



## Abstracts

# 30th Annual Meeting of the Canadian Association for Physical Anthropology

Ottawa, Ontario 2002



Hôtel Crowne Plaza Hotel

Ottawa, Ontario

October 24-26, 2002

Agarwal, S.C. (McMaster University, Hamilton, Ontario), X. Banse (Université Catholique de Louvain, Brussels), W. White (Museum of London, London, England), M.D. Grynpas (University of Toronto and the SLRI of Mount Sinai Hospital, Toronto, Ontario), and J-P. Devogelaer (Université Catholique de Louvain, Brussels)

*The Use of pQCT to Examine Trabecular Architecture in an Archaeological Medieval Population*

In order to non-invasively examine age and sex-related changes in bone quality in an archaeological sample, a study was made of vertebral trabecular architecture with the use of peripheral quantitative computed tomography (pQCT). Lumbar vertebrae from a total of 73 individuals (m=32, f=41), divided into 3 age categories (17-25, 26-45, 46+ yrs.) from two urban British medieval skeletal samples, were scanned using a pQCT Research SA+ Scanner (Stratec, Pforzheim, Germany). A mid-coronal section was taken from each vertebral body, and analyzed in a Qwin Pro (Leica) image processing and analysis system to evaluate classical trabecular morphological parameters. While both sexes showed age-related change of trabecular structure, only females demonstrated a significant decrease in trabecular bone volume (BV/TV), trabecular number (Tb.N), and a significant increase in trabecular separation (Tb.Sp) between the oldest and two younger age groups. A significant sex difference in trabecular structure is also seen in the oldest age group. The study demonstrates that pQCT is a rapid and effective method for the examination of trabecular architecture in archaeological bone.

Albanese, John (McMaster University, Hamilton, Ontario)

*A New Metric Sex Determination Method Using the Clavicle and Humerus*

A new metric sex determination method is presented using the clavicle and humerus that has been developed from a sample from the Terry Collection and the Coimbra Collection (n = 556). Four models have been developed using logistic regression, a statistical approach that is ideal for predicting a dichotomous dependent variable such as sex. The four models require 2 to 4 of the following easily collected standard measurements: maximum length of the clavicle, maximum vertical diameter of the head of the humerus, maximum diameter of the humerus at mid-shaft, and maximum epicondylar breadth of the humerus. Models were tested using a sample from the FDB (n = 197) which was selected to include only positively identified individuals and no data from the Terry Collection. This test is approximately equivalent to applying the models to 197 forensic cases from across North America. Allocation accuracies for the models tested using the FDB data are high and range from 93% to 95%.

Allard, Travis (RCMP)

*Creating a Mathematical Representation of Cranial Suture Patterns for Use in Identification of Unknown Decedents*

The purpose of this research is to test the ability to make positive identifications of unknown individuals using a numerical representation of cranial suture patterns. Pre-

liminary results indicate that it is possible to identify individuals using a numerical representation of cranial sutures, as expressed as co-ordinates of an "XY" graph. Pattern recognition algorithms are used to identify the uniqueness of the individual sutures with the aid of image analysis software. The use of cranial suture patterns for positive identification may apply to situations that involve cremated, severely decomposed and fragmented remains, since the bones of the cranial vault are more resistant to such destructive forces (Sekharan 1989). This technique is particularly useful when ante-mortem dental radiographs and frontal sinus methods of identification are unavailable.

**Barta, Jodi Lynn (McMaster University, Hamilton, Ontario)**

*Beyond a Diagnosis: A Unique Opportunity to Combine Ancient DNA Analysis and Individual Medical Records to Study a Putative Case of Tuberculosis*

Ancient DNA (aDNA) analysis has provided new tools for researchers in diagnosing the presence of disease in some pathological skeletal remains. The case discussed in this paper provides a unique opportunity to combine a positive diagnosis of the presence of *Mycobacterium tuberculosis* complex DNA with hospital records penned by various attending physicians throughout the course of the disease. Using these records in combination with aDNA analysis allows a glimpse beyond a mere positive vs negative diagnosis into the actual illness experience of this particular individual.

**Bathurst, Rhonda R and Jodi Lynn Barta (McMaster University, Hamilton, Ontario)**

*Ancient DNA Diagnosis of Canine Tuberculosis*  
**Poster Paper**

An unusual dog burial recovered from a 16<sup>th</sup> century Neutral Iroquois site in Ontario displays a distinctive osteological condition called canine hyperpulmonary osteoarthropathy (HPOA). A proliferation of new bone exostoses primarily on the lower limbs is characteristic of the advanced stages of this skeletal syndrome. The condition is triggered by a pulmonary mass or pulmonary tuberculosis, the latter of which may be transmissible between dogs and humans. Ancient DNA analysis confirms the presence of *Mycobacterium tuberculosis* complex, establishing it as the causal agent for this case of canine HPOA. This is the first palaeogenetic evidence of tuberculosis to be isolated from an archaeological dog, and illustrates the potential for dog remains to be used as human proxies in ancient health and disease studies.

**Beauchesne, Patrick and Shelley Saunders (McMaster University, Hamilton, Ontario)**

*A Test of the Revised Rapid Manual Method for the Preparation of Bone Thin Sections*

A recent publication by Maat (2001) introduces a modification of Frost's earlier "rapid manual method" for ground bone thin section preparations, which uses "surface embedding" with cyanoacrylate for sample protection. This revised method is supposed to provide a quick, inexpensive system for producing thin sections from archaeological specimens

with the quality of results equivalent to more involved and equipment-intensive methods. Our study conducted a test of comparison of Maat's method to several other techniques that use vacuum embedding media. A number of samples were tested, including modern bone samples from the dissecting room as well as archaeological samples in differing states of preservation. The results were highly favourable for a large majority of the specimens, both modern and archaeological and the different methods produced images of similar quality. However, poor preservation of the specimens is still an issue and only relatively dense, intact specimens hold up to the physical demands of the grinding procedure. Future refinement of this technique would allow for large-scale sampling and encourage more osteological researchers to use histomorphometric analysis of archaeological hard tissues.

**Begun, D.R. (University of Toronto, Toronto, Ontario)**

*What, if Anything, are Orrorin Tugenensis and Sahelanthropus Tchadensis? A Cladistic Approach to the Radiation of Late Miocene Hominids*

*Orrorin tugenensis* and *Sahelanthropus tchadensis* are insufficiently known to resolve their relations. Nevertheless, morphological, temporal and geographic data can be evaluated in light of previous phylogenetic and paleobiogeographic analysis of fossil and living great apes. *Orrorin* is reconstructed as biped, but similar morphology is found in African apes, australopithecines, and Miocene hominids. *Orrorin* morphology is predictable for a hominid near the ancestry of chimpanzees and humans. In contrast, *Sahelanthropus* differs from the reconstructed chimpanzee-human ancestral morphotype with its chimp-like brain case and fossil human-like basicranium and face. Some see an unexpected amalgam of anatomical characters in *Sahelanthropus*, but only if it is assumed to be closely related to living hominids (great apes and humans). *Sahelanthropus* is actually consistent with the pattern of diversity in late Miocene hominids. All fossil great apes are unique, making phylogenetic analysis difficult while revealing an interesting pattern of evolution in time and space.

**Blundell, L. C. (University of Durham, Durham, England)**

*Assessment of Upper Premolar Morphological Traits as Reliable Phylogenetic Indicators*

Upper premolar morphological traits have been used in several studies that argue for alternative phyletic placements of early and middle Miocene fossil hominoids relative to extant primate clades. The underlying interpretation is that upper premolar enlargement relative to the first and/or second molar and a reduction in upper premolar cusp heteromorphy are characteristic of extant apes. This study tests the strength of the phylogenetic signal contained within these characters to determine whether they diagnose the groups of living primate taxa for which they are proposed.

The hypotheses are evaluated by means of character state analysis performed on seven metric characters derived from associated upper premolar and molar data collected from seventeen extant and fifteen extinct catarrhine species. The computer programme MacClade is used to reconstruct hypothetical ancestral nodes using the phylogenetic method of character optimization.

The results indicate that there is only a very weak phylogenetic signal contained within these traits as both characters fail to unambiguously diagnose groups of living apes as clades. These findings imply that phylogenetic analyses that incorporate one or both dental traits to develop a phylogenetic framework within which to place fossil taxa relative to extant anthropoids are fundamentally flawed because neither character provides convincing evidence of common ancestry relationships.

**Blyth, Lisa (University of Western Ontario, London, Ontario)**

*Analysis of Tooth Enamel Phosphate: Reconstructing Place of Origin for War of 1812 Combatants*

Biogenic phosphate in tooth enamel has proven useful in identifying place of origin and migration patterns for archaeological specimens. These interpretations are possible because latitude and climatic effects result in variation in the oxygen isotope composition of meteoric water. When humans ingest water from their environment, these isotopic variations are passed onto them and are reflected in the biogenic phosphate contained within their teeth. The research presented here was conducted on individuals from the War of 1812, battle of Stoney Creek, using tooth enamel phosphate. Previous skeletal analyses examined stature, health and disease, trauma, and age at death. However, a major issue surrounding this collection is place of origin, since virtually no records exist of who was buried on the battlefield, and archaeological evidence suggests that both British and American soldiers were interred there. Preliminary results will be presented based on known  $\delta^{18}O$  values of atmospheric precipitation.

**Cardoso, Hugo F.V. (Museu Nacional de História Natural, Lisboa, Portugal)**

*A Methodology for the Development of Univariate Sectioning Points for Skeletal Sex Determination and Their Uses in Fieldwork*

Metric methods for sex determination in adults have a high accuracy but they tend to rely on multiple measurements or specific bones such as the hip bone. Although confirmation of sex allocation is done after a more complete analysis of remains, preliminary sex determination may be necessary in the field in both forensic and archaeological contexts. The need for easy and fast sex determination in the field is frequently incompatible with fragmentary and incomplete remains. Univariate methods using a single measurement have been developed for use in these situations, but they lack statistical theoretical support. The purpose of this research is to illustrate the statistical basis of univariate methods of sex determination developed using the sum of male and female averages divided by two as a sectioning point. In addition, examples of univariate sex determination methods along with their potential use in fieldwork will be provided.

