which have been virtually unchanged since 1985. In Manitoba, Human Evolution was a mandatory topic from the 1960s up until 1990, but a biology curriculum reform in 1998 removed it from the required topics. The information is still present in the textbooks, but teachers are no longer mandated to discuss it. Given the public attention paid to every anthropological discovery, and the controversy and discussion that that

discovery invariably generates, it is vitally important that students receive proper education on the subject throughout their school career, not just at the end of high school. Furthermore, a person's acceptance of evolution is directly correlated with their understanding of the topic. Given that students habitually demonstrate a better understanding of evolutionary theory when it is related to their own species, an alteration to the curriculum to include human evolution would greatly increase public knowledge and acceptance of the discipline.

#### **Calibrating radiocarbon dates from individuals with mixed marine and terrestrial protein diets**

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The analysis of Later Stone Age human remains from the Namaqualand coastline of South Africa produced mixed results. The carbon and nitrogen stable isotopes of some individuals implied a diet that reflected a higher than expected consumption of marine protein as compared to the analysis of faunal remains from occupation sites. More importantly, a few radiocarbon dates were from warm and arid periods where all other indicators suggest the area was abandoned. In order to verify the results the radiocarbon dates needed to be calibrated but two key pieces of data were missing, one needs to: A) account for the proportion of marine protein or carbon in bone collagen and B) input the delta R or local marine reservoir value due to the old carbon reservoir effect. This paper presents the calculation of these values for the west coast of South Africa during the Holocene in order to facilitate the calibration of radiocarbon dates. To determine the proportion of marine protein in the diet the observed endpoint values of carbon isotopes from human burials were used to represent approximations of 100% marine ( $\delta^{13}\text{C} = -10.6\text{‰}$ ) and 100% terrestrial ( $\delta^{13}\text{C} = -19.0\text{‰}$ ) diets. The %Marine diet was then estimated for each individual. The delta R value was measured by radiocarbon dating paired marine and terrestrial samples from Later Stone Age sites. The average delta R value for the Holocene is  $146 \pm 85$  yrs along the West coast. Once the radiocarbon dates were calibrated, the ages of the Namaqualand burials aligned with the settlement data, confirming that the region was likely abandoned during warm and arid periods.

#### **Habitat characterization, abundance, and distribution of neotropical primates in Pando, Bolivia**

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This study investigates population densities and habitat preferences of a primate community in northwestern Bolivia. Primates in this region were surveyed between June and July 2011 on 8 km transects which were walked at 1km /hr. For each group of species sighted, location, size, composition, activity, height, and habitat occupied were recorded. In addition, 80 quadrats, each 100 m<sup>2</sup> in dimension, located at 100 m intervals along transects were sampled. For all botanical plots, DBH, tree crown size, and number of stems were assessed. In total, 10 diurnal primate species were surveyed in 6 habitat types, of these *Saguinus fuscicollis* had the highest density (25.1 individuals/km<sup>2</sup>) and *Callimico goeldii* had the lowest density (3.3/km<sup>2</sup>). Primary, secondary, and edge habitats were the most abundant along transects and the majority of primates were found in primary habitat. Disturbed and edge habitats created by human activity contained fewer primates than did primary habitats, but three of the species were found at higher densities along edges. Results indicate that primary forests in this area support larger populations of primates than disturbed habitats, but that some species are still common in areas with anthropogenic disturbances. Furthermore, satellite images of this region from 1969 and 2012 were compared, and the rate of deforestation has more than doubled over the last forty years. These results indicate that of all species studied, only the two *Saguinus* species are habitually using edge habitat, which has important implications for understanding anthropogenic impacts on wild primate communities in the Amazon.

**Cultural factors affecting the spread of the 1918 flu in a Newfoundland community**

Dimka, J.\*

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The 1918 influenza pandemic resulted in an estimated 50-100 million deaths worldwide, with extreme variation in mortality rates observed in different areas. This variation in severity likely can be attributed to local conditions including cultural and demographic features. This presentation will describe the specific experience of Greenspond, Newfoundland and Labrador, and surrounding communities during the pandemic, in which a minimum of 400 residents became ill and 11 residents died. The Greenspond region included multiple small communities engaged in traditional kin-based fishing, yet also had a long history as an important economic and political administrative center. These circumstances allow for consideration of both local factors and the impact of regional through international concerns on disease spread in the communities. Several features of life in the Greenspond region have been identified from archival records and ethnographic literature. These features include typical daily activities like participation in local fisheries, seasonal employment that resulted in prolonged absences of a portion of the population, and important institutions such as schools and churches. Additionally, descriptions of individual and community responses to illness and death from influenza and other causes have been drawn from archival sources and documented personal accounts. The presentation will address how these factors might have affected spread or severity of the influenza pandemic and how such contextual data can be used to stimulate and address hypotheses in epidemiological research.

**You are not what you eat during stress: isotopic evaluation of human hair from Belleville, Ontario**

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Carbon and nitrogen isotope signatures in sequential segments of human hair keratin provide an archive of temporal fluctuations in isotopic composition close to the time of an individual's death. This paper explores health status prior to the death of early settlers from St. Thomas Anglican Church cemetery in Belleville, Ontario (1821-1874). The main objective is to determine if there is a consistent difference in carbon and nitrogen isotopic signatures along sequentially segmented hair in individuals who have observable pathological conditions versus individuals who display no osteological evidence of pathology. Elevated nitrogen values can be associated with physiological stressors such as chronic illness, infection, or injury that affect an individual's metabolism. Higher nitrogen values may represent a recycling of nitrogen derived from the breakdown of existing proteins in the body and subsequent tissue repair. Preliminary results on ten individuals indicate that  $\delta^{15}\text{N}$  values are approximately 1‰ higher if an individual was suffering from a pathological condition (e.g. bone infection). The variability in nitrogen values of 1‰ over the expected trophic level shift may be indicative of factors such as nutritional or physiological stress. These results suggest that  $\delta^{15}\text{N}$  values are not only useful for studying diet, but may also be used as indicators of physiological stress.

**The vertebral neural canal: exploring the effect of body size on demographic patterns in a potential indicator of nonspecific childhood stress**

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The size of the neural canal (NC) may be a useful indicator of nonspecific stress in childhood: associations have been reported between small NC and early mortality and poor health in both archaeological and living samples. NC size and femur size may convey information regarding growth at different stages of childhood, but it is unclear to what extent the two may confound one another. This work investigates the relationship between NC and femur size in Later Stone Age coastal foragers from South Africa's Western Cape. From approximately 3500 to 2000 uncalibrated  $^{14}\text{C}$  years BP, this population appears to have undergone an intense period of *in situ* adaptation. Individuals with exceptionally short femora appear during this time, suggesting that chronic population stress may have led to stunted linear growth. I measured the sagittal and transverse diameter of NC at four vertebral segments (T1, T6, L1, and L5) in 54 (M=30, F=24) individuals with measurements of maximum femur length (FXL) and maximum head diameter (FXH). After assessing



sexual dimorphism, I transformed all values to sex standardized Z scores and calculated partial correlation coefficients and nonlinear regression models for FXH, FXL, and all NC. I then examined age-related and chronological variation in NC z-scores (age groups: <30 years, 30-50 years, 50+ years). All procedures were then repeated after adjusting NC z-scores for femur head size (FXH). My results indicate that stunting of the upper thoracic NC can occur independently of small femur size and may reflect stress at the population level.

#### **How large troop size, greater group spread affects vervet monkey responses towards playbacks of aerial and land predator alarm calls**

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The classic playback studies of Seyfarth, Cheney and Marler (1980) suggested that vervet alarm calls conveyed semantic content; a characteristic previously thought to be unique to human languages. This conclusion was drawn in part because all individuals performed the same stereotypical and ubiquitous behavioural responses to playbacks. The vervet groups studied by Seyfarth et al. (1980) were, however, small and group spread was low. At the Samara Game Reserve study site in South Africa, we recently conducted our own playback study on two troops of vervet monkeys that were more than twice the size of those found in previous studies. Our aim was to determine if larger troop sizes and group spread would lead to greater variability in behavioural response compared to the stereotyped behaviours found in smaller groups. We performed playbacks of aerial and land predators to our study groups under conditions where there was no actual predator threat. Our results reveal a much wider range of responses to particular kinds of alarm calls, and suggest that animals are making assessments of danger based on something other than the semantic content of alarm calls alone, and call into question the value of the 'functional reference' paradigm.

#### **Investigating diet and regional origins in the Smith's Knoll skeletal sample, Stoney Creek, using stable isotopes**

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This study uses stable isotopic analysis to identify diet, geographic origins and long-term residency in a sub-sample of the Smith's Knoll skeletal collection, soldiers who died during the June 6th 1813 Battle of Stoney. Bone collagen and carbonate sampled from 21 femora and 1 mandibular fragment were analyzed to differentiate between two major modes of dietary consumption, one wheat-based, the other maize-based, in an attempt to decipher United Kingdom from North American soldiers. The bone collagen and carbonate data indicate that 6 individuals were consuming diets consisting of largely C4 plants, possibly maize, suggesting North American residence. Conversion of bone carbonate oxygen values to meteoric water suggest that at least 2 individuals may have resided in North America during adulthood, with isotopic values falling lower than meteoric precipitation value of -9‰ for the United Kingdom. Most of the individuals in the sample had isotopic values indicating a mixed diet of both C3 and C4 foods, and carbonate oxygen within the overlapping meteoric range of drinking water in both the United Kingdom and North America. Oxygen isotope results from 14 teeth suggest that, as children, 5 individuals may have originated in North America, while 9 individuals have isotopic signatures indicative of both a North American or United Kingdom origins. Overall, the isotopic data indicates that a large portion of the soldiers sampled in this study were consuming both C3 and C4 foods, and originated and resided along the mid- to northeastern coast of North America or the United Kingdom.

**Poor mothers give richer milk for daughters than sons: a test of the Trivers-Willard hypothesis on milk fat concentrations in northern Kenya**Fujita, M.<sup>1</sup>, Roth, E.A.<sup>2</sup>, Lo, Y.-J.<sup>3</sup>, Hurst, C.<sup>1</sup>, and A. Kendell<sup>1</sup><sup>1</sup>Dept. of Anthropology, Michigan State University; <sup>2</sup>Dept. of Anthropology, University of Victoria; <sup>3</sup>Dept. of Counseling, Educational Psychology and Special Education, Michigan State University.

The Trivers-Willard hypothesis predicts unequal parental investment between daughters and sons depending on maternal condition and offspring reproductive potential. Specifically, in polygynous populations where males have higher reproductive variance, it predicts mothers in good condition should invest more in sons while mothers in poor condition should invest more in daughters. Previous tests of the hypothesis focused on behavioral investment while few investigated biological investment. Milkfat synthesis is one of the most energetically expensive components of maternal investment, yet our understanding of its variations in relation to the offspring's sex is still limited. This study tests the Trivers-Willard hypothesis on human milkfat concentrations. Data from exclusively breastfeeding mothers in Ariaal agro-pastoral villages of northern Kenya were used to test the hypothesis that economically sufficient mothers will produce higher milkfat for sons than daughters while poor mothers will produce higher milkfat for daughters. A linear regression model was applied, using log transformed milkfat as the dependent variable, and offspring's sex (Son=1/Daughter=0), socioeconomic status (higher=1/lower=0), and the sex-wealth interaction as the predictors. Our results supported the hypothesis: offspring's sex and socioeconomic status interacted ( $p=0.014$ ,  $n=72$ ) with milkfat. The model estimates that economically sufficient mothers produced richer milk for sons than daughters (2.6 vs. 0.6 g/dL) while poor mothers produced richer milk for daughters (2.6 vs. 2.3 g/dL), after controlling for maternal age, parity, postpartum time, BMI, fat intake, sons living at home, and the community membership. Further research on milk fat and other milk constituents in relation to the offspring's sex is warranted.

