

Study of the Taphonomic Processes Affecting Skeleton #46 from Cabeco da Arruda (Muge, Portugal)

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The paper examines the taphonomic processes affecting Skeleton #46 from the Mesolithic site of Cabeco da Arruda (Muge, Portugal) housed at the Museo Geologico in Lisbon. The skeleton had a significant amount of breccia attached which enabled us to assess the position of bones at the time of excavation and to attempt the interpretation of the original burial position. The study concludes that the skeleton was buried on the back with legs flexed above the thorax. The limited space associated with the burial could have resulted from perishable burial architecture. This interpretation is further compared to the published data on Mesolithic burials in Muge and in other sites in Europe. The paper shows that even with very limited documentation in certain circumstances it is possible to get a more thorough understanding of burial practices if enough attention is paid to movement of bones within a burial.

The Significance of the Paleoepidemiological Study of American Trypanosomiasis

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Analysis of soft tissue specimens from nearly 300 human mummies for the presence of ancient DNA (aDNA) of *Trypanosoma cruzi* (the infectious agent of American trypanosomiasis or Chagas disease) from the Atacama Desert's coastal sites in northern Chile enabled reconstruction of this disease's behavior during the last 9000 years. These results suggest that, given the availability of specimens, most other infectious agents could be identified by this approach. More importantly and broadly, however, the study symbolizes the transition of the field of mummy studies from the level of case reports to the level of population studies. This is a critical step in the evolution of a new scientific discipline because population studies possess a feature not shared by case reports: the ability to test hypotheses.

Personal Identification Using the Frontal Sinus

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While the size and shape of the frontal sinuses are generally accepted as unique to each individual, there are no standardized methods of taking measurements for individualization, and no known error rates. These shortcomings render findings from the frontal sinuses inadmissible in a court of law as per the Daubert ruling in the U.S., and the Mohan ruling in Canada. Many researchers have attempted to set the standard for measuring frontal sinuses and determining their individuality. Metric measurements of traits and probability analysis of trait combinations have typically formed the basis for these methods. However, previous researchers have made one primary assumption: that each trait measured is independent of all other traits.

The purpose of this research is to examine the frontal sinuses of multiple skull x-rays in order to test the interdependence of traits and establish a standardized method of personal identification. The objective is to empirically test the accuracy and precision rates of this technique in order to adhere to the Daubert and Mohan rulings for admissibility of evidence in a court of law. This research was conducted using x-ray films, donated to the University of Toronto at Mississauga by a local hospital and the raw data was entered into SPSS for statistical analysis. Pearson's Chi-square tests determined the interdependence of traits, and combinations of independent traits were calculated using probability analysis. Seventy four combinations of three independent traits and one combination of four independent traits were established and probability values for the most common and least common categories were calculated for each combination. An examination of the trait combinations confirms that even when one is working with the most common results for each trait, there are many combinations that will provide a probability value in the thousands, (i.e. X out of every thousand people have that particular combination of traits). This is statistically significant to forensic anthropologists attempting to perform an individual identification using the frontal sinuses. Furthermore, a standardized method of measuring the frontal sinuses benefits all physical anthropologists by presenting a consistent method of data collection, comparison, and analysis.

Isotopic and Dental Evidence of Diet in a Pioneer Population

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This study investigates the diet of a pioneer Canadian population through the analysis of dental pathology and stable isotopes in collagen samples from a skeletal collection of sixty-four individuals excavated from a 19th century Methodist cemetery in Port Hope, Ontario. The combined use of isotopic and dental evidence of diet in light of historical evidence provides insight into the living conditions in 19th century Port Hope and enhances our knowledge of how diet, culture, and environment influence and affect health. The analysis of stable carbon and nitrogen isotopes in human collagen samples indicates that the diet of these Canadian settlers remained similar to that of their European counterparts with a heavy reliance on meat, wheat, and root vegetables, while maize and sugar cane were not important components of their diet.

The analysis of dental caries, enamel hypoplasia, abscesses, antemortem tooth loss, dental calculus, and wear patterns indicates that males and females experienced similar levels of dental health, although a higher rate of calculus and lower severity of caries among males suggest that there may have been slight dietary differences between the sexes that were not revealed by stable isotope analysis. The caries data reinforces historic evidence that pioneer Canadians were extremely reliant on bread, cakes and other refined carbohydrate-rich foods. The levels of oral health in the Port Hope sample are compared with those of other historic populations from Canada, the United States, and Britain to obtain a clearer understanding of the factors involved in the adaptation to different physical and cultural environments.

The Canadian samples had higher rates of caries than British and American populations, suggesting that Canadians consumed larger quantities of sugar and carbohydrates and likely did not have the dietary variety enjoyed by many British populations.

Tuberculosis and Childhood Infection: Investigating the Family Dynamic

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The appearance of tuberculosis infection in a child today is described as a 'sentinel event', an indication that public health measures have failed to prevent a new instance of transmission of this infectious disease. Historically, many Canadian children were known to have been exposed and infected in childhood; for some children this exposure occurred within the context of the family home. This research examines the family dynamic in tuberculosis transmission from the perspective of the child. A random sample of 822 children admitted to the Queen Mary Hospital for Consumptive Children (Toronto) between 1909-1950 provides a starting point for addressing the significance of the family context in Canadian history. Findings suggest that mothers, more often than fathers, were identified as the main source of exposure. Studies on tuberculosis in industrialized populations prior to the 1950s (and the initiation of drug-based therapies) reveal a gendered disease epidemiology where women, relative to men, typically experienced higher tuberculosis burdens in early adulthood. Interestingly, this period of life coincides with the initiation of childbearing and the introduction of young (and potentially susceptible) children to the home. We question the significance of a cycle of infection and disease onset which, historically, may have increased the potential for an inter-generational transmission of tuberculosis.

Patterns of Traumatic Injuries in Nubia during the Egyptian New Kingdom Colonial Occupation

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Egypt and Nubia have had a long history of contact, ranging from Diplomatic coexistence to total invasion. During the Middle Kingdom period, the Nubian polity at Kerma posed a serious threat, inciting Egypt to build a series of fortresses along the Nile. Although Kerma resisted Egyptian aggression, it eventually fell during the Second Intermediate Period. During the subsequent New Kingdom period, the Egyptian frontier was extended further than it previously had been in Nubia, to the Fourth Cataract of the Nile. Evidence of violent confrontations is documented in the skeletal sample from Kerma (Judd 2000) dating to this period, providing a suggestion of a Nubian culture of violence. A cemetery at the site of Tombos dating to Egyptian New Kingdom occupation of Nubia, located at the Third Cataract of the Nile (modern-day Sudan), displays a strikingly different pattern in the skeletal remains from those at Kerma. Although a high injury rate may be expected during this period of colonial conquest,

almost no skeletal indications of interpersonal violence are present. Earlier researchers believed that Nubia was demoralized and exploited during this occupation, though more recent work has suggested that this period had the positive consequences of providing mutual benefits and allowing Nubia to maintain substantial autonomy.

The skeletal remains from Tombos provide an opportunity to explore the interactions of Egyptian and Nubians. This paper presents the differing patterns of traumatic injuries at Tombos and other Nubian skeletal samples, including Kerma, and investigates what may account for the variation in injury rates.

Reconstructing the Evidence: Recovering Buried Remains

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In cases of scattered or buried remains, forensic anthropological and archaeological methods are used to reconstruct human behaviour and interpret the context of evidence. The purpose of this research is to evaluate two methods of excavating human remains in support of their ability to: [1] recover all types of evidence; and [2] aid in jury comprehension by conveying information about placement of evidence and body in relation to one another and the grave itself.

Two known burials of pig remains were excavated using two different techniques: (a) the forensic bisect approach and; (b) traditional archaeological excavation. The usefulness of each technique was assessed based on the following four criteria: [1] accuracy in evidence collection; [2] increased probability of collecting all physical evidence; [3] prevention of postmortem damage; and [4] difficulty in presenting information to a jury.

In both cases we were able to: expose stratigraphy, determine depths, note root cutting, and document tool trauma. The results of this study indicate that both methods are capable of successfully recovering evidence. Tool marks made from digging the grave were preserved in both cases and relationships between all objects found in the strata were established. Major differences between the two approaches include the time necessary to complete excavation, documentation, and recovery, with the bisect method proving to be a more efficient methodology. In addition, presentation of the evidence to a jury can be complicated by the traditional archaeological approach since contextual information and the relationship of evidence found using a horizontal layering method is difficult for the untrained jury member to visualize and problematic for the expert witness to explain. The forensic bisect approach is therefore a more favourable method in crime scene excavation as it allows for clear and easy to understand testimony that will aid in the jury's comprehension of the logical events surrounding the disposition of the body.

