**Recent Advances in Bioarchaeological Research across the Asia-Indo-Pacific Regions**

Convenors:

*Rebecca Kinaston (University of Otago, New Zealand. rebecca.kinaston@gmail.com)*

*Charlotte King (University of Otago, New Zealand. charlotte.king@otago.ac.nz)*

*Melanie Miller (University of Otago, New Zealand. melanie.miller@otago.ac.nz)*

*Monica Tromp (Max Planck Institute for the Science of Human History, Jena, Germany. tromp.monica@gmail.com)*

*Anna Willis (James Cook University, Australia. anna.willis1@jcu.edu.au)*

Panel Abstract:

Bioarchaeology is a rapidly developing field in the Asia-Pacific region. Through the direct analysis of human remains, bioarchaeologists are producing human stories. Researchers can build models of human biosocial change when bioarchaeological information is combined with other lines of evidence from archaeological, linguistic and ethnographic records. The incorporation of cutting-edge techniques (such as aDNA, proteomics and isotopic analysis), with more established osteological techniques allow bioarchaeologists to address the ‘big questions’ surrounding human migrations, histories of disease, development of social hierarchy and inequality, and subsistence change. This session will bring together bioarchaeologists from different regions and time periods to discuss emerging trends within their areas of research.

Number of talks: 28

Number of 90-minute blocks required: 4

In the pages following we present the abstracts submitted to us by our participants, and provisional titles from others who have confirmed their involvement but have not had the time to submit their abstracts to us. Currently they are in no particular order, running order will be decided upon when/if the panel is accepted.

**A New Hope: the efficacy of microparticle, proteomic and genomic techniques on dental calculus in the Indo-Pacific region**

*Monica Tromp1,**Jessica Hendy1, Rebecca Kinaston1,2, Hallie Buckley2, Lisa Matisoo-Smith2, Jean-Christophe Galipaud3, Stuart Bedford4, Marc Oxenham4 and Matthew Spriggs4*

*1Max Planck Institute for the Science of Human History, Jena, Germany*

*2University of Otago, Dunedin, New Zealand*

*3 Institut de Recherche pour le Développement, Marseilles, France*

*4 the Australian National University, Canberra, Australia*

The focus of this paper is to present the efficacy of microparticle, proteomic and genetic techniques to extract information from dental calculus within the Indo-Pacific region. We include samples from the Con Co Ngua cemetery (7,000 – 6,000 BP) in northern Vietnam, the Pain Haka cemetery (3,000 – 2,100 BP) in East Flores, Indonesia (ISEA) and the early Lapita cemetery, Teouma (3,000 – 2,400 BP) in Vanuatu (Oceania). There has already been significant success analysing microparticles from dental calculus in the Pacific and East Asia, allowing us to better understand plant use within the region. The few studies of dental calculus using genetic and proteomic techniques have so far only been conducted on samples from Europe and/or cool and dry environments where biological material generally preserves well. Can dental calculus preserve genetic and proteomic biomarkers even within the unfavourable preservation conditions of the Indo-Pacific region? Is dental calculus our new hope?

**Determining Diet and Mobility of Iron Age Northeast Thailand Using Stable Isotope Analyses at the Site of Non Ban Jak.**

*Jessica Schalburg-Clayton1, Charlotte King1, Hallie Buckley1, Siân Halcrow1, Charles Higham1, Louise Shewan2, Christina Stantis3, Kate Domett4*

