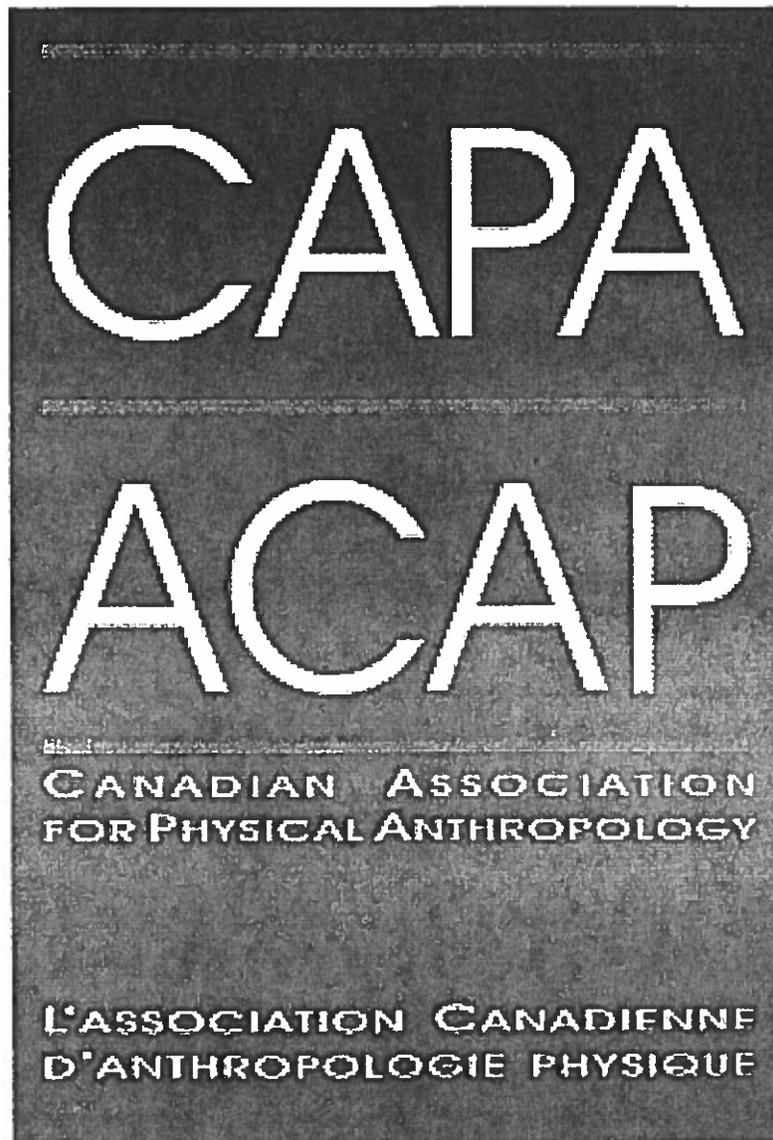


# 29th Annual Meetings

*Winnipeg – Manitoba*

25-27 Oct 2001

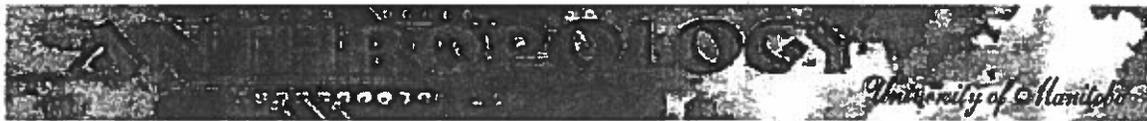


## Scientific Program

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Department of Anthropology, University of Manitoba

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# Message from the Organizing Committee

On behalf of the Department of Anthropology, University of Manitoba we would like to welcome you to the 29<sup>th</sup> Annual Meetings of the Canadian Association for Physical Anthropology/l'Association Canadienne d'Anthropologie Physique in Winnipeg, Manitoba.

Of course a meeting of this nature is not possible without considerable support. A variety of organizations have contributed directly to the costs of hosting these meetings. The support of the following organizations is gratefully acknowledged: Vice-President (Academic) and Provost (University of Manitoba), Pearson Education Canada, Office of the Dean, Faculty of Arts (University of Manitoba), Arts Endowment Fund (University of Manitoba), Alumni Association Inc. of the University of Manitoba, and the Department of Anthropology, University of Manitoba.

For donating materials we would like to express our gratitude to Cambridge University Press, University of Chicago Press, Wiley-Liss, and CITD Press.

Finally, we would like to thank those individuals who have contributed directly to various organizational aspects of the meetings. Siobhan Kari, through the University of Manitoba Work Study Program developed and designed the meetings webpage and online forms. The University of Manitoba Academic Computing and Networking provided technical support and hosting of the web page. Vera Ciriviri-Gjuric and the Department of Anthropology provided administrative support leading up to the meetings. And of course there are the many volunteers who help with audio-visual, registration and displays: Kirsten Anderson, Kirsti Bos, Cassie Davidson, Beth Espey, Todd Garlie, Heather Gill-Robinson, Diana Good, Barb Hewitt, Paul King, Matthew Komus, Linda Larcombe, Dale Simpson, Myra Sitchon, Dedrie White, Amanda Woods and Chris Wylie.



Rob Hoppa



Dwight Rokala



Emőke Szathmáry

# Exhibitors

During Thursday and Friday the Tache Room adjacent to the Scientific Meetings room will have displays available for attendees to view. **Pearson Education** will have a display table set up with a variety of material including the latest textbooks for examination. The **University of Manitoba Bookstore** will have discount order forms on a selection of books of interest to attendees on sale. A viewing table of product from **Cambridge University Press, Wiley-Liss, University of Chicago Press** and **CITD Press** with order forms will also be available.

# Conduct of Sessions

## Oral Presentations:

A variety of sessions including both special symposia and regular sessions have been organized. Regular sessions are organized into broad themes based on the selection of papers submitted to the conference organizers. In all sessions, oral presentations are 20 minutes in length – ideally 15 minutes for the presentation and 5 minutes for questions and discussion.

## Poster Presentations:

Posters will be on display in the Tache Room adjacent to the scientific meetings. Attendees are encouraged to view the posters during breaks and lunch. The session chairs will note posters relevant to specific sessions.

## Student Competition:

A number of papers and posters are eligible for the student competition, administered by the Association. **Student eligible papers are noted in the program with a check box  adjacent to their title.** Note that CAPA guidelines permit only single authored papers to be eligible.

## Special Sessions

In addition to the Regular Sessions, several symposia and round-table sessions have also been planned. These are:

### *Symposia*

- ♦ **Community Partnerships: Balancing Aboriginal and Academic Issues in Physical Anthropology**
- ♦ **Forensic Case Work: Lessons from the Field**
- ♦ **Medical Anthropology: A Symposium in Memory Of Our Friend and Colleague Christine Egan**
- ♦ **A Celebration of Hermann Helmuth's Contribution to Physical Anthropology**

### *Round Table Discussion*

- ♦ **Osteology and the Tri-Council Ethics Statement: How to Proceed**

### *Skill Building Session*

- ♦ **Entering the Academic Profession**

# General Information

The local arrangements committee looks forward to seeing you all at the 29th Annual meetings of the Canadian Association for Physical Anthropology/l'Association Canadienne d'Anthropologie Physique. If you need any assistance, please do not hesitate to ask a member of the local hosts team, identified on their name badges by a **BLUE STRIPE**.

## Venue:

The meetings and all associated events will take place at the Fort Garry Hotel. Scientific sessions will take place in the Gateway room, and displays and posters will be in the adjacent Tache Room. Both rooms are on the second floor of the hotel.

## Hotel Fort Garry

Address: 222 Broadway, Winnipeg, Manitoba R3C 0R2

Phone: 204-942-8251

Fax: 204-942-7036

## Registration:

Registration will be available as follows:

Wed night at the Reception 7:30-9:00pm

Thu outside the Meetings room from 7:00am - 4:00pm

Fri outside the Meetings room from 7:30am - 4:00pm

Local information booklets and pamphlets will be available on a self-serve basis.

Banquet tickets are in the registrant name badges. We cannot replace lost tickets so please hold on to them. The tickets are required at the door to the banquet room Friday evening.

## Tags:

All registrants will be provided a name badge. Volunteers and local hosts will be identified with a blue stripe on the bottom of their badge. To aid participants, session chairs will be identified with a yellow stripe on the bottom of their badge.

## Media Needs for Presentations:

Individuals should meet with session chairs and A/V volunteers during breaks to supply slides/disks etc. Todd Garlie is coordinating A/V needs. A 35mm slide projector, overhead projector and data projector with laptop are available. For PowerPoint presentations, it is recommended that individuals provide their presentation on either a CD or a 100MB (not 250) ZIP disk.

## Reception:

Courtesy of the Alumni Association Inc. of the University of Manitoba, finger foods will be served at the reception along with a cash bar. The reception begins at 8pm in the La Verendrye Room on Wed night. Cash bar opens at 7:30pm. Registration will be available from 7:30pm to 9:00 pm at the reception.

## Coffee Breaks:

There will be two coffee breaks per day – mid morning and mid afternoon. Regular and decaffeinated coffee, tea and water will be provided. A selection of baked goods will also be served at coffee.

**Student Lunch:**

Courtesy of Pearson Education Canada, a student buffet will be provided in the Tache Room from about noon to 1pm on Thursday and Friday. A deli meat and cheese tray with assorted breads, bagels and cream cheese, fruit, yogurt, and assorted juice and soft drinks will be available.

**Banquet:**

On Friday evening, the banquet will be held in the Club Room downstairs in the Fort Garry Hotel. Tickets are required to attend. A classic Manitoba Buffet will be served from 8pm. The doors and cash bar open at 7:30pm. A smoking room with cafe tables will be available, although smoking will not be permitted in the general dining room or at the bar.

## Scientific Program Schedule

**THU**

8:00 AM 8:10 AM - OPENING CEREMONY

8:10 AM - 10:10 AM *Biochemical Analyses*

10:10 AM 10:30 AM COFFEE

10:30 AM - 12:10 PM *Skeletal Biology I*

12:10 PM 1:20 PM LUNCH

1:20 PM - 3:40 PM *Community Partnerships: Balancing Aboriginal and Academic Issues in Physical Anthropology*

2:20 PM 2:40 PM COFFEE

3:40 PM 5:00 PM *Human Evolution*

5:00 - 5:45 PM - *Professional Development Workshop: Entering the Academic Profession*

5:30 PM 7:00 PM - BUSINESS MEETING

**FRI**

8:20 AM - 9:00 AM *Ancient DNA*

9:00 AM 11:20 AM *Forensic Case Work: Lessons from the Field*

10:00 AM - 10:20 AM COFFEE

11:20 - 12:00 PM *Primatology*

12:00 PM 1:10 PM LUNCH

1:10 PM - 4:00 PM *Medical Anthropology: A Symposium in Memory Of Our Friend and Colleague Christine Egan*

2:40 PM - 3:00 PM COFFEE

4:20 PM - 5:20 PM *Demography*

5:20 PM - 6:30 PM *Round Table Discussion: Osteology and the Tri-Council Ethics Statement: How to Proceed*

7:30 PM - 11:00 PM BANQUET (buffet put out at 8pm)

**SAT**

8:30 AM 2:20 PM *A Celebration of Hermann Helmuth's Contribution to Physical Anthropology*

10:20 AM 10:40 AM COFFEE

12:00 PM 1:00 PM LUNCH

2:20 PM 2:40 PM COFFEE

2:40 PM - 5:20 PM *Skeletal Biology II*

5:20 PM 5:30 PM - CLOSING CEREMONIES

**THUR-FRI 9am - 5pm**

*Posters*

# Abstracts

**Abonyi, Sylvia (University of Saskatchewan)**

*Sickness and Symptom: Experiences of Diabetes Among the Moose Factory Cree.*

Native North American populations have the highest global prevalence of diabetes. Explanations take the view of diabetes as a sickness or as a symptom, but these views are seldom considered together. This paper reports on an anthropological investigation of both of these experiences of diabetes in the Mushkegowuk Cree region of northern Ontario. As elsewhere, the high prevalence of diabetes is linked to patterns of diet and physical activity. Explanations include availability, cost and preference of food and access to recreation activities, but culture, identity and historical contingency also play a role. Diabetes is experienced as a symptom of contemporary economic and social conditions, but also of individual and collective low cultural esteem and self worth arising from a colonial past. Biomedical hypotheses of Aboriginal genetic susceptibility to diabetes are linked to notions of collective identity. These views have repercussions for reactions to diagnosis as well as coping strategies around diet, physical activity, and medication. Addressing diabetes experiences both as sickness and symptom requires consideration of the pivotal role of the renegotiation of identity and reevaluation of culture taking place in many Aboriginal communities across Canada, including the Mushkegowuk region.