Variation in the Cortical Bone Histology within the Human Femur and its Impact on Estimating Age-at-Death

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Histological methods for the estimation of age at death using cortical bone are based on the evaluation of microstructural changes over time. Since histological analysis is a destructive method, most techniques attempt to limit the amount of cortical bone needed for analysis. Sample location, however, can have a significant effect on the accuracy of these methods. Regional variation exists in the microstructure of long bones of various mammals including cursorial animals and primates. This variation is a result of locally acting loads, producing a compensatory relationship between bone density and its structural and geometric properties. Furthermore, research demonstrates that both inter-section and intra-section variation is present at the mid-shaft of the femur, which is the primary element and location for estimating age at death in humans. This research determines the extent of regional variation within the human femur and its affect on age estimation.

The percent osteon and Haversian canal area and cortical thickness were quantified. Thompson's All Males Left Femur regression equation was used to estimate age. Results show that there is a significant regional variation in the estimated ages found in the posterior aspect of the femoral shaft, as well as significant circumferential variation in the mid and mid-distal cross-sections. Thus, significant inter-section and intra-section variation occurs in bone remodelling exists within the adult human femur. The degree of variation can affect age-at-death estimation, thus use of histological methods is dependant on the ability to identify the anatomical locations.

The Human Child in Primatological Perspective: Insights and Obstacles

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Views within anthropology concerning the utility of considering human behaviour in comparison to nonhuman primate behaviour range from this being a means for establishing the evolutionary development of human behaviour patterns, to it not being of much use at all. One aspect of human-nonhuman primate comparisons that has proven fruitful is the behavioural development of infants and juveniles (with much of the work coming from comparative psychology). Primatologists paid a good deal of attention to human-nonhuman primate comparisons 20-40 years ago; more recently, this focus seems to have waned somewhat, even as the body of comparative data on nonhuman primates has continued to grow. While primate biology does still have useful contributions to make to the biological anthropology of the child, these will not come from the use of referential models. Productive insights on the child from primatology must be firmly rooted in broadly-based analyses that draw on emergent properties from cross-species comparisons. Some examples where greater understanding of the child emerges from this broad "humans as primates" perspective are considered.

The Supracondylar Process in British Columbia Skeletal Samples

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The supracondylar process or supratrochlear spur of the humerus is an anatomical variant known since the early 1800s. Hrdlička, Terry and others of their generation established the rarity of this feature in humans at less than 1 per cent based on samples of 1000 or more persons. More recent studies of Eskimo, Aleut, and Indian skeletal samples from the U.S. have produced similar figures. Because of this, I concluded that coincident expressions in the only two skeletons recovered from a single British Columbia archaeological site, along with other distinctive characteristics, reflected a possible sibling relationship. Other examples in the province have now been recorded for a total of 16 individuals from 11 sites, or 3.6 per cent overall. The potential of familial relationships for individuals with spurs is not diminished where supporting morphological and cultural contexts are available.

Survey of Degenerative Joint Disease in Maya Skeletal Remains

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Analysis of skeletal material of past populations has shown evidence of degenerative changes which are similar in nature to those which present in a contemporary setting. The distribution of degenerative changes is thought to reflect biological or behavioural influences which may be distinctive for a certain population or subgroup of a population.

A collection of skeletons from ancient Lamanai, Belize were the subject of investigation. These were interred between 150 BC and AD 1450. All skeletal elements were assessed for the presence and degree of any joint condition. Joint degeneration was scored as mild, moderate or severe. The distribution of degenerative joint changes was compared for age groups as well as between sexes.

In the subgroup of 50 nearly complete skeletons 7.5% of 2688 joints had degenerative changes. There was at least one joint affected in 58% of the skeletons and 48% had at least one spinal joint demonstrating degenerative changes. The study found 85% of females and 59% of males were affected by joint degeneration. Degenerative changes were seen in 56% of 20 – 35 year olds, 87.5% of 35 – 50 year olds and 100% of those over the age of 50 in this sample.

There was a higher than expected involvement of the temporomandibular (26%) and atlanto-dental (24%) joints. The study otherwise echoes previous research with skeletal collections from other ancient populations from the Americas, Europe and Asia. The results are compared to another group of Lamanai skeletons representing individuals who died after Spanish occupation of the site. The degenerative joint change frequency is similar for both groups.

This study also explores the skeletal distribution of degenerative changes among the ancient Maya population at Lamanai. Possible cultural and environmental factors underlying the distribution patterns are examined. A comparison of the distribution of joint changes with the post-contact group at Lamanai will suggest possible differences in the acquisition of skeletal lesions. This data could be used to compare the joint conditions seen in other populations.

Traumatic Injuries among the Mummies of Akhmim, Egypt

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Akhmim Mummy Studies Consortium

Recent CT research has tapped considerable biological and cultural information carried in the mummified remains of the ancient Egyptian population. The Akhmim Mummy Studies Consortium (AMSC) was established to help gather data from one subset of the ancient Egyptian community, those persons associated with the important city of Akhmim, located about 300 miles south of Cairo. Maspero (1893) mentions that over 800 mummies came to light during the earliest excavations at the site in March, 1884. Akhmim's numerous cemeteries were at that time hastily excavated; mummies brought to light were sold to travelers and subsequently entered museums throughout the world. Although Akhmimic mummies are known from a variety of periods, it appears at this time that the largest chronological grouping belongs to the Second Persian and Ptolemaic Periods (340 BC to 30 BC). AMSC is currently concentrating on that contingent of late mummies, many of which came to North America in the late 19th century. To date, AMSC has identified no fewer than twenty-five Akhmimic individuals in American and Canadian collections. The ancient names of many of these persons are known, and their genealogical profiles are often reconstructible. The University of Manitoba's Bioanthropology Digital Imaging Analysis Laboratory (BDIAL) is assisting AMSC in its facial reconstruction project to help bring Akhmim's regional population into clearer perspective.

Several of the mummies examined to date have significant traumatic injuries in the pelvic and femoral region that have important implications for understanding the society of Ptolemaic Akhmim. Hypotheses will be adduced to account for the pattern of fractures identified in AMSC's recent CT analyses.

Patterns of In-house Iroquoian Burials, in the Context of Early Historic Ethnography

Crystal Forrest

At the Late Ontario Iroquoian Draper Site (A1Gt-2), located in what is now Pickering, Ontario, fifteen human burials were encountered within the longhouses comprising the village. During the time period in Southern Ontario, most Iroquoian people were buried in communal ossuaries, making those interred in settlements a minority. Previous ethnographic and archaeological research has suggested that certain segments of the population are more likely than others to be represented in in-house interments. It has been suggested that infants, particularly twins, the elderly, the chronically ill, and those having died violent deaths are segments of the population most likely to have been excluded from ossuary burial, and, thus, to have been interred in longhouses. This paper will discuss the osteological and archaeological characteristics of the individuals interred at the Draper site in an effort to examine the applicability of ethnographic evidence in assessing precontact interments. In particular, are the classes of people identified in the ethnographic literature as being unsuitable for ossuary burial recognizable in the longhouse interments at the

Draper site? Can in-house burial be considered to be an alternate form of interment to ossuary burial for certain individuals? How can osteology help clarify Iroquoian mortuary behaviours?

Gender-Based Child Feeding Practices in a Rural Canadian Population.

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Public health efforts to halt rising rates of childhood obesity have been hampered by the multi-factorial nature of the epidemic, and by a lack of data linking high body mass index (BMI) to specific patterns of dietary intake. This paper presents findings from anthropometry (n=504), dietary recall (n=360), and focus group interviews (n=175) with a sample of 7-13 year old schoolchildren living in rural Ontario, Canada. Compared with the 2000 CDC growth reference, overweight and obesity rates are high, with a significant difference in obesity rates between boys and girls. Based on the anthropometry results, I hypothesize that the gender difference in obesity rates is partially attributable to differential feeding practices. Though there is documentation of culturally-based differential feeding of boys and girls in the anthropological literature, there is little North American evidence for such practices. This paper tests this hypothesis, and finds nutritional evidence for different patterns of dietary intake in rural boys and girls. This finding is supported by interview data that describe differences in the social construction of boys' and girls' bodies.

The Identification of Paget's Disease in a Prehistoric Specimen from Ontario

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Skeletal remains were analyzed to assess pathological indicators for the presence of Paget's disease. The remains were found in a co-mingled context in a burial pit feature at the Skinner site in southwestern Ontario. The Skinner site is archaeologically associated with the Young Phase dated from 800-1200 A.D.

Radiological examination of numerous elements, including cranial and post-cranial, was used to determine the presence of pathological bone. Abnormally thick and irregular bone identified in a cranial vault lead to further histological studies on this element.

The identification of Paget's disease in this specimen represents one of the extremely rare cases reported in the paleopathological literature and may well represent the earliest case of Paget's in the New World.

The Current State of Mummy Studies

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The field of mummy studies is, by necessity, a multidisciplinary and holistic approach to the interpretation of preserved human remains. The analysis and interpretation of mummified human remains presents numerous complex challenges. Although many of the methods are similar to those

used in osteological analyses, modifications may be necessary. There is often a need for completely non-invasive approaches to analyses; in the case of some wrapped mummies, the biological anthropologist may never even see the body.