*1University of Otago, Dunedin, New Zealand*

*2Monash University, Melbourne, Australia*

*3Bournemouth University, United Kingdom*

*4James Cook University, Townsville, Australia*

Excavations at the moated Iron Age site of Non Ban Jak (NBJ) (c. 4–9 centuries AD), located in Northeast Thailand, Nakhon Ratchasima Province in the Upper Mun River Valley, yielded a large and well-preserved skeletal sample (over 200 individuals). This sample offers the opportunity to investigate emerging trends during the Iron Age of increasing population sizes, changing subsistence strategies, and the beginnings of an entrenched hierarchy. In particular, NBJ provides evidence for wealth disparities between its two burial mounds, allowing for the evaluation of how emerging social inequalities may have affected health. Isotopic analysis of dental enamel, using carbon (δ13C), oxygen (δ18O), and strontium (87Sr/86Sr) values, is particularly well-suited to the task of testing this question. Carbon isotope analysis, for example, gives insight into diet in the past, testing whether rice consumption increased uniformly among individuals in the Iron Age or if instead differential access to resources developed. Mobility-related isotopes, oxygen and strontium, allow for an investigation of the nature of population growth, and assessment of whether development was a result of external migrants coming to NBJ, or internal population increase through fertility. This paper will present the results of preliminary isotopic analysis conducted at the site and describe initial dietary patterns within and between the mounds, and how these bioarchaeological data may fit with prevailing archaeological models of social and environmental change.

**A Biocultural Approach to Human Interaction and Consequences of Disease in Japan**

*Melandri Vlok1, Hirofumi Matsumura2, Marc Oxenham3 and Hallie Buckley1*

*1University of Otago, Dunedin, New Zealand*

*2Sapporo Medical University, Sapporo, Japan*

*3Australian National University, Canberra, Australia*

Human interaction through the processes of migration and trade has impacted the health of past populations. These processes facilitated the spread of infectious diseases globally. Furthermore, ecological and biocultural contexts surrounding migrants are associated with higher risk of malnutrition. The impacts of disease in relation to human group interaction likely influenced the development of settlement systems and sociocultural practices in the past. Human populations in interaction with each other can induce social transitions which are often correlated with a change in health levels.

This paper explores the impact of human interaction levels in archaeological populations from Japan. The biological and social contexts of the Jomon, a pre-Neolithic sedentary hunter-gatherer group, will be compared with the contexts of the industrialised Edo period in order to investigate the impacts of different levels of human interaction over time. It is hypothesised that with increasing levels of human interaction, in general both the levels of infectious and nutritional diseases will increase. However, it is expected there will be differences in the levels of nutritional diseases compared to infectious diseases between the Jomon and Edo. This is a result of the differential impacts of other biocultural factors such as climate instability and dietary access, with the compounding effects of the potential for external population contact in the Edo period to introduce new infectious diseases.

In the context of Jomon, interaction within the population increased over time as climate change led to population movements to refuge areas. In contrast, the Edo period was one of increasing urbanisation and heavily engaged in global maritime trade, indicating high levels of human interaction both within the population and with external population groups. Comparison of the two time periods enables examination of the impact of the introduced infectious disease and their ability to spread given the unique physical, social and biological environments. Furthermore, assessment of the nutritional levels of the populations enables discussion of synergies between infectious diseases and malnutrition and the overall impact of diseases in Japan both biologically and socially.

**Exploring the origins and antiquity of non-communicable diseases in Asia: DISH and erosive arthropathies (gout)**

*Nelissa Ling1, Siân Halcrow1, Marc Oxenham2, Kate Domett,3 Hallie Buckley1*

*1University of Otago, Duendin, New Zealand*

*2Australian National University, Canberra, Australia*

*3James Cook University, Townsville, Australia*

This proposed project seeks to contribute to the knowledge of non-communicable diseases (NCDs) (i.e. metabolic syndrome, cardiovascular diseases, renal diseases) by assessing skeletal evidence of diffuse idiopathic skeletal hyperostosis (DISH) and erosive arthropathies (gout) in the archaeological record. NCDs are global health problems and the leading cause of population mortality today. DISH and gout appear to be comorbid, and are commonly linked to rich dietary intake in European populations. However, genetic predisposition is also considered an underlying mechanism in the manifestation of these pathological joint conditions.

This research will assess DISH and gout in skeletal assemblages from archaeological sites in East and Southeast Asia to inform on the origins and antiquity of NCDs. Populations groups such as those from East Asia, Southeast Asia, and the Pacific Islands demonstrate high rates of metabolic health problems, and their close ancestral link to each other suggests a hereditary aspect behind the prevalence of NCDs specific to this region. The research will explore the relationship of DISH and gout to body size as measured by long bone dimensions and vertebral canal dimensions as non-specific indicators of physiological stress (e.g. food shortage, dietary pattern). Current health literature and the archaeological record will be drawn on to illustrate how socio-cultural and environmental stresses may have imposed directly, or indirectly, to DISH and gout pathogenesis, and potential NCD prevalence.

