



Paleopathology Club - Newsletter No. 148
<http://www.pathology.vcu.edu/research-labs/gerszten-lab-research/paleopathology-club/>
April, 2018



IMPORTANT NEWS

Our Newsletter is **ONLY** available via E-mail.

Dear Members:

The 42nd Scientific Session of the Paleopathology Club will be held Sunday, March 17, 2019 from 1:30-3:00 p.m. during the:

108th Annual Meeting of
The United States and Canadian Academy of Pathology
Sunday, March 17, 2019
Gaylord National Resort and Convention Center
National Harbor, Maryland, U.S.A.

If you would like to submit a paper for platform presentation, please send us the title and author.

The 41st Scientific Session of the Paleopathology Club was held Sunday, March 18, 2018 from 1:30-3:00 p.m., at the Vancouver Convention Center during the:

107th Annual Meeting of
The United States and Canadian Academy of Pathology
Sunday, March 18, 2018
Vancouver, BC, Canada

Enclosed are the abstracts of their presentations.



Speakers of the program in Vancouver, BC

Answer to Case #143

Diagnosis: Calcification in the Abdominal Aorta

Submitted by: Alexander N. Gabrovsky, Virginia Commonwealth University, Medical College of Virginia Campus, Richmond, VA.

The answer to Case #143 can be viewed and printed in Internet Explorer 6.0 at:

<http://www.pathology.vcu.edu/research-labs/gerszten-lab-research/case-studies/case-143/>

Case #144:

History: The figure shows the inferior view of right medial clavicle, with a well-developed rhomboid fossae. Specimen found in excavation from Bouqras, Syria, ca. 8800 BP in a desert area with known exposure to the grass pea toxins.

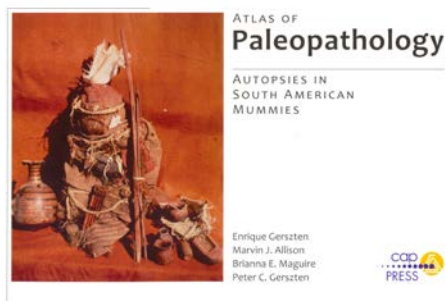
Submitted by: Dr. Deborah C. Merrett from Simon Fraser University, Burnaby, British Columbia, Canada

The slide of Case #144 can be best viewed and printed in Internet Explorer 6.0 at:

<http://www.pathology.vcu.edu/research-labs/gerszten-lab-research/case-studies/case-144/>

Notice!

1. If you have an interesting slide you would like to share with other members, please send it along with the history.
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2. The next meeting of the Paleopathology Club will be held Sunday, March 17, 2019 at the Gaylord National Resort and Convention Center, National Harbor, Maryland. If you would like to do a presentation please send us your name and title.
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3. We published an "Atlas" of Paleopathology, which is a synopsis of 40 years of investigation in South American Mummies. This publication is available at CAP Press. Northfield, IL, 60093, phone: 800-323-4040 option 1, and is directed mainly at those interested in Archeology, Anthropology, History of Medicine, Forensic Pathology and Pathology (Cost \$35.00).

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Paleopathology at El Chorro de Maíta in Cuba

Darlene A. Weston, Dept of Anthropology, University of British Columbia, Vancouver, Canada

The historical literature has detailed the devastating effects of European contact on the indigenous populations of the Caribbean, but little research has been undertaken on the physical remains of the people from this time period. According to the early historical literature, the Spanish colonists imposed the “encomienda” system of forced labour upon the indigenous populations they encountered in the Caribbean, subjecting them to violence, overwork, and poor nutrition. The archaeological site of El Chorro de Maíta, located in the Cuban province of Holguín, approximately 4 km from the Atlantic Coast, consists of remnants of an indigenous settlement and cemetery that can be dated to a time that encompasses the early encomienda system (AD1510-1550). The people buried in the cemetery were amongst the earliest people in the New World to have contact with Europeans, as well as be co-opted into a system of forced labour. The 133 individuals buried on the site were examined to determine if the affects of the encomienda system were visible in individuals’ bones and teeth.