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**Ecological correlates of the stress response in fragment-dwelling Lemur catta of Madagascar's central highlands**

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Habitat fragmentation poses ecological challenges for resident species, yet responses vary depending on the nature and extent of the habitat change. For group-living animals, resource structure, ranging behavior, and interactions with conspecifics can influence the ability of populations to cope with fragmentation. I used fecal glucocorticoid (fGC) levels, a physiological indicator of stress, to investigate the ecological correlates of the stress response in free-ranging ring-tailed lemurs (*Lemur catta*) inhabiting two forest fragments in south-central Madagascar. At Anja Special Reserve (34 ha), introduced food and water resources to the habitat support the highest density of lemurs/ha compared with other sites at which *L. catta* has been studied. In the Tsaranoro Valley Sacred Forest (53 ha), selective logging has removed many of the native fruit trees and *L. catta* have limited access to introduced resources; as such, the habitat supports a population that is one-sixth the density of that at Anja. Over a seven month period in 2010/2011, I measured behavior, habitat utilization, and fGC levels of adult *L. catta* in each fragment. Levels of fGC were significantly higher in *L. catta* at Anja throughout the study period. At both sites, fGC levels were lowest during the pre-mating period, but seasonal differences in fGC did not vary by sex or reproductive state. I discuss these results in the context of resource acquisition and competition and suggest that social challenges associated with high-density group living may contribute to the stress response of *L. catta* in densely populated forest fragments.

### Childhood obesity and food security in Nunavut, Quebec and Greenland

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We compare levels of childhood obesity and food insecurity among Inuit populations living in Nunavut, Quebec and Greenland. Data on obesity are drawn from recent health surveys undertaken in Canada and from the Greenlandic Research Database, an ongoing programme of health surveillance. The sample consists of 1121 children (554 boys and 567 girls) aged 3-5 years. Data on levels of food security in the three jurisdictions are drawn from related health surveys. We observed a marked east-to-west gradient in results. Obesity prevalence was 50.8% among Nunavut children, significantly higher than that of both the Nunavik (32.2%) and Greenland (24.5% rural Greenland and in 12.8% in Nuuk) samples (Chi square comparisons,  $p < .001$ ). A similar pattern of food insecurity was observed, with 67.6% of Nunavut Inuit reporting food insecurity, significantly higher than the prevalence of food insecurity in Nunavik (24%) and Greenland (8%). Results suggest childhood obesity is tied to the socioeconomic conditions producing food insecurity in Inuit populations. Rates of poverty and unemployment are higher in Nunavut than in Nunavik and Greenland. Despite the high cultural value placed on traditional food consumption, low income represents a significant barrier to traditional hunting and fishing activities in all three regions, but especially in Nunavut where the high cost of fuel and ammunition are prohibitive to many residents. Social change and economic hardship may have weakened traditional food sharing networks. Social safety nets operate differently in the three jurisdictions, resulting in relatively lower imported food costs for Greenlandic residents.

### An examination of the impact of childhood stress on later life health through the assessment of accentuated striae of Retzius and skeletal pathology in two medieval Danish populations

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The impact of early childhood physiological perturbations (stress episodes) on adult health and longevity in the modern population is becoming a focal point of clinical studies. In such research, retrospective investigations of childhood health, along with the consultation of clinical records and longitudinal studies may be able to elucidate this relationship. The consideration of health in past populations can be greatly enlightening to such areas of investigation, as these samples present data on the health of individuals at various stages of their lives. This poster presents the results from a pilot study seeking to elucidate the impact of childhood health and well-being on adult health and survival in two Medieval Danish populations. This was done through the joint consideration of dental enamel microstructure and osteological evidence for health and longevity in adult skeletal remains. These preliminary results indicate a relationship between a higher percentage of accentuated striae of Retzius in the first four years of life and reduced stature and mean age at death.

### A possible case of scoliosis in a Roman-era woman from Helike, Achaea, Greece

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In 373/372 BC an earthquake and tidal wave destroyed the classical city of Helike, founded in prehistoric times on the southwest shore of the Gulf of Corinth. Since 2000, the Helike Project, under the direction of Dr. Dora Katsonopoulou, has been conducting systematic excavations to locate the ruins of the city and document the long occupation history of the surrounding region. To date, sites dating from the Early Helladic (Bronze Age) to the Byzantine period have been discovered. These include a number of burial plots dating to the late Classical through Byzantine eras. The skeleton discussed here was recovered from one of Helike's Roman-era cemeteries and is likely that of a female aged 40 to 45 years at death. The fifth lumbar vertebra is partially sacralized on the right side and the sacrum shows a pronounced corresponding asymmetry. Sacralization of the fifth lumbar vertebra is common, and typically has minimal health effects. However, here the condition appears to have had a significant effect on quality of life. The fifth lumbar vertebra rests at

an angle on the sacrum, and in situ photographs of the remains show an unusual curvature of the lower spine. These observations, along with severe arthritic degeneration of the spine, support a differential diagnosis of scoliosis. We discuss this diagnosis and review Roman-era writings on the treatment and perception of scoliosis that provide insights into the effects of the condition on this woman's life experience.

#### **Using residential school entrance examinations to assess youth BMI in Manitoba and Saskatchewan First Nations communities, 1930-50**

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First Nations people in Manitoba and Saskatchewan are experiencing an epidemic of type 2 diabetes mellitus, accompanied by a concomitant rise in related complications. Estimated age-adjusted prevalence is as high as 250 per 1,000 in some communities, though there are significant variations by community, by tribal affiliation, by gender and by relative location. The epidemic is thought to have emerged from the 1970s, triggered by ongoing sociocultural disruption associated with changes in diet and activity that have favoured greater rates of obesity. Questions around the origin of this epidemic include when changes in body morphology first began to occur. Analysis of body mass index (BMI) values derived for incoming students in selected Manitoba and Saskatchewan residential schools during the period 1930-50 may offer some clues. The literature suggests that there is a relationship between childhood BMI and adult obesity, and so evidence of elevated BMI among the students during the study period might be linked to later diabetes. Although childhood BMI can be problematic for comparative studies, these data do enable us to conduct a general comparison between students in different schools as well as in the same school over time. Moreover, as children from different communities attended the same schools it is possible to achieve a finer scale of analysis. We present results of our analysis of the residential school BMI data, highlighting implications for using this type of data to improve our understandings of the origins of this epidemic among Saskatchewan and Manitoba First Nations peoples.

#### **A pilot study of temporal trends of stature changes from Neolithic to Early Imperial Dynasties of ancient China**

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This pilot study aims to use the published data of archaeological human remains to investigate the temporal trend of stature changes in ancient China. The collected data consist of mean stature estimates and raw femur length data of 789 individuals (451 males and 338 females) from 39 sites throughout China from the early Neolithic to early imperial dynastic periods. To increase the accuracy of stature estimation, the regression formulae were developed specifically for East Asian populations by Trotter, Shao and Chen were used to estimate the stature based on femur length. The result indicates Trotter's formulae performed quite well though it was not specifically designed for Chinese populations. The temporal comparison reveals a decline in stature for both males and females after the Neolithic period and followed by a subsequent brief increase in male stature during the Han Dynasty (202BCE – 220CE). This distinctive secular trend is consistent with intensified social complexity and increased population density during the Neolithic periods. The anomalous increase in stature during the Han Dynasty may be related to the relatively stable and prosperous periods resulting from a newly unified China.

#### **A micro-CT study of the canine mesial ridge (Bushman's canine) in Later Stone Age dentitions**

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The canine mesial ridge is a morphological variant described for the lingual enamel surface of the permanent maxillary canine. The trait has been observed with high frequency among sub-Saharan African populations, in contrast to lower prevalence among populations of non-African origin. The canine mesial ridge is one of a suite of traits that form the "Sub-



Saharan African Dental Complex” which is significant for its mass-additive ancestral qualities. Because the canine mesial ridge has utility for exploring the population dynamics of modern human groups, we sought to more fully understand the variation in the trait by examining its expression at the enamel-dentine junction (EDJ) in addition to the outer enamel surface (OES). This pilot student of a small sample of dentitions from Later Stone Age sites in South Africa examines the correlation between expression of the canine mesial ridge at the OES and EDJ in relation to the scale outlined in the Arizona State University Dental Anthropology System. On the basis of a small sample with variation in the degree of canine mesial ridge expression, we offer preliminary conclusions for a more objective approach to scoring the trait, and demonstrate an approach that can be used to expand the samples to include teeth with worn enamel as well as unerupted crowns.

**Inferring mode of locomotion through microscopic cortical bone analysis: A comparison of the third digits of *Homo sapiens* and *Ursus americanus* using micro-CT**

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Bone is 3D dynamic and complex; unique in its ability to structurally adapt in response to mechanical stimuli and microdamage. Comparative skeletal morphology is commonly utilized to infer locomotion patterns of hominin species; however, instances of remarkable gross similarity despite different modes of locomotion do occur. A commonly cited example is the similarity between the elements of bipedal human (*Homo sapiens*) hands/feet and quadrupedal black bear (*Ursus americanus*) front/hind paws. This study tests the hypothesis that microscopic analysis is a more representative and accurate means to infer a species' mode of locomotion. Micro-CT data were collected at the mid-diaphysis of 5 human and 5 bear third metacarpal (MC)/metatarsal (MT) pairs. Independent and paired t-tests assessed whether cortical bone microstructural and strength parameters differed between species and element. Cortical variation was further analyzed by visually comparing histology sections from 2 humans and 2 bears. Independent t-tests revealed canal number (MC,  $p=.005$ , MT,  $p=.001$ ), canal diameter (MC,  $p=.031$ , MT,  $p=.027$ ) and polar moment of inertia (MC,  $p=.006$ , MT,  $p=.001$ ) were significantly different between bears and humans. Within species, paired t-tests revealed no significant difference between MCs and MTs. Histological inspection of osteon shape, spatial arrangement and population density revealed further variation between species and element. This preliminary study shows that cortical bone microarchitecture is quantifiable and these features are accessible through non-destructive micro-CT imaging. Interspecies variation was present but no cortical differences between the MCs and MTs of humans was found. A key limitation of this study was sample size and further investigation of the relationship between mechanical loading and mode of locomotion is warranted.

**Covered eyes, hands tied: reflections and exhumations at the CREOMPAZ former military garrison Cobán, Guatemala**

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Concealed within the active CREOMPAZ Regional Training Command for Peacekeeping Operations in Cobán, Alta Verapaz, Guatemala, over 300 remains have been exhumed by the Guatemalan Forensic Anthropology Foundation (FAFG). From site 1, where 21 graves have been excavated, 276 remains were exhumed. One grave contained women and children. Other graves contain men with eyes blindfolded, hands and feet tied. Who are these individuals buried in clandestine graves with hands tied and eyes covered and why are they buried within a former military garrison? The FAFG – CREOMPAZ Military Base exhumation is one example of the shift from despair to hope that the country is experiencing. This excavation represents a chance at uncovering the truth from the Guatemala internal armed conflict (1960-1996) where over 250,000 individuals were killed or disappeared and the role that the Guatemala military played in state terrorism. These graves comprise the disappeared; those whose family members have no knowledge of the fate or whereabouts of their loved ones. Testimonies collected by the FAFG indicate the location of the graves and that there are 335 reported individuals missing from the Cobán area from during the internal armed conflict. Now, a small team of organized archaeologists and excavators are uncovering the truth buried within the Military Base. The poster presentation will outline the significance of this excavation, process, and reflections from days spent brushing away the dirt and exhuming the truth in the CREOMPAZ Military Base.