**Colquhoun, Ian C. (University of Western Ontario, London, Ontario and McMaster University, Hamilton, Ontario)**

*Seasonally Variable Fission-Fusion Social Organization in the Black Lemur (Eulemur*

*macaco macaco)*

Fission-fusion social organization (wherein primate social groups break into subgroups, reform, fission and reform again at intervals, often with membership in subgroups showing no consistent patterns), has long been recognized both in some Old World and some New World anthropoid species. Only more recently has it come to light that at least some lemuriform species also exhibit fission-fusion social organization. In this paper, I detail factors implicated in seasonally variable fission-fusion grouping in the black lemur (*Eulemur macaco macaco*). Throughout the year, larger social groups were more likely to fission into subgroups; small social groups fissioned only rarely. While subgrouping in one group increased markedly prior to the formation of two new social groups, seasonal changes in food availability and relative levels of habitat disturbance also affected the occurrence of subgrouping. A large study group that ranged in disturbed forest subgrouped most extensively during the austral winter (i.e., dry season), when fruit resources were scarce and animals relied heavily on dispersed nectar sources.

**Coyle, Cpl. Mike and Cst. Dan Almas (R.C.M.P., Missing Women Task Force)**

*The Importance of Positive Identification: The Lengths and Depths of the Vancouver Missing Women Task Force Excavation*

The purpose of this paper is to outline the importance of victim identification in a homicide investigation. The Vancouver Missing Women case demonstrates the commitment of Canadian police agencies to secure positive identifications of the victims by involving IDENT officers, osteology technicians, and forensic experts from across the country to process the largest crime scene in Canadian history. This paper describes the methods of large-scale excavation and recovery in use at this site and the potential categories of evidence that may lead to positive identifications of the victims.

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

*A Comparison of Histological Age Estimation Methods Using Ribs*

The accuracy of the Stout (1986), Stout and Paine (1992), Stout and colleagues (1994) and Cho and colleagues' (2002) histological methods of age estimation using human cortical bone are compared. Each method was applied to a sample of 26 rib thin sections of documented ages 31 to 95 years (mean age 72.6). The results indicate that Stout's (1986) method produced more accurate age estimations with a moderate correlation ( $r = 0.64$ ) to known age. The Cho and colleagues' (2002) method moderately underestimated age and the Stout and Paine (1992) method severely underestimated age with a mean difference of -32.5 years between known and predicted ages. Stout and colleagues' (1994) method presented the smallest mean difference between known and predicted ages (3.35 years); however, it also produced the largest variation around the mean ( $\pm 22.7$  years). It is recommended to use the Stout (1986) method when performing histological age estimations.

**Deane, A. S. and D. R. Begun (University of Toronto, Toronto, Ontario)**

*The Burden of Proof in Hominoid Cladistics: Individual Character Consistency Indices as*

*a Phylogenetic Measure of Confidence in Cladistic Analyses of Morphological Characters*

Although cladistic methodology is widely accepted as the standard for interpreting primate phylogeny, debate over its implementation remains. While it is demonstrated that discordant phylogenetic conclusions are the result of methodological differences and not an intrinsic shortcoming in the skeletal evidence (Deane and Begun, 2002), debate persists over the reliability of hypotheses based on morphological evidence.

The present study recommends using individual character consistency indices for evaluating competing phylogenetic hypotheses given that statistic's ability to evaluate the parsimony fit of individual synapomorphic characters. It is here demonstrated that the more parsimonious arrangement of a *Pan/Homo* clade excluding *Gorilla* is only three steps removed from a *Pan/Gorilla* clade excluding *Homo*. Although the most parsimonious clade collapses in three steps and would otherwise be considered statistically unreliable, examining the consistency indices of the synapomorphic characters supporting each clade suggests the *Pan/Homo* clade is considerably more robust than a *Pan/Gorilla* clade excluding *Homo*.

**Deane, A. S., E. P. Kremer and D. R. Begun (University of Toronto, Toronto)**  
*A New Morphometric Approach to Understanding Skeletal Curvature Using Analytical Comparison of Digitized Curvatures (ACDC)*

Diet, positional behaviour and locomotion are among the most basic ecological parameters defining a species. Certainly each of these factors has been intensely studied using a morphometric approach to better understand the relationship between the function and morphology of extant and fossil primates. One area of particular focus is the quantification of skeletal curvature.

Whereas traditional curvature indices are calculated using manual measurements, the present study is a demonstration of a new computer assisted method for calculating curvature from 2-D digitized images. This methodology is a significant improvement over traditional methods that are limited by the assumption that curvature is symmetrical. ACDC makes possible a thorough interpretation and analysis of the 'true curvature' in addition to reducing the potential for measurement error. This methodology also allows curvatures to be predicted for fragmentary specimens, thereby increasing available sample sizes. Several examples from a preliminary analysis of canine crown curvature are provided.

**Dolphin, Alexis (University of Massachusetts, Amherst, MA)**  
*Beautiful Ideals: A Biocultural Approach to the Body and its Modification*

The concept of the biocultural dialectic is often applied by physical anthropologists to questions of illness and health, and increasingly within a political economic framework (see Goodman and Leatherman 1998). While the political economic approach to understanding the interaction between biology, culture, and environment is useful, one of its disadvantages is that it has a tendency to neglect the role of individual choice and agency in constructing biologies, and in turn, social interactions on several levels.



With this paper I will explore the possibilities to taking a biocultural approach to the form of body modification known as tight-lacing, or 'extreme' corseting, as practiced today in North America and Europe. The practice of tight-lacing provides a rich example of how individual's ideals of beauty, discipline, and sexuality are deliberately enacted through the manipulation of their own biology. With the example provided by tight-lacers, it is possible to see that there are a range of motivations and actions by which individuals make choices regarding their own bodies, and that they can have a significant impact on both their biology and social experience.

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

*Piecing Together the Mortuary Program of the Ontario Middle Woodland Hopewellian Manifestation at Cameron's Point*

A bioarchaeological analysis was performed on the skeletons from Cameron's Point Mound C, a middle Woodland burial mound dated to AD 100 +/- 55. The mound is located on the north shore of Rice Lake, near Peterborough, Ontario. Past interpretation performed in the late 1960s seemed to indicate that the clear bipartite burial pattern of sub-floor semi-articulated and articulated pit burials and disarticulated fill burials was due to rank differences. The goal of this analysis was to re-examine this hypothesis through assay of the representativeness of the mound series, age/sex compositions, evidence of mortuary processing, biological measures of distance, diet, gender differences, and pathology in order to examine Cameron's Point group membership and test for possible differences in rank between the fill and sub-floor burials. A reconstruction of possible mortuary programs whose end-stage could result in this type of patterning was performed, ultimately discounting

the rank hypothesis, and increasing the understanding of Middle Woodland mortuary practices.

**Dudar, J. Christopher (Smithsonian Institution, National Museum of Natural History, Washington D.C.) and J. Brian Gilchrist (Genealogical and Archival research analyst, Etobicoke, Ontario)**

*Filling the Gaps: Osteological and Historic Records Collaboration at the Elmbank Cemetery Relocation*

Jurmain (1999:7) has remarked that historical accounts are, "usually too imprecise" to be used in diagnoses and support of determinations of behaviour from osteological data. If such is the case, should we turn our backs on this irreplaceable, but implicitly flawed, resource?

Excavation and relocation of the Elmbank cemetery, at Pearson International Airport (Toronto) in 2001, provided the opportunity for collaboration between osteological and genealogical investigators. The task of locating the next of kin to aid in the process involved painstaking searches through wills, newspaper files, civil registers, city directories, census and land records. To date, several hundred descendants have been identified, with more than 200 living relatives contacted for consultation about the relocation process. In many instances, documented causes of death and unique narratives were discovered that enriched the analysis of individual skeletal remains by providing vital testimony to the hard-



ships endured by the people buried at Elmbank. Several of these cases will be highlighted with respect to the extraordinary contribution made by the historic records findings.

Jurmain (1999:9) does acknowledge that, "Science cannot be practiced as if in an ideal world." As researchers of past societies, we cannot afford to be choosy about what is available to us. Cultural and taphonomic biases already pervade our skeletal data, yet our awareness of these limitations should not inhibit us from making the best interpretation from all sources available.

**Faulkner, Andrea and Mary S.M. Pavelka (University of Calgary, Calgary, Alberta)**

*Group Size and Social Structure of a Previously Unstudied Population of Black Howlers*

This paper reports on the size and structure of social groups of *Alouatta pigra* inhabiting a semi-evergreen secondary riverine forest along the Monkey River in southeastern Belize. *Alouatta* is among the best studied of the neotropical monkeys, however most research has focussed on 2 of the 6 recognized species (*A. palliata* and *A. seniculus*). Detailed studies of the population, ecology and behavior of *A. pigra* have only been carried out on one population within the entire geographic range of *A. pigra*. Clearly, more sites need to be surveyed to document the range of variation in density and troop size of *A. pigra* within the range of its current geographic distribution (Estrada, 2001). The Monkey River populations are the southern most to be studied, and these new data support an interpretation of considerable uniformity in *A. pigra* group size and structure despite variation in habitat and food supply.

**Folinsbee, Kaila (University of Toronto, Toronto, Ontario)**

*When is the Absence of Evidence Evidence of Absence? Palaeobiogeographic Implications of the Fossil Record at Ngorora*

There exist a number of fossil localities of middle to late Miocene age in Africa, some of which provide a good estimate of faunal diversity and evidence of vertebrate migrations between Eurasia and Africa. Ngorora is one such site, so complete it offers the opportunity to explore the significance of hominoid absence in Africa during this time (true absence or extinction, or false absence, present but not preserved). In this paper I use the vertebrate fossil remains from Ngorora and a model predicting the probability of true absence of a fossil from the palaeolandscape (Nowak et al., 2000) to challenge the notion that lack of preservation and/or habitat are the reasons no hominoid fossils have been found here. Instead, mammalian faunal sets from Ngorora tentatively corroborate the theory that hominoids became extinct in Africa during the late middle Miocene, only returning to that continent in the late Miocene.