**Albanese, John (McMaster University)**

*Measurement Error and Metric Methods for Sex Determination*

For over a century, the pelvis in general and the pubis in particular have been recognized as being highly sexually dimorphic and the best source of information when determining the sex of an unknown individual from skeletal remains. However, since the earliest descriptions of the pubis length measurement, it has been recognized that the location of the key landmark in the acetabulum often has to be estimated. Using samples from the Terry Collection (n = 326) and the Coimbra Collection (n = 233), the purpose of this research is to, first, test the reproducibility of a new alternative to the traditional measurement of the pubis, and second, to use the best measurement of the pubis along with other measurements of the innominate and femur to develop a metric method that can be used with confidence to determine the sex of individuals of various geographic origins and time periods.

In this study, it was found that, first, the alternative pubis measurement, known as the Superior Pubis Ramus Length (SPRL) can be collected more reliably with less mean intra-observer error (0.57%) than the more commonly used manner of measuring the pubis (2.7%); second, a logistic regression sex determination method using the new pubis measurement, along with other measurements of the innominate and femur, has an allocation accuracy of up to 98.5% (depending on the model used and the manner of testing) across independent samples; third, traditional racial categorization was irrelevant to the accuracy of the method; and fourth, measurement error greater than 2% in the measurement of the pubis can be the difference between a correct and an incorrect allocation of sex, particularly in borderline cases.

**Blumenfeld, Jodi (University of Illinois, Urbana-Champaign)**

*Neandertal facial morphology: A climatological or biomechanical adaptation?*

Neandertals (*Homo neanderthalensis*) are distinguished from anatomically modern humans (*Homo sapiens sapiens*) by a suite of distinctive cranial and postcranial features. In recent years, there have been many different attempts to understand Neandertal facial morphology in terms of both function and phylogeny, and characteristic Neandertal facial features have been hypothesized to represent either adaptations to the cold climate in which Neandertals lived, or biomechanical adaptations related to intense anterior tooth use. Three

characteristic Neandertal facial features were examined in relation to a climatologically diverse comparative sample of both fossil and recent humans. If these distinctive features are, in fact, related to cold adaptation it was expected that they would also be present in anatomically modern cold adapted populations. Results indicate that these features are not indicative of cold adaptation, but rather are biomechanical adaptations most likely inherited from an ancestral *Homo heidelbergensis* population, as well as due to heavy anterior dental loading which occurred through the practice of both masticatory and paramasticatory activities practiced by the Neandertals.

**Blyschak, Kristina (McMaster University)**

*The Neonatal Line in Human Deciduous Enamel: A Neonatal Line is A Neonatal Line is a Neonatal line.*

Studies of deciduous enamel have concluded that the birth process and perinatal disorders result in the formation of a widened neonatal line and/or neonatal enamel hypoplasia. A widened neonatal line has been associated with a complicated delivery, neonatal difficulties at birth, maternal complications at birth, infant birthweight and short gestation length. The present study measured the width of the neonatal line in a sample of forty-five primary teeth collected from Canadian children. Birth history information was gathered through in-depth interviews with the mother of children donating teeth. Statistical testing was carried out to determine if significant differences exist in neonatal line width between groups of children with respect to birth trauma, neonatal health, maternal health and term at birth. A preliminary investigation of the effect of birth duration on the width of the neonatal line was undertaken. Line width differences between tooth classes were also considered.

The results of the current study were compared to those of earlier clinical studies of the neonatal line and enamel hypoplasia. The present data demonstrates that neonatal line width varies within the tooth crown and between tooth classes; a range of widths also exists within individual specimens. The observed relationships between neonatal line width and birth trauma, neonatal health, maternal health, and term at birth were not consistent with those of earlier dental studies. These associations were dependent on the tooth class examined and the location of the width measurements within the tooth crown. No correlation was found between birth duration and the width of the neonatal line. The most troubling issue to emerge during the present study is the lack of a rigorous methodology in previous investigations of the neonatal line. This lack of procedural rigor may account for the discrepancies between the findings of the present study and those of earlier investigations. At present, the width of the neonatal line does not reflect the severity or the duration of the disturbance that caused it. Its use as a diagnostic tool in physical anthropology and during forensic investigations is not justified.

**Bond, Tara (University of Alberta)**

*Chemical Analysis of Old and New Osteons in Human Bone Using Scanning Electron Microscopy*

Archaeological bone samples were soaked in lead, strontium and zinc nitrate solutions and then examined with Scanning Electron Microscopy (SEM) in order to determine if old and new osteons exchange ions differently. The preliminary results show that modern bone does not exchange ions with soaking solutions of any type. In contrast, archaeological bone exchanges ions in solution. Older osteons in archaeological bone are prone to chemical exchange with elements such as Sr and Zn, which exchange heterionically with the bone. In contrast, newer osteons in archaeological bone had higher levels of Pb, an elements that fills voids left by Ca in its decomposition. Examination of structural components (i.e., osteons and voids), which can be done with SEM analysis but cannot be done with some other methods (eg., INAA), thus seems crucial for the study of diagenesis.

**Brownlee, Kevin (University of Manitoba)**

*Gifts from our Ancestors: Analysis of Human Remains from an Aboriginal Perspective*

Issues dealing with burials, repatriation and reburial face all archaeologists and physical anthropologists. In some instances these have become extremely political, resulting in court battles, and increased animosity between scientists and Aboriginal people. The events in Manitoba over the 12 years have paved the way for partnerships to be developed between the Aboriginal community and archaeologists in the proper way of handling burials. The key to this partnership is that archaeologists are listening to what the Aboriginal community is saying and asking for, rather than archaeologists setting the rules. One of the requests from the Aboriginal community is that if they allow analysis to take place that the communities must benefit from the research, on an educational level. As such, the results of what archaeologists and physical anthropologists do must be written in a format useful to the Aboriginal community. In some instances this has resulted in the construction of display cases to be used in schools located in First Nation communities and books, and non-technical reports to be used by community members. This presentation will highlight the partnerships developed in Manitoba between archaeologists and Aboriginal people specifically dealing with human remains.

**Burke, Ariane (University of Manitoba)**

*Neanderthal settlement strategies and the occupation of middle altitudes during the Middle Palaeolithic in Crimea*

The Middle Palaeolithic landscape of Crimea was shaped by the Crimean mountain ranges. Rising up abruptly 1,400 meters above sea level, the mountains provide dramatic environmental contrasts and a variety of distinct microenvironments within relatively short distances. Preliminary analysis of the lithic and faunal procurement patterns from the site of Karabi Tamchin indicates that Middle Palaeolithic people were at times intensively exploiting these environments. A comparison with patterns of resource use investigated at lower altitudes in Western Crimea hints at considerable behavioural flexibility on the part of Neanderthal populations in terms of logistical organisation and subsistence patterning.

**Carnegie, SD and LM Fedigan (University of Alberta)**

*Preliminary Description of Ovarian Hormone and Behavioral Characteristics in Wild White-Faced Capuchins (Cebus capucinus)*

In contrast to other non-human primates (i.e. macaques, baboons), female white-faced capuchins do not have a distinct mating period or show conspicuous signs of estrus. Little is known about the reproductive cycle and behavioral cues of sexual receptivity in this species. Fecal sampling of ovarian hormones has been successfully used in the field and the lab as a non-invasive method of observing endocrine patterns. In this study, we compared the occurrences of mating behavior to progesterone patterns in female capuchins and have attempted to determine when mating occurs in relation to the various phases in the ovarian cycle (follicular, periovulatory, and luteal).

Behavioral data and fecal samples were collected concurrently from five females in one group of habituated, wild capuchins in Santa Rosa National Park, Costa Rica. The results from the fecal assays show characteristic patterns of elevated progesterone (P4) for two pregnant females and an absence of cycling for a third, adolescent female. However, the fourth and fifth adult females started P4 cycling only 2 ½ months into the study, a result that was unexpected.

The occurrences of mating showed no clear pattern in association with the hormone cycle. The two pregnant females were observed to mate more often (individually) than the other three females combined. These results

were unexpected and further research will be done in an attempt to understand the ovarian hormone pattern and associated mating behavior in female capuchins. The information gained from this study will help us to understand mating patterns in female *Cebus capucinus* and will contribute information to the theories of concealed ovulation and non-conceptive mating in primate females.

**Cormack, Julie (Mount Royal College)**

*In his own words. Davidson Black from "Mushkemush Kemit" to anthropologist.*

Davidson Black is well known for his identification of *Sinanthropus pekinensis* from the Chinese site of Zhoukoudian. He is less well known for other contributions such as collaboration in establishing the Cenozoic Research Laboratory (today, IVPP) and proposing adaptations to standard anthropometric measuring equipment. These contributions to prehistory come from his broad-based science education, early field training with the Hudson's Bay Company and the Geological Survey of Canada, and his continual interactions with numerous international scholars. From his own journals and correspondence, this paper describes Davidson Black's growth as a young man working in northern Ontario to his establishment as a highly regarded internationally renowned anthropologist.

This is the story of Davidson Black, through his own visions and insights.

**Crowder, Christian (University of Toronto)**

*Establishing the Range of Variation in Epiphyseal Closure of the Distal Tibia and Fibula: A Radiographic Study*

In 570 individuals (270 females and 300 males) divided into three ancestral categories (white, black, and Hispanic), the stages of epiphyseal fusion of the distal tibia and fibula were recorded through the use of radiographs from local hospitals in Texas. Fusion was classified as: 1) no fusion, 2) unclear, 3) partial fusion, and 4) complete fusion. The results show that there are no statistically significant differences ( $\alpha = .05$ ) in timing of fusion for the distal tibia and fibula between female ancestral groups. Complete fusion of the distal tibia and fibula occurs between the ages of twelve and fifteen. At sixteen years of age, all subjects were fused. The results show that there are no statistically significant differences between male ancestral groups for stages one, two, and three for distal tibiae and fibulae; however, at stage four white males are significantly older when complete fusion occurs. For white males, complete fusion of the distal tibia and fibula occurs between the ages of sixteen and seventeen. All white males showed complete fusion of the distal tibia and fibula by eighteen years of age. In black males, complete fusion of the distal tibia and fibula occurs between the ages of fourteen and eighteen. All black males showed complete fusion of the distal tibia and fibula by nineteen years of age. In Hispanic males, complete fusion of the distal tibia and fibula occurs between the ages of fourteen and seventeen. All Hispanic males showed complete fusion of the distal tibia and fibula by eighteen years of age.

The ankle is commonly X-rayed and is a fairly simple anatomical structure with little overlay from surrounding tissues. Using data from contemporary populations and recording the total range of variation in epiphyseal fusion will allow forensic anthropologists to more accurately predict age in the adolescent – young adult time frame. This study helps establish the total range of variation found in epiphyseal closure for modern populations and ancestral groups that lack current data.