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**Call it what you will: the utilization of ill-defined causes of morbidity to detect a sample of male patrons of prostitution during a venereal disease epidemic among the Klondike gold rushers**

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As in other historic communities, the study of prostitution in the Klondike overwhelmingly rests upon observations of the women engaged in 'the oldest profession'. This topic has been the subject of intensive scrutiny by previous scholars, yet the male clientele have gone entirely unrepresented due to biases in the creation of relevant primary and secondary data sources that have acted to preserve the anonymity of male participants while simultaneously publicizing the private lives of female prostitutes. The presence of venereal disease, which existed in epidemic form during the early years of the gold rush, offers the opportunity to identify a sample of male patrons of prostitution in the Klondike through an examination of admissions noted in the patient register of a local hospital. Careful scrutinization of this data source informed by an understanding of the contemporary construction of diagnostic labels and the practice of employing pseudo-diagnoses, euphemisms and ill-defined causes of morbidity in regard to socially stigmatized diseases, draws attention to patients admitted to the hospital for illnesses such as "male trouble" during the epidemic. When likely cases of venereal disease contracted through intimate contact with the demimonde are thus identified, the sample therein constructed offers insight into the social construction of venereal disease and its biosocial impact in this particular time and place, while demographic data contained within the patient register sheds light upon the role of prostitution within the Klondike specifically, but also in the case of frontier and boomtown communities more generally.

**Crack and crack pipe sharing and evolutionary social norms**Ivins, A.<sup>1,2</sup>, Benoit, C.<sup>1,2</sup> and E.A. Roth<sup>1,3</sup><sup>1</sup>Centre for Addictions Research of British Columbia, University of Victoria; 2Dept. of Sociology, University of Victoria;<sup>3</sup>Dept. of Anthropology, University of Victoria

Crack pipe sharing is implicated in the transmission of Hepatitis C and HIV. Qualitative data gathered from two studies in Victoria, British Columbia, delineated crack smokers' rules, or "etiquette" of lending, borrowing, and using crack and crack pipes. Initial analysis showed that these rules fulfill Henrich and Henrich's (2007) three criteria for social norms: 1) they prescribe "proper" behaviour (or proscribe "improper" behaviour), for individuals within a population or within some subset of a population, 2) they are widely shared by at least a significant portion of the population and, 3) failure to adhere sufficiently closely to them will anger other members (even if the action does not materially affect them). Crack and crack pipe social norms parallel those for food sharing found among contemporary foraging peoples in that they include notions of altruism, risk reduction and reciprocity, function to promote intra-group cooperation and personal identity, and enhance social reputations. While food sharing social norms arose by natural selection for an adaptive behaviour, crack and crack pipe sharing norms are often maladaptive. For example, in certain contexts crack pipe sharing negates smokers' belief that pipes can transmit infectious diseases. Ramifications of these findings are considered in light of evolutionary theory and future harm reduction programs featuring health information dissemination and safe crack pipe kits distribution to crack smoking populations.

**Dirty hospitals and superbugs: how diseases are changing the symbol of the hospital**

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The labeling of new diseases and the culturally constructed meanings that evolve around them has had important repercussions on how hospitals are viewed. The reputation of hospitals as 'bastions of health' is being challenged by the emergence of hospital acquired infections (HAI's). HAI's place the locus of disease within the hospital and in doing so cause hospitals to be reconceptualised as diseased spaces. This is in contrast to the 20th century notion of hospitals as healing spaces and instead echoes the historical role of hospitals as 'fetid miasmas of disease'. By using the example of Methicillin-resistant *Staphylococcus aureus* (MRSA), a relatively new HAI, this paper discusses how the perception of

hospitals has been shaped by HAI's through an examination of the effect of HAI's on the physical and social space of the hospital.

#### **A test of metric methods for sex determination using fragmentary crania**

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Estimating sex from skeletonized remains is an important question addressed by forensic anthropologists in medicolegal cases. Fragmentary human remains compromised by different types of inhumation, or physical insults (e.g. explosions, fires, and mutilations) may frustrate the use of traditional morphognostic and metric sex determination methods. The base of the cranium is protected by a large soft tissue mass composed of muscle, tendon, and ligaments and can be less susceptible to damage. Several studies have been conducted to investigate the potential discriminatory value of the cranial base for the estimation of sex. In the present study, the basal region of the occipital bone in a small undocumented skeletal sample was analyzed for sex differences using various osteometric techniques. Numerous discriminant function equations were tested from three different studies using a number of measurements of the condylar region of the occipital bone described by Holland (1986). Allocation of sex using the occipital bone was compared to sex estimated using the pelvis. The allocation accuracies for Holland's (1986) equations ranged from 53.8% to 76.9%; for Gapert, Black and Last's (2009b) equations accuracy was from, 23.1% to 76.9%; and for Macaluso's (2011) equations, allocation accuracy ranged from 61.5% to 84.6%. The most effective single dimension was the maximum length of the occipital condyle (MLC) which correctly classified 76.9% of individuals examined.

#### **Examining statistical differences between standard osteological measurements taken in situ versus in a laboratory setting: preliminary results**

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Legislative parameters governing bioarchaeological projects undertaken by cultural resource management (CRM) companies often dictate the type of analysis conducted. In situations where analysis cannot be executed in a laboratory setting due to policy restrictions or reasons of expediency, researchers turn to conducting analysis in the field. This study aims to determine if there is a statistically significant rate of interobserver error between lab and in situ measurements. Standard osteological measurements of 15 individuals from the Old Don Jail in Toronto, Ontario, Canada, were analyzed by three researchers. The remains were analyzed in situ 12 months prior to being analyzed in a laboratory setting. A paired t-test was performed to determine if there was significant difference between the two sets of measurements. The mean difference ( $M=0.7182$ ,  $SD=4.9712$ ,  $N=719$ ) was statistically significant ( $t(718)=4.2108$ , two tail  $p=0.000028$ ), suggesting that there are significant differences between measurements taken in the field and those taken in the laboratory. The results of this study are important given that bioarchaeologists strive for high accuracy and precision, as well as replicability of results.

#### **Examining population affinity using occlusal polygons of the molars**

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Dental morphology has long been utilized in anthropology as a means to examine population affinity. Occlusal polygons, a pseudo-geometric morphometric technique developed to measure teeth for the purpose of investigating population affinity, utilizes the length, angles between cusp tips, and area of the molar crowns by using each cusp tip as a vertex (Morris 1986). The purpose of this research was to explore the variation present in the relative cusp location between three ancestral groups using occlusal polygons and geometric morphometric analyses (GMA). Coordinate data were collected from the cusp tips of the first and second maxillary and mandibular molars of 185 individuals of European

(n=105), African (n=52), and Asian descent (n=28). GMA was conducted in MorphoJ. The data were subjected to a Generalized Procrustes Analysis. The Procrustes coordinates (PC) were then exported and analyzed using discriminant function analysis (DFA). Lastly, interlandmark distances (ILDs) were calculated from the coordinate data and also analyzed through DFA. The average percent correct classification by tooth for ancestral group using ILDs was 51.4%. Correct classification using ILDs was highest in individuals of European descent 59.0%. Using a three-way analysis for ancestry, correct classification using the PCs averaged 84.6%. Correct classification using PCs was highest in individuals of African descent (97.2%), while correct classifications for individuals of European descent averaged 78.9% and for individuals of Asian descent averaged 72.5%. In summary, shape variables derived through the GMA yielded much higher correct classifications and can be used to accurately assess ancestral affiliation.

### **Cranial morphology of the Vedda people - the indigenes of Sri Lanka**

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The Vedda of Sri Lanka represent the indigenous hunter gatherer population of the island. In the past they have been recognised as a distinct ethnic group. Support for the representation of the Vedda people as a unique hunter gatherer population is diminishing due to their rapid urbanisation and cultural assimilation over the past two centuries. Due to considerable admixture between the Vedda, Sinhala, and Tamil populations of the island no clear boundaries exist among these groups morphologically, linguistically or culturally. Today the majority of people who self-identify as Vedda, speak an Indo-European language and do not subsist on hunting and gathering. This study uses craniometric data on a sample of Vedda crania (n=51) housed at several institutions. A descriptive statistical exploration of Vedda cranial size and shape is presented. It is followed by an analysis comparing the Vedda cranial morphology with that of the Sinhala and Tamil groups of Sri Lanka and other mainland South Asian regional populations. The Vedda cranial morphological pattern appears to be similar to that of the other South Asians in the sample. Multivariate statistical analyses on comparable craniometric variables affirm that the Vedda resemble adjacent South Asian populations, while differing significantly from the Andaman Islanders.

### **Regional similarities in pathological conditions among three Anglo-Saxon communities**

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Medieval cemeteries in Britain have been frequently excavated over the last century. The focus on burial grounds has led to extensive debate amongst scholars regarding the meaning and style of burials practiced by Anglo-Saxons. This debate has focused upon grave-goods and cemetery organization, with less focus on the health of the populations. This study furthers the investigations into the health of Anglo-Saxon populations. It examines the prevalence and absence of pathological conditions at the Anglo-Saxon cemeteries of Bamburgh, Norton and Mill Hill. Two of the sites studied derive from medieval Northumbria, while the third is located in Kent. As Anglo-Saxon burial sites are fairly scarce, these sites were chosen based on their regional variation and the extent of pathological study which has been done on the remains. It was hypothesized that there are similarities between the Northern (Northumbrian) and Southern (Kent) regions of Anglo-Saxon settlement in terms of the pathology among the sample skeletal remains. Based upon the results of this comparison, it is concluded that infectious disease, trauma and dental conditions were an uncommon occurrence at these sites and that general health was the norm.



### Chimpanzee play areas in the Lebialem-Mone Forest Landscape

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Play has recently been acknowledged as an important aspect of daily chimpanzee (*Pan troglodytes*) life. However, researchers have focused on the behavioural, social, cognitive and evolutionary aspects of chimpanzee play, and relatively little is known about the ecology of chimpanzee play. During a four-week primate field survey (July-August 2011) within the Bechati forest block of the Lebialem-Mone Forest Landscape (LMFL) of Cameroon data on several chimpanzee (*P. t. ellioti*) nest sites were collected, along with direct observations of chimpanzees engaged in play. Relevant data regarding the material composition, organization, distribution, altitude and age were recorded. Arboreal night nests characterized the majority (72% n=13) of nest sites at Bechati. There were two other types of nest sites discovered: terrestrial day nest sites (17% n=3) and play areas (11% n=2). Both play areas were organized with terrestrial day nests arranged in a half circle around a worn slope and associated with several play tools (brandishing and dragging tools), raked leaves and 'clean trails'. These areas were constructed around or near (<50m) anthills and termite mounds. Fishing rods for termite fishing and ant dipping were also discovered. Sites with this material composition, organization and distribution were classified as 'play areas'. Observations of chimpanzee behaviour and their vocalizations at play sites were also made. From the data collected it is hypothesized that these play areas were constructed during the daytime with the primary function being play related (e.g., sliding, leaves racking, play tool construction and use and play fighting). Future research is needed to strengthen the claim that these areas were primarily established as play centers. More data should help us to better understand their variation in the LMFL and their function in daily chimpanzee life.

