

## *Bioarchaeology in Southeast Asia and the Pacific: Newsletter*

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Welcome to the tenth annual newsletter designed to update you on the latest news in the field of bioarchaeology in Southeast Asia and the Pacific. Please circulate to your colleagues and students and email me if you wish to be added to the email recipient list. In the next few weeks you will also be able to find copies of this and past newsletters at <http://seapbioarchaeology.wordpress.com/> and <http://eprints.jcu.edu.au/> and search for “Domett”.

### *News*

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#### NEW ZEALAND

**From:** Hallie R. Buckley

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**Subject:** *New Lecturing position in biological anthropology at the University of Otago*

<https://otago.taleo.net/careersection/2/jobdetail.ftl?lang=en&job=1400794>

An exciting opportunity has arisen for a dynamic researcher to join a growing and highly committed group of biological anthropology researchers and teachers in a large, diverse and research-oriented Department. A confirmation path/permanent position, commencing at the Lecturer level, is available.

Applicants will hold a PhD or equivalent research qualification. All applicants must have proven research ability within the field of biological anthropology, with the potential to develop an on-going and active independent research programme capable of attracting external funding. Ideally, the successful candidate's research will align with the Department's current research strengths in anthropological genetics, including aDNA, and bioarchaeology projects in the regions of SEAsia and the Pacific Islands.

The successful applicant will be required to teach biological anthropology, at the undergraduate and postgraduate level, and contribute to other relevant teaching at the undergraduate level.

Specific enquiries may be directed to Professor Neil Gemmell, Head of Department, Department of Anatomy. Contact [Professor Neil Gemmell](#) Tel: + 64 3 479 6373

Applications quoting reference number 1400794 close on Friday, 30 May 2014.

**From:** John Lukacs  
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**Subject:** *Visiting the University of Auckland*

Professor Lukacs is currently visiting at the University of Auckland, New Zealand for a semester. His visit includes teaching a one-off special topic course "The Biology of Scientific Racism". He has also recently presented a seminar at the university to provide an up-date on new insights into sex & gender differences in oral health.

## AUSTRALIA

**From:** Georgia Roberts  
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**Subject:** *Possible bioarchaeological session at the AAA (Australian Archaeology Association) meeting this year.*

The AAA conference this year is being held in Cairns and sponsored by James Cook University. The theme is "Archaeology in the tropics" with a focus on northern Australia and SW Asia. Georgia is interested in seeing if anyone is interested in contributing to a Bioarchaeology session at this conference. It is being held during the first week in December (1-3). Please email Georgia if you are interested: [georgia.l.roberts@gmail.com](mailto:georgia.l.roberts@gmail.com)? Student papers are very welcome.

**From:** Susan Hayes  
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Centre for Archaeological Science, University of Wollongong  
**Subject:** *From Hobbit to Homicide: recent publications in the field of facial approximation*

My work with Mike and Thomas Sutikna concerning the face of *Homo floresiensis* (it includes a critical geometric morphometric analysis of current international museum representations of 'Hobbit') was published in *Journal Archaeological Science* in July, and a more recent facial approximation paper concerning the Belanglo remains of a young woman has just come out in *Forensic Science International*.

Both papers are methodologically rich (very few 'facial reconstructions' contain methodological information or indeed, any justification - and the Belanglo paper includes a critical review of forensic applications since 2000), and the homicide case, while not archaeological, has relevance to most anatomically modern humans. (Full details of the papers are in the 'Recently Published' list below).

Other news is that plans are progressing for new work with Sangiran 17 in Bandung, Indonesia - one of the few *Homo erectus* with facial bones - all looking good and hopefully soon research permissions will be in place.

I'm also applying for a DECRA for next year and would be interested to know if anyone would like their remains to be considered for inclusion as a potential collaboration - the project already has quite a few early hominins and AMH, but good to know if there's any interest.

PACIFIC

**From:** Angela L. Clark, Nancy Tayles, and Hallie R. Buckley  
Department of Anatomy, Otago School of Medical Sciences,  
University of Otago, Dunedin, New Zealand  
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**Subject:** *Rima Rau Burial Cave Research Project, Atiu, Cook Islands.*

In 2013, members of the Biological Anthropology Research Group from the Department of Anatomy, University of Otago researched a burial cave on the island of Atiu, Southern Cook Islands. The team included Nancy Tayles, Hallie Buckley, Angela Clark, Fieke Neuman and PhD student Christina Stantis. The fieldwork consisted of a cave survey and osteological examination of some of the human remains from the 15<sup>th</sup> July to the 23<sup>rd</sup> August 2013.

The name of the cave, *Rima Rau* ("Five Hundred" in Cook Island Māori), is suggested to be a reference to the number of dead interred in the cave. We were invited by the family landowners to investigate the cave because the extended family on whose land it is located sought explanations as to when and why individuals were interred there in prehistory. A variety of legends surround the origin of the burials, including the remains from a battle, massacre or cannibal feast. However, this method of interment could represent a normal prehistoric mortuary practice, but knowledge of which has been lost since the island was Christianised in 1823. To understand the significance of the human remains interred in *Te Ana Rima Rau* we were permitted to temporarily remove the bones from the cave and conduct osteological analyses but were not able to take samples for dating or other destructive analyses. The research was conducted under a permit from the National Research Council of the Cook Islands, and we were accompanied, and greatly assisted, on cave visits by a family representative, Punua Tauraa.

The main axis of *Rima Rau* burial cave is around 28 metres long, and is formed from a complex network of chambers and passages. We identified four chambers and two passageways, all of which contained human remains. Mostly, the remains were disarticulated and commingled, and positioned on natural floor ledges or in clefts in cave walls. Bones found on the cave floor were usually against the walls of the cave, or placed underneath overhangs. We analysed and recorded over 600 skeletal elements that were disarticulated and lying loose in the cave, although, due to time constraints, this was only a small proportion of the bones present. Current estimates of the minimum number of individuals interred in the cave include 35 adults and 7 infants and children. The Atiu Islanders, particularly the children, were very interested in our research so we had an opportunity to educate them in the delights of bioarchaeology.

The cave survey and context for the interpretation of the remains has been written and submitted for publication. The assessment of the quality of life of the human skeletal remains has been completed and is currently being written for publication. Further aspects on dental health will be included in Christina Stantis's PhD. This research project was funded by a University of Otago Research Grant awarded to Nancy Tayles and Hallie Buckley.



**Figure 1:** A typical scene of disarticulated and commingled human skeletal remains that were found on the cave floor inside *Rima Rau* burial cave, Atiu



**Figure 2:** Hallie Buckley with senior students from *Enuu Manu* high school at the entrance to the cave



**Figure 3:** Angela Clark exploring and surveying the smallest passage of the cave at under one metre high

## PHILIPPINES

**From:** Rebecca Crozier

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**Subject:** *Archaeological human remains from Island Southeast Asia; a taphonomic approach.*

This two year project will be funded by the University of the Philippines (2.5 million pesos), commencing in 2014.

## GUAM

**From:** Cherie K. Walth

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**Subject:** *Archaeological Investigations at the Naton Beach Site, Tumon Bay, Guam*

## INTRODUCTION

Recently the draft report for the Naton Beach Site excavations was completed. The site is located on the north end of Tumon Bay, Guam, and offers an unprecedented look into an extended time period in Guam's prehistory. The archaeological excavations centered on the recovery of 370 human burials. The

370 human burials included 155 Pre-Latte individuals, 212 Latte individuals, and three unaffiliated individuals. Shell ornaments from four of the Pre-Latte burials were submitted for radiocarbon dating that returned a range of dates from approximately 800 to 400 B.C. (2-sigma calibrated), placing these individuals in the middle phase of the Pre-Latte period. The Latte period spans from approximately A.D. 1000 into the Post-Contact (European contact) period. Radiocarbon dating was not conducted for the Latte individuals, but ceramic artifacts found in the matrix with the burials indicate that these remains likely span the entire Latte period. One Latte period child was found with glass beads, a trade item that suggests at least one individual was buried there during the Post-Contact period. Altogether, this collection represents people who lived and died at Naton Beach over a 2,000-year time span.

## HIGHLIGHTS OF THE INVESTIGATION



**Example of shell ornaments found with Pre-Latte burials. *Conus* beads on the left and bracelet on the right.**

The 155 Pre-Latte burials were examined in terms of their location within the site and patterns of the internments by age, gender, orientation, position, placement, and grave offerings. Cluster analysis was employed, and clusters of burials indicated association with possibly residential pole-and-thatch structures.

In general there is no pattern for differential burial by gender. The pattern suggests that internment may have been primarily based on kinship groups with burial areas consisting of both sexes and all age groups (even though children are not numerous). There is some variation in orientation of the burials but the majority of all burials are in an east-west

orientation, with most having the head inland and the feet toward the shore. Burials were overwhelmingly placed in an extended position and on their back. This is consistent for all age groups and both sexes. Shell ornaments were commonly placed with the burials as grave offerings; shell beads were especially found in abundance and found usually with females. Other items identified as grave offerings were shark teeth, ceramic vessel, slingstone, bone tools, *Pinctada* shells, fishing gear, tools for working wood (adzes), and ochre was found associated with 12 burials.

As with the Pre-Latte, the 212 Latte burials were examined in terms of their location within the site and patterns by age, gender, orientation, position, placement, and grave offerings. The cluster analysis



**Example of shell artifacts found with Latte burials. Beads from *Spondylus* on the left and *Tridacna* adze on the right.**

grouped the burials within the site in 11 groups, with 13 additional burials isolated and randomly scattered that were placed in a separate analysis group. The site patterning suggests that Latte clusters could be burials associated with *latte* dwellings. One cluster is in an area possibly associated with a pole-and-thatch structure. Most of the burials are oriented east-west, suggesting the *latte* structures were north-south or parallel to the shore. There are four clusters that are either

female or male dominated, suggesting that there may be gender-specific dwellings. Burial location was primarily based on kinship groups, except perhaps in the gender-specific areas, which were residentially based. Almost half of all burials had at least one item as a grave offering, and the grave goods were found with both females and males, and with adults and subadults in nearly equal numbers. A wide variety of items were found with the burials. The most common item was shell adzes and the

rarest included glass beads, sea urchin tool, and shark teeth. The grave goods represent tasks such as fishing (fishing gear of hooks and gorges), domestic activities (ceramic vessels, bone awls, and needles), food processing (ground stone), hunting (slings), woodworking (shell and stone adzes), ornaments (shell and glass beads), and other industrial tasks (coral and sea urchin tools).