**de Gruchy, Spencer (University of Alberta)**

*From the Class to the Field: A Student Perspective*

The purpose of this presentation is to express the student experience moving from the classroom into the field. A university education imparts specialized knowledge to students interested in particular subjects and prepares them for gainful employment. The professor uses various methods such as readings, laboratory assignments,

and research projects to teach the student what they themselves have learned. The classroom is vitally important because it provides a foundation from which the student will refer back to while working, however, field work will allow the student to learn things that the classroom cannot provide. Disciplines that have fieldwork, specifically forensic anthropology, should include some aspects of the field experience during courses. In the field the student can learn how to behave professionally, learn search procedures and understand the reality of dealing with decomposing human remains. Forensic casework is another facet of the field that students should be exposed to and for those students who are unable to get into the field, casework may provide a viable alternative to increase experience. Students who assist the professor in case work will realize that what they learn in class, if properly taught, is directly applicable to the job. The major benefits for students that have the opportunity to experience field and case work are; 1) they will obtain a sense of what is needed to be competent, and 2) they will learn quickly whether or not they are suited for forensic work.

**de Gruchy, Spencer (University of Alberta) and Diana Rossi (University of Alberta)**

*A preliminary study concerning the consolidation of cremated bovine bone*

Although cremation arrests the decomposition process, it results in osseous fragmentation and the deformation of macroscopic features used in osteobiographical analysis. Fortunately, several histological methods, specifically those pertaining to the estimation of age, can be applied to thermally altered bone. Many forensic and physical anthropologists are hesitant, however, to apply these techniques due to the inherent fragility of cremated material. Therefore, the objective of this study was to identify whether or not consolidation would reduce this fragility, facilitating the cross-sectioning and grinding of cremated remains. Fifteen green, bovine femoral diaphyses were used for the purpose of experimentation. Selected bones were divided by weight into three samples; each sample was then burnt at specific temperatures. Two polymers, Acryloid B-72 and Butvar B-98, were chosen based on their suitability in the preservation of non-cremated bone. Each polymer was applied to four fragments from each sample using simple brushing and immersion techniques. One fragment from each sample was left untreated for control. After consolidation was complete, fragments were cross-sectioned and ground down to a thickness of 100-120 microns.

Results indicated that all of the tested fragments, both treated and untreated, could be cross-sectioned and ground down sufficiently to view the microstructural features of the bone. There were, however, significant differences in the amount of time required to prepare each successful sample and the number of failed attempts. Both the untreated fragments and those treated with Butvar B-98 demonstrated unacceptable rates of fragmentation and disintegration. In contrast, specimens coated with Acryloid B-72 proved to be harder and stronger than both the Butvar treated and untreated specimens. Acryloid B-72 is, therefore, recommended for the consolidation of cremated remains in preparation for the histomorphometric estimation of age.

**Delisle, Richard G. (McGill University/Université de Montréal)**

*Adaptationism and Cladism in Human Evolution Studies*

The field of human evolution has been subjected to a number of theoretical changes in the past fifty years. This review paper will evaluate the impact of the two most important research programs for the assessment of human phylogeny: the evolutionary synthesis and cladistics. The differences between these two research programs and their implications for the establishment of place man's in nature will be presented. A pledge will be made in favor of historical studies in the field of human evolution in order to clarify the issues being debated in this field.

**Dolphin, Alexis (University of Massachusetts - Amherst); Alan Goodman (Hampshire College); Peter Outridge (Geological Survey of Canada); Dulasiri Amarasiriwardena (Hampshire College) and Daniel Kang (Hampshire College)**

*A Preliminary Analysis of Childhood Nutrition Using Laser Ablation – Inductively Coupled Plasma – Mass Spectroscopy (LA-ICP-MS) of Deciduous Teeth from the Solis Valley, Mexico.*

Trace element analyses of archaeological human bone and their application to questions of anthropological interest are complicated by several factors, such as diagenesis, bone turnover, and sample destruction. This paper will introduce the application of an alternative method for analysing trace elements in human teeth using laser ablation-inductively coupled plasma-mass spectroscopy (LA-ICP-MS). LA-ICP-MS is ideal for the analysis of elemental abundances in human remains due to its very low detection limits (~ 1ppm), multielement capabilities, fine spatial resolution (as low as 10-30um), and minimal sample preparation and destruction. This paper will discuss some applications of LA-ICP-MS technology and our own preliminary research in documenting the distribution of Mg, Ca, Fe, Zn, Cu, Pb, Sr, and Ba within pre- and post-natal enamel. We ablated 62 anterior deciduous teeth from 45 individuals living in the Solis Valley of Mexico. Each tooth was donated by a child who had participated, since their birth in the mid-1980's, in an intensive, longitudinal study of the functional consequences of mild-to-moderate malnutrition.

The preliminary pre-and post-natal trace element data show that the average levels of elements such as Zn and Pb increase after birth ( $p < 0.01$ ), with individual values ranging more widely, while others such as Sr do not change significantly. In a preliminary test of our method we focussed our attention on tooth Zn concentrations. Being that the phytate and Ca content of the diet is known to inhibit Zn absorption, we predicted and found that tooth Zn concentrations are negatively correlated with dietary phytate ( $r = -.404$ ) and Ca ( $r = -.476$ ). Preliminary hypotheses regarding group and individual shifts in Zn levels will be discussed in light of data available regarding the exposure of these children to high maize diets while in utero and during breastfeeding. The application of LA-ICP-MS methods to the analysis of trace elements in teeth provides exciting possibilities for examining those archives of childhood nutrition and health because, unlike bone, dental enamel does not remodel, is not as commonly affected by diagenesis and forms incrementally at a known rate.

**Dougherty, Kate (University of Western Ontario)**

*Sex-linked genetic buffering and stature change in ancient southern Lowland Maya.*

This study is an extension of the work performed by Danforth (1994) examining stature change in prehistoric Maya of the Southern Lowlands. A review of the extant skeletal data indicated variation in statures, which Danforth ascribed to the result of methodological problems associated with stature reconstruction, reliability in sex determination, and variation in health response according to site size and location. This preliminary study is a test of the hypothesis that stature variation may be the result of a genetic buffering (as proposed by Stinson 1985) possessed by females which shields them from the effects of stress in the environment. Preliminary results indicate that the stature difference between males and females changes through time; for example in Tikal, males show a statistically significant reduction in stature from the Early to the Late Classic, while female stature increases. While the main methodological problems associated with stature reconstruction still need to be addressed, the effects of a proposed genetic buffering must be addressed as well, as it can provide another way to explain inter- and intra-site variation outside of social status and access to resources.

**Dudar, Chris (Consulting Anthropologist)**

*Taphonomy, Burial Custom, and Occupational Hazards at the Elmbank Cemetery Relocation Project.*

The pioneer Elmbank Cemetery (in use from 1833 to 1937), located within Pearson International Airport, Toronto, was relocated during March 12 to August 14, 2001 by Archaeological Services Inc. of Toronto. A total of 622 individual skeletal remains were investigated (197 females, 216 males, 209 subadults, and 138 burials with nameplates), making this the largest historic cemetery relocation undertaken with archaeological methods in Ontario.

Brothwell (1987) and Pfeiffer and colleagues (1989) attributed poor articulation, or a “tumbled” appearance of some skeletal remains found in coffins, to delayed interment with subsequent jostling of the coffin prior to burial. While this may account for some cases of poor articulation at Elmbank, we believe that cyclic ground water conditions lead to floatation and drifting of elements after defleshing. The observation of burial customs, such as the placement of coffins within wooden grave shaft liners or coffin shipping boxes, and historic embalming practices, also support the refutation of the delayed interment/jostling hypothesis. The combined structural integrity of a grave shaft liner and coffin act to create a stable support for backfill, leaving the interior coffin space to be filled with seasonal groundwater. Arsenic based embalming fluids, in use during the last half of the 19th century to approximately the beginning of the 20th century, would also act to delay the natural defleshing process until some time after interment.

Despite the relatively low levels of arsenic detected in some grave features (0.7 to 2.9 ppm) and basic precautions taken, tests revealed a blood arsenic level from this investigator of 6.7 nmol/L, towards the high end of the medically acceptable range (0 to 8.8 nmol/L). The occupational hazards associated with working on historic arsenic embalmed remains, as well as procedures to reduce exposure, will be discussed.

**Dudar, Chris (Consulting Anthropologist)**

*Historic Navajo demography and kinship through family reconstitution using Bureau of Indian Affairs historic censuses, Catholic mission records, and ethnographic interviews*

Moore (1980) asserts that the anthropological study of past non-literate aboriginal cultures can be conducted through the analysis of colonial censuses, which were directed by the administration of the dominant society. These records have been generally dismissed due to the opinion that they contain unique and insurmountable methodological problems, such as the ethnocentric bias introduced by enumerators unfamiliar with the target culture. The approach proposed by Moore and Campbell (1989) overcomes some of these limitations through the incorporation of historic ethnological accounts contemporary to the census material and augmentation with ethnographic interviews of modern descendents.

The Bureau of Indian Affairs (BIA) yearly reservation rolls for the Leupp District of the Navajo Reservation (1917 to 1940) were cross referenced with birth, marriage, and death records from the St. Michael's Catholic Mission. In many cases extended families could be reconstituted, and clan affiliations determined. Subsequent interviews with surviving individuals and descendents of those enumerated on the BIA censuses has resolved many links, and provided personal insights into past Navajo lifeways. Broad level demographic analysis shows that the historic Navajo population was expanding quickly at a time when contemporary demographers assume they had not entered the demographic transition. Detailed longitudinal examination of the BIA records has resolved larger social structure units hidden within the census data, as well as discovered previously undocumented marital exogamy practices.

While this ongoing study is not a true partnership with the Navajo community, considerable support for the demographic research has been received from all levels of the tribal government. Reconstructed genealogies

are presented to the families involved, and have provided a much-needed connection to the past that acculturation has all but severed for some Navajo generations.

Research supported by a Social Sciences and Humanities Research Council of Canada Post Doctoral Fellowship.

**Galloway, Tracey; Anne Ehrlich and Tina Moffat (McMaster University)**

*Moving Pictures: the Relationship Between Internal Mobility and Health in Two Hamilton Neighborhoods*

The Local Determinants of Health Project (Eyles et al. 1999) is a three-year multidisciplinary study of the relationship between health status outcomes and the determinants of health across a range of neighborhoods in Hamilton-Wentworth. An offshoot of the exploratory phase of this large research project, this paper presents findings from an investigation into the factors associated with population mobility in the Hamilton neighborhoods of Beasley and Corktown. Although census tract measures of mobility describe the populations of Beasley and Corktown as highly mobile, local measures and interview data indicate considerable diversity in mobility rates within these neighborhoods. High 1-year mobility rates occur in concentrated areas within Beasley and Corktown, while other local areas have 1- and 5-year mobility rates well below the Hamilton average. Predictions of the contribution of immigration to high mobility have been set aside in favour of evidence for associations between socioeconomic indicators and internal mobility.

**Garlie, Todd (University of Winnipeg)**

*Anthropometric trends over the last 50 years: A Canadian Example*

Recent research suggests that there is a global secular increase in the anthropometric variables of stature, mass and the BMI during the latter part of the twentieth century. Few of these studies have employed historical growth data from large mixed longitudinal studies. Even fewer were conducted in a Canadian context.

This paper compares stature, mass and the BMI values from two groups of Canadian children from Burlington, Ontario between 1950 and 1999: The Burlington Growth Study (1952-1972) and The Burlington School Study (1998-99). The results illustrate that children growing up in the 1990s are taller, heavier and more likely to be at risk for becoming overweight, if they are not already, than their counterparts growing up during the 1950s and 1960s. These findings are consistent with research that has found similar secular increases for these anthropometric variables in the twentieth century in other geographic regions.

**Garvie-Lok, Sandra (University of Calgary)**

*Isotopic Evidence for Millet and Maize Use in Medieval and Ottoman Greece*

Historical documents show that the primary staple grains of medieval and Ottoman Greece were wheat and barley. However, other grains were also used. These included millet and, after its introduction to the region in the 16th century, maize. The importance of millet and maize to past Greek diets is uncertain. Some scholars have suggested that they were not highly valued, and were used largely as fodder and famine food. However, records of the Ottoman era (15th – 19th century) suggest that millet and maize were important secondary staples even in times of plenty. Recent advances in bone stable isotope analysis offer the opportunity to examine the use of millet and maize as secondary staples. By comparing  $\delta^{13}\text{C}$  values of bone collagen and carbonate, minor additions of these C4 grains to diets dominated by C3 resources can be detected.