This paper will identify and address the challenges associated with the analysis and interpretation of human mummies and discuss the need for recognition of mummy studies as an important discipline.

Can Dental Health Provide Insight into the Transition from Foraging to Pastoralism in the Eastern Cape, South Africa?

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Around 2000 BP pastoralism was introduced to the southern region of

South Africa. The foraging lifestyle was not completely replaced by pastoralism, but rather continued to exist alongside pastoralism for many centuries.

Although differences in archaeological evidence for foragers and pastoralists have been proposed, this incomplete transition, along with other factors including mobility and inherent social and cultural similarities, make clear distinctions difficult to identify. This study examines the dental health of Later Stone Age inhabitants of the Eastern Cape region of South Africa, dating between 8000 BP to 400 BP. The Purpose of this research is to determine if differences exist that may assist in the differentiation of foragers from probable pastoralists. Minimal differences in dental health have been reported between protohistoric South African forager and pastoralist groups (Morris 1992), but differences in dental health between Later Stone Age foragers and pastoralists remain understudied. Dental conditions including dental caries, occlusal wear, antemortem tooth loss, and dental abscesses were assessed on a sample of 42 radiometrically dated Later Stone Age adult skeletons from coastal and inland locales across the Eastern Cape of South Africa. An age trend in dental health was observed; the incidence of caries, antemortem tooth loss, wear, and alveolar abscesses increased from young to old adult. However, temporal trends in any of the four measures of dental health that may suggest changes in lifestyle were not identified. These results suggest that diet and the use of teeth for non masticatory functions may have remained relatively stable across time.

The Geographical Epicentre of the 1918 Influenza Pandemic

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There continues to be spirited debate about the geographical epicentre of the 1918 influenza pandemic. One position claims that the virus originated in Europe and that, as much as 2 years earlier, outbreaks of influenza indistinguishable from the killer 1918 variant occurred among British troops stationed in France. This pre-seeding of the virus, coupled with the horrendous conditions of WWI, catapulted the pandemic that swept the world.

The other leading position contends that the virus evolved in the

United States and was introduced to Europe by the American Expeditionary Forces in the spring of 1918. In this paper, we discuss the evidence for Purulent influenza amongst British troops, prior to the 1918 pandemic. Using Data from surviving British War Diaries we critique the 'pre-seeding' hypothesis and present the perspectives of military doctors who treated soldiers who fell ill from influenza.

An Assessment of Compact Bone Microstructure and its use in Differentiating between Mammalian Species, including *Homo sapiens*

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In recent years much research in biological and forensic anthropological literature has been focussed on the use of histomorphometric analysis of compact bone tissue to differentiate between mammalian species, particularly between human and non-human bone by those involved in the examination of fragmented skeletal remains from potential forensic contexts. The majority of these studies have provided methods of differentiation without addressing the variability existing within compact bone due to both intrinsic and extrinsic factors. Bone and bone portion sampled as well as age, sex, activity level and any pathological conditions affecting the skeleton all influence the microstructural appearance of compact bone. Similarly, many mammalian species display the same types of bone tissue with similar-sized structures, despite the differences in their body morphology and/or size.

This poster presentation will outline a study completed to assess the use of histomorphometric analysis in distinguishing between compact bone tissue of several mammalian species, including *Homo sapiens*. Examination and comparison of results from published studies of histomorphometric analysis of mammalian compact bone from anthropological, zoological and medical sources was undertaken and is presented. Further research into the variations of the 'normal' appearance and parameters of compact bone microstructure affected by intrinsic and extrinsic factors is also addressed.

As several mammalian species display the same types of bone tissue with overlapping values of histological structures, it is concluded that complete differentiation between the mammalian species discussed (rat, cat, dog, rabbit, raccoon, badger, deer, goat, sheep, pig, cow, water buffalo, horse, deer, New World monkey, Old World monkey and human) cannot be conducted via histomorphometric analysis alone. These mammalian species are classified according to bone tissue type and sizes of histological structures, providing the reader with a series of groups of potential mammalian species based on compact bone microstructure. Further methods for complete differentiation, including direct comparative histomorphometric analysis, DNA analysis and immunological testing, are presented for consultation.

Genocide as ‘Applied Biology’ – The Role of Physical Anthropology in Nazi Germany

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The atrocities that happened during World War II at the hands of Nazi officials are now known to most of the world. It is estimated that 6 million Jews were killed during the Nazi regime in Germany under the name of racial science, and there were many psychiatric patients and Gypsies killed whose numbers remain uncounted (Muller-Hill 1988: 20). Science, including physical anthropology, played a crucial role in eugenics and euthanasia laws of Nazi Germany during the Third Reich. There were many atrocities committed in Nazi concentration camps in the name of scientific research in this period. Scientific backing to these events was essential in making the public believe in the necessity of these measures.

Changes in ideology that would allow the sterilization and Eventually murder of millions of people began decades before Hitler came into power. Scientific research and publications on racial studies prior to 1933 were numerous in Germany and in other countries. In fact, Germans were not the only ones that believed in the necessity of implementing measures of racial hygiene, as can be seen from the eugenics laws in the 20th century in the United States. Germany, however, took these measures to the extreme with their forced euthanasia program of ‘lives not worth living’.

In this poster, I will investigate the role of physical anthropology in the crimes against humanity committed in Germany and its occupied territories under Hitler's rule. I will look at the precluding factors in research that led to extreme measures such as eugenics and euthanasia programs. I will examine the experiments in the field of physical anthropology performed on concentration camp prisoners that were done in the name of research for racial hygiene. And I will finally look at the fate of physical anthropology and the scientists involved in these projects after the war, and consider the effect of this history on the future of physical anthropology.

The Frequency of Tuberculosis-Susceptibility Gene Polymorphisms in Manitoba Aboriginal Populations and their Relationship to Identified MTB Isolates

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Numerous strains of *Mycobacterium tuberculosis* (MTB) have been identified in culturally and geographically diverse groups in Manitoba and a high frequency of a severe form of tuberculosis is prevalent among some, but not all northern First Nations groups. This research seeks to work with First Nations individuals and communities to test whether or not those groups with elevated MTB rates have a higher frequency of tuberculosis-susceptibility SNPs compared to the general First Nations population and determine whether or not these SNPs were present in these populations prior to the arrival of Europeans. The identification and analysis of the tuberculosis-susceptibility genes in Manitoba's Aboriginal populations may lead to the development of vaccines or therapeutics that targets tuberculosis in these high-risk groups. This presentation will outline the strategies that will be used to

organize this research that will involve the expertise of numerous tuberculosis specialists in Manitoba.

The Relationship between Hysteria and Epilepsy in the Late 1800s

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The illness known as hysteria in the late 1800s in France has come to be associated predominantly with Jean-Martin Charcot, a neurologist who worked with hysterics at the Salpêtrière, an asylum in Paris which housed individuals (mostly women) with a variety of neurological problems. Epileptics and hysterics were kept on wards together in this facility. There was confusion during this period between hysteria and epilepsy and the housing of patients together may have influenced how Charcot described the disease. To Charcot, these patients were not simply hysteria patients: these patients were afflicted with hysteria in combination with epilepsy so it constituted a mixed form of hysteria. The hysterical seizures resembled epilepsy in the first stage, but after this initial similarity the patient went into full fledged hysterical seizures. There were four phases to the grande attack: the first phase resembled the epileptic seizure. The second stage consisted of violent movements, the most well-known was the "arc-en-cercle" also referred to as clownism. The third stage was called the "attitudes passionnelles" (emotional poses). In the fourth stage, consciousness was regained. In the era in which Charcot was working, a number of problems existed in distinguishing between epilepsy and hysteria. What was the relationship between epilepsy and hysteria? In this paper I will examine what was known about epilepsy in the late 1800s and discuss how this illness influenced the discourse surrounding hysteria.

A Case of Exchange: Post Contact Aboriginal Health in Southeastern Australia

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European colonization has resulted in dramatic changes in the health of many indigenous populations. While a general pattern of change can be recognized, understanding the processes behind that change requires a more local perspective. In this paper, using both archival records and human remains, it is argued that changes as simple as the introduction of fencing wire had ramifications for Aboriginal health in the Riverina region of southeastern Australia. Furthermore, Aboriginal health cannot be understood in isolation from the health of Europeans living in the district. In 1995 the remains of five people in the Cobramunga (Western Riverina) district were returned to the local community. They were recorded by the author as part of a collaborative project with the Wamba Wamba Aboriginal Land Council. These burials date to the post-contact period and provide rare physical evidence of the impact of disease and lifestyle changes that accompanied European colonization of Western New South Wales. Comparison with dated remains from before European contact show clear increases in markers of poor childhood environments and infectious diseases. Archival sources, particularly local hospital records, however,

demonstrate that the trajectory of these changes in health and demography are regionally specific. European settlement in the western Riverina was relatively late (1840s) and partitioning of land through fencing occurred even later. This created a particular pattern of disease among the Aboriginal people of the area.