There are morphological and pathological characteristics that likely reflect social, cultural, and genetic differences between the two Naton Beach populations. Social and cultural differences are expressed by the differences seen on the dentition. The Pre-Latte people used their teeth as tools more and in different ways than the Latte. This is expressed in the labial abrasion observed on the upper dentition of the Pre-Latte, which is essentially lacking in the Latte individuals. The reason for this practice is not clear. But, it is possible that with the introduction of the Latte to the island, the Latte introduced a new way of working or producing the same result that did not involve use of the teeth. A decidedly cultural characteristic of chewing betel nut was practiced by the Latte groups that was essentially non-existent in the Pre-Latte. The areca nut tree is indigenous to Guam and was available to the Pre-Latte people, but betel nut chewing does not become evident in the assemblage until the Latte were present. Another cultural practice evident from the Latte period assemblage and not found during the Pre-Latte was the harvesting of human bone for tools and crania for ancestor worship.



**Betel nut staining on dentition observed on the Latte individuals.**



**Labial abrasion of upper anterior dentition observed on the Pre-Latte individuals.**

The genetic relationship between the Pre-Latte and Latte assemblages is best represented by the dental metric and nonmetric data. The nonmetric traits were compared to key traits that distinguish the two main ancestral groups in the pan-regional area. Both the Pre-Latte and Latte groups were found to compare favorably with the Sundadonts. On a local level, a number of traits were found to be significantly different between the Pre-Latte and Latte populations. The two groups share a common ancestor, but during prolonged separation, the two groups acquired separate frequencies of dental traits. When both shared the island, there was likely genetic admixture (interbreeding). The similarities in traits may be explained by retained shared ancestral traits and genetic admixture.

The samples for the Naton Beach Pre-Latte and Latte probably reflect normal population mortality. There was no evidence of death from warfare. The transition from the Pre-Latte to the Latte periods may have been a peaceful one. Both groups were healthy, active people. There are some endemic diseases in the population such as yaws for the Latte and gout for both groups. Anemias, represented by cribra orbitalia, are found in low frequencies for the Latte assemblage and rarely occurred in the Pre-Latte. Infection was found in low frequency for both groups. The occurrence of osteoarthritis, although commonly found, is generally slight, with very low rates of moderate to severe expressions. The

amount of physical stress was likely low. The people were active, but the activity was not overly strenuous. This suggests good overall health and nutrition for both groups.

## INDONESIA

**From:** David Bulbeck

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**Subject:** *Analysis of crania from the prehistoric cemetery of Melolo, Sumba, Indonesia*

David Bulbeck, from the Department of Archaeology and Natural History at The Australian National University, delivered a PowerPoint presentation at the 27th Annual Conference of the Australasian Society for Human Biology at the University of Sydney on 8th December 2013. The title of the presentation was "Analysis of crania from the prehistoric cemetery of Melolo, Sumba, Indonesia". The abstract published for the presentation was submitted before David had the opportunity to complete his analysis. Accordingly, a summary of the presentation is provided here to update readers on the full results.

Excavations at Melolo on Sumba, eastern Indonesia, have produced one of the largest known prehistoric assemblages of crania in Island Southeast Asia. The burials probably date to the first millennium CE. Eastern Indonesia is a zone of sharp transition from individuals of "Southern Mongoloid" appearance to the northwest and "Papuan" appearance to the east.

The small number of fairly complete crania from Melolo combine a small, flat face with a long, narrow braincase. Most crania, however, are represented only by their braincase, which presents a dilemma in their analysis from a population-based perspective (with reference to series published using the W.W. Howells suite of cranial measurements).

One approach was to apply the Penrose shape statistic to the sample means even if this meant using a sample size as small as one for some of the included measurements. This approach placed the males in a group that included East Asians and Polynesians. The results for the females were less clear. Melolo clearly belonged with a large clustering of European and "Mongoloid" crania, but whether the closest affinity was with Europeans or Mongoloids depended on the method used to summarise the results.

A second approach was to classify the individual crania with Linear Discriminant Analysis and summarise the resulting membership probabilities. Restricting the analysis to the five crania with at least 30 Howells measurements, the closest affinities clearly lay with East Asians (South Japanese and Hainan Chinese). However, when the number of required measurements was reduced so as to allow more Melolo crania to be included in the analysis, the closest affinities lay with the Dogon of West Africa, Hawaiian Polynesians and the Atayal of Taiwan, as well as South Japanese.

A consistent finding from all of the analytical results was the lack of any affinity with the Howells series from Australia and Melanesia. The so-called "Melanesoid" affinity, proposed by earlier comparative studies, was based purely on the long shape of the cranial vault. This aspect found a faint echo in the Dogon affinities that emerged when the analysed Melolo sample was dominated by crania

lacking their faces, but was otherwise completely overruled by affinities discovered with East Asians and Polynesians. In summary, the Melolo crania demonstrate the presence of people who were craniometrically "Mongoloid" by the first millennium CE on Sumba, which lies towards the west of eastern Indonesia.

David gratefully acknowledges a small research grant from the School of Culture, History and Language at the Australian National University, which enabled him to measure the Melolo crania at the Tropenmuseum in Amsterdam. The permission provided by Jacob van Brakel to measure the crania and the assistance of his staff in accessing the collection are also thankfully acknowledged.

## VIETNAM

**From:** Nguyen Kim Thuy, Tran Thi Minh, Nguyen Anh Tuan

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**Subject:** *Vuon Hong Site Belongs to Imperial Citadel of Thang Long, Hanoi, Vietnam*

Vuon Hong site, located in Badinh district, Hanoi, Vietnam, is a part of the Imperial Citadel of Thang Long. From December 2012 to April 2014, the Vietnam Institute of Archaeology collaborated with Thang Long – Hanoi Heritage Conservation Center to excavate over 10.000 m<sup>2</sup> at this site. In the site, archaeological investigations revealed a large number of relics and artifacts belonging to different dynasties: Ly dynasty (11<sup>th</sup> – 12<sup>th</sup> centuries), Tran dynasty (13<sup>th</sup> – 14<sup>th</sup> c.), Le dynasty (15<sup>th</sup> – 18<sup>th</sup> c.), and the Nguyen dynasty (19<sup>th</sup> c.)

Additionally, Vietnamese anthropologists found approximately 120 human skeletons in the site with two methods of burial: primary burial and secondary burial. Interestingly, we also saw 3 burial patterns: one individual per grave (figure 1), two individuals per grave (figure 2) and three individuals per grave (figure 3).



**Fig1. 12.VH.G3.L4.Mo.287**



**Fig 2. 12.VH.G10.L7.Mo.011, Mo.012**



**Fig3. 12.VH.G19.L2.Mo.002, Mo.007, Mo.008**

In general, dating of human remains is divided into two burial layers: early period (4 burials) and late period (other burials).

+ Early period: burials belong to the Tang dynasty (7<sup>th</sup> – 9<sup>th</sup> c.)

+ Late period: burials belong to the Nguyen dynasty (19<sup>th</sup> c.)

Recently, human remains from the Vuon Hong site are being recovered and studied. All results relating to these human skeletons will be reported in the near future. The analysis of the human remains is very important to document not only the ancient humans of Imperial citadel of Thang Long, but also the ancestors of the Vietnamese in general.

THAILAND

**From:** Charles Higham, Dougald O'Reilly, and Louise Shewan  
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**Subject:** *From Paddy to Pura: the Origins of Angkor – Excavations at Non Ban Jak*

Non Ban Jak is a large, moated Iron Age settlement in the upper Mun Valley. Under a grant from the Australian Research Council to Dougald O'Reilly and Dr Louise Shewan, the third season of excavations took place from the 1<sup>st</sup> November 2013 until the 28<sup>th</sup> February 2014. The excavation was directed by Charles Higham and Rachanie Thosarat.

The fieldwork is combined with the excavation of Prei Khmeng at Angkor, and is designed to identify the cultural changes that witnessed the transition from the later Iron Age to the formation of early Chenla states.

In addition to the excavation of a residential quarter of the site, Cristina Castillo has undertaken flotation to recover plant remains, while Nathan Harris and Sian Halcrow are responsible for the analysis of the human remains. The sequence uncovered as in the first and second seasons, covered the later Iron Age, with initial occupation, based on the dating of rice grains, in the 5<sup>th</sup> century A.D. This date is identical with that for the moats round the site.

Many clay walls and floors were revealed in a 2 metre deep cultural sequence, together with a total of 108 human burials set within the structures. The men, women and infants were accompanied by a wide range of mortuary offerings, including gold, silver, agate, glass, bronze and iron ornaments, iron tools and weapons, complete pots, bivalve shells, grey clay and spindle whorls.

The analysis of the plant remains is proving highly informative as to the methods of rice cultivation, while the recovery in the second season of a large socketed iron ploughshare adds to the evidence for agricultural change during this vital period.

*Other News:*

Under a major grant from the Marsden Fund of the New Zealand Government, Charles Higham, Thomas Higham and Fiona Petchey are undertaking a new series of radiocarbon dating for key Southeast Asian sites. Results obtained so far are proving most informative.

The Shanghai Archaeological Forum held its inaugural meeting in Shanghai in August 2013. The fieldwork programme "The Origins of the Civilization of Angkor" was voted one of the ten winners chosen for major research findings. C. Higham and R. Thosarat received their certificates from the Mayor of Shanghai and Lord Renfrew. C. Higham also gave a keynote lecture on Comparative World Civilizations.