### Behind the behinds: an experimental examination of musket trauma in War of 1812 soldiers from the Smith's Knoll site in southern Ontario

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The examination of skeletal evidence for ballistic injuries, while it has received less attention anthropologically than other types of trauma, is an important source of information regarding violence and warfare in the past. Clear evidence for musket injuries was observed on three innominates within the Smith's Knoll assemblage, which contains the disarticulated, fragmented, and commingled remains of soldiers killed during the battle of Stoney Creek in the War of 1812. The observed pelvic lesions represent three individuals who were shot in the buttocks from behind. Experimental investigation was performed to further elucidate characteristics of these injuries such as type of ammunition and potentially range of fire. To this end, faunal proxies constructed from porcine scapulae and flesh were shot with a replica flintlock smoothbore musket loaded with musket ball and buckshot ammunition at distances of 10, 15, and 20 yards. The resulting lesions were examined macroscopically and microscopically, and measurements of lesion diameter and spread were taken. Examination of these experimental lesions allowed us to confirm that two of the archaeological specimens displayed evidence of lesions likely caused by the impact of buckshot ammunition; these represent the first examples of buckshot lesions to be observed archaeologically. No consistent pattern or relationship was observed to exist between lesion diameter or spread and range of fire. Therefore, variability in the accuracy and efficiency of the flintlock musket precludes the determination of range of fire based on lesion dimensions, limiting the information available regarding this aspect of soldier experience.

### Single-grain OSL dating of the Middle Palaeolithic site Lusakert, Armenia

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Lusakert is a Middle Palaeolithic rockshelter in the Armenian Caucasus with an abundance of obsidian artefacts. The only existing chronological control for the site is an <sup>40</sup>Ar/<sup>39</sup>Ar date of ~200 ka on the basalt layer in which the rock shelter is formed. Previous chronological studies indicate the possibility that Neanderthals were present in the Southern Caucasus

at a later date than elsewhere in Europe (Adler et al. 2008). However, a more widespread application of modern chronological techniques is required to make sense of this complicated story. The presence of Late Middle Palaeolithic tools gives Lusakert the potential to provide a robust chronology for this time period in the southern Caucasus. In turn the archaeological record in Armenia could provide crucial clues for deciphering the patterns of Neanderthal social interaction amongst themselves and possibly also with modern humans.

Single-grain Optically Stimulated Luminescence (OSL) dating was undertaken on three archaeological units from the interior of the rockshelter. Initial analysis showed that the samples have a low quartz content, low intrinsic brightness, and are dominated by a relatively slowly decaying OSL component. We explore a range of measurement and data analysis strategies to circumvent these limitations. Due to the extremely complicated nature of its sediments and luminescence characteristics, this site is an important case study for showcasing a wide variety of problematic chronological features that can be commonly present at other archaeological sites.

### **Visualization and quantification of macroscopic patterning in human primary lamellar bone using novel techniques in stitched polarization microphotography**

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Recent research from anatomical and anthropological quarters has refocused the attention of traditional bone microscopy on primary bone tissues. Growth and “drift” in primary long bone tissues results in diaphyseal/metaphyseal robusticity, curvature, and adaptive morphology in youth – all points of interest for inductive inquiry in bioarchaeology. These are also major determinants of peak bone strength and mass – major factors in avoiding risks associated with musculoskeletal disease later in life. For these reasons several techniques have been proposed for the measurement and comparison of primary bone tissue distributions and growth axes, however not all of these are feasible for the total age range of individuals who display evidence of drift. In addition, most do not easily lend themselves to automated computer analysis which would otherwise greatly increase analysis efficiency. Our current research employs a method, using 45 degree polarized microphotography and basic digital geometrics, which successfully extracts drift data (endosteal and periosteal areas and growth vectors) even from older adults and facilitates development of automated measurement for future research.

### **Alberta has plenty of syph: satire and stigma**

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Alberta is currently in the midst of a serious syphilis outbreak. New cases of syphilis have been on the rise since 2000 and in response to the outbreak Alberta Health Services unveiled their online awareness campaign, *Plenty of Syph*, in 2011. This campaign disseminates a provocative and satirical message concerning individuals with syphilis in an attempt to raise awareness. Though the campaign uses new media to reach its audience, and ostensibly represents a new type of public awareness campaign, its broader themes are influenced and informed by historical public health campaigns. The *Plenty of Syph* campaign is analyzed for its portrayal and entrenchment of blame and stigma; the role of guilt, fear, and humour in the message; its characterization of women; and the recognition of the appropriate target population. This study aims to identify and critique the successes and failures of the campaign while unpacking its social and medical messages. Ultimately, does *Plenty of Syph* deflate or entrench stereotypes about syphilis? What is the manifest message of the campaign? The efficacy of this campaign has yet to be determined, but the social and medical messages it espouses will influence its reception.

**Unmasking cholera in Haiti: the transboundary nature of disease and international humanitarian intervention**

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The unexpected cholera epidemic in Haiti demonstrates the necessity to reconceptualise the complexity of disease interactions in a globalized post-disaster scenario. The multi-dimensionality of cholera in Haiti reveals pre-existing factors creating the country's vulnerability were exacerbated after the January 2010 earthquake, and subsequently enabled the entrenchment of a novel pathogen. The initial media response served to stigmatize the Haitian experience of cholera, where the source of the epidemic was attributed to the country's limited public health infrastructure without questioning the persistence of these conditions despite the presence of non-governmental and related organizations. The publicized origins of the devastating epidemic as attributed to United Nations peacekeepers magnifies the urgency of addressing the transboundary nature of infectious disease in a scenario involving international humanitarian relief measures and the responsibility of such organizations. A critical evaluation on international intervention in the perceived "failed state" discourse encompassing Haiti identifies concerns regarding the accountability and legitimacy of United Nations humanitarian missions: the operational framework enables the supranational body to act without safeguards for the recipient state, the motives underlying interventions in consideration of the Right to Protect influence perceptions of a country's sovereignty and questions of neutrality arise from a decade's long presence in Haiti. A positive and collaborative working relationship between the United Nations and recipient countries is required to not only meet short-term goals but provide resources for the long-term without maintaining an extended presence.

**Re-evaluating the genetic and linguistic evidence for the human migrations into Cuba**Matheson, C.D.<sup>1,2,3</sup>, Joseph, F.<sup>2</sup>, and I. Roksandic<sup>4</sup><sup>1</sup>Dept. of Anthropology, Lakehead University; <sup>2</sup>Dept. of Biology, Lakehead University; <sup>3</sup>School of Social Science, University of Queensland; <sup>4</sup>Dept. of Anthropology, University of Winnipeg

The geographical origins of indigenous Cubans have produced four hypotheses. The most widely accepted migration of humans from South America and migrations from other location like Florida, the Yucatan Peninsula and Central America. This paper focuses on re-evaluating genetic and linguistic evidence for migrations into Cuba. Ancient and modern genetic data from Cuba, the Caribbean, North America, Central America and South America, has been analysed with consideration for the historical and linguistic context of human migrations into Cuba. Modern genetic data provides little resolution for the origins of indigenous Cubans. The ancient genetic data and linguistic evidence supports the traditional and most widely accepted migration of humans from South America however it also provides evidence of human migrations from elsewhere, suggesting that human migrations from other location like Florida, the Yucatan Peninsula and Central America are still viable locations for the origins of some indigenous Cuban people.

**The problem of the Guanahatabey and the complexity of human migrations into Cuba**Matheson, C.<sup>1,2,3</sup> and I. Roksandic<sup>4</sup><sup>1</sup>Dept. of Anthropology, Lakehead University; <sup>2</sup>Dept. of Biology, Lakehead University; <sup>3</sup>School of Social Science, University of Queensland; <sup>4</sup>Dept. of Anthropology, University of Winnipeg

Our current state of understanding of the early peopling of Cuba and the Great Antilles in general is lamentably insufficient. The customary explanation that it consisted of several waves of migrations that originated in northeastern South America and followed the chain of the Lesser and Greater Antilles because winds and sea currents did not allow more direct routes does not hold water in the face of evidence by early Spanish and English witnesses of remarkable boatbuilding and seafaring skills displayed by native Caribbean populations. Given the paucity of available data, the present study does not attempt to give clear-cut answers, but rather to show – based on ancient DNA analysis, as well as on linguistic examination of the non-Arawakan place names in Western Cuba usually designated as Guanahatabey – that Mesoamerica cannot be excluded as a potential source of early settlers in Cuba, and that early contacts might have been established with Florida as well.

**The evolutionary ecology of nausea and vomiting of pregnancy on Yasawa Island, Fiji**McKerracher, L.<sup>1</sup>, Collard, M.<sup>1</sup>, and J. Henrich<sup>2</sup><sup>1</sup>Dept. of Archaeology and Human Evolutionary Studies Program, Simon Fraser University; <sup>2</sup>Dept. of Psychology and Dept. of Economics, University of British Columbia

Nausea and vomiting of pregnancy (NVP) refers to a suite of traits – including nausea, vomiting, and the development of novel food aversions – that many women experience during early pregnancy. Given that these traits impose energetic costs, the existence of NVP is puzzling from an evolutionary perspective. Three main hypotheses have been put forward to explain NVP. The by-product hypothesis holds that embryos prevent mothers from aborting them by disrupting maternal endocrinology and this disruption incidentally causes NVP. The compensatory placental growth hypothesis holds that embryos cause NVP to reduce maternal calorie consumption because mothers invest more energy in pregnancies when mildly calorie restricted during placentation. The prophylaxis hypothesis suggests that NVP minimizes embryo exposure to pathogens and chemical toxins during a crucial phase of embryo development. We tested these hypotheses with dietary and NVP data obtained through interviews with 70 women from Yasawa Island, Fiji. The hypotheses offer different predictions regarding the foods likely to become aversive during early pregnancy. The by-product hypothesis predicts that aversions should focus on foods encountered by mothers most frequently. The compensatory placental growth hypothesis predicts that aversions should focus on macronutrient-dense foods. The prophylaxis hypothesis predicts that foods with relatively high pathogen and toxin loads should be foci for aversions. We found that, in Yasawan women, novel aversions focus on animal foods and on toxic plants. Thus, our findings are most consistent with the prophylaxis hypothesis as, during early pregnancy, women generally avoid foods likely to disrupt embryo development.

**Cranial and caudal vertebral border shift at the Meroitic site of Semna South, Northern Sudan**

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According to anatomy texts, the human spine consists of seven cervical, twelve thoracic, five lumbar, five sacral and four caudal vertebrae. The borders between the regions are somewhat fluid, however, with upward (cranial) shift and downward (caudal) shift observable. The shift may be complete, resulting in more or fewer vertebrae in a region, or incomplete, resulting in border vertebrae showing a combination of cranial and caudal features. Although lumbar-sacral involvement may produce symptoms (Bertolotti Syndrome), in general border shift appears to simply reflect the range of variability seen in humans. Studies of American Indians and Inuit indicate that shift in these people is predominantly caudal, especially at the thoracic-lumbar and lumbar-sacral borders. This study examines border shift in over 500 Nubian skeletons dated primarily to the Meroitic period from the site of Semna South, located at the Semna Cataract on the Nile River in extreme northern Sudan. The burials were excavated by the Oriental Institute of the University of Chicago in 1967 and 1968 as part of the Aswan High Dam recovery program and are presently curated at Arizona State University. The site was inundated after the building of the Dam. In contrast to the North and South American picture, the Semna South Nubians exhibit primarily cranial shift, with the thoracic-lumbar border affected most frequently.