**Garlie, Todd (University of Winnipeg, Winnipeg, Manitoba), Christopher Meiklejohn (University of Winnipeg and University of Manitoba, Winnipeg, Manitoba), Deborah C. Merrett and Christopher L.B. Lavelle (University of Manitoba, Winnipeg, Manitoba), Denise Enns (University of Alberta, Edmonton, Alberta) and Kevin Brownlee (University of Manitoba, Winnipeg, Manitoba and Historic**

**Resources, Government of Manitoba)**

***Early Dentistry or Dental Defect: Enigmatic Molar Crown Morphology in Three Boreal Forest Sites***

**Poster Paper**

Unusual first molar morphology is presented from three well-preserved skeletons recovered from the Churchill River and Burntwood River regions of northern Manitoba. These individuals, dating from the nineteenth century, were recovered from the Oto-who-win site, Threepoint Lake (GkLr-11), the Pakatawakan Bay Burial site, South Indian Lake (HgLr-3) and the Opachuaunau Lake burial site 1 (HeLv-28). Analysis shows that the mandibular molars of GkLr-11 (Individual 2) and HgLr-3 (Individual 2), present with unusually large, well-rounded pits. The maxillary molars of HgLr-3 show similar morphology to the mandibular molars but appear to be in an earlier developmental stage. A third individual, HeLv-28 (Individual 1), presents with similar pits on the mandibular first molars but again appears to be at an earlier developmental stage. Macroscopic examination of these individuals reveals completely smooth surfaces and exposed primary and secondary dentin. These pits are interpreted as secondary to carious lesions that have been cleaned out, suggesting early dental intervention in the Northern Boreal forest using non-western methods. To the authors' knowledge similar lesions have not been described elsewhere in the literature.

**Gauthier, Colette and Treena Swanston (University of Saskatchewan, Saskatoon, Saskatchewan)**

***Bones and Ball Fields: The Forgotten Cemetery of St. Vital (1879-1889)***

In October 1999, human skeletal remains were accidentally discovered near Battleford, Saskatchewan by a local farmer busy constructing a ball field for an upcoming family reunion. Preliminary archival research identified the discovery as the remnants of a cemetery once belonging to the Roman Catholic Church of St. Vital.

Established in 1878, the Mission of St. Vital was founded by the Oblates of Mary Immaculate to encourage the adoption of a Christian lifestyle by the First Nations people of the surrounding region. According to church records, 87 parishioners were interred in the St. Vital Cemetery between 1879 and 1889. For reasons yet unknown, 50 individuals were later relocated to the Town cemetery, while 37 remained in their original burial location.

The following paper will recount the discovery, excavation, and preliminary research findings concerning the cemetery of St. Vital. This collaborative research venture serves as an example of successful partnerships between multiple stakeholders in archaeological research.

**Gill-Robinson, Heather (University of Manitoba, Winnipeg, Manitoba)**

***The Art and Science of Tattoos on Mummies***

Tattoos have been found on well-preserved human remains from throughout the world. The images displayed in these tattoos range from simple lines and crosses to elaborate de-

signs with specific meanings.

Early analysis of the tattoos on mummies relied upon the visual recording of these images and occasional attempts to interpret the images through known iconography. Recent technological advances are now allowing new analysis and interpretations of the tattoos found on mummified human remains.

This paper is a brief discussion of the identification, recording, analysis and interpretation of tattoos on mummies from throughout the world.

**Glencross, B. (University of Toronto, Toronto, Ontario)**

*Patterns of Long Bone Trauma in the W.S. Webb Skeletal Sample, Indian Knoll, Kentucky*

Statistical and qualitative initiatives for the handling and interpretation of trauma in ancient populations were applied to pre-mortem long bone fracture data from the archaic period, Indian Knoll skeletal sample. Results, generated from risk of injury models and demographic analyses indicate that the long bone fractures suffered by these prehistoric foragers were infrequent events mainly affecting juveniles, young adult males and older females. That long bone fracture events appear random and unrelated also suggest a relative stability in risk across the lengthy temporal scale represented by this sample. The majority of long bone fractures are found in the forelimb and most are likely the result of unintentional injury indicating that the physical rather than the social environment was a major force behind injury. Several causes of long bone fracture are hypothesized and all reflect changing risks associated with different phases of the life cycle.

**Herring, Ann and Tina Moffat (McMaster University, Hamilton, Ontario)**

*Doing Biocultural Anthropology: Easier Said Than Done*

We are co-investigators in a transdisciplinary project, "Deconstructing the Determinants of Health in Hamilton, Ontario". The principal investigator and a number of researchers are geographers; other co-investigators are drawn from gerontology, cultural anthropology, economics, health science, and we are collaborating with a host of community partners. Physical anthropologists would describe the project as biocultural, in that we are exploring the ways in which health and wellness of residents in four Hamilton neighbourhoods are compromised or enhanced by their social and physical environments. The project has generated a wealth of information on health in our study neighbourhoods using structured and semi-structured interviews, census data, GIS distributions of environmental risks (e.g. pollution) and community assets (e.g. green space), space syntax analyses of spatial configuration, and public health indicators (e.g. SMR). We nevertheless struggle to operationalize the biocultural approach in this contemporary, urban, western setting in which differences in health and wellness are often subtle and deeply embedded within a complex ecosocial and historical framework.

**Hewitt, Barbara (University of Manitoba, Winnipeg, Manitoba)**

*Mummies in Manitoba? Initial Report on the Remains of Two Partially Mummified Sub-Adults from Western Manitoba*

No one thinks of Manitoba when they think of the number of places in the world where mummies are found. However, recently two partially mummified bodies were returned to the province, and brought to the Department of Anthropology at the University of Manitoba for examination. Both had been excavated from sites in Manitoba over the years, one in the 1930's, and the other in the late 1960's. By a stroke of extraordinary luck, large portions of the upper bodies of these two subadults retain soft tissue. Skin, hair, textiles and several types of beads are all well preserved. The distinctive silversmith marks on the silver jewelry they wore allow us to situate these burials firmly within the middle of the Fur Trade Period in Central Canada. Equally remarkable are the similarities between the burials, the artifacts recovered from each, and the individuals themselves.

This report will present initial forensic findings for both of these individuals, as well as a discussion of two other, possibly related individuals recovered nearby with strikingly similar artifact assemblages and items of adornment.

**Hoppa, Robert D. (University of Manitoba, Winnipeg, Manitoba)**  
*Testing Osteometric Applications Of 3-D Imaging Using The 3DMetrics Flash!Cam*

The use of 3D imaging technology represents a current and innovative approach to many research problems in physical anthropology. Using a camera that can take 3D pictures simplifies data gathering and creates a digital base from which to work. The use of a 3DMetrics Flash!Cam is a viable method for obtaining these 3D images. It is straightforward to use, and creating 3D models is simple with the use of their software. These digital format models will be able to reach a larger audience over the Internet and can be converted for more traditional methods of distribution including newspapers and television.

The camera is positioned 1 metre from the skull (or tip of the nose in a living subject). For each image taken, a grating image is used to determine the three dimensional measurements and a colour image is taken for texture and colour. The latter is then superimposed on of the three dimensional model to create a life like model. Software is then used to stitch multiple models together. This is done automatically when using multiple cameras imaging in tandem, or semi-automatically when using a single camera to generate a series of views.

This study explores the accuracy and reliability of morphometric analyses on computer generated models using the Flash!Cam. Implication for future research are discussed.

**Johnson, Jennifer A. (University of Toronto, Toronto, Ontario)**  
*Reading Writing and Anthropology: Results of a Survey on the Teaching of Anthropology to Ontario Elementary and Secondary School Students*  
Poster Paper

In order to make the public more aware of anthropology and to encourage the teaching of anthropological topics in schools, one must first know the present status of the teaching of anthropology in these institutions. Since formal research into the timing and course offer-

ings of anthropology in Canadian schools in the province of Ontario is lacking, a survey was conducted with students in the Introduction to Anthropology class at the University of Toronto during the Fall 2000 term. 407 surveys were completed, of which 363 respondents had been schooled in Ontario.

Results of this survey demonstrate that anthropology is finding its way into the elementary and secondary school classrooms in Ontario. However, much like previous work conducted in the United States, this survey found that the majority of anthropological information in Ontario is discussed in upper level secondary school courses, such as, History, Contemporary Studies, and Biology. As a result, students are not always aware that the topics that intrigue them are in fact anthropological in nature. By further developing the role of anthropology in elementary and secondary schools, education will be improved and the public will become more familiar with anthropology and its practitioners.

**Jones, J.L. (University of Massachusetts, Amherst, MA), A.H. Goodman, J. Reid and D. Amarasiriwardena (Hampshire College, Amherst, MA), M.E. Mack (Howard University, Washington D.C.) and M.L. Blakey (College of William and Mary, Williamsburg, VA)**

*The Teeth that Bind: Estimating African Natality at the New York African Burial Ground by Elemental Signature Analysis*

This paper discusses an initial attempt at estimating natal geography, specifically New World versus African born, from skeletal remains of colonial era Africans and African Americans through laser ablation inductively coupled plasma mass spectrometry (LA ICP-MS) elemental signature analysis (ESA). ESA, as used for this study, is a semi-quantitative method for determining the relative relatedness of individuals based on multiple element concentrations, applied here for the first time to human dentitions. Samples included culturally modified and non-modified teeth excavated from the 18<sup>th</sup> century New York African Burial Ground (ABG). Since teeth develop during known chronological ranges, it is possible to estimate different natal environments, migration patterns and/or occupational exposure patterns based on differential ratios.

Implicit in this study is a test of Handler's (1994) conclusion, based largely on ethnohistorical data, that dental modification was not practiced in the Americas and thus serves as a bioarchaeological marker of African natality. Indeed, results of ESA of first permanent molars from 14 modified adults and 19 non-modified subadults suggest that skeletal remains with modified dentitions are elementally distinct and likely those of natal Africans. Further, relatively high levels of lead may be a specific signature indicator of non-African natality. Notable exceptions, however, underscore the need for methodological refinement and the possibility that some degree of tooth modification was practiced in the Americas. ESA data is therefore presented in the context of artifactual and cultural data. This research underscores the potential of ESA for bioarchaeology and the benefits of a biocultural approach to life history reconstruction.

**Katzmarzyk, Peter T. (Queen's University, Kingston, Ontario)**  
*Temporal Trends in Obesity in Canada: An Emerging Epidemic*

Several recent studies have documented an increase in the prevalence of obesity in Canada over the past couple of decades, and this increase parallels the increases observed in other developed nations. Obesity is a complex condition that results from a chronic energy imbalance where energy intake exceeds energy expenditure; however, there is currently debate as to whether the current obesity epidemic is primarily the result of decreased energy expenditure or increased dietary energy intake. It is likely that the observed increases are the result of a combination of both decreased physical activity levels and increased energy intake in the population, coupled with a high prevalence of people that are genetically susceptible to weight gain. The high prevalence of obesity is placing a significant burden on the health care system and is thus a public health priority. Aggressive public health campaigns are required to slow or reverse the recent temporal trends in obesity in Canada.