CAMBODIA

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**Subject:** *The Paddy to Pura: Origins of Angkor - Excavations at Prei Khmeng, Cambodia*

The excavation of Prei Khmeng was undertaken as part of the Paddy to Pura Research Project, a joint collaboration between the Australian National University/University of Sydney and the APSARA Authority. The two previous seasons of research were undertaken at Phum Lovea nearby.

The site of Prei Khmeng had been excavated by the École Française d'Extrême Orient in the early 2000s as part of a project that was focused upon identifying the pre-Angkorian occupation and use of the area from the 7th century to the Angkorian period. The current excavations were also undertaken on the mound to the south of Prei Khmeng temple where an 8 x 8 m unit was established. This was located to the southeast of the furthest south of the EFEO excavations mentioned above.

The EFEO excavations encountered interments which dated to the Iron Age both on the temple mound and near the edge of the moat to the south of the temple, indicating the presence of an Iron Age settlement in this area.



**Figure:** Dougald O'Reilly, Tristan Russell, Bonnie Clark and Jennifer Newton working on one of the Prei Khmeng burials. (Image: Kate Domett)

The current research was aimed at expanding the area of the cemetery as part of the overall aims of the Paddy to Pura Research Project. This project aims to compare and contrast the Thai and Cambodian archaeological record to identify key factors leading to early state formation and to elucidate this process in Cambodian pre-state societies. This will be achieved by:

- investigating the profound socio-cultural changes underway from the late prehistoric to the early historic periods on a comparative regional basis.
- undertaking an analysis of changes in economy, and exchange networks as well as site morphology and settlement pattern.
- examining past human mobility, health and the genetic relationships within and between populations.

The excavation at Prei Khmeng was very successful in terms of identifying a pre-historic cemetery and a great deal of data was recovered and will now be analysed by the Paddy to Pura team. Of interest here are the differing types of interment in terms of grave layout/position and orientation and also varying grave wealth. It will be interesting to see whether there are any chronological factors involved with this and also interesting to explore the isotopic data on origin of the people.

LAOS

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**Subject:** *Bioarchaeological research as part of the Middle Mekong Archaeological Project (MMAP)*

Dr Siân Halcrow joined the Middle Mekong Archaeological Project last year to work with Korakot Boonlop to investigate the human remains excavated as part of the MMAP project directed by Dr Joyce White and Mr Bounheuang Bouasisengpaseuth. In September 2013 Dr Halcrow visited Luang Prabang to collect data from the skeletal sample. The Phou Phaa Khao Rockshelter (PPKR) and Tham An Mah site (TAM) from Luang Prabang Province, Laos PDR, excavated as part of MMAP yielded a total of 14 individuals. This skeletal sample offers a unique opportunity to assess human adaptation in this region. A paper on this project was presented this year at the Congress for the Indo-Pacific Prehistory Association in Siem Reap, a final skeletal report has been written for the Lao Department of Heritage, and a journal article is in progress.

Project website: <http://penn.museum/sites/mmap/>

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**Subject:** *Human Osteology Workshop in Laos*

Associate Professor Nancy Tayles from the University of Otago and Stacey Ward, ex-Otago Master's student, now an archaeologist in Sydney, presented a two-day workshop on Human Osteology at the National University of Laos, Vientiane in February this year. The first day was a series of seminars on

aspects of skeletal analysis, which was attended by NUL staff and senior students, and archaeologists from the Department of the Environment and Heritage of the Laos Ministry of Information, Culture and Tourism. The second day was devoted to practical sessions to a smaller group, with numbers limited by the amount of skeletal material available. The workshop was well received and it is hoped to repeat the event in future years.



**Figure: Laos workshop presenters and some attendees**

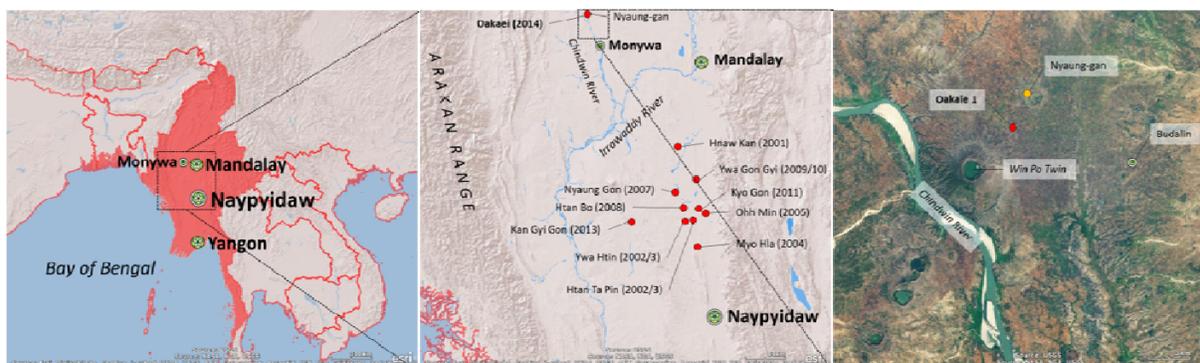
## MYANMAR

**From:** Thomas Oliver Pryce, Myo Min Kyaw, Anne-Sophie Coupey, Aude Favereau, Samuel Guérin, Marie Perrin

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**Subject:** *Back to the Bronze Age – The Mission Archéologique Française au Myanmar 2014*

In 1998 the Mandalay Department of Archaeology (Myanmar Ministry of Culture) excavated an ancient cemetery on the northwest corner of an extinct volcanic crater at Nyaung-gan (Figure 1, Budalin Township, Sagaing Division, see Moore, 2006, Moore and Pauk, 2001, Tayles, et al., 2001). The burials contained stone, pottery and bronze grave goods but, critically, no iron. In the absence of radiometric dates Nyaung-gan was therefore attributed to the Bronze Age; Myanmar's first known site of this essential period for understanding late prehistoric movements of people, goods and ideas between China, Southeast Asia and India, and vice versa. In 1999 Myanmar archaeologists invited regional specialists, including Prof. Jean-Pierre Pautreau (CNRS), to visit Nyaung-gan to give their advice and, subsequently, to form research partnerships. Such is the origin of the Mission Archéologique Française au Myanmar (MAFM).



**Figure 1 : Location of MAFM's sites from 2001 to 2014**

Co-directed by Prof. Pautreau and U Ayemang, the Franco-Myanmar team's first excavation season took place in 2001 at Hnaw Kan, an ancient cemetery located at the northern end of the Samon Valley (Figure 1, Pautreau, et al., 2001). The burials goods contained glass, carnelian and agate beads, all indicating that it was an Iron Age site, even if the pottery was unlike that Prof. Pautreau had already encountered in Iron Age cemeteries in northern Thailand (Pautreau, et al., 2001). Between 2002 and 2011 the MAFM excavated a further eight Iron Age cemeteries in the Samon Valley (Figure 1). Large fragments of charcoal were rarely recovered for radiocarbon dating but the few determinations available indicate a mid/late 1<sup>st</sup> millennium BC range, which is consistent with Iron Age dates across Mainland Southeast Asia. Physical anthropological study of the human remains revealed some variety in funerary tradition, including shroud-wrapped and coffin burials for extended adults, and flexed infants occasionally interred in jars. The pottery tradition was more homogenous with a common “trilogy” of cylindrical, globular and dish morphologies as grave goods. The presence of copper-base metal ornaments, tools and weapons was indicative of some degree of exchange as the raw materials are not to be found in the immediate vicinity but the occurrence of glass and hardstone ornaments could be seen as evidence of long-distance interactions, perhaps with South Asia. These studies combined make the largest and most detailed dataset for Iron Age funerals in Myanmar (Pautreau, 2007, Pautreau, et al., 2010).

In 2013, the lead author's first year as MAFM director, the team excavated an Iron Age cemetery at Kan Gyi Gon, 50-60 km west of the Samon Valley (Figure 1, Pryce, et al., 2013). Shroud, coffin and jar funerary traditions were all present among the 53 inhumations (22 adults, 16 immature and 15 indeterminate) and the pottery assemblage also comprised the “trilogy” common with Samon Valley ceramics. A major methodological advance was the use of a simple bucket flotation technique to recover tiny fragments of charcoal, which when carbon-dated allowed for a more precise chronological range from 500–200 BC, with exception of a single infant jar burial dated 1000–840 BC – potentially Bronze Age.



**Figure 2 : The 2014 excavation at Oakaie 1 showing the burial cuts, with detail of S15 including the copper-base tool left of the north arrow.**

To be sure of detecting this earlier period, in January 2014 we investigated a cemetery 2.5 km southwest of Nyaung-gan (Figure 1), and thus completed the cycle started in the 1990s by ‘returning to the Bronze Age’. Twenty-five clearly-defined graves containing 28 individuals were excavated, representing two phases of funerary activity due to both north-south and northwest-southeast skeletal alignments (Figure 2). We are still awaiting radiocarbon dates for charcoal and bone samples from the with but the presence of a single copper-base socketed tool in S15, combined with the absence of iron, glass, agate and carnelian, is strongly suggestive of a Bronze Age date. Indeed, the provision of an accurate date range for this period is essential for Myanmar as the fulcral Neolithic-Bronze Age transition has recently been heavily revised for Thailand (e.g. Higham, et al., 2011) – in summary, does the same movement of people, goods or ideas occur both sides of the Salween River or are they separate phenomena?



**Figure 3 : Range of ceramic morphologies found as grave goods at Oakaie 1.**

As might be expected, the Oakaie 1 ceramic assemblage is highly reminiscent of that known from Nyaung-gan (Figure 3), as is the presence of stone beads and bracelets (Figure 4). One highly important find is that of lithic debitage and bead roughouts in burial S5 (Figure 4). This suggests this individual may have been an artisan and that they may have practiced their craft in the local area. This idea is supported by the presence of extensive scatters of similar lithic and ceramic material in the fields west and south of Oakaie 1, towards the Win Po Twin crater. Conditional upon 2014's laboratory analyses the plan for 2015 is to return to Oakaie for further excavation of cemeteries and possibly settlement/industrial sites of Neolithic-Bronze Age date, as well as intensive foot survey to link the distribution and chronology of the surface material.



