41st Annual Meeting
41éme Congrés annuel

Program with Abstracts
Programme avec les résumés

Canadian Association for Physical Anthropology
Association canadienne d'anthropologie physique

Photo by Ken Jones

October 17-20, 2013
du 17 au 20 octobre, 2013
Scarborough, ON

UNIVERSITY OF TORONTO SCARBOROUGH

The Organizing Committee would like to thank all of our generous sponsors who have supported the 2013 annual CAPA-ACAP conference.

Welcome to Scarborough!

We are delighted to welcome you to the 41st annual meeting of CAPA-ACAP in beautiful Scarborough, Ontario. This rapidly growing part of Toronto is the home to a wonderfully culturally varied community. Just to give you a sense of our diversity, fewer than half of Scarborough residents list English as their mother tongue. Other languages that are commonly spoken include Tamil, Cantonese, Tagalog, Mandarin, and Gujarati. It is truly an excellent place to teach Anthropology!

A particular feature of this year's meeting is that we will be spending 2 days (Saturday and Sunday) on the campus of the University of Toronto Scarborough (UTSC). This is made possible by the generous support of Dr. Rick Halpern, Dean and Vice Principal (Academic) who (among other things) will be buying everyone lunch on Saturday. We also would like to thank the UTSC Vice Principal Research, Dr. Malcolm Campbell, who is sponsoring the Poster Sessions. In addition, we have received tremendous support from our various commercial sponsors, who are listed on the inside cover of this program book. Thanks!

Additional thanks need to go out to the other members of the CAPA Organizing committee: Lianne Tripp, Sara Ghazi, and Drs. Genevieve Dewar and Larry Sawchuk. We have also received incredible support from Frank Villiva of UTSC (Supervisor, Conference & Events). And this meeting would not be possible without our student volunteers. We appreciate all of your hard work!

Finally, we would like to extend a particular welcome to our undergraduate visitors. This year we are opening the weekend sessions to members of the UTSC Anthropology and Health Studies student association ("AHA"). We are delighted to welcome the next generation of anthropologists to sample everything that CAPA-ACAP has to offer.

We hope you enjoy the meetings, and please don't hesitate to find one of us if you have any questions or concerns.

Mary T. Silcox, PhD
Michael A. Schillaci, PhD
Monika K. Sumra, MSc

Schedule of Events

Thursday, October 17th (Delta Toronto East):

Registration: 5:00-9:00 pm, Toronto Foyer

Welcome Reception: 7:00-9:00 pm, Toronto Foyer

Friday, October 18th (Delta Toronto East):

Registration: 8:30-12:00; 1:30-4:00, Toronto Foyer

Technical session 1,Human Biology, DNA and Osteology: 8:30-12:00, Toronto A/B
Technical session 2, Bioarchaeology and Osteology: 8:30-12:00, Toronto C/D

Graduate Student Luncheon: 12:00-1:30, Terrace Boardroom
-participation is limited to those who registered in advance

- Academic Writing: The Process of Writing for an Academic Journal and Where to Begin - presented by Dr. Tracey Galloway, University of Manitoba
- Applying for Funding: Tips and Tricks for Writing Effective Proposal and Funding Applications - presented by Dr. Megan Brickley, McMaster University
- CV Writing: The Dos and Don'ts of an Academic Resume - presented by Dr. Lesley Harrington, University of Alberta

Symposium, Physical Anthropology and Food Security: 1:30-4:15, Toronto A/B

Pub night: Mill St. Brew Pub, Beer Hall (21 Tankhouse Ln.; Beer Hall located on Rackhouse Mews)
-participation is limited to those with advance tickets
-please arrive in the hotel lobby by 6:00
-buses will leave from the Main Gates (55 Mill St.) at 9:30 to return to the hotel

Saturday, October 19th (University of Toronto Scarborough)

-buses from the hotel to the university will leave from in front of the hotel starting at 7:00 am
-buses returning to the hotel will leave from Parking Lot C (see UTSC campus map="P_C")
-parking is available in Parking Lot 4 ("P_4" on the campus map) for those who requested it in advance

Registration: 8:30-12:30, Social Sciences Building ("MW" on campus map) Foyer

Poster Session: 10:00-4:15, MW130
-poster authors should be at their posters 10:00-10:15 & 2:45-3:15

Symposium, Canadian Contributions to Bioarchaeology, in Honour of Susan Pfeiffer: 8:30-12:15, MW 170

Lunch: 12:15-1:30, Rex's Den, basement, UTSC Student Centre ("SL" on Campus Map)
-sponsored by the Dean and Vice Principal (Academic), University of Toronto Scarborough
-participation is limited to those with advance tickets

Discussion on repatriation issues led by Susan Pfeiffer: 1-30-2:00, MW 170

Technical session, Forensics and Osteology 3: 2:00-4:15, MW170
Technical session 4, Living and fossil non-human primates: 2:00-4:15, MW160

Business meeting: 5:00-6:00, Delta Toronto East, Neilson Room

Pre-banquet reception: 5:30-6:30, Delta Toronto East, Toronto Foyer

Banquet: 6:30-10:00, Delta Toronto East, Toronto A/B

Sunday, October 20th (University of Toronto Scarborough)

-buses from the hotel to the university will leave from in front of the hotel starting at 7:00 am
-buses returning to the hotel will leave from Parking Lot C (see UTSC campus map="P_c")
-parking is available in Parking Lot 4 ("P_4" on the campus map) for those who requested it in advance
-luggage storage is available in room MW 324

Poster Session: 9:00-12:00, MW130
-poster authors should be at their posters 10:30-11:00

Symposium, The Odd, the Unusual, and the Strange: Human Deviant Burials and their Cultural Contexts: 9:00-12:00, MW 170

Bus to the airport: leaves at 12:15 from Parking Lot C (see UTSC campus map="P_c")
-participation is limited to those with advance tickets

Podium sessions

(* indicates student prize eligibility)

Friday October 18th morning, Delta Toronto East Hotel, Toronto A/B

Technical session 1: Human Biology, DNA and Osteology
Chair: L. Tripp

8:00-8:30		Presentation set-up
8:30		Welcome from the Organizing Committee
8:45	Burke, S.D.A.	Biocultural perspectives on bed rest in the tuberculosis sanatorium era
9:00	*Bryce, E.K.	A new method for quantifying inter-diurnal weather movement and its application to predicting daily mortality
9:15	*Tripp, L.	Evolving laws, bio-demography, and the Hindu community of Gibraltar
9:30	Battles, H.T.	Use of GIS in evaluation of models related to poliomyelitis mortality patterns in southern Ontario, Canada, 1900-1937
9:45	Sawchuk, L.A., Tripp, L., Damouras, S., and M. DeBono	Seasonality of stillbirths in Malta and the effect of pasteurization
10:00-10:15		Coffee Break
10:15	Parra, E.J., Hider, J.L., Gittelman, R.M., Shah, T., Edwards, M., Rosenbloom, A., and J.M. Akey	Exploring signatures of positive selection in pigmentation candidate genes in East Asian populations
10:30	Sumra, M. and M. Schillaci	Stress and the multiple-role woman: taking a closer look at the "Superwoman"
10:45	*Holland, A., and A. Lorbergs	"Not one of the big ones": exploring representations of the lived experience of osteoporosis
11:00	Siek, T., and M. Liston	Acute leukemia versus juvenile scurvy in differential diagnosis
11:15	*Holland, E.	Addressing the Osteological Paradox through a direct comparison of childhood health based on non-survivors and survivors
11:30	*Decrausaz, S.L.	The role of morphometrics in the presence of parturition scarring on the human pelvic bone.
11:45	*Robertson, H.I.	A geometric morphometric study of sex-based shape differences in the human hip bone

Friday October 18th morning, Delta Toronto East Hotel, Toronto C/D

Technical session 2: Bioarchaeology and Osteology
Chair: A. Wade

8:00-8:30		Presentation set-up
8:30		Welcome from the Organizing Committee
8:45	Viola, B., Sawyer, S., Shunkov, M.V., Derevianko, A.P. , Pääbo, S. and J.-J. Hublin	New teeth from Denisova cave and the dental morphology of the Denisovans
9:00	Drapeau, M.S.M., and J. Forgues-Marceau	Metatarsal torsion and footwear in human populations
9:15	Chazan, M., and F. Berna	Discrepancies between biological and archaeological indicators for the onset of hominin control of fire
9:30	Cameron, M. E., and S. Pfeiffer	Later Stone Age foragers' long bone cross-sectional geometric properties compared: fynbos, forest and lower Orange River Valley
9:45	Yang D.	SFU-JLU joint centre for bioarchaeological research of Chinese skeletal remains
10:00-10:15		Coffee Break
10:15	Dolphin, A.E., Lorvik, K., and A. K. Hufthammer	Childhood stress among the well-to-do in early medieval Bergen, Norway
10:30	McConnan Borstad, C., Garvie-Lok, S.J., and D. Katsonopoulou	Dietary resource use during the Hellenistic, Roman, and Byzantine periods at Helike (Greece)
10:45	Klales, A. R., and J. P. Elias	"A disjointed muddle of bones?" Deliberate disseveration in Egyptian mummification
11:00	Wade, A.D., Beckett, R., Conlogue, G., Gonzalez, R., Wade, R., and Brier, B.	Talking to the embalmers: experimental and ancient mummification radiology
11:15	*Nafte, M.	Trophies and talismans: the traffic of human remains
11:30	*Saly, A.	An assessment of metric-based methodologies from 3D images
11:45	Raguin, E., Streeter, M.A., Lazenby, R.A. and M.S.M. Drapeau	Endosteal lamellar deposition as an indicator of mechanical load: comparison between two populations

Friday October 18th afternoon, Delta Toronto East Hotel, Toronto A/B

Symposium: Physical Anthropology and Food Security
Chair: T. Galloway

1:00-1:30		Presentation set-up
1:30	Galloway, T., and L. Semchuk	The impact of federal food subsidy programs on food security in Canada's northern communities
1:45	Williams, J. S.	Food security on the central Peruvian coast: Investigating the impact of Inca imperialism on food availability
2:00	Moffat, T., and D. Thrasher	Addressing child malnutrition and food insecurity with School Lunch Programs: Canada, France and Japan
2:15	Wilson, W., DeCaro, J., Manyama, M., and B. Hallgrimsson	Maternal mental health as a mediator of the impact food insecurity on child health in a peri-urban region of Tanzania
2:30	Crooks, D.L., Hadley, C., and L. Cliggett	Global food insecurity and mental health project: a research protocol
2:45-3:00		Coffee Break
3:00	*Williams, J.	Adolescent food acquisition beyond the household food environment in Belfast, Northern Ireland
3:15	Sellen, D.	Food security as child care in human evolution
3:30	*Anderson, L.	The experience of household food insecurity among new immigrant mothers in Toronto
3:45	Fujita, M., and A. Apland	Food insecurity, coping strategy, and nutrition among Ariaal mothers in Kenya: an exploratory study
4:00	Discussion	

Saturday October 19th morning, University of Toronto Scarborough, MW 170

Symposium: Canadian Contributions to Bioarchaeology, in Honour of Susan Pfeiffer
Chair: G. Dewar

8:00-8:30		Presentation set-up
8:30	Dewar, G., Ginter, J., and M. Schillaci	The Western Basin Tradition Anomaly in southwestern Ontario: who were they?
8:45	Forrest, C.	Investigating the lives of infants and juveniles in the Late Ontario Iroquoian Period in Ontario
9:00	Harrington, L., Hopper, C. and S. Pfeiffer	Three short lives: the shared experiences of the Modder River children recorded in enamel
9:15	Kurki, H.K	Size matters: size and shape characteristics of Later Stone Age foragers of Southern Africa
9:30	Ginter, J.	Exploring subsistence complexity in southernmost Africa during the Mid- to Late Holocene using human skeletal remains
9:45	*Merritt, C.E.	Revisiting the age estimations of Later Stone Age hunter-gatherers from southern Africa
10:00-10:15		Coffee Break
10:15	*Doyle, L.E.	Cranial injury in the context of population growth and changing land use in the Later Stone Age: two new cases from the Western Cape
10:30	Crowder, C., Beresheim, A. and J. Heinrich	Concepts of skeletal biology through a histological perspective
10:45	Choh, A.C., Lee, M., Johnson, W., Demerath, E.W., Towne, B., and S.A. Czerwinski	Genetic epidemiology in the Fels Longitudinal Study
11:00	Dupras, T.L., Holder, S., Jankauskas, R., Williams, L., and J. Schultz	Misery, malnutrition and mortality! Stable isotope evidence for chronic starvation among the soldiers of Napoleon's grand army's during their march on Moscow
11:15	Varney, T.L., Sparkes, H., Murphy, R., Courtaud, P., Romon, T., and D. Watters	Dietary variation among enslaved labourers from three colonial burial sites on three West Indian islands
11:30	Merrett, D.C.	Health and hypoplasia: lines from Northeast China, a personal perspective
11:45	Dudar,J.C.	Making the most of it: human osteology in the era of repatriation
12:00	Pfeiffer, S.	Discussion

Saturday October 19th afternoon, University of Toronto Scarborough, MW 170

1:30-2:00 Discussion on repatriation issues, led by S. Pfeiffer

Technical Session 3: Forensics and Osteology
Chair: H. Cardoso

1:00-1:30		Presentation set-up
2:00	Cardoso, H., Santos, A., Magalhães, T., Caldas, I., Andrade, M., Puentes, K., Marinho, L., Assis, S., and A. Toso	Building new identified skeletal reference collections for forensic purposes: the experience of the BoneMedLeg Research Project in Porto, Portugal
2:15	*Maltais Lapointe, G.	Validation using 3D CT of the new interpretation of Gerasimov's nasal projection method for forensic facial approximation
2:30	*Richer, S.M.	A comparison of three methods used to characterize personal uniqueness of the frontal sinuses using CT data
2:45-3:00		Coffee Break
3:00	*Sharman, J.	Age, sex and the life course: population variability in human aging and implications for bioarchaeology
3:15	Roksandic, M.	Stages of growth and senescence as the method of assessing skeletal age
3:30	*Kirkpatrick, C.L.	A new model for the creation of region-specific subadult dental age estimation standards
3:45	*Casaca, L.	Which bones are better preserved? A study of preservation, completeness and weathering from the Smith's Knoll collection of human remains.
4:00	Vigeant, J., Ribot, I.and J.-F. Hélie	Approaching colonial settlement through stable isotopes: a study from Montréal

Saturday October 19th afternoon, University of Toronto Scarborough, MW 160

Technical Session 4: Living and fossil non-human primates
Chair: I. Colquhoun

1:30-2:00		Presentation set-up
2:00	Brent, L.J.N., Semple, S., MacLarnon, A., Ruiz-Lambides, A., Gonzalez-Martinez, J., and M. L. Platt	Personality traits in rhesus macaques are heritable but do not predict reproductive output
2:15	Dubuc, C., Ruiz-Lambides, A., and A. Widdig	Male lifetime reproductive success and opportunity of selection in rhesus macaques of the free-ranging population of Cayo Santiago
2:30	Colquhoun, I.C.	A new action plan for lemur conservation (2013-2016): key aspects and priorities moving forward
2:45-3:15		Coffee Break
3:15	Douglas, P.H., Deschner, T., and G. Hohmann	Reconsidering hypersexuality in bonobos (*Pan paniscus*): data from wild bonobos at Luikotale paint a different picture of bonobo sexual behaviour
3:30	López-Torres, S.; Schillaci, M.A., and M. T. Silcox	Life history of the most complete fossil primate skeleton: exploring growth models for *Darwinius*
3:45	Begun, D.R.	Comparisons between *Rudapithecus* and primitive hominoid carpal bones: implications for hominine phylogeny and positional behavior.

Sunday October 20th morning, University of Toronto Scarborough, MW 170

Symposium: The Odd, the Unusual, and the Strange: Human Deviant Burials and their Cultural Contexts
Chair: A. Scott

8:30-9:00		Presentation set-up
9:00	Betsinger, T.K., Scott, A.B., and A. Tsaliki	The evolution of the unknown: deviant burials and archaeological interpretations
9:15	Garvie-Lok, S.	A journey Into bone: detecting and interpreting 'vampire' burials in Byzantine and Ottoman Greece
9:30	*Hosek, L.	Postmortem wanderings: a bioarchaeology of Early Medieval revenants
9:45	Kendall, C. and A. Roddick	Interpreting deviant burials in the ancient Andes
10:00	Congram, D. and R. Kosalka	What and who is deviant in Bosnia-Herzegovina; discerning culture and intent at burial sites from armed conflict
10:15	Liston, M.A.	Burial and social deviance in ancient Athens
10:30-11:00		Coffee Break
11:00	Meyers, K.	From deference to deviance: changing burial patterns in Anglo-Saxon England
11:15	*Reusch, K.	Castrate burials: normal, deviant, other?
11:30	Sadvari, J.W., Haddow, S.D., Knüsel, C.J., Larsen, C.S., and S.E. Nugent	Unearthing the unusual: a record of non-normative mortuary behaviors at Çatalhöyük, Turkey
11:45	Discussion	

Poster Sessions: Saturday and Sunday, UTSC MW 130

Sponsored by the Office of the Vice Principal Research, UTSC

(* indicates student prize eligibility)

-posters should be set up by 10 am, Saturday Oct. 19th and removed by 12 pm, Sunday Oct. 20th

-authors should be present at their posters Sat. 10:00-10:15 & 2:45-3:15; Sun. 10:30-11:00

1	Long, A., Bloch, J. I., and M. T. Silcox	Neocortical ratios in stem primates and their importance for understanding primate brain evolution
2	Prufrock, K., and M.T. Silcox	Phalangeriform marsupials as models for the study of body mass in primitive primates
3	Bertrand, O.C., and M.T. Silcox	*Ischyromys typus* (Rodentia, Ischyromyidae): its relevance in understanding primate brain evolution
4	Leatherdale, A.J., Morris, Z., Booth, L., Sweeney, J., Hodgetts, L., and F. J. Longstaffe	A stable isotopic analysis of collagen and carbonate from archaeological bear (*Ursus americanus*) remains at the Dorchester Village Site (AfHg-24)
5	*Horocholyn, K.	Comparative histology of burned mammals using light microscopy: examining heat-induced changes in femoral samples of deer, pig and cow
6	Rhodes, S., Walker, M.J., López-Martinez, M., Haber-Uriarte, M., López-Jiménez, A., Buitrago- López, A.T., and G. Dewar	Analysis of *Hystrix* specimens recovered from Sima de las Palomas, Murcia, Spain: identification and paleoenvironmental revision
7	Ghazi, S., and G. Dewar	Shifting frequencies of micromammal species at Ha Makotoko rockshelter in Lesotho southern Africa identifies the transition from the Late Pleistocene to the Holocene
8	Eaton, K. M., Mayne Correia, P. M., and M. C., Pitre	Evaluation of biodeterioration in deer bone inoculated with *Amycolatopsis* sp. using scanning electron microscopy (SEM).
9	Bishop, K.G.	Reexamining the role of animal husbandry in Roman Italy according to the $\delta^{13}C$ and $\delta^{15}N$ values of fauna recorded from the sites of Isola Sacra and Velia
10	Jones, G., and G. Albanese	Head-to-head test of Fordisc 3.0 and Albanese 2003 Models for sex determination using the hip bone and femur
11	Dick, D., and D.C. Merrett	Assessing the potential use of the supraorbital notch as an indicator of sex in humans
12	Edwards, M., Sundararaman, K., Johnson, M., Cha, D., Miles, J., and E.J. Parra	The global distribution and genetic basis of iris color and structure in populations of European, East Asian, and South Asian ancestry
13	Gladyck, S., Forde, A., and J. L. Barta	Answering questions of social history using ancient DNA to analyze skeletal remains from the Spring Street Presbyterian Church Cemetery, New York

14	Young, J.	Art, life, and adaptation in the Canadian Arctic
15	Swanston T., Varney T., Coulthard I., Murphy R., and D.Cooper	New synchrotron-based technique for the spatial mapping of trace elements in archaeological bone
16	Sutinen, J., Williams, J.S., and G. Iannone	Identification of non-local individuals from the ancient Maya site of Minanha, Belize, using strontium isotope analysis
17	Meloche, C., and J. Albanese	The archaeology of Southern Ontario bioarchaeology: a case study of the Rickley site
18	Beresheim, A., and C. Crowder	Histomorphometric patterning along the mechanical axis in the mid-shaft femur
19	*Schattmann, A.	Periosteal new bone formation: not just a simple stress marker
20	*Teeter, M.A.	Bone health in the Dakhleh Oasis, Egypt (150-450AD): confirming the diagnosis of osteoporosis in 4 females using density estimations derived from metric analysis of the first metatarsal
21	Prowse, T.L.	Diet and dental health on a Roman imperial estate at Vagnari, Italy
22	*Dillon, R.	Paleopathology of Early Intermediate Period (200 B.C. to A.D. 750) human remains from Huaca Santa Clara and the Gallinazo Group, Virú Valley, Peru
23	Phillips, S., and M. Moroz	Multiple myeloma or lytic metastatic carcinoma: differential diagnosis of osteolytic lesions
24	*Forman, S.	Examining polio in the archaeological record to identify possible care
25	*Bogaert, K. L.	Evidence for influenza in the summer of 1918 on Canadian military transports
26	*Semchuk, L.	The “Nutritious Food Basket”: an instrument with limited capability for evaluating health policy in Northern Canada
27	*Bolt, L.M.	Male-specific use of the purr in the ring-tailed lemur (*Lemur catta*)

Abstracts of the 41st Annual Meeting CAPA-ACAP

Symposia

(* indicates student prize eligibility)

Physical Anthropology and Food Security

Organizer: Dr. Tracey Galloway, Department of Anthropology, University of Manitoba

There are important biological and cultural distinctions between human and non-human primates, however we share one very important biological imperative: we all must eat, usually every day. The drive to do so is an important driver of primate behaviour and social organization and a fundamental, perhaps the fundamental way, in which primates interact with their environment. “Food security” can be defined most broadly as access to food. While this concept is currently “in vogue” among researchers working in public health, it is less often used in physical anthropology to describe differential access to resources in past or present populations or among non-human primates. The extent to which a population or community is “food secure” depends on numerous factors and can be measured through a variety of means. Factors constraining access to nutrient resources are often similar across communities: population expansion, environmental degradation, socioeconomic status and, increasingly, climate change. This symposium presents research from physical anthropology which examines food security in human and non-human primate populations, past and present, and explores the processes influencing access to food.