As part of a wider study of subsistence in medieval and Ottoman Greece, bone collagen and carbonate  $\delta^{13}\text{C}$  values were determined for human remains and domesticated fauna from a variety of locales.  $\delta^{13}\text{C}$  values of domesticated animals do not indicate a general use of C4 grains as fodder. Human  $\delta^{13}\text{C}$  values suggest

primary reliance on C3 grains by all populations, with variable use of millet or maize as a secondary staple. The strongest evidence for C4 grain consumption is seen at 14th century Corinth and in the Ottoman populations. Increased millet use at Corinth may reflect the difficult economic times the city suffered in that century. Increased C4 grain use in the Ottoman era may reflect the adoption of maize into local agricultural regimes. This would agree with some historians' suggestions that maize played an important role in Ottoman agriculture. The results illustrate the potential of collagen and carbonate  $\delta^{13}\text{C}$  analysis to document low-level C4 grain consumption. Further analyses of Mediterranean populations may allow the pattern of maize consumption in the Ottoman era to be more fully reconstructed, with interesting implications for our knowledge of the economy of the Ottoman Empire.

**Green, Chris (University of Manitoba)**

*Genes vs. Geography: Competing Explanations for the Diabetes Epidemic?*

**Background:** Type 2 Diabetes (NIDDM) is one of the most common non-communicable diseases in the world today. In most developed countries it is the fourth or fifth leading cause of death and is becoming epidemic in many developing and industrialized nations. There is great debate about the cause of the diabetes epidemic. Although there is general consensus that NIDDM has both genetic and social roots, there is little consensus on the relative contribution of these factors. The "thrifty gene" hypothesis proposed in the early 1960's suggested that the especially high rates of NIDDM observed among North American Indians, Blacks and Mexican Americans was due to the high frequency of a thrifty gene in their respective population gene pools.

**Purpose:** In order to explore the relative contributions of genetic background and socioeconomic factors to the prevalence of NIDDM on a population level, the current study examined the geographic variability of Type 2 Diabetes prevalence in the City of Winnipeg, Manitoba. Using several spatial techniques including the spatial scan statistic, a moving spatial filter, and spatial regression, a number of sociodemographic, environmental and lifestyle factors were examined for their association with NIDDM variability.

**Results:** The results of the study indicate that there is a strong geographic relationship between low socioeconomic status, risky and stressful neighborhood environments, poor lifestyle habits, and high rates of NIDDM. The study also demonstrates a strong and significant relationship between self-reported Aboriginal status and NIDDM at the geographic level. However, once predictor variables such as education and income are entered into an explanatory model, Aboriginal status loses all of its significance as a predictor of NIDDM.

**Importance of Findings for Anthropology:** The results of this study raise questions about how we can come to understand the powerful and predictable impact that place has on the health of populations. This study also raises critical questions about how racial constructs and proposed genetic predispositions are currently used in anthropological, genetic, and epidemiological research. Greenfield, Haskel (University of Manitoba) Status and Hierarchy in the "A" cemetery from Kish This paper will present a new methodology for reconstructing the status position within social hierarchies of internments from the early complex societies in the Near East. Data from the "A" cemetery in Kish, dated to the Early Dynastic period, will be used to demonstrate its potential.

**Helmuth, Hermann (Trent University)**

*Early Peterboroughians: bioarchaeological observations*

Human skeletal remains from a 19th century cemetery now housing the Peterborough Armoury were unearthed in 1998 and 1999. Ten skeletons and remains of some 30 more commingled individuals are represented, comprising possibly 20 males and 12 females, five subadults and 35 adults. Cranial measures and traits prove the skeletons to be Europeans. Overall health must have been poor with severe signs of degenerative joint

disease, DISH, nutritional-metabolic deficiencies, some fractures and a high "diseased and missing" dental index in addition to strong periodontal disease and frequent abscesses.

**Hines, Justin (University of Toronto)**

*Preliminary Survey to locate a study group of Spider Monkeys (Ateles geoffroyi)*

Spider monkeys live in Honduras, but where? Having been hunted for generations in most parts of the country, they are elusive at best. The purpose of my 10-week survey was to try to find a group that would tolerate a prolonged study of this relatively little known species. Through the assistance of several Non-Government Organizations, especially FUPNAPIB, I surveyed 7 of the protected areas along the north coast, finding only traces of bitten fruits and broken foliage. One promising group was rejected for political reasons. Towards the end of my stay, as the project began to appear impossible, I was introduced to Santos, a guard in the largest national reserve. In the course of three days of hiking, he guided me through primary forest to a remote section of the reserve where we did succeed in finding a group of 15-20 individuals. The area is sufficiently inaccessible that this group has no fear of people and I was able to maintain contact with them. First observations hint at some interesting contrasts with published material

**Larcombe, Linda (University of Manitoba)**

*Cytokine Genotypes of a North American Aboriginal Population: Implications for Disease Resistance and Susceptibility.*

Two seemingly disparate observations are explored through the holistic discipline of anthropology.

- In a study of patients with end-stage renal disease marked differences in the frequency of distribution of cytokine genotypes between Caucasians and North American Aboriginals was observed. The cytokine genotypes of Aboriginals with ESRD are skewed in favour of the high production of IL-6, TGF $\beta$ 1 and the low production of TNF $\alpha$ , IFN $\gamma$  and IL-10.
- Contact between people of European descent and North American Aboriginals resulted in the spread of diseases such as measles, small pox and tuberculosis among the Native North Americans.

Presented is a summary of a research proposal that will investigate the relationship between differential cytokine genotypes and the inability of the North American Aboriginal population to mount an effective immune response to intracellular bacterial diseases. Research questions and objectives regarding the immunogenetic program of contemporary and past North American Aboriginal populations are formulated based on the above observations and understanding of the role of cytokines in response to infection. The discipline of anthropology includes a diverse range of sub disciplines through which this research will be pursued.

**Lazenby, Richard (University of Northern British Columbia)**

*Circumferential Variation in Second Metacarpal Cortical Thickness: Sex, Age and Mechanical Factors*

Variation in cortical thickness in four quadrants of the human second metacarpal was investigated in a 19th century historic cemetery sample (100 males, 72 females, skeletal age 20 to 50+ years). Both left and right elements were studied (total N=344). Multivariate analysis of covariance (for age, sex and side, controlling for absolute size) was used to test the hypothesis of equality of thickness in dorsal, palmar, medial and lateral quadrants. Differences in regional cortical thickness posits localized regulation of resorption and formation adapting bone shape to functional loads, with implications for activity-modulation of skeletal senescence. The palmar cortex was found to be uniformly thicker in both sexes and both sides, and at all ages (young, middle and old adult); the medial, lateral and dorsal cortices did not differ significantly among themselves. Patterns of

age-related loss differed between men and women, with the latter showing significant declines across all age groups for all quadrants and males only small decrements after middle age. The larger cortical thickness in the palmar quadrant corresponds to the region of maximum compressive strain in the second metacarpal for functions involving full flexion (grasping). Although thicker at all ages, women lose mass in the palmar cortex at the same rate as in other quadrants, suggesting that function does not offer protection against endocrinologically-mediated depletion of bone mass (post-menopausal osteopenia).

**Lee, Shirley (University of Manitoba)**  
*The Labelling of Premenstrual Syndrome*

The term premenstrual syndrome was coined in England in 1953 by two physicians, Raymond Greene and Katharina Dalton. Another label had been used previously in research by Frank (1931) who described the disorder as premenstrual tension (PMT). Distressing symptoms associated with the menstrual cycle, while not identified as part of a discrete disorder before Frank's article was published, had been noted in the literature prior to the 20th century. Conditions such as the wandering uterus and hysteria had been described in early Greek medicine and, in the 18th and 19th centuries in Europe, both the uterus and ovaries were implicated in negative emotional and physical states experienced by women. Early research on PMT and PMS in the 20th century will be examined in this article. While recognizing that PMS is widely accepted within western cultures as a label used to describe disordered female physiology, an analysis of the literature suggests that the term also represents a sickness-oriented perspective toward the menstrual cycle embedded in cultural conceptions of the female body.

**Liston, Maria (University of Waterloo)**  
*Early Iron Age cremation burials from the Agora of Athens*

The Agora of Athens is best known for its history as the commercial and civic center of Classical Athens. Prior to this use the area held scattered houses and associated burials in the Bronze Age and Early Iron Age periods. At the beginning of the Iron Age, communal tombs were abandoned in favor of individual burials. Cremations appear as a common burial type for the first time, and often are accompanied by elaborate grave offerings. Although the sample is small, the cremation burials found in the Agora excavations have been critical in the reconstruction of burial rites and social organization during this period leading to the formation of the city-state of Athens. As part of a complete publication of the early Iron Age material from the Agora, the cremation burials were recently re-examined, many for the first time since their excavation in the 1930's and 1950's. Often only the cranial bone had been cleaned and studied for the initial publications. Examination of the complete remains has resulted in a number of new discoveries. The presence of subadult cremations had been previously unrecognized, and the apparent absence of children from formal, high-status burials has played a significant role in hypotheses concerning early Iron Age society. Additional information is now available about some of the best documented graves, including the so-called "Rich Athenian Lady," the "Warrior Grave," and the grave with the ceramic boots.

**Lovell, Nancy (University of Alberta)**  
*Pitfalls in the interpretation of trauma: the case of a crucifixion from ancient Egypt*

Evidence of trauma on the calcaneus at Mendes, Egypt (Roman Period) was attributed to crucifixion by Redford and Lang (1996). My own "forensic" examination of the material indicates that 1) the direction and angle of penetration are inconsistent with the reported positioning of the feet, and 2) the lesions are post-mortem in origin. Based on my familiarity with the site and my experience excavating human remains there, I believe that the lesions were most likely caused by penetration of growing roots of "halfa" grass, rather than by nails. Apparent long bone fractures also are more parsimoniously explained by post-mortem damage than by

the reported crurifragium. This case illustrates the importance of the burial context for the interpretation of skeletal trauma.

**Maar, Marion (Noojmowin Teg Health Centre and McMaster University)**

*Health research and First Nations community empowerment on Manitoulin Island*

Recent health policies increasingly reflect what Aboriginal people have always maintained: The gap between Aboriginal health status compared with the broader Canadian population can only be closed by empowering communities, families and individuals to make their own choices regarding health practices and programs.

Aboriginal health programs on Manitoulin Island in Northern Ontario have changed dramatically over the past decades, increasing access to culturally appropriate care by regaining local control over health care services. Self-determination in health care allows local communities to expand the definition of health to include the physical, mental, emotional and spiritual aspects of clients. At the service level, health promotion and illness prevention programs are locally designed and implemented.

Working towards the integration of biomedicine and traditional Aboriginal medicine gives clients access to culturally relevant treatment. Rapid organizational changes have left local health agencies with the task of resolving many complex research issues, including the development of a local health information database, designing a framework for tracking and evaluating holistic health services, and integrating biomedicine with traditional Aboriginal medicine. The move towards First Nations increasing community control in health care is paving the way for meaningful and action oriented research partnerships between anthropologists and First Nations health agencies.

**Matheson C and J. El Molto (Lakehead University)**

*A Perspective on Molecular Palaeopathology*

The identification of specific pathologies in archaeological remains is a controversial and difficult field. With the advent of PCR technology in the 1980s the application of molecular techniques to the diagnosis of ancient diseases was made possible. Lesions caused by diseases like leprosy, tuberculosis, malaria, treponematosi, plague, some cancers and many other diseases are now routinely tested and confirmed using specific DNA probes. Moreover, the methods are becoming more sensitive and more specific to enable detection from minute traces of pathogen DNA. This facilitates the identification of any degree of exposure to pathogens to establish more accurate health status of individual burials. With the added sensitivity of the molecular methods comes the advantage (-if investigating the presence of other factors and/or diseases such as inherited genetic susceptibility, specific genetic disorders (e.g. sickle cell) or even identifying preserved viral particles. In this paper we overview the new developments in the exciting field molecular palaeopathology suggesting the possibility of investigations of host-pathogen relationships in past human populations.