**Figure 4 : lithic debitage and bead roughouts from S5 (top left), stone beads (top right), stone bracelet (bottom left), copper-base socketed tool (bottom right).**

**BIBLIOGRAPHIE/BIBLIOGRAPHY :**

- Higham, C.F.W., Higham, T.F.G., Kijngam, A., 2011. Cutting a Gordian Knot: the Bronze Age of Southeast Asia: origins, timing and impact, *Antiquity* 85, 583–598.
- Moore, E., 2006. *Early landscapes of Myanmar*, River Books, Bangkok.
- Moore, E., Pauk, P., 2001. Nyaung-gan: A preliminary note on a Bronze Age cemetery near Mandalay, Myanmar (Burma), *Asian Perspectives* 40, 35-47.
- Pautreau, J.-P., 2007. *Ywa Htin, Iron Age burials in the Samon Valley, Upper Burma*, Mission Archéologique Française au Myanmar, Paris.
- Pautreau, J.-P., Coupey, A.-S., Kyaw, A.A., 2010. *Excavations in the Samon Valley: Iron Age burials in Myanmar*, Mission Archéologique Française au Myanmar, Chiang Mai.
- Pautreau, J.-P., Pauk, P., Domett, K., 2001. Le cimetière de Hnaw Khan, Mahlaing (Mandalay), *Aséanie* 8, 73-101.
- Pryce, T.O., Coupey, A.-S., Kyaw, A.A., Dussubieux, L., Favereau, A., Lucas, L., Perrin, M., 2013. *The Mission Archéologique Française au Myanmar: Past, present and future*, *Antiquity* 87, online only.
- Tayles, N., Domett, K., Pauk, P.U., 2001. *Bronze Age (Myanmar): a report on the people from the cemetery of Nyaunggan, Upper Myanmar*, *Antiquity* 75, 273-278.

## *Recent Publications*

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A reminder about the online bibliography for Southeast Asian archaeology, including bioarchaeology at <http://seasia.museum.upenn.edu/> Click on left image to access. You will need to establish a login, but it is very simple and quick.

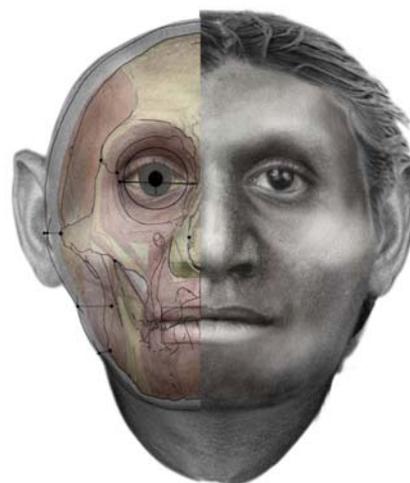
- Buckley HR., Kinaston R., Halcrow S., Foster A., Spriggs M., and Bedford. (In press) Scurvy in a tropical paradise? Evaluating the possibility of infant and adult vitamin C deficiency in the Lapita skeletal sample of Teouma, Vanuatu, Pacific islands. *International Journal of Palaeopathology*. <http://dx.doi.org/10.1016/j.ijpp.2014.03.001>.
- Clark, A.L., N. Tayles and S.E. Halcrow (2014). Aspects of health in prehistoric mainland Southeast Asia: Indicators of stress in response to the intensification of rice agriculture. *American Journal of Physical Anthropology*. 54 (3), 484-495.

Numerous bioarchaeological investigations have suggested that as agriculture intensifies, levels of physiological stress and poor health increase. However, previous research in Southeast Asia suggests that a decline in health was not universal. This study aimed to provide the first investigation of human health during the intensification of rice agriculture in the large skeletal sample from the prehistoric site of Ban Non Wat, Northeast Thailand (1750-420 B.C). Health was analysed using two indicators of childhood stress, the prevalence of linear enamel hypoplasia (LEH), a measure of early childhood stress, and stature, as a measure of late childhood stress, were collated for 190 adults. Sex-specific diachronic relationships between the prevalence of LEH and stature were explored. For both sexes, initially the prevalence of LEH was found to decrease and then increase over time. Stature remained constant over time for males, although for females stature increased initially, then decreased. Early childhood stress was not significantly correlated with stature in females ( $P = 0.185$ ), but high levels of LEH were unexpectedly correlated with taller male stature ( $P = 0.017$ ). Our findings suggest an initial improvement in health during agricultural intensification at this site, likely related to a reduction in physiological perturbations and maintenance of a nutritious diet during this time. The subsequent deterioration in health may reflect geomorphologically and archaeologically indicated variation in environmental conditions and consequential sociocultural changes. We suggest that the sex-differences in the relationship between stature and LEH may relate to the timing of stress and/or catch-up growth.

- Domett K, Newton J, O'Reilly DJW, Tayles N, Shewan L, Beavan N. (2013) Cultural Modification of the Dentition in Prehistoric Cambodia. *International Journal of Osteoarchaeology* 23: 274-286.
- Domett K, Colbert A, Chang N. (2013) The life and times of two people from the Bronze Age in northeast Thailand. *HOMO - Journal of Comparative Human Biology* 64: 147.
- Foster, A., Buckley, HR., Tayles N., Spriggs, M., Bedford, S. (2013). Gender, Labour Division and the Skeleton: a case study from the Teouma Lapita cemetery. In: Glenn R Summerhayes and HR Buckley (eds). *Pacific Archaeology: Documenting the Past 50,000 years*. Dunedin. Otago University Press. Pp: 76-90.
- Gilmore, H., C. Schafer and S. E. Halcrow (2013). *Tapu* and the invention of the “Death Taboo”: An analysis of the transformation of Polynesian cultural concept. *Journal of Social Archaeology*. 13 (3), 331-349.

- Glover I. C. and Shahnaj Husne Jahan. (2014). An Early Northwest Indian Decorated Bronze Bowl From Khao Sam Kaeo. Published in *'Before Siam, Essays in Art and Archaeology'* Nicolas Revire and Stephen Murphy, eds Bangkok, River Books, pp. 9–13.
- Halcrow, S.E., J. Rooney, N. Beavan, K. C. Gordon, N. Tayles and A. Gray (in press). Assessing Raman spectroscopy as a prescreening tool for the selection of archaeological bone for stable isotopic analysis. *PLoS ONE*.
- Halcrow, S. E., N. J. Harris, N. Beavan and H. Buckley (2014). First bioarchaeological evidence of probable scurvy in Southeast Asia: Multifactorial etiologies of Vitamin C deficiency in a tropical environment. *International Journal of Paleopathology*. DOI: 10.1016/j.ijpp.2014.01.004.
- Halcrow, S. E., N. J. Harris, N. Tayles, R. Ikehara-Quebral and M. Pietruszewsky (2013). From the mouths of babes: dental caries in infants and children and the intensification of agriculture in mainland Southeast Asia. *American Journal of Physical Anthropology*. 150:409-20.
- Hayes, S., T. Sutikna, et al. (2013). "Faces of Homo floresiensis (LB1)." *Journal of Archaeological Science* 40(12): 4400-4410.  
<http://www.sciencedirect.com/science/article/pii/S0305440313002343>

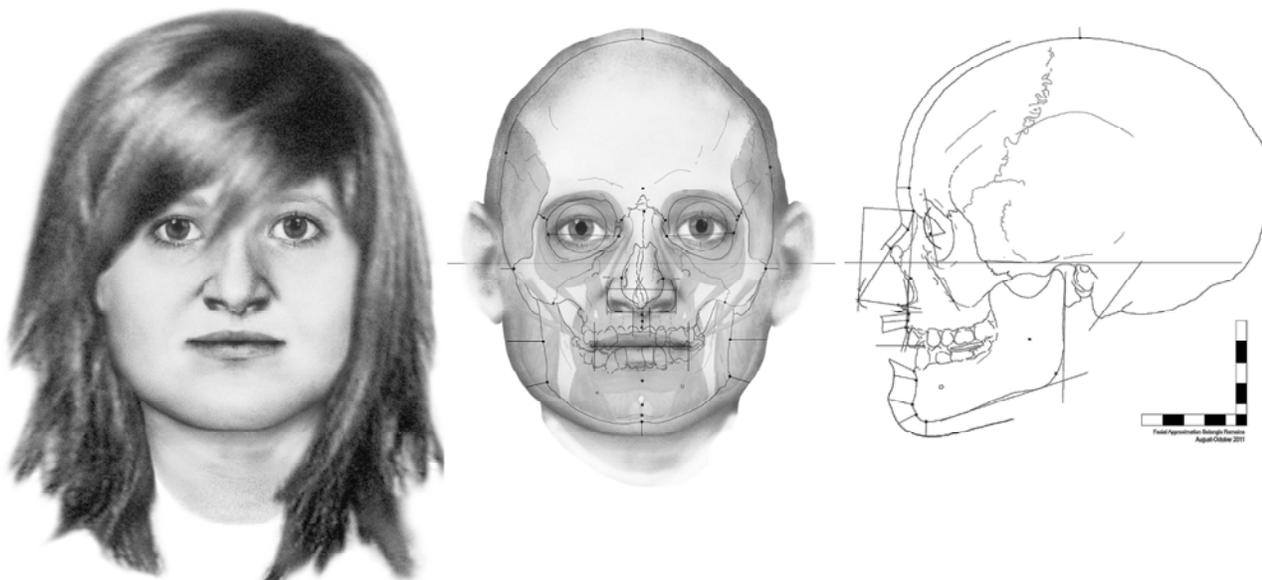
Liang Bua 1 (LB1), the holotype specimen of *Homo floresiensis*, has been given a number of different faces since she was first announced in 2004. In collaboration with Mike Morwood and Thomas Sutikna (Indonesian National Centre for Archaeology), this paper outlines the methods and approach we used to approximate the face of 'Hobbit', from the skull reconstruction to correct for taphonomic and damage during and after excavation, to estimating surface appearance (skin colour, hair etc.). The initial submission of this paper was fairly brief, but the reviewers' comments strongly suggested more information was needed regarding what we did, and why we did it. In retrospect this publication should have been two papers, as the second half includes a geometric morphometric analysis of nine other faces of LB1, many of which are on display in major museums throughout the world. This analysis showed a surprising degree of variance in face shape, feature dimensions and locations, which is odd, given all palaeo-artists were of necessity working from the same skull (LB1 is the only one to have been excavated with a cranium). Mike's response to the final draft of the paper was that it was a bit too technical, and he's right. We've been misinterpreted as claiming LB1 is a modern human, whereas what we have done is apply and adapt modern *H. sapiens* skull-soft tissue relationships to an extinct hominin species.