1. The impact of federal food subsidy programs on food security in Canada’s northern communities

Galloway, T., and L. Semchuk
Dept. of Anthropology, University of Manitoba

In northern Canada, the high cost of transportation is a significant barrier to food security, nutritional status and therefore population health. In April 2011 the federal department of Aboriginal Affairs and Northern Development (AANDC) launched Nutrition North Canada (NNC), a northern food subsidy which replaced the longstanding Food Mail program. While Food Mail funded the cost of air freight provided by Canada Post, NNC is directed toward retailers and wholesalers who ship large volumes of food and goods to the north. Popular and media response to NNC has been overwhelmingly negative, with politicians labeling the new subsidy an unmitigated disaster. The present study analyzes the impact of the transition from Food Mail to NNC on food security among residents of Canada’s northern communities. Methods include review of publicly-accessible federal government program documents, and data on health and socioeconomic status from the 2007-8 Inuit Health Survey and the Census of Canada. Analysis reveals that, in contrast to claims of greater affordability and retailer compliance made by AANDC, prices have not stabilized following the transition from Food Mail to NNC. Despite a program structure designed to heavily subsidize food costs in smaller, remote communities, the competitive model under which NNC operates continues to penalize remote communities and generate inequitable food pricing. Placed in the context of high rates of poverty and unemployment, the transition from Food Mail to NNC has worsened the health inequities experienced by northern residents as a result of food insecurity.

2. Food security on the central Peruvian coast: Investigating the impact of Inca imperialism on food availability

Williams, J. S.
Dept. of Anthropology, Trent University

Naturally mummified human remains recovered from the Late Horizon cemetery of Huaquerones, situated in the Rímac valley of the central Peruvian coast, have been analyzed for the stable isotopes of nitrogen and carbon. The isotopic analysis of tissues that grow rapidly and incrementally (e.g., hair and nail) and tissues that grow more slowly and represent a homogenized picture of diet (e.g., bone, muscle, skin) enabled a better understanding of how short term diet immediately preceding death related to long term diet in the years before death. Together these data, in addition to pathological, archaeological and ethnohistoric data, were used to investigate whether the population(s) interred at Huaquerones had secure access to food and whether food security was affected by the Inca occupation of the central coast. Short term diet fluctuated with the seasons; indicating food choices were related to food availability. However, long term diet suggests the range of food choices was stable over time. A lack of archaeological evidence for storage facilities in the Rímac valley could

indicate vulnerability to food shortages; however, this lack of evidence may also be related to the intense modern occupation and destruction of archaeological sites in and around Lima. Ethnohistoric, pathological and isotopic evidence suggests that Inca tribute demands stimulated an increased cultivation of maize and, in some locations, led to food shortages or a decrease in health. However, the isotope values from Huaquerones are elevated relative to the pre-Inca site of nearby Cajamarquilla; consistent with an increase in maize consumption following the Inca occupation of the central coast. Pathological data from Huaquerones is consistent with periods of stress but overall good health. The extensive canal networks and the socio-political organization of the Rímac valley indicate a careful control and manipulation of the environment in order to create a stable and productive microclimate suitable to the cultivation of a variety of crops. Together these data suggest that food security for the population(s) interred at Huaquerones was at least maintained, if not improved, with the Inca occupation of the central coast.

3. Addressing child malnutrition and food insecurity with School Lunch Programs: Canada, France and Japan

Moffat, T., and D. Thrasher
Dept. of Anthropology, McMaster University

Child food insecurity remains a problem in many G8, high-income countries. These countries have various programs to address child food insecurity, including food stamps, food banks, and child nutrition programs. Valerie Tarasuk (2000) in her report on food insecurity in Canada argues that food insecurity is dynamic, in that it can vary according to duration, lifecourse stage, and context. While a child may live in a food insecure household, s/he may receive food from other sources, including at school. Canada is exceptional within the G8 for not offering any state-subsidized school lunch programs. In this paper we present overviews of nutrition programs in France and Japan, two nations that successfully serve nutritious and affordable lunches to school-aged children daily. Both programs are provided to all children and are guided by principles of food quality and nutritional health. In addition to offering a substantial, nutritious meal to all children, including food insecure children, they also contribute to teaching children the value of a balanced meal. A comparison of child obesity prevalence and change over the past decade indicates that Japan and France have much lower rates of child obesity and obesity increase than Canada. School lunch programs may be an important factor in addressing child malnutrition and food insecurity. In conclusion we argue that school lunch programs should be Canada's first step in implementing the UN special rapporteur on the Right to Food recommendation for a nationally funded children and food strategy.

4. Maternal mental health as a mediator of the impact food insecurity on child health in a peri-urban region of Tanzania

Wilson, W.[1], DeCaro, J.[2], Manyama, M.[3], and B. Hallgrimsson[4]
[1]Dept. of Archaeology, University of Calgary; [2]Dept.of Anthropology, University of Alabama; [3]Catholic University of Health and Allied Sciences, Mwanza, Tanzania; [4]Dept. of Cell Biology and Anatomy, University of Calgary

The lack of physical and economic access to sufficient and nutritious food for the entire household, or food insecurity (FI), is an important public health and humanitarian problem in Northwest Tanzania. While the relationship isn't consistent, FI has been associated with adverse physical and mental health outcomes. Pathways toward differential child outcomes likely involve household psychosocial dynamics and childcare practices that extend beyond nutritional availability.

In order to better understand this variance, our study tests a new model for the relationship between FI, demographic characteristics, and markers of maternal and child health.

In a cross-sectional study of 150 households with children aged 0-60 months in Mwanza, Tanzania, we surveyed primary caretakers regarding FI, subjective social status (SSS), household wealth (HW), and mental health (MH). Dried blood spots and anthropometric measurements were collected for the caretakers and their children.

FI is associated with lower SSS and poorer maternal MH. While FI is associated with reduced height-for-age z-sores (HAz), a non-specific marker of chronic stress, and elevated C-reactive protein (CRP), a marker of inflammation, in children, the relationship is not statistically significant. Notably, maternal MH mediates, but does not moderate, child health outcomes; poor maternal MH exacerbates the trend toward declining HAz with age and, in infants (<12 mo.), predicts elevated CRP.

Our finding that there is a psychosocial and physical complex of risk associated with FI is consistent with the work of others, but we take this a step further by directly measuring one immune marker that may be implicated in the pathways linking FI, maternal MH, and child health. Poor maternal MH seems to stand at the center of this risk complex, and perhaps can be best understood as a sensitive marker for social and ecological risk. We speculate that maternal MH is serving here as a mediator; proximally, maternal depression may act to diminish child wellbeing by impeding the ability of mothers to actively buffer young children against adversities that have the potential to produce growth faltering and higher inflammation, such as poor nutrition and high infectious disease load.

5. Global food insecurity and mental health project: a research protocol

Crooks, D.L.[1], Hadley, C.[2], and L. Cliggett[1]
[1]Dept. of Anthropology, University of Kentucky; [2]Dept. of Anthropology, Emory University.

Global food crises and economic recessions have brought to the fore issues of food insecurity and mental health. Communities are undergoing rapid and profound economic, climate and social changes that pose new challenges to well-being; however the mechanisms and pathways that link food insecurity and mental health are not yet clear. We propose that multi-sited, multi-method biocultural research is an appropriate research strategy for identifying these pathways and measuring their effects. However, this type of research is especially challenging in that conceptual frameworks and research models must lead to the provision of data that are comparable across research sites while simultaneously accommodating the contextual variation within and among them. In this paper, we present a research protocol resulting from a three day NSF-sponsored workshop attended by 25 participants. The objectives of the workshop were to develop (1) a conceptual framework and underlying model to guide future research; (2) a research protocol that provides the flexibility needed to accommodate variation in the pathways between the two constructs of interest while allowing for rigorous, empirical testing of the relationship between food insecurity and mental health across sites; and (3) a plan for locating, sharing and compiling research results in a way that facilitates fair and ethical sharing of data among researchers. The protocol provides a way for biological/physical anthropologists, working alongside their cultural anthropological colleagues, to provide policy-relevant research on food insecurity and mental health outcomes. In doing so, it recognizes that food security is a managed process that is context specific, with differential availability of and access to resources by individuals and groups. Thus collaborative and multi-sited research is key to the ultimate goal of the project, which is to provide cross-cultural research results in an appropriate framework for use by program planners and policymakers.
Project Sponsors: National Science Foundation, Award #1029058; College of Arts and Sciences, University of Kentucky.

6. Adolescent food acquisition beyond the household food environment in Belfast, Northern Ireland

*Williams, J.
Dept. of Anthropology, University of Kentucky

Food security is an issue in urban industrialized environments where low-income households often have a more difficult time accessing or implementing healthy diets. A great deal of food security research has focused on food availability at the household level; yet, little is known about the food acquisition habits of young people when they are outside of their homes. In this paper, I examine food acquisition behaviors of secondary school-aged students living in Belfast, Northern Ireland. Student descriptions, from interviews and questionnaires, are used to detail adolescent food acquisition behaviors from various community sources including school, youth clubs, shops, restaurants, and friend's houses. This provides information on the ways that young people access food when they are outside of their homes in communities with diminished economic resources. This information is significant because it sheds light on the role that community resources play in shaping adolescent nutritional practices, which can then be related to nutritional status outcomes including height-for-age, BMI-for-age, and waist to height ratios. An examination of adolescent food security outside of homes builds upon existing trends in physical anthropology that highlight multiple factors shaping nutritional status outcomes in low-income environments, while recognizing the contributions that young people can make to their own nutritional practices and outcomes. In this paper I will demonstrate that the diets of teenagers in Belfast are shaped in significant ways by food related choices that teenagers make outside of their homes. For example, eating at restaurants and youth clubs increases the number of fried foods, sweets, and sugary drinks consumed by adolescents in the sample population. This research is significant because exploring the independent food acquisition habits of

young people provides insight into the autonomous lives that these young people can live outside of their household food environments and how this autonomy affects diet and nutritional status in a low-income environment with a high propensity for food insecurity.

7. Food security as child care in human evolution

Sellen, D.
Dept. of Anthropology, University of Toronto

This paper explores the relevance of the evolved vulnerabilities of young children to research programs within evolutionary anthropology that address food and nutrition security as pathways to reducing global child health disparities. The modern concept of nutrition security is reconsidered as a potentially helpful conceptual construct for thinking about the central role (or otherwise) of sociality in protecting human young form serious nutritional deprivations. Latest research on the importance of nutrition during early life and what works to protect it in contemporary societies is used to develop a model of a human "care package in which food security plays a key role. The hypothesis that human infants are adapted to a "food secure" niche protected by caregivers is developed.

8. The experience of household food insecurity among new immigrant mothers in Toronto

*Anderson, L.
Dept. of Anthropology, University of Toronto

Household food insecurity is experienced when appropriate, nutritious and safe foods required for a healthy and productive life are not available and/or the ability to acquire such foods is uncertain. Recent immigrants to Canada are known to be at a higher risk of household food insecurity than the general population. The current quantitative scales widely used to measure household food insecurity are largely based on qualitative research conducted on U.S and Canadian-born families with children, and there has been limited qualitative work conducted on food insecurity among recent immigrants in Canada. This analysis aims to contribute to the understanding of food insecurity in Canada by examining the experience of low-income, recently arrived refugee claimants and family class immigrants living with young children. A series of semi-structured interviews were conducted with 16 Spanish-speaking Latin American and 16 Sri Lankan Tamil newcomer mothers living in Toronto's Jane and Finch neighbourhood. Two key shifts in participants' experiences of food insecurity over the life course were identified to influence their subjective experience food insecurity here in Canada. First, for many participants their ability to manage the situation of household food insecurity has decreased due to limitations in finding employment and decreased levels of social support. Second, for most participants the relative deprivation experience in Canada has also decreased upon arrival in Canada. Further research to examine the experience of food insecurity within other immigrant groups could help develop a food security module aimed at measuring these particular aspects of new immigrant food insecurity in Canada. Furthermore, this research could inform the development of culturally appropriate programs and policy to support food insecure immigrant families.

9. Food insecurity, coping strategy, and nutrition among Ariaal mothers in Kenya: an exploratory study

Fujita, M., and A. Apland
Dept. of Anthropology, Michigan State University

Food insecurity is a situation where people do not have the ability or means to get the foods they need. They deal with this problem by using coping strategies to manage the quality and quantity of food that they consume. Coping strategies provide a link between food insecurity and health outcomes through nutritional intake. This study investigates the relationship between food insecurity, a coping strategy, nutrient intake values and nutritional statuses to explore the pathways between food insecurity and nutritional outcomes. Data collected in 2006 from mothers in Ariaal agropastoral communities in northern Kenya were used. A food insecurity index was constructed from interview data about access to key food items. Not including milk (a staple food for Ariaal women) in breakfast was identified as a possible coping strategy to stretch resources by analyzing 24-hour dietary recalls. We hypothesized that skipping milk at breakfast will increase the odds of vitamin A insufficiency but it will not affect energy status, reflecting a compromise in the quality rather than the quantity of food. The relationship between food insecurity index and not having milk with breakfast was examined, and the effects of this behavior on 1) nutritional intake (vitamin A and energy) and 2) malnutrition (low serum retinol and chronic

energy deficiency) were evaluated using regression models. Food insecurity index was a positive predictor for not having milk (p=0.021, n=232). This behavior was a positive predictor for low vitamin A intake (p<0.001, n=212) but not for low energy intake, after adjusting for food insecurity and poverty. Further, skipping milk was a positive predictor for low serum retinol (p=0.043, n=232) but not for energy deficiency after adjusting for food insecurity and poverty. Not including milk in breakfast appears to have served as an effective coping strategy for getting sufficient energy intake but with a cost of compromised vitamin A intake. The dietary quality was sacrificed, and women who skipped milk had higher odds of insufficient serum vitamin A concentrations. (Sponsor: NSF Dissertation Improvement Grant #0622358; the Wenner-Gren Foundation; the Micronutrient Initiative; Michigan State University Honors College Professorial Assistantship.)

Canadian Contributions to Bioarchaeology, in Honour of Susan Pfeiffer

Organizer: Dr. Genevieve Dewar, Department of Anthropology, University of Toronto Scarborough

Susan Pfeiffer's research in the field of biological anthropology has made significant contributions to our understanding of past human behaviour. Throughout her career as both a professor and administrator, she has devoted herself to high quality teaching and community involvement. Through the study of dental and skeletal materials, Susan and her colleagues have expanded our understanding of health, diet, and behaviour among the past populations of North America and southern Africa. Susan also worked to develop the historic Repatriation Memorandum of Understanding with the Huron-Wendat Nation.

This symposium will briefly cover the many research programs that Susan has been actively involved with over the past thirty years, as well as research programs that Susan's students have contributed to in the United States, Russia, and the Caribbean. The session will conclude with a question-and-answer period with Susan as the discussant.

With over 60 published articles, 20 book chapters, and 5 books to her credit, Susan has established herself as a leading contributor to the fields of human skeletal biology, bone and dental tissue histology, and the origins of modern humans. We are honoured to recognize Susan's past and continuing contributions to the field of bioarchaeology at the 2013 CAPA conference, hosted by the University of Toronto Scarborough.

1. The Western Basin Tradition Anomaly in southwestern Ontario: who were they?

Dewar, G[1]., Ginter, J[2,3]., and M. Schillaci[1]
[1]Dept. of Anthropology, University of Toronto Scarborough; [2] Faculty of Humanities & Social Sciences, Sheridan Institute of Technology & Advanced Learning; [3]Trent University Archaeological Research Centre (TUARC), Trent University

Archaeological research into the Late Woodland period (AD 600 to 1650) of southern Ontario has typically engaged in trying to understand the origins, development, and interaction between the historic Iroquoian tribes. In southwestern Ontario the Western Basin Tradition (WBT), a lesser-known neighbouring group, shared the landscape with the proto-Iroquoians but left a very different material signature. Archaeological evidence suggests that the WBT populations were a highly mobile transhumant hunter-gatherer-fisher group that aggregated in summer along the Great Lakes and fissioned into family units moving upriver during the winter months. Importantly their burial pattern was unique and included a variety of internment styles and post mortem modifications. While these contemporaneous populations reflect different lifestyles, research is still trying to negotiate the fundamental relationship between them. Who were the WBT? Are they the diachronic *in situ* development from a Middle Woodland hunter-gatherer lifestyle and the precursor to the Algonquian settlement system? Or are they an Iroquoian speaking population that chose not to settle into large villages and practice maize horticulture?

As the archaeological data we currently have cannot differentiate between these two hypotheses, we look to the skeletal remains of the individuals themselves and use bioarchaeological methods to address the question of 'who were they?' In this paper we report on the results of the stable isotopes, biomechanics, dental caries, aDNA and craniometrics to conclude that while their material culture may seem different the WBT were in fact Iroquoian-like and particularly similar to the Huron. The results of the dental caries, stable isotopes and biomechanics studies all indicate that the WBT were in fact using maize at the same intensity as the

horticulturalist Iroquoians to the east. The lack of the X haplogroup hints at a closer relationship to the Iroquoians rather than Algonquians, while the distance matrix correlation based on craniometrics identifies the Huron as the closest genetic population.

These results show that we can learn much more about a past culture through the integration of traditional archaeological data with bioarchaeological approaches to obtain a richer picture of the past.

2. Investigating the lives of infants and juveniles in the Late Ontario Iroquoian Period in Ontario

Forrest, C.
School of Liberal Arts and Sciences, Humber College.

As the most vulnerable members of a community, the study of infants and juveniles has the potential to provide insight into community health and social processes. The bioarchaeological approach to studying infants and juveniles in Ontario is complicated by the need to navigate a complex political landscape, including working within the constraints of repatriation efforts. This paper focuses on several projects in which an innovative approach to studying infants and juveniles was employed in order to respect the wishes of descendant communities.

The first project centred on the question of biological responses to social and environmental anomie. Using a sample of infants and juveniles from precontact and historic period Iroquoian sites in Ontario and upper New York State, quality and tempo of growth were evaluated before and after European contact. The feasibility of treating Iroquoians on both sides of the border as a single population was explored, and utilizing this approach led to a larger sample size that allowed for broader characterizations of growth outcomes. As a result, it became clear that growth outcomes were not substantially different before or after contact, or in New York versus Ontario. These results suggest that people within these communities continued to express cultural agency in their actions in spite of deleterious conditions and pressures to change.

The second project was a pilot project that focused on breastfeeding and weaning behaviours among Iroquoians throughout time. This project was also intended to test whether or not it was feasible to study trophic level shifts indicative of these behaviours using a single tooth per individual, which is the limit for retention of biological samples from collections slated for repatriation at the University of Toronto. Samples of dentin from Iroquoian deciduous first molar roots were subject to stable light nitrogen isotope ratio analysis. The results indicate that this method is effective for identifying changes in nitrogen isotope ratios, although it is unclear whether these results are indicative of changes in behavior over time.

3. Three short lives: the shared experiences of the Modder River children recorded in enamel

Harrington, L.[1], Hopper, C.[1] and S. Pfeiffer[2]
[1]Dept. of Anthropology, University of Alberta; [2]Dept. of Anthropology, University of Toronto

The skeletal remains of three Later Stone Age juveniles recovered from a sand dune near the mouth of the Modder River, Western Cape, South Africa have been described previously for their notable peri-mortem cranial trauma. This multiple-burial presents a unique opportunity among hunter-gatherer assemblages to study evidence for growth disruptions among related children who grew up at the same time and place. With dental ages of approximately two, six, and twelve years at death, the cohort spans childhood development. Perikymata groove patterning was studied and imaged with microscopy on eleven permanent anterior tooth crown replicas to identify the frequency and sequence of systemic enamel defects relative to a standard chronology for crown formation. The position and spacing of accentuated perikymata grooves demonstrate when growth disruptions were experienced during the lifetime of each child. The pattern of enamel defects coupled with the presence of some skeletal indicators of growth disruption (cribra orbitalia and growth arrest lines) provides evidence for the frequency of stress episodes successfully overcome. As the violent event that lead to the death of these children is part of a broader pattern of population disruption localized to the Western Cape, this case explores the question of what were “normal” challenges experienced in the course of childhood among hunter-gatherers.

4. Size matters: size and shape characteristics of Later Stone Age foragers of Southern Africa

Kurki, H.K.
Dept. of Anthropology, University of Victoria

The long-standing research program investigating the foragers of the Later Stone Age (LSA) of coastal and near coastal southern Africa, undertaken by Susan Pfeiffer and her colleagues and students, has tackled a wide range of questions concerning adaptation, adaptability, and life history of this population through time and space. This program arguably represents one of the longest running and most broadly focused bioarchaeological investigations of the past 25 years. This paper synthesizes one small part, the examination of the unique body size and shape characteristics of the LSA foragers. As critical biological parameters of individuals, populations, and species, body size and shape can inform us about ecological adaptations, biological plasticity, and health of past populations. I focus on three conclusions we have reached in this collection of research: 1) body size and shape in small-bodied populations do not associate as well as expected with climate as ecogeographic models would predict; 2) craniofacial size is less plastic that body size in the face of ecological stressors; and 3) pelvic shape is uniquely derived in this small-bodied population. While the question of why this population is on the small end of the human body size range is still an open question, these studies provide examples of the ways in which size and shape variation within and among populations may reflect adaption and adaptive responses. The exceptional representation of skeletal material of this population across thousands of years, in a relatively limited but environmentally diverse geographical range, and with a rich archaeological context provides an excellent opportunity to address such questions.

5. Exploring subsistence complexity in southernmost Africa during the Mid- to Late Holocene using human skeletal remains

Ginter, J.
Faculty of Humanities and Social Sciences, Sheridan College; Trent University Archaeological Research Centre (TUARC), Trent University

The mid- to late Holocene in sub-Saharan Africa marks a period of subsistence change from a hunting and gathering economy to one based on, or incorporating aspects of, food production. The transition to food production follows a north-south gradient with the earliest evidence found in North-East Africa and the most recent in South Africa. Traditionally, the impetus for the transition to food production was placed on population growth and migration. However, accumulating archaeological evidence from across sub-Saharan Africa suggests that the nature of the food production, the extent to which aspects of food production were incorporated into the existing subsistence economy, and the mechanisms responsible for this transition varied across the region. In order to better understand this complex process skeletal metric, non-metric and biomechanical data were gathered from seventy-three adult mid- to late Holocene skeletons from the Eastern Cape, South Africa. The analysis of skeletal metric data did not identify a different skeletal morphology associated with the initial appearance of food production in southernmost Africa. This, coupled with homogeneity in cranial non-metric trait frequencies through time, does not support migration as a key factor driving the transition of food production. Rather, these findings support a diffusion model whereby some hunting and gathering groups incorporated aspects of food production into their subsistence economy via interaction and trade with food producers.