**Palaeodemographic Tools for Skeletal Samples from Southeast Asia and the Pacific**

Clare McFadden1, Marc Oxenham1

1Australian National University, Canberra, Australia

One of the prominent issues in palaeodemography to date has been the underenumeration of infants in archaeological samples. Throughout Europe, the United Kingdom, and the Americas, a number of archaeological sites appear to experience poor infant representation as a result of cultural practices and differential preservation and recovery. Palaeodemographic measures have, to date, excluded the 0-4 year age category in order to avoid introducing error through preservation, deposition, or recovery bias in this age group. However, infant underrepresentation is not a consistent, worldwide phenomenon. In Southeast Asia and the Pacific, a number of sites have indicated good skeletal preservation overall, with infants appearing to be well represented. For such sites, current palaeodemographic tools may fail to accurately represent the demographic parameters of the source population. This is particularly true for those sites where subadults aged 5 years and over experience good survivorship. Furthermore, the 0-4 year age category should, logically, be highly sensitive to fluctuations in birth rate and therefore its exclusion represents a loss of valuable information. With well-preserved skeletal samples in Southeast Asia and the Pacific in mind, two new palaeodemographic tools have been developed to estimate fertility and the rate of natural increase based on age-at-death data including the 0-4 years age category. Not only do these tools provide a better fit for skeletal samples from these regions, they have been demonstrated to provide an improved correlation over existing tools with the population dynamics of interest. The tools have been developed using United Nations data which has afforded opportunities to evaluate a greater range of demographic parameters than traditional life table approaches and examine interrelationships between variables. The palaeodemographic tools presented have great potential to provide improved and new insights into human adaptation, both in the regions they have been developed for and across the globe.

**Tracing travellers: using multiple isotopic systems to understand colonial mobility and the people who journeyed thousands of miles for a better life**

*Charlotte King1, Hallie Buckley1, Peter Petchey2, Rebecca Kinaston1,3, Lisa Matisoo-Smith1, Baylee Smith1, Darren Gröcke4, Geoff Nowell4*

*1University of Otago, Dunedin, New Zealand*

*2Southern Archaeology Ltd, Dunedin, New Zealand*

*3Max Planck Institute for the Science of Human History, Jena, Germany*

*4Durham University, Durham, United Kingdom*

Human migrations have shaped global culture as we see it today. The Indo-Pacific region is no exception to this, major migration events have been implicated in the spread of agriculture, the peopling of the Pacific, and genetic susceptibility to disease in the region. Historic migrations are generally less-focussed upon by archaeologists, yet the archaeological record has the potential to fill gaps in the historical record and allow us to understand how individual lives were impacted by movement across the globe. In this study we use multiple isotopic systems (carbon, nitrogen, oxygen, sulphur and strontium isotopes) and, combined with other data (e.g. aDNA), build individual stories of mobility during the colonial period of New Zealand. These people had diverse origins, some coming from Europe (often via other colonies in the Pacific), while others hailed from China. All came looking for a better life, either hoping to strike it rich in the New Zealand goldfields or start a pastoral life as landholders in the new colony. By analysing tissues forming during different points in an individual’s life we are able to assess their origins, and compare childhood diet with diet and quality of life in colonial New Zealand. Ultimately we trace the movement of people in the increasingly globalised colonial period, revealing stories of the travels and travails of colonial life.