Non-metric analysis of the Dentitions from Bronze Age Tell Leilan, Ancient Mesopotamia

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Dental non-metric traits have been recognized as extremely valuable aids in assessing biological affinities between populations because these traits are highly heritable, largely independent of environmental influence, and show significant variation between populations. This paper presents results of the analysis of dental non-metric traits from skeletal remains recovered from the northern Mesopotamian site of Tell Leilan, in modern Syria. Situated on the fertile Habur Plains, Tell Leilan began as a small, rain-fed agricultural settlement but quickly developed into a large, fortified city, the site of a highly organized state-level society. Nineteen mandibular and 23 maxillary tooth-trait combinations were scored, with the antimere exhibiting the highest degree of trait expression being used in the analysis. Traits and methods followed the Arizona State University Dental Anthropology system for permanent teeth and that of Hanihara and co-workers for deciduous teeth. The Tell Leilan skeletal population exhibits permanent dental trait frequencies consistent with Western Eurasian ancestry, a predictable conclusion given the geographic location of the site. These data from Tell Leilan can be added to the unfortunately very small corpus of data obtained from living populations in the Middle East and from other Mesopotamian archaeological populations, and it is hoped that future research in this area will lead us to a better understanding of the biological relationships of ancient Near Eastern peoples and the complex issues of migration and urbanization in antiquity.

Living and Dying in a Mining Town: Bell Island 1909-1918

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Mining communities offer unique case-study opportunities for anthropologists, particularly those interested in past studies of mortality. Historically mining was a male dominated high risk occupation, and mining-related deaths (both direct and indirect) were common and gender-specific. This study investigates the mining community of Bell Island, a small island 5km off the Conception Bay coast of Newfoundland. Submarine iron ore mining began in 1894 and ceased in 1966. This study focuses on the years 1909-1918, when Bell Island was essentially a single occupation community. The community was relatively isolated and there was no hospital nearby. This initial study examines government death registers, listings of employee fatalities at Wabana Mines, and population information extracted from the 1911 Census of Newfoundland. This research evaluates

various aspects of health, including cause specific mortality and gender, within the context of a mining community.

New and Improved? How does New Technology Measure up against Traditional Methods of Endocast Creation

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As part of a larger study into the affect of cultural cranial modification on the brain, a comparison of silicone and virtual endocasts was undertaken. The purpose of the comparison was to determine if the creation of virtual endocasts was as reliable and accurate as the traditional method involving silicone replication. To make this determination three crania were selected from the collection at the University of Western Ontario to undergo both CT-scanning/computer manipulation and silicone casting. The crania were scanned on a General Electric Lightspeed scanner at a resolution of 0.6mm. The subsequent data from the scans was input into AMIRA, a medical imaging software program able to create virtual endocasts. Silicone endocasts were then created using these same crania based on the methodology outlined by Murill and Wallace (1971). Both methods have their advantages and disadvantages in regard to potential specimen damage, cost, measurement precision, ease of creation and use as a teaching tool.

Analyses were completed by comparing the presence and absence of both particular blood vessel imprints and overall patterns on the endocasts, and by comparing measurements traditionally used to describe endocasts. The results of these analyses suggest that while virtual endocasts created through AMIRA are accurate, the level of detail is below that of silicone endocasts. These findings suggest that the new technology is a viable option for completing accurate research results; however, finer-detail CTscans, such as micro-CT, may offer more detailed results allowing for more information to be gained from this non-destructive means of study.

The Determination of the Sex and Ancestry of Cremated Remains: Assessment of the Effects of Heat-Induced Shrinkage

Stephanie-Marie Marciniak and Tracy L. Rogers

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The purpose of this research is to assess whether heat-induced shrinkage of the cranium introduces significant error in the determination of sex and ancestry. Thirty male and eight female crania were analyzed from the Grant Collection. A series of 15 to 22 measurements were taken and the shrinkage rates from the reviewed literature were applied to each. FORDISC 2.0 was utilized to analyze the outcome on the metric assessment of sex and ancestry. Significant differences in results for males lead to incorrect assessments of sex and ancestry at the 5% and greater (10%, 15% and 25%) shrinkage rates. Conversely, shrinkage did not influence the assessment of sex and ancestry for females. With the incorporation of colour change, an accurate relationship can be formulated among the two extremes of shrinkage. The 0 to 2% shrinkage rate is associated with temperatures below

800°C and can be correlated with blackened or charred remains. The 25% rate of shrinkage, which is associated with temperatures greater than 800°C, can be correlated with completely calcined (white) remains. There is a lack of correlation, however, among shrinkage, temperature, and colour between the two extremes of shrinkage, which can affect the accuracy of the evaluation of sex or ancestry. At the 5% shrinkage rate, it is not possible to discriminate between a female whose sex is correctly determined as female and a male who is incorrectly determined to be female.

Disease and the City Space: Preparing to view Winnipeg's core from a

Syndemic Perspective

Agapi Mavridis

McMaster University

A syndemic approach to the study of health in an area explores the relationship between health-related problems and the social conditions that create and sustain them. This poster illustrates preliminary research into the possible application of a syndemic framework to examine the health of residents living in downtown Winnipeg, Manitoba. In particular, the Point Douglas and Downtown community areas (as designated by the Winnipeg Regional Health Authority), will be the focus of this research, as they exhibit the highest frequencies of many transmittable and non-transmittable diseases in the city.

Relative Success of Trichromatic and Dichromatic Capuchins (*Cebus capucinus*) in Foraging on Camouflaged Insects in a Tropical Dry Forest

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Primates are unique among eutherian mammals in their capability for trichromatic (3 photopigment) color vision. Catarrhine primates (Old World monkeys, apes and humans) have routine trichromatic vision due to a duplication of the locus for the longer-wavelength opsin (LWO), located on the X-chromosome. In platyrrhine primates (New World monkeys) this duplication event has not occurred, however, several alleles of the LWO are present. Thus, only heterozygous females are capable of trichromatic vision while homozygous females and males are dichromatic (2 photopigments) and like most other mammals, are considered "colorblind".

The selective pressures for polymorphic color vision remain unclear despite the large amount of attention recently devoted to the topic. It is likely that the challenge of finding food plays an important role in shaping the selective pressures on color vision phenotypes. Many studies support the notion that trichromats are better suited than dichromats for finding colored fruit and edible leaves against the dappled forest background. Conversely, research on colorblind humans and

recent captive experiments on platyrrhine monkeys document a possible advantage to dichromats over trichromats in breaking color-camouflage. However, this has yet to be evaluated in a natural context.

We investigated the relative abilities of trichromatic and dichromatic capuchin monkeys (*Cebus capucinus*) to forage on camouflaged insects in a tropical dry forest of Costa Rica. Two groups (N= 35 individuals) of known color vision type were observed in both wet and dry seasons for a total of seven months. We found dichromatic monkeys to be more efficient overall at catching insects per time spent foraging. Additionally, we found efficiency of both dichromats and trichromats varied with different environmental conditions, including weather, foliage cover, and height in the canopy. Our results lend support to the theory of frequency-dependant selection, which predicts that polymorphism functions to decrease intraspecific competition in a population by maintaining multiple phenotypes, each adapted to different tasks. This differs from another main theory, heterozygote advantage, which predicts that trichromats are superior

Infant Health: Modelling Adaptation and Stability of Middle Ground Subsistence Economies

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This research tests the hypothesis that children's health can provide invaluable information as to how people made a living, what they ate and how stable the population's biological and cultural adaptations to local conditions were. Evidence is derived from four Near Eastern human skeletal samples from the central Zagros Mountains, dated to between 8,000 and 4,000 B.C.

The transition to agriculture has been viewed as a rapid irreversible transition between two dichotomous stable states - hunting/foraging and farming - with good health and poorer health, respectively. However, a growing body of evidence indicates that 'transitional' economies based on herding supplanted hunting/foraging in the Zagros Mountains during the early Neolithic and that not all of these economies led to the adoption of agriculture.

This study combines traditional skeletal markers of health, correlations of dental formation and enamel prism striation age estimates with long bone lengths, and Neonate (birth to one month of age) to Post-neonate (one month to one year) Ratios to assess children's health in these 'transitional' Neolithic economies. A model is then developed whereby the stability and success of these populations (ie. those using middle ground economies) can be inferred from the examination of infant skeletal remains.

Results suggest that in non-optimal situations, as estimated by non-specific skeletal indicators of stress and by archaeological context, a higher proportion of infant deaths occurred in the Post-Neonate than in the Neonate period. This is consistent with ethnographic observations in modern non-Western contexts.

A Minimally Destructive Protocol for the Analysis of Proteins in Egyptian Mummies

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One of the greatest obstacles in the molecular analysis of ancient tissues is contamination by modern material. This is especially true for ancient DNA (aDNA) analysis where even trace amounts of contamination can cause false positives and sequencing errors. A number of strategies have been developed to counter this, such as the use of multiple samples in separate laboratories and facilities set aside specifically for aDNA analysis. For some applications, such as palaeopathology, identification of species-specific proteins from parasites or other infectious organisms may also be of use in confirming the results obtained by genetic testing.