6. Revisiting the age estimations of Later Stone Age hunter-gatherers from southern Africa

*Merritt, C.E.
Dept. of Anthropology, University of Toronto

Studies consistently assess the life expectancy of past populations as 30 to 35 years of age. This interpretation of the archaeological record has significant implications for our understanding of fertility and death rates, mortality curves, and overall population health. However, the application of age estimation methods developed on modern populations to past populations has often been cited as an issue in paleodemography. Past populations were typically shorter in stature and lighter in body mass than current populations, and this is especially true for the Later Stone Age hunter-gatherers of southern Africa, who have stature estimates of 148.3cm to 159.3cm and body mass estimates of 38.6kg to 50.9kg. Recently it has been shown that individuals with low body mass are under-aged by 5 to 15 years. The joint surfaces of underweight individuals show fewer

age markers compared to average and obese individuals, with physical activity, mechanical loading, and levels of lean muscle mass as factors that may influence skeletal aging.

Using the age estimations derived from the Suchey-Brooks pubic symphysis method, the Lovejoy et al. auricular surface method, and the İşcan et al. rib method, this study will show how various reconstructions of mortality profiles for the LSA change the interpretations of paleodemographic parameters for this population. The results of these findings suggest a higher presence of older adults in the LSA skeletal record and some important new directions for researchers. With redefined age estimations, new interpretations of paleodemographic parameters will change our understanding of human history.

7. Cranial injury in the context of population growth and changing land use in the Later Stone Age: two new cases from the Western Cape

*Doyle, L.E.
Dept. of Anthropology, University of Toronto

This is a study of two cases of cranial injury from the southern West Coast, with the aim of identifying possible causes and situating them in the context of mid-Holocene population dynamics in the Western Cape. The Later Stone Age of southern Africa is characterised by small-scale, mobile foraging groups with ancestral ties to living Khoe-San speakers. To date, over 360 individuals have been documented, dating from 140 to 10,860 uncalibrated years before present (bp). Evidence of interpersonal violence is rare, with the exception of 10 cases of what appear to be deliberate injuries: 7 perimortem cases (all adult females or juveniles) and 3 exhibiting healing (all adult males). These cases are surprisingly clustered in both space and time: all perimortem cases (from four sites) are from the southern West Coast, and all available dates fall between 2220 and 2800bp. These dates coincide with a period of population growth throughout the Cape. On the West Coast in particular, intense resource harvesting, the appearance of stunted adults, and isotopic evidence of territorial partitioning suggest a scenario of prevalent tension during this time. Both new cases date to 2300 and 2240bp. The first is a relatively small, older male with a linear gash on the right parietal boss. The gash has a fusiform outline and v-shaped profile, suggesting an impact from an edged object. Remodelling is incomplete, but sufficient healing had taken place to infer an interval of months to years before his death. The second case, a young female, has two unhealed depressed fractures in the the left parietal. The smaller of the two resembles a clean puncture, while the larger is roughly ovoid in outline, suggesting a blow with a pointed object of round cross-section. Both individuals bear traumas consistent with deliberate injury, though from different instruments. Based on descriptions of other cases, both are consistent with other West Coast instances of deliberate, perimortem injury from the same period. Although positive evidence is still elusive, these individuals add two datapoints in support of the narrative of a tense period linked to increased population density on the Cape West Coast.

8. Concepts of skeletal biology through a histological perspective

Crowder, C.[1], Beresheim, A.[2] and J. Heinrich[2]
[1]Armed Forces Medical Examiner System, Office of the Armed Forces Medical Examiner, Dover AFB; [2]Dept. of Anthropology, University of Toronto

Bone histology research within Anthropology has made strides from descriptive, method based studies to more interpretive research in skeletal biology emphasizing the dynamic nature and complexity of the skeleton's micromorphology. Histological studies of past and present populations and human and non-human organisms allow for the examination of the interrelationships between environment, culture, and biology. This presentation outlines our current research in hard tissue histology and demonstrates the usefulness of a histological approach to evaluate broader questions regarding skeletal biology. While the development and validation of histological techniques and methods have been performed by the authors, our current focus resides in the broader issues surrounding three research areas: Examining differences in non-human versus human bone microstructure, skeletal aging in humans, and assessing pediatric bone trauma.

Histological analysis of human versus non-human bone is often performed through qualitative analyses. Our research focuses on quantitative analyses and the examination of mechanisms influencing bone microstructure. The evaluation of non-human verses human histology underscores evolutionary relationships and functional adaptation.

Histological studies of skeletal age previously have been focused on a product based approach (the age estimate). Our research shows the biological significance of various histological variables and offers hypotheses regarding the discrepancies of results amongst past studies and the overall effectiveness of histological age estimation.

Through attention to bone fracture mechanics, anthropologists have become proficient in trauma analysis and interpretation. Our research demonstrates the use of histological examination to assist with identifying fractures and providing temporal information for suspected cases of child maltreatment/abuse. Although this research is focused toward forensic applications, it can be applied to evaluating interpersonal violence in past populations. These studies have produced many new questions for anthropologists regarding the interpretation of bone biology; however, they represent a move away from solely descriptive, product based analyses to broader exploration of bone microstructure and functional morphology.

9. Genetic epidemiology in the Fels Longitudinal Study

Choh, A.C.[1], Lee, M.[1], Johnson, W.[2], Demerath, E.W.[3], Towne, B.[1], and S.A. Czerwinski[1]

[1]Division of Epidemiology, Lifespan Health Research Center, Dept. of Community Health, Wright State University Boonshoft School of Medicine; [2]MRC Unit for Lifelong Health and Ageing, London, UK; [3]Division of Epidemiology and Community Health, School of Public Health, University of Minnesota.

Genetics is important in understanding possible biological mechanisms influencing health. One advantage of studying living populations is the ability to measure physical traits and the relative ease of genotyping DNA. Using data from the Fels Longitudinal Study, we will review some of the genetic epidemiological evidence for genetic influences on body composition such as adiposity, muscle and bone traits. Because genes can have differential influences across the lifespan, it is also important to study growth and development traits such as BMI, peak height velocity (PHV) and adiposity rebound.

The Fels Longitudinal Study started in 1929, and began as a study of growth and development and body composition. Over the last over the last 30 years, the aims of the study have expanded to include chronic diseases and aging. Body composition traits are assessed using gold-standard measurements. For our studies of growth, we use serial data of stature and BMI to calculate peak growth velocities in infancy and adolescence.

Significant evidence for additive genetics effects has been observed for body composition and growth traits at all ages. Heritabilities for bone, fat and muscle range from 0.19 to 0.78, 0.41, and 0.19 to 0.62 respectively. Growth traits during infancy and adolescence range from 0.44 to 0.99 and 0.30 to 0.98, respectively. Some traits are differentially influenced by genes across age. For example, additive genetic effects that influence BMI during infancy and at birth are different from those that influence BMI during adolescence and adulthood. Using genome-wide linkage analysis we found gene variants in the *GLIS3* gene to be linked to visceral adipose tissue and variants in the *SOX6* gene to be related to bone quality. Using genome-wide association analysis, we found variants in the *PALLD*, *XYLT1*, and *PHF23* genes to be associated with bone geometry traits. Lean muscle mass is associated with *RGS7BP*. Growth traits such as age at PHV are associated with *PTPRT* and *GC* genes, while skeletal maturation traits are associated with *CYFIP1*, *FHOD3*, *PIGX* genes.

Many gene variants influence body composition and growth traits. Understanding which genes influence these traits and when will help determine biological mechanisms underlying health.

10. Misery, malnutrition and mortality! Stable isotope evidence for chronic starvation among the soldiers of Napoleon's grand army's during their march on Moscow

Dupras, T.L.[1], Holder, S.[1], Jankauskas, R.[2], Williams, L.[1], and J. Schultz[1]
[1]Dept. of Anthropology, University of Central Florida; [2]Dept. of Anatomy, Histology, and Anthropology, Faculty of Medicine, Vilnius University.

Stable isotope analysis is commonly used to interpret diet, migration and geographic origin in bioarchaeological studies. However, it is becoming increasingly obvious that metabolic state has a significant impact on stable nitrogen isotope values. Modern clinical studies involving stable isotope analyses have focused on nutritional stress related to pregnancy and morning sickness, acute starvation related to anorexia nervosa and/or bulimia, and controlled animal studies to evaluate shifts in trophic levels. These studies demonstrate that $\delta^{15}N$ values

are initially depleted as protein consumption or absorption decreases but becomes more enriched as the body enters a catabolic state. This paper presents a preliminary exploration of stable carbon and nitrogen isotope analysis of bone collagen from a sample of 78 individuals excavated from a mass burial in Vilnius, Lithuania believed to have been part of Napoleon Bonaparte's Grand Army following the Russian Invasion of 1812. C:N ratios, % collagen, and %C and %N all show that these samples are very well preserved. Although there are no correlations between age and isotopic values for either carbon and nitrogen, there is great variation in values with the range of $\delta^{13}C$ values between -11‰ to -20‰, and $\delta^{15}N$ values range from +7‰ and +14‰. $\delta^{13}C$ values indicate a great variation in diet, not surprising given that Napoleon's Grand Army was composed of soldiers from many areas of Europe and North Africa. The variation of $\delta^{15}N$ values suggest that metabolic state must be considered when interpreting these values. Soldiers in Napoleon's Grand Army were reported to have suffered many hardships along their march including infectious disease, chronic starvation, and ultimately death. This paper will explore the potential cause for this variation in $\delta^{15}N$ values as it relates to the history of Napoleon's Grand Army and their attempt to conquer Moscow in 1812.

11. Dietary variation among enslaved labourers from three colonial burial sites on three West Indian islands

Varney, T.L.[1], Sparkes, H.[2], Murphy, R.[3], Courtaud, P.[4], Romon, T.[5], and D. Watters[6]

[1]Dept. of Anthropology, Lakehead University; [2]Dept. of Anthropology, University of Alberta; [3]National Parks Authority of Antigua and Barbuda; [4]PACEA, Université Bordeaux 1; [5]INRAP, Guadeloupe, F; [6]Anthropology, Carnegie Museum of Natural History.

During the eighteenth and nineteenth centuries, European colonies in the West Indies were economically dependent upon the sugar industry, which was in turn dependent upon the labour of enslaved Africans and their descendants. The exposure of historic cemetery sites in recent years has led to the archaeological excavation of an increasing number of burial grounds where the enslaved were interred. This paper presents stable carbon and nitrogen isotope data for bone collagen from three such sites on the adjacent Caribbean islands of Antigua, Montserrat, and Guadeloupe. The former two islands were once British, while the latter remains French. This data is compared with the published values for a fourth site on Barbados, which was a British held colony. The Antigua site is unique in that it does not represent plantation slaves, but those attached to the Royal Navy. While the isotopic values correspond with what is known of the diet of enslaved labourers from the historic record regarding the stable carbohydrates in the diet, the protein component of the diet appears to have been composed of fish to a greater extent than expected. The data also demonstrates the variability of slave diet which is interpreted as considering different provisioning strategies due to a number of factors including island, colonial power, status of owner (naval vs. civilian), and the status and agency of the enslaved labourers themselves. This study contributes to broadening our knowledge of the experiences of enslaved populations of African origin in the West Indies.

12. Health and hypoplasia: lines from Northeast China, a personal perspective

Merrett, D.C.
Dept. of Archaeology, Simon Fraser University.

There is growing awareness that multiple centres of domestication and increasing cultural complexity are the norm in China. The Yangtze and Yellow River Valleys are not the only regions where these complex events occurred. In particular Northeast China has, until recently, flown below the archaeological radar. This region has seen the boundary between sedentary agriculturists and nomadic pastoralists in constant flux as climate has varied since the mid-Holocene climatic optimum. Exploration of relationships between health, subsistence, and cultural complexity in Northeast China is facilitated by the numerous skeletal remains excavated.

Through a case study of my research experiences in Northeast China over the last two years, this paper provides a personal perspective on how new analytical techniques such as SEM study of dental hypoplasia, analyses of enamel microstructure, and application of new theoretical frameworks such as human osteological paradox can be applied to the study of archaeological Chinese human remains. The analyses will generate unique and important insights about human health and diseases of the past, which not only help our understanding of regional archaeology in China but also illustrate the whole spectrum of human-environmental interactions in global perspective.

However, conducting research in China is far from a simple process. National reluctance to allow archaeological material to leave China necessitates conducting the data collection entirely in China within the framework of the Chinese academic realm. Mutual respect and trust have proven to be key to the success of any collaborative bioarchaeological research on Chinese human skeletal remains.

13. Making the most of it: human osteology in the era of repatriation

Dudar,J.C.
Dept. of Anthropology, Smithsonian Institution, National Museum of Natural History.

Susan Pfeiffer started her academic career at a time when North American archaeologists and physical anthropologists were relatively unfettered in their excavation and analysis of human remains, especially Native American burials. It is not surprising that most physical anthropologists balked at the enactment of restrictive policies and legislation that allowed only limited access to skeletal remains discovered on sites during economic development. Many saw this as an end to the discipline in North America, yet others adapted to the changing circumstances and evolved field protocols to capture essential data in the limited time available. Rather than seeing lost opportunities, Susan Pfeiffer emerged as a go-to person within the emerging cultural resource management (CRM) community in Ontario, and consulted on many human burial excavations with her students. For most of us this was our first exposure to the glamorous world of fieldwork. A whole cohort of young academics would not have gotten their start if these CRM opportunities had been passed by. This presentation will reflect on the past, present, and future of human osteology in the era of repatriation, and the continuing role Susan Pfeiffer has in inspiring students to rise to the challenge and make the most of every opportunity to collect data.

The Odd, the Unusual, and the Strange: Human Deviant Burials and their Cultural Contexts

Organizers: Amy Scott, Dept. of Anthropology, University of Manitoba; Dr. Tracy Betsinger, Dept. of Anthropology, SUNY College at Oneonta; Dr. Anastasia Tsaliki, Dept. of Archaeology, University of Athens

Deviant burials provide an opportunity to gain invaluable insight to cultural constructions of outsiders, non-conformers, or “others” of different kinds. Sometimes, based on religious beliefs or other social factors, individuals who were viewed in life or death as extraordinary, separate from or outside of the social group were given unique burials, reflecting the deceased’s otherness or special status. These burials are identified in the archaeological record by evidence of different or unusual burial rites to those common in the given social group, segregated inhumations/cremations, unexpected burial accompaniments, or alterations to the corpse. Evidence of deviant or non-normative burials has been documented in a variety of geographic locations and temporal periods, which will be reflected in this session. The allure of deviant burials and their larger social meaning is tied to our archaeological understanding of how the living choose/feel obligated to bury the dead and the social values imprinted on these specific burials. While non-normative burials are primarily focused on specific individuals within a community, the social values that help construct deviant status after death is arguably reflective of larger social norms and beliefs. From this then, deviant burials provide a unique opportunity to: 1) explore the specific burial context of certain individuals within a community and 2) highlight the social values or social constructions of identity after death through various mortuary treatments.

Highlighting deviant/non-normative burials in a symposium format would provide a unique opportunity to explore these specific case studies and the overarching themes visible in these burials across different geographic and temporal landscapes. These burials are unique in nature based on their ‘deviant’ designation, but an understanding of the common elements that unite these various burials can provide a better understanding of why these burials occur, how specific individuals were targeted within their communities, changing cultural beliefs and norms, and what these burials may reflect about the larger population.

1. The evolution of the unknown: deviant burials and archaeological interpretations

Betsinger, T.K.[1], Scott, A.B.[2], and A. Tsaliki[3]
[1]Dept. of Anthropology, SUNY College at Oneonta; [2]Dept. of Anthropology, University of Manitoba; [3]Dept. of Archaeology, University of Athens

Deviant, or non-normative, burials have been documented in the archaeological record for many years. The context and interpretation of such burials vary tremendously based on cultural, regional, or geographic differences in which the burials are recovered. The term “deviant” itself can refer to a wide range of concepts, including differences in burial location and treatment, as well as atypical funerary rites. Deviant burials may also include those with indicators of violent death, such as decapitations. The purpose of this paper is to examine the concept of deviant burials itself, as well as how archaeological interpretations are made. Additionally, the recent increase in attention to deviant burials, such as vampire burials, by popular media is explored. Questions regarding the impact of such popularization on scientific investigations are addressed.

2. A journey Into bone: detecting and interpreting ‘vampire’ burials in Byzantine and Ottoman Greece

Garvie-Lok, S.
Dept. of Anthropology, University of Alberta

Greece is one of several European nations with well-documented pre-modern traditions of belief in vampires. Because many apotropaic rituals related to vampires centred around the grave, these beliefs should be archaeologically visible in the form of burials in which the corpse was transfixed, beheaded or otherwise treated to dispel a vampire. Although recent years have seen descriptions of some burials fitting these expectations, they are surprisingly few given the common appearance of ‘vampires’ in the documentary evidence.
This presentation considers vampire-dispelling rituals through the broader lens of burial in Byzantine and Ottoman Greece. A look at normative burial traditions through documentary and archaeological evidence gives us some insights into what graves of these eras ‘should’ look like, as well as a glimpse into the emotional meaning of a corpse’s burial and decay to surviving loved ones. I then move on to discuss documentary and ethnographic evidence for vampire-dispelling rituals in Greece as well as proposed archaeological ‘vampires’, using a burial from Ottoman-era Mytilene (Lesbos, Greece) as an example. Looking at vampire traditions in this light gives us insight into the physical traces they should leave behind – and why they might be under-reported archaeologically. It also gives us added insights into the process of burial and decay, which can be seen, following Barber and others, as a journey from life into afterlife as represented by the purity of bone.

3. Postmortem wanderings: a bioarchaeology of Early Medieval revenants

*Hosek, L.
Dept. of Anthropology, Syracuse University

The fear of revenents – the returning dead – throughout early medieval Europe is a useful frame for considering the complex treatment of the dead and the malleability of social identity in early medieval mortuary practices. Rather than assuming that unusual burials reflect a “deviant” social identity in life, it is possible to see local traditions, social entanglements and evolving rituals emerge through a contextualized analysis of human remains. Deaths from disease, violence, or misfortunes might result in mortuary practices to keep certain dead from returning to trouble the living. This paper will consider how corpses become “complex intersections of interests, desires and understandings" (Tarlow 2002:87) through a biocultural investigation that takes into account the life course of an individual and the potential for transformative impacts on the skeleton.
Unusual burials from two fortified settlement sites in what is now the Czech Republic will be examined: Libice, a 10th century site in Bohemia, and Pohansko, a major 9th century center in neighboring Moravia. Several graves excavated at each of these sites are consistent with historical and archaeological descriptions of potential revenants. A bioarchaeological investigation of unusual burials at these sites will explore transformations of social and ritual landscapes in the early medieval world. The lived experience of the body, contextualized by archaeological and historical sources along with skeletal data allows for a more nuanced understanding of “deviance” and fear of the dangerous dead in the archaeological record.

4. Interpreting deviant burials in the ancient Andes

Kendall, C. and A. Roddick
Dept. of Anthropology, McMaster University

The ancient Andes were home to many cultural groups in fairly close proximity to one another in both time and space. In these populations, religious ceremony typically involved the practice of sacrifice. As time went on, and the groups competed for dwindling land and resources, the sacrifice of prisoners captured in raids and warfare became commonplace. Deviant burials provide a simple way to demark sacrificed individuals as outsiders from the home group. These burials contain grave goods indicative of sacrifice for religious and supernatural purposes. Using evidence presented in research by other authors collected for a literature analysis on the ancient Andes, this work investigates and presents several hypotheses on why sacrifice changed over time and space. The aim of our work was to both summarize the articles presented for future researchers, and to marry several coherent themes in the literature about deviant burials, sacrifice, and religious worship. Researchers' believe these deviant burials may have been affected by numerous cultural and outside environmental influences. These may include changing weather patterns and threats to security. Our further investigation into these findings confirms the previous hypotheses, but also uncovered additional novel ideas, which were scarcely discussed in the literature in question. These include borrowing from other cultures found to be intriguing to the home group, forced implementation of newer practices, and changes in what was valued by a group over time and space. These discoveries are important as they allow future researchers to reassess previous studies of these groups, while using different, and perhaps more encompassing analyses to better understand the ancient Andes and the many cultural groups that inhabited this landscape through the ages.

5. What and who is deviant in Bosnia-Herzegovina? Discerning culture and intent at burial sites from armed conflict

Congram, D.[1] and R. Kosalka[2]

[1]Joint POW/MIA Accounting Command, Central Identification Laboratory, Hawai'i; [2]Dept. of Anthropology, University of Toronto Mississauga

In general, how a dead person's body is disposed of tells us about the deceased, those conducting the disposal and also the socio-political context of the place in which the disposal is taking place. In this presentation we will examine what constitutes deviant burial of victims of the war in Bosnia-Herzegovina. Throughout the war in Bosnia in the early and mid-1990s, funerary rites – among other cultural norms – dramatically evolved for a multitude of reasons including changing resource access, legal and political administration, restricted or forced movement of people, and the destruction of religious centres, which was sometimes accompanied by the murder of religious figures who would normally conduct funerary rites. The enormous number of deaths over a short period of time, rapidly changing social identities and the varied circumstances of death previously challenged any effort to interpret - upon discovery of remains – who a person was, the circumstances of their death and the site and nature of body disposal.

After having spent many years participating in grave prospection, excavations and anthropological analyses of thousands of victims of the war in Bosnia from dozens of sites, in association with a large proportion of those exhumed having been positively identified, we are able to discern patterns and draw reasonable conclusions about what constitutes "deviant burial". Further, we go beyond observing deviations as understandable relative to a very small temporal and sociopolitical context to infer intention of the person who committed a burial: if the goal was to hide a murdered body; make a hasty but honest effort to treat a body according to a certain cultural custom; or an attempt to hide a criminal death by way of a seemingly proper, or "non-deviant" burial. Results show that burial patters vary greatly across time and space, but generally reflect rational decisions directly related to the intent of the person conducting the burial. We hope that this research encourages future forensic and humanitarian work to go beyond basic case work and begin to form hypotheses, which will aid interpretation about human funerary behaviour in historic and contemporary conflict contexts.