**McEwan, Jan (University of Alberta); Simon Mays (English Heritage) and Glen Blake (Guy's Hospital, London)**

*Growth and Bone Mineral Density in a Mediaeval Juvenile Skeletal Sample*

The relationship of bone mineral density (BMD) to longitudinal growth and weight during childhood has been clearly demonstrated in modern clinical studies and is employed as a measure of growth and development. BMD, height and cortical thickness increase in an approximately linear fashion and, in normal growth, all three should be well correlated. However, reduced cortical thickness and short stature have been a common finding in skeletal samples from pre-industrial societies. This is usually attributed to environmental stress. In this pilot study dual energy x-ray absorptiometry (DXA) was employed to measure BMD in thirty three individuals

aged 4-19 from Wharram Percy, a deserted mediaeval village site in Yorkshire, England. From radiogrametric cortical measurements and bone length, the relationship between BMD, longitudinal growth and cortical thickness was assessed. The radius was used for all three measurements. The results indicate that, while BMD and longitudinal growth were well correlated, cortical thickness did not keep pace with the other growth parameters. We postulate that cortical thickness is particularly sensitive to environmental changes, probably periods of malnutrition, dependent on the vagaries of the mediaeval feudal economy. A previous study of adults from the site indicated that reduced cortical thickness was a persistent feature in this population. It is, therefore, suggested that the three growth parameters together may give us a clearer understanding of the health status of these children prior to death than these factors taken in isolation.

**McVeigh, Claire (California State University, San Bernardino)**

*Mortality Bias in Tooth Size*

An investigation of mortality bias is undertaken by intra-population comparisons of tooth size. This is achieved by comparing mesiodistal diameters of the permanent teeth of adults skeletons and to those of subadult skeletons, using material from the cemetery collections of Spitalfields and Poundbury.

In the Spitalfields sample, mean permanent tooth size is significantly larger in adults than subadults. For the Poundbury sample, mean adult tooth size is not significantly larger. The evidence from Spitalfields, therefore, supports the hypothesis that individuals who survive to adulthood have larger teeth than those who die during childhood, while the evidence from Poundbury does not. It is suggested that the sub-adult sample from Spitalfields is not representative of their peer group in respect to tooth size, the majority of whom had normal size teeth and survived to adulthood.

**Meiklejohn, Chris and Todd Garlie (University of Winnipeg)**

*The University of Winnipeg's programme in osteological analysis and repatriation: history of a developing partnership.*

The Department of Anthropology at the University of Winnipeg began work on osteological/forensic analysis in 1980 as a result of an approach by the RCMP. This has led to a situation where, as of 2000, the department has a dedicated laboratory working in informal cooperation with the Provincial Office of the Chief Medical Examiner, various police and civic agencies, and the Manitoba Historic Resources Branch. In addition to basic osteological identification the laboratory has, since the late 1980's been involved in the repatriation of human remains to various local groups, both First Nations and other. This has led to a situation where First Nations groups are supporting both the excavation and analysis of disturbed burial areas within explicit agreements that the materials will be returned to the local communities following analysis. In addition a new programme has been put in place in 2001 which will see the analysis of all human remains recovered in the province in the past and their repatriation to local groups. This paper looks at the history and development of this interactive programme.

**Menec, Verena (University of Manitoba)**

*Self-Perceptions of Health: The Role of Ethnic Background*

Objectives. Numerous studies show that self-perceptions of health predict survival. This relation holds even when more "objective" health measures (e.g., physician assessments, morbidity indices, functional status) are controlled in the analyses. It is not clear, however, what explains this association and, indeed, we do not have a clear understanding of the factors that influence people's perceptions of their own health. This study was designed to examine whether there are cultural differences in how people rate their health and whether they might be matched by corresponding differences in morbidity, functional status, and mortality.

**Methods.** The present study was based on the 1990 wave of the Aging in Manitoba study (2484 participants who had complete data on all relevant measures). Whether individuals were alive or dead was assessed six years later, in 1996. Ethnic background was determined on the basis of self-reports of what nationality descent participants considered themselves. Individuals of British descent represented the largest ethnic group (39.5%) and were used as a comparison in all analyses.

**Results.** Seniors of Ukrainian/Russian background rated their health as being poorer than individuals of British background (controlling for demographic variables, morbidity and functional status). Similarly, seniors of German background perceived themselves as being in poorer health than their counterparts of British background. Ethnic background was generally not related to morbidity and functional status. Ethnicity was, however, related to mortality. Seniors of Ukrainian/Russian, German, Dutch, or Polish background were less likely to have died six years following the survey than individuals of British background.

**Discussion.** The finding that seniors of Ukrainian/Russian and German background rated their health as being poorer than individuals of British background, but did not exhibit greater morbidity or poorer functional status and, indeed, were less likely to have died six years later, suggests that self-perceptions of health are culturally bound. Cultural differences may, for example, exist in what people perceive as "normal" health. Alternatively, individuals from certain ethnic backgrounds may avoid the extremes on a continuous measure.

**Merrett, Deborah C (University of Manitoba)**

*What's Got Your Goat? Palaeopathology in Early Neolithic Iran.*

The transition to agricultural subsistence in the Near East is thought to be spatially and temporally variable with respect to the earliest domesticates. Palaeoclimatic amelioration occurred at a much later date in the eastern Fertile Crescent, the Zagros Mountains, than in the more westerly and southerly Levant. The concomitant Neolithic cultural transition also varies among the regions of the Near East. In the Zagros, the earliest agriculture is characterized primarily by the domestication of goats and the development of transhumant pastoralism (Hole, 1984), while the utilization of domesticated cereals was delayed relative to the Levant.

This paper assesses the skeletal consequences of the adoption of a pastoral subsistence strategy through examination of the axial skeleton of 2 adolescents and 14 adults from the site of Ganj Dareh in western Iran, dated to ca 7000 bc. The skeletal remains were examined with respect to lesion location within the vertebral column and within the individual vertebrae, lesion prevalence in the sample and the balance between bone resorption and deposition.

The bodies of thoracic, lumbar and sacral vertebrae exhibit osteophytic new bone formation and resorptive lesions. Through differential diagnosis the possible pathological and/or activity-related aetiologies, that include tuberculosis, brucellosis, actinomycosis and osteoarthritis, are assessed. The inter-relationships between health status and subsistence strategy are discussed.

**Moffat, Tina; Tracey Farmer; Ann Herring and Anne Ehrlich (McMaster University)**

*The determinants of health at the local level in the city of Hamilton.*

"Deconstructing the Determinants of Health at the Local Level" is a multidisciplinary investigation of population health in the city of Hamilton, Ontario (PI: John Eyles, Department of Geography, McMaster University). The aim of the project is to understand how the determinants of health approach plays itself out at the level of the neighbourhood -- a much smaller unit of analysis than is normally used in national aggregate

level studies. The study focuses on four environmentally and socially contrasting neighbourhoods in the city of Hamilton. The investigators are utilizing mixed methods (both quantitative and qualitative) to assess the degree to which human health is determined at the local level.

As part of the qualitative assessment of both the health of people in a particular neighbourhood and the "healthiness" of a neighbourhood, we have conducted a series of interviews with key informants to determine community needs and assets. Preliminary results indicate that people do link their community's health status to their local neighbourhood environment, and that they recognize the broader determinants of health beyond specific biomedical issues such as access to healthcare. Major themes of common concern across all neighbourhoods are: safety/crime, physical environment, transportation/accessibility, perception of neighbourhood, sense of community, local economics and vulnerable groups such as children/youth and seniors. Future research direction will include comparing and contrasting the results of quantitative assessments of health status from telephone surveys to the qualitative profiles of the neighbourhoods.

**Molto, J. El and C. Matheson (Lakehead University)**

*Vertebral Pathologies at Kellis 2: A Study in Differential Diagnosis*

This paper describes vertebral pathologies in three burials located in the same area of Kellis 2, a large Roman Period cemetery from the Dahkleh Oasis, Egypt. Two burials, a male (#265) and female (#377) are estimated to be 50-60 years of age, while the third (4377) is a female 55-65 years old. The older adult ages and the fact that there are multiple foci of infection in each of the vertebral columns has previously lead to a presumptive diagnosis of Brucellosis, although the authors favour bovine tuberculosis as the more likely cause. Molecular investigation of the tuberculosis specific DNA regions IS6110 and S12 has been conducted and will be reported herein. The results have implications for the differential diagnosis of these two diseases when differentiated on the basis of dried bone lesion macroscopy (visual assessment) only.

**Nelson, Andrew (University of Western Ontario)**

*The anthropometry/osteology interface: body size and form in Precolumbian populations on the North Coast of Peru.*

Hermann Helmuth successfully navigated in the realms of anthropometry (measurement of live people) and osteology (measurement of skeletons) and emphasized to his students the importance of envisioning a skeleton in terms of a live human being. This paper attempts to merge osteological data from a series of archaeological sites on the north coast of Peru with the broad body of literature on the anthropometry of modern people of the Andes. The proximate goal is to see if it is possible to identify individuals from the highlands in coastal communities, which would inform us of the movement of people in antiquity. The ultimate goal is to bring the skeletal material Ato life@, using osteological data to address broad scale cultural questions.

**Parish, Joe (University of Missouri-Columbia) and Tanya von Hunnius (McMaster University)**

*A possible case of Down Syndrome in a 19th century Canadian cemetery: a multidisciplinary approach.*

In 1982 the remains of 29 individuals were unearthed at the site of the Stirrup Court Cemetery in London, Ontario. These individuals resided in what is suggested to be a 19th century peri-urban community adjacent to the historic township of London. One particular individual (Burial 21) of this small skeletal sample reveals the presence of morphologic abnormalities that indicate the existence of a genetic disorder which predominantly affected the neuromuscular system. In addition, several non-genetic pathological conditions are present. This poster presents the descriptions of these skeletal abnormalities at the macroscopic level. They suggest that this individual suffered from Down's Syndrome. Historic records also point to this suggestion. A combination of burial groupings, a burial plaque and census records all converge to strongly support the suspected identity of

this individual as well as his parents. Finally, aDNA research is used to confirm or refute the presence of this chromosomal aberration and possibly provide information as to the origins (i.e., maternal or paternal) of this disorder. By using different forms of evidence (macroscopic descriptions, historic records and aDNA research) a more complete analysis of this particular individual is performed.

**Pfeiffer, Susan (University of Toronto)**

*Small Adult Size Among Southern African Foragers: A Case of Stabilizing Natural Selection?*

The archaeological visibility of foragers in southern-most Africa increases throughout the Holocene. Does this represent an actual increase in human numbers? Selection and adaptation among hunter-gatherers is important to our understanding of human survival not just in Africa, but throughout the world. Through the study of over 125 14C-dated adult skeletons, body size can be studied from various perspectives. For the past 10,000 years, mean estimated stature has not exceeded that of historic Khoisan descendant populations. Estimated body mass is also very low throughout this period. Variance in stature among these petite people can be linked to diet and to apparent territoriality, at least in the Southern Cape. There is a period just prior to 2000 BP when variance in size increased, with the inclusion of some very short people (<140 cm) in the Western and Southern Cape regions. This pattern ends abruptly at a time known for the introduction of pastoralism, when adults are once again just short. Corollary issues include interpersonal trauma in the high-variance era and the possibility of different patterning in the Eastern Cape. Underlying the developing picture is the question of how small adult size may have been adaptive.

Research sponsored by Social Sciences and Humanities Research Council of Canada.