**Keenleyside, Anne (Trent University, Peterborough, Ontario)**

*Teaching Physical Anthropology: A Workshop on Teaching Strategies and Tricks of the Trade*

Teaching is often a neglected part of what we, as academics, do. As most students don't take anthropology in high school, they are exposed to anthropology for the first time at the university level. Their first exposure to the subject and how it is taught is therefore critical if they are to pursue further studies in the discipline. This workshop will present strategies for teaching physical anthropology. Strategies that can be used for both introductory level courses and upper level courses will be presented and will include activity-based, arts-based, cooperative learning, direct instruction, independent learning, inquiry and research, and critical thinking strategies. Some discussion of Howard Gardner's theory of multiple intelligences and the need to adopt teaching strategies that reflect the different ways in which students learn will be included.

**Kivell, Tracy L. (University of Toronto, Toronto, Ontario)**

*Reevaluation of Oreopithecus Positional Repertoire*

The recently resurrected hypothesis that *Oreopithecus bambolii* is a habitual biped is refuted via analysis of functional morphology and trabecular architecture. Numerous features of the postcrania, particularly those of the vertebrae, pelvis, femur and foot, posited to be adaptations for bipedality in *Oreopithecus* can also be found in highly suspensory mammals (Wunderlich *et al* 1997). Examination of convergent morphology in *Oreopithecus*, sloths and Malagasy "sloth lemurs" do not support the suggestion that the morphology of this late Miocene hominoid is necessarily indicative of habitual terrestrial bipedality. This is substantiated by preliminary analysis of sloth iliac trabecular architecture. Analogous cancellous structures in *Oreopithecus* and *Choloepus* challenge previous analyses that *Oreopithecus* displays human-like mechanical loading of the pelvis. Thus, examination of the entire *Oreopithecus* skeletal morphology, palaeoenvironment and convergent morphological and trabecular features with highly suspensory mammals imply that this hominoid is also highly suspensory, and likely slow-moving.

**Latham, J. and T. Moffat (McMaster University, Hamilton, Ontario)**

*Beyond Tim Hortons: The Availability and Affordability of Food in Hamilton, Ontario*

Abundant evidence shows that a diet high in fat, cholesterol, and sugar can lead to overweight and obesity, which are risk factors for cardiovascular disease and diabetes. Relative to the rest of the population, lower-income people are at a higher risk of these diseases. Nutritionists have long advocated diets high in whole grains, fruits, and vegetables and low in saturated fats to reduce the incidence of nutrition-related disease. Evidence from England and Scotland (Mooney 1990; Sooman et al. 1993) suggests that food pricing can be a barrier to selecting healthier foods. This study investigated food stores in two socioeconomically contrasting areas of Hamilton, Ontario, to ascertain whether food pricing presents a barrier to choosing a healthy diet. Preliminary results suggest that food in general is more expensive in the more affluent neighbourhood, and that a price disincentive to eat healthy food exists in both lower and higher-income neighbourhoods.

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

*On the Right Metacarpal of God: A Pollical Parable of Sinister Symmetry, Dexterously Delved*

The study of laterality from the perspective of skeletal biology must accommodate two distinct but overlapping asymmetries. Fluctuating asymmetry (FA) as a consequence of intrinsic (genetic) or extrinsic (environmental) stress occurs as a developmental departure from symmetry without bias as to side. Directional asymmetry (DA) represents a behavioural departure from symmetry favoring the side experiencing the greater functional strain. Neither asymmetry is uniform within the organism (i.e., dental FA may be less than skeletal FA; metacarpal DA should logically exceed metatarsal DA). However an argument can be made that apportioning FA and DA within single structures (i.e., a metacarpal) affords an opportunity to assess the relative contribution of each to an observed 'right-left' difference in behaviourally-mediated morphology. Here it is proposed that one way to approach this task is to assess asymmetry in ontogenetically constrained versus labile traits. Asymmetry in the former should reflect FA exclusively, as they must be resistant to behavioural modification in order to maintain anatomical integrity, while the latter will reflect both FA and DA. In skeletal elements, articular dimensions are considered to be constrained, and diaphyseal dimensions labile (Lieberman et al. (2001) *Am. J. Phys. Anthropol.* 116: 266-277). A test of the model using data from the second metacarpal is presented.

**Lovell, Nancy C. (University of Alberta, Edmonton, Alberta)**

*A Mortuary Enigma at Ancient Mendes, Egypt*  
Poster Paper

Adjacent to the main cemetery mound at Kom el-Adhem, Mendes (Lower Egypt) is a mass grave containing the remains of both adults and children, which lie in disarray and exhibit considerable variation in compass orientation and arrangement of the body. Three possible explanations for the mass grave are considered in this paper: 1) traumatic death at the



hands of enemies/invaders and abandonment of the bodies where they fell; 2) hasty disposal of the dead due to disease; and 3) irreverent disposal of disenfranchised members of the local society. A number of individual, social, and cultural factors that influence disposal of the dead are considered in the interpretation of these mortuary remains, and, given the temporal and functional attributes of the site, explanations 2) and 3) above are deemed the most probable.

**Luukkonen, Paul (University of Toronto, Toronto, Ontario), Vera Tiesler-Blos (Autonomous University of Yucatan, Merida, Mexico), Arlene Lahti, Carney Matheson and J.E. Molto (Lakehead University, Thunder Bay, Ontario)**  
*Who's Who at Calakmul? A mtDNA Feasibility Study of Skeletal Remains from an Ancient Population of Campeche, Mexico*  
**Poster Paper**

Ancient DNA was recovered from skeletal remains of the ancient Mayan site Calakmul (Campeche, Mexico). The mitochondrial analysis of bones from ancient populations enables the identification of maternally related individuals. This type of study provides evidence of biological relationships. When examined in their depositional context these relationships allow various hypotheses of social structure to be tested. This includes insight into the nature of mortuary patterns and other cultural practices. The patterns of biological relationships established by molecular data can be used to generate and to test existing interpretations about settlement patterns, inter-regional affiliations and the movement of peoples.

Mitochondrial sequences including the hypervariable regions one and two (HV I and HV II) were identified from a number of individuals. Ancient DNA from Calakmul can be amplified and utilized in identifying matrilineages of past populations. The comparison of individuals allows for the identification of maternal relatives and provides valuable insight into population patterns of a given site or region.

**Madden, G.D. (University of Nevada, Las Vegas, AZ)**  
*Misplaced Mummies: Employment of Non-Destructive Methods for Documentation*

As concerns regarding indigenous peoples have come to reshape the handling and disposition of human remains, it has become apparent to collections managers that poorly maintained documentation is now a major issue. While efforts are being made to improve not only the overall system of documentation, but also that of specific individuals, it is evident that in the case of mummified human remains there is no guide or process to follow. A study of 13 mummified human remains, curated at the University of Nevada, Las Vegas, has been designed as a guide to non-destructive examination for documentation purposes. This guide takes indigenous beliefs into consideration while continuing to be scientific in nature. Based on the guidelines developed, over half of the sample population has been identified, each of which were previously of unknown origin, age, sex or antiquity.

**Martin, R, A.J. Nelson, M. Beisinger and S.J. Naftel (University of Western Ontario, London, Ontario), I.M. Kempson and W.M. Skinner (University of South**

**Australia, Adelaide, Australia)**

***Mechanisms for the Accumulation of Metals in Human Hair from an Archeological Context: Studies Using Ultra-Trace Analysis***

Recent advances in analytical instrumentation including Ultra-Trace Inductively Coupled Plasma Mass Spectroscopy (ICP/MS), X-ray Photoelectron Spectroscopy (XPS), Scanning Electron Microscopy with Energy-Dispersive X-ray Spectroscopy (SEM/EDX), Time of Flight Secondary Ion Mass Spectroscopy (ToF-SIMS), and Synchrotron Radiation Analysis (SRA) have made possible the quantitative measurement of trace elements in very small samples of human hair. In addition, these techniques, when used together, provide an indication of both the spatial distribution and chemical state of each element in the sample. We have employed these techniques to examine the metal content of selected ancient hair samples and have compared them to modern hair including samples exposed to flowing steam water. The results are consistent with oxidative degradation of the hair followed by three principle modes of metal exchange with the environment. These include: a simple ion exchange mechanism, precipitation of water-borne aluminosilicates and colonization of the hair surface by microorganisms. The latter are a significant source of metals in the hair samples. A more complete understanding of these mechanisms will lead to a better understanding of post-depositional diagenesis.

**Matheson, C.D. (Lakehead University, Thunder Bay, Ontario)**

***DNA from Mummified Remains***

There have been numerous reports of DNA recovery from mummified material. Even the first few studies on ancient DNA included the analysis of mummified tissue. Some of these studies have been placed into controversy based on the authenticity of the results and debate as to whether DNA can be recovered from mummified tissue at all. There are a number of issues of preservation and recovery, which will affect the analysis of mummified tissue. These have to be understood before success will be achieved with the extraction of DNA from this type of material. A number of examples of extraction of DNA from various types of mummified material will be provided to illustrate these problems associated with the recovery of DNA. These will include naturally preserved mummies, bog bodies and human made mummies both recent and ancient.

**Matthews, Julianna (University of Western Ontario, London, Ontario)**

***The Relationship Between Molar Wear and Caries Frequency in Two Postclassic Maya Skeletal Populations***

Pits and fissures on the occlusal surface of molars provide an ideal environment for the development of carious lesions, with the composition of diet acting as a significant determinant in this process. A second modifier of the occlusal surface of molars is wear, a process that gradually removes enamel, obliterating pits and fissures. Wear alters the morphology that contributes to the production of caries, and in previous analyses wear and caries frequency have been both positively and negatively correlated. This study evaluates the dental remains from two Postclassic Maya sites, Marco Gonzalez and San Pedro, in order to examine the above relationship. Dental wear was quantified using crown height measure-

ments, and the frequency of occlusal caries was evaluated via macroscopic observation. Preliminary results will be presented, and will include comparisons by site, sex, arcade, and tooth position. Interpretation of these results will incorporate current knowledge of diet for these populations.

**Maxwell, Jay (University of Western Ontario, London, Ontario)**

*Addressing Issues of Selective Mortality in Skeletal Populations Using Indicators of Iron Deficiency Anemia*

Pathological changes in the skeleton have often been used by bioarchaeologists to interpret general levels of stress in past populations. The validity of using such indicators is problematic due to unproven assumptions linking skeletal disease to overall health. Due to their inherent nature, lesions related to iron deficiency anemia may present an opportunity to overcome some of these problems. This study uses the incomplete obliteration of anemic lesions during healing and their inability to newly form in adulthood to clarify interpretations of morbidity, mortality and survivorship in several different Maya populations. Results suggest that by comparing adult and sub-adult lesion frequencies, basic generalizations regarding anemia's relative contribution to morbidity and mortality can be attempted. Further analysis using supporting bioarchaeological information regarding more specific etiological causes of anemia can then also be used to interpret temporal and spatial differences in health between populations.