6. Burial and social deviance in ancient Athens

Liston, M.A.
Dept. of Anthropology, University of Waterloo

The excavations in the Agora of Athens have revealed not only the historic center of ancient Athens, but also the earlier village occupations north of the Acropolis. Bodies of the dead were formally deposited in small cemeteries and informally in abandoned wells while the area was a habitation site. Burials were forbidden once the formal Agora was established, in order to avoid pollution of the sacred aspects of the civic center. This failed to stop the practice of depositing bodies clandestinely in wells and cisterns, however. Burials in wells range in date from the Neolithic to Byzantine periods, and the reasons for their abnormal, and at times illegal, deposition vary. In addition to the disposal of neonates and murder victims discussed in other papers, the deviant burials include a prone burial in a formal grave, and four individuals buried in wells who had physical limitations that may have made them social outcasts. Their debilitating disease or injury may have prevented them from functioning normally, and is probably reflected in their manner of burial. Despite the non-normative burial, two of these from the Early Iron Age, when burials were common in the nearby habitation areas, are known to have been accorded some elements of formal burial, in the form of modest grave goods. It is unclear from the excavation records if the two others from historic period burials were accompanied by any grave goods, and the illegal nature of their deposition in the Hellenistic period makes this less likely. The phenomenon of prone burial has also received considerable attention, and has been shown at times to be used to bury individuals whose deviant behaviour in life made them potentially dangerous to society after death. An inhumed individual buried face-down in the midst of a number of cremations typical for the period suggests that this practice may have been followed in early Iron Age Athens as well. Although occurring at different times, these burials suggest that social deviancy was long recognized in ancient Athens and was reflected in burial practice.

7. From deference to deviance: changing burial patterns in Anglo-Saxon England

Meyers, K.
Dept. of Anthropology, Michigan State University

Deviance in the mortuary archaeological record presents both challenges and opportunities for interpreting change and transition. Non-normative burials can represent non-conformist, outsider or transitional activity depending on the frequency and context of the behavior. Our examinations are further complicated by the change over time that can lead to change in what and for whom certain behavior is acceptable. In Anglo-Saxon England, cremation and inhumation are practiced for a number of centuries. Co-occurrence of these burial forms has diverse meanings based through time and space. In order to determine whether a specific burial form is meant to reflect deviance, it needs to be determined where the normal range of behavior lies. Further, the meaning of these burials changes drastically over a number of centuries in relationship to broader social processes of migration, Christianization, and warfare. In this investigation, the placement of burials and treatment of the remains is investigated to determine when co-occurrence is considered normal or deviant. The placement and treatment of burials in this time period is important in determining meaning, as the ancient Bronze, Iron and Roman age monuments were reused in different ways over time. Further, the appearance of divergent burial treatments can be representative of different identities, both ethnicity and deviance. By examining the changes in the relationship between cremation and inhumation in Anglo-Saxon England, we are afforded the opportunity to examine different contexts and challenges of determining the normal range of behavior, deviant burials and meaning of co-occurrence of cremation and inhumation.

8. Castrate burials: normal, deviant, other?

*Reusch, K.
School of Archaeology, University of Oxford

Castrates existed in large numbers in the past but are rarely found in archaeological skeletal populations. Several reasons may exist for this, but one that must be seriously taken into account is whether they were given deviant burials. Of the few known burial methods for castrates, some indicate that they may have undergone unusual funerary or burial rituals, while others appear to have received ‘normal’ funerary and burial rites. These burial methods seem to vary by culture, and prescribed rites were not always consistently followed. What were consistent were the societal attitudes to castrates across cultures. According to the historical record, these were almost universally negative. How then do castrate burials reflect social views of castrates? These individuals

were known to be unusual and even transgressive in some cultures, but their burials do not necessarily reflect this social view. How can we trace deviant individuals (those we know were socially or physically abnormal in life) if their burials are not deviant? If the purpose of deviant burial research is to understand deviant burials and is based upon the notion that those who are buried in a deviant manner were unusual in some way in life, what does it mean for deviant burial theory when known deviant individuals are buried normally? A discussion of the benefits and drawbacks of the study of castrate burials as deviant with reference to specific cultural differences may aid larger discussions of deviant burial theory and the amount of interpretation that may be made from deviant and normal burials.

9. Unearthing the unusual: A record of non-normative mortuary behaviors at Çatalhöyük, Turkey

Sadvari, J.W.[1], Haddow, S.D.[2], Knüsel, C.J.[3], Larsen, C.S.[1], and S.E. Nugent[1]
[1]Dept. of Anthropology, The Ohio State University; [2]Cranfield Forensic Institute, Cranfield University; [3]Dept. of Archaeology, University of Exeter.

While the site of Çatalhöyük is most well-known for its lengthy Neolithic occupation, it also served as a burial ground during the Roman and Byzantine periods and currently stands as a prominent landmark rising above the agricultural fields of the nearby village of Küçükköy. Over the course of the last 10,000 years, and through each of these discontinuous occupations, Çatalhöyük stands out as a place for both the living and the dead. As bioarchaeologists, we seek to use our knowledge of the latter to better understand the former. Viewing Çatalhöyük through the lens of mortuary archaeology puts us on the path to advancing this understanding, as we find at the site examples of non-normative burial practices during each of these chronologically disparate periods of occupation (the prehistoric, historic, and recent past), practices which can inform us not only about the "others" buried in non-normative ways, but also about the living members of the communities that decided upon and carried out these interments. This paper documents and discusses several examples of non-normative burials at Çatalhöyük, including burials characterized by unusual grave inclusions (e.g., a sheep, a plastered skull) in the Neolithic, a double burial with an atypical grave orientation in the Roman/Byzantine period, and the lone twentieth century burial of a woman from Küçükköy. In their own way, each of these burials enhances our understanding of status and identity construction within a community, ostracism from a community, and the power of social memory across the distant and not so distant past.

Abstracts of the 41st Annual Meeting CAPA-ACAP

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Use of GIS in evaluation of models related to poliomyelitis mortality patterns in southern Ontario, Canada, 1900-1937

Battles, H.T.
Dept. of Anthropology, McMaster University.

Poliomyelitis was a major emerging epidemic disease in the early 20th century, and models of its epidemiology continue to be revised. The traditional polio model links severity of the disease to increased age at infection, with infection occurring at older age in less densely populated areas. Nielsen and colleagues have recently presented two new hypotheses linking polio severity to intensity of exposure and cross-sex transmission. This study tests these using polio mortality data from two counties in southern Ontario, Canada. According to the intensive-exposure hypothesis, exposure to the poliovirus within the home leads to increased severity of infection. It predicts that polio deaths will increase with family size and that there will be a U-shaped age curve in deaths due to younger school-age children bringing the virus into the home. The cross-sex transmission hypothesis holds that transmission of the poliovirus between opposite sexes increases severity and predicts excess male deaths in smaller families. Data for polio deaths in Wentworth and York Counties, including the cities of Hamilton and Toronto, from 1900-1937 were gathered from death registrations and other archival sources and entered into an Excel database. ArcView 3.2 was used to map all polio deaths with a residential street address at the time of death. GIS analysis found statistically significant ($p < .05$) differences in age at death according to distance from Toronto's city centre. Analysis also revealed two distinct stages within the study period. Stage One (1910- 1927) is characterized by an equal sex ratio and a median family size of 4. Stage Two (1928-1937) is characterized by a sex ratio of 1.5 and a median family size of 2. For 1910-1937 inclusive, the sex ratio for ages 0-19 was 2.6 in families of 1-2 children and 0.9 in families of ≥3 children. A U-shaped age curve was observed only in Stage Two, with a dip at ages 7-8. These results support Nielsen and colleagues' hypotheses in addition to aspects of the traditional polio model. These findings tie polio mortality patterns to demographic shifts and demonstrate the sensitivity of the poliovirus-host relationship to changes in the socio-ecological environment.

Comparisons between *Rudapithecus* and primitive hominoid carpal bones: implications for hominine phylogeny and positional behavior

Begun, D.R.
Dept. of Anthropology, University of Toronto.

During the 2009 and 2010 field seasons at the Hungarian late Miocene locality of Rudabánya, we recovered six associated carpal of the stem hominine *Rudapithecus hungaricus*. The bones include a scaphoid, centrale, lunate, triquetrum, pisiform and trapezoid. Notably, the centrale and scaphoid are unfused, as in most primates but not crown hominines. An unfused centrale-scaphoid is the primitive condition in hominines. Fusion of these bones is an important synapomorphy of crown hominines, and has been related to knuckle-walking in their last common ancestor. In contrast with the east African early Miocene hominoids *Proconsul* and *Afropithecus*, and middle Miocene apes *Equatorius* and *Nacholapithecus*, the articulated wrists bones of *Rudapithecus* have numerous similarities with crown hominids, many of which are plausibly related to suspensory positional behavior. These include a deeply concave midcarpal joint and a pronounced and palmarly oriented scaphoid tubercle and pisiform. Other distinctions from more primitive hominoids that are also similarities with hominines include a large scaphoid relative to the lunate, a relatively small trapezoid and a large trapezium, implied by the large facet for this bone on the centrale. In *Rudapithecus* the broad midcarpal joint surface of the lunate clearly accommodated the hamate as well as the capitate, as in extant hominines. The *Rudapithecus* scaphoid and lunate are unique in the development of pits for the radial and ulnar-carpal palmar ligaments and for the lunate parts of the dorsal radial and ulnar-carpal ligaments. Significantly, both for phylogenetic and functional reasons, the pisiform lacks a facet for the ulnar styloid process. While damaged, the triquetrum must have lacked this facet as well, given its articulation with the pisiform and lunate. All early and middle Miocene hominoids for which the area is known possess an ulnar-pisiform/triquetrum contact, as in all other primates except crown hominoids. Gibbons have a bony intra articular meniscus rather than a direct styloid to carpal contact, but it still leaves a facet on the pisiform. Overall, the wrist bones of *Rudapithecus* are modern in most aspects of their morphology,

quite distinct from early and middle Miocene hominoids, and indicative of specialized arboreal and suspensory positional behavior.

Histomorphometric patterning along the mechanical axis in the mid-shaft femur

Beresheim, A.[1], and C. Crowder[2]
[1]Dept. of Anthropology, University of Toronto; [2]Armed Forces Medical Examiner System, Office of the Armed Forces Medical Examiner, Dover AFB.

The relationship between mechanical loading and bone dynamics has been well studied through comparisons of cross-sectional shape and investigations of microstructural organization. Previous research suggests that topographical bone remodeling may coincide with the orientation of predicted bending forces in long bone diaphysis. Evaluating regional patterning in transverse thin-sections will increase our understanding of the biological significance of histological variables.

In this study, mid-shaft femur cross-sections (n=52) from a known-age cadaveric population were used to assess the amount of variability in intact (PI), fragmentary (PF), and drifting (PD) osteon population densities along the major (Imax) and minor (Imin) centroidal axes. It was hypothesized that regions of interest (ROIs) centered along the Imin axis would exhibit a greater number of remodeling events (higher osteon population densities) in order to preferentially accommodate high bending strains. Contrary to expectations, ANOVAs conducted on mean data revealed no significant differences between assessment locations for the PF and PD variables. For PI, the Imin assessment locations were more variable and exhibited greater mean values than the Imax assessment locations. Significant differences were observed among four pair-wise location comparisons: ImaxAnt vs. IminLat, ImaxAnt vs IminMed, ImaxPost vs IminLat, and ImaxPost vs IminMed.

With reference to bending strains, as inferred through cross-sectional geometric analysis, intact osteons appear to be the most relevant microstructural adaptation for deducing mechanically driven bone turnover. New intact osteons not only remove damaged tissue, but also promote toughness by increasing cement line and lamellar interfaces. Fragmentary and drifting osteons more strongly reflect other biological relationships, such as that between remodeling and age-related change, or between remodeling and metabolic demand.

***Ischyromys typus* (Rodentia, Ischyromyidae): its relevance in understanding primate brain evolution**

Bertrand, O.C.[1], and M.T. Silcox[2]
[1]Dept. of Anthropology, University of Toronto; [2]Dept. of Anthropology, University of Toronto Scarborough.

Brain size has long been highlighted as a critical trait in early primate evolution. Most mammalian groups have experienced brain size increase through time, and consequently fossils are essential to understanding brain evolution. Primates are part of Euarchontoglires, so fossil members of this group take on a special importance in reconstructing what is primitive for Primates. However, apart from primates, the only fossil members of Euarchontoglires known from relatively complete skulls pertain to the Apatemyidae and to Glires (rodents + rabbits). Ischyromyidae is one of the oldest rodent families (Late Paleocene to Late Oligocene), either at the base of Rodentia, or the ancestor to modern families such as Sciuridae and Aplodontidae. The genus *Ischyromys* is one of the better represented rodents of the North American Oligocene, known from postcranial and cranial material. The present study on *Ischyromys typus* is the first with quantitative data for a fossil Glires endocast.

Total volume of the *Ischyromys typus* virtual endocast is 5.6 cm^3. Body mass was estimated at 1312g by generating regression equations for two cranial measurements, skull length and length of the palate without incisor, from a large sample of living rodents (N=192). The encephalization quotient (EQ) was estimated at 0.38 with Jerison's equation and 0.55 with Eisenberg's equation. *Ischyromys typus* (middle Orellan, early Oligocene) had an EQ similar to some Plesiadapiforms (*Microsyops annectens*, Middle Eocene) and higher than the most primitive Apatemyidae (*Labidolemur kayi*, latest Paleocene-early Eocene). The olfactory bulbs volume is 1.8cm^3, which corresponds to 3.12% of the total volume of the brain. This value is similar to some early Euprimates (*Adapis parisiensis*, Late Eocene) but lower than plesiadapiforms and apatemyids. These results show that by the Early Oligocene, contrary to what would be expected, rodents had relatively smaller olfactory bulbs compared to Eocene stem Primates, but did not have brains as large as Eocene Euprimates. This suggests that

both Rodentia and Primates have convergently experienced a reduction in the volume of the olfactory bulbs, but only Primates had a significant brain size increase during the early phases of their evolution.

Reexamining the role of animal husbandry in Roman Italy according to the $\delta^{13}C$ and $\delta^{15}N$ values of fauna recorded from the sites of Isola Sacra and Velia

Bishop, K.G.
Dept. of Anthropology, McMaster University.

Stable isotope analyses of faunal remains have yielded important information related to transhumance and animal management practices as well as agricultural practices like manuring. The stable isotope analyses that have been conducted on animal remains in Roman Italy (100 BCE - 700 CE) served as isotopic averages for available diet in order to be compared with the human data. A directed stable isotope analyses of faunal samples can provide considerably more information than solely acting as a data baseline for human studies. This paper examines the use and application of faunal remains to analyze human subsistence practices. In particular I discuss how $\delta^{13}C$ and $\delta^{15}N$ values recorded in fauna have been used to examine manuring, penning, and salt marsh grazing in archaeological contexts outside of Roman Italy. Based on the isotopic trends stated in past studies, I reevaluate the interpretations previously recorded among fauna found at the sites of Isola Sacra (100 - 300 CE), and Velia (100 - 300 CE). The range of intra- and inter-species variation between these two sites was consistent with different animal husbandry practices. The $\delta^{15}N$ values recorded among pig remains illustrated two distinct feeding regimes in both contexts, which may be consistent with prior identification of two macroscopically distinct species of pig. Alternatively, the $\delta^{13}C$ and $\delta^{15}N$ values recorded among cattle were different at each site and are consistent with different animal containment regimes. Isola Sacra cattle exhibited nitrogen values consistent with consumption of manured cultigens, potentially associated with being penned in a controlled area. Ancient literature illustrates different agricultural practices from Roman Italy, detailing the care and use of such animals for that region. Utilizing the ancient literature, macroscopic analyses, and the isotope values enables a thorough investigation into every faunal remain. Studies like these are important as they not only increase the breadth of knowledge related to human subsistence and agricultural practices, but also provides a modest database with which to build future faunal and human studies.

Evidence for influenza in the summer of 1918 on Canadian military transports

*Bogaert, K. L.
Dept. of Anthropology, McMaster University.

One of the most puzzling aspects of the 1918 influenza pandemic in Canada is the absence of influenza in the summer months of 1918, especially considering that the disease was present in Europe and close to home in American ports. To date the only confirmed reports in Canada occurred in the first weeks of July, with the arrival of the *HMS Araguaya*, quarantined in Halifax, and then among the crew of the outbound troopships *Nagoya* and *Somali*, which were disinfected and quarantined in Montreal. The lack of summer cases was ascribed at the time to successful quarantine, and more recently to survivor immunity from previous visitations of the disease (Humphries, 2008). However, an examination of previously unstudied daily logs from Canadian transports (RG 150 Vol. 274) reveals that epidemics of influenza occurred in August on-board *HMT Pannonia*, and *HMT Atreus*. By the time *HMT Pannonia* reached Liverpool on August 15th, 1918, there had been 151 cases of pneumonia and influenza on board, with 4 deaths out of a strength of 2140. *HMT Atreus*, with a strength of 879, experienced 26 cases and 1 death at sea before soldiers disembarked on August 25th, 1918. The majority of influenza cases on *HMT Pannonia* were admitted to the ships' hospital before final embarkation from Canada. Clearly influenza was more prevalent in Canadian ports in the summer of 1918 than previously thought.

Male-specific use of the purr in the ring-tailed lemur (*Lemur catta*)

*Bolt, L.M.
Dept. of Anthropology, University of Toronto.

In mammals, purring has been described mostly in affiliative contexts. In the ring-tailed lemur (*Lemur catta*), both males and females purr, but males appear to purr in contexts additional to affiliation. In order to determine why and when male ring-tailed lemurs purr, 480 hours of focal data were collected on 25 males aged three and older from Beza Mahafaly Special Reserve, Madagascar from March-July 2010. Throughout the

sampling period, males were followed for 30 minutes at a time and their behavior including purring vocalizations and agonistic interactions was noted each 2.5 minutes using one-zero sampling. Male purring rate increased during periods of male-male agonism when compared with times without intra-sexual agonism (Wilcoxon signed-rank test: $z = -3.2$, $n = 25$ males, $p = 0.001$), and purring rate was positively correlated with male dominance rank (Spearman rank correlation: $rs = 0.56$, $n = 25$ males, $p = 0.004$; linear regression: $r^2 = 0.265$, $df = 23$, $p = 0.008$). My results indicate that the male ring-tailed lemur purr is used as an agonistic vocalization in the context of male-male encounters. The male agonistic purr is a new behaviour reported for this species.

Personality traits in rhesus macaques are heritable but do not predict reproductive output

Brent, L.J.N.[1,2], Semple, S.[2], MacLarnon, A.[2], Ruiz-Lambides, A.[3], Gonzalez-Martinez, J.[3], and M. L. Platt[1,4]
[1]Duke Institute for Brain Sciences, Center for Cognitive Neuroscience, Duke University; [2]Centre for Research in Evolutionary and Environmental Anthropology, University of Roehampton; [3]Caribbean Primate Research Center, University of Puerto Rico; [4]Depts. of Neurobiology, Evolutionary Anthropology, and Psychology & Neuroscience, Duke University.

There is growing evidence that behavioural tendencies, or 'personalities', in animals are an important aspect of their biology, yet their evolutionary basis is poorly understood. Specifically, how individual variation in personality arises and is subsequently maintained by selection remains unclear. To address this gap, studies of personality require explicit incorporation of genetic information. Here, we explored the genetic basis of personality in rhesus macaques (*Macaca mulatta*) by determining the heritability of personality components and by examining their fitness consequences. We collected observational data via focal-animal sampling for 108 adult females living in three social groups in the free-ranging population of Cayo Santiago Island, Puerto Rico. We applied principal component analysis to nine spontaneously-occurring behaviours and identified six putative personality components, which we named Meek, Bold, Aggressive, Passive, Loner, and Nervous. All components were repeatable and heritable, with heritability estimates ranging from 0.14 to 0.35. We found no evidence of an association with reproductive output, measured either by infant survival or by inter-birth interval, for any of the personality components. This finding suggests either that personality does not have fitness-related consequences in this population or that selection has acted to reduce fitness-associated variation. These results contribute to our understanding of the evolution of individual differences and form the scaffold for future research into the proximate and ultimate causes of personality in primates.

A new method for quantifying inter-diurnal weather movement and its application to predicting daily mortality

*Bryce, E.K.
Dept. of Anthropology, University of Toronto Mississauga.

A consistent finding in historical studies of weather and mortality is that unsettled weather is detrimental to human health and is associated with an increase in mortality rate. However, modern studies have moved away from using the presence of storms to describe weather, in part because their definition was based on qualitative observation of real-time events and the amount of weather change has always been difficult to measure. This paper presents a novel method for quantifying the degree of inter-diurnal change in the weather. The new measurement was used to test the hypothesis that consecutive days of unsettled weather are associated with excess mortality. It was found that, as expected, days with large weather variability are associated with excess mortality. Days with an intermediate amount of variability are the healthiest, that is, associated with the lowest mortality. Unexpectedly, days with little inter-diurnal change in weather are associated with high mortality. The role of season and stagnant hot-humid air masses will be explored to investigate this unexpected finding.

Biocultural perspectives on bed rest in the tuberculosis sanatorium era

Burke, S.D.A.
Dept. of Anthropology, University of Manitoba.

The late 19th/early 20th century rise of biomedicine ('scientific medicine') paralleled the rise of tuberculosis sanatoria in Canada. Bed rest was increasingly advocated in treatment regimens and defined the tuberculosis sanatorium patient experience. Purported functional effects of bed rest were grounded in anatomical studies of normal and tuberculous lungs. These studies identified a distinctly human tendency to develop tuberculosis disease-related cavitation in the 'favourable soil' of the apical region of the lungs. Two underlying mechanisms

were explored to explain this 'apical vulnerability', both suggested to have been linked to the human tendency to spend much time in an upright posture: 1. a relative deficiency of blood supply to the apices, and 2. a relative over ventilation of the apices. Bed rest, by reorienting humans on a horizontal plane and modifying gravitational effects on the body, was intended to reduce apical vulnerabilities by shifting these dynamics. This research, based on early 20th century medical journal publications, considers the growing understanding of human lung biology and function and offers insights into the specific physiological rationale for selected sanatorium era treatments, including the seemingly straightforward prescription of bed rest. Supporting the use of bed rest was an underlying belief in the therapeutic value of artificial hyperemia (increasing blood supply, or perfusion) to produce lower oxygen concentrations (lower ventilation) which, in turn, created an apical lung environment less hospitable to aerobic tuberculosis bacteria. Alongside bed rest, this research argues, the medical treatment of artificial pneumothorax, a compression therapy that evolved early in the sanatorium era, was intended to impact on tuberculous lung cavities directly by inducing localized hypoxia.