**Prowse, TL (McMaster University); HP Schwarcz (McMaster University); SR Saunders (McMaster University); L Bondioli (Pigorini National Museum of Prehistory and Ethnography) and R Macchiarelli (Pigorini National Museum of Prehistory and Ethnography)**

*Stable Isotope Analysis of Diet at Isola Sacra (1st – 3rd c. AD), Italy*

This study investigates diet in a human skeletal sample from the Imperial Roman necropolis of Isola Sacra (1st – 3rd centuries AD) using evidence from stable isotope analysis of bone. The individuals buried in this cemetery belong to one of the largest Roman period skeletal collections in Italy and are associated with one of Rome's key maritime ports, Portus Romae. This sample is an important source of biological information on the lives of these Roman people. Textual and archaeological evidence are commonly used to reconstruct the diet of the ancient Romans and these sources tell us a great deal about the range of food choices available. The skeletal data are an invaluable addition to the existing information, as they can provide an indication of what was actually consumed.

Bone collagen samples from 110 femoral sections were analyzed for carbon and nitrogen isotope values and 66 bone apatite samples were also analyzed. The isotopic data indicate that the diet of this coastal population was a mixture of approximately 60% terrestrial and 40% marine resources. There is some isotopic variability between sexes and different age categories, but little variation between different burial types in the cemetery. Comparison with a small, rural Roman sample reveals an isotopic distinction between consumers of predominantly terrestrial resources and those consuming a significant proportion of marine resources. These results are interpreted in relation to current written and archaeological evidence on ancient Roman diet. Further, the correlation between the collagen and carbonate data is also examined.

**Rainey, Dori (University of Western Ontario)**  
*Nonmetric Postcranial Trait Analysis at Quetzalcoatl*

The archaeological city of Teotihuacan, first occupied in the second century B.C., is located in the Valley of Teotihuacan in the Central Mexican highlands. At its height in A.D. 600, Teotihuacan was an urban center approximately 20 km<sup>2</sup> and a population estimate between 150 000 to 200 000 people (Sempowski 1994:3). By A.D. 200 Teotihuacan had the largest integrated complex of monumental structures in Mesoamerica including the Temple of Quetzalcoatl, the third largest pyramid in the city. The temple was the first discovery of a large multiple sacrificial burial at Teotihuacan and, based on the stratigraphic evidence of the burial pits, it was contemporaneous with the construction of the temple. The significance of research focusing on the Temple of Quetzalcoatl relates to the potential knowledge for large-scale human sacrifice and contemporaneous events reflecting the political and social climate in Teotihuacan.

The 17 burials included in this analysis contain a total of 129 individuals: 97 males and 32 females, and are arranged in a symmetrical pattern correlating to the four cardinal directions in and around the Temple of Quetzalcoatl. The following analysis attempts to use the patterns of variation in postcranial nonmetric traits to determine the biological affinity of the Quetzalcoatl sample and to infer the social and/or political explanations. This biodistance analysis focuses on the facet of identity regarding the biological relatedness of the individuals within and among the burials. Of specific interest is the relationship between the male burials hypothesized to be bureaucrats, the male burials hypothesized to be soldiers, and the female burials hypothesized to be associated with the soldier burials. To further elucidate these relationships, several nonmetric traits related to activity patterns are also analyzed. The frequencies of the 45 traits analyzed differ among the female, bureaucratic, and soldier burials, suggesting possible differences in affinity and/or social contexts.

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**Rogers, Tracy (University of Toronto)**  
*Expect the Unexpected*

The relationship between case work and research is dynamic. Case work challenges our long-held beliefs and cherished perceptions, introducing new variables with which we must contend. It is a testing ground for the products of our research, and a means of identifying gaps in our knowledge. Research, on the other hand, provides us with the techniques and methodologies required to analyze human remains. One of the chief lessons I have learned from this process is the necessity of maintaining an open mind and a flexible approach to problem solving. Case examples are used to demonstrate the potential pitfalls of routine thinking and the importance of expecting the unexpected.

**Saunders, Shelley (McMaster University)**  
*What the Bones Have Taught Me: Confessions of a Humbled Osteologist*

This presentation recounts some of the experiences and lessons learned by a university-employed anthropologist trained in human skeletal biology who has been consulted by forensic experts on an occasional basis. The issues that I have identified as most important to me while engaged in forensic work relate to concepts of ethical behaviour and professionalism. In 1990, Galloway and colleagues published a review article in the *Yearbook of Physical Anthropology* titled

“Physical anthropology and the law: legal responsibilities of forensic anthropologists.” I reconsider their counsel in light of my own experience. In addition, I have consulted with my local and regional colleagues, individuals who are part of the forensic “team”, on their opinions and perceptions of the role and responsibilities of the osteologist who consults on forensic cases. Some of their responses are also dealt with in this presentation.

**Sawchuk, Larry (University of Toronto)**

*Changing Patterns of Breastfeeding and Employment Outside the Home in Gibraltar.*

An analysis of all civilian, primiparous women (n= 1608) who gave birth to a liveborn child in Gibraltar from 1960 to 1996 demonstrated a remarkable shift in breastfeeding practices. During the period 1960 to 1976, there was a significant and negative association between breastfeeding and women entering the workforce outside the home ( $r=-.665$ ,  $p=.003$ ,  $df=16$ ). Women were significantly more likely to not practice breastfeeding if they 'worked' at the time of marriage (OR=1.90, with  $X^2= 33.51$ ,  $p=.000$ , 1 df). After 1979, the pattern reversed itself with more 'working' women than expected now breastfeeding their child. The relationship of breastfeeding and women's employment is further explored in terms of social economic status, maternal age, mother's birthplace as well as a number of other key socio-demographic factors. Potential implications related to children's health and development will also be discussed within the context of this secular trend of breastfeeding observed in Gibraltar.

**Sawchuk, Larry (University of Toronto) and Dedrie I. White (University of Manitoba)**

*Living and Dying in Times of Crisis*

In 1828 and 1834, Gibraltar was struck by two major epidemics. In 1828, yellow fever swept away over a thousand souls over the course of a few months. Six years later, cholera made its first deadly visitation to the small British Colony. An analysis of over 5,000 cause-specific deaths yielded from the Roman Catholic parish registers revealed a life expectancy at birth of 24.8 +/- .4 years during the normative period 1826 to 1836. In contrast, life expectancy at birth for 1828 stood at 15.9 +/- .8 and for 1834 at 18.7 +/- .9 years. A comparison of age- and sex- specific probabilities of the two epidemics relative to normal background mortality will also be presented.

**Simpson, Dale (University of Manitoba)**

*Successful partnerships with indigenous groups-Rapa Nui Style*

Rapa Nui, or more commonly known as Easter Island is located 3700 km west of South America and 2250 km southeast of Pitcairn. It has been considered by many as the world's most isolated place. Traditionally the island is known as Te Pito O Te Henua, which in Rapa Nui translates the “navel of the world.” The island is only 166 square km, but boasts magnificent megalithic sculptures, rock art and remarkable structural remains. The prehistoric people of Rapa Nui produced nearly one-thousand massive statues named Moai, and moved hundreds of them, some weighing up to 50 metric tons, to locations all around the island. The statues, along with other features of the island's prehistory, have led to much archaeological speculation and field research. The archaeology and natural history of this small, isolated and remarkable island have drawn a great deal of attention, yet few people actually ever get to visit this enigmatic local. In this presentation, I will discuss how I was not only lucky enough to visit and do field research on Rapa Nui, but how a successful partnership between the University of Hawai'i field school, which I represented” and the Rapa Nui people was created, solidified and now waiting for future elaboration. Relating from my most life-changing experience, I will examine the reciprocal relationship that was implanted within two seemingly distance cultures that in contemporary times need each other to explain, investigate and understand the prehistory of Rapa Nui.

However, what I have learned is that a valuable lesson could be learned from Rapa Nui, is about our own culture and place on this earth.

**Sitchon, Myra (University of Manitoba)**

*A preliminary evaluation of digital imaging techniques for skeletal aging*

Age-at-death estimates derive from qualitative and quantitative assessments of age-related morphological changes in various areas of the skeleton. Traditional age estimation methodologies rely on the appearance of certain features of a bone that are visually compared to a set of published age-progressive stages developed from morphological changes in skeletal samples of known age. Inadequacies associated with visual scoring include the inability to accurately distinguish discernible aging features in older adults.

To address the current issues facing skeletal age estimation, this project examines the application of image analysis techniques with the objective to quantify progressive age-related changes of features and correlate them more precisely with actual age. The purpose is to refine the methodology of estimating age-at-death through the unique variety of approaches offered by image analysis such as microscopic measurements, three-dimensional modeling, superimposition, visualization, surface rendering, and feature analysis. The changes in the hipbone will be of particular note, focusing on the early development and late degenerative changes of the pubic symphysis.

Image analysis is beneficial in age estimation methodology by identifying discernible morphological changes related to chronological age more accurately and in detail than is possible with the human eye alone. The increased comparative capability of imaging analysis software addresses the issues associated with estimating the age of older adults by recognizing age-progressive traits overlooked by visual scoring.

The outcome of a preliminary investigation applying imaging analysis techniques on the Suchey-Brooks casts of the pubic symphysis is encouraging. One area of study involves the measurements of image pixel brightness that correlate with descriptions of age progressive changes outlined in past age estimation studies. Pixel intensity data translated into line plots represent the range of elevations on a surface. Elevation data corresponds with the different textures and relief exhibited in the various age phases of the symphyseal surface.

In conclusion, this preliminary study suggests that imaging analysis may be a useful tool in age estimation methodology. Computer assisted analyses promotes increased standardization in methodology, benefiting the observer by improving the efficiency and accuracy of skeletal age estimation in comparison to actual chronological age.

**Skinner, Mark (Simon Fraser University)**

*25 Years of Forensic Anthropological Consulting: Research Implications*

Forensic anthropology is still in an immature state with many basic questions about skeletal biology, site formation, identification, manner and cause of death as well as elapsed time since death still uninvestigated. Clearly, the scope for research topics, many of which are suitable for thesis treatment by students, is large and inviting. Our goal as forensic scientists rather than forensic technicians should be to elicit and pursue research programs which will expand the theoretical foundation of our discipline.

While recognizing that specific cases must be investigated and acknowledging that the stimulus for research will usually be practical case work, our proper concern is with basic questions about process, the answers to which may be generalized across many cases and among diverse forensic disciplines. A review of my cases, both domestic and international, over the past quarter century reveals that dozens and dozens of research

problems have arisen. Few of these relate to the core aspects of forensic osteology (ancestry, sex, age at death, stature). Rather, they relate to processes of site formation (including forensic botany and biology, grave fill matrices); elapsed time since death (including entomology, chemistry); manner and cause of death (including diatoms, ballistics, tool marks); taphonomic processes (including postmortem bone breakage, deliberate removal and reburial of remains).

Some previously interesting research topics (such as skeletal individuality) have been largely negated by advances in DNA typing; while our need to understand the detailed history of hard tissue formation (including non-optimal growth environments) is even more manifest. The expanding role of international forensic anthropology especially mass grave exhumation and large scale autopsy series have highlighted serious gaps in our knowledge base (including handling of paper and other documents, material culture, ethnic burial practices, standards of exhumation, description and analysis; statistical trends, decompositional phenomena).

In conclusion, forensic anthropology case work over many years has for me blurred and expanded the traditional boundaries of our discipline and shown how interconnected forensic scientists must be.

**Smith, Cathy (Harvard University)**

*Rooting our Family Tree: The Role of C4 Plants and Wetland Habitats in Early Hominid Dietary Evolution*

The expansion of savanna habitats has long enjoyed a central role in models which seek to explain hominid origins and the unique evolutionary trajectory followed by our lineage. Recently, however, paleoenvironmental reconstructions have called this emphasis on the savanna into question and have forced paleoanthropologists to reevaluate the role that grasslands played in the pivotal events shaping our evolutionary history.

This paper contributes to this reevaluation through the use of stable carbon isotope analysis of fossil tooth enamel. Employing useful distinctions in photosynthetic chemistry, the diets of early hominids can be assessed for the importance of forest (C3 plant) versus grassland (C4 plant) foods using this technique. These analyses show that the australopithecines were consistently incorporating C4 plant-based foods in their dietary regimes. On average, up to 25 or 30% of the diet was composed of such foods.