Mummified tissue is a notoriously difficult material for study. The sample sizes are often small, due to its scarcity and value, and different tissues appear physically very similar. We have been developing a protocol for studying ancient proteins in mummified tissue, based around samples prepared for histology, which can lessen these problems. The protocol uses histological stains to identify the tissue type and IR spectroscopy to assess the preservation of bulk protein in the sample. Specific proteins can then be detected in suitable specimens using immunohistochemistry and immunoblotting.

The results to date show that histology, immunohistochemistry and IR spectroscopy may all be carried out successfully on mummified tissue prepared using techniques very similar to standard methods. Protein extraction from formalin fixed, paraffin embedded, experimentally mummified modern tissue can also be carried out successfully. Extraction of ancient proteins appears, however, to be adversely affected by co-extracting substances. The identity of these co-extracts and methods to lessen their effect will be discussed, as will the implications of the variable preservation potential of proteins revealed by experimental mummification.

Once optimized, it is hoped that this protocol will provide a useful tool for molecular analysis of ancient remains. The initial stages of tissue typing and assessment of the molecular preservation may also show promise as a screening tool for use by tissue banks in identifying new tissue samples and their suitability for further analysis.

The 'Subadult': Theoretical Perspectives in the Biological Anthropology of the Child.

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The past decade has seen significant advancement of anthropological understandings of children and childhood. Much of this literature comes from sociocultural studies of children's agency and resilience in adverse environments. While there have been few biological publications that address purely theoretical aspects of child studies, much anthropological research that is biological conceptualizes children and childhood in ways that contribute significantly to this emerging body of theory. This paper examines the strengths and weaknesses of biological approaches to the anthropology of the child.

Ancient Travellers from Pacatnamu, Peru: Evidence from Phosphate Oxygen-Isotope Ratios in Human Tissues

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Previous isotopic analyses ($\delta^{13}C$ and $\delta^{15}N$) of both bulk hair and bone from the site of Pacatnamu, located in the Jequetepeque Valley on the north coast of Peru, have demonstrated a shift in the consumption of marine resources between the Moche (ca. 450-750 A.D.) and Lambayeque periods (ca. 900-1100 A.D.). Sequential analyses of hair, however, demonstrates short term intra-individual variability that is even greater than the long term shift associated with cultural change. The frequency, timing, and amplitude of dietary change in the hair are inconsistent with patterned seasonal consumption but could indicate geographic relocations resulting from short term travel between regions with different food resources, for example, coast and highlands.

We further investigate the occurrence of geographic relocations using oxygen isotope analysis of phosphate, primarily in human bone. Variability in these data indicates that some people had recently come to the site from at least one other region. The majority of relocated individuals were children. We explore explanations for this variability which include the vertical (coastal/highland) nature of ancient Peruvian exchange systems and the hypothesis that Pacatnamu was a religious pilgrimage site.

In Search of the Perfect Pustule: Challenges to National Smallpox Inoculation in 19th Century U.K.

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Prior to the beginning of the 20th century, one of the few effective measures to prevent disease was smallpox inoculation. Despite the great fear of the ravages of smallpox, vaccination of infants made slow progress during the 19th century. In Great Britain, vaccination was available free of charge beginning in 1815 and in 1853 it became compulsory. By 1860, a review of smallpox vaccination among British children shows that, because of regional variations in compliance, misunderstanding of instructions and ineffective vaccine lymph the level of inoculation could be as low as 20% of new births. The goal of inoculation was the 'perfect pustule', which would leave a permanent scar indicating successful immunization against smallpox.

This paper presents new work on the changing levels of smallpox vaccination throughout the late 19th and early 20th centuries, based on the inspection of military recruits. Although the recruits were adults, the marks tell of the vaccination of the child. The data show regional and temporal variations in the level of smallpox vaccination within the U.K. In 1858, the large number of imperfect marks led the army to adopt the policy of re-vaccination of all recruits, which greatly reduced levels deaths due to smallpox. Much of the progress in vaccination of infants depended on the compliance of parents, while improvements in successful vaccination and revaccination of army recruits depended on improvements to the quality of the calf lymph.

Diet and Growth of Makushi Amerindian Children in Neighboring Villages in Guyana

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Amazonian Indians are among the shortest people in the world. While the etiology of this condition remains unclear, researchers have proposed that this may be explained by environmental factors such as diet, infection, and climate, as well as genetic factors. By focusing on the diet of Makushi Amerindian children in neighboring villages in Guyana, this paper affords an opportunity to evaluate the potential relationship between diet and growth. Although, both villages occupy similar environments and the villagers presumably share similar genotypes, the children in these villages exhibit significantly different rates of stunting (23% vs. 50%) and wasting (5% vs. 23%). Given the environmental and presumed genetic similarities, we hypothesize that these differences in growth can be explained by differences in diet. The hypothesis is evaluated by comparing 24-hour dietary intake data collected on 23 individuals under the age of 5 years. Data were collected twice a month for a period of one year for a total of 304 daily records. Dietary intakes were assessed using Diet Analyzer Plus and the World Health Organization's daily recommended intakes. Results indicate that the children in both villages have insufficient caloric intake. Children from the village with the higher rate of stunting and wasting had significantly lower intakes of iron, sodium, vitamin A, thiamin and riboflavin. The results suggest that the higher prevalence of stunting and wasting in children in this village may be the result of these micronutrient deficiencies.

Growing Up North: The Archaeology of Childhood in Nunavut

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It was only relatively recently that childhood became a topic of serious interest to researchers studying ancient material culture. This paper will illustrate some archaeological approaches to childhood by drawing upon the author's research into the Dorset and Thule cultures of Arctic Canada. In late prehistoric times Nunavut was occupied sequentially by these two cultures, the latter being the direct ancestors of the Inuit who live there today. For archaeologists interested in exploring childhood the Arctic has three very desirable characteristics: potentially magnificent preservation due to the effects of permafrost; a complex and varied material culture; and from their Inuit descendants a rich and detailed body of ethnographic information that can be drawn upon for analogy. With these advantages it is possible to identify a wide range of artifact types specifically associated with children, which can be studied to learn about the role of children in society. This paper will conclude by discussing how a bioarchaeological approach might contribute even further to our understanding of what it was like to be "Growing Up North" in Dorset and Thule times.

Developmental Defects in Two Skeletal Collections from England

Mindy Pitre

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The skeletons of 39 Quakers from Kingston-upon-Thames (1663-1814 AD) and 42 members of the St Augustine the Less church, Bristol England (1240-1956AD) were examined for the presence of developmental anomalies of the vertebral columns, ribs, and base of the skull. The skeletal remains from the Quaker (KUT) and St Augustine (AUG) samples offered a potential opportunity to study defect frequencies in an isolated and assorted gene pool respectively. Little variation was found in the presence of defects between both collections. The majority of defects consisted of disturbances in the development of paraxial mesoderm (AUG=50%; KUT=51%). Border shifting (AUG=38%; KUT=41%) and developmental delay of vertebral elements (AUG=14%; KUT=21%) (clefing of the sacrum and select vertebrae) were the most common defects of the paraxial mesoderm. Less common were errors in segmentation such as block vertebrae and numerical errors (AUG=5%; KUT=12%). Notochord defects and rib abnormalities were absent. Some defects were sporadic, recorded in only one or a few skeletons (e.g., transverse basilar cleft) while a tendency for certain defects to occur more frequently than others was apparent (i.e., cranial shifting at the occipitocervical and thoracolumbar borders). Differences in social and marriage patterns between both groups did not seem to have an effect on overall defect frequencies. An overall absence of nutritionally-derived traits suggests that individuals from both archaeological samples probably led reasonably healthy lives.

Hand Manipulation Skill of Gibbons

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Current neurological research has suggested that hylobatids lack capacities for higher cognitive functions characteristic of the great apes; accordingly little research has been done on the behavioural expressions of cognition in the lesser apes in conjunction with their hand manipulation skills. Previous researchers have suggested that gibbons possess limited ability to grasp objects because of their unique hand shape; however information on the manipulative abilities of their hands is scarce.

The aims of this study were to understand the ways in which gibbons use their hands to transport, manipulate and hold objects, which offers insight into the cognitive and functional abilities of the species. This study monitored object use and hand manipulation skills as well as behavioral change invoked by the introduction of inanimate objects to gibbon environments. All manipulation of objects, individual activity patterns, and interactions between group members were recorded through focal animal studies on two pairs of adult gibbons to discern if lesser apes are capable of finding ways to use their hands to manipulate objects as other apes do. Additionally extensively during a variety of activities and show marked differences in the way hands are used during specific activities. Frequency of specific types of hand contact

with objects suggest that there are significant differences between the sexes in terms of object manipulation as well as in time spent in contact with various objects., the kinds of inanimate objects (textures, colors, etc.) gibbons are attracted to was noted to increase our understanding and ability to provide greater stimulation in captivity. Initial analysis of data suggests that gibbons are able to manipulate objects in a variety of different manners beyond those suggested in previous descriptions of object manipulation. Gibbons use their first digit(pollex) extensively during a variety of activities and show marked differences in the way hands are used during specific activities!