Later Stone Age foragers' long bone cross-sectional geometric properties compared: fynbos, forest and lower Orange River Valley

Cameron, M. E.[1,2], and S. Pfeiffer[1]
[1]Dept. of Anthropology, University of Toronto; [2]Dept. of Anthropology and Archaeology, University of Cambridge.

Diaphyseal cross-sectional geometry can be used to infer activity patterns in archaeological populations. This study examines the cross-sectional geometric (CSG) properties of adult Later Stone Age (LSA) herder-forager humeri and femora from the inland lower Orange River Valley of South Africa (n=5m, 13f), and compares their CSG properties to LSA forager adults from the fynbos (n=22m, 14f) and forest (n=14m, 19f) regions, building on a previous report (Stock and Pfeiffer 2004). The periosteal mould method was used to quantify total subperiosteal area (TA), torsional strength (J), bilateral asymmetry (BA), and diaphyseal circularity (I_{max}/I_{min}) at the mid-distal (35%) location of upper arms (humeri) and the mid-shaft (50%) location of upper legs (femora).

Maximum humerus and femur lengths were similar among the three samples, suggesting that adult stature was similar in all three regions. When compared to Stock and Pfeiffer (2004), CSG property values obtained using the periosteal mould method correlate well, and there are no significant differences between the data collected using the different methods. No statistically significant differences were found between the CSG properties of men and women from different regions, suggesting that all samples undertook similar habitual activities. Humerus TA and J are highest among inland men and women. Humerus I_{max}/I_{min} and bilateral asymmetry are similar between the sexes in the lower Orange River Valley, indicating that men and women undertook similar activity types with similar upper limb loading patterns in this region. Men from all three regions display similar femur CSG properties, indicating similar degrees of terrestrial mobility in LSA men. Forest women have higher femur CSG property values than fynbos and inland women. While the lower Orange River Valley sample is small, regional variation among the three samples may reflect local ecology and the specific subsistence demands affecting populations in these different regions.

Building new identified skeletal reference collections for forensic purposes: the experience of the BoneMedLeg Research Project in Porto, Portugal

Cardoso, H.[1], Santos, A.[2], Magalhães, T.[2], Caldas, I.[3], Andrade, M.[4], Puentes, K.[2], Marinho, L.[5], Assis, S.[5], and A. Toso[5]
[1]Dept. of Archaeology, Simon Fraser University; [2]National Institute of Legal Medicine – Northern Delegation, Porto, Portugal; [3] Faculty of Dentistry, University of Porto, Portugal; [4]Lisbon University Institute, Lisbon, Portugal; [5]Centre for Environmental Biology, University of Lisbon, Portugal.

Several age, sex and stature estimation techniques and methods utilized by forensic anthropologists in the identification of skeletonized human remains rely heavily on collections of documented human skeletons. Most of these collections have been amassed over 50 years ago or represent early 20 century and late 19th century or even earlier population groups. Consequently, estimates of sex, age, or stature obtained from those samples are likely to be biased when applied to modern populations due to secular changes. The BoneMedLeg research project was devised to address these issues by initiating a new collection of identified human skeletons obtained from one of the major cemeteries in the city of Porto, Portugal. The new collection is targeting individuals who have died in the last 20 years and in doing so, will be providing a reference standard which can be considered more representative of the modern Portuguese population. Currently, 80 full skeletons (42 females and 38 males, between 16 and 94 years of age) have been collected and curated. In addition to amassing a new

collection, the BoneMedLeg project is compiling age, sex and stature data from various similar collections in Portugal and Europe, to assess population and secular variation in skeletal size and morphology. Although the BoneMedLeg collection will immediately benefit the medico-legal investigation in Portugal and southern Europe, it will also provide important data for assessing the accuracy of methods currently used to build the biological profile by forensic anthropologists worldwide.

Which bones are better preserved? A study of preservation, completeness and weathering from the Smith's Knoll collection of human remains

*Casaca, L.
[1]Dept. of Anthropology, McMaster University.

Taphonomic processes have a significant impact on archaeological collections, especially in the case of mass graves. Mass graves may be disarticulated, commingled and fragmented, limiting the types of questions researchers can ask. Analyses of aspects of preservation such as completeness and condition of bone produce additional information about complex collections. A review of the literature suggests that preservation analyses are not always completed, and if they are, the number and description of preservation scores vary making comparisons across collections difficult. Previously published literature is not consistent, some studies suggest denser larger elements are better represented but others suggest the opposite. The database of the human remains from the battle of Stoney Creek during the War of 1812 was used to address this question in the context of mass graves. The objective was to determine whether small bones were underrepresented in comparison to the large limb bones, and if the data correlated to the weathering scores recorded. Completeness was recorded using the Zonation method, which divides each bone element into separate areas. Weathering was recorded using the scale for human bone presented by McKinley. At a 5% level of significance, all of the bilateral bones are similarly represented in the collection. The small bones, including the metacarpals, metatarsals, calcanei and tali are underrepresented in comparison to the femora, tibiae and ulnae ($p=0.05$), which is interesting when compared to the weathering data. Comparing the minimum number of individuals for the right radius and the cranial bones at a 5% level of significance indicates that the crania are also underrepresented in the collection. This study highlights the importance of preservation analyses, and adds to the current literature on which bones are better preserved in commingled, disarticulated and fragmented archaeological collections. Confirmation that the smaller bones were under-represented provides useful information for excavators and curators.

Discrepancies between biological and archaeological indicators for the onset of hominin control of fire

Chazan, M.[1], and F. Berna[2]
[1]Dept. of Anthropology, University of Toronto; [2]Dept.of Archaeology, Simon Fraser University.

It is broadly accepted that the onset of hominin control of fire had a fundamental impact on hominin adaptations. Richard Wrangham and colleagues have vigorously argued that multiple lines of biological evidence point *H. erectus* reliance on cooked foods. However, a recent review of archaeological evidence for fire from European archaeological sites failed to support the expectation that fire should be ubiquitous on sites associated with *H. erectus.* There are however claims for early evidence of fire on sites in the Middle East and Africa and our research team working at the site of Wonderwerk Cave, South Africa has recently published multiple lines of evidence for the use of fire in an Acheulean stratum dated to 1 mya. More recently we have published evidence of burnt microfauna in an Oldowan context dated to ca. 1.8 mya. The evidence from Wonderwerk could be construed as confirming expectations of the *H. erectus* cooking hypothesis however questions remain as to why fire was is not more ubiquitous on early sites and why defined hearth features are difficult to detect on early sites. This paper will briefly outline the next stage of research at Wonderwerk Cave designed to address this issue and also will question whether it is correct to model a single point of onset for hominin control of fire or if we should be considering a long process of changes in human interaction with fire.

A new action plan for lemur conservation (2013-2016): key aspects and priorities moving forward

Colquhoun, I.C.
Dept. of Anthropology and The Centre for Environment & Sustainability, Western University.

With the July 2012 conservation status assessment of all lemuriform taxa by the IUCN/SSC Primate Specialist Group, lemurs became recognized as the most endangered group of mammals on the planet. In the wake of this startling determination, the 5th International Prosimian Congress (IPC) since 1972 was convened at

Ranomafana National Park, Madagascar in early August 2013. During the Congress, Dr. Christoph Schwitzer (Vice-Chair for Madagascar, and Red List Authority Coordinator, for the IUCN/SSC Primate Specialist Group), unveiled a new lemur conservation action plan: "Lemurs of Madagascar: A Strategy for Their Conservation 2013-2016". Attendees of the IPC were in complete agreement that the immediate next step must be to communicate and draw attention to the key aspects of the new action plan.

The present report highlights the major dimensions of the 2013-2016 lemur conservation action plan: i) engagement of local communities that are in proximity to lemur populations; ii) encouraging ecotourism, and fostering best-practices to enable the success of community-managed ecotourist ventures; iii) maintaining the presence of long-term research projects at important field sites, and encouraging the establishment of new long-term projects both at additional field sites and on less-studied taxa; and, iv) continued research on captive populations of lemuriform taxa. The first three priorities are specifically targeted at 30 sites in Madagascar that will be absolutely critical to the future of lemuriform biodiversity. The biggest hurdle now will be meeting the projected budgets for proposed work at each of the 30 targeted sites identified in the action plan.

The role of morphometrics in the presence of parturition scarring on the human pelvic bone

*Decrausaz, S.L.
Dept. of Anthropology, University of Victoria.

Osteological evidence of a childbirth event has been thought to present as sclerotic tissue development and pitting (parturition scarring) as a result of repeated musculoskeletal microtrauma. This scarring may be found on the dorsal aspect of the pubic bone, around the ventral aspect of pubic symphysis and at the pre-auricular sulcus. Similar bony changes have also been found in males of some populations. Differences in body mass, stature and pelvic dimensions may result in differential muscular and tendinous action on the pelvis and may influence the development of this scarring in both sexes. In females, the additional stress on the pelvis during the process of childbirth may exacerbate the scarring. The associations between skeletal body mass and stature (which were estimated using skeletal proxies), pelvic outlet size and the presence and type of parturition scarring were examined in males and females. Two skeletal samples (total female n=144, male n=147) from one modern and one archaeological population were included, both with known parity status. Scarring was categorized into types and the degree of development of parturition scarring was coded on an ordinal scale. Non-parametric tests were used to test mean rank scarring scores between sexes in both samples. Tests for correlation between scarring scores and pelvic outlet breadth, and between scarring scores and body mass and stature were carried out. Sclerotic tissue deposition and dorsal pitting is associated with body mass in males in both samples, but not in females in both samples. Body mass, stature and pelvic outlet breadth do not correlate with one another amongst females in both samples. Medio-lateral pelvic canal outlet size has a negative correlation with dorsal pitting amongst females in the archaeological sample only. Results suggest that parturition scarring may not necessarily indicate childbirth events, but may be intensified by pelvic outlet constriction in females and increased body mass in males.

Assessing the potential use of the supraorbital notch as an indicator of sex in humans

Dick, D.[1], and D.C. Merrett[2]
[1]Dept. of Anthropology, University of Toronto; [2]Dept. of Archaeology, Simon Fraser University.

Although non-metric traits such as the Supraorbital Notch/Foramen (SNF) have been traditionally used to explore biological diversity and population distance, the SNF has more recently been examined metrically. Previous studies of the position and frequency of the SNF have noted that due to its relative consistency, it could potentially be used as an estimator of sex in humans. This paper examines the utility, accuracy and precision of the SNF location as a method of sex estimation.

The SNF location was established through five standard measurements to reproducible locations on the skull. Utilizing five ratios created to standardize the position of the SNF for body size, this study compared the standardized position of the SNF between males and females of known sex within a population (N = 15; M = 8, F = 7). The results indicate that the standardized position of the Supraorbital Notch is not significantly different between males and females in the study sample. Thus the location of the SNF is constant when accounting for body size. As a result, in this population, it is not a reliable indicator of sex. The standardized ratio created by comparing the measurement "Right SNF distance from the instrumentally determined midline" with the measurement "Coronale" (frontal bone width) yielded a statistically significant difference between Males and

Females; however, it was only able to accurately determine sex 8% of the time. This study provides the methodology by which future studies on the use of the SNF as an indicator of sex could be conducted. Analysis of similar ratios within a larger population may produce more significant results.

Paleopathology of Early Intermediate Period (200 B.C. to A.D. 750) human remains from Huaca Santa Clara and the Gallinazo Group, Virú Valley, Peru

*Dillon, R.
Dept. of Anthropology, University of Western Ontario.

During the Early Intermediate Period (200 B.C. to A.D. 750), the Virú Valley and the rest of the north coast of Peru were going through a socio-political transformation where the river valleys, formerly ruled by petty chiefs, were restructured into early state societies. This period of change is currently being investigated by archaeologists attempting to understand the emergence of early states, however, until recently there has been no systematic study of the human remains in the Virú Valley. My research, in conjunction with the work of other archaeologists, will show that the Virú Valley was an impoverished area in terms of the elaboration of the burials and the number of grave goods, as well as with the state of the skeletal health of a subset of individuals interred in civic-ceremonial areas of the sites. Preliminary analyses of the human remains indicate a high degree of dental disease and skeletal indicators of stress as well as a fairly high degree of trauma and cranial deformation and prominent muscle markings. This research will be important in order to begin to build a dataset for the human remains in the Virú Valley and to better understand the special context in which these remains were buried in comparison to similar and contemporaneous burial practices elsewhere on the north coast of Peru.

Childhood stress among the well-to-do in early medieval Bergen, Norway

Dolphin, A.E.[1], Lorvik, K.[2], and A. K. Hufthammer[3]
[1]Dept. of Anthropology, Western University; [2]Norwegian Institute for Cultural Heritage Research, Bergen, Norway; [3]Bergen Museum, University of Bergen, Bergen, Norway.

Children are particularly vulnerable to stresses in their environments, and as such, their health is of interest to bioarchaeologists aiming to assess the impact of major social shifts on the well-being of past peoples. This presentation will introduce ongoing efforts to reconstruct the health of children who lived in Bergen, Norway, during its early and rapid transition to an urbanized political and religious centre in the 12th and 13th centuries. A sample of 26 well-preserved individuals with secure archaeological contexts (1170-1198 AD), excavated from St. Mary's Church (Mariakirken) in the 1950s/60s, are being used to assess childhood growth arrest, reconstruct nutritional variation, and document individuals' origins. Although no skeletal remains of children were excavated, retrospective assessments of childhood health were made possible through analyses of dental microstructures. Results show that, among the St. Mary's individuals, children commonly experienced repeated episodes of physiological stress, despite many of them likely being members of relatively well-to-do families in the new town.

Reconsidering hypersexuality in bonobos (*Pan paniscus*): Data from wild bonobos at Luikotale paint a different picture of bonobo sexual behavior

Douglas, P.H., Deschner, T., and G. Hohmann
Department of Primatology, Max Planck Institute for Evolutionary Anthropology.

Bonobos (*Pan paniscus*) are often described as hypersexual apes who "make love not war". Extended female receptivity and variability in copulatory positions have contributed to this image, with data from captivity showing high rates of copulation in bonobos compared to other primates. However, new data collected from wild bonobos may challenge this stereotype, painting a different picture of the bonobo mating system and female sexuality. Data was collected at the Luikotale field site in Democratic Republic of Congo, spanning thirty months during 2010-2013 (over 4000 contact hours). Detailed observations of all occurrences of sexual and social behaviours were recorded from 17 mature females and 7 mature males during female focal follows. Urine samples were collected from females for noninvasive monitoring of steroid hormones and reproductive state, and to investigate female mating behaviour as a function of proximity of ovulation. Preliminary results reveal that free-ranging bonobos engage in male-female copulations at rates much lower than previously have been reported in captivity and at field sites where wild bonobos have been provisioned with food. Interindividual differences in mating behaviour reflect differences in female rank and parity, with higher ranking and multiparous females copulating at lower rates than younger nulliparous and primiparous conspecifics. Female mating behaviour and possible

explanations for the interindividual and intersite disparity in copulation rates will be discussed. This study extends the current database on bonobo sociosexual behaviour and presents a new and divergent perspective on bonobo sexuality. The findings are of important consideration when examining interspecific variation in primate mating systems, and contribute to the discourse on the evolution of sexuality in humans.

Metatarsal torsion and footwear in human populations

Drapeau, M.S.M., and J. Forgues-Marceau
Département d'anthropologie, Université de Montréal.

Recent studies have suggested that metatarsal torsion can indicate the presence or absence of an opposable hallux and even the presence of a longitudinal arch in the foot of early hominins. The human foot, when compared to apes, present a hallux and second metatarsal that have no torsion indicating the lack of opposability as well as third and fourth metatarsals that are strongly everted away from the hallux, reflecting the presence of a longitudinal arch. Little work has been done however to study the variation of torsion within modern humans to evaluate how torsion may vary according to small variations in loading regime and height of the longitudinal arch. Because females are reported to have slightly higher arches than males, we expect that females would have more everted lateral metatarsal. Also, it is reported that western style footwear results in longitudinal arches that are, on average, higher and hallux that are less divergent. We expect that populations wearing these types of shoes would have lateral metatarsals that are more everted and a hallux that is less everted than population with soft shoes. We measured metatarsal torsion in different modern human populations that varied according to footwear. Our sample consisted of 155 individuals, 23 Inuit, 27 Amerinds, and 105 Eurocanadians (48 males, 34 females, 73 unknown). Metatarsal torsion was measured as the angle between the dorsoplantar axis of the base and the head in the coronal plane. Our results indicate that there are no differences between males and females. Inuit, Amerinds and Eurocanadians had similar torsion for the second metatarsal. As expected, however, Eurocanadians have first metatarsals that are less everted than Amerinds or Inuit, and the lateral-most three metatarsals that are more everted (with the exception of the fifth that is more everted in the Inuit). These results suggest that metatarsal torsion is a trait that can be plastic and that it reflects differences in footwear among humans, but may lack sensitivity to capture very slight differences such as those observed between males and females.

Male lifetime reproductive success and opportunity of selection in rhesus macaques of the free-ranging population of Cayo Santiago

Dubuc, C.[1,2], Ruiz-Lambides, A.[2,3], and A. Widdig[2,4]
[1]Dept. of Anthropology, Center for the Study of Human Origins, New York University; [2]Dept. of Primatology, Junior Research Group of Primate Kin Selection, Max-Planck Institute for Evolutionary Anthropology; [3]Caribbean Primate Research Center (Cayo Santiago), University of Puerto Rico; [4]Institute of Biology, Faculty of Bioscience, Pharmacy and Psychology, University of Leipzig.

In mammals, variance in lifetime reproductive success (LRS) is predicted to be greater for males than females because they are less limited by gamete production and parental investment. While a handful of species characterized by a high degree of polygyny support this prediction, very little is known for sexual promiscuous species. Here, we used 20 years of genetic data to investigate whether male LRS is skewed in rhesus macaques (*Macaca mulatta*), an anthropoid characterized by a high level of sexual promiscuity. We calculated LRS for 211 males and 275 females of the Cayo Santiago population reaching sexual maturity and either died of natural causes or reached senescence using 3199 potential offspring surviving their first year of life (92.5% of sampling success). We first compared the strength of reproductive skew between males and females (Nonacs' B index), and then assessed the standardized variance of male LRS, a good estimate of the opportunity for selection (I). Male LRS was significantly skewed with about 20% of male subjects never reproducing, and another 35% reproducing more than average. Male skew was more pronounced than female skew, but showed a low standardized variance (I=1.3) suggesting a relatively low opportunity for selection. Together, these results further support that variance is more pronounced in males, but that the strength of the phenomenon is lower in species facing high degree of polygyny.

Evaluation of biodeterioration in deer bone inoculated with *Amycolatopsis* sp. using scanning electron microscopy (SEM)

Eaton, K. M.[1], Mayne Correia, P. M.[1], and M. C., Pitre[2]
[1]Dept. of Anthropology, University of Alberta; [2]Dept. of Anthropology, St. Lawrence University.

A stable curation environment, in which the microscopic and molecular properties of bone remain intact, is vital to the reliability of future research on skeletal collections. Microbially induced biodeterioration of skeletal material may cause the destruction of histological structures and alter the molecular composition of bone. Analyzing the mechanisms by which microorganisms invade bone is important to anthropological efforts concerning the preservation of archaeological and modern specimens. Considerable research has been conducted concerning the effects of the burial surroundings; however, our understanding of the effects of the curatorial environment on bone is limited. Current curation protocols are challenged with developing techniques to monitor the microscopic integrity of materials in the least destructive manner possible. In this study, deer metapodials were heat-sterilized and experimentally inoculated with *Amycolatopsis* sp., a filamentous bacterium ubiquitously found in archaeological soils. The inoculated metapodials were stored in 13 distinct curation scenarios for two years and examined with scanning electron microscopy (SEM). Our results revealed that there are substantial differences between curation scenarios with regards to the type of microorganisms present, the extent of microbial spread, and the formation of biofilms. Only polyethylene-based materials (and not styrene-based plastics) proved successful in limiting microbial growth in this study. The use of other typical storage containers such as Styrofoam and fibre trays, acid-free tissue, acid/lignin-free boxes as well as cloth and paper bags were associated with moderate to severe contamination with more than 90% of the observed bone surface obscured in contaminated areas. The microbial structures and biodeterioration present in this skeletal material are indicative that the interactions between microorganisms and bone in the curatorial environment are highly influenced by the type and composition of storage containers used.

The global distribution and genetic basis of iris color and structure in populations of European, East Asian, and South Asian ancestry

Edwards, M.[1], Sundararaman, K.[1], Johnson, M.[1], Cha, D.[1], Miles, J.[2], and E.J. Parra[1]
[1]Dept. of Anthropology, University of Toronto at Mississauga, Mississauga, Ontario, Canada; [2] Miles Research, Escondido, California.

Genome wide association studies and the development of quantitative methods of measuring iris color have begun to greatly increase our understanding of global iris pigmentation variation. However, there are still many deficiencies in the present state of eye color research. In particular, limited research has been devoted to iris color variation in populations of non-European ancestry. Although brown eyes predominate in regions outside of Eurasia, there is still substantial iris color variation within these groups. Similarly, very little research has been directed towards characterizing global variation in iridial structures.

We will describe the distribution of iris color and structure in a sample population of 1456 individuals of East Asian, European and South Asian ancestry that were recruited between 2012 and 2013 from the University of Toronto community. Quantitative measurements of iris color will be acquired from high resolution photographs that were taken of each participant's right iris. Using this method, an automatic macro extracts a 256 by 256 pixel square from the left quadrant of each eye. The average color of this square is then expressed in CIE 1976 L*a*b* (CIELAB) color space, which characterizes colour across three dimensions: a lightness coordinate (L*), a red-green coordinate (a*) and a blue-yellow coordinate (b*). In addition to measuring iris color, we will also characterize the presence or absence of four structures commonly found in the human eye. These structures consist of Wolfflin nodules (round bundles of decayed collagen distributed along the outer border of the iris), Fuchs' crypts (pit-like atrophies in the top layer of the iris), nevi (hyper-pigmented spots), and contraction furrows (rings that encircle the iris). We will also describe the use of infrared photography to measure structures that lie beneath the melanin layer, and cannot always be observed on conventional color photographs.

In recent years, a large number of studies have started to use pigmentation characteristics to piece together puzzles of forensic and anthropological interest. A better understanding of global iris pigmentation variation will allow us to further elucidate the factors that influenced the evolution of eye color and structure in different regions of the world.

Examining polio in the archaeological record to identify possible care

*Forman, S.
Dept. of Archaeology & Classical Studies, Wilfrid Laurier University.