Each skeleton was analyzed to determine age, sex, and health status. Paleodemographic analyses compared the site’s mortality profile with model attritional and catastrophic populations. The effects of the encomienda system were assessed via the presence or absence of evidence for mistreatment (violent trauma), hard physical labour (enthesopathies), dietary changes (rate of dental caries), and infectious disease (systemic periosteal reactions). The results were compared with other archaeological Caribbean skeletal populations from Guadeloupe, Puerto Rico, St Lucia, and Trinidad.

Interestingly, the El Chorro population was relatively free of skeletal indicators of disease: there was one case of infection, one benign neoplasm, 10 spines with signs of degeneration, and only four well-healed minor fractures. When compared with pre-historic Caribbean skeletal populations that had not experienced European contact, the El Chorro population did not have increased frequencies of trauma, joint disease, enthesopathies, infectious/inflammatory lesions, or dental caries, and the average stature of the population remained within the normal range for indigenous Caribbean populations. Another interesting finding was the presence of a relatively large number of children in the skeletal assemblage whose mortality peaked at the 5-9 year age group. When the mortality profile of the El Chorro site was compared to model catastrophic and attritional populations, it was statistically similar to the catastrophic model.

The analysis of the El Chorro skeletons suggests a health status and lifestyle that was largely similar to pre-Columbian Caribbean populations, exhibiting no skeletal affects of harsh treatment, poor nutrition, an extraordinary workload, or severe infectious disease as a result of the encomienda system of forced labour. However, the fact that the population exhibited very little pathology and almost no chronic pathological lesions suggests that most of the cemetery population, including a large number of young children, died of acute causes. The site’s mortality profile suggests there may have been a catastrophic event, perhaps influenced by the introduction of infectious disease to which the population had no immunity (the acute cause of death). These life histories of the El Chorro people are illustrative of a snapshot in time during the early colonization process in Cuba.

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Paleopathology of Osteoarthritis

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Osteoarchaeologists use a comparative approach to studying human diversity through skeletal remains when all other soft tissues have decayed. Much information can be gleaned from the skeleton (e.g., sex, age, ancestry, diet, body size etc.) and we can investigate human variation in biology and behaviour by exploring the mechanisms that underlie population differences today, and in the past. Osteoarthritis (OA) is a complex proliferative bone condition that has been documented in human populations as one of the most common skeletal pathologies. Despite extensive study, relatively little is known about its causal mechanisms and origins, except that OA slowly evolves from some combination of systemic and local biomechanical risk factors to alter the anatomy and matrix composition of articular cartilage and the bone underneath it. Diagnostic dry-bone OA criteria are informed from clinical sources, but adapted to suit the circumstances of paleopathology where OA prevalence is likely *under*-represented. Because of bone's limited response to disease (i.e., forming or resorbing), specific paleopathological diagnoses on the basis of skeletal lesions alone are difficult, and likely to reflect the later stages of the condition or its more severe manifestations. A full understanding of the OA disease process has not been reached; nor has agreement on the theoretical and methodological context for interpreting the meaning of arthritic data in terms of health and activity of past human populations.

One of the major stumbling blocks in paleopathological research of OA has been in the definition of OA *severity*. In the living population, we are able to qualitatively assess severity by symptomatic markers such as pain and limitations in mobility. But clinical research has consistently proven that pain and florid joint changes are unrelated. A small bone spur can lead to debilitating pain and immobility, while the most degenerative joint morphology may not be painful at all. So how can we remedy this in the archaeological record where pain and mobility are not preserved? We cannot go back in time and ask people how they felt when they moved around and we certainly cannot infer specific behaviours from OA pathological lesions that share a common pathway with other stress loading effects. Can we really determine OA severity in past populations?

I address this issue in a study of a large cemetery sample of modern Europeans to demonstrate that multivariate statistics and simple, non-parametric methods like principal component analysis (PCA) can be used as tools in exploratory OA data analysis and predictive models in the archaeological record. I show (1) how PCA can accurately synthesize very large and complicated inter-related OA datasets to reveal discrete patterns of pathological expression; and also (2) that a 'severity' measurement from PCA is valuable to describe composite OA pathology, reflective of the variation in joint-specific wear patterns. These results are significant if bioarchaeologists hope to investigate the combined effects of systemic and local mechanical risk factors such as age, sex, activity, and body size on skeletal responses in joints, that contributes to diagnostic considerations of OA, and to determine the relative impact and interaction of *multiple* underlying factors that shape OA pathogenesis.