Frequency of specific types of hand contact with objects suggest that there are significant differences between the sexes in terms of object manipulation, as well as time spent in contact with various objects.

Excavation of a Rural Roman Cemetery at Vagnari, South Italy

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Excavations since 2000 at the site of Vagnari, south Italy, have revealed the presence of a large settlement (ca. 3 hectares) consisting of housing, extensive industrial areas, and a cemetery. Stamped architectural tiles discovered at Vagnari and environs suggest that this site and the surrounding territory were owned by the Roman emperor, and were managed by a local administrator. The site of Vagnari, near the modern city of Gravina, is the largest Roman Imperial settlement in the Basentello valley and likely was its economic center, especially given its location near the Via Appia, an important trade route linking the city of Rome to the southeast coast of Italy. Three years of excavation (2002-2004) have uncovered 38 inhumation burials (25 adults and 13 subadults) and 1 cremation burial. The majority of the burials are 'a cappuccina', characterized by large tegulae covering the individual in an inverted 'V' shape. Archaeological evidence for the economic activity at Vagnari and the relatively modest grave goods found in the burials suggest that this population probably consisted of slaves, freedmen, and/or free tenants, who lived and worked on this site. Grave goods found within the burials date the cemetery to the 2nd - 4th centuries AD. This poster will provide a description of the cemetery and a preliminary demographic and paleopathological analysis of the human skeletal remains. The ongoing excavation of this cemetery and the subsequent skeletal analyses will provide insights into the lives of a relatively unknown segment of the ancient Roman population, the workforce of a rural Imperial Roman estate.

Exploring Childhood Growth, Morbidity, and Mortality in Roman Italy

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Studies of childhood growth and development in past populations have explained observed patterns of growth faltering, morbidity, and mortality as the result of complex interactions between nutrition and infection. It is also recognized that some variables influencing growth and development may not be visible in the skeletal record. Thus, it is important to use as many (and varied) lines of evidence as possible when attempting to evaluate the relative significance of factors affecting childhood growth, nutrition, and health in the past.

This paper presents the skeletal sample from the Imperial Roman necropolis of Isola Sacra, Italy (ca. 1st – 3rd centuries AD) as a case study, drawing together multiple lines of evidence from archaeological, historical, skeletal, and dental data to develop a comprehensive picture of the factors affecting childhood development during Roman times. Literary evidence from the Roman period provides contextual information on infant and childhood rearing practices from the time of birth, including recommendations on how infants should be breastfed. Isotopic data contribute to an understanding of the pattern and process of weaning and the subsequent diets of children. Microscopic evidence from teeth give us a precise indication of the occurrence and timing of 'insults' that can be used in tandem with long bone measurements to explore skeletal evidence for growth faltering, possibly related to undernutrition and disease. Finally, palaeopathological evidence provides further information about morbidity in this skeletal sample.

Muscular Robustness and Morphological Study of the Upper Limb Articulations in Humans

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Muscular robustness and morphological study of the upper limb articulations in humans. Although it has been accepted for years that the cross-sectional shape of the diaphysis is modeled in response to the mechanical demands incurred during growth, articular surfaces and shape were often considered to be predetermined genetically. It is now known that contractions of muscles crossing the joints are necessary for proper formation and development of the articular surfaces. Geometry of the articular surface is modified during growth in response to the loads produced by muscular contraction in order to reduce the risk of damage to the articular cartilage, tendons, ligaments, and articular capsule. For many articulations, the resulting congruent shape of both articular surfaces provides stability. Very few studies have been able to demonstrate directly the influence of muscle contractions on the shape of joints in humans. This paper tries to determine if the size and/or the shape of the articulations of the upper limbs change according to the forces that cross them. The upper limbs are used because, in contrast to the lower limb, they are not shaped by gravitational forces, which are mostly symmetrical, and most humans favor the use of one arm over the other.

This project compares articulation of the right and left side of modern humans. It is hypothesized that the favoured side of the upper body will have larger articulation than the other side. Size of the muscle insertions for each side

is used as a surrogate for the charges incurred by upper limb articulations during life. The results, so far, show that there is an asymmetrical tendency found in the muscle insertions at the individual level. However, there does not seem to have any significant correlated differences in size of the articulations. It is possible that the difference in loads incurred by articulation of the right and left arm are instead reflected by shape differences. For example, in order to better distribute the larger loads, joints may develop flatter surfaces. Further study on this question is currently in progress.

Hammer, Tong, and Caliper: The State of Physical Anthropology in Canada, 1910-1930

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Anthropology was slow to professionalize in Canada, even slower to gain academic standing in the country's universities. For decades after its founding in 1910, the Anthropological Division of the Geological Survey of Canada served as the discipline's main institutional base, its employees -civil servants- having to contend with often glaring contradictions between their own scientific and scholarly priorities and the priorities of bureaucrats and politicians who set policy and controlled the purse strings. This paper examines the implications of this arrangement for one branch of the Division's national research program during its first twenty years: the physical anthropology of Canada's Aboriginal population.

Dental Variation in Modern Populations

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Forensic anthropological research must abide by the Daubert criteria (U.S.A.) and Mohan ruling (Canada) to ensure admissibility in a court of law. Current methods of evaluating ancestry and establishing positive identification do not necessarily meet these requirements, since they lack rigorous testing. One way to resolve this issue is to establish frequencies of traits and determine the probability of features occurring within particular populations. By establishing frequencies of dental traits in specific ancestral groups, it will be possible to assist law enforcement agencies and forensic specialists in the positive identification of human remains discovered in forensic contexts. This research will utilize dental information, radiographs and photographs to score frequencies in the sample. Personally identifiable information from each patient will be excluded from the dataset, and each patient record will be assigned a random case number in lieu of a name to ensure confidentiality. The sample consists of patients ranging from 5-80 years of age representing different ethnicities. The traits to be evaluated include: rotation of teeth; crowding of teeth; molar cusp pattern (examining the occlusal surface); extra cusps, such as protostylids and Carabellil's cusp; shovel-shaped incisors; double-shovel-shaped incisors; peg-shaped teeth; taurodontism; enamel extension and pearls; deflecting wrinkle and/or trigonid crest.

Contextualizing Smoking Behaviour in Young Gibraltarians: The Community Interface

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Cigarette smoking within the British dependent territory of Gibraltar has long been high among the male inhabitants. From the eighteenth century onwards, Gibraltar's strategic location in the Mediterranean, along with its free port status, established 'the Rock' as an important node in global trade and military networks. As a free port, taxes on tobacco products were extremely low, enabling tobacco to quickly become a cornerstone of the Gibraltarian economy, both licit and illicit. Commenting on the ubiquitous nature of cigarette use in Gibraltar, a local physician in 1905 noted that "it is more likely to see a white crow than a Spaniard without a cigarette dangling from his mouth". More recently, however, a dramatic rise in tobacco use has been noted among the youth of this community, particularly adolescent females. This trend was discerned from local public health surveys made available to the authors on the smoking habits of 12-19 year old students and their parents in Gibraltar. A total of 1274 (626 male, 648 female) students participated in the 1974 survey, followed by 1461 (734 male, 727 female), 1291 (577 male, 714 female), and 1368 (618 male, 750 female) in 1981, 1988, and 1997, respectively. Applying a case study approach and relying on variety of data sources (e.g. health surveys, archival documents, participant observation) this paper seeks to highlight the importance of community and context in understanding smoking habits.

This study provides evidence that adolescent smoking in Gibraltar is linked to parental smoking behaviour, age, peer influence, media, and changing economic and social conditions. Moreover, it demonstrates the ways in which smoking becomes normative in a community with a long history of economic dependence on the tobacco industry.

Can we learn anything new from a Small Colonial Fortress Community about the 1918 Influenza Epidemic?

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Like thousands of other communities in 1918, Gibraltar was struck by the deadly influenza pandemic. Detailed analyses of the mortality records for 1918 versus 1919-22 indicate: a significant drop in life expectancy at birth by at least five years, a sex differential in the age-specific mortality pattern, and a positive correlation between overall mortality and areas of excessive overcrowding. Further exploration of the data will focus on the impact of the epidemic on the stillbirth rate and the pattern of births. At the qualitative level, textual material reveals that the epidemic in Gibraltar was noted for a lack of hospital attendance during the epidemic by the indigenous population, an outcry by the local community over serious cases being brought in from sea-going vessels, and the virtual absence of any official public

communications from colonial authorities during the epidemic.

Timing of Formation of Localized Hypoplasia of the Primary Canine in Humans.