**McEwan, Jan, Simon Mays and Terry Riauka (University of Alberta, Edmonton, Alberta)**

*Quantification of Bone Mineral Content in Archaeological Bone*  
Poster Paper

This study is part of an ongoing investigation of osteoporosis in skeletal remains in the medieval population of Wharram Percy, England. It is a pilot project evaluating the efficacy of digital X-ray to examine bone density. 10 age matched radii (5F, 5M) from a previous DXA study were used. Each bone was x-rayed with both conventional and digital units with a graduated aluminum standard as reference. Conventional x-rays were digitized. Bone density was calculated for digital and digitized data and compared with DXA measurements previously reported. Results indicate digital and digitized images are quantitatively comparable and similar to DXA. Digitization of x-rays may be an efficient, convenient and accurate investigation of osteoporosis in archaeological bone.

**McKenzie, Laura and Mary S.M. Pavelka (University of Calgary, Calgary, Alberta)**

*Population Reduction and Social Disorganization in Black Howlers (*Alouatta pigra*) Following a Hurricane*

The opportunity to study the effects of a powerful hurricane on monkey populations, diet, and behaviour was presented when hurricane Iris virtually destroyed the forest along Monkey River in southern Belize on October 8 2001. A 52 hectare area in which black

howlers have been under study since 1999 was directly in the path of the hurricane, resulting in a unique opportunity to study the effects of a hurricane by comparing pre- and post-hurricane data and observations. This paper reports on the effect of the hurricane on the monkey population and behaviour. Prior to the hurricane, 8 social groups, averaging 6.37 members, had been stable in both group composition and range for at least 2 years. The hurricane, which levelled much of the forest, resulted in the complete loss of the forest canopy. The trees that remained standing lost most or all branches and were 100% defoliated. The monkey population in the study area was reduced by 42%, and surviving animals experienced a period of extended social disorganization involving transient individuals, high numbers of solitary monkeys, and small fragmentary social groups. The period of disorganization lasted 12 weeks, after which we found a reduction in the number of solitaries and an increase in the stability of large groups. Within the study area, 5 social groups have been more or less stable in composition since approximately week 15, however home ranges had yet to stabilize at week 35. Post-hurricane diet was limited to fruit and leaves remaining in the deadfall for the first 2 weeks and to new leaves and leaf buds for many weeks after that. Normal fruit consumption in April and May was prevented this year by the failure of surviving trees to produce fruit. With the loss of forest canopy there has been increased use of low foliage and ground travel, and with the reduction in population density there has been a reduction in vocalization frequency.

**Milner, Jillian A.; Warren Wilson (University of Calgary)**

*Weaning Practices of the Makushi of Guyana and Their Relation to Health and Growth: A Preliminary Assessment of International Recommendations*

The purpose of this investigation was twofold: First, to assess the relationships between the age at weaning and the subsequent health and growth of Makushi infants and children. Second, to then determine the applicability of the World Health Organization's international recommendations of exclusive breastfeeding up to (about) six months of age to this particular population. Weaning is defined here as the cessation of exclusive breastfeeding. A younger weaning age of less than six months was expected to compromise both health and growth. Measures of infant mortality and rates of growth faltering were used to determine the effects of variable weaning ages by village ( $n=9$  villages). Analysis indicated that age at weaning does not appear to have a straightforward correlation with either infant mortality or growth faltering. Village-specific analyses are variable and highlight the importance of using a biocultural approach to understanding infant feeding practices. These results suggest that further research is needed to assess the applicability of WHO guidelines.

**Nargollwalla, M. (University of Toronto, Toronto, Ontario) and Erksin Güleç (University of Ankara, Turkey)**

*Site Formation and Taphonomy at Çandır: A Geographic Information Systems Approach*

Currently, Geographic Information Systems (GIS) are widely used in each of the sub-disciplines of Anthropology. In Paleoanthropology, GIS have been used both for the 3- and 4-dimensional geographical mapping of fossil localities, in addition to the presentation and quantification of skeletal and dental morphology. In this study, GIS is used to recon-

struct aspects of the paleoenvironment at the Miocene fossil hominoid localities of Çandır (Central Turkey) in order to identify and evaluate the taphonomic processes influencing site formation. Using this technique, the Çandır excavations are modelled in 3- and 4-dimension, which facilitate paleoecological analysis and the identification of relationships between various data types. This method, in addition to further taphonomic analysis of the locality suggest that the hominoid primate recovered from Çandır, *Griphopithecus alpani*, may have been sampled from a different ecosystem and deposited at Çandır by fossil carnivores. These findings have important implications when interpreting the paleoecology of the area.

**Nash, Jennifer L. (University of Western Ontario, London, Ontario)**

*Accounting for Variability in Musculoskeletal Stress Marker (MSM) Studies: The Effects of Body Height, Robusticity, and Population Characteristics on Enthesial Development*

MSMs have been extensively explored for their potential to infer habitual activity patterns. Some studies, however, have revealed variation in MSMs that does not seem to be correlated with activity. It has been suggested that MSM development may be affected by factors other than activity, namely, age and sex. This study explores the effect of body height, robusticity, and population characteristics on MSM size. It is hoped that knowledge of how MSM size is influenced by factors independent of activity will allow some of the MSM variation to be accounted for, thereby clarifying the observed patterns.

Upper and lower limb MSM size is correlated with body height, robusticity, and population affiliation. Preliminary results indicate that MSM development is inversely correlated with body height and robusticity, suggesting that larger individuals naturally exhibit smaller MSMs. These correlations may prove crucial for conclusions about habitual activity patterns obtained from MSM data.

**Parish, Joseph M. (University of Missouri, Columbia, MO)**

*The Necessity of an Holistic Biocultural Approach to Epidemiologic Studies in Anthropology*

For the last 20 years or so departments have been debating whether to split along physical and cultural lines. This debate comes in an age when the buzzword "multidisciplinary" describes the atmosphere of cash-strapped universities of the 21<sup>st</sup> century. Holism is one of the first terms we discover in our introductory anthropology classes. It is the force that binds the four subdisciplines of anthropology into a cohesive whole. This paper draws on my own experiences with how anthropology is perceived by the "hard" sciences to discuss how I view the place of this holism in my own work and the work of many of my mentors. I believe the root of this is what we have come to call a biocultural approach. I will emphasise the need for this type of approach in any epidemiologic study undertaken within anthropology.

**Peckmann, Tanya (University of Cape Town Medical School, South Africa)**  
*Dialogues with the Dead: An Osteological Analysis of the Palaeodemography and Life History of the 18<sup>th</sup> and 19<sup>th</sup> Century Northern Frontier in South Africa*

Osteological, dental, and molecular analyses were conducted on remains from seven historical archaeological sites within South Africa. This project combined the physical anthropological evidence with historical documentation (written and oral) and cultural materials to provide a context in which to view the data and provide answers to the question, 'what was life like for these people during this time?' The emphasis was on the collection of lifestyle data for the purpose of adding to the unwritten history of indigenous South Africans and to give voice to a once forgotten group of peoples.

**Petersen, Peter**  
*Facial Reconstruction Using Clay and Other Techniques*

The intricate volume and proportions of the human skull give people their facial looks. Human flesh in different, but predictable, thicknesses is simply draped, grown, on top of the skull. About 40 locations on the skull have been identified as important for reconstructions and facial measurements. The distances from the bone-surface to the skin surface in those locations has been recorded. Tissue-depth data have been collected over many years and provide the foundation for this technology. Of course, statistical data can't give the correct measurement for one individual but in most cases the data will give a useful indicator for the location of the life skin surface. Connect the three-dimensional locations of the surface markers, work on the three-dimensional reality of the human head and you got an image of a face you don't know. Hopefully someone will recognize the reconstructed image and maybe identity can be established. The talk deals with problems of this theory, the use of the techniques, the requirements for the forensic artist, technical notes and finally my own experience.

**Philips, Shawn (Indiana State University, Terre Haute, Indiana)**  
*Document dilemmas: Reconciling contradictions in historical bioarchaeology*

This paper addresses a variety of the kinds of contradictions and frictions that can exist between documentary and osteological data. Case studies are presented in order to address issues of context, data reliability, and the interpretive leaps necessary when merging humanistic and scientific methods for analysis. Methods for reconciling such contradiction are proposed as well. One such method is an expansion of the biocultural approach. For example, if bioarchaeologists more fully developed a research program for how to incorporate the cultural component of the biocultural model, many of the frictions between the two data sources could be ameliorated.

**Prowse, Tracy (McMaster University, Hamilton, Ontario)**  
*Concordance Between Dental Pathology and Isotopic Evidence for Weaning*

Isotopic analysis of the subadults from the Roman Imperial site of Isola Sacra (ca. 1<sup>st</sup> – 3<sup>rd</sup>

centuries AD) indicates that the weaning process started early, as young as 6 months of age, and was completed by approximately 2 years of age. This study examines the correlation between this isotopic evidence and the prevalence of dental calculus, caries, and tooth wear in the deciduous dentition. Dental health data was collected from a total of 78 individuals aged between 1 and 12 years. The paper considers the possible masticatory and non-masticatory behaviors of Roman children that may explain the patterns observed, particularly the age at which caries and calculus start to appear, and the extensive tooth wear observed.

**Rogers, Tracy (University of Toronto, Toronto, Ontario)**  
*Levels of Certainty in Positive Identification*

Positive identification of unknown human remains is often viewed in terms of a dichotomy in which either the remains are person X, or they are not. In practice, establishing a positive identification is a process involving the accumulation of consistencies observed between an individual's ante-mortem records and the post-mortem characteristics of the deceased. The process continues until a threshold of evidence is attained, or a single unexplainable inconsistency is observed and positive identification is precluded. The threshold of acceptance varies depending on the purpose the identification will serve. Levels of certainty range from subjective phrases, such as "most likely" in archaeological and historic cases, to statements of probability in criminal cases. This paper discusses skeletal methods of establishing positive identification in terms of three levels of certainty, drawing on examples presented in this session.

**Rudzik, Alanna (University of Toronto, Toronto, Ontario)**  
*Patient Satisfaction and Confidence in Public Health Care, Republic of Trinidad and Tobago*  
**Poster Paper**

A preliminary study of patient satisfaction and confidence in public Primary Health Care services was conducted in Trinidad and Tobago, to examine two main research questions.