- Hayes, S. (2014). "Facial approximation of 'Angel': Case specific methodological review." *Forensic Science International* 237: e30-e41. [http://www.fsijournal.org/article/S0379-0738\(14\)00009-7/abstract](http://www.fsijournal.org/article/S0379-0738(14)00009-7/abstract)

In August 2011 NSW Homicide requested a facial approximation (more commonly known as 'facial reconstruction') be undertaken on the remains of an unidentified young woman found in August 2010 in

Belanglo State Forest, NSW. Popularly referred to as 'Angel' due to a t-shirt found near the remains, this young woman's identity remains unknown, even though since the release of this estimate of her facial appearance helped generate over 130 new and unique leads from the Australian public. Following permission to submit the methods and results to peer review in 2013, I also undertook a review of forensic facial approximation methods, as published in peer-reviewed academic journals since 2000. It became very apparent that not many other practitioners explain their methods, and those that do, continue to apply many statistically invalidated skull-soft tissue relationships. This paper is both a methodological review of forensic applications, and an example of, comparatively speaking, methodological transparency – each aspect is explained from the initial request to the final version which was first released to the Australian media in December 2011. Overall, this paper aims to show what can occur during a facial approximation – and not just forensically, but also archaeologically.



- Higham C.F.W. (2014). *Early Southeast Asia: From the First Humans to the Civilization of Angkor*. Bangkok: River Books.

This book describes over a million years of human occupation in mainland Southeast Asia. It draws together the new evidence for the occupation by *Homo erectus*, *Homo floresiensis*, the Denisovans, and the expansion of anatomically modern humans. The later prehistoric sequence incorporates the new radiocarbon chronologies from Ban Non Wat and Ban Chiang. The LiDAR surveys are incorporated in the revised review of the civilization of Angkor. The volume is lavishly illustrated with colour images and maps.

- Higham C.F.W. (2013) Hunter-Gatherers in Southeast Asia: From Prehistory to the Present *Human Biology*: 85: 21-44.  
A review of the hunter gatherer occupation of Southeast Asia given at a symposium held in Paris in April 2013.
- Higham C.F.W. (in press 2014) From the Iron Age to Angkor: new light on the origins of a state. *Antiquity*.

This paper offers a new model of the origins of the agrarian states of inland Southeast Asia.

- Higham C.F.W. and Higham T.F.G. (2012). A new chronological framework for Ban Chiang, Northeast Thailand. In Tjoa-Bonatz, M.L., Reinecke, A. and Bonatz, D. (eds.), *Crossing Borders* 171-80. Singapore, NUS Press.

The chronology of Ban Chiang has been controversial for too long. This paper presents the results of a new radiocarbon dating initiative based on human bone from this site, which places the initial settlement in the 16<sup>th</sup> century BC with the transition into the Bronze Age in the late 11<sup>th</sup> century BC.

- Horrocks, M., Neiuwould. M., Kinaston, R., Buckley, H., Bedford, S. (2014) Microfossil and Fourier Transform InfraRed analyses of Lapita and post-Lapita human dental calculus from Vanuatu, Southwest Pacific. *Journal of the Royal Society of New Zealand*. 44(1): 17-33.
- Ikehara-Quebral R, Ryan EM, Parr N, Liston J, Pietrusewsky M, Douglas MT. (2014). An overview of intentional dental modification in Micronesia. *American Journal of Physical Anthropology* S58:148.
- Kinaston, R and Buckley HR. (2013) The Stable Isotope Analysis of Prehistoric Human Diet in the Pacific Islands with an emphasis on Lapita. In: Glenn R Summerhayes and HR Buckley (eds). *Pacific Archaeology: Documenting the Past 50,000 years*. Dunedin. Otago University Press. Pp: 91-107.
- Kinaston, R., Buckley, HR, Valentin, F., Bedford, S., Spriggs, M., Hawkins, S., and Herrscher, E. (2014) Lapita diet, subsistence strategies and methods of animal husbandry in Remote Oceania: new stable isotope evidence from the 300-year-old Teouma site, Efate Island, Vanuatu. *PLoS ONE* 9(3): e90376. doi:10.1371/journal.pone.0090376.
- Kinaston, R., Buckley. HR., Gray, A. (2013) Diet and social status on Taumako, a Polynesian outlier in the Southeastern Solomon Islands. *American Journal of Physical Anthropology*. 151(4): 589-603.
- Kinaston, R., Walter, R., Jacomb, C., Brooks, E., Tayles, N., Halcrow, S., Stirling, C., Reid, M., Gray, A., Spinks, J., Shaw, B., Fyfe, R., Buckley, H. (2013). The first New Zealanders: Patterns of diet and mobility revealed through isotope analysis. *PlosOne*. 8(5): 1-11. e64580.
- Kinaston, R., Buckley, HR., Gray, A., Shaw, B., and Mandui, H. (2013) Exploring subsistence and cultural complexes on the south coast of Papua New Guinea using palaeodietary analyses. *Journal of Archaeological Science*. 40: 904-913.
- Mckay, S., R. Farah, J. Broadbent, N. Tayles and S. E. Halcrow (2013). Is it Health or the Burial Environment: Differentiating between hypomineralised and postmortem stained enamel in an archaeological context. *PLoS ONE*. 8(5), e64573.
- Newton J, Domett K, O'Reilly DJW, Shewan L. (2013). Dental health in Iron Age Cambodia: temporal variations with rice agriculture. *International Journal of Paleopathology* 3: 1-10.
- Newton J, Domett K, Chang N. (2013). Prehistoric diet and dental health at Ban Non Wat, Thailand. *HOMO - Journal of Comparative Human Biology* 64: 155.

- Newton J, Domett K. (2014). The biocultural context of dental modification in prehistoric Southeast Asia. *American Journal of Physical Anthropology* S58: 195.
- Pietrusewsky M. (2013). Biological connections across the Sea of Japan: a multivariate comparison of ancient and more modern crania from Japan, China, Korea, and Southeast Asia. In: Pechenkina K, Oxenham, M, editors. *Bioarchaeology of East Asia: Movement, Contact, Health*. Gainesville: University Press Florida. p. 143-178.
- Pietrusewsky M, Buckley H, Anson D., Douglas, MT. (2014). Polynesian origins: a biodistance study of mandibles from the Late Lapita site of Reber-Rakival (SAC), Watom Island, Bismarck Archipelago. *Journal of Pacific Archaeology* 5(1):1-20.
- Pietrusewsky M, Lauer A, Tsang C-h, Li K-t, Douglas MT. (In press). Dental indicators of health in early Neolithic and Iron Ages from Taiwan. *Journal of Austronesian Studies*..
- Pietrusewsky M, Douglas M, Swift MK., Harper RA, Fleming MA. (In press). Health in ancient Mariana Islanders: a bioarchaeological perspective. *Journal of Island and Coastal Archaeology*.
- Pietrusewsky M, Lauer A, Tsang CH, Li KT, Douglas MT. (2014) Tooth ablation in early Neolithic skeletons from Taiwan. *American Journal of Physical Anthropology* S58:207.
- Robbins Schug G, K Elaine Blevins, Brett Cox, Kelsey Gray, and V Mushrif-Tripathy. (2013). Infection, Disease, and Biosocial Process at the End of the Indus Civilization. *PLOS ONE* 0084814. DOI: 10.1371/journal.pone.0084814

In the third millennium B.C., the Indus Civilization flourished in northwest India and Pakistan. The late mature phase (2200-1900 B.C.) was characterized by long-distance exchange networks, planned urban settlements, sanitation facilities, standardized weights and measures, and a sphere of influence over 1,000,000 square kilometers of territory. Recent paleoclimate reconstructions from the Beas River Valley demonstrate hydro-climatic stress due to a weakened monsoon system may have impacted urban centers like Harappa by the end of the third millennium B.C. the impact of environmental change was compounded by concurrent disruptions to the regional interaction sphere. Climate, economic, and social changes contributed to the disintegration of this civilization after 1900 B.C. We assess evidence for paleopathology to infer the biological consequences of climate change and socio-economic disruption in the post-urban period at Harappa, one of the largest urban centers in the Indus Civilization.

Bioarchaeological evidence demonstrates the prevalence of infection and infectious disease increased through time. Furthermore, the risk for infection and disease was uneven among burial communities. Corresponding mortuary differences suggest that socially and economically marginalized communities were most vulnerable in the context of climate uncertainty at Harappa. Combined with prior evidence for increasing levels of interpersonal violence, our data support a growing pathology of power at Harappa after 2000 B.C. Observations of the intersection between climate change and social processes in proto-historic cities offer valuable lessons about vulnerability, insecurity, and the long-term consequences of short-term strategies for coping with climate change.

- Scott, R. and Buckley HR. (in press) Exploring prehistoric violence in Tonga: understanding skeletal trauma from a biocultural perspective. *Current Anthropology*.

- Summerhayes GR and HR Buckley (2013). *Pacific Archaeology: Documenting the Past 50,000 years*. Dunedin. Otago University Press. 189 pages.