**Reconstructing southeast Spanish Copper Age migration: an isotopic analysis of the Camino del Molino mass burial**Merner, C.<sup>1</sup>, Grimes, V.<sup>1,2</sup>, and D.C. Salazar-Garcia<sup>2,3</sup><sup>1</sup>Dept. of Archaeology, Memorial University; <sup>2</sup>Dept. of Human Evolution, Max Planck Institute for Evolutionary Anthropology; <sup>3</sup>Research Group on Plant Foods in Hominid Dietary Ecology, Max Planck Institute for Evolutionary Anthropology

This study is the first application of strontium (<sup>87</sup>Sr/<sup>86</sup>Sr) and oxygen ( $\delta^{18}\text{O}$ ) isotope analyses to identify human mobility patterns during the southeast Spanish Copper Age (3100-2200 BCE). Human (n = 93) and faunal (n = 23) tooth enamel were sampled from the Copper Age site of Camino del Molino (Caravaca de la Cruz, Murcia, Spain) and analyzed to distinguish local and non-local individuals. The Camino del Molino site was a dense communal burial pit in continuous use during cal. 2800-2400 BCE. Results show at least 11 of the 93 individuals are migrants to the Camino del Molino area,

exhibiting  $^{87}\text{Sr}/^{86}\text{Sr}$  values higher than the local biologically available strontium isotope range (0.7064-0.7107). One young female has an enamel  $^{87}\text{Sr}/^{86}\text{Sr}$  value (0.721) much higher than comparative published strontium isotope data from Spanish archaeological sites, which may indicate she was raised somewhere outside of Spain. Overall, these results show that immigration did occur during this time period and suggest wide migration networks within the Iberian Peninsula. This paper will discuss the significance of the strontium and oxygen isotope data in the context of the Spanish Copper Age at local and regional scales.

#### **A tooth is a tooth: molar dens invaginatus**

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This poster presents a case of unusual dental morphology from an unprovenanced molar tooth of Euro-Canadian origin. The case tooth was outwardly normal, the anomaly only being discovered following sectioning of the tooth. The anomaly was examined by bright field and polarized light microscopy to identify the locations of the various dental tissues. A developmental sequence of the present anomaly was determined through detailed examination of the various tissues and in comparison with the dental literature. The anomaly is suggested to be an example of dens invaginatus, resulting from localized increase in tissue proliferation during the early stages of tooth development. Dens invaginatus is a rare anomaly with varying degrees and manner of expression and clinical consequence. However, since dens invaginatus is usually found in maxillary lateral incisors, the case of a molar with this morphology proves to be an exceptionally rare anomaly in an unusual location within the dental arcade. The aetiology of such anomalies is unknown though some suggest that strong genetic factors are involved. If so, further studies of the anomalies in other primates may shed light on human dental development from an evolutionary perspective.

#### **Patterns of skeletal age markers on Underweight vs. obese individuals**

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When skeletal remains are found in prehistoric, historic, or forensic contexts, establishing age at death is an important step in reconstructing life histories, building demographic profiles, and identifying victims. One variable not often considered in adult age estimation is that of body size; namely, how the degeneration of weight-bearing joints and non-weight-bearing joints in individuals with varying heights and weights may be affected by skeletal aging. Age estimation studies have not systematically considered body size as a variable that could influence our standards. This study assessed age from weight-bearing and non-weight-bearing bone surfaces in skeletons of individuals with known heights and weights at death. Eight age estimation methods were applied to over 800 skeletons from the Hamann-Todd and William Bass Collections. Individuals ranged in size from 1.30m to 1.95m (4'3" to 6'4") and 24kg to 148.3kg (53lbs to 636lbs). The pubic symphysis, auricular surface, sacrum, and acetabulum represented the weight-bearing joints; the first and fourth ribs represented the non-weight-bearing joints. Preliminary analyses show that at all sites, the pattern of over-aging younger individuals and under-aging older individuals is consistent for all methods. However, underweight individuals are typically under-aged by the largest margin at all sites, regardless of weight-bearing or non-weight-bearing joint, while the trend for obese individuals is less clear. For heavier individuals, the pattern of age markers tends to be more important in assessing age. These results suggest body size is important in age estimation.

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### Current biocultural perspectives on rickets in the past

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In the past decade vitamin D deficiency in association with a resurgence of rickets has featured prominently in biomedical and epidemiological studies. A decrease in sunlight exposure and a shift to breastfeeding away from vitamin D fortified infant formula has highlighted the biocultural determinants of nutritional rickets. Using a comparison of two previously published studies of rickets -- St. Martin's 18/19th century industrial urban centre in Birmingham, UK and a collection from Bahrain, Arabian Gulf, 300 BC- 250 AD -- we outline the potential biocultural influences in interpreting determinants of rickets in the past.

### Stable isotopic investigation of Ontario Iroquoian and Western Basin dog diets as proxies for human subsistence behavior

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We have used the stable isotopic compositions of bone-collagen and bone-carbonate to reconstruct access of Late Woodland Ontario Western Basin and Neutral Iroquoian domesticated dogs to maize and protein sources. As proxies for human diet, domesticated dogs serve as a means for comparing the Neutral Iroquoian dedicated-maize agricultural diet with the diet of the semi-mobile, horticultural Western Basin peoples. Maize was the plant staple for both groups and its consumption can be tracked using its distinctive carbon isotopic composition. The nitrogen isotopic composition of the dogs can be used as an indicator of protein source. Our findings suggest that Western Basin dogs were eating protein from a higher trophic level than Iroquoian dogs, possibly indicating more fish in their diet. The Western Basin peoples' emphasis of seasonal resource acquisition and warm weather lacustrine site selection supports an increase in fresh water resource consumption. Both groups of dogs appear to be eating comparable amounts of maize, supporting recent evidence of heavy maize consumption by Western Basin human populations. Our findings support Western Basin year-round maize consumption despite the archaeological evidence of seasonal mobility among some Western Basin peoples.

### White-faced capuchins (*Cebus capucinus*) may prefer caterpillars over fruit while treating other insects as fallback foods

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Researchers suggest that fruit and caterpillars are preferred capuchin foods, but non-caterpillar ("nc") insects are fallback foods which, by definition, are constantly available and often difficult to process, "second-choice" foods. Caterpillars, a seasonal and easily processed food, are likely preferred over other insects and possibly some fruit. We measured the abundance of caterpillars and "nc" insects in a seasonal Costa Rican tropical dry forest from May 2011 to July 2012, and the proportions of insect versus fruit feeding events by capuchins over the same time period. Preliminary results suggest "nc" insect abundance did not differ across seasons, which is one indicator that they can function as fallback foods. Furthermore, if capuchins prefer fruit over "nc" insects, we would expect a higher proportion of fruit than insect feeding events when fruit is available. However, we found higher proportions of insect versus fruit feeding in early wet seasons, when fruit is abundant, and the opposite in dry season (Logistic regression,  $Z_{2519,2895.3}=18.4$ ,  $p<0.0001$ ). We also found a higher proportion of insect versus fruit feeding events in 2011 and lower proportion in 2012 ( $Z_{2519,2895.3}=8$ ,  $p<0.0001$ ). We explain high insect feeding events in early wet seasons by variable caterpillar abundance, which increased significantly from the 2011 early wet to late wet season (three-way ANOVA,  $F_{2,117}=67.9$ ,  $p<0.0001$ ). Flexible and omnivorous diets like those exhibited by capuchins have been linked to the evolution of large brains.

**Water isotopes of Ontario: investigating the applications of hydrogen and oxygen isotopes as geographical indicators**

Nagel, A. and M. Mant

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The oxygen and hydrogen stable isotope compositions of organic matter are increasingly being explored as geographical indicators following the principle 'you are what you eat and drink.' The relationship of oxygen and hydrogen isotopes in human hair to geography has promising forensic applications for the determination of geographic origin and recent residence of unidentified human remains. This research examines variability in oxygen and hydrogen stable isotope values found in 17 human hair and 17 water samples encompassing eight geographical sites in the greater Hamilton and southern Ontario region. The results were then compared to established isotopic values for southern Ontario provided by the Canadian Network for Isotopes in Precipitation using the Online Isotopes in Precipitation Calculator, hosted by Purdue University ([http://wateriso.eas.purdue.edu/waterisotopes/pages/data\\_access/oipc.html](http://wateriso.eas.purdue.edu/waterisotopes/pages/data_access/oipc.html)). The results suggest that the oxygen and hydrogen isotopes in the individuals' hair correlate with the isotopic values of the water in their place of residence. This research adds to the growing body of research on the potential of using hair to determine an individual's place of residence shortly before death.

**Non-destructive multimodal imaging of the first 7 years of the mummification process – the afterlife of “Yes” the cat**Nelson, A.<sup>1</sup>, Butler, J.R.<sup>2</sup>, Garvin, G.<sup>3</sup>, Gelman, N.<sup>2</sup>, Moran, G.<sup>4</sup>, Wade, A.D.<sup>1</sup>, and Z. Morris<sup>1</sup><sup>1</sup>Dept. of Anthropology, University of Western Ontario; <sup>2</sup>Lawson Health Research Centre, London, Ontario; <sup>3</sup>St. Joseph's Health Care, London, Ontario; <sup>4</sup>Seimens Canada

In November of 2004, we initiated an experiment in mummification. The objective of the experiment was to characterize how the different tissues changed in response to the mummification process, with the particular focus being to see if stigmata of pathological processes, such as increased radiodensity of ligaments, could be produced by mummification. A cat, named “Yes”, which died of natural causes and belonged to a former graduate student, was the subject of the experiment. Yes was mummified by evisceration and desiccation using natron (NaCl, NaHCO<sub>3</sub> & Na<sub>2</sub>CO<sub>3</sub>) for 70 days. The organs were removed but the heart was left within the thorax and the brain was not removed. The cat was CT scanned immediately before mummification began, 2 months post-mummification and then 7.5 years after mummification. In addition, the most recent mummy imaging techniques of microCT and magnetic resonance imaging (MRI), including ultrashort echo time (UTE) and pointwise encoding time reduction with radial acquisition (PETRA) sequences, have been deployed to examine tissue changes at high resolution in complementary imaging modalities to better elucidate the post-mummification changes. It is clear that the changes in the appearance of the various tissues are considerable. In particular, an increase in the proportion of fat to muscle gives the superficial appearance that muscles accumulate fat in the process of mummification. However, a detailed analysis of the CT and MRI data paint a much more complex picture. This more complex picture will have important implications for our interpretation of CT scans of mummies and of potential pathological changes observed.

**Methodologic considerations for assessing physiologic stress in women**Nepomnaschy, P.A.<sup>1,2</sup> and K.G. Salvante<sup>1,2</sup><sup>1</sup>Faculty of Health Sciences, Simon Fraser University; <sup>2</sup>Human Evolutionary Studies Program, Simon Fraser University

Most research on women's stress does not adequately account for the longitudinal changes in stress physiology as women transition between reproductive phases. We will present our evaluation of said changes and present methods to incorporate variation in the corresponding statistical analyses. We used data collected in a population of healthy women from rural Guatemala to examine the transitions from post-partum amenorrhea (PA) to the resumption of regular ovarian cyclicity (ROC) and between phases within ovarian cycles. We evaluated stress (free cortisol) and reproductive hormones (estrone glucuronide, pregnandiol glucuronide, follicle stimulating hormone beta-subunit and human chorionic gonadotropin beta-subunit) in urine specimens collected from 22 women. Using linear mixed models we observed clear cortisol profiles across the transitions of interest ( $p < 0.05$  in both cases). Given the observed within-individual variation, the use of single raw cortisol values is inadequate to compare physiological stress levels across individuals. Our analyses

suggest that a minimum of 10 specimens per individual is required to properly assess an individual's physiologic stress levels. Our evaluation of alternative statistical treatments suggests that cortisol values should be standardized to make comparisons of physiologic levels both within and between women. The standardized ranking method and the sample percentile method are both appropriate, and the choice between the two should be made in accordance with the distributions of individuals' cortisol values.