But in what form were these early hominids consuming C4-based comestibles? Hominids may have been consuming grasses directly (their blades, seeds or corms) or they may have been eating animals that had, in turn, consumed these plants. The nutritional and ecological viability of these alternatives is evaluated and it is concluded that neither of these possibilities fits well with the nutritional and morphological characteristics and constraints displayed by these early hominids.

Instead, it is argued here that the roots and rhizomes of plants growing at the water's edge many of them C4 plants are far more likely candidates for the source of the C4 isotopic signal in the australopithecines. The nutritional characteristics of these foods are explored along with the morphological requirements of the dentition needed to process such resources. Finally, the phenology of these plants and their distribution are reviewed and are thus recognized as viable fallback foods that would have been widely available in the many wetlands which filled the Plio-Pleistocene African Rift. The implications of increasing reliance on these resources are thus explored.

**So, Joseph (Trent University)**

*Culture, Migration and Mental Health: an epidemiological study of psychosocial stress levels in four immigrant communities*

The impact of migration on physical and mental health is well established in previous research. In the case of ethnic minority migrants, the migration experience can be exacerbated by the added burden of family separation, cultural and linguistic barriers, economic hardship, unemployment or underemployment, and racism, especially if the forced migration takes place as a result of conflict such as warfare in the home country.

A study was undertaken to assess the psychosocial stress levels of immigrant groups at the Hong Fook Mental Health Service, a Ministry of Health funded community mental health agency that offers service to the Chinese, Vietnamese, Cambodian, and Korean ethno-cultural communities in the Greater Toronto Area. Data was collected from a sample of 530 individuals using the Zung SAS (Self-rated Anxiety Scale) as the primary instrument, augmented by socio-demographic data, including information on ethnicity, immigration history, language, and self-identified stressors such as unemployment, financial difficulties, family problems, social isolation, cultural and language barriers, and health problems.

Analysis involved using all above indicators as independent variables contributing to higher anxiety and stress levels as measured by the SAS score. The results show that the scores of all immigrant groups are significantly higher than the "western", non-immigrant controls as measured by Zung ( $t = -14.66$ ,  $p < .05$ ). One-way analysis of variance of the ethnic samples showed the Cambodian group has significantly higher anxiety scores. ( $F = 6.70$   $p < .05$ ) The Newman Keuls Post Hoc Test also revealed the Cambodian group to have significantly higher SAS scores. This may be attributed to the continuing impact of the pre-migration experiences of the Cambodian refugees. ANOVA revealed a gender difference in SAS scores, with women having higher anxiety levels. A positive correlation was found between the number of problems and the anxiety score ( $r = .29$   $p < .05$ ). Particularly noteworthy is the higher scores among respondents with health problems, language barriers, social isolation, and intergenerational conflicts.

The findings indicate migration experience is a stressful one that is compounded by cultural factors. Anthropologists, and medical anthropologists in particular, are in a unique position to contribute to health promotion projects involving community outreach and the delivery of culturally appropriate care to these ethnically diverse communities.

**Stock, Jay (University of Toronto)**

*Climatic and behavioural influences on lower limb morphology among foragers.*

The gracilization of the skeleton is a significant morphological trend in human evolution. Interpretations of this trend are limited, because the relationships between skeletal morphology, habitual behavior and climate are poorly understood. The external morphology and robusticity of the lower limb have been the focus of numerous studies that have linked bone morphology to factors including terrestrial mobility and the long-term adaptation of body size and shape to climate. To better interpret the pattern of robusticity in the past, we must be able to differentiate the climatic and behavioral influences on lower limb morphology. To what extent is the pattern of robusticity in the lower limb influenced by climate and terrestrial mobility?

This study investigates the relationship between general patterns of terrestrial mobility, climate, and lower limb morphology among proto-historic and prehistoric foragers from the North American Great Lakes ( $n=14$ ), the Andaman Islands ( $n=31$ ), the Tierra del Fuego ( $n=18$ ), and Southern Africa ( $n=38$ ). Comparisons of external osteometrics and diaphyseal cross-sectional geometry of the femur and tibia demonstrate morphological differences between the groups that are correlated with differences in terrestrial mobility. There is greater

variability in diaphyseal strength of the femur than the tibia, a trend that is consistent between groups and between sexes within each group. As a result, femoral strength appears to be more closely correlated with habitual behavior. The lower variability in robusticity of the tibia suggests that there are greater adaptive constraints on the morphology of distal limb segments.

**Stratton, Sabine (University of Alberta)**

*An Introduction to Current Ethical Issues in Physical Anthropology*

This paper will serve as an introduction to a discussion about current ethical issues in physical anthropology. I got involved in this topic when the Tri-Council Policy Statement on "Ethical Conduct for Research Involving Humans" came into place. I, like many others, hadn't given the new policy much consideration but suddenly was asked questions about my interpretation of definitions in the policy. In other words, what is considered doing "harm" in research? How does that perspective change with the make up of the Research Ethics Board? What is "minimal risk" in research? What is "informed consent" for clinical research? The concept of "anonymity" in research; does it exist? What is an "identifiable group"? In addition to the history of the new policy and what CAPA can contribute to the next edition of the policy, I'll discuss some of these issues.

**Strong, Christopher A. (University of Toronto)**

*Dental Microwear and Stable Isotope Analysis Differences in Browsing and Grazing Species of South African Bovid*

An understanding of paleodiet leads to a better understanding of nutritional adaptations and paleoecology. This preliminary study evaluates both the dental microwear and stable carbon isotope signatures of four species of African bovid with relatively simple diets (two species of grazers and two species of browsers). Stable carbon isotope analysis clearly distinguishes the browsing species from the grazing species. Quantification of dental microwear features reveals differences in the density of microscopic enamel scratching among the species. As expected, the dental microwear analysis conducted in this study suggests that the black wildebeest and red hartebeest are grazers whereas the eland is a browser. The kudu does not fit the expected quantitative pattern of dental microwear. Although the dental microwear results are promising, the exact relationship between dental microwear and subtle differences in dietary adaptations remains unclear. To date, most paleohominid diet researchers have been exclusive when employing these methods, using either dental microwear or stable isotope analysis. This study illustrates the utility of combining the two approaches to further our understanding of paleodiet.

Acknowledgement: Stable carbon isotope analysis courtesy of the Archaeometry Unit, Department of Archaeology, University of Cape Town, South Africa.

**Syms, Leigh (Manitoba Museum of Man and Nature)**

*Building Bridges with First Nations Communities and Making Burial Analysis Relevant*

Schisms have tended to develop between First Nations who demand their rights to determine the treatment of their ancestors and the archaeologists and physical anthropologists who desire the scientific knowledge that is associated with the remains. This schism has all too frequently developed into a confrontation.

In northern Manitoba, a relationship of cooperation and sharing and trust has developed. This has been due to a long record of archaeologists working with band councils, Native elders and individuals. This relationship relies upon the recognition that there must be on-going consultation and interaction with the Native communities, that the recovered burials must be treated with respect, and that the knowledge derived must be treated and presented as part of the communities' heritage. This program has resulted in an emphasis upon

returning the information on the 'old ones' and their personal belongings in ways that are seen as relevant to the communities:-- educational displays, classroom heritage programming, and readable reports that emphasize the insights that these "old ones" provide for developing awareness and pride in the old ways(heritage) , particularly for the youth.

**Teichroeb, Julie; Tania Saj and Pascale Sicotte (University of Calgary)**

*What is the Mechanism Driving Scramble Competition in Geoffroy's Pied Colobus (Colobus vellerosus)?: A Test of the 'Pushing Forward' Effect*

In 1983, van Schaik et al. suggested that the mechanism driving scramble competition in long-tailed macaques was a 'pushing forward' effect. Foraging animals were found to move on at the approach of other foraging individuals, regardless of whether that individual was high or low ranking. van Schaik et al. (1983) hypothesized that this was due to the decreased efficiency of foraging with others. Our research indicates that *Colobus vellerosus* experience scramble competition: Prior analysis showed that day ranges are significantly longer in our large focal group (N=31) when compared to our small focal group (n=8) during the same four month period (MW U=-27,  $p < 0.025$ ). The question we want to investigate here is whether we can identify a 'pushing forward' effect at the individual level in *C. vellerosus*. We compared the length of individual female feeding bouts, with the assumption that a 'pushing forward' effect would translate into shorter feeding bouts in the large group. Eight different food items were tested and mature leaves, which are generally considered low quality, showed no significant differences in feeding bout durations (5 tests: MW  $p > 0.05$ ). Of the analysis of three 'high quality' food items, including young leaves, seeds, and buds, only one, the floral buds of *Ceiba pentandra*, showed the small group to have significantly longer feeding bouts than the large group (MW  $z = -2.378$ ,  $p = 0.0174$ ). This suggests that the 'pushing forward' effect may only drive scramble competition in *C. vellerosus* when they feed on certain (perhaps higher quality) food items.

**Thompson, Jennifer (University of Nevada)**

*Skeletal biology of Neolithic human remains from Dakhleh Oasis, Egypt*

Human skeletal remains of 6 Neolithic individuals, dating to approximately 6500 to 4000 years before present, were recovered from several localities in the Dakhleh Oasis of Egypt. The purpose of this paper is to present an analysis of their dental, cranial and infracranial morphology and evidence of dental and skeletal palaeopathology. Most of these individuals died between 20 and 30 years of age. The dental morphology is variable and one individual has a mal-occluded premolar. The most complete male individual is powerfully built, as indicated by the muscle attachment areas. In addition, he has an enthesopathic lesion on his heel which is thought to be the result of mechanical stresses related to high levels of walking and running. Stature estimates of the most complete male and female reveal a degree of sexual dimorphism, with the male 5'6" tall and the female about 5'2" in height. The dentition reveals several incidences of dental pathology including abscess, dental caries, enamel hypoplasia, enamel hypocalcification, as well as periodontal disease. Pathologies of the infracranial skeleton include compression fracture, arthritis, periostitis and porotic hyperostosis. The dentition show signs of pervasive and ongoing stress, as does the incidence of porotic hyperostosis, which together point to dietary stress or the incidence of disease. This hypothesis is supported by the archaeological evidence indicating economic stress due to climate deterioration. These skeletal and dental finds are important because little is known about the Neolithic pastoralists living in the Dakhleh region although their material culture has been described in some detail. Thus, an examination of their health and other attributes will not only serve to test this hypothesis of economic stress as a result of increasingly arid environmental conditions, but will also ultimately allow contrasts to be made with earlier people in this area as well as later agriculturalists in the Dakhleh region and elsewhere.

**Toyne, J. Marla (University of Western Ontario)**

*Muskuloskeletal Stress Markers (MSM) among a prehistoric Inkan sample from Tucume, Peru.*

How can we understand the physical activities in the daily lives of past populations? This is one of the important questions that archaeologists ask of the physical anthropologists who study human remains found in burials. Archaeological artifacts and burial offerings associated with individuals are often used to hypothesize about occupations or activities of individuals. However, physical anthropologists are often called upon to examine the actual osteological remains to understand how cultural activities affected the biology of an individual. In addition to trauma, wear patterns and joint degeneration as indicators of occupational or habitual activity stresses, musculoskeletal attachment sites can be examined to understand which muscles and areas of the body were under the greatest activity related stress. Diane Hawkey (1991, 1998) devised a visual observation scoring system for Muskuloskeletal Stress Markers (MSM) or enthesopathies. Using this methodology I examined a small sample of 22 individuals from the prehistoric site of Tucume, Peru. In this paper, I will present the preliminary results of applying this MSM technique to this sample. I will also examine the issues and problems that arose during my analysis in order to assess if this is an effective method for understanding occupational activities in archaeological samples.