### *Conference Details*

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#### PAPERS PRESENTED AT RECENT CONFERENCES

- **2013** IUAES (International Union of Anthropological and Ethnological Sciences) Congress 2013, Manchester, UK August 5th to 10th 2013

<http://www.iuaes2013.org/index.html>

This congress included a session “The vulnerable child: biological responses to life in the past” organised by Dr Sian Halcrow and Associate Professor Mary Lewis.

Relevant papers included:

- Halcrow, S.E., Tayles, N., Inglis, R., and C. Higham. Twins in prehistoric mainland Southeast Asia: Birth, death and personhood.

This paper presents an extremely rare finding of at least two and possibly four twin burials from the prehistoric site of Khok Phanom Di in Southeast Thailand (4100-3500 BP). We outline a straightforward biological and archaeological methodological approach for identification of twin (or other multiple birth) burials and a social theoretical framework to interpret twin mortuary treatment. The consideration of these twin burials within a theoretical framework, using bioarchaeological evidence including the infant mortality profile, mortuary ritual and information from cross-cultural ethnographic studies of twinning, advances knowledge of concepts of personhood and social identity (age) of infants in this past population.

- Robbins Schug, G. Filling in the holes: subsistence transition, skeletal emaciation, and compact bone histology.

The second millennium B.C. was a period of significant social and environmental changes in prehistoric India. Population growth in the Deccan region of west-central India led to unsustainable agricultural practices in the first half of the Jorwe period (1400-700 B.C.). At the site of Inamgaon, agriculture was finally abandoned around 1000 B.C. and rates of skeletal emaciation increased as greater proportions of infants and children faltered in body mass index (body mass for stature). This paper correlates the evidence for growth faltering in measures of whole bone morphology with new evidence for growth derangement in the midshaft femur compact bone histology. The deposition of primary lamellar tissue at the periosteal surface and within the secondary osteons (BMU's) serve as a stratigraphic record of growth and growth disruption. When bone resorption and formation are decoupled due to disruptions in homeostasis, reversals in bone formation are visible as 'double zone' osteons and cement lines in circumferential lamellar tissue. Growth derangement is also observable in immature archaeological bone as a change in the expected distribution of porosity across the tissue and an increase in the total amount of porosity, accompanied by loss of cortical connections between resorption bays. In this paper, I will demonstrate the histological and macroscopic markers of growth disruption in immature remains from Inamgaon and clarify the specific biological impacts of significant environmental, social, and subsistence transition on the infants and children of Inamgaon.

• **2013 Otago School of Medical Sciences (OSMS) Postgraduate Symposium**

University of Otago, Dunedin, NZ

- The application of digital radiography to bioarchaeological studies of oral health: A case study from Ban Non Wat, Thailand. Shkrum, S.A., Tayles N., Halcrow, S.E. and Foster Page, L. 2013.

• **2013 Australasian Society of Human Biology**

University of Sydney, Australia

The 27th Annual ASHB conference was held at the University of Sydney in December 2013. A number of papers at the conference included bioarchaeology research in Southeast Asia and the Pacific. All abstracts will be published in the journal *HOMO: Journal of Comparative Human Biology*.

- Prehistoric Polynesians: recent research on human burials in Rima Rau Cave, Atiu, Southern Cook Islands. Nancy Tayles, Hallie R. Buckley and Angela L. Clark. Department of Anatomy, Otago School of Medical Sciences.

Our team of bioarchaeologists recently completed a field season on the island of Atiu, with the objectives of researching the origins of human skeletal remains in a cave, to establish who was interred there, and what their lives had been like. This project was stimulated by the local Atiu families on whose land the cave was located. Before going to Atiu, we researched oral traditions and historic documentation about the burials. During the field season we mapped the cave and recorded the locations of disarticulated and commingled accumulations of bones. We selected areas of the cave to systematically record the locations of individual bones, remove them to a 'laboratory' in the vicinity, to record details of their osteology, including counts, sizes, and individual characteristics such as pathology and genetic variations, before returning them to the cave. The analysis of the data is in progress as this abstract is being written but the presentation will include results. We also collected small samples of bones and teeth for radiocarbon dating, isotopic study of diet and migration, and ancient DNA analysis. This aspect of the project will provide the basis for a discussion of issues relating to research in remote and isolated communities.

- Osteoarthritis in prehistoric Ban Non Wat, Thailand: 2000 years of stasis. K Domett<sup>1</sup>, C Evans<sup>2</sup>, N Tayles<sup>3</sup>, N Chang<sup>2</sup>  
<sup>1</sup>School of Medicine and Dentistry; <sup>2</sup>School of Arts, Education and Social Science, James Cook University, Townsville, Australia; <sup>3</sup>Department of Anatomy and Structural Biology, University of Otago, New Zealand

Osteoarthritis is frequently observed in past populations. It can lead to pain, limited mobility and disability. The prehistoric community of Ban Non Wat in northeast Thailand spans over 2000 years from early Neolithic to late Iron Age. From a biocultural perspective, this temporally continuous sample of skeletal remains provides a rare opportunity to look at the development of health through time within a discrete environment. Osteoarthritis, as one aspect of health, was highest in the shoulders, elbows, knees and feet with some remarkably consistent patterns through time. The multifactorial aetiology of osteoarthritis and an incomplete understanding of its exact pathogenesis cloud the interpretation of these patterns, but genetic homeogeneity alongside limited variation in subsistence activities over time are suggested as key factors.

- David Bulbeck. *Analysis of Crania from the Prehistoric Cemetery of Melolo, Sumba, Indonesia.*
- Damien Huffer & G Perri. *A New Approach to More Accurately Reconstruct the Medullary Cavity in Cross-Sectional Geometric Analyses.*
- Judith Littleton et al. *Interpreting Violence in the Early Bronze Age of Mongolia.*
- Marc Oxenham & A Willis. *Con Co Ngua, a 5,500--6,000 BP Cemetery in Northern Vietnam: Preliminary Observations.*
- Christine Cave & M Oxenham. *Old and Older: Extending the Age at Death of an Anglo--Saxon Cemetery Population.*
- Denise Donlon & S Croker. *A review of Anthropological Casework Involving Non-human bones in an Australian Forensic Setting.*
- Donna MacGregor & K Murray. *Forensic Case Study: Unusual Skeletal Age Variation within an Individual in Queensland.*
- Jennifer Menzies et al. *Experimental Taphonomy near Belanglo State Forest and the Implications for Time-Since-Death Assessment Methods.*
- Christina Adler et al. *Ancient DNA from Human Oral Microbiota Records Dietary Impacts of the Farming and Industrial Eras.*
- Gina MacFarlane. *A Trial Method for Assessing Root Transparency and its Potential Use in Assigning Relative Age at Death to Mature Adult Skeletal Remains.*
- Anna Willis & M Oxenham. *The Neolithic Demographic Transition and Oral Health: A Case Study from Japan.*
- Rebecca Griffin et al. *Amino Acid Racemization: An Investigation of its Application to Age--at--Death Estimation of Archaeological Remains.*
- Nancy Tayles et al. *Prehistoric Polynesians: Recent Research on Human Burials in Rima Rau Cave, Atiu, Southern Cook Islands.*
- Georgia Roberts. *Teaching Juvenile Osteology in Tertiary Institutions – A Review.*
- Phillip Roberts. *Pathological Progression of Syphilis: A study of Cases with Multiple Admissions to Victorian Hospitals in the Nineteenth Century.*

• **2014 41<sup>st</sup> Annual Meeting of the Paleopathology Association**

Calgary, Alberta, Canada

The abstracts are available here: <http://www.paleopathology.org/2014MeetingInfo.html>

• **2014 83<sup>rd</sup> Annual Meeting of the American Association of Physical Anthropologists**

Calgary, Alberta, Canada

Abstracts are available from <http://physanth.org/annual-meeting/83rd-annual-meeting-2014>

Southeast Asia and the Pacific were well represented in the invited Poster Symposium at AAPA: A World View of (Bio)Culturally Modified Teeth: Reason, Result, Response (Joel Irish and Scott Burnett, Chairs)

- Ikehara-Quebral R, Ryan EM, Parr N, Liston J, Pietrusewsky M, Douglas MT. (2014). An overview of intentional dental modification in Micronesia. *American Journal of Physical Anthropology* S58:148.

Intentional dental modification observed in bioarchaeological samples from Micronesia includes multi-linear incisions and horizontal abrading of the labial tooth surfaces in the Mariana Islands and tooth blackening in Palau. The social implications of deliberate tooth alteration have been the focus of past studies in the region, with little attempt to explore the biological implications, due to the small number of affected individuals. Cultural practices that expose the dentin or the dental pulp chamber, such as incising and abrading, are expected to increase an individual's risk of oral-dental infection. When protective tooth enamel, the hardest tissue in the body, is removed, dental decay can advance more rapidly in the underlying soft dentin, exposing the pulp. When the pulp is invaded by pathogenic microorganisms and their toxins, it can become inflamed. If left untreated, this will progress to pulp necrosis and infection, and subsequently spread to the surrounding alveolar bone (e.g., periapical abscess formation). To understand the biological impacts of intentional modification, we examined over ten pre-European Contact (pre-1521) dental samples from the Mariana Islands to test for a correlation between intentionally modified teeth and two indicators of oral-dental health, carious lesions and periapical abscesses. Although differences in data collection methods and poor bone preservation prevented the use of both indicators across the board, our preliminary results indicate that horizontal abrading in at least one sample appears to be associated with carious lesions while dental incising is not. We contextualize these results by comparing them with bioarchaeological data from the Pacific-Asia region.

- Pietrusewsky M, Lauer A, Tsang CH, Li KT, Douglas MT. (2014) Tooth ablation in early Neolithic skeletons from Taiwan. *American Journal of Physical Anthropology* S58:207.