**From the Mouths of Babes: Novel Methods for Determining Weaning and Stress in Neolithic Northern Vietnam**

*Alisha Adams1 Siân Halcrow, Kate Domett2, Marc Oxenham3*

*1University of Otago, Dunedin, New Zealand*

*2James Cook University, Townsville, Australia*

*3Australian National University, Canberra, Australia*

The Neolithic agricultural transition was arguably the largest shift in subsistence, social structures, and health that modern humans have experienced. However, evidence from Southeast Asia shows that the global model of consequences on health does not address the regional and temporal variations observed in Southeast Asia. Contrary to the global model, Southeast Asian populations continued to exploit a variety of resources within their unique tropical environment, and did not appear to show the predicted deterioration in health. A Neolithic site in Northern Vietnam, Man Bac (1800-1500 BC), presents another contradiction within Southeast Asia, with evidence for compromised health through the high prevalence of cribra orbitalia, linear enamel hypoplasias, and high infant and child mortality. This PhD research evaluates how the transition to agriculture affected health and weaning in Neolithic Northern Vietnam through an investigation into the causes of childhood stress at Man Bac. This site presents a unique opportunity to test the effects of the agricultural transition, with a large number of individuals (n=78) with good preservation, including a high number of subadults (n=46, aged 0-18). By combining stable isotope analysis, linear enamel hypoplasia, and paleopathological observations in adult and subadult remains, we will investigate the relationship between weaning, stress, diet and survivorship. Preliminary results of one aspect of this project will be presented, investigating the timing of systemic stress during early childhood development through the assessment of linear enamel hypoplasia. By understanding the sources of stress in childhood, we may be able to then understand the long-term health the Man Bac population.

**Social Inequality during the Iron Age in Central Thailand: A Case Study of Mortuary Practice and Migration at Ban Pong Manao, Lopburi Province**

*Gina Palefsky1, Thanik Lertcharnrit2, Kelly J. Knudson3*

*1University of California, Merced, USA*

*2Silpakorn University, Thailand*

*3Arizona State University, USA*

The Iron Age in central Thailand represents a critical moment of sociopolitical change between the minimally stratified societies of the Bronze Age and the increasingly complex and socially unequal nascent states of the Dvaravati Period. This trajectory is frequently attributed to intensified trade and migration between South and Southeast Asian populations. Since central Thailand was the homeland of the Dvaravati kingdoms, identifying migration in Iron Age contexts in this region is of particular importance. This study presents the results of radiogenic strontium isotope analysis and mortuary data from 32 adult burials dated to the late Iron Age (c. 300 - 400 CE) at the highland archaeological site of Ban Pong Manao. Most individuals were buried with numerous grave goods, including intentionally broken ceramics and ritually bent metal implements, and some graves included imported metal, glass, stone, and shell artifacts. The presence of non-local artifacts implies interregional interaction and may indicate some degree of social inequality, but the scale, nature, and expression of these relationships remains unclear. This study considers the entanglements of migration and social identity, as a person’s categorization as a lifelong local or recent immigrant may have been a salient element of social life that influenced access to resources, social status, and resulting lived experiences of social inequality. Mortuary and isotopic analyses at Ban Pong Manao provide additional data regarding migration during the late Iron Age and further help to contextualize sociopolitical trajectories and the development of social inequality in central Thailand.

**Trauma and conflict in prehistoric Southeast Asia**

*Lucille Pedersen1,2, Kate M. Domett1, Nigel Chang2, Siân E. Halcrow3, Hallie R.Buckley3*

*1College of Medicine and Dentistry, James Cook University, Townsville, Australia.*

*2College of Arts, Society and Education, James Cook University, Townsville, Australia.*

*3Department of Anatomy, University of Otago, Dunedin, New Zealand.*

This study represents the first large-scale comparison of trauma that has been conducted for prehistoric mainland Southeast Asia as opposed to narrow localised studies to increase the understanding of past behaviours as well as the cultural and environmental stressors that lead to trauma and conflict in earlier societies. This temporal and geographical synthesis of skeletal trauma and contextual data from prehistoric Thailand, Cambodia, Vietnam and Myanmar shows an increase in the prevalence of individual trauma (fractures, sharp force and blunt force lesions) from the Neolithic (7.8%), to the Bronze Age (11.8%), and to the Iron Age (12.6%). The increase in risk of injury is suggested in this study to be related to increasing socio-political and technological complexity, burgeoning population density and environmental constraints. Local variability is observed in the type and prevalence of trauma, with most skeletal assemblages reflecting an accidental injury pattern (Colles’ fractures, trauma to the small bones of the hands and feet, vertebrae, pelvis and clavicles). However, a number of sites exhibit evidence of trauma associated with interpersonal violence (craniofacial injuries, distal ulna fractures and perimortem sharp force trauma). Several Iron Age sites in northeast Thailand and northwest Cambodia experienced serious physical conflict compared to other regions. This coincides with intensified agriculture in northeast Thailand and greater influence from external sources including China and India. In northwest Cambodia there was contextual evidence of significant social tension prior to the formation of centralised polities such as Angkor in Cambodia. We argue that while there is a general increase in the amount of trauma over time, the causes may be multifactorial and represent a range of local and regional variation that requires further research.