1) What is the demographic composition of the PHC population? 2) Is satisfaction with health care services constant across all demographic groups? Data was collected from 280 individuals, using a purpose-designed questionnaire. Data analysis was performed using SPSS. The data show that the majority of the PHC population comes from disadvantaged demographic groups in Trinidad. Satisfaction was not constant through all demographic groups; younger patients, patients with higher monthly income, and patients who visited the private medical system expressed less satisfaction with health care services. The reliability of satisfaction information collected from patients, when using standard satisfaction study methodology, is questioned. Alternate methods of health service evaluation, such as objective recording of processes of care, should be used to supplement patient satisfaction surveys.

**Saj, Tania L. and Pascale Sicotte (University of Calgary, Alberta)**  
*A Case Study of Male-takeover and Male Provocation Among the Geoffroy's Pied Colobus*



*(Colobus vellerosus) at Boabeng-Fiema, Ghana*

Among some colobine species, both intergroup encounters between bisexual groups and those occurring when only males encounter a bisexual group occur. The latter males can be solitary or in an all-male group, or may have left their group temporarily to provoke a bisexual unit ('male provocation' *sensu* Steenbeek 1999). These encounters can lead to group-takeovers. In this paper, we describe the effects of a male takeover by an all-male group on the social dynamics of a bisexual group of *Colobus vellerosus*. We also discuss the influence of a 'male provocation' by the same males on an extra-group female's transfer into this group. From January to August 2001, T.S. collected focal data on a small *vellerosus* group ( $n = 8$ ; consisting of 1 male, 3 females, 4 immatures) during 4-day follows at Boabeng-Fiema, Ghana. Observation days were grouped into pre-takeover (P1: 22 days) and two post-takeover periods (P2: 14 days, P3: 33 days). The distinct pre and post-takeover social dynamics, such as the high rate of agonism (initiated mostly by the new males), the high rate of copulations between the resident females and new males, the infanticide attempts by the new males on the youngest immature, and the change (decline) in status of the resident male, clearly show that the new males were highly motivated to join the group to gain access to females. Of interest is also the timing of the female's transfer into the study group, which coincided with a male provocation of her group initiated by 2 of the new males. The characteristics of her transfer offers support to the Sterck *et al.* (1997) hypothesis that male protection (or lack of) may influence female dispersal in Dispersing Egalitarian species. Finally, we also present information about the social structure of this group one year after the takeover.

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

*Breastfeeding in the Time of Great Social Change: A Case Study of Gibraltarian Women (1960-1996)*

Between the period 1960 to 1996, Gibraltarian women ( $N > 1000$ ) modified their feeding behaviour of infants during a period of great social change. As a significant number of women entered the work force in 1970 following the border closure with Spain, the proportion of primiparous women breastfeeding their children fell dramatically. The only exception to this rule were women who were married to professionals and the wealthy. Using a technique by Fleiss, statistical analysis confirmed this trend as well as the emergence of class differentials in breast feeding practices. Factors responsible for the observed temporal trends in feeding behaviour are discussed.

Sawchuk, Larry, Stacie D.A. Burke, Leah Walz and Janet Padiak (University of Toronto, Toronto, Ontario)

*Two Different Worlds: Infant Mortality as a Proxy Measure of the Health Experience in the Maltese Islands*

Infant and childhood mortality data, collected from 1903-1938 for the Maltese Islands, a British colony located in the central Mediterranean, are employed as proxy measures of the health experience of the inhabitants of the various communities of Malta. Strikingly high Infant Mortality Rates (IMR) persisted in Malta for decades after significant im-

provements were realized in other countries – a matter of great concern to a string of Chief Medical Officers in Malta. The average IMR remained over 200 per thousand live births for all but 1919, averaging 263.9 for the years examined, and reaching as high as 330.1 in 1931. One notable community, Asciak/Ghaxaq showed an average, outlying, value of 426.51 infant deaths per thousand live births. Analyses combining data from available health reports and census returns was undertaken, including linear regression and analysis of variance (ANOVA) tests. District (urban+suburban/rural) was determined to be a significant factor in the variability in IMR, with rural communities demonstrating higher infant mortality rates, particularly in 1931 (p-values for 1911, 1921, and 1931 were 0.044, 0.002, and 0.000 respectively). This paper examines possible explanations for the elevated rates of infant and childhood death in Malta and explores patterns and disparities in infant and childhood death amongst the communities of Malta, touching on issues of sanitary practices, crowding, sewage, availability of uncontaminated water, and the treatment of infants.

**Schillaci, Michael A. (University of Washington, Seattle, Washington)**

*A Morphometric and Radiographic Study of the Effects of Hybridization on Patterns of Craniofacial Growth Allometry Among the Macaques of Sulawesi*

The goal of the present research was to investigate the effects of hybridization on patterns of craniofacial growth allometry among macaque species from Sulawesi, Indonesia using external and radiographic measurement data obtained from wild and pet animals. Measurement variables were chosen to quantify anteroposterior, vertical, and horizontal growth trajectories of the macaque craniofacial skeleton. Regression parameters including slope and intercept were generated for each of ten craniofacial variables, and one body measurement for males and females. Both least-squares (LS) and reduced major axis (RMA) regression were used. Because the age of each animal was unknown, body weight was used as a proxy measure of chronometric age. Differences between hybrids and their parental taxa in LS regression parameters were assessed using a generalized analysis of covariance (ANCOVA) model allowing unequal slopes. Differences between hybrid samples and the average of their parental species was assessed using a t-test, and interpreted using a model of allometric heterochrony. The results of this analysis indicate a hybrid pattern of craniofacial growth allometry characterized by increased growth rates and late growth onset when compared to the parental averages for most variables describing all three growth trajectories. The pattern of increased hybrid growth rates was interpreted as growth heterosis stemming from increased heterozygosity due to hybridization. Significant ANCOVA comparisons of slope and intercept values between Sulawesi macaque hybrids and their interfertile/interbreeding parental taxa brings into question the taxonomic significance of recently observed ontogenetic divergence between Neanderthals and Upper Paleolithic modern humans in Europe.

**Sicotte, Pascale (University of Calgary, Calgary, Alberta)**

*Flexibility in residence pattern in primates that "should be" female-resident; what mechanisms can we invoke?*

Since Moore wrote his seminal paper in 1984 on female transfer in primates, few reviews

on whether or not there is a true dichotomy between female-resident species and female-transfer species in primates have been done. The most recent comprehensive model of female social relationships (Sterck et al. 1997) still takes the view that in most cases, the dichotomy will hold, whether it is because of phylogenetic inertia (Di Fiore and Randall 1994) or because once female alliances have developed to defend resources, loss of these alliances via transfer is costly. In what was traditionally considered "Female-bonded" species (i.e. Resident-Nepotistic in Sterck et al. 1997's model), one should then expect very few female transfer. In "Resident-Egalitarian" species, the situation is not so clear, however. Several species belonging to this category, particularly species of the sub-family Colobinae, have been reported to exhibit at least some female transfer. What are the conditions under which a RE social system can evolve, and under which conditions could "some" female transfer take place? I review some ecological and social conditions that could explain the occurrence of "some" female transfer in RE species, evaluate to what extent they are matched in species known or suspected to be RE (in particular in the black and white colobus) and outline avenues for research in this area.

**Sitchon, M. (University of Manitoba, Winnipeg, Manitoba)**  
*Going Digital: Age Estimation from the Pubic Symphysis Using Digital Images*

Recent technological developments in image processing to a digital format have facilitated the rapid transmission of photographic information over long distances via Internet based networks. In addition, digital images have increased the efficiency of storing visual information into user-friendly databases. The ability to store photographs into a viable and compact format offers new possibilities in the area of skeletal age estimation. For instance, images of skeletal features can be shared and stored in a digital form resulting in an efficient and economical alternative to 35mm photography.

This study examines the potential application of digital photography for age estimation purposes through the analysis of images of the pubic symphyseal surface. Age estimates obtained from digital images of individuals from the Grant known age collection are compared with estimates recorded during contact with the actual sample. Initial results demonstrate that an analysis of a digital image of the pubic symphysis is equally successful as traditional observation in producing age at death estimates closer to actual age.

**Sitchon M., R.D. Hoppa (University of Manitoba, Winnipeg, Manitoba) and S.R. Saunders (McMaster University, Hamilton, Ontario)**  
*A Test of the Milner-Boldsen Method and Transition Analysis on Known Age Modern and Archaeological Pubes*

Boldsen and colleagues (2002) have recently published a new method of adult age at death estimation. This technique, known as the Transition Analysis or Milner-Boldsen method, combines new osteological scoring methods for the adult cranium and pelvis, with a new statistical approach to combining this information into an estimate of age at death, including confidence intervals. Age estimates are based on the transition of age related morphological changes that occur in several distinct components of a particular skeletal structure.

Inferences regarding age at death are determined through the combination of component scores from one or more skeletal structures. The authors argue that the component approach is superior to more common type-cast approaches, as the method can accommodate incomplete data, as might be found in partially preserved elements.

This study evaluates the Transition Analysis method in determining age at death from the pubic symphyses of 105 individuals from a modern skeletal collection and 19 individuals from a nineteenth century Canadian pioneer cemetery. The results suggest that the Transition Analysis method proved to be more successful in providing age at death estimates closer to actual age for the modern sample. In addition, the Transition Analysis method captured age related morphological changes in older individuals better than other widely utilized pubic symphyseal aging techniques.

**Skinner, Matt (George Washington University, Washington D.C.)**  
*Age-Related Changes to the Intervertebral Discs of the Human Sacrum*  
**Poster Paper**

While investigations into the phylogeny, ontogeny, and comparative external morphology of the modern human sacrum exist, similar studies of the *internal* morphology of the modern human sacrum are few. This project investigates age-related changes to the intervertebral discs sealed within the modern human sacrum. Specifically, it tests the hypothesis that, if sacral intervertebral discs are not functional, the results of disuse, such as poor nutrition, will result in resorptive remodeling leading to an age-related decrease in disc size.

Quantitative analyses of sacral intervertebral disc size were performed on a sample of sagittally-sectioned sacra ( $n = 63$ ) that was divided into two age classes:  $<80$  years and  $\geq 80$  years. Each sectioned intervertebral disc (referred to as disc classes D1, D2, D3 and D4 moving cranio-caudally) was digitally photographed and disc size was measured as cross-sectional area using a digital image analysis program.