Although varied in its expression, the intentional removal of teeth during life has been documented in the living and in archaeological skeletal record worldwide. Several earlier studies indicate that tooth ablation was relatively common in Taiwan as well as in the Chinese mainland beginning with the Neolithic Age continuing into the Iron Age in these regions. More recent examples of tooth ablation among several of Taiwan's indigenous groups, some occurring as late as the early twentieth century, have also been reported. In this study, we report an unusually high frequency of tooth ablation in some of the earliest Neolithic (ca. 5000 BP) skeletons from the Nankuanli East (NKLE) site in southwestern Taiwan. The patterns of ablation and teeth missing in 15 adult male and 8 adult females from the NKLE site are compared. With one exception, the most common pattern of tooth ablation in the NKLE skeletons, male and female, was the symmetrical removal of the maxillary lateral incisors and canines. In contrast to these findings, we further report no tooth ablation among the Iron Age skeletons from the Shisanhang (SSH) site in northwest Taiwan. The significance of the almost ubiquitous occurrence of tooth ablation among the earliest Neolithic skeletons from Taiwan, including the manner of tooth removal, and the absence of this cultural modification in the SSH teeth are explored. This study contributes to studies in anthropology that attempt to reconstruct past behaviors from archaeological human skeletons.



This research was supported by National Research Council of Taiwan.

- Newton J, Domett K. (2014). The biocultural context of dental modification in prehistoric Southeast Asia. *American Journal of Physical Anthropology* S58: 195.

This research examines the intentional dental modifications of ablation and filing from archaeological sites throughout Southeast Asia. Until recently, cases of tooth filing were undocumented throughout prehistoric Southeast Asia and intentional ablation has been predominantly limited to Neolithic and Iron Age sites. The increasing number of samples from newly documented sites in Cambodia, and previously reported evidence from other parts of Southeast Asia, such as Thailand and Vietnam, allows the opportunity to systematically examine ablation patterns from across the region. Biological factors such as age and sex are examined, along with migratory and diet patterns, to evaluate the association of these factors with dental modification. Methods of extracting and filing the teeth, and the biological impact on subsequent dental health are also explored. Pathology related to alveolar bone or adjacent teeth is quite low, and it appears dental modification did not negatively impact dental health. Similar patterns of ablation were found between the Neolithic Thai site of Khok Phanom Di and late Iron Age Cambodian sites Phum Snay and Phum Sophy, suggesting possible links between Thailand and Cambodia. Though some unique patterns have been identified and are discussed, including distinctive filing patterns for Cambodia. This research allows improved opportunities for understanding the biological impact and biocultural significance of intentional dental modification throughout prehistoric Southeast Asia.

This research was partially funded by the Australian Research Council (DP0984968).

• **2014 66<sup>th</sup> Annual Scientific Meeting of the American Academy of Forensic Sciences,**  
Seattle, WA, February 12-22

- Estimation of cartilaginous and soft tissue components for estimating adult stature using the anatomical method. Atsuko Hayashi<sup>1</sup>, MA; Thomas D. Holland, PhD, D-ABFA<sup>1</sup>, Michael Pietrusewsky, PhD, D-ABFA<sup>2</sup>

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Using a Microscribe® G digitizer, this study presents an improved method for estimating skeletal height using the standing anatomical position. Once accurate individual skeletal heights were obtained, regression formulae that account for the cartilaginous and soft tissue (CCST) height components were used to estimate biological statures.

This pilot study will impact the forensic science community by demonstrating how the CCST is related to age and individual variation. The goal of this study is to improve the accuracy of the anatomical method of stature estimation and to create multiple stature estimation formulae for skeletons where age-at-death is known but antemortem stature records are lacking.

Thirty-eight European American males from the William M. Bass Donated Skeletal Collection at the University of Tennessee Knoxville were used for this study. The individuals were born between 1929 and 1940, and died between 1987 and 2009. The range of age-at-death is 19 to 74 years with a mean of 46.7 years. Using the digitizer, measurements of the heights of the cranium, vertebral columns from C2 to L5 (TVH), the vertical space height between the anterior margin of the sacral promontory to the level that connects the superior margins of the left and the right acetabulae (AP-SMLRACE), articulated talus and calcaneus, and the physiological length of the tibia (Martin 2) were recorded. The physiological length of the femora was measured using an osteometric board because of the limited arm length of the digitizer. The interlandmark distances were calculated by Euclidian distances, in two or three dimensions, and trigonometry.

The use of five different locations on individual vertebrae: anterior, left, right, posterior, and the average of the left and the right sides, allows alternative means of calculating TVH in the event that individual vertebrae columns are incomplete. The spinal curve corrections were adapted from the Intermediate Index (DI) of Delmas

(1952) as normal for all ages as well as under 42 years of age. Delmas' Dynamic Index (DDI) was used for individuals 43 years of age and older. These indices were used to evaluate additional curve reductions to determine if they should be applied to older ages. The CCST heights were obtained by subtracting the TSHs from the adjusted cadaver stature (ACS) (Trotter & Gleser, 1952).

The relationships among CCSTs, TSHs, and age were investigated using the Pearson correlation coefficients. The results showed the CCSTs had negative correlations ( $r = -.206$  to  $-.409$ ) to age whereas the TSHs had almost no correlation ( $r = .012$  to  $.1$ ) to the CCSTs. Next, the test on residuals of Partial correlation was examined and confirmed that there are no influences after controlling on the TSHs. These results indicated that the individuals who have tall TSHs do not necessarily have thicker CCSTs. Therefore, the ten regression formulae for estimating CCST heights from all 5 locations, DI, and DDI were constructed from only age (e.g., Anterior CCST (mm) =  $-0.853 * \text{age} + 179.58$ , 95% PI (Point Estimate  $\pm 54.13\sqrt{1.026} + [(\text{Age} - 46.74)^2 / 7107.69]$ ). ACS to Estimated Biological Statures (EBS = TSH + CCST) were tested by Paired T-tests on the ten models which ranged from  $-0.006$  mm to  $0.0197$  mm with 95% lower CI between  $-8.269$  mm to  $-8.970$  mm and upper CI between  $8.309$  mm to  $8.947$  mm ( $p > .996$ ). Lastly, four independent samples of war casualties (European ancestry) from JPAC-CIL were examined for accuracy and bias from antemortem stature records. The results showed Accuracy:  $10.76$  to  $13.09$  mm, Bias:  $-0.71$  to  $17.13$  mm.

More accurate individual total skeletal heights (TSHs) were obtained using the digitizer, specifically when the S1 height was replaced with AP-SMLRACE and the physiological length of the tibia (Martin 2) from Fully (1956) was used. This methodology will be useful for skeletons that lack records of biological stature to create stature estimation equations from single and multiple elements in order to increase group specific and generic stature estimates.

• ***IPPA Indo-Pacific Prehistory Association Meeting 2014***

Siem Reap, Cambodia Sunday 12 to Saturday 18 January 2014

<http://ippa.weblogs.anu.edu.au/>

This conference included a wide array of bioarchaeological research; abstracts are not currently available on the web. Those of bioarchaeology interest included the following (but there were many more!):

- Halcrow, S.E. and Boonlop, K. 2014. *The Prehistoric Human Remains from Two Rockshelter Sites in Luang Prabang Province* (Read by Dr Joyce White). 20<sup>th</sup> Congress of the Indo-Pacific Prehistory Association, Siem Reap.

This paper presents the preliminary results from the bioarchaeological investigation of 14 individuals dated provisionally to the Iron Age from two rock shelter sites in Luang Prabang Province, Lao PDR. We present information on health and disease, post-mortem modification of the bones and mortuary treatment.

- *Approaching the Taphonomic Analysis of Human Remains in the Philippines. Perspectives from Neolithic Britain.* Rebecca Crozier, Archaeological Studies Program, University of the Philippines.

Fragmentary and disarticulated human skeletal remains present a significant challenge to the analyst. Within the Philippines, at sites such as Ille Cave in the Dewil Valley, Palawan, disarticulated bone has been a frequent occurrence. This site is not an isolated example, and such material is commonly reported throughout Southeast Asia. As traditional osteological analysis demands the recovery of discrete skeletons, this type of material is often considered to be of little use. However, advances in the fields of forensic archaeology and taphonomy have furnished researchers with a new set of tools with which to approach these complex assemblages. Indeed, the one characteristic which leads many researchers to hold such remains of limited utility, may actually reveal significant information pertaining to the reconstruction of the taphonomic history of a site. Drawing on a case

study from Neolithic Britain, this paper will demonstrate the intrinsic value of these often marginalised assemblages.

- C.F.W. Higham reported on the excavation of Non Ban Jak, and was a discussant in the session on Neolithic expansion into Southeast Asia
- Oxenham MF, Matsumura H, Shinoda K, Huffer D, Willis A. *Exploring the initial emergence of farming communities in Southeast Asia: a bioarchaeological approach using Man Bac*
- Huffer D, Oxenham M. *Investigating Activity and Mobility Patterns during the mid-Holocene in northern Vietnam*
- Willis A, Oxenham M. *Reconstructing Diet at An Son, Southern Vietnam: Implications for Understanding Southeast Asian Neolithic Subsistence Patterns*
- Domett K, Colbert A, Newton J, Chang N. *Frail, foreigner or favoured? A contextualized case study from Bronze Age northeast Thailand*
- Ward, SM, Tayles, N. *Cremation in Southeast Asia: An overview.*
- Pax, V, Lewis, H, Lara, M. Early Holocene cremation burials from the Ille Site, Palawan, Philippines: description and regional significance
- Kinaston, R., Bedford, S., Spriggs, S., Hawkins, S., Buckley, H. *Is there a Lapita Diet?*
- Buckley HR, Valentin F, Kinaston R, Foster A, Spriggs M, Bedford S. *The Chief of Teouma? Osteobiography of a middle-aged man who died 3000 years ago in Vanuatu.*
- Valentin F, Herrscher E, Sand C. *Morphology, health and diet in New Caledonia from the Lapita settlement to the European contacts*
- Tromp M, Buckley H, Matisoo-Smith E, Bedford S, Spriggs M. *You are what your pig eats? Analysing Lapita subsistence from human and pig dental calculus.*
- Stantis C, Richards M, Kinaston, R and Buckley, H. *Paleodietary reconstruction in prehistoric Tonga: a multidisciplinary approach.*
- Nelson GC, Stone JH, Fitzpatrick SM *Adapting to Palau*
- Stodder ALW, Ryan EM, Anderson RH, Douglas MT, Ikehara-Quebral R. *Under the Latte: Osteobiography and Social Context of a Burial Assemblage at Tumon Bay*
- Matsumura, H, Hsiao-chun Hung, Li Zhen, He Gang, Sun Guo-ping, Zhnag Chi, Nguyen Lan Cuong. *Human migration in Neolithic East/Southeast Asia: exploring through skeletal morphology*
- Eun Kin Woo, Sunyoung Pak. *Assessing life conditions of capital city-dwellers: Paleopathological analysis of archaeological human remains from the Eunpyeong Cemetery.*