**A Bioarchaeological Analysis of Foot Binding at the Xuecun site, Henan Province, China.**

*Yahaira Gonzalez1 and Christine Lee1*

*1* *Department of Anthropology, California State University, Los Angeles*

Traditionally Chinese archaeological excavations date to the Medieval Period or earlier due to negative beliefs on disturbing direct ancestors. So, there are few human skeletons available for bioarchaeological analysis from the Song (960-1279), Ming (1368-1644), and Qing (1644-1912) Dynasties. As part of the Yangtze River Relocation Project (cultural resource management), a portion of the Xuecun cemetery was excavated in Henan Province. Two hundred and three burials were excavated dating from the Han (206 BC- 220 AD) to Qing Dynasties. This provided a rare opportunity to examine foot binding which only dates from the Song to Qing Dynasties. Twenty-seven female burials corresponded to this time period. The percentage of women with foot binding increased over time. By the Qing Dynasty, 100% of the women of marriageable age had bound feet. Tarsals and metatarsals were altered in shape and size. Infection and necrosis of the phalanges were widespread. Common side effects included muscular atrophy of the legs from disuse, osteoporosis, and trauma from falls. This study will provide the historical, geographical, and skeletal context for female footbinding at the end of the Chinese Empire.

**Resource Utilization and Regional Interaction in Iron Age Cambodia -- the Evidence from Angkor Borei**

*Louise Shewan\*1, Rona Ikehara-Quebral\*2, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ [order of co-authors being determined]*

\*Joint first authors

*1Monash University, Melbourne, Australia*

2 *International Archaeological Research Institute, Inc., Honolulu, Hawaii*

Angkor Borei is a Protohistoric/Iron Age (ca. 500 B.C.E. - 500 C.E) site located in Takeo Province, southern Cambodia, on the western edge of the Mekong Delta. The Iron Age is considered a transformative period characterized by increasing socio-political complexity, intensified mercantile activity, technological innovation, and developments in site morphology and settlement use. The site, covering some 300 ha, was first occupied from the mid first millennium B.C.E and was an important regional centre. Excavations conducted in 1999 and 2000 at the edge of a cemetery mound at Vat Komnou (200 B.C.E to 200 C.E.) revealed the remains of one hundred and eleven individuals. Examination of the skeletal assemblage suggests the ancient inhabitants were relatively healthy with evidence for dental modification (including intentional tooth filing) and skeletal changes consistent with a sexual division of labour. Dental pathologies suggest a mixed diet including fibrous foods and a lesser reliance on processed agricultural foods while the faunal assemblage attests to the broad-spectrum exploitation of the local environment. Building on previous work, we present isotopic evidence from an additional 15 individuals to refine our understanding of the residential behaviour and exploitation strategies of the population. Using strontium, oxygen, and carbon isotope measurements from tooth enamel we provide evidence for both local area resource utilization and wider regional interaction.

**Paleopathology at the end of the Uighur Khanate (744-840), Arkhangai Aimag, Mongolia**

*Ariana Beltran-Burgos1 and Christine Lee1*

*1* *Department of Anthropology, California State University, Los Angeles*

The Uighur Empire was the shortest foreign ruled dynasty in Mongolia’s history, lasting less than a century. While the Uighur were officially conquered by the Kirgiz, contemporary historical documents list several years of unusually cold winters (zud in Mongolian), widespread livestock deaths, famine, and epidemics. Very little is known about the Uighurs from this time period. Today they mainly live in Xinjiang Province, in western China. Sixteen burials were excavated in Arkhangai Aimag dating to the final years of the Uighur Khanate. These burials unusually were associated with a Manichean temple and not with the neighboring city of Kharbalgas. Half of the individuals were premature births or infants. No other cemetery in Mongolia has recorded this high a percentage of infant burials. Paleopathological analysis has uncovered many signs of illness and malnutrition. Cribria orbitalia, periostitis, and enamel defects are common among the burials analyzed. The uncommon burial location, large number of infant burials, and widespread skeletal pathologies suggest an unusually stressful time in Uighur history.