Results demonstrate a significant decrease in the mean cross-sectional area of D2 individually and D2, D3, and D4 collectively between the two age classes ( $p < 0.05$ ), but no similar change in the size of D1. The results of this preliminary study support the hypothesis that there is both age-related resorption of inferior sacral intervertebral discs, as well as the biomechanical maintenance of the superior disc. The implications of these results for understanding the phylogeny and intraspecific variation in the hominoid sacrum will be discussed.

**Snarr, Kymberley A. (University of Toronto, Toronto, Ontario)**  
*Howlers (*Alouatta palliata*) on the north coast Honduras*

There have been no long term studies of howlers (*Alouatta palliata*) in Honduras and little is known about their presence in the protected and unprotected areas. The presence and abundance of howlers in eight protected areas and the unprotected areas between them was investigated through survey work. Data were collected via investigational field trips, key informant interviews, semi-structured interviews and focus groups with local people.

An examination of the ecological and cultural factors affecting the presence of howlers will be discussed. Comparison of these data to other data from conspecifics in Central America will be made. Data presented in this paper is a small subset of data gathered for an ongoing larger project initiated in February 2000 which is examining howlers living in a fragmented low and wet and mangrove forest on the north coast of Honduras.

**So, Joseph K. (Trent University, Peterborough, Ontario)**

*Doing Biocultural Anthropology: The View from Cross-Cultural Mental Health*

Biological anthropologists involved in research in a medical setting have historically neglected the role of sociocultural and other behavioural variables and their influences on health status. The research designs in biological anthropology were framed to achieve measurable outcomes that were essentially biological, quantitative and positivistic in nature. As a result, research in mental health has been largely bypassed in favour of physical health, in part due to the western conception of the Cartesian mind-body dichotomy that has limited the domain of research in the biological sciences including biological anthropology. This paper argues in favour of extending the mandate of biological anthropology research to include the area of mental health, and to include research designs that measure non-biological outcomes. These arguments are illustrated by using previous studies of depression (1998) and anxiety (2000) levels among Chinese, Vietnamese, Korean, and Cambodian ethnocultural communities in the Greater Toronto Area, and in a newly initiated study on the effectiveness of mental health service interventions for clients from the four ethnocultural communities in the GTA. The strengths and weaknesses of biological anthropologists participating in mental health studies are explored.

**Spence, Michael W. (University of Western Ontario, London, Ontario)**

*The Felon and the Phrenologist: The Forensic Identification of an Executed Felon*

A case from London, Ontario, is used to illustrate some of the potential and problems in the application of forensic procedures to historic questions. A human cranium was found among the belongings of a London heritage home donated to the city as a museum. Family lore and a study by a local historian indicate that it is the skull of Cornelius Burley, hanged in London in 1830 for murder. However, there are some major problems with this account, not least among them the lack of any independent verification of the skull's identity. A forensic analysis of the cranium and a further study of the historic data suggest that the account is substantially correct, though some aspects of it require revision.

**Strong, Christopher A. and Susan Pfeiffer (University of Toronto, Toronto, Ontario)**

*Human Dental Size Reduction: A Comparison of Middle and Later Stone Age Mandibular Molars*

Comparisons of Middle and Later Stone Age peoples of Southern Africa advance our understanding of the evolution of *Homo sapiens*. In this study, the permanent molar crowns of 42 individuals from the Later Stone Age of South Africa were measured. The mandibu-

lar molar measurements from these Later Stone Age foragers are compared with those of 10 individuals from five well provenienced Middle Stone Age sites and with published values from historic Bushmen of South Africa. The Later Stone Age foragers and the Bushmen are indistinguishable in mandibular molar size and shape. The first molars of the Middle Stone Age foragers are significantly larger than those from the Later Stone Age ( $p=0.00$ ). The most pronounced difference is in the mesiodistal diameter of  $M_1$  ( $p=0.00$ ). These findings are consistent with the world-wide pattern of dental reduction in modern humans and may demonstrate a reduction in the size and change in the shape of mandibular molars in humans from the late Pleistocene to early Holocene in Southern Africa.

**Swanston, Treena and Ernest G. Walker (University of Saskatchewan, Saskatoon, Saskatchewan)**

*Atresia of the External Auditory Meatus: A Case from a Late 19<sup>th</sup> Century Cemetery*

A late 19<sup>th</sup> Century Roman Catholic cemetery, associated with the church of St. Vital, was recently rediscovered on private property south of the town of Battleford, Saskatchewan. The R.C. Diocese, Government of Saskatchewan, R.M. of Battle River, and the landowners made the decision to have the individuals disinterred and reburied in the town cemetery. The University of Saskatchewan was brought into the project, and permission was received to perform an osteological assessment. One individual was discovered missing the right external auditory meatus, a congenital condition known as aural atresia, which has rarely been found in archaeological settings. This paper will focus on the significance of the find and what might be learned from an archaeological case of aural atresia.

**Tait, Gary S.**

**Fraud and Fallacy in Physical Anthropology: A Look at Problems of Misrepresentation in the Twentieth Century**

It has been nearly 50 years since the Piltdown finds were shown to be fraudulent. The Piltdown hoax is probably the best known case of deliberate deception in science, but other forms of empirical misrepresentation tend to be more common. These include "marginal deception", which involves manipulation of data (e.g. fudging, slanting, smoothing) to support a preferred hypothesis or illustrate a putative trend; misinterpretation of observations under the influence of fallacious theory or false assumptions, and mistakes resulting from personal shortcomings, such as carelessness of poor technique, which may lead to spurious conclusions.

This paper examines several cases of misrepresentation in physical anthropology (drawn mainly from paleoanthropology) and elucidates the historical impact of these events on the development of the discipline. The Piltdown fabrication is discussed as the main instance of deliberate deception. Theory-induced misconception is illustrated by the "cerebral-drive" hypothesis and the "single-species" model (which affected the assessment of *Australopithecus* and *Ramapithecus*, respectively), and idiosyncratic error by the misidentification of the *Hesperopithecus* molar, by the faulty dating of the KBS Tuff, and by other episodes of scientific fallacy. Examples of marginal deception have been found in the work done in the first half of the twentieth century on race-crossing and racial differences in mentality.

The more general purpose of this investigation is to compare the orthodox textbook version of scientific development (through progressive refutations of faulty models and hypotheses, by means of improvements in analytical technique and empirical knowledge) to an account based on evolutionary epistemology. This latter alternative stresses the importance of theory in giving relevance and meaning to observations of facts, and views scientific development as the result of competition between rival research systems and research traditions. This study concludes that the alternative approach is superior because the former narrative is undermined by several serious historical anomalies.

**Tocheri, M.W., M.W. Marzke, D. Liu, M. Bae, G.P. Jones, R.C. Williams and A. Razdan (Arizona State University, Tempe, AZ)**

***How 'Handy' Was Homo Habilis Anyway? A 3D Comparative Analysis of the Trapezium***

Three-dimensional trapezium models from *Homo sapiens*, *Gorilla gorilla*, *Pan troglodytes*, *Australopithecus afarensis* (A.L.333-80), and *Homo habilis* (O.H.7) are acquired through laser digitizing. Least-square planes are generated for each articular surface and the angles between the planes are compared. Our results, obtained from using new 3D modeling and analytical tools, raise interesting questions about the functional capabilities of the fossil hands of *A. afarensis* and *H. habilis*. Multivariate statistical analyses clearly illustrate that A.L.333-80 is morphologically more similar to that of modern humans whereas the O.H.7 trapezium (from the so-called 'handy man') is more similar to that of the gorilla. The O.H.7 trapezium was first described forty years ago by J.R. Napier (*Nature* 196, 409-411) as gorilla-like, but he did not show this quantitatively nor did he address the important functional implications of this morphology. Soon afterward, the O.H.7 trapezium became part of the type specimen of *H. habilis* (Leakey L.S.B et al., *Nature* 202, 7-9: 1964). However, the presence of some key morphological differences from humans highlighted and quantified by our research indicates marked differences in the functional capabilities of the O.H.7 trapezium, particularly in those that facilitate tool manufacture and tool use. If the O.H.7 trapezium represents part of the hand responsible for manufacturing and using the stone tools found at Olduvai, our results suggest that the hand manipulated the stones in a way for which we have no modern analog.

**Toyne, J. Marla (Tulane University, New Orleans, LA )**

***Testing the Ethnohistoric Record with Biological Expectations. An Example from Northern Peru***

One source of information that can aid cultural interpretations of archaeological human remains is the documents written by historical travelers. In Peru, early Spanish explorers, missionaries and settlers chronicled the social patterns, activities and customs of many of the indigenous peoples in the region. Archaeologists have used these ethnohistoric documents for centuries to develop a deeper understanding of the way of life of the prehistoric peoples of Peru. Physical anthropologists can do the same, though a degree of caution is advised. This paper discusses how a series of biological expectations were developed based on ethnohistoric documents and used to test a hypothesis about the social position of a particular group of individuals from the site of Túcume. There were inconsistencies in the



results indicating that these sources of information need to be treated more rigorously or may not be reliably used to answer specific questions.

**Toyne, J. Marla** (Tulane University, New Orleans, LA); **Andrew J. Nelson** (University of Western Ontario, London, Ontario); **Alfredo Narváez Vargas** and **Bernarda Delgado Elias** (Museo de Túcume, Peru)

*Mummies, the Media and Science: The Unwrapping of an Inca Mummy from Túcume, Peru*

When faced with the decision to unwrap or to preserve mummified bundles intact, scientists must make a difficult choice depending on the type of research questions that motivate their investigation. However, when outside parties are involved in the process, such as the documentary media, other motives may affect that decision. Scientists and media producers have quite different (yet not necessarily opposing) interests that affect how they perceive the analytical process. On one hand, physical anthropologists are concerned with learning as much as possible about the biological features of the human remains, yet may be uneasy about the physical destruction of the tissues and associated cultural materials that may be affected by the unwrapping process. On the other hand, documentary producers are attracted to a dynamic presentation that involves "revealing" facts and information to an audience. In this paper, we discuss how thesis research conducted at the site of Túcume in Peru was affected by the presence and influence of public media. Specifically, we would like to discuss the results of the unwrapping of an Inca mummy bundle.