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A commonly observed enamel defect in deciduous teeth is a flat-bottomed pit or crater on the mid-labial surface of primary canine crowns. Termed localized hypoplasia of the primary canine (LHPC), these defects are poorly understood. Based on their location, appearance, and prevalence by tooth type, LHPC is claimed to have a separate aetiology distinct from linear enamel hypoplasia. The most developed model for their production, proposed by Skinner and co-workers in publications in the

1980's and 90's, posits that two conditions are necessary for their development: i) reduced retinol levels and ii) mild physical trauma. These authors hypothesise that individuals with retinol deficiency may develop abnormal fenestrations of cortical bone overlying the canine crypt, making those ameloblasts that are unprotected by any bony covering more vulnerable to damage from mild physical trauma. In a more recent paper on LHPC in apes (2003), Skinner and Newell appear to downgrade the role of diet in the formation of cortical dehiscences, instead attributing it to a physical imbalance between crown size and crypt expansion. The second factor, trauma, in humans is said to result from exploratory 'mouthing', an activity that occurs in the first year of life. Timing of the formation of LHPC is key to this hypothesis.

This paper presents the results of a small histological study of

LHPC carried out mainly on teeth from the Imperial Roman necropolis of Isola Sacra, ca. 2nd to 3rd century ACE. We are the first to establish an accurate chronology of formation using odontochronology. Our results, showing that the initiation of the lesion occurs between 3 and 4 months, fall on the lower side of the range estimated by Skinner et al. of 3.6 to 7.4 months. However, our histological reconstruction of the sequence of events during lesion formation differs from other published interpretations. For instance, it is evident that LHPC are classic 'pit form' hypoplastic defects, with stress markers (Wilson bands, accentuated striae) associated with the floor of pits. These stress markers occur through the whole ameloblast sheet, not just in the area affected by the lesion. This suggests a systemic disruption and we discuss alternative hypotheses.

A Measurement Error Study Using Small-Bodied Insectivorous M₂ Dimensions

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A measurement error study was undertaken to statistically evaluate whether the current methods of

measuring primate shearing crests (Kay, 1975; Kay and Covert, 1984; Strait, 1993; Coupar, 1996; Kirk and Simons, 2001; Strait, 2001) and molar dimensions (Hlusko *et al.*, 2002) yield accurate and precise results. This study was designed to test two hypotheses: 1) whether significant differences existed between the means of measurements taken by each observer, and 2) whether the differential size of the M₂ of each species caused significant differences between the measurements taken by each observer. Mesiodistal (MD) length, buccolingual (BL) width, and eight separate shearing crests were measured on the left M₂s of *Erinaceus europaeus* (European hedgehog) and *Blarina brevicauda* (short-tailed shrew) by two separate observers. The eight shearing crests measured were: the protocristid (crest 1), paracristid (2a & 2b), cristid obliqua (3), postcristid (4), postmetacristid (5), and entocristid (6a & 6b). Measurements were repeated ten times by each observer for each species over a period of two weeks to ensure precision. The mean measurements of MD length, BL width, and each shearing crest were then calculated for each observer for each species and a Student's two-tailed *t*-test was used to test the above hypotheses. P-values of ≤ 0.05 were considered to denote significant differences between mean measurements. The results of this study indicate significant differences between many of the measurements taken by each observer for the characteristics analysed. The most significant differences for both *E. europaeus* and *B. brevicauda* were observed for the cristid obliqua, postcristid (4), and entocristid (6a & 6b). Also, the mean measurement for MD length for *E. europaeus* was significantly different between observers. We conclude that there is a lack of precision and accuracy in the accepted method used to measure primate shearing crests, mesiodistal length, and buccolingual width on the left M₂. Therefore, we advocate the importance of conducting a measurement error study when employing any method of measurement, especially when measuring molar shearing crest lengths on small-bodied insectivorous primates.

Changing Paradigms in the Study of Primate Origins

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Several scenarios have been suggested to explain the evolution of the unique constellation of traits that characterizes living primates. Among the factors these scenarios emphasize are adaptations to an arboreal milieu, specializations for visual predation, co-evolution with angiosperms, and features for grasp-leaping arborealism. In recent years the primary source of evidence used for evaluating these scenarios has been the study of extant primates, and living non-primate model taxa such as marsupials.

However, it is only through study of the fossil record that direct evidence for the process of primate origins can be uncovered, and these scenarios tested directly.

For the last 15 years the view has been widespread that plesiadapiforms, an extinct group of fossil mammals once thought to be archaic primates, were actually early representatives of Dermoptera, an Asian order of gliding mammals. However, recent discoveries and detailed analyses have demonstrated that this view is poorly supported. Instead,

plesiadapiforms are revealed as the earliest radiation of fossil primates and as the forms most relevant to assessing hypotheses about primate origins. Study of plesiadapiforms in a functional and phylogenetic context demonstrates that characteristic primate traits such as grasping hands and feet, the postorbital bar, low-crowned, bunodont molars for eating fruit, and long legs for leaping arose in a mosaic fashion in early primate evolution, rather than in a single adaptive shift at the base of the order. The order and timing of the evolution of these traits suggests that co-evolution with angiosperms was likely a key driving force in the earliest phases of primate evolution. In contrast, neither a shift to an arboreal milieu, nor the adoption of visual predation, emerge as key events in the origin of the order.

The Benefits of 3D Imaging in Researching Bone Pathology

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The study evaluated the diagnostic and research potential of six imaging modalities: 3D imaging using ARIUS 3D software, Gross, (non-destructive) Microscopy, CT Scan, Radiograph and MRI, as they relate to palaeopathological analyses. The sample consisted of two archaeological specimens from the Kleinberg collection; a femur exhibiting manifestations of osteomyelitis and four fused vertebrae displaying characteristics of tuberculosis (TB). Utilizing the specimens, the six imaging modalities were compared and contrasted in regards to cost, view, clarity, ease of use, observable features/bone structures, ability to differentiate between active/healed and atrophic/hypertrophic bone growth, and lastly its ability to aid in the diagnosis of the pathological condition. The results indicated that 3D images have great archival, educational and preservational aspects which include: (1) Less handling of fragile specimens, (2) exact replica for further study if bones are repatriated, and (3) ability to share data - with the potential for creating a public database with unlimited access to specimens. The major downfall is the expense of the 3D images, since they do not provide any more diagnostic information than the initial gross observations. Gross analysis is portable, provided the researcher has a sufficient knowledge base. Non-destructive microscopy further magnifies what is not apparent to the naked eye at a cost effective price; but, it is cumbersome with problems arising from the size of the object being viewed comparable to the actual field of view. Radiographs are easier to obtain and more cost effective than CT scans; but a more in depth look at the structures can be achieved when viewing CT splices. MRI proved to be the least beneficial since no image was recorded due to the lack of hydrogen isotopes in dry archaeological bone. Therefore, even with all the sophisticated imaging technology, the specimens were diagnosed using two of the simplest and inexpensive methods: gross analysis and radiographs. These findings provide an in depth evaluation of the imaging technologies currently available to researchers since, at this time, research of these technologies revolves around their importance within hospital settings and not their applicability to anthropologists.

Using Magnetic Resonance Imaging to Compare the Frontal Sinus Morphology in Monozygotic Twins

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The goals of this research project were two-fold: Firstly, to investigate the use of Magnetic Resonance Imaging (MRI) to physical anthropology; and secondly and more specifically, to look at similarities and differences in the morphology of the frontal sinuses of identical twins using MRI. MRI is a technology frequently and effectively used in the medical field. Its employment of radiowaves and magnets means it is harmless to patients and volunteers, and therefore ideal for clinical and research purposes. MRI was evaluated in this study through the investigation of the frontal sinuses, structures of specific interest to physical anthropologists. The frontal sinuses are located between the inner and outer tables of bone in the forehead region. They have a long history of study by physical anthropologists and although their function remains elusive, they are frequently used to provide clues to personal identity in forensic contexts. In this study the frontal sinuses of nine pairs of monozygotic twins were compared using measurements of maximum height, width, depth and volume, in addition to qualitative descriptors. Intra- and interobserver error research was conducted and basic statistical analysis was performed. The results show that, though some twins were very similar to each other, others were notably different. There was also considerable variation observed between the twin pairings. It is concluded that MRI is very useful to both soft tissue and hard tissue studies. Though more concrete conclusions regarding the uniqueness of twins' frontal sinuses will be dependent on larger sample sizes. With the increased employment by medical facilities of new techniques such as MRI and CT, the antemortem record is becoming increasingly diverse with images of the frontal sinuses being not only in traditional radiographic format, but now more commonly in three-dimensional CT or MRI format. Anthropologists must learn to interpret these scans and structures for cases of personal identification. This research finds that the frontal sinus patterns can be compared using MRI data and therefore, the technology has the potential to be useful in forensic cases.