**Dental Caries in Prehistoric Population of Liang Bua**

*Delta Bayu Murti1,2*

*1Dept. of Anthropology, Faculty of Social and Political Sciences, Airlangga University, Indonesia*

*2Ethnography Museum and Center of Death Study, Faculty of Social and Political Sciences, Airlangga University, Indonesia*

**Background.** Caries is a dental disease caused by micro-bacterial activity on the tooth surface by creating a pattern of destruction in the crown or root structure of the tooth. Studies of caries in prehistoric populations explain that generally this disease is caused by the dominance of consumption of foods containing carbohydrates with high sugar content. The consumption pattern is explained as the impact of lifestyle transition from hunting and gathering to agriculture (Neolithic). **Objectives.** The purpose of this study is to describe the dental caries pathology on human skeletal remains from Liang Bua to understand its relationship with changes in the population lifestyle. **Materials and Methods**. The material of this study is human skeletal remains from Liang Bua, Flores, East Nusa Tenggara, that lived during the agriculture/Neolithic transition period. The methods for this study used a macroscopic/osteoscopic observation based on a description from Hillson (2002) to identify caries on the teeth of individuals from Liang Bua. **Results.** The results of observation and identification show that individuals from the Liang Bua experienced caries problems in their teeth, indicates the high consumption of a diet containing carbohydrates or diet with high sugar content.

**Leprosy and human migration in Lewoleba, Flores, Indonesia**

*Toetik Koesbardiati1,2, Delta Bayu Murti1,2, Rusyad Adi Suriyanto3*

*1Department of Anthropology, Faculty of Social and Political Sciences, Airlangga University*

*2Ethnography Museum and Center of Death Study, Faculty of Social and Political Sciences, Airlangga University*

*3Laboratorium of Bioanthropology and Paleoanthropology, Medicine Faculty, Gadjah Mada University*

Nusa Tenggara Timur (NTT), Indonesia, has proven to be a melting pot of migration in eastern Indonesia. It is accepted that Mongoloid entered from western Indonesia and moved to east and from north to south. These migrants meet in the NTT region. Nevertheless, it is not automatically that the initial population mixed with the migrant population (Mongoloid). The hypothesis that can be constructed from this situation is the existence of mixed gradations between migrant populations and the early inhabitants of the archipelago (Australomelanesoid). Geographically distance and cultural strength may be a barrier for both populations to be mixed. Of the clusters of islands in East Nusa Tenggara and based on skeletal human remains in East Nusa Tenggara, it shows that Lewoleba is the most remote location out of reach of migrant populations. The ancient population of Lewoleba also has the greatest characteristic of Australomelanesoid, compared to the ancient inhabitants of the NTT region, where Mongoloid features dominated. One of the interesting things is that 1 of 5 human skeletons found in Lewoleba suffer from leprosy. Leprosy became a new source of data related to migration to the NTT region. Whether the leprosy brought by migrants and then infect the ancient population of Lewoleba or lewoleba is endemic of leprosy. This becomes interesting to study. If Leprosy is endemic, it is indicates that the ancient population of Lewoleba is less mixed with the migrant population. The purpose of this paper is to analyze the linkages between leprosy and human migration in Lewoleba. The method used is literature search of related research results. Leprosy has a marker as a characteristic of bacteria m. leprae. This feature can be investigated by repetition of TTC (TTC repeat). The results showed that TTC repeat pattern of leprosy in Lewoleba indicated that Lewoleba was endemic area. This indicates that the ancient people of Lewoleba lacks interaction with other communities. Nevertheless, it cannot be concluded that Lewoleba is the origin or source of leprosy transmission. Another analysis is required, for example SNP analysis for clarity on the origin of the leprosy bacteria.