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Lathyrism in Antiquity
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Abstract

Since the first demographic transition, ca. 11,000 Cal BP, humans have been pushing the boundaries of regions thought suitable for habitation and subsistence activities. Settlements emerged not only in areas optimal for rain-fed agriculture but also in regions prone to drought or flooding. In doing so, reliance on domesticated plants could sometimes bring unforeseen health risks when shifts in climate transformed communities at the edge from sustainable to marginal. Pulses, in particular, being perhaps the first plants to be domesticated, are a case in point. Although most pulses have good nutritional value, the grass pea (*Lathyrus sativus*) contains neurotoxic compounds that render them harmful when consumed as a substantial portion of the diet over periods as short as two to three months. Lathyrism, a disease of lower limb paraparesis and locomotor disruption, is the result. Paradoxically when other crops fail, the palatable grass pea survives as the primary food source making it an (less than) ideal famine food.

Lathyrism is a disease of great antiquity and despite concerted efforts is a continuing public health issue in the modern world. Reliance on *Lathyrus sativus* as a backup food resource was and still is an adaptive strategy for living with fluctuating climate in borderline sustainable environments. This paper discusses the disease of lathyrism, examples from the modern world, and evidence of grass pea use in antiquity. Through a case study from the Middle Euphrates Valley the criteria for identifying lathyrism in human skeletal remains are set forth. To our knowledge this is the first reported case of lathyrism in the archaeological record.

Grass pea is indigenous across a wide swath of northeastern Africa, the Near East, Afghanistan and into the Indian subcontinent. It is theorized that during early plant domestication grass pea was inadvertently included as a low level contaminant of large-seeded legume crops such as lentils. Its capacity to withstand both drought and flooding would have propelled it rapidly towards its use as a famine food. Lathyrism was recognized as a separate disease entity by early physicians: the Greek Hippocrates and the Roman Pliny. In 19th century India an asylum in Allahabad was established to house people with locomotor disabilities, most of whom were suffering from lathyrism. In the modern world outbreaks of lathyrism occurred subsequent to the severe droughts of the 1990s. For example in Ethiopia about 2.4 per cent of the population was affected.

Remains of legumes do not preserve well in the archaeological record due to the rapid degradation of their soft husks. Only in charred contexts is there hope of legume seed recovery. In the early Neolithic of the Euphrates and Tigris Valleys, ca 9,500 to 7700 Cal BP, charred remains of *Lathyrus sativus* have been identified from many contexts at sites such as Çayönü, Nevalı Çori, and Jarmo. Indeed, at the site of Gritille (in modern Turkey) charred grass peas were recovered from storage bins firmly establishing that their use was known to the Early Neolithic inhabitants of the region. Grass peas have also been recovered from later Bronze Age and Iron Age sites of the Levant.

Lathyrus neurotoxins have several different effects on the body. Firstly, motor neurons of the lower limb are affected, reducing a person's ability to walk, placing increased stress on tendon and ligament attachments to bone, and potentially injuring entheses. In most cases this effectively removes the sufferers from the workforce limiting their participation as contributing members of society. Secondly, bone growth is affected. Any epiphyses that have not yet fused at time of disease onset remain open. If the individual lives with the disability for long enough, their age-at-death (or age-at-examination) will be incongruent with age estimates from epiphyseal fusion. Our case study derives from the site of Bouqras in the Middle Euphrates Valley, at the boundary (ecotone) between steppe and desert. Bouqras occupation is contemporary with the sites above. Evidence is derived from overuse injuries seen as abnormal bone morphology at ligament and tendon attachment sites. These changes are consistent with severe lathyrism.

Movement of the boundary between steppe and desert has on occasion transformed communities from being sustainable with the practice of rain fed agriculture to being marginal. From the Neolithic subsistence transition to the present, the reliance on plant-based agriculture can pose substantial risks to human health, specifically a risk that is still high in regions of droughts and floods such as northeast Africa, the Near East and south Asia. One adaptive strategy of plant-based food-producing economies for survival in fluctuating marginal environments is reliance on the neurotoxic legume: the grass pea (*Lathyrus*

sativus). This paper suggests that the triad of climate instability, marginal environment, and increasing population beyond the carrying capacity of a region combine to increase the risk of lathyrism in areas of the world where grass peas are cultivated.

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