#### **Palaeodemographic features of South African forager skeletal collections**

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Most studies of the curated skeletons of South African Holocene foragers have focused on morphology. This study explores the question of whether their age and sex distributions hold demographic information. Genetic reconstructions suggest that these ancestors of contemporary KhoeSan speakers expanded in numbers in the millennia prior to the arrivals of black and white populations. Several hundred skeletons represent this population, but they extend over a broad temporal and spatial expanse. Using data provided by several colleagues, this paper reviews potentially useful demographic criteria: temporal patterns in numbers of burials, proportions of juveniles to adults, the sex ratio of young adults (and hence relative mortality risk associated with first reproduction), and proportion of potentially post-reproductive adults. While plausible results are generated, sample sizes and sample structure remain central concerns.

#### **Maternal diet and infant brain sparing among Ngorongoro Maasai**

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Natural selection for bipedal locomotion and encephalization creates an obstetric dilemma. Consequently, a trade-off occurs between human brain size, locomotory efficiency, and the increased risk of maternal and infant mortality from obstructed labour. The Maasai of Northern Tanzania, attempt to ease the obstetric dilemma by restricting maternal dietary intake in order to limit fetal growth. However, due to the tendency for growth restricted newborns to exhibit brain sparing, these maternal practices would have to achieve corresponding head and body size reductions. To determine the efficacy of this cultural adaptation to the obstetric dilemma, we interviewed traditional birth attendants and mothers about their maternal practices. Maternal diet was measured, and infant anthropometric data were collected on 141 maternal-infant pairs. Participants reported a 50% reduction in dietary intake. Of the 141 infant participants, 36 (25%) were growth restricted. The brain sparing tendency was observed among the growth restricted sample, suggesting that maternal dietary restriction does not overcome the obstetric dilemma.

#### **Exploring paleopathology from the inside out; an investigation of dental pathology and trauma with CT in the clinic, the lab, and at the synchrotron**

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This research is focused on a single mandible representing an adult male individual (radiocarbon dated to 3830 ± 70 years cal. BP) from the Cis-Baikal cemetery site of Ust'-Ida I (Siberia, Russian Federation). The mandible contains two features of interest, the tip of a projectile point embedded in the symphyseal region and apparent bilateral agenesis of the central incisors. Despite the absent teeth, the mandible presents a dental arcade without diastemata, appearing normal or complete at first glance. We proposed two hypotheses to explain the incisors agenesis: a congenital defect (i.e., agenesis); or antemortem tooth loss resulting from the projectile point. We used a variety of computed tomography (CT) techniques to illustrate the capabilities available and non-destructively examine the internal architecture of the mandible. Clinical CT at 150µm resolution can create complete render of the mandible but details of the point are not

present. High resolution peripheral quantitative CT (HR pQCT) at 41µm resolution can distinguish the point in the mandible and shows the absence of unerupted incisors and/or partial alveolar sockets. Finally, the mandible was imaged at the Canadian Light Source, using high resolution synchrotron microCT at 20 µm and 10 µm resolutions to examine the microstructural details of the bone surrounding the point. The reconstructed synchrotron images showed no signs of remodelling or cortical resorption surrounding the point and no indication that central incisors had ever been present, indicating that this was a case of congenital incisor agenesis and that the trauma involving the projectile point occurred perimortem.

#### **Getting into shape: Analysing individualization of the frontal sinuses using logistic regression**

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Identification of unknown individuals is important in forensic cases to notify next of kin and to execute legal matters. The frontal sinuses are one of several areas in the skeleton considered to offer enough uniqueness on which to base personal identification. Due to their location inside the skull, between the inner and outer tables of the frontal bone, visualisation of the frontal sinuses is achieved through radiographic imaging, typically X-Ray or computed tomography (CT). Basic visual comparison, overlaying an antemortem image and a postmortem image to identify a match, has given way to several methods that have attempted to quantify observed morphological variation. Recently, owing to the Daubert ruling, an increased emphasis has been placed on quantification and testing to develop accurate and replicable methods within forensic anthropology. This paper presents the results of logistic regression analysis to predict whether two frontal sinus outlines are from the same individual. Following a protocol adapted from Cox et al. (2009), data were collected on a postmortem CT dataset of 130 individuals. Differences between repeated measures of the same skull (n=104) and different skulls (n=5459) were calculated. Logistic regression analysis was undertaken to determine if this difference could accurately predict individualization. A total of 99.7% of pairs were correctly classified (91.3 % of same skulls and 99.9% of different skulls). It is proposed that the regression formula presented here can be applied to forensic cases to determine if two frontal sinus outlines belong to the same or different individuals.

#### **Opening remarks: Canadian research in Canimar Abajo, Matanzas**

Roksandic, M.

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Guanahatabey and Taíno heritage: biological and cultural landscapes of indigenous people in pre- and post-contact Cuba investigates three key issues in Cuban and Caribbean archaeology and ethnohistory: 1) the patterns of migrations and colonization of the island of Cuba; 2) human impact on the environment and the appearance of low level food producers in Cuba; and 3) the fate of the indigenous groups at the time of contact with the Spanish, including their genetic, linguistic and cultural persistence in the modern-day Cuban identity. Our program of research requires a multidisciplinary approach that incorporates different branches of archaeology (bioarchaeology, environmental archaeology, paleoecology), isotope analyses, molecular anthropology (of both ancient and modern populations), linguistics and ethnohistory (of the Taíno, Guanahatabey and/or the as yet un-identified pre-Taíno substrate) to tackle the full scope of the proposed research questions.

#### **A case of dental modification on incisors in a pre-Columbian context of Canimar Abajo, Cuba**

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The question of dental modifications in the Caribbean and the discussion of whether they were introduced into the archipelago with the influx of African populations, or whether they were present at a pre-contact date remains unresolved. Here we present dental modification from the site of Canimar Abajo, Cuba. We examine the type of modification, it's possible function or lack thereof and the question whether parallels can be drawn with Indigenous

groups in the Circum Caribbean. Given the pre-Columbian date of the site, this case provides unequivocal evidence of pre-Contact dental modifications.

#### **More than the sum of its parts? Multivariate analysis of locomotor behavior in *Ardipithecus ramidus***

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Locomotor behavior in the Pliocene hominin *Ardipithecus ramidus* has been inferred to be primitive, comprising mainly above-branch palmigrade quadrupedalism, with infrequent vertical climbing and suspensory behaviors. By extrapolation, initial analyses have concluded that the last common ancestor of African apes and humans was also a generalized arboreal quadruped. If correct, this interpretation implies extensive homoplasy in the evolution of the African ape postcranial skeleton. However, this interpretation is based only on univariate or bivariate analyses of the postcranial skeleton in haplorhines, many using uncommon variables and/or size corrections. To determine whether postcranial morphology in *Ardipithecus* is indicative of generalized arboreal quadrupedalism, we used discriminant function analysis (DFA) to assess the degree to which appendicular skeletal morphology correlates with locomotor behavior in primates. Data include segment lengths from stylopod, zeugopod and autopod elements of fore- and hindlimb in >800 specimens representing all extant primate groups, each assigned to locomotor categories based on published data. The DFA accurately separates extant groups according to locomotor behavior based on postcranial morphology, correctly classifying >97% of cases. Among fossil taxa, *Proconsul* is unambiguously classified as an arboreal quadruped. In contrast, *Ardipithecus* occupies a unique morphospace intermediate between arboreal quadrupeds and vertical climbers/knuckle-walkers, although it is marginally closer in multivariate space to the latter. Our analysis indicates that *Ardipithecus* is not a typical arboreal, palmigrade quadruped. Instead, the total morphological pattern in its appendicular skeleton is consistent with frequent forelimb-dominated locomotor behaviors.

#### **Normal variation or abnormal situation: a preliminary paleopathological study of the sternum**

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Paleopathology relies on the ability to distinguish between normal and abnormal bone. The inclusion of many skeletal elements as a means of diagnosing pathological conditions is important in archaeological contexts, where limited elements are available. The sternum could play a role in pathological diagnoses but few studies provide descriptions or images of sternal lesions. This study assesses the relationship between bony reactions on the manubrium with pulmonary disease and trends between sternal lesions with age and sex. Eighty-one individuals in the Grant Skeletal Collection with a manubrium were assessed. Sternal lesions of all scores were present in 34.57% (28/81) of individuals. When divided into two groups based on cause of death, pulmonary and non-pulmonary disease, results showed an equal frequency of sternal lesions (34.48% (10/29) and 35.29% (18/51) respectively). Individuals with pulmonary disease were further divided into tuberculosis and non-tuberculosis categories. Chisquare tests showed no significant difference in sternal lesion frequencies for cause of death group, pulmonary category, or sex. The frequency of sternal lesions did vary significantly between age groups with older adults showing more sternal porosity than adolescents, young adults, and middle adults, but are not indicative of age. The scoring system proposed is useful to record and differentiate normal sternal porosity from abnormal porosity. Preliminary results suggest no association exists between sternal lesions and disease; however, further work is necessary on a larger sample, with a higher incidence of tuberculosis, and a relatively equal age and sex distribution to determine if the results are unique to the Grant Collection.



### Patterns of nursing and allonursing in white-faced capuchins (*Cebus capucinus*)

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Allonursing is a relatively rare behaviour in the primate order although white-faced capuchins are known to allonurse regularly and the reason for this high rate remains unclear. In white-faced capuchins, infants will attempt to suckle from all group members, including males. Using preliminary data, I attempt to discern why infants at Sector Santa Rosa, Costa Rica engage in such high rates of allonursing. Behavioural data were collected using 10-minute focal follows and ad libitum data on 9 infants (0-16 months old) in 3 capuchin groups. I examined the effects of rank, female lactation status and parity of the handler-infant dyads engaging in allonursing using GLM models. I plan to examine the effects of kinship once the data are available. Nursing bouts ( $n=341$ ) were significantly longer than allonursing bouts ( $n=60$ ) ( $F(1,399) = 9.414$   $p=0.02$ ). There were 4 instances of allonursing from males. Infants tended to select lower-ranking females over higher-ranking females, lactating females over non-lactating females and parous females over nulliparous females. However, the duration of allonursing bouts did not differ across these categories (Rank:  $F(1,54)=0.158$ ,  $p=0.693$ ); (Lactation status:  $F(1,54)=0.698$ ,  $p=0.407$ ); (Parity:  $F(1,54)=1.215$   $p=0.274$ ). If obtaining milk is the infant's goal, as suggested by the trend towards selecting lactating females, then they might improve their chance of a successful allonursing bout by selecting lower-rank females. Subordinate females may be more receptive to an allonursing attempt, if in turn they benefit through alliance-formation with the mother of the higher-ranking infant.

### The influence of allomothering and maternal activity on mother-infant contact in vervet monkeys

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Primate mothers are challenged with the task of caring for offspring characterized by a relatively long lactation period. In order to cope with the costs of a long lactation, Altmann (1980) and Dunbar (1988) suggested primate mothers train their infants to nurse when ventral contact is not a hindrance to the mothers' activity. Primate mothers may also utilize other troop members as 'babysitters' to forage unencumbered by a clinging offspring. I examined the role of maternal activity and allomothering on infant contact in 15 mother-infant pairs of free-ranging vervet monkeys, *Chlorocebus aethiops*. Infant ventral contact decreased disproportionately based on mothers' activity, where infant ventral contact was significantly lower while the mother was foraging than resting from months three to six (month three:  $z=-3.01$ ,  $p<0.05$ ; month four:  $z=-4.52$ ,  $p<0.001$ ; month five:  $Z=-3.80$ ,  $p<0.01$ ; month six:  $z=-2.94$ ,  $p<0.05$ ), and significantly lower while the mother was moving than resting in months five and six (month five:  $z=-1.46$ ,  $P<0.05$ ; month six:  $z=2.77$ ,  $p<0.05$ ).