**Trauma, Society and Environment: a contextualised interpretation of injury at Ban Non Wat**

*Kate M. Domett1, Lucille Pedersen1,2, Nigel Chang2, Nancy Tayles3 and Charles F.W. Higham 4*

*1College of Medicine and Dentistry, James Cook University, Townsville, Australia.*

*2College of Arts, Society and Education, James Cook University, Townsville, Australia.*

*3Department of Anatomy, University of Otago, Dunedin, New Zealand.*

*4Department of Anthropology and Archaeology, University of Otago, Dunedin, New Zealand.*

All populations are vulnerable to traumatic injury, but the degree of vulnerability can shift as communities are forced to adapt to changing climates, landscapes and socio-political environments. For example, a domino effect may occur with climate changes leading to drought and reduction in successful agriculture which can lead to economic instability, malnutrition, and migration which can increase the potential for violence. This study will investigate the potential link between traumatic injuries, climate change and associated socio-political and agricultural changes in a prehistoric community from northeast Thailand. The site of Ban Non Wat is significant in its temporal continuity from Neolithic to late Iron Age (1750 BC – 600 AD) and its large sample size (677 provenanced individuals with age and sex estimations). Based on preliminary observations there are 65 traumatic lesions evident on 45 adults (including 22 males and 20 females). This study will discuss the significance behind the low prevalence of trauma in the Neolithic (9.4% of individuals) and Iron Age (2.1%) compared with that in the intervening Bronze Age (15.2%). Long bone fracture rates will also be discussed. It can be difficult to differentiate between the causes of injuries on an individual level, but through a combination of individual stories and contextualized population patterns we can weigh into the debate on the reasons for trauma experienced in this region. This will be discussed in reference to the climatic shift to a drier climate during the prehistoric occupation of Ban Non Wat and the impact this had on rice agriculture.

**Does Money Buy Everything? Social Inequality and Health and at Late Iron Age Non Ban Jak, Northeast Thailand**

*Stacey M. Ward1, Siân E. Halcrow1, Hallie R. Buckley1, Charles F.W. Higham2, Kate M. Domett3, Dougald J. O’Reilly4, 9Louise Shewan5*

*1 Department of Anatomy, University of Otago, Dunedin, New Zealand.*

*2 Department of Anthropology and Archaeology, University of Otago, Dunedin, New Zealand.*

*3 College of Medicine and Dentistry, James Cook University, Townsville, Australia.*

*4 School of Archaeology and Anthropology, Australian National University, Canberra, Australia.*

*5 Monash Warwick Alliance, Monash University, Melbourne, Australia.*

Social inequality is known to have deleterious effects on health and is a key feature of hierarchical social organisation. Archaeological debate has characterised the Iron Age of northeast Thailand as hierarchical and the recent reassessment of the timing of technological and social developments indicate a rapid and late transition towards this mode of social organisation. Bioarchaeological research demonstrates an associated deterioration of health at this time. Through a fusion of archaeological and bioarchaeological data within a biocultural theoretical framework, this paper presents a holistic overview of social inequality and health in the skeletal assemblage from the late Iron Age (420 BCE – 500 CE) site of Non Ban Jak in northeast Thailand. Archaeological analyses assessed inequality by exploring spatial patterning of burials using a Geographic Information System (GIS) and through analyses of the prestige value of mortuary offerings. Bioarchaeological analyses investigated health in the skeletal assemblage and comprised analyses of adult and child long bone length and developmental defects of the dental enamel. These different strands of bioarchaeological and archaeological evidence were then combined using the GIS to assess if there was any relationship between social inequality and health. Results suggested that overall health deteriorated throughout the late Iron Age at Non Ban Jak. Variation in health was visible across different areas of the site and these variations became larger over time, suggesting social inequality was present and possibly entrenched. Non Ban Jak may represent the final stages of the transition towards a hierarchical social structure over the course of late prehistory.