This paper examines the importance of investigating polio in the archaeological record in order to build a demography of the disease and how it has evolved through time. Early recorded potential evidence of polio includes an Egyptian carving of a young man with a crippled and withered leg. Cases of polio in antiquity are sporadic and it was not until the nineteenth century that it became an epidemic which continued into the twentieth century. Once a vaccine was developed in the 1950s, polio epidemics decreased dramatically, although complete eradication remains elusive. When polio results in paralysis, it can be seen in the skeleton, generally in regards to disuse atrophy but also arthritis. Studies on living polio victims highlight the difficulties they faced both physically and socially in terms of cultural stigma. Paralysis in some survivors may be such that they are unable to work and require consistent care from others. Examining the archaeological record for polio victims can give insight into the level of care a society provided to those needing assistance and therefore, to how they viewed those with disabilities.

Shifting frequencies of micromammal species at Ha Makotoko rockshelter in Lesotho southern Africa identifies the transition from the Late Pleistocene to the Holocene

Ghazi, S., and G. Dewar
Dept. of Anthropology, University of Toronto Scarborough.

Micromammal species are particularly sensitive to their environmental niches making them excellent indicators for palaeoenvironmental reconstructions. While the use of the postcrania is problematic, the dentition, mandibles and maxillae can often be identified to species and is a powerful tool to explore subtle shifts in local habitat. This study presents the results from the analysis of a large micromammal sample from Ha Makotoko Rockshelter in Lesotho. Specifically the remains were analyzed to provide details of the paleoenvironmental conditions of the region between the pre-woodlot (12000-9500 BP) and woodlot (9500-8500 BP) periods, before and after the Pleistocene / Holocene boundary.

Applying Shannon's diversity index of species revealed a statistically different distribution of species through time. During the late Pleistocene period the pre-woodlot layers exhibit a low diversity index value of 0.33 while the Holocene period woodlot layers produced a much higher value at 1.07. The species suggest that the region was becoming warmer and more humid allowing for increase in the diversity of species.

Answering questions of social history using ancient DNA to analyze skeletal remains from the Spring Street Presbyterian Church Cemetery, New York

Gladyck, S.[1,2], Forde, A.[2], and J. L. Barta[2]

[1]Forensic and National Security Sciences Institute, Syracuse University; [2]School of Biological and Health Sciences, Madonna University.

During the building of the Trump SoHo Tower at the corner of Spring and Varick Streets in New York City, excavators hit a series of underground burial vaults from the historic Spring Street Presbyterian Church. Archaeologists removed the skeletal remains of over 200 individuals from the burial vaults that were in use from at least 1820 to 1843. Under pastors, Samuel H. Cox and Henry G. Ludlow, the church became a politically active anti-slavery institution pushing the boundaries of racial politics by engaging with the major concerns of abolitionists, advocating for an end to segregated seating, offering services of all types to all congregants, and calling for racial equality. Church records indicate that African-Americans were admitted into the congregation as early as 1820. However, church records do not mention a separate burial section for African-Americans nor is there mention of African-Americans buried in the vaults. This project focuses on determining the ancestry of the individuals using ancient mitochondrial DNA (mtDNA) analysis. For the pilot study, DNA was extracted from the skeletal remains of 14 individuals, followed by amplification, sequencing, and analysis to determine the mitochondrial origin of the individual samples in order to provide a glimpse into the lives of the individuals interred in the Spring Street Cemetery.

“Not one of the big ones”: exploring representations of the lived experience of osteoporosis

*Holland, A.[1], and A. Lorbergs[2]
[1]Dept. of Anthropology, McMaster University; [2]School of Rehabilitation Sciences, McMaster University.

Osteoporosis is the most common metabolic bone disease in Canada and has serious, debilitating consequences for those afflicted. In spite of the high prevalence of osteoporosis and associated deformity, there has been little exploration into the lived experience of osteoporosis. As a chronic condition, the physical symptoms of osteoporosis are complicated by significant psychological, emotional and social challenges. The effects of these nonskeletal changes and associated coping mechanisms are poorly represented in the academic and public health literature and result in the experience of osteoporosis being mischaracterised by non-patients as a relatively minor disruption to life, with little recognition of pain or deformity. These beliefs about the lived experience of osteoporosis influence conceptions of risk and participation in prevention behaviours. This paper uses data collected from two pilot projects, a focus group with older at-risk adults and interviews with young adults, to begin to explore how perceptions of osteoporosis influence beliefs about the lived experience in people who do not have osteoporosis. A lifecourse approach is used to frame a discussion of how the beliefs and attitudes of these two groups toward osteoporosis are used to minimize the disease experience and how these ideas about the disease might reflect and influence larger social conceptions of osteoporosis.

Addressing the Osteological Paradox through a direct comparison of childhood health based on non-survivors and survivors

*Holland, E.
Dept. of Anthropology, University of Toronto Mississauga.

The osteological paradox addresses the issue of whether or not skeletal interpretations of past population health reflect the health of the living population from which they were drawn. The purpose of this research is to examine the ability of subadults, or childhood non-survivors, to represent the health of those who survived childhood, the adults. The ability of subadults to represent the health of those who survived is tested here by directly comparing interpretations of childhood stress based on non-survivors (subadults aged 6-20,14 females and 9 males) to those based on retrospective analyses of survivors (adults aged 21-46, 26 females and 27 males). Non-survivors and survivors were directly matched by birth year, using the Coimbra Identified Skeletal Collection. As a result, interpretations of childhood stress based on non-survivors and those based on survivors reflect a shared childhood, whereby the adults represent individuals alive at the time the non-survivors died. A variety of stress indications were assessed for both groups (long bone and vertebral canal growth, linear enamel hypoplasia, cribra orbitalia, porotic hyperostosis, and periosteal bone reaction). Overall, long bone growth generates the same interpretation of health for non-survivors and survivors, and both groups exhibit the same range of stress (mild to severe) across the other indicators. It would seem then, that non-survivors are reliable proxies for survivor health except the pattern of stress experienced in childhood differs. Female non-survivors do not experience stress at the same time, nor to the same degree as female survivors and male non-survivors exhibit greater evidence of stress than male survivors. These different patterns suggest that interpretations based solely on non-survivors would under-represent the stress experienced by female survivors and over-represent that experienced by male survivors. In addition, these different patterns between males and females suggest that hidden heterogeneity of frailty may be sex specific, where males are more vulnerable to stress early in development and females more able to develop resistance to stress and survive. Therefore, in order to generate the most complete picture of childhood health, it is vital that both non-survivors and survivors be included in assessments of past population health.

Comparative histology of burned mammals using light microscopy: examining heat-induced changes in femoral samples of deer, pig and cow

*Horocholyn, K.
Dept. of Anthropology, University of Alberta.

The positive identification of human remains is a key task most osteologists face in the field, either in order to reconstruct human-animal contact in archaeological populations, or to initiate police investigations through forensic analysis. Cremation can complicate the identification of fragmented material. Histological analysis is used to differentiate between faunal material for unburned skeletal material using metric analysis or observing

qualitative characteristics. This study focuses on the histological comparisons between three cremated mammalian species found commonly in many North American and European contexts – *Sus scrofa domesticus* (domestic pig), *Bos taurus domesticus* (domesticated cow), and *Odocoileus virginianus* (white-tailed deer). Five femoral specimens from each species were selected and burned at 600°C, 800°C and 1000°C, and then thin-sectioned for light microscopy. Quantitative techniques focused on the measurement of osteons and Haversian canals dimensions within a given area of cortical bone. The qualitative approach observed the visible differences in histological structures. Results indicated that histological structures were still visible in burned specimens, although visibility was dependent on the extent of carbonization. Unique structures were found in each species, although the presence of some structures in the burned material was unexpected. Quantitative analysis showed evidence for the smallest Haversian structures in deer and the largest in the cow samples. Statistical analysis demonstrated changes in osteon dimensions of pig and cow samples at 800°C and 1000°C. The contraction of osteons in burned pig created osteons similar in size to the deer osteons at 800°C and 1000°C. These results suggest that there is limited value in histological analysis of cremated faunal skeletal material for species differentiation.

Head-to-head test of Fordisc 3.0 and Albanese 2003 Models for sex determination using the hip bone and femur

Jones, G., and J. Albanese
Dept. of Sociology, Anthropology and Criminology, University of Windsor.

The pelvis in general and the pubis in particular have been recognized as the best sources of information for determining the sex of an unknown individual. The objective of the present study was to conduct a head-to-head test of two approaches that use pelvic data to estimate sex: Albanese's (2003) methods for estimating sex using logistic regression compared to the discriminant function equations utilized by Fordisc 3.0. The independent sample consists of individuals from the Terry and Coimbra Collections (n= 67 males and 67 females). Often described erronenously as a "population-specific" method, Fordisc's requirement of a racial approach to human variation confounds the application of the method by making it more difficult to apply and resulting in a lower overall allocation accuracy with a higher sex bias. Fordisc provided an overall allocation accuracy for estimating sex of 93.8% with a considerable sex bias (89.1% for males and 98.5% for females), whereas the Albanese method resulted in a higher overall allocation accuracy of 98.5% with no sex bias in the estimation of sex in this sample. The higher allocation and better overall performance of the Albanese 2003 method can be attributed to several factors including, 1) the use of the more statistically robust logistic regression instead of discriminant function, and 2) considering sex as an independent question and avoiding a racial approach to the investigation of human variation.

A new model for the creation of region-specific subadult dental age estimation standards

*Kirkpatrick, C.L.
Department of Anthropology, Western University.

Subadult age is most commonly estimated from human remains using 'universal' dental development standards based on North American and European reference populations. Recent studies have indicated a need for region-specific subadult dental age estimation standards. In preparation for the creation of a new standard for Egyptian and Middle Eastern subadults, a meta-analysis of past standards was conducted and a new model was developed for the creation of subadult dental age estimation standards. The introduction of the new model will be accompanied by the introduction of an online reference, comparing aspects of age estimation standards based on the new model with those of past age estimation standards based on dental development.
The proposed new model involves the formation of new panoramic dental radiographic reference collections with more precise age and sex attributions. A new region-specific, not population-specific, subadult dental aging standard will then be created based on the radiographic study of 1020 modern Egyptian subadults, with 60 subjects (30 males and 30 females) forming a representative sample for each year of subadult life. Volunteers and/or their guardians will also be asked to complete a questionnaire regarding demographic and health history information along with socio-cultural and environmental factors that may affect dental development and dental health.

Following radiographic data collection, the new model requires that dental development be recorded for individual teeth using calcification and eruption scoring systems. Bayesian statistics will then be used to create a region-specific aging standard that compensates for any population distribution bias. During the development of

the dental aging standard for Egypt and the Middle East, variations of the Bayes Theorem will be applied and tested using a bootstrapping statistical method in order to determine the most accurate, specific and unbiased statistical method for use in the development of future region-specific dental age estimation standards. The new standard should better represent regional epigenetic factors affecting dental development and provide sex-specific age calculations based on more systematic data collection methods and improved statistical methods. An improved subadult dental age estimation standard will have important applications to forensics, bioarchaeology, paleopathology, dentistry, orthodontics, socio-cultural anthropology and law.

"A disjointed muddle of bones?" Deliberate disseveration in Egyptian mummification

Klales, A. R.[1,2], and J. P. Elias[3]
[1]Dept. of Anthropology, University of Manitoba; [2]Anthropology Dept., Dickinson College; [3]Akhmim Mummy Studies Consortium, Carlisle, PA.

Petrie's work at Deshasheh in 1897 is most famous for producing one of the first x-ray images of ancient Egyptian physical remains. What is not widely remembered is that this x-ray was not of a mummy in the usual sense, with desiccated soft tissue intentionally preserved through the infusion of resinous substances. It was of a rather different type of body, one which Petrie termed "dissevered." Disseveration, a deliberate treatment in which skeletal elements of the body are separated and repositioned, necessarily results in a certain amount of disarticulation. Historically this has led to the erroneous conclusion that these bodies have been taphonomically disturbed.

While Petrie had identified the practice in Old Kingdom bodies only, disseveration was not confined to that remote time period. An examination of five individuals in the Akhmim Mummy Studies Consortium (AMSC) database reveals that intentional modification and repositioning of skeletal elements is evident among mummies of the First Intermediate, Kushite, Saite, and Late Periods. The most prevalent pattern we have noticed in this sample, is a disarticulation of the thoracic skeleton and near avoidance of the appendages, which in such cases remain close to their expected anatomical configurations. Study of published photographs shows that similar disseveration was sometimes practiced during the New Kingdom as well. In addition to describing these cases, we will attempt to identify the cultural significance of this enduring pattern of mortuary preparation found in ancient Egypt.

A stable isotopic analysis of collagen and carbonate from archaeological bear (*Ursus americanus*) remains at the Dorchester Village Site (AfHg-24)

Leatherdale, A.J.[1], Morris, Z.[1], Booth, L.[1], Sweeney, J.[2], Hodgetts, L.[1], and F. J. Longstaffe[3]
[1]Dept. of Anthropology, The University of Western Ontario; [2]Timmins Martelle Heritage Consultants Inc.; [3]Dept. of Earth Sciences, The University of Western Ontario.

The spiritual significance of black bears (*Ursus americanus*) to the southern Ontario Iroquoian (OI) people is well documented ethnographically and ethnohistorically and has led to the interpretation of certain archaeological features from OI sites as representative of these beliefs in antiquity. The multi-component Dorchester Village Site (AfHg-24) was occupied throughout the Middle Ontario Iroquoian stage (1300 to 1450 CE) and has one such pit feature, denoted as Feature 365. It is interpreted as a ritual deposit of faunal remains based on the unusually large number of black bear remains, including two complete skulls in the uppermost layer of the deposit. Ethnographic and ethnohistoric sources describe the ritual feeding of maize to black bears prior to their sacrifice and consumption. Here we describe the stable carbon and nitrogen isotopic compositions of type I bone collagen and the stable carbon and oxygen isotopic compositions of bone carbonate from six bear mandibles and three teeth from a single mandible from Feature 365. The goal is to determine whether these animals were fed large quantities of maize, a C4 plant, for an extended period prior to their deaths using the paleodietary reconstruction method of stable isotopic analysis. The stable carbon isotopic compositions of type I collagen suggest that these animals were primarily C3 (non-maize) consumers. However, the isotopic composition of type I collagen is biased toward carbon derived from dietary amino acids in animal proteins. The stable carbon isotopic compositions of bone carbonate, which is more reflective of the bulk metabolic carbon pool, indicate greater C4 plant consumption suggesting that maize or maize-consumers played a role in their diet. This study demonstrates the metabolic implications behind paleodietary reconstruction using stable isotopic analysis and provides potential evidence of a particular ritual practice hundreds of years before its written documentation.

Neocortical ratios in stem primates and their importance for understanding primate brain evolution

Long, A. [1], Bloch, J. I. [2], and M. T. Silcox[3]
[1] Dept. of Anthropology, University of Toronto; [2] Florida Museum of Natural History; [3]Dept. of Anthropology, University of Toronto Scarborough.

When compared to other mammalian taxa, a defining feature of all extant euprimate brains is a significantly expanded neocortex, comprising up to 80% of the cortical surface in *Homo sapiens*. Questions pertaining to when and how this region first started expanding in the primate lineage have been a significant part of palaeoprimatological discourse throughout much of the last half century. These arguments have relied upon examination of gross anatomical landmarks on fossil endocasts of Early Tertiary euprimates that already exhibit significant neocortical expansion compared to contemporaneous non-primates. The current study provides the first measurements of neocorticalisation in stem primates ("plesiadapiforms"). Ratios of total neocortex surface area to total endocast surface area obtained from measurements of virtual endocasts of *Ignacius graybullianus* (~55 Ma) and *Microsyops annectens* (~46 Ma) contrast with those calculated for early euprimates in being within the 95% confidence intervals for archaic mammals generally, suggesting that neocortical expansion had not yet evolved on the primate stem. *Ignacius* is near the average of its mammalian contemporaries in regard to degree of neocorticalisation, while *Microsyops* exhibits a neocortical ratio that is slightly below average. These values are likely attributable to temporal effects, body mass differences, as well as taxon-unique sensory specialisations. The current paucity of earlier, identifiable euarchontogliran endocasts makes it unclear whether these plesiadapiform taxa exhibit neocortical expansion when compared to earlier euarchontoglirans, or whether they represent the primitive euarchontogliran brain condition. Regardless, these results suggest that a major shift occurred in primate brain organisation between the first and second primate radiations, perhaps in association with elaborations to the visual system.

Life history of the most complete fossil primate skeleton: exploring growth models for *Darwinius*

López-Torres, S.[1]; Schillaci, M. A.[2], and M. T. Silcox[2]
[1]Dept. of Anthropology, University of Toronto; [2] Dept. of Anthropology, University of Toronto Scarborough.

Darwinius masillae is a juvenile specimen of an adapiform primate from the middle Eocene of Messel (Germany), which represents the most complete fossil primate known. For the past four years, it has been at the centre of controversy about the relationship of adapiforms to the rest of euprimates, stemming from the hypothesized close relationship of *Darwinius* to Anthropoidea. This hypothesis contradicts the classic view of adapiforms having a closer relationship to Strepsirrhini.

The present study reconstructs the ancestral permanent dental eruption sequences for the basal euprimate, haplorhine, and anthropoid, and stem and crown strepsirrhine, using data from 91 fossil and extant taxa. The results show that the ancestral sequences for the basal euprimate, stem strepsirrhine, and basal haplorhine are virtually identical, and very similar to that of *Darwinius*. However, *Darwinius* clearly differs from anthropoids in that the latter show a dramatic delay in the eruption of the third lower molar relative to the premolars. In *Darwinius,* although m3 remains unerupted, it is closer to eruption than p3 or p4, and therefore the species would not have exhibited this pattern.

In the original description of the skeleton, a growth study and calculation of age at death of *Darwinius* were performed using the platyrrhine *Saimiri* as a model, based on the hypothesized anthropoid relationship. Particularly key was the eruption of p2, which was treated as the point of interruption of the sequence, and therefore the basis for the determination of the age at death. However, fast-growing platyrrhines generally exhibit a delayed eruption of p2, while *Darwinius* shows an early eruption of that tooth. This contrast would suggest that *Saimiri* would not represent a good exemplar for *Darwinius*' development. Here, a model based on the well-studied strepsirrhines *Eulemur* and *Varecia* is presented, based on the competing hypothesis about *Darwinius*' relationships, and the inference that strepsirrhines better represent what is primitive not only for strepsirrhines but also for haplorhines. Using this model, *Darwinius*'s age at death would have been older than previously suggested (13-14 months), while the projected adult weight falls within the range that the original study proposed.

Validation using 3D CT of the new interpretation of Gerasimov's nasal projection method for forensic facial approximation

*Maltais Lapointe, G.
Dept. of Anthropology, University of Toronto.

Accurately approximating the facial features for forensic facial approximation and ultimately successful recognition is challenging, especially the nose. The nasal region is mainly composed of cartilages that rarely survive extreme decomposition. Numerous methods have been published to position the tip of the nose in profile with variable results. Gerasimov's two-tangent method (1971) is the most commonly used. The nasal tip is positioned using the intersecting point of two tangents that follows the general direction of the nasal bone and the anterior nasal spine. However, an article published by Ullrich and Stephan in 2011 states that the method was not properly performed and provides new guidelines. This research used a sample of CT scans from a modern Denmark population (N=66) to determined which of Gerasimov's literal translation or Ullrich and Stephan's new version of the two-tangent method is the most accurate. A combination of the two methods was also evaluated to determine the effect of each tangent independently, and multiple trials were used to examine the effect of intraobserver error. It was determine that the new guidelines consistently result in smaller mean difference. However, none of the methods were found to be statistically accurate in positioning the tip of the nose unlike previous studies, which could be explained by the level of experience and the type sample used. These results are important because it demonstrates the importance of methodological testing and the influence of multiple variables.

Dietary resource use during the Hellenistic, Roman, and Byzantine periods at Helike (Greece)

McConnan Borstad, C.[1], Garvie-Lok, S.J.[2], and D. Katsonopoulou[3]
[1]Dept. of Archaeology, University of Calgary; [2]Dept. of Anthropology, University of Alberta; [3]Project Director, The Helike Society.

Stable isotope analysis of archaeological human remains is a well-established technique and has proven useful in exploring aspects of past diet. Bone collagen samples from 24 individuals from Hellenistic, Roman, and Byzantine period Helike, Greece were analyzed for $\partial^{13}C$ and $\partial^{15}N$ for the purposes of reconstructing general dietary resource use and to detect any changes that may have occurred over time. Historical documents suggest that the Byzantine period in particular was associated with increased marine resource use, as Orthodox Christian fasting rules promoted abstinence from meat and occasionally dairy products for a large part of the year. Fish and seafood were considered acceptable substitutes and would have been easily accessible at Helike due to its coastal location. The results indicate that overall diet at Helike was based upon C3 terrestrial resources with domesticate animals providing most of the dietary protein. Based on comparisons to reconstructed resource values, some individuals also show evidence of marine protein consumption. The intensity of this marine signal differs between each time period, possibly reflecting changes in topography and in the availability of local aquatic resources. It is most pronounced in the Hellenistic individuals. The Byzantine individuals show the most isotopic variability for all the time periods, suggesting that religious fasting and dietary edicts were being followed in different ways and to different degrees at Helike. These results contribute to the growing body of stable isotopic knowledge for this particular region of Greece and demonstrate the importance of taking into account possible changes in resource availability when reconstructing dietary resource use.

The archaeology of Southern Ontario bioarchaeology: a case study of the Rickley site

Meloche, C., and J. Albanese.
Dept. of Sociology, Anthropology and Criminology, University of Windsor.

This study will engage and consider the policies of mid-20th century archaeology in Ontario, considering their application and adverse effects on excavation procedures and their resulting collections, including the case study of the Rickley site. The Rickley collection and excavation will be utilized as an example of how detrimental midcentury policies have been in terms of the collection itself and future research prospects. We frame some problems doing research with this collection and some of the solutions to these problems moving forward. Accountability, both in the form of professionalism and recognition of the important role that First Nations play in the involvement and consultation processes today, whether it be for academic or the more recognizable cultural resource management reasons, is a large and deciding factor in the development of future procedures of

documentation and excavation. The path that bioarchaeological practice takes is an evolutionary one, where the context of the past will continue to influence growth in the future.