**Varney, Tamara (University of Calgary)**

*Stable carbon and nitrogen isotopic analyses at a colonial naval cemetery at English Harbour, Antigua, WI*

This paper focuses on the stable isotopic analysis of bone and tooth samples from a colonial cemetery in English Harbour, Antigua, WI. The cemetery was associated with a Royal Naval Hospital that operated from approximately A.D. 1793 to 1822 during the height of the Napoleonic Wars. Investigation of sparse historical documents, archaeological excavation of an associated midden and osteological analysis of the human remains suggests that the cemetery served not only naval personnel, but also soldiers, slaves, family members and prisoners of war. Questions of identity commonly surround colonial cemeteries in the Caribbean, particularly those whose context suggests lower social standing. Colonial populations were diverse but generally included several classes of colonists, slaves, freeman and military personnel. Issues of health and lifestyle, and linkage with a local historic record, which is often quite sparse, are difficult to approach without first establishing the identity of those buried in the cemetery. Recent studies have applied stable isotopic techniques to establishing identity and tracing life histories in archaeological contexts. Identity can be established through stable isotopic analysis when different groups within a society may maintain different diets that are then reflected in the stable isotopic values of hard tissues. Bone collagen and bone apatite from 30 individuals were analysed for stable carbon and nitrogen (collagen only) isotopes. The results demonstrate that two groups can be separated on the basis of their stable isotope values that correspond to racial affiliation determined by osteological analysis. When linked with historic knowledge on dietary preferences, identity can be established such that questions of health, and resource use and allocation can be addressed.

**Von Hunnius, Tanya; Jodi Barta and Shelley Saunders (McMaster University)**

*The McMaster Palaeogenetics Institute: Studies in Human Disease and Population Relationships*

McMaster University's facility for ancient DNA research is evolving into a state of the art center for the study of nucleic acid samples recovered from human and animal specimens. Our current research projects are directed towards questions of anthropological and archaeological interest, particularly evidence for human migration and the study of certain infectious diseases. With the support of the Canada Foundation for Innovation (CFI) as well as McMaster University, our two physically separated laboratories, one for extraction and one for amplification and sequencing, are completely renovated and newly outfitted. One of the major difficulties facing ancient DNA researchers is establishing the authenticity of their results. This poster paper

illustrates some aspects of our methodological approaches to sample processing as well as our contamination avoidance procedures. Notably, the institute is investigating the use of robotics as a novel and experimental approach towards further contamination control. We provide illustrations of the range of research projects currently under way with specific examples of our success at demonstrating fragment authenticity by reproducing results over time and by different experimenters.

Support for the McMaster Palaeogenetics Institute is provided by the Canadian Foundation for Innovation, the Social Sciences and Humanities Research Council of Canada, the Museo Nazionale Preistorico Etnografico "Luigi Pigorini", funding from the Royal Irish Academy to the University of Cork, the University of Calgary, a private trust, and from the Canada Research Chairs program.

**Waters, Andrea (University of Calgary)**

*The Effects of Growth on Stable Nitrogen Isotope Ratios in Subadult Long Bones*

The use of stable isotope data to reconstruct past diet and lifeways requires we understand the relationship between isotopic abundances in food and water and those retained in body tissues. Growth is one of many factors that may have an effect on the relationship between diet and the isotopic record of that diet. Katzenberg and Lovell (*Int. J. Osteoarchaeol.*, 1999) have demonstrated that pathological conditions resulting in tissue loss can alter stable isotope ratios since the body is in a state of negative nitrogen balance. Conversely, during growth the body is in a state of positive nitrogen balance since new tissue is being rapidly produced. If growth is affecting nitrogen isotope values it is postulated that the metaphyses, the growing ends of a long bone, will have a different isotopic signature than the rest of the long bone. In this study, 27 subadult long bones from the Uxbridge Ossuary, outside of Toronto, Ontario, are analysed for the effect that growth may have on stable nitrogen isotope ratios in bone collagen.

**White, Christine (University of Western Ontario); Fred Longstaffe (University of Western Ontario) and David Pendergast (Royal Ontario Museum)**

*Temporal Change, Social Structure and Diet in the Altun Ha Maya*

This study reports the results of the analysis of stable carbon-isotope ratios for both bone collagen and apatite, and of nitrogen-isotope ratios for bone collagen, from 72 human skeletons from the near-coastal Maya site of Altun Ha, Belize. The sample spans the Preclassic to Postclassic periods, approximately 800 B.C. to after A. D. 950, and includes a comparison of nine excavation zones representing contrasting status groups. Diet at Altun Ha exhibits several layers of complexity that reflect the social complexity of Maya society. Although the diet was maize-based (C-4), it also contained large quantities of marine/reef resources, enough to cause an artificial appearance of pure carnivory in many cases. Two samples thought to consist of dedicatory sacrifices (Structure C-13 and Terminal Classic period in Zone E) are dietarily distinct, but for Structure C-13 this distinction could be obscured by time period. Protein consumption, as indicated by  $\delta^{15}\text{N}_{\text{col}}$  values, appears to have been fairly stable throughout the sequence of the site (with the exception of age and sex differences), but a marked shift to reduced consumption of C4 foods seems to have occurred after the Early Classic period. A second similar decline probably occurred between the Late/Terminal Classic and the Postclassic period. These apparent temporal trends may, however, be confounded by differences between zones within time periods. High status seems to be marked by a high degree of C4 food consumption.

**Williams, Jocelyn (University of Calgary); Fred J. Longstaffe (University of Western Ontario) and Christine D. White (University of Western Ontario)**

*A Stable Isotopic Analysis of Diet at Marco Gonzalez and San Pedro, Belize.*

This paper is concerned with the stable nitrogen and carbon isotopic analysis of diet at Marco Gonzalez (100 BC -1350 AD), and San Pedro (1400-1650 AD), Belize. Little is known about the Maya between the Postclassic and Historic (900-1650 AD) periods. Dietary analysis at these sites provides important insight into

social organization, health and subsistence economy and also expands our understanding of the distribution of stable carbon and nitrogen isotopes within marine foodwebs. The diets at these sites were isotopically distinct from each other and regionally. These societies do not appear highly stratified, with no inter-site dietary differences between sex, class or age. The ancient Maya of San Pedro and Marco Gonzalez had a diet that was protein and lipid rich and also contained a small proportion of maize. The majority of protein came from marine sources; however, there was an important contribution of C3-consuming terrestrial or riverine animals. The dietary contribution of C3-consuming animals was greater at Marco Gonzalez than at San Pedro. The diet of females and males at San Pedro contained a larger proportion of marine resources than the diet of females and males at Marco Gonzalez. Dietary evidence corroborates archaeological evidence which suggests that San Pedro and Marco Gonzalez had distinct functions, political economies and ties to the mainland. Regionally, Marco Gonzalez and San Pedro represent the first documented ancient Maya population whose diet consisted mostly of marine resources with a minimal reliance upon maize.

This research was supported by an NSERC (Natural Sciences and Engineering Research Council) Postgraduate Scholarship (to Williams), and grants from the Wenner Gren Foundation (to White) and NSERC (to Longstaffe).

**Wilson, Warren (University of Calgary); Janette Forte (Iwokrama International Centre for Rainforest Conservation and Development, Guyana) and Barbara Piperata (University of Colorado)**

*Birth Order, Growth, and Maternal Depletion Among the Makushi*

While birth order has been argued to be an important factor influencing a child's growth, the relationship between these two variables is unclear. In developed countries birth weight increases in later-born children. In developing countries, researchers have proposed there may be a decrease in birth weights in later-born children when short birth intervals do not allow the mother to recover from the physiological stresses of the previous pregnancy. The proposed inability to recover is known as the maternal depletion hypothesis. The objective of this paper is to assess the relationship between birth order and growth in Makushi Indians of Guyana. We hypothesized that later-born individuals will have compromised growth in comparison with first-borns due to maternal depletion.

NHANES I and II were used to assess the nutritional status of 1100 Makushi. Student's t-tests were used to compare anthropometrics of first- and later-born individuals and proportional-Z tests were used to compare the frequencies of wasted and stunted first- and later-born individuals. Body-mass index (BMI) was used as an indicator of nutritional status for mothers and a regression was calculated to evaluate the relationship between parity and BMI for 82 Makushi mothers.

We found few significant differences between first and later-born individuals in weight, height, skin folds, or wasting. However, significantly more of the later-born individuals are stunted in comparison to first-borns. For those 82 women for whom we have parity data, the average parity is 5.8±2.9 and average interbirth interval is 2.3±1.6 years. Regression analysis demonstrates no relationship between BMI and parity.

Hence, while we found few differences in growth parameters, later-born individuals in this population have a significantly higher frequency of stunting. The parity and BMI data suggest that this is not due to maternal depletion. Rather, the most plausible explanation for the pattern observed in these Makushi communities is that an increase in the number of children in a family decreases the food resources available to each individual. The data described here indicate that studies which seek to understand the etiology of variation in growth, should control for birth order.

**Wright, Lori (Texas A & M University); Doug Price (University of Wisconsin) and Jim Burton (University of Wisconsin)**

*Under the volcano: Strontium isotopes and foreigners at Kaminaljuyu, Guatemala*

Isotopic analysis is now beginning to address questions of population movement among regions and between ancient states. In Mesoamerica, questions about the role of contact, and indeed migration among the Maya area and Central Mexico arise for a number of Early Classic sites. Using oxygen isotopic analysis of tooth enamel, previous studies have shown that several skeletons buried in tombs at Kaminaljuyu, Guatemala, were not those of migrants from the central Mexican city of Teotihuacan. Although most of the skeletons appear to have lived local highland Guatemalan childhoods, several are clearly foreigners. To help identify the origin of these skeletons, we conducted strontium isotopic analysis of tooth enamel. This paper will present the preliminary strontium isotope results of the Kaminaljuyu remains.

**Young, T. Kue (University of Manitoba)**

*Factor analysis of ethnic variation in the multiple metabolic (insulin resistance) syndrome in the First Nations, Inuit and non-Aboriginal populations.*

**Objectives** This study aims to describe and compare the pattern of risk factor clustering in the multiple metabolic (insulin resistance) syndrome (MMS) in three Canadian ethnic groups (Indians, Inuit and non-Aboriginal Canadians).

**Design** Secondary analysis of data collected in three cross-sectional, population-based sample surveys in three contiguous regions of Canada during the late 1980s and early 1990s (Ontario, Manitoba and Northwest Territories).

**Setting and Participants** The combined dataset consists of 873 Cree-Ojibwa Indians from northern Ontario and Manitoba, 387 Inuit from the Keewatin region of the Northwest Territories, and 2,670 non-Aboriginal Canadians (predominantly of European origin) in the province of Manitoba. The samples are representative of the non-institutionalized, adult population of their respective catchment areas.

**Main Outcome Measures** Factor analysis transformed 10 anthropometric and metabolic variables (height and weight, waist and hip girth, mean systolic and diastolic blood pressure (BP), total cholesterol, triglycerides, high-density-lipoprotein-cholesterol (HDL), and fasting plasma glucose) into three uncorrelated factors.

**Results** Three factors, which together account for 64.3% of the variance, can be identified: an "obesity factor" (factor loadings for weight, height, waist and hip girth, and HDL); a "blood pressure factor" (factor loadings for mean systolic and diastolic BP, and total cholesterol); and a "lipid/glucose factor" (factor loadings for triglycerides, total cholesterol, HDL and fasting plasma glucose). Fasting insulin is available for only a subset of the data, and separate analysis shows that it groups with glucose. Factor scores generated by the factor analysis differ according to ethnic group, diabetes status and sex on multivariate analysis of variance.

**Conclusions** MMS is prevalent in diverse ethnic groups, but varies in the pattern of phenotypic expression, with some components more prominent in some groups.

**Zeller, Anne (University of Waterloo)**

*Changing Perspectives in Primate Typology*

Amazingly, as our planet becomes smaller, more and more species are being discovered on it. In 1968 when I first formally studied primates in Hermann Helmuth's classes, about 200 species of primates were recognized,

but during the 30 plus years since then over 40 species have been added to the list and many additional subspecies have been identified. Looking back in time it seems that while the number of non-human primates species recognized in past centuries was fewer, the number of types of living humans that were designated separately was greater. This paper is an overview of the history of primate typology in the west since the time of Aristotle, with some reference to how primates were incorporated into the western world view. The process of typology and the methodology of systematics has important theoretical consequences for how we perceive the world and understand our place in it.