**Prehistoric Austronesian cultural dispersals from Island South East Asia to the Pacific Islands: the evidence from ritual tooth ablation**

*Rebecca Kinaston, Hallie R. Buckley, Toetik Koesbardiati, Jean Christophe Galipaud, Rushid Suriyanto, Aimee Foster, Siân Halcrow, Delta Bayumurti, Stuart B .Bedford*

The Austronesian Expansion was the largest prehistoric maritime migration in the world. During the Neolithic, Austronesians settled thousands of islands over vast areas of open ocean. A ‘transported landscape’ of plants, animals and technological knowledge was essential to the success of these populations because it allowed them to establish gardens in new environments, raise animals, and manufacture material items such as pottery. These foods and cultural items undoubtedly served more than just a utilitarian significance and were part of a larger Neolithic Package of ideas, identity, and social connections that spread with Austronesian speakers. The purposeful removal of teeth (tooth ablation) is a ritual process commonly used in modern and prehistoric societies to mark important life stage events, such as marriage and coming of age. Here, we investigate the presence and absence of tooth ablation in prehistoric skeletal assemblages from Island Southeast Asia (ISEA) and the Pacific Islands. From the observed distribution of tooth ablation across the regions, we hypothesize that the practice was an important component of the Neolithic cultural package transported with the Austronesians. The continuation of the ritual into the modern period in some areas may be a reflection of prehistoric Austronesian ritual processes.

**Local resistance in the form of human-animal relationship in pericolonial highland Philippines: A faunal analysis**

*Chin-hsin Liu, Adam Lauer2, Stephen Acabado3, John Krigbaum4*

*1Department of Anthropology, California State University Northridge*

*2International Archaeological Research Institute, Inc., Honolulu*

*3Stephen Acabado, Department of Anthropology, University of California Los Angeles*

*4Department of Anthropology, University of Florida*

The Spanish conquest and subsequent colonization of the Philippines introduced new crops that changed the customary foodways of indigenous cultures as well as drastically transformed the landscape that affected the food source of wild and domesticated fauna. Although most of the Philippines fell under the might of the Spanish Empire, the northern Luzon highlands were never permanently controlled by the colonial administration, but colonial policies instituted in the early 1600s affected cordilleran lifestyles, particularly the Ifugao. Acabado (2017) argued that the responses of seemingly uncolonized indigenous groups to colonial forces are part of pericolonial processes. Foremost of these responses is the subsistence shift and intensification of social differentiation, which are indicated by a shift to wet-rice cultivation and increases in ritual fauna in the archaeological record; shifts that are interpreted as acts of resistance. This paper investigates evidence of resistance through faunal management strategies of the Ifugao, indicated in the isotopic signature of recovered fauna from the Old Kiyyangan Village. Seventy-two faunal skeletal remains (43 teeth and 29 bones, representing four species) were sampled for light stable isotope analysis. Most pigs’ signals concentrate at the C3 end of carbon spectrum with limited variation. When compared to human signals, the anthropogenic input in pigs’ diet is significant. Signals from bovines and rusine deer suggest these animals were feeding in a wider range of landscapes. When evaluated against site chronological sequence, there is no marked change in faunal dietary behavior pre- and post-Spanish conquest, despite the social and economic changes attributable to colonialism. These findings suggest that the Ifugao maintained a consistent relationship with key faunal species over time. Intensification of indigenous practices involving fauna such as rituals and feasts was likely one of the key factors maintaining land ownership and strengthening social cohesion, leading to successful resistance against colonial control.

In addition, we have confirmation of involvement from several others who have not yet written abstracts:

**John Krigbaum et al. *Regional Isoscapes in the Holocene of Southeast Asia***

**Anna Gosling et al. *Gout and Hyperuricemia in the Pacific***

**Frederique Valentin et al. *Diet and subsistence at Talasiu late Lapita site (Tonga), contribution of isotopic and oral data***

**Siân Halcrow et al. *The palaeodemographic transition in Southeast Asia: What infant death can tell us.***

**Melanie Miller et al. *Dietary patterns through time and space: A review of isotopic data from China***

**Hallie Buckley et al. *Life and Death in the early Colonial settlement period of Otago, New Zealand.***

**Rebecca Crozier et al. *Something out of nothing: A new jar burial site in the Philippines***

**Marie Antoinette Sioco, Rebecca Crozier et al. *'Head-hunting in the Philippines: tracing a vanished practice'***

**Anna Willis et al.**