Trophies and talismans: the traffic of human remains

*Nafte, M.
Dept. of Anthropology, McMaster University

As Laderman (2003) asserts, the order of an entire social structure depends upon putting the dead body in its proper place. In this paper, I look at two seemingly opposed areas of Western culture that have each put the dead body in its 'proper place', a place that defines and demarcates their respective power, authority and history. These areas are the Roman Catholic Church, with their rich tradition of making and displaying relics, and the field of medicine in the creation and promotion of anatomical specimens. I argue that these fundamental Western establishments continue to use and move the undisposed dead to convey forms of spatial control, ideology, and identity. Both institutions have also influenced and informed a variety of visual artists who integrate human remains into their artwork and as such, continue the tradition of moving human remains from personal to public spheres. I present these works within the context of highlighting the strong connections between personal narrative, institutional identity, and the transformation of the dead body into objects of material culture.

Underscoring this discussion is the notion that human remains have an inherent influence and agency that can be harnessed and usurped. Both specimens and relics have compelling features that radiate power within and beyond their place of containment, with a surprising authority that can transform whatever space they are made to occupy. They are the remains of dead persons and yet, objects that are amassed for defining very distinct socio-political and legal boundaries. Furthermore, aside from providing forms of worship, trade, and entertainment, specimens, relics, and art objects impart practices of commodification that are actively transported into vast networks of trade, auction and private collecting.

Exploring signatures of positive selection in pigmentation candidate genes in East Asian populations

Parra, E.J.[1], Hider, J.L.[1], Gittelman, R.M.[2], Shah, T.[3], Edwards, M.[2], Rosenbloom, A.[3], and J.M. Akey[2]
[1] Dept. of Anthropology, University of Toronto at Mississauga; [2] Dept. of Genome Sciences, University of Washington;[3] Dept. of Mathematical and Computational Sciences, University of Toronto at Mississauga

Currently, there is very limited knowledge about the genes involved in normal pigmentation variation in East Asian populations. We carried out a genome-wide scan of signatures of positive selection using the 1000 Genomes Phase I dataset, in order to identify pigmentation genes showing putative signatures of selective sweeps in East Asia. We applied a broad range of methods to detect signatures of selection including: 1) Tests designed to identify deviations of the Site Frequency Spectrum (SFS) from neutral expectations (Tajima's D, Fay and Wu's H and Fu and Li's D* and F*), 2) Tests focused on the identification of high-frequency haplotypes with extended linkage disequilibrium (iHS and Rsb) and 3) Tests based on genetic differentiation between populations (LSBL). Based on the results obtained from a genome wide analysis of 25 kb windows, we constructed an empirical distribution for each statistic across all windows, and identified pigmentation genes that are outliers in the distribution. We identified 20 putative pigmentation *genes (ATRN, EDAR, KLHL7, MITF, OCA2, TH, TMEM33, TRPM1, ADAM17, BNC2, CTSD, DCT, EGFR, LYST, MC1R, MLPH, OPRM1, PDIA6, PMEL and TYRP1)* showing extremely unusual patterns of genetic variation in East Asia. Most of these genes are outliers for different tests and/or different populations, and have already been described in previous scans for positive selection, providing strong support to the hypothesis that recent selective sweeps left a signature in these regions. We describe the next steps of our research, in which we will identify, using bioinformatics tools, putative functional polymorphisms in each gene, and will genotype these genetic markers in an East Asian sample for which quantitative estimates of skin pigmentation (obtained with a reflectometer) are available. Our goal is to increase our understanding of the genetic architecture and evolutionary history of skin pigmentation in human populations.

Multiple myeloma or lytic metastatic carcinoma: differential diagnosis of osteolytic lesions

Phillips, S., and M. Moroz
Dept. of Earth and Environmental Systems, Indiana State University

This study presents an analysis of the skeletal remains of an elderly female with multiple osteolytic carcinomic lesions. Few cases of metastatic carcinoma (secondary neoplastic foci) have been reported in the bioarchaeological literature. Of those reported, most are osteolytic in their reaction. And, even fewer cases of multiple myeloma (primary malignancy of plasma cells) have been reported. Both conditions present similar manifestations that can complicate a clear distinction. This analysis conducts a differential diagnosis of the lesions in the present case, using macroscopic and radiographic techniques, and suggests that multiple myeloma (MM) is the more likely interpretation. A literature review indicates no historic period cases of MM from US archaeological contexts have been recovered and one possible case from the NE Canadian frontier has been reported for all of historic period North America. MM is a rare clinical condition (~2 cases/100,000) and is almost nonexistent in individuals under 50 years of age. The individual presented in this study is from a late nineteenth century "county home." It is also suggested that with the development of a cultural institution to care for the elderly, that, with such care, more individuals were beginning to survive fatal conditions long enough for bony tissues to be affected.

Diet and dental health on a Roman imperial estate at Vagnari, Italy

Prowse, T.L.
Dept. of Anthropology, McMaster University

Excavations at the site of Vagnari in southern Italy have uncovered an Imperial estate and necropolis (2^{nd} – 4^{th} centuries AD). Vagnari is the largest Roman period site in the region and was likely situated near the *via Appia*, an important trade route linking Rome to the southeast coast of Italy. Stable isotope evidence for diet ($\delta^{13}C$, $\delta^{15}N$) indicates a largely terrestrial diet with no differences in isotopic signals based on sex, tomb type, date of burial, or number of grave goods. In contrast, the dental pathology data indicate higher rates of caries, antemortem tooth loss (AMTL), and tooth wear among adult males in the cemetery. It has been suggested that, in general, females should have more cavities due to life history variables such as earlier eruption of teeth, hormonal changes associated with reproduction, and sex-based variability in dietary patterns (e.g., frequency of consumption of food). The data from the Vagnari skeletal sample do not support this hypothesis and indicate that males were consuming a more cariogenic diet leading to higher rates of caries and AMTL in all age categories. The results also show no differences in dental health in relation to tomb type, burial chronology, or number of grave goods.

The higher rates of dental disease among adult males at Vagnari indicate dietary differences between the sexes in adulthood (that were not detected in the isotopic data), which may be associated with gender-based differences in quality and consistency of food consumed. Foods that are high in carbohydrates or that are sticky and sweet provide an ideal environment in the mouth for the formation of cavities, so the males at Vagnari were likely consuming more food items that had these properties. We do not know is if these were higher 'status' foods, but historical evidence from the Roman period suggests that males had greater access to a wider variety of foods due to their elevated status in the household and in Roman society. The results of this analysis also emphasize the importance of integrating isotopic and dental pathology data in the analysis of past diet.

Phalangeriform marsupials as models for the study of body mass in primitive primates

Prufrock, K.[1], and M.T. Silcox[2]
[1]Dept. of Anthropology, University of Toronto, [2]Dept. of Anthropology, University of Toronto Scarborough

Equations generated from dental and cranial measurements of extant primate samples produce body mass estimates of stem primates ("plesiadapiforms") that are not in accord with one another. A possible explanation for this discrepancy is the difference in cranial form between plesiadapiforms and extant euprimates that lack hypertrophied incisors and have larger brains and relatively reduced nasal regions. Enlarged incisors, along with other primate-like traits (e.g., convergent orbits and grasping extremities), are seen in a diverse suborder of small-to medium-bodied marsupials, Phalangeriformes. As such, phalangeriforms may provide a better comparative population for cranial scaling in plesiadapiforms. In this study, we construct 15 new body mass estimation equations using least squares regression. The equations derive from cranial measurements of a

broad sample of phalangeriforms (n= 33 species with body mass ranging from 20-6800 g). Although all measurements reflect a strong positive association with body mass (Pearson's r: 0.79-0.94), measurements heavily influenced by the presence of hypertrophied incisors had some of the highest Pearson's r-values (e.g., dental arcade width:0.94, dental arcade length: 0.94, and prosthion-inion length: 0.94), indicating that this trait does strongly influence cranial scaling. Using these equations, body mass was estimated for members of four plesiadapiform families (Palaechthonidae [*Palaechthon nacimienti*], Paromomyidae [*Ignacius graybullianus*], Plesiadapidae [*Plesiadapis tricuspidens, Pl. cookei*], and Microsyopidae [*Microsyops annectens*]). The majority of body mass predictions yielded values that are more congruent with those derived from extant primate dental equations than estimates based on extant primate cranial measurements. For example, an equation based on prosthion-inion length yielded a body mass estimate of 352 g for *Ignacius graybullianus*, more similar to an estimate based on M1 area (375 g), than the notably lower previous estimates based on the cranium (231-286 g). These results demonstrate a basis for reassessing body mass in plesiadapiforms, a crucial biological parameter for investigating early primate niche use and other aspects of biology such as the early evolution of the brain.

Endosteal lamellar deposition as an indicator of mechanical load: comparison between two populations.

Raguin, E.[1], Streeter, M.A.[2], Lazenby, R.A.[3] and M.S.M. Drapeau[1]
[1]Dept. of Anthropology, Université de Montréal, [2]Dept. of Anthropology, Boise State University, [3]Anthropology Program, University of Northern British Columbia.

It has been hypothesized that "endosteal lamellar pocket" (ELP), a remnant of bone modeling characterized by primary circumferential lamellar bone, is deposited endosteally as a functional adaptation to enhanced the resistance to mechanical load. If this is so, we would expect that ELP will be found predominantly in areas where the loads are greatest. This study tests whether ELP is correlated with cross-sectional properties of human metacarpals. More specifically, we tested whether direction of greatest bending rigidity (θ) was correlated to weighted mean angle (WMA) of the ELP. Our sample consists of second metacarpals from two genetically distant populations, Eurocanadian and Inuit. The Eurocanadian sample is from the St. Thomas cemetery of Bellville, Ontario (n=48, 15 females and 33 males), a cemetery that was active between 1821 and 1874. The Inuit sample consists of Sadlermiut from Southampton Island in the Central Canadian Arctic, probably of the proto-historic period (n=26, 12 females and 14 males).

We found that, in the Eurocanadian sample, θ and the WMA are moderately but significantly negatively correlated (circular correlation coefficient R=-0.23), whereas the correlation is reduced in the Inuit (R=0.11). When sexes are separated, the correlations are much higher for males (R=-0.40 for EC and R=0.36 for Inuit) and lower for females (R=0.17 for ES and R=0.08 for Inuit). Differences between the two populations may reflect variations in the types of activity resulting in a different spatial distribution of the ELP relative to θ, while differences between the sexes may reflect the generally more strenuous activities practiced by males compared to females. Our results suggest that ELP is indeed a response to incurred mechanical loads and could eventually be used to infer manipulatory activities in archaeological populations.
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Analysis of *Hystrix* specimens recovered from Sima de las Palomas, Murcia, Spain: identification and paleoenvironmental revision

Rhodes, S.[1], Walker, M.J.[2], López-Martinez, M.[3], Haber-Uriarte, M.[4], López-Jiménez, A.[2], Buitrago- López, A.T.[3], and G. Dewar[5]
[1] Dept. of Anthropology, University of Toronto; [2]Departmento de Zoologia y Antropologia Fisica, Universidad de Murcia; [3]Murcia, Spain; [4]Departmento de Prehistoria, Arquelogia, Historia Antigua e Historia Medieval, Universidad de Murcia; [5]Dept. of Anthropology, University of Toronto Scarborough.

Small mammals from archaeological contexts have often been used as environmental proxies in Paleolithic studies. Key to such use is an understanding of both the biogeographic distributions and habitat preferences/dietary needs of both extinct and extant species. As such, precise taxonomic identification of archaeologically derived faunal specimens can be significantly informative to attempts to understand why a particular region was occupied by prehistoric hominid populations. This study details the identification of five rodent dental specimens, recovered during the 2011 field season at Sima de las Palomas del Cabezo Gordo,

Southeastern Spain via statistical and morphological comparison of morphometric dental features. Recovered from contexts dated to between 125 – 60 kya, these specimens come from a time of limited fossil representation, a relative 'dark age', with regards to Hystricidae geographic distribution, as well as a time of variable climatic warmings and coolings preceeding the last glacial maximum. Identified correlations between the Sima de las Palomas specimens, *Hystrix javanica* and *Hystrix brachyura* in molariform size, a reliable measure of phenotypic variation when compared multidimentionally, suggests a greater geographic range for these species than previously documented. Furthermore, the inclusion of *Hystricidae* populations in the faunal record at Sima de las Palomas allows for a more detailed account of the various plant species likely included in the local ecosystem and substantiates previous climatic interpretations. Studies such as this are important in that they provide a nuanced understanding of the environments inhabited by our early ancestors, in this case *Homo neanderthalensis,* during climatically volatile periods.

A comparison of three methods used to characterize personal uniqueness of the frontal sinuses using CT data

*Richer, S.M.
Dept. of Anthropology, University of Manitoba

Identification of unknown individuals is important in forensic cases to notify next of kin and to execute legal matters. Several areas in the skeleton have been proposed to aid in identification, including the frontal sinuses. These structures are considered unique to each individual because of the high degree of observed morphological variation. 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).

Visual comparison and superimposition of an antemortem image over a postmortem image to identify a match are the most basic methods for identifying if two frontal sinuses belong to the same individual. This simple approach has given way to several methods that attempt to quantify observed morphological variation in the frontal sinuses. These methods can broadly be grouped into three categories: measurement, coding and outline methods. 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. In line with this ruling, it is crucial to test and validate all personal identification methods on independent samples.

This paper will present a comparison of three methods (one from each category) of quantifying the personal uniqueness present in the frontal sinuses. The sample used in this study is a postmortem CT collection of 130 individuals from the University of Copenhagen. The protocols will be described, including the adaptations made to two of the methods which were originally designed to be used with X-ray image data rather than CT data. All methods were repeated using all individuals to identify intra observer error. The three methodologies will be evaluated and compared for their abilities to characterize individuality and produce unique matches in this sample. The results show that the weakest method is the coding system, while the strongest are the outline and measurement techniques. The aspects of frontal sinus morphology that made matching difficult will be discussed and recommendations for forensic anthropologists to increase standardization will be made.

A geometric morphometric study of sex-based shape differences in the human hip bone

*Robertson, H.I.
Dept. of Anthropology, University of Victoria

Previous studies have shown that geometric morphometrics (GM) is a useful tool for measuring the shape differences in the human hip bone that distinguish between the sexes. It should, therefore, be ideal for identifying and measuring possible shape differences within the sex groups due to individualizing factors such as genetic differences in adolescent growth patterns. The purpose of this study was to use GM to investigate sex-based shape differences in the hip bone on a 5 scale sex classification scheme (male, possible male, indeterminate sex, possible female, and female). Fifty-nine undocumented left hip bone specimens were assessed for skeletal sex using the greater sciatic notch, the ventral arc, the subpubic concavity, and the ischiopubic ramus ridge. The hip bones were translated into three-dimensional computer models using the NextEngine laser scanner. Thirty landmarks were used to capture the shape of the hip bone for GM analysis. A full Procrustes superimposition oriented the landmark coordinates to the same axis of reference and scaled to

the same general size. A principal component analysis identified the components of hip bone shape that best identified males and females, males and possible males, and females from possible females.

The components of hip bone shape that best distinguished between the sexes are consistent with the findings of other GM studies. Males are characterized by a shorter and wider pubis and a longer hip bone. Females were characterized by a longer and narrower pubis, a shorter hip bone, and a more superiorly angled posterior portion of the ilium. Individualizing components of hip bone shape, not related to sex differences, include the width of the iliac crest and the shape of the ischial tuberosity. The pubis also possesses components of shape that allude to distinctions between female and possible female individuals. Components of shape did not clearly define male or possible male individuals. Individuals of indeterminate sex shared male hip bone shape. The components of shape that allude to differences in the female pubic bone are interesting contributions to the understanding of human variability within sex groups and how human variability influences sex identification based on hip bone morphology.

Stages of growth and senescence as the method of assessing skeletal age

Roksandic, M.
Dept. of Anthropology, University of Winnipeg

Despite some recent advances, many claims to having solved the problems of age determination, and numerous papers published since 1982, point age estimates remain the main impediment to advancing our understanding of demographic profiles of past human population. From biases inherent in the methods of assessment, to biases inherent in the sample, the perpetual myth of short and brutish prehistoric life and the life expectancy of 35 years reached at adulthood still permeate the literature, despite numerous papers that demonstrate the biological impossibility of such a population. In 2011 Roskandic and Armstrong have proposed using stages of growth and senescence rather than point age estimates in bioarchaeology. The stages are based on biologically meaningful and easy to recognize skeletal markers. Here I will present the method of using life history based stages to assess age of an individual and compare three archaeological and one comparative sample to demonstrate that rude as these categories are they pick-up important differences between samples.

An assessment of metric-based methodologies from 3D images

*Saly, A.
Dept. of Anthropology, University of Toronto Mississauga.

With advancements in 3D scanning technologies, 3D scanning of skeletal materials is becoming incorporated into morphological methodologies, yet it still remains absent from metric based analyses. The purpose of this research is to test the accuracy and examine the variation between measurements taken in the traditional manual manner, to those from 3D images. The measurements that are being utilized within this research are for the purpose of examining femoral torsion, femoral curvature and femoral subtrochanteric shape. Photogrammetry is used to create the 3D images of each femur as this method is easy to use and requires no special equipment; only digital photographs and Agisoft Photoscan© software to create the 3D images. Through this analysis various problems associated with the process of effectively capturing images were identified and resolved. Problems included: (1) the construction of a stand for the femur that maximized the visible surfaces of the bone for imaging, as well as; (2) creating a reference measurement that could be applied in both a 2D and 3D manner in order to provide a frame of reference for the software to generate accurate measurements. Although metric methods are generally considered more objective than morphological techniques, the subjectivity of measurements from 3D images is an issue that must be addressed as there is currently no standardization. The manner in which the measurements are obtained from an image involves manipulating the image by inserting planes, slicing the 3D image and creating multiple axes. Identifying the issues associated with creating 3D images from scanning technologies and standardizing the measurements in a new medium is a necessary first step that will enable scans and digital images to be measured precisely and accurately for the purposes of documentation, stature estimation, sex assessment, and evaluation of ancestry. The value of digital images to future research will increase exponentially, once standardized methods of image capture and analysis are established.

Seasonality of stillbirths in Malta and the effect of pasteurization

Sawchuk, L.A.[1], Tripp, L.[1], Damouras, S.[2], and M. DeBono[3]
[1]Dept. of Anthropology, University of Toronto, Scarborough; [2]Dept. of Computer and Mathematical Sciences, University of Toronto, Scarborough; [3]University of Malta

Data drawn from monthly published mortality reports from Malta Government Gazette was used to compile a data base from 1922 to 1954. In Malta, pasteurization of goat milk gradually came into force around 1939. Two distinct patterns emerge in stillbirths before and after pasteurization (1922-1938; 1939-1954). During the first period, the average stillbirth rates stood at 6.14 per 100 male births and 3.33 per 100 female births. During period two, the seasonal pattern disappeared; the stillbirth rate fell markedly with the average stillbirth rates of 3.32 per 100 male births and 1.80 per 100 female births. Analysis of the seasonal pattern with sex incorporated into the model was estimated by monthly odds-ratio effect with 95% confidence bands. In the month of July, male stillbirths peaked at 7.11 per births where the OR was significantly greater than 1). After the 1939, the seasonal pattern disappears. We propose that the change in seasonality of stillbirths was due to newly enacted legislation imposing legal sanctions of selling of unpasteurized milk; greater public consumption of tinned milk,; and greater awareness of the health risks of consumption of raw milk products linked to undulant fever morbidity. This presentation will expand our understanding of fetal wastage by incorporating a model of health risk that directly addresses traditional cultural values, group complicacy, and imperfections in the health knowledge delivery systems.

Periosteal new bone formation: not just a simple stress marker

*Schattmann, A.
Dept. of Anthropology, McMaster University

Periosteal reactions, including new bone formation, are commonly observed and recorded pathological lesions of archeological human bone. Extensive research using macroscopy, radiography and histology has demonstrated these lesions to be non-diagnostic markers of disease or trauma. However, the causative agent (e.g., disease, biological process, or trauma) encodes within the lesion appearance and characteristics information which can rule out or support particular diagnosis, including: location, size, type of reaction, vascularisation, and colour. Such detailed information can provide clues to whether the process was acute or chronic, recent or old, isolated or systemic, extent of change, and particular processes. The following poster argues the importance of recording such details to aid in diagnosis.

A macroscopic study of periosteal new bone formation was performed on a collection of nine individuals (juveniles and male adults) from Quebec City, 1745-1753 A.D. A total of 71 lesions were analysed. Lesion documentation includes location (affected bone, bone portion and anatomical view), size (area and proportion relative to the entire bone), type (woven, sclerotic, or mixed), vascularisation (porosity, striations, or mixed), and colour (Munsell classification).

The differential diagnosis of new bone formation considered scurvy, trauma, ulcers, infections including syphilis, and respiratory illnesses (e.g. T.B.). Each condition possesses a unique set of characteristics. Results show that the new bone formation was most consistent with but not pathognomonic of scurvy in 4 individuals. Other lesions suggested pulmonary infections in 2 individuals. Chronic conditions potentially affect up to 4 individuals while a localised acute affected 1 individual.

The study clearly demonstrates that recording detailed information on periosteal new bone formation, allows researchers to better consider various disease processes operating and consider issues such as co-occurrence of conditions. The process outlined allowed fuller differential diagnosis to be undertaken through a process of elimination.

The "Nutritious Food Basket": an instrument with limited capability for evaluating health policy in Northern Canada

*Semchuk, L.
Department of Anthropology, University of Manitoba

The Northern Food Basket (NFB) is a food costing tool used since 1990 by federal and territorial governments to monitor food pricing in northern communities. Based on the Thrifty Nutritious Food Basket developed by Agriculture Canada in the 1980s, it monitors the cost of 46 food items that together reflected Canadian consumption patterns and met Health Canada recommendations for nutrient intake. In 2007 a Revised Northern Food Basket (RNFB) was introduced that expands the number of food items to 67, reflects the adoption of new Dietary Reference Intakes by Health Canada, and alters the composition of the food basket to include items typically consumed by northern residents. The present study examines the use of food baskets as pricing tools, their efficacy in monitoring the affordability of food, and their role in guiding health policy development and implementation in Canada. Methods include review of publicly-accessible federal government program documents, data on socioeconomic status from the Census of Canada, and relevant literature. Analysis was conducted using time-trend comparisons and content analysis. The NFB and the RNFB currently serve as the primary source of data on food security in Canada's northern communities. These instruments offer very limited capability for understanding the burden of high food costs and food insecurity on northern communities and families.