Allomothering rates were highest in the first couple of months, which corresponded with the mother spending a significantly greater portion of time socializing while the infant was off-ventral contact compared to on-ventral contact (month zero:  $z=3.87$ ,  $p<0.001$ ; month one:  $z=3.15$ ,  $p<0.01$ ). These results suggest mother-infant contact is influenced by allomothering and maternal activity, with mothers spending more time socializing in the first couple of months when the infant is off-ventral contact and decreasing infant ventral contact while foraging in the later months.

### A new method for transporting and storing fragmentary human remains

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The practical issue of transporting fragmentary human remains has received little attention in the bioarchaeological literature. Most methods have been developed ad hoc for the purposes of cultural resource management and do not address the unique needs and challenges of dry bone. Many of these also do not control for the continued biological and chemical decomposition of remains during transport and subsequent storage. However, the need to move collections, fossils, and samples over long distances continues to be a major component of anthropological research. This poster presents a method created to transport a collection of terminal Pleistocene human remains from the University of Alberta to the National Museum of Tanzania. The remains consisted of thousands of extremely fragile fragments that were separated into several hundred catalogue numbers based on skeletal element and provenience. As it was unclear

when the material would be accessioned, this system also needed to function as long-term storage. Finally, the collection had to be intellectually and physically accessible by other researchers in the interim. By combining museum and archival products with everyday items like tackle boxes, we were able to pack the collection in 8 weeks according to museum standards and for under \$1000 CAD. We also retained samples to re-evaluate the condition of the bone in 5 years' time. This method is relatively simple and inexpensive, but may significantly reduce damage to archaeological human remains used in international research. This is critical for preserving materials for future study, as well as upholding our ethical obligations as anthropologists.

#### **Hair $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ values in long-tailed macaques (*Macaca fascicularis*) from Singapore**

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The analysis of carbon and nitrogen stable isotopes has become an important avenue of research for primatologists interested in the study of feeding ecology and nutrition in nonhuman primates. Until only recently much of the research on stable isotopes in nonhuman primates has focused on African and New World primates but not on Asian primates such as macaques. In the following report we describe intra- and inter-group variation in stable isotope values in a population of long-tailed macaques in Singapore. In addition, we place the observed variation in stable isotopes within a larger context for the genus *Macaca*. Our analysis revealed significant variability among geographic locations in  $\delta^{13}\text{C}$  but not  $\delta^{15}\text{N}$ . The range of variation in  $\delta^{13}\text{C}$  was consistent with a diet based on C3 resources, with the group from one location (Bukit Timah) exhibiting a low value consistent with a closed canopy environment. Based on the significantly larger mean among group difference, Singapore exhibits a higher level of dietary heterogeneity as reflected by stable carbon and nitrogen isotope values than the macaques from Gibraltar and Nepal—the only other macaques for which intergroup differences have been reported. Our genus-wide comparison revealed that relative to other macaque species from Europe and Asia, the macaques from Singapore exhibit a high mean  $\delta^{13}\text{C}$  value but a mid-range mean  $\delta^{15}\text{N}$  value. These results are important because they contribute to our understanding of stable isotope variability in the genus *Macaca*.

#### **Designating the deviants: An exploration of mortuary traditions at the Drawsko 1 cemetery site (17th-18th centuries)**

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Analysis of the Drawsko 1 (Poland) cemetery has uncovered emerging patterns that speak to the complexity of the mortuary traditions observed at this post-medieval (17th-18th centuries) site. While the main focus of research to date has been concerned with the osteological analysis of deviant “vampire” burials, new data regarding mortuary traditions reflect how these deviant individuals were situated within the larger community. The two primary goals of this study are: 1) to assess mortuary tradition variability at Drawsko, and 2) to assess the mortuary traditions of other Polish cemeteries with evidence of deviant burials. Mortuary data were collected for 261 adult (>18 years; n=111) and subadult (<18 years n=150) individuals, including the presence/absence of a burial coin, artifacts, and a coffin, as well as arm positioning, burial orientation, and burial location. Each of these mortuary variables were compared to one another with attention paid to age and sex (when possible) using chi-squared tests ( $p < 0.05$ ); results indicate no statistical significance for any variables. These data were then compared to the mortuary traditions visible at surrounding sites with deviant and non-deviant inhumations. Results from this intra- and inter-population study illustrate uniformity in mortuary traditions in this region of Poland not only within the Drawsko 1 site, but also from earlier medieval sites dating to the late 10th century. While the complexities of these mortuary patterns are still being investigated, the similarities in treatment of both deviant and non-deviant individuals over time demonstrates continuity in burying the dead to protecting the living.

**The Superwoman: stress and multiple-role engagement**

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In media and popular literature, the “superwoman” is portrayed as a woman who performs multiple, concurrent, full-time roles balancing both her family and work life. These roles may include those of mother, wife, caregiver, volunteer, student, worker, and homemaker. Engagement in multiple social roles however, is known to contribute to adverse psychological and physiological experiences of stress. Although the superwoman has often been described as being exposed to multiple stressors generated through multiple-role engagement little attention has been given to psychological perceptions that underlie the relationship between the number of roles and stress. The present research investigates the relationship between multiple-role engagement and stress in a small sample of women (n=322). Our analysis also evaluated the relationship between the number of roles and the level of perceived satisfaction, and social capital. We predicted that superwomen would exhibit higher levels of perceived stress and lower levels of satisfaction. The results of our ANOVA test indicated there is not a significant difference in perceived stress across quartiles of role engagement, nor was there a difference in role satisfaction. There was, however a significant difference across quartiles of role engagement in life satisfaction ( $p=0.018$ ). Superwomen (n=81), defined as respondents in the 4th quartile of multiple-role engagement (3.736 roles), did not exhibit significantly (Mann-Whitney U tests) different levels of perceived stress, average role satisfaction or life satisfaction than those respondents engaged in fewer roles. Superwomen exhibited significantly greater social capital as measured by network size ( $p=0.027$ ) and diversity ( $p<0.001$ ).

**Shedding synchrotron light on the usage of mercury in colonial Antigua**Swanston, T.<sup>1</sup>, Varney, T.<sup>2</sup>, Coulthard, I.<sup>3</sup>, George, G.N.<sup>4</sup>, Pickering, I.J.<sup>4</sup>, Murphy, R.<sup>5</sup>, and Cooper, D.M.L.<sup>1</sup><sup>1</sup>Dept. of Anatomy and Cell Biology, University of Saskatchewan; <sup>2</sup>Dept. of Anthropology, Lakehead University; <sup>3</sup>Canadian Light Source, Saskatoon; <sup>4</sup>Dept. of Geological Sciences, University of Saskatchewan; <sup>5</sup>National Parks, Antigua, West Indies

As part of a larger study on lead poisoning in colonial Antigua, a mass spectroscopic analysis (ICP-MS) of bone elements from 17 individuals once buried in a Royal Naval Hospital cemetery (1793-1822) revealed a high level of mercury in one individual. Due to the impact of diagenesis on archaeological material, trace element data retrieved by conventional methods must be scrutinized. Synchrotron radiation X-ray fluorescence (SR-XRF) was employed to determine whether the mercury was present as a result of biogenic deposition. The SR-XRF study revealed an osteon with mercury-labeled lamellae, which is indicative that the mercury was biogenic. The synchrotron radiation X-ray absorption spectroscopic (SR-XAS) technique of X-ray Absorption Near Edge Structure (XANES) was used to determine that the mercury was present in the bone tissue as an inorganic mercuric sulfide. While mercury toxicity is now recognized, elemental mercury and inorganic mercury compounds were used for centuries to treat ailments such as syphilis and yellow fever. The inorganic mercury identified in this study is known to cause kidney damage and may have impacted the individual's health.

**Clothing and the replacement of Neanderthals by modern humans**

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Between 40,000 and 25,000 years ago, during the cold, dry period known as Oxygen Isotope Stage 3, modern humans migrated into Europe and replaced the Neanderthals. Here, we report a two-part study in which we investigated whether clothing could have played a role in this replacement event. In the first part of the study, we carried out a systematic review of the use of mammals for clothing among mid-to-high latitude non-industrial societies in order to identify taxa whose remains can be interpreted as evidence or utilitarian clothing. In the second part of the study, we statistically compared the relative frequencies of the above taxa in Neanderthal-associated and early modern human-associated archaeological occupations from Europe. The results of the analyses suggest that modern humans made utilitarian clothing out of a wider range of taxa than Neanderthals. They also suggest that the clothing produced by modern humans

was more thermally effective than the clothing made by Neanderthals. Fur ruffs, which are important in polar environments today, may have been a modern human innovation. These findings are consistent with the idea that clothing played a role in the replacement of Neanderthals by modern humans

#### Testing the efficacy of aspartic acid racemization for aging adult human skeletal remains

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Few problems have confounded bioarchaeological research more than that of aging older (> 40 years) adult human skeletons. Researchers have targeted virtually every area of the skeleton and dentition in order to develop sequences of morphological and microscopic changes that can be correlated with chronological age. The key problem is that the morphological and microscopic changes are more variable with increasing age, and this variance reduces their correlation with chronological age estimation. In the past three decades molecular research has impacted virtually every research area in bioarchaeology except aging. This project aims to address that discrepancy. The main objective of this research was to test changes in the ratio of enantiomers (racemization) of aspartic acid found in human dentine as a means of obtaining age-at-death estimates from skeletonized remains. Ultra High Pressure Liquid Chromatography (uHPLC), coupled with fluorescence tagging, was used to determine the amount of racemization found within the dental tissues of 14 individuals from the Dakhleh Oasis, Egypt (50-450 AD). I found that without standard operating procedures this methodology is problematic. Suggestions are given so as to standardize this methodology in order to facilitate its use in future bioarchaeological research projects. Refinement of this method of aging may allow for much better age-at-death estimations, especially when evaluating older adult cohorts.

#### Coherence, coordination and spatial dynamics in vervet monkeys

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Vervet monkeys (*Chlorocebus aethiops*) are highly social primates, spending much of their day foraging in cohesive, coordinated groups. Subgroup formation and fission-fusion, however, have also been observed. In this study, we attempt to objectively identify and quantify subgroup formation. We also aim to determine if the size, composition and cohesion of said subgroups can be measured, as well as the frequency of their formation. Over a period of nine months, we collected data on two large troops of vervet monkeys on the Samara Game Reserve, in South Africa. We developed a novel method to collect data on individual vervet spatial position throughout the course of a day using handheld GPS-equipped data loggers. Our results reveal the clear formation of subgroups across both studied troops of monkeys, with large variation in frequency of subgroup formation between troops. Our research introduces a novel methodology to the field of primatology, as well as a means to quantify spatial-temporal dynamics across species.

#### Not the sole reason: An examination of first metatarsals in hopes of identifying bunions from the past

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The aim of my poster is to elucidate how bunions may be identified in the archaeological record. A bunion, or hallux valgus, is the abnormal angulation of the first metatarsal head laterally. This is often accompanied by the swelling of the bursal sac and other abnormal bone activity around the first metatarsal head. This kind of tissue injury would exert pressure on the first metatarsals and create visible abnormal bone activity on the first ray. I patterned my examination of first metatarsal bones on May's 2005 criteria on how to identify hallux valgus in the archaeological record. I examined two osteological collections: the first was Simon Fraser's teaching collection. This collection consists of disarticulated modern skeletal remains. These bones do not have any records associated with them. The second collection comes from an archaeological site of Ganj Dareh, Iran, which dates back to roughly 7,000 BC. This collection was provided to me by

SFU's Professor Deborah Merritt. It contains roughly 49 individuals. For both collections, I examined the individual metatarsals. If the first ray was present in individuals from the Ganj Dareh collection, I also examined it for any signs of abnormalities. All together I examined 13 Ganj Dareh individuals and 15 disarticulated metatarsals from the SFU collection. Examining and comparing metatarsals from various periods of time may provide insight into the continual evolution of bipedalism and whether footwear is part of the problem or solution. This is especially interesting in regards to the new fad of minimalist footwear and whether or not reducing cushioning and relearning how to walk may improve or harm our overall health.