**Varney, T. L.** (University of Calgary, Calgary, Alberta)

*Private Voices and Public Records: Using Historical Documents and Osteology to Reconstruct Colonial Life in the Caribbean*

This paper discusses different types of historical sources and their application in informing dietary reconstruction and life histories at a Royal Naval Hospital cemetery on Antigua, West Indies (c. 1800). Historical sources on colonial military and naval diet provide extensive information on foodstuffs available for general consumption. However, different types of sources supply information that is sometimes contradictory. Unofficial documents such as sailor's logbooks and diaries and first hand accounts of colonial life by colonists and soldiers have proved to be very valuable sources of insights into diet that could not be obtained from official military and naval documents. While the official sources document military- and naval-issued food rations and stress reliance on imported foodstuffs, the unofficial sources reveal the importance of personal preference and local foodstuffs in determining the foods that were actually consumed. These unofficial sources have been key in the interpretation of stable isotopic values of human remains, as well as faunal remains from refuse middens, and have contributed to our knowledge of resource use and allocation in a military context during the Napoleonic Wars.

**von Hunnius, Tanya** (McMaster Paleogenetics Institute, Hamilton, Ontario)

*aDNA Success Rates: A Comparison of Tooth and Bone Samples from the Same Individuals*

Some previous ancient DNA studies have indicated that when teeth and bone samples are used in the same analysis, the tooth will generally supply superior results. This observation does not usually generate much attention in the discussion and thus, the mechanisms behind this variability may be ignored. Another important issue is that the sample sizes used within ancient DNA analyses generally tend to be small (10-20 individuals). This paper compares the results of bone and tooth mitochondrial DNA of 61 individuals from two sites in Ireland, which clearly show that teeth are a far better medium for ancient DNA analysis than bone. Possible explanations for this will be presented. Although analyses have been successful in amplifying ancient DNA from many diverse sources (e.g., bone, teeth, hair, tissue, coprolites, etc.), researchers should be aware of the best potential samples of ancient DNA in order to minimize their time and destruction of valuable tissues, as well as maximize their results. Further, this study reveals that using more than one tissue type is an important way of authenticating the DNA sequence obtained from each individual.

**Waters, Andrea L. (University of Calgary, Calgary, Alberta)**

*An Intra-Bone Analysis of Nitrogen Isotope Ratios in Subadult Long Bones:  
The Effects of Differential Bone Turnover and Growth*  
Poster Paper

As our understanding of the biogeochemistry of stable isotope analyses for archaeological investigations is refined, a need for further research on within-bone variation and the effects of differential bone turnover is required. Bone collagen samples were taken from the different growth areas of a long bone (diaphysis, metaphysis, epiphysis) from 27 subadult long bones (ages fetal to 24 years) from the Uxbridge ossuary, outside of Toronto, Ontario. In individuals less than seven years of age significant differences in stable nitrogen isotope ratios between the metaphyses and the diaphysis were found. This is due to the incorporation of the dietary shifts of breastfeeding and weaning into different areas of the bone at different times.

Metaphyseal bone collagen is 'newer' (more recently deposited) than diaphyseal bone collagen and therefore is more representative of diet before death. Moreover, this research suggests that the metaphysis that undergoes the majority of longitudinal growth will have a more recent isotopic signature than the metaphysis that undergoes less growth. In individuals older than seven years of age there were no significant within-bone isotopic differences. Mean within-bone variation was less than one permil for both stable nitrogen and carbon isotopes. Epiphyses have isotopic values that are more similar to metaphyseal values, than to diaphyseal values, which suggests that isotopic values from the epiphyses may also be reflective of a more recent period before death. Overall, these results caution isotope researchers to be cognizant of the implications and possibilities of their tissue sampling locations.

**Weiss, Elizabeth (University of Arkansas, Fayetteville, AR)**

*Humeral Cross-Sectional Morphology from 18<sup>th</sup> Century Quebec Prisoners of War: Activity Pattern or Biology?*

This study used aggregate measures of cross-sectional robusticity and asymmetry (based

on humeral areal and inertial cross-sectional components) to test a prediction from bone remodeling theory that a physically active 18<sup>th</sup> century Quebec prisoner of war sample should have more robust and asymmetrical humeri than a non-physically active 20<sup>th</sup> century New Mexico suburbanite sample. The prisoners of war engaged in labor-intensive activities (indicated by narrative accounts and confirmed by observations of arthritis and other pathologies), while the suburbanite sample did not. The hypothesis that intensive labor leads to changes in humeral morphology was not confirmed. Instead, the results showed that pre-existing biological factors such as ethnicity, age, and sex explained the pattern of similarities and differences in cross-sectional humeral morphologies. Results from this study join those from other recent investigations to suggest that additional controls are required before attributing cross-sectional differences to activity patterns.

**White, Christine D. (University of Western Ontario, London, Ontario), Jocelyn S. Williams (University of Calgary, Calgary, Alberta), Fred J. Longstaffe (University of Western Ontario, London, Ontario)**

*Oxygen Isotopic Composition of Bone Carbonate: An Additional Tool to Investigate Weaning in the Maya Postclassic*

The bone carbonate of 67 individuals from two Postclassic Maya sites was analyzed for the stable oxygen isotopes to investigate whether variation existed between infants and adults that could be attributed to breast-feeding. Mean  $\delta^{18}\text{O}$  values increase by age group: 1) 2-18 months = 27.6 ‰  $\pm$  0.3; 2) 2-6 years = 27.2 ‰  $\pm$  0.7; 3) 7 years and up = 26.8 ‰  $\pm$  0.5. The  $\delta^{18}\text{O}$  values between individuals most likely breast-feeding at the time of death (2-18 months) and those who would be completely weaned (7 years and up) differed by 0.8 ‰; similar to the 0.7 ‰ difference between infants and adults at Kaminaljuyú (Wright and Schwarcz 1998). Results indicate that oxygen isotopic analysis from bone carbonate is a reliable and can be used to investigate the weaning process. This research was supported by an NSERC (Natural Sciences and Engineering Research Council) Postgraduate Scholarship (Williams), and grants from the Wenner Gren Foundation (White) and NSERC (Longstaffe).

**White, Christine D. (University of Western Ontario, London, Ontario); Rebecca Storey (University of Houston, Houston, TX), Fred J. Longstaffe and Michael W. Spence (University of Western Ontario, London, Ontario)**

*Urbanization, Immigration and Ethnicity at Teotihuacan: An Ancient Model for Modern Cities*

Stable carbon-isotope ratios in bone collagen and oxygen-isotope ratios in bone and enamel phosphate from 25 individuals from the residential compound of Tlajinga 33 were used to examine the possibility that the inhabitants, who were craft producers, may have accepted immigrants for maintaining either their biological viability or their economic productivity. A significant proportion (29%) of the inhabitants grew up elsewhere, but the majority had dwelt in Teotihuacan for many years before their death. The social position of foreigners appears to have been generally high (e.g. the occupants of Tomb 50 have come from elsewhere, possibly West Mexico), but foreigners were also found in low status contexts such as middens. The stable isotope ratios reflecting long term dwelling suggest that social

status was achieved and probably also imply political and/or ethnic assimilation.

**White, Dedrie and Kevin Brownlee (University of Manitoba, Winnipeg, Manitoba)**

***Hunter's Brother: A Preliminary Analysis*  
Poster Paper**

This study presents the preliminary findings from a detailed analysis of the Hunter's Brother burial remains and associated artifacts. This research was possible through a partnership established between the Pine Creek First Nation, University of Manitoba, and the Province of Manitoba. This burial was recovered in June 1938 during road construction along the Valley River in Dauphin, Manitoba. The analysis of the grave goods suggests that the burial occurred during the time period 1805-1820, based on the recovery of Robert Cruickshank trade silver, shell hair pipe beads and glass beads. The remains represent a male, in the early years of adolescence.

A complete inventory of the remains was taken and the skeleton is approximately 58% complete, with the majority of bones being well preserved. This burial is interesting because of the presence of preserved soft tissue on the right shoulder girdle and arm, and is unique among Manitoban burials due to the preservation. Measurements of the remains, and analysis of taphonomic changes, including copper staining from the presence of a copper kettle at the time of burial were undertaken. Pathologies were also examined (briefly? Take out) during the analysis. The most notable pathology is the unusual observation of the right mastoid process, which appears porous, possibly indicating mastoiditis. In addition to the remarkable preservation of the human remains a number of perishable artifacts were well preserved including a wooden sugaring spoon, peacock feathers, silk, and a hand woven sash. During the period between 1805 to 1820 many groups are documented as occupying this region however it has been concluded that the remains belonged to the Algonquian linguistic group, either the Ojibwa or Ottawa based on ethnohistorical and historical literature.

Currently, three other burials dating to the same time period are undergoing analysis in Manitoba. There are striking similarities among all four burials, including similar grave goods and some genetic pathologies, suggesting that these four individuals may represent a single cultural group. Genetic and ethnohistorical research continues on these four burials in hopes of proving a genetic or cultural link.

**Wood, Carolann and Shelley Saunders (McMaster University, Hamilton, Ontario), Luca Bondioli (L. Pigorini National Museum of Prehistory and Ethnography, Rome, Italy) and Roberto Machiarelli (Université de Poitiers, Poitiers, France)**

***Biocultural Factors Affecting the Prevalence of Rickets Among the Roman Subadult Population of Isola Sacra Necropolis (1<sup>st</sup> -3<sup>rd</sup> Century AD)***

The earliest written reference to rickets comes from the Roman period author, Soranus,

yet paleopathologists have not explored questions surrounding the perplexing prevalence of this disease in ancient Rome. This research seeks to look beyond a biomedical approach to disease and search for biocultural explanations for the prevalence of rickets in the classical Roman period. The ultimate causes of disease are social, cultural and socioeconomic in nature, and it is these factors that have significantly influenced the prevalence of rickets in both past and present populations. Identification of subadult individuals exhibiting paleopathological indicators of rickets is coupled with an extensive survey of the Classical literature indicating the factors impinging on the health and well being of Roman children.

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

*Behavioural Variability between Captive and Wild Macaca fascicularis*

The theme of this symposium has been the increase in our understanding of the variability inherent in the behaviour of primates. Very few studies currently available have compared captive and wild groups of the same species using the same protocols. In this paper a group of wild *Macaca fascicularis* from Indonesian Borneo is compared with a group of captive *Macaca fascicularis* from Monkey Jungle Florida using a 5 minute interval scan sample technique. Two aspects of behaviour are compared. The first is the frequency of location on the ground or levels above the ground, compared with time of day, and the second is the frequency of five different behaviours, eating, sitting, locomoting, grooming and play. The results suggest that behaviours vary between the groups according to time of day, and that there is some variability in frequencies of behaviour between males and between females in the two different living conditions. This suggests that the exigencies of location may affect the behaviour and time budget of the two sexes differently, which is an important consideration when attempting to generalize about the behaviour of a species.