Age, sex and the life course: population variability in human aging and implications for bioarchaeology

*Sharman, J.
Dept. of Archaeology, Durham University, UK

The identification of age-at-death and sex of human skeletal remains is essential in forensic anthropology, bioarchaeology and palaeodemography, and estimations rely on the use of proven methods. Many methods exist and are generally applied to skeletons from all time periods and geographic locations, despite studies suggesting that there are differences in the expression of traits characteristic of males and females and that aging rates vary within and between populations.

The aim of this project was to study variation in aging and sexual dimorphism in six documented collections from different geographic locations and/or time periods. Age and sex methods were tested on adult skeletal remains dating from the 17th to 20th century from Canada, England, South Africa, and Portugal. Aging methods used were focused on the sternal end of the fourth rib, cranial sutures, pubic symphysis and auricular surface. A more subjective age estimate for each individual was also produced, using informal skeletal age indicators alongside formal methods. Sex determinations were based on pelvic and skull morphology, and metrical analysis.

Significant differences were found between some collections in aging rates and timing of age-related changes; for example, the Dart and Pretoria Collections have slower rates of aging compared to the European collections. Collections were also found to differ in expression of particular morphological traits of the auricular surface that are considered diagnostic for older age phases; this has the potential to result in systematic error in age estimation in some collections.

Similarly, the expression of sexually dimorphic traits was found to significantly differ between some of the collections. Some traits show geographic clustering in terms of expression, while other traits exhibited significantly different ranges of expression between collections that were geographically close. In terms of age estimates, the subjective age estimates were significantly better than estimates based only on formal aging methods, particularly for the oldest individuals, and intraobserver error tests suggest that user experience is important. Error incurred in age and sex estimates because of population variation in aging rates and sexual dimorphism may be mitigated by the use of subjective age estimates and multiple methods.

Acute leukemia versus juvenile scurvy in differential diagnosis

Siek, T., and M. Liston
Dept. of Anthropology, University of Waterloo

Differential diagnosis is a vital tool in paleopathology as skeletal material is limited in the ways it can respond to a disease, and a single definitive diagnosis is often not possible. Bone lesions may form in response to any number of illnesses. Some may be diagnosed more often than others due to researcher's familiarity with the skeletal symptoms and perceived prevalence of the disease. However, some diseases may exhibit similar bony responses. An example of possible confusion is seen with acute leukemia and juvenile scurvy. Here we present the skeleton of an infant from the Weiner Laboratory at the American School of Classical Studies in Athens, who displayed porous bone lesions similar to those expected from scurvy. However, the pattern and morphology of the lesions is also similar to a medically diagnosed case of juvenile acute leukemia in a skeleton of comparable age from the University of Athens Human Skeletal Reference Collection. We found numerous similarities through macroscopic examination of these two specimens, and found that the skeletal lesions of the known leukemia case resemble other published cases identified as juvenile scurvy. We suggest that acute leukemia must be considered in the differential diagnosis of the Wiener Laboratory skeleton, and may need to be considered along with scurvy in the identification of porous lesions in juveniles.

Stress and the multiple-role woman: taking a closer look at the "Superwoman"

Sumra, M.[1] and M. Schillaci[2]
[1]Dept. of Anthropology and Collaborative Program in Women's Health, University of Toronto; [2] Dept. of Anthropology, University of Toronto Scarborough

In the popular media and academic literature increased stress in women is often associated with performing multiple full-time roles, and engagement in multiple social roles is known to contribute to adverse psychological and physiological experiences of stress. Despite the literature on the topic little attention has been given to the psychological and physiological measures that reflect the relationship between the number of roles and stress. In the present study the relationship between levels of engagement in seven (7) distinct roles and self-reported/perceptions of stress in a small non-random sample of women in North America (N=308) was examined. The relationship between overall life satisfaction and social capital as potential mediators of stress were also evaluated. Our analysis revealed that women engaged in more roles did not report higher levels of perceived stress (R= -0.006, NS). Life satisfaction was the strongest predictor of perceived stress (R= -0.487, P<0.01). Our results also showed a significant relationship between the number of roles and social capital as measured by network diversity (R=0.324, P< 0.01). Physiologic stress as measured by the hormone cortisol in scalp hair, and urine was evaluated for a subset of our sample (N=31). Women engaged in more roles did not exhibit higher levels of physiologic stress (Hair: R=0.060, P=0.746; Urine: R= -0.175, P=0.348). Perceived stress was not associated with physiologic stress in either hair (R=0.127, P=0.497) or urinary cortisol levels (R= -0.139, P= 0.453). A popular archetype of female identity, the "superwoman", was examined within the context of multiple- role engagement and perceived stress. Although superwomen did report the highest levels of perceived stress when compared to non-superwomen, this difference was not significant statistically (Z=0.5412, P=0.588). Our results provide greater insight into the relationship between multiple-role engagement and the experiences of stress in women.

Identification of non-local individuals from the ancient Maya site of Minanha, Belize, using strontium isotope analysis

Sutinen, J., Williams, J.S., and G. Iannone
Department of Anthropology, Trent University

Strontium isotope data has become an important tool in identifying non-local individuals at archaeological sites. For this study, tooth enamel samples were collected for 20 individuals from the ancient Maya site of Minanha, Belize. These individuals date to periods spanning the formative occupation of the centre, as well as its fluorescence and protracted decline. The goal of this research was to investigate if non-local individuals played a role in Minanha's formation and fluorescence. The study utilised published strontium isotope maps from Belize and the Yucatán in order to establish local $^{87}Sr/^{86}Sr$ values. The values of the Minanha enamel samples (n = 20) were predominantly out of the expected strontium isotope range; this result seemed implausible and an alternative method was utilised to establish the local $^{87}Sr/^{86}Sr$ values. The outlier method identified 5/20 (25%)

non-local individuals. All of the non-local individuals had $^{87}Sr/^{86}Sr$ values that coincided with published $^{87}Sr/^{86}Sr$ values reported from within 10 – 20 km of Minanha. However, some strontium isotope values also corresponded with $^{87}Sr/^{86}Sr$ values reported from regions >50 km away. The percentage of non-locals at Minanha is consistent with other Mesoamerican centres. This study emphasises the importance of collecting local baseline $^{87}Sr/^{86}Sr$ values from sites themselves, as $^{87}Sr/^{86}Sr$ values from neighbouring regions might not reflect local strontium isotope values.

New synchrotron-based technique for the spatial mapping of trace elements in archaeological bone

Swanston T.[1], Varney T.[2], Coulthard I.[3], Murphy R.[4], and D.Cooper[1]
[1]Dept. of Anatomy and Cell Biology, University of Saskatchewan; [2]Dept. of Anthropology, Lakehead University; [3]Canadian Light Source, Saskatoon, SK, [4]National Parks Antigua, West Indies

Until recently, it was difficult to determine whether trace elements were present in archaeological bone due to biogenic uptake or due to diagenesis. By using the mapping technique of synchrotron radiation X-ray fluorescence (SR-XRF), we can identify biogenic trace elements and identify patterns within and between populations. Bone samples associated with the Royal Naval Cemetery (1793-1822) in Antigua have been analyzed using this technique as part of a larger study that includes the goal of identifying the social determinants of lead poisoning in colonial Antigua. While we have had success with elemental mapping, there are limitations when working with archaeological bone. Grinding thin sections is problematic when bone preservation is not ideal and the variation in the thickness results in artefacts due to the geometry of the SR-XRF technique. As a way of enhancing the lead maps, confocal SR-XRF, which is a novel technique for bioarchaeology, has been included as part of the scanning procedure. When this method is used, the archaeological bone is left intact and the beam is directed to scan within the sample at a known depth with the detector capturing signal from a known volume. This paper will discuss the valuable addition of the confocal SR-XRF technique to the spectrum of methods applied to the analysis of archaeological bone.

Bone health in the Dakhleh Oasis, Egypt (150-450AD): Confirming the diagnosis of osteoporosis in 4 females using density estimations derived from metric analysis of the first metatarsal

*Teeter, M.A.
Dept. of Anthropology, University of Western Ontario

The study of diseases in past populations has been a long-standing research interest within bioarchaeology. These studies allow investigation not only of the evolution of diseases and disease pathogens, but also considers the role of contributing factors such as environments, social status, genetics, sex, and age on disease risk and prevalence. Different populations, and individuals within those populations, have varying disease profiles owing to the aforementioned contributing factors. One such disease that appears throughout human history is osteoporosis. Regardless of the population, or the environment in which they live, osteoporosis is, and has always been frequent in the older age cohorts. The ubiquitous nature of this disease throughout time, combined with the past and present societal costs, warrants extensive research that seeks to examine its prevalence and causes. This poster describes a new method for creating a population specific bone density baseline as well as diagnosing osteoporosis in past populations using metric analysis of the first metatarsal (MT1). Measurements were taken of the MT1 for 72 individuals from the Dakhleh Oasis skeletal sample (150-450 AD). The volumes of the first metatarsals were then estimated using the formula for a quadrilateral frustrum (apex-truncated square pyramid). This shape is approximate to that of the metatarsal, and therefore allows for a calculated proxy of the real volume. The approximate density was then determined by dividing the weight of each metatarsal by the estimated bone volume, which in turn allowed for the creation of a population specific bone density baseline. 4 females, previously diagnosed with osteoporosis due to low impact hip fractures, were then compared to the healthy adult cohorts with respect to their estimated bone density. All four individuals fell more than 2.5 standard deviations below the healthy adult cohort, as per the World Health Organization's standard for the diagnosis of osteoporosis. It appears, like other parts of the skeleton, that the MT1 is not spared from the density changes seen during the progression of the disease, and warrants further investigation. In an age of an ever increasing reliance on technological developments, this experiment illustrates that simple methods and approaches still have merit.

Evolving laws, bio-demography, and the Hindu community of Gibraltar

*Tripp,' L.
Dept. of Anthropology, University of Toronto, Scarborough

A common theme in evolutionary studies is the identification of genetically distinct populations, their origins, and evidence of admixture. Gibraltar presents the typical scenario in which the various communities have; a communal sense of "deep history" and self identity; sufficient community members to support endogamy; and at different points in time significant admixture with "outsiders". This presentation shows that the bio-demographic development of Gibraltar's Hindu community stands in stark contrast. Gibraltar's restrictive citizenship laws, (which originated in 1885 to curtail overcrowding), had a profound impact on the establishment and growth of the Hindu community; and their present community identity as one of "Gibraltarian." Like their fellow Jewish Diaspora merchant community, scholars have argued that the settlement of the Hindus appears to have a deep history in Gibraltar. However, the Hindus' path to becoming a visible demographic presence on the Rock was marred with distrust because they were viewed as exploitative of the lucrative trade and importation/exportation economy of the port city. Consequently, laws regarding rights to residence and trade were specifically targeted at the Hindu community, resulting in a constraint on the demographic structure as confined solely to males. After WWII, the demographic structure of the Hindu community underwent a significant change not simply in numbers (N= 115), with growth at 7.65% per annum, but for the time, the presence of females (n= 29) in the community. The size and structure remained relatively stable from 1951 to 1961 (r = 0.6). From 1970 to 1981, growth commenced once again with r = 4.3%. By 1991, the Hindu community had attained 555 members. This increase was facilitated by legislation in 1981 that allowed Hindu women to reside permanently in Gibraltar. However, the increase in population size was short lived, as the community declined in to 491 members in 2001. While the population size and growth represents simple demographics, the origins of Hindu community structure is far more complex is and has been mythicized. This study contributes to our understanding of social-political factors on bio-demography of minority communities.

Approaching colonial settlement through stable isotopes: a study from Montréal

Vigeant, J.[1], Ribot, I.[1]and J.-F. Hélie[2]
[1] Dept. of Anthropology, Université de Montréal; [2] Geotop, Université du Québec à Montréal

At the end of the 17th century, Montréal was the trading center for fur and an expanding colony. Many individuals were either visiting or settling in the region. They came from Europe, other parts of New France, the inland territories or New England. The Notre-Dame's cemetery in use from 1691 and 1796 is, therefore, a major source of information relating to colonial settlement in North America.

In this project, up to 58 individuals were analyzed for the isotopic composition of enamel and bone carbonate ($d^{13}C$ and $d^{18}O$) as well as bone collagen ($d^{13}C$ and $d^{15}N$), to address questions on provenance, mobility and an the corresponding change in diet. The oxygen isotope results obtained from premolars (forming between 2 to 7 years of age) suggest that these individuals were mainly native to the area of Montreal (N=30), while some (twenty individuals) came from regions with higher $d^{18}O$ and others (eight individuals) showed lower ^{18}O values. These results reflect the colonization process of the city: with its first waves of migration (as after 1680 birth rate rather than immigration explains the population growth). In order to add further precision to mobility, the third molars (crown formation from 10 to 17 approximately, N=29), where available, were analyzed. From this subsample of 29, 11 individuals had traveled from an environment enriched in ^{18}O compared to the colony, five of them at a period when they were immature. These results agree well with the recruitment age for French sailors and with the presence of slaves in the city. A change in $d^{13}C$ in the diet is to be expected considering the frequent contacts between European and First Nations and the presence of the latter in our samples. This however, is not currently verified. In comparison with other North-East American populations, Notre-Dame's diet is dominated by C_3 plants and thus compares well with the European diet. When comparing all data (isotopic, osteological, archaeological), hypothetical identities were proposed for some cases. Finally, this study provided insights into the European colonization of North-east America, on both population and individual levels.

New teeth from Denisova cave and the dental morphology of the Denisovans

Viola, B. [1,2], Sawyer, S.[2], Shunkov, M.V.[3], Derevianko, A.P. [3], Pääbo, S.[2] and J.-J. Hublin[1]
[1] Dept. of Human Evolution, Max-Planck-Institute of Evolutionary Anthropology; [2] Dept. of Evolutionary Genetics, Max-Planck-Institute of Evolutionary Anthropology; [3] Institute of Archaeology and Ethnography, Siberian Branch, Russian Academy of Sciences, Novosibirsk, Russian Federation

In 2010, genetic analyses of a phalanx fragment from Layer 11 of Denisova cave showed that it originates from a previously unknown hominin group, the Denisovans. Based on their nuclear DNA, they seem to be the Asian sister group of Neanderthals, having separated from them in the Middle Pleistocene. Our knowledge of their morphology is extremely limited, as the material known until now only consists of a proximal fragment of a juvenile distal phalanx and an upper second or third molar of a different individual, linked to the phalanx by its mtDNA. The molar is very large, lacks the expanded hypocone seen in Neanderthals and has massive and strongly flaring roots.

Ancient DNA from another hominin specimen, a toe phalanx, found in a slightly lower layer (11.4) is similar to that seen in Neanderthals, showing that both Denisovans and Neanderthals were present in the cave.

New hominin material recovered since 2010 also includes two teeth, a naturally exfoliated left lower di_2 from layer 11.4 and an incomplete upper M^3 crown from the border of 11.4 and of the underlying Layer 12. The molar is a Denisovan based on its mtDNA and nuclear DNA, but the affinities of the di_2 are unclear. The di_2 is not very diagnostic, with slight marginal ridges and strong labial convexity. It is very small, close to the lower limit of the Neanderthal range of variation. The molar is even larger than the previously described specimen, and is morphologically rather different. The crown is very low with little relief, and the cusp pattern is unusual, with one large and several small accessory cusps between the hypocone and metacone, resulting in a pentagonal crown outline. We will discuss the morphology of these specimens in a comparative context, and its implications for our understanding of this enigmatic hominin group.

Talking to the embalmers: experimental and ancient mummification radiology

Wade, A.D.[1], Beckett, R.[2], Conlogue, G.[2], Gonzalez, R.[2], Wade, R.[3], and Brier, B.[4]
[1] Dept. of Anthropology, University of Western Ontario, [2] Bioanthropology Research Institute, Quinnipiac University, [3] Anatomy Services Division, University of Maryland, [4] Post Campus, Long Island University

Twenty years ago, Ronn Wade and Bob Brier produced MUMAB (Mummy, University of Maryland At Baltimore), the first modern mummy embalmed in the ancient Egyptian tradition, to serve as the centerpiece of the Mummy Replication Project. The mummy was created to better understand the process of the Egyptian mummification tradition, and has been studied over the past two decades to assess the success of the embalming process, as we know it, at halting decomposition.

This paper discusses radiological findings from high-resolution computed tomography scans and magnetic resonance imaging, and places them in the context of the embalmers' firsthand experience. The aim of the study was to examine the assumptions mummy researchers make in the radiological study of Egyptian mummified remains, and their correlation with the process as it was actually carried out.

The scans were reviewed by four of the authors (AW, RB, GC, & RG), and described in relation to our current understanding of the ancient Egyptian mummification tradition. The results were then reviewed by the embalmers (BB & RW) for a commentary impossible to receive from the embalmers of ancient Egypt.

For the most part, the radiological review correlates well with the biological profile of the donor body and with the mummification procedures carried out. Intermittent resin use in the wrappings and damage from tissue sampling were correctly identified. There were, however, discrepancies between the interpretation and procedure for the transnasal craniotomy lesion, intracranial residues, transabdominal evisceration incision, diaphragm incision, and the exact nature of some packing materials.

SFU-JLU joint centre for bioarchaeological research of Chinese skeletal remains

Yang D.
Dept. of Archaeology, Simon Fraser University

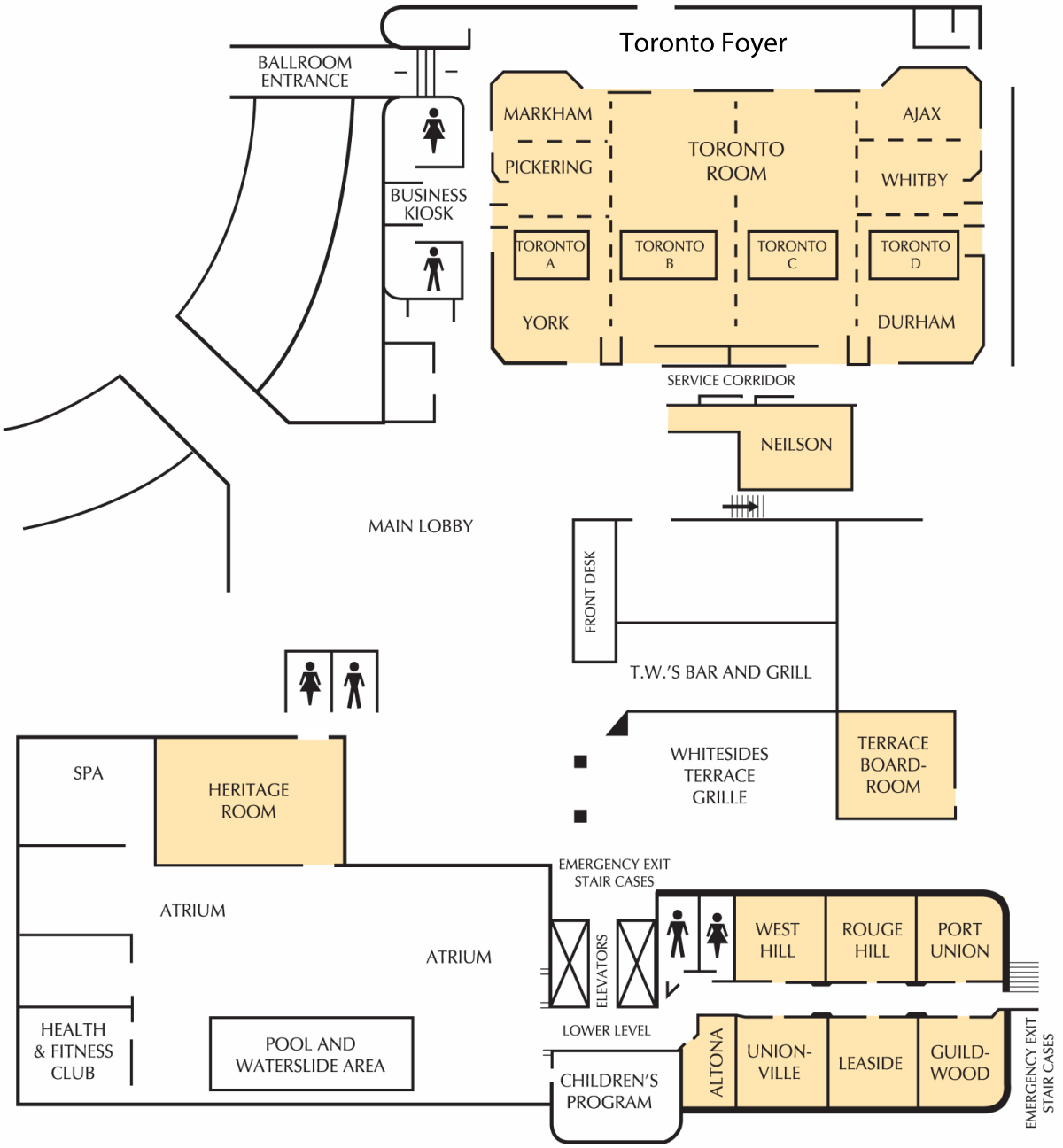
Canada's Simon Fraser University (SFU) and China's Jilin University (JLU) have recently established a Joint Centre for Bioarchaeological Research (JCBR). This presentation introduces some of the joint workshops and collaborative projects that JCBR has undertaken to date. While the great potential and many challenges associated with the joint effort will be illustrated, the 2013 summer human osteoarchaeology workshop held at JLU will be highlighted. Participants of the three-week workshop were 26 senior undergraduate students from the top 13 Chinese top universities, 5 faculty and students from SFU, and 8 faculty and graduate students from JLU. The success of the workshop has demonstrated that the JCBR can be an effective platform for faculty and students from both universities to join forces to advance bioarchaeological studies on human skeletal remains in China.

Art, life, and adaptation in the Canadian Arctic

Young, J.
Canadian Museum of Civilization

When an isolated grave was excavated in the Canadian High Arctic in 1959 much attention was given to the rare and beautifully decorated bowdrill that accompanied the individual. But little attention was provided to the almost complete skeleton of the Inuit male occupant. Speculation arose as to whether the depictions of daily life on the bowdrill represented the general activities of arctic peoples or if the imagery was specific to the individual within the grave. Analysis of the skeletal remains, prompted by a repatriation request, revealed a pattern of muscle, ligament, and joint usage consistent with the graphic narratives. Changes to the humeri, radii, scapulae, clavicles, femora, spine, and cranium attest to a life of kayaking and hunting. Though it will never be known whether these images are biographical or narrative in inspiration, it is certain that this individual from Arctic Bay led a life similar to that depicted on his grave inclusions.

Map, main floor, Delta Toronto East Hotel



Map, University of Toronto Scarborough Campus

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