#### **Lead poisoning in the eighteenth century Royal Navy at English Harbour, Antigua, W.I.**

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Lead (Pb) has been cited as a contributing factor in the demise of the British military in the West Indian colonies during the French Revolutionary and Napoleonic Wars (c. A.D. 1792-1815). In order to address the validity of this assertion, bone samples from 17 individuals whose remains were excavated from a Royal Naval Hospital cemetery in Antigua, WI were analyzed. The bulk element concentration levels were measured via inductively coupled plasma mass spectroscopy (ICP-MS). Pb was identified at levels sufficient to induce at least mild poisoning in 14 individuals, with nine having levels which suggest they likely experienced moderate to severe poisoning. The biogenic nature of this toxic element was confirmed in six samples using synchrotron radiation x-ray fluorescence (SR-XRF). Pb was pervasive in the colonial environment since the malleable, non-corrosive element was utilized in making many commonplace items such as cooking utensils, distillation equipment, and eavestroughing. It was also a common ingredient in medicinal compounds, and alcoholic beverages. The association of the cemetery with a naval dockyard and hospital on an island with no natural source of fresh water other than captured rainwater suggests that lead contaminated water and rum would have been common sources of the element for these individuals. The Pb levels in many of the individuals tested in this study so far may have been enough to impact their health. A question of historical interest is being addressed, and the variability of lifestyle and health in a colonial navy outpost is beginning to be revealed.

#### **A multi-factorial model of intra- and inter-population differences in pre-menopausal women's progesterone concentrations**

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Biological anthropologists have been at the forefront of documenting significant between-cycle differences in a woman's concentrations of ovarian hormones. This temporal variation is often coincident with seasonal changes in food availability and/or workloads, lending strong support to energetic explanations for variation in ovarian functioning. In addition, in Mayan women, changes in ovarian steroid concentrations are associated with temporal changes in cortisol, suggesting that psychosocial stressors also impact an individual's ovarian functioning. These explanations of within-woman hormonal variation also underpin models that seek to explain inter-population hormonal variation. It has long been thought that average ovarian steroid levels in non-industrialized populations in which energetic stressors were commonplace were always lower than those in industrialized populations. However, nomadic herders reliant on animal foods and following physically demanding lifestyles are now known to have progesterone concentrations significantly higher than those in industrialized and other non-industrialized populations. Moreover, inter-individual hormonal variation in healthy pre-menopausal women is far greater (three-fold and more in several study samples) than that between populations (less than two-fold). Energetic models cannot readily explain the entirety of this substantial non-pathological variation. Drawing on what is currently known of variations in the genes coding for enzymes acting in steroid biosynthesis and metabolism, and using hormonal data from pre-menopausal women representing several populations, we present a multi-factorial model based on the hypotheses that genotypes and dietary composition, as well as energetic



and psychosocial stressors, are plausible and significant contributors to both within and between populational variation in ovarian steroid levels.

#### **An abdominal incision plate for a transperineal evisceration: embalming archaism in the late Roman Period**

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In April of 2012, the human Egyptian mummies of the Redpath Museum in Montreal were computed tomography (CT) scanned. The 'Theban Female' mummy (RM2717) was previously believed to have been embalmed in the New Kingdom [1550-1069 BCE], but the CT scans demonstrated a feature not previously noted prior to the Third Intermediate Period [1069-664 BCE] – transperineal evisceration. Subsequent AMS radiocarbon dating, however, placed the mummy within the latter half of the Roman Period [30 BCE – 395 CE], between 230 CE and 380 CE. The CT scans also demonstrated the presence of a cartonnage incision plate, typically associated with magical healing of an evisceration incision in the left abdominal wall. This unusual incision plate likely represents an embalming archaism, given the late date for the mummy. Despite the decline in mummification at the end of the Roman Period, the abdominal incision plate remained part of the tradition of providing the deceased with a healed and protected mummy for her enjoyment in the afterlife. The plate was not visible on plain film radiographs, and it was only by virtue of the three-dimensional nature and excellent contrast resolution of CT imaging that it was noted and analysed.

#### **Demography, violence and mortuary practices in the pre-Columbian Caribbean: Kelbey's Ridge 2, Saba**

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The site of Kelbey's Ridge 2, located on the small Leeward island of Saba, in the Lesser Antilles, and dating to 1350-1450 cal AD, provides a unique opportunity to examine the material and physical remains of a small Caribbean community as it existed just prior to colonial contact. Material culture, site features and 14C dates indicate a Taino cultural affiliation, unusual due to the position of site, which is east of the focus of the classic Taino culture found in the Greater Antilles. Though the burial population consisted of only 10 individuals in seven graves, 70% of these individuals were juveniles. Composite graves revealed mortuary practices involving inter-generational burials, the combined interment of cremated and non-cremated remains, and the exclusion of specific body parts. Paleopathological analysis revealed evidence of interpersonal violence, strenuous physical activity, and poor dental health. This research was funded by the Netherlands Organisation for Scientific Research (NWO) grant 277-62-001 (Communicating Communities).

#### **Evaluating etiologies of cribra orbitalia and porotic hyperostosis in the Kleinburg ossuary skeletal collection**

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The diet and lifestyle of the Kleinburg Ossuary Skeletal Collection was reconstructed using ethnohistoric information and published research on paleobotanical and stable isotopic evidence in order to evaluate conflicting hypotheses of etiology for lesions associated with cribra orbitalia (CO) and porotic hyperostosis (PH). Hypotheses of etiology investigated cite iron deficiency anemia, megaloblastic anemia, the anemia of chronic disease and scurvy as potential causes of the lesions of interest. These conditions can be summarized in three distinct hypotheses: (1) iron deficiency anemia, (2) distinct deficiencies, and (3) erythropoietic anemia hypotheses. 161 individuals were macroscopically assessed for evidence of CO and PH. Cribra orbitalia was diagnosed in 74.6%, and porotic hyperostosis (PH) in 41.2%. Only 15.8% possessed both lesions. Pearson's chi-square test revealed that the association between the two lesions is not significant  $\chi^2(1)=1.289$ ,  $p=0.346$ . Based on high frequency of CO, low number of individuals affected by both CO and PH and the lack of significant

association between CO and PH, the results suggest that among the three models of etiology that this research set out to test, the iron deficiency anemia hypothesis is not valid. Because the Kleinburg diet contained sufficient protein to prevent anemia, these results do not permit an evaluation of the merits of the distinct deficiencies hypothesis versus the erythropoietic anemia hypothesis with respect to PH, however the lack of support for the iron deficiency hypothesis, particularly as a cause of orbital lesions, is an important contribution to the debate concerning lesions that are encountered so frequently in the archaeological record.

### 3D micro-CT analysis of craniocervical injuries caused by judicial hanging

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In 1995, the skeletal remains of four hanged felons were excavated from the Peterborough County Jail (Ontario, Canada). The four hanged men have been positively identified as Thomas Konek, Michael Bahri, Edward Jackson and William Brenton through the use of archival records and photographic superimposition. We present an analysis of the crania, mandibles and cervical spines of all four individuals using micro-CT and 3D visualization, carried out at the Sustainable Archaeology Ancient Imaging Laboratory at the University of Western Ontario. The macroscopic nature of the hanging trauma has been documented and described by Spence and colleagues (1999). However, the use of 3D imaging enhances the interpretation of trauma by allowing us to detect and analyze effects on the skeleton that are neither detectable macroscopically, nor visible from external surfaces of the bone. The use of 3D imaging and visualization to examine skeletal injuries known to be caused by judicial hanging is relevant to forensic anthropologists because it allows affirmative characterization of the resulting trauma. The results of this analysis will form a basis for comparison against cases where suicidal hangings are suspected. However, caution must be used when extrapolating these results to modern forensic cases. In particular, the injuries to C2 associated with the "long drop" typical of historic judicial hangings are rarely encountered in cases of suicide by hanging.

### Dietary diversity scores to assess dietary quality among Guyanese Makushi

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Anthropologists working with indigenous peoples of tropical rainforests have long held that diet is the key to understanding the lifeways, current health, and potential impacts of the rapid culture change now occurring among many of these groups. Despite this and a long interest by anthropologists in the subsistence strategies and health of the peoples of tropical rainforests, we have little reliable information about their diets. This study is designed to begin to address this shortfall in the literature by reporting dietary intake data for Makushi Amerindians of Guyana. In six households in each of 13 Makushi villages, 24-hour recalls were conducted for the mother, child under the age of 5 years and one adolescent or other adult. Recalls were conducted twice a month for one year, providing 5616 days of dietary data. Dietary diversity scores are calculated to assess dietary quality as these scores have been found to reflect nutrient adequacy among adults and children. Preliminary analyses indicate that of all the foods reported, starch is the most common, representing 56% of the foods consumed. Starch is followed by fish (17%), fruits (10%), meat, nuts and dairy (each ~3%). As well, the scores indicate that children consume a monotonous diet, generally consuming foods from only 2 food groups per day. The implications for Makushi health outcomes will be discussed.

**SFU's bioarchaeology in China**

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The presentation will introduce SFU's on-going collaborative research with the Institute of Archaeology, Chinese Academy of Social Science (CASS) in Beijing, and the plan to build a joint Bioarchaeology Research Centre at Jilin University (JLU) in Changchun, China. With technical assistance from faculty and graduate students at SFU, the Institute of Archaeology has recently built a dedicated ancient DNA laboratory with the same lab layout/design as SFU's lab. It is expected that the use of the same research protocols will facilitate more effective inter-lab collaborations between the two labs since research personnel from one lab can easily walk in to work in the other lab. The planned JLU-SFU research centre aims to create a platform for both SFU and JLU researchers to work together on archaeological remains curated at Jilin University. The University runs the largest archaeology program in China, enrolling 50-60 new MA and Ph.D. students each year. The program is particularly strong in physical anthropology / human osteology, where tens of thousands of human skeletal remains are available for research. While the collaborative research with the Institute of Archaeology in Beijing is currently focused on ancient DNA studies, the joint research with JLU will be more centered on the study of human skeletal remains.

**Oral health of people from Houtaomuga Site (ca. 7,000 BC – AD 500) in Northern China**

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This presentation reports a preliminary study that, as part of a larger research project, explores oral health of 70 human skeletal remains unearthed from 42 burials from the Houtaomuga site on the plain of Northern China. There are four layers of cultural deposits at this site, spanning from ca. 7,000 BC to AD 500. The sample contains 41 adults (18 males, 19 females and 4 sex-undetermined individual) and 29 sub-adults. This study examined 317 deciduous and 949 permanent teeth for the frequency and severity of five dental health indicators: wear, chipping, caries, antemortem tooth loss, and abscessing. Results in adults reveal a low frequency of caries (9.8%) and the high prevalence of AMTL and abscessing (29.3% and 34.1%, respectively). The Silicone-PVS technique was used to make 105 labial/buccal casts of teeth selected from 30 individuals in order to document enamel hypoplasia. The replicas were examined using both light and scanning electron microscopy to determine timing and duration of stress episodes. This study aims to explore the relationship between EH frequency and weaning age within the context of life conditions of ancient populations that once inhabited this area. It is expected that when comparing with samples from surrounding areas, these indicators will provide a unique way to understand the lifeways and the effectiveness of adaptive strategies applied by the ancient people in Northern China.