Utilizing Geographic Information Systems in the Search for Human Remains

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Forensic anthropology combines aspects of archaeology, geology, and geography to enhance the search and recovery of human remains. This study explores the use of geographical techniques, specifically Global Positioning Systems (GPS) and Geographical Information Systems (GIS) in the search for human remains. The aim of the research was to develop a GIS based protocol in the search for human remains that incorporated preliminary information from the investigators, a tip from an informant and/or found human remains, ground reconnaissance, body dumpsite characteristics, aerial photography, topographic maps, and Global Position Systems (GPS) to guide the ground

reconnaissance and create a search plan. Before the protocol could be developed each aspect had to be examined individually. GPS, being one of the more critical components, required greater attention. An experiment was designed to test the accuracy of handheld GPS units, comparing a military to a civilian model. Neither model was capable of producing consistent results with low error. Based on experimental results GPS was deemed useful as a general navigation tool, but not an efficient tool for determining exact locations.

The second phase of the research utilized GIS technology in the search for human remains. The goal of the GIS portion of the research was to gain information regarding the topography of the potential search area prior to visiting the location. To maximize the efficiency of the use of GIS a standardized protocol was developed. The protocol included sections for information regarding the case as well as a systematic checklist for the application of GIS technology. The protocol was applied to the mock Katie da Silva case, created for a University of Toronto forensic anthropology course, to test its effectiveness. The proposed protocol was successful in locating and minimizing a search area that contained a clandestine burial related to the mock Katie da Silva Case. It was determined that this protocol can be successfully applied in cases where there is a trained GIS investigator available and there is an abundance of preliminary information.

From Dawn 'til Dusk? : The Activity Pattern of *Carpolestes simpsoni*

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In order to reconstruct the ecology of an extinct animal it is vital to know what activity pattern it exhibited. Fortunately for those who study fossil primates, small extant primates (<75mm from prosthion to inion) have consistently smaller orbits than similarly sized nocturnal forms. Diurnal living primates also typically have larger optic foramina (relative to orbital diameter) than nocturnal primates, which is related to their generally higher visual acuity. There is a danger, however, in assuming that the same scaling relationships apply to all the most primitive members of the order, the plesiadapiforms, including *Carpolestes simpsoni*. Particularly, *C. simpsoni* has relatively small orbits and small optic foramina, a combination not seen in any living primate.

In order to determine whether any consistent relationship exists between relative orbital diameter or relative optical foramen size and activity pattern in non-primate small mammals, pertinent measurements were taken from a sample of rodents and insectivorans from the Manitoba Museum. These measurements were combined with existing data from other small mammals, and studied using regression analysis and box-plots. The results demonstrate that there is no consistent relationship between orbital diameter and activity pattern in non-primate small mammals. This implies that this variable cannot be used in isolation to reconstruct activity pattern in fossil primates whose orbits do not scale like those of living primates. There is also no consistent pattern between relative optic foramen size and activity period in non-primates, with some groups of small mammals exhibiting a much wider range of variation than seen in Primates as a whole.

Restricting comparisons to euarchontans (Dermoptera, Scandentia) suggests that *Carpolestes simpsoni*'s small orbits and optic foramina are more consistent with a nocturnal activity period, which is in agreement with reconstructions of the primitive activity pattern of Primates as being nocturnal. However, in light of the range of variation seen in the insectivorans and rodents studied here, such conclusions need to be made cautiously.

Collection of Photographic Evidence for Trial Purposes and Construction of Demonstrative Aids

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When compiling a visual inventory, it is imperative that forensic anthropologists establish the authenticity of their images for evidentiary purposes. Recent developments in digital imaging technologies have resulted in the establishment of best practice guidelines for the collection of electronic evidence. Due to the increased demand and reliance upon electronic media in medico legal investigations, many countries are in the process of developing and revising legislation pertaining to the authenticity of electronic evidence. This progress necessitates forensic anthropologists factoring additional technical information into their visual inventories.

In court, forensic anthropologists can incorporate visual/demonstrative aids to supplement their verbal testimony using images captured during their analyses. The anthropologist and legal counsel may consult a medical illustrator to help create the visual aids. Therefore, forensic anthropologists must employ the best image capturing processes in order to assist medico-legal illustrators and forensic artists.

The objectives of this paper are: first, to identify the technical information that forensic anthropologists should document when creating photographic inventories of osteological remains, particularly for digital media; second, to identify the technical aspects forensic anthropologists should consider when capturing images that may be incorporated into visual aids for trial purposes.

Visual recording of skeletal remains in standardized anatomical planes is critical for orienting and contextualizing the elements for the viewer. When compiling a visual inventory of digital images, forensic anthropologists should create an unaltered and secured 'master/reference' file, as well as a 'working' copy that interested parties may consult. Each digital image should have a corresponding audit trail or work log that documents the date and time that the image was accessed, as well as the method and reason for manipulation.

Forensic anthropologists are obligated to demonstrate that the electronic images are not unduly altered. Additionally, they are compelled to provide correct positioning and documentation of each skeletal element in order to ensure admissibility of images and maximize their potential use in visual demonstrative evidence presentations.

Teotihuacan's Interaction with the Guatemalan Pacific Coast: Preliminary Isotopic Evidence

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The nature of the relationship between the powerful central Mexican state of Teotihuacan and various parts of the Maya world has been hotly debated. The Pacific coast of Guatemala was not only an area rich in natural resources, but it was also strategically located for the control of other Maya areas. Archaeological evidence suggests that there was direct contact between the Pacific Guatemalan coast and Teotihuacan that developed into colonization. The extent of political and economic control exercised by the central Mexican state may have been the result of actual military conquest stemming from the adoption of a more expansionist policy. The geographic origins of 15 individuals from sites in the Esquintla region (Los Chatos, Manantial, Balberta) were reconstructed using oxygen-isotope ratios from bone and enamel phosphate. A substantial portion of these individuals exhibit isotopic compositions that are consistent with a Teotihuacan origin. The data are discussed in light of the above hypotheses as well as the hypothesis that Pacific Coast people were present at the highland Maya site of Kaminaljuyú.

The Children of Kellis 2: Bioarchaeology of a Roman Period Cemetery in Dakhleh, Egypt

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Childhood in ancient Egypt is often depicted as being carefree, with parents cherishing their children, yet little is known about childhood in Egypt during the era of Roman rule (c. 27 BC – AD 395). Some scholars have described childhood in the Roman Empire as being less than desirable, while others indicate that children were valued. It is clear that Roman ideology, particularly political, religious and economic ideologies, had a significant impact on life in Egypt, however the impact of ideologies concerning infancy and childhood has been largely unexplored. With the appearance of Christianity around the third century AD, in particular, another provocative dimension was added to the social, religious, and political character of the communities in which individuals were born, lived and died. In this paper, we present the preliminary results from bioarchaeological analyses of the foetal, infant, and child remains from Kellis 2, a Roman period cemetery located in Dakhleh, Egypt. To date, excavations have revealed the exceptionally well-preserved skeletal remains of 635 individuals, approximately 61% of which represent the remains of children, the youngest aged at 22 weeks gestation. At a time when adults have been considered the normative category in many archaeological and skeletal investigations, the analysis of non-adult skeletal remains is extremely important. The Kellis 2 cemetery presents the possibility of exploring the setting, the nature and the course of this complex

interaction and its effect on the lives and mortuary treatment of the children interred there.

Bioarchaeology Redux: A Holistic Approach to the Study of Biological Material

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In everyday language, people frequently use the terms physical, or biological, anthropology and bioarchaeology interchangeably. The term bioarchaeology first appeared in print, albeit in reference to zooarchaeological analyses, in 1972. The term was soon appropriated by researchers in the anthropological community, and generally came to refer to the study of skeletal human remains recovered from archaeological contexts. With an increasingly interdisciplinary approach to the study of humans in the past, however, bioarchaeology has broader applications than was once the case. In this post-positivist era of anthropological study, earlier definitions appear somewhat outdated and inadequate in terms of understanding the dynamic relationships that existed within past societies. We propose a new definition of the term, and advocate for a more holistic approach to the study of biological material that is derived from archaeological endeavours.

Bone Weathering Patterns in Southern Ontario of Metatarsal v. Femur and the Postmortem Interval

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25 defleshed pig femora and 25 metatarsals were observed over a year to establish: (1) bone weathering patterns for use in estimating time since death in Southern Ontario; and (2) whether larger (femora) or smaller (metatarsals) bones provide a better indicator of time since death. Pig hind limbs were observed to determine a timeline for decomposition of soft tissues during the fall and winter. Ambient air temperature, humidity, precipitation, sunlight, soil pH, and freezing and thawing were considered as factors affecting the breakdown of bone. Weathering patterns were observed based on the extent of bleaching, amount of periosteum and soft tissues present, as well as the appearance of greasiness, cracking and flaking of cortical bone. Both entomological activity and climatic conditions affected soft tissue decomposition. Animal activity affected both the process of bone weathering and soft tissue decomposition, causing variability in sample decomposition and bone breakdown. The variation in microenvironment, partially caused by soil composition, introduced variability in bone weathering rates. Overall, femora show more changes in weathering than the metatarsals. For example, cracking was observed in 12.5% of femoral samples by six and a half months, while no cracking was observed on any metatarsals at that time. The femur also provides a better indicator of time since death than can be established using metatarsals.