- Oxenham, M and Willis A. *A case of hip ankylosis in Iron Age Nagsabaran, Northern Luzon, Philippines.*
- Fajun Li. *A paleodemographic analysis of Ding Si Shan site*
- Hisashi Fujita. *Relation between dental caries and periodontal diseases in archaeological human remains.*
- Ho Chul Ki, Min Seo, Myeung Ju Kim, Chang Seok Oh and Dong Hoon Shin. *Archaeological and historical approaches to paleoparasitological studies in Korea*

#### UPCOMING CONFERENCES AND EVENTS

- ***Australasian Society of Human Biology 28th Annual Meeting 2014***

This year, ASHB will be held in Adelaide in early December. If you would like to receive more information about the conference, please email the ASHB secretary, Dr Sarah Croker, who will put you on the mailing list : [scroker@anatomy.usyd.edu.au](mailto:scroker@anatomy.usyd.edu.au)

The conference flyer will be posted at <http://school.anhb.uwa.edu.au/ashb/> in upcoming months. This conference is well attended by biological anthropologists from around Australia and New Zealand.

- ***Australian Archaeological Association (AAA) 2014***

This year the AAA will be held in Cairns, northern Queensland, Australia in early December, 2014.

Details for interested participants can be found at:

<http://www.australianarchaeologicalassociation.com.au/>

Nigel Chang and Kate Domett will host a Southeast Asian archaeology session so please email [nigel.chang@jcu.edu.au](mailto:nigel.chang@jcu.edu.au) or [kate.domett@jcu.edu.au](mailto:kate.domett@jcu.edu.au) if you are interested.

- ***International Symposium on the Studies of Prehistoric Cultural and Physical Remains***

Taipei, Taiwan, September 27 & 28, 2014.

- Paper to be given at the “2014 From Matsu Archipelago to Southeast Coast of Asia”:

Bioarchaeology of Early Neolithic Skeletons from the Nankuanli East Site, Southwestern Taiwan

Michael Pietrusewsky<sup>1</sup>, Adam Lauer<sup>1</sup>, Cheng-hwa Tsang<sup>2</sup>, Kuang-ti Li<sup>2</sup>, Michele Toomay Douglas<sup>1</sup>

<sup>1</sup>Department of Anthropology, University of Hawaii at Manoa, Honolulu, USA

<sup>2</sup>Institute of History and Philology, Academia Sinica, Taipei, Republic of Taiwan

In this study, we examine the health and way of life of some of Taiwan's earliest Neolithic peoples through studies of skeletons from the Nankuanli East site. The Nankuanli East site is one of three oldest sites (ca. 4500-5000 BP) identified during salvage excavations in 2002-2003 in the Tainan Science Park (TSP) in Shanhua District, Tainan City, in southwestern Taiwan. Approximately 82 extended and supine burials and extensive archaeological materials including pottery, ornaments, shell-bracelet funerary objects and the remains of domesticated and wild animals were recovered from this site. The main subsistence base of these early Neolithic peoples included extensive marine exploitation, hunting, and collecting of wild plant resources as well as early farming involving the cultivation of small grains, root and fruit crops. The presence of foxtail millet has also been

identified for this site. Twenty-three (15 male and 8 female) of the most complete and well-preserved burials from this site are used in this study.

In addition to documenting two forms of dental modification, betel staining and tooth ablation, we examine the health of the health of these early inhabitants of Taiwan using several indicators of oral/dental and physiological health, including, adult stature, cribra orbitalia (CO), linear enamel hypoplasia (LEH), and dental pathology (dental caries, antemortem tooth loss - AMTL, alveolar defects, dental calculus, alveolar resorption, and dental attrition). Comparisons are made between males and females, with Iron Age skeletons from the Shisanhang site in northwestern Taiwan, and with skeletal series outside of Taiwan.

More than two-thirds of the teeth from the NKLE skeletons exhibit staining that is likely attributed to chewing of Areca nut. The frequency of betel-stained teeth is significantly greater in males than in females. With few exceptions, the most common pattern of tooth ablation in the NKLE skeletons was the bilateral removal of the maxillary lateral incisors and canines, a pattern that has been recorded among some Indigenous groups in Taiwan and in other Neolithic skeletons from Taiwan. This pattern is rarely observed outside Taiwan. No tooth ablation and very little betel staining are observed in the Iron Age skeletons from the Shisanhang (SSH) site.

Overall, very few differences were observed in the health of males and females from the NKLE site and between this early Neolithic site and the Iron Age site of Shisanhang. The estimated average stature for NKLE males is 160.9 cm and 155.2 cm for females. Regional comparisons of health indicators suggest that the earliest Neolithic inhabitants of Taiwan may have experienced more childhood physiological stress for at least one indicator (LEH) than that observed in other series. However, the frequency of another indicator of childhood health in the NKLE skeletons, CO, was significantly lower when compared to other skeletal series outside Taiwan. Overall, the frequencies of several indicators of oral infection (e.g., AMTL, dental caries, and alveolar defects) observed in the NKLE and SSH skeletons are among the lowest reported indicating generally good dental health for Taiwan's prehistoric inhabitants. Future research, involving additional skeletons from the Nankuanli East site as well as other sites from Taiwan, will expand on the research reported in this study. This study contributes to studies in anthropology that attempt to reconstruct past behaviors and health from archaeological human skeletons.

National Research Council of Taiwan supported this research.

- ***Annual Meetings of the Paleopathology Association***

Europe: Lund, Sweden August 26-29, 2014

North America: St Louis, Missouri March 24-25<sup>th</sup>, 2015

<http://www.paleopathology.org/meetings.html>

- ***Annual Meeting of the American Association of Physical Anthropology***

North America: St Louis, Missouri March 25-29<sup>th</sup>, 2015

<http://physanth.org/annual-meeting/future-meeting-venues>

*Graduate Student Projects*

MASTERS PROJECTS

*Those underway...*

**Life History at Roonka Flat: A Dental Microwear Approach**

Lexi Burrows

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This year I will be conducting dental microwear analysis on the ancient sub-adult skeletal population from Roonka Flat, South Australia. The purpose of this analysis is to evaluate this method's applicability in the reconstruction of life-course timing (and its repeatability for use on other skeletal assemblages). Dental microwear is a measurable skeletal modification that has been found to vary in response to both biological and social processes of aging. Therefore the data gathered from this dental microwear analysis will be partnered with estimated dental age to fulfil a life-history approach to a bioarchaeological study: reconstructing the timing of major phases within the sub-adult-life-course at Roonka Flat. This research is valuable as there is little information on the life histories of hunter-gatherer childhoods, in particular those situated within Aboriginal Australia.

**A methodological investigation into the identification of bone fragments through a histological analysis of bone microstructure**

Sophie Miller

Email: [smil157@aucklanduni.ac.nz](mailto:smil157@aucklanduni.ac.nz)

It has been noticed that histologically there is a distinct difference between the microstructure of human bone and non-human animal bone. This has led to a variety of studies investigating methods of differentiating human and non-animal bone. This is relevant to archaeological studies as there are often problems encountered with faunal material in archaeological assemblages, particularly where remains are too fragmentary or modified to be morphologically identified to the level of genus or species (Greenlee & Dunnell 2010). This can cause problems for archaeologists when looking at the nature of human-animal interactions. The research question proposed is to determine the applicability of Greenlee and Dunnell's (2010) method to a wider and more variable archaeological and fragmentary assemblage. It will also aim to question the nature of subsistence on Aitutaki, and if the reanalysis of unidentified mammal fragments changes interpretations made by Allen in 1992.

***A Comparative Study of the Taphonomy of Non-Adult Human Remains from Contrasting Burial Environments in the Philippines***

Jessica Peña

Archaeological Studies Program, University of the Philippines

Opinions are somewhat divided, within the archaeological literature, as to the survivorship of non-adult human remains. However, to date, few studies have examined the specific preservation patterns of such skeletal material. Therefore, the aim of this study is to establish the taphonomic profiles of non-adult human remains from 3 contrasting archaeological sites in the Philippines; a cave site, a jar burial site and an open site. The assemblages will be examined for evidence of anthropogenic interference as well as more natural agents of

modification. This study will contribute to current discourse by providing a greater understanding of non-adult remains in the archaeological record and their bone preservation patterns in tropical and humid burial environments.

Supervisor (Rebecca Crozier)

***Enteseal Changes in Adult Human Remains from Ille Cave, El Nido, Palawan: A Preliminary Study***

Sarah Agatha Villaluz, Archaeological Studies Program, University of the Philippines

This preliminary study focuses on studying the enteseal changes found in adult human remains from Ille Cave, El Nido, Palawan. Interpretation of results will be achieved through the grouping of identified enteseal changes according to each muscle functional complex (shoulder, elbow, forearm, hip, knee, foot). This approach allows a closer correlation between observation of enteseal changes and the potential activities that created them. It is intended that this study will illustrate the applicability of enteseal change methods in a non-European population, and further studies, combined with historical and ethnographic accounts, may be able to ascertain possible task-specific activities among this population.

Supervisor (Rebecca Crozier)

***Head-hunting in the Cordilleras: re-telling the vanished practice from an osteological perspective***

Marie Louise Antoinette R. Sioco, Archaeological Studies Program, University of the Philippines

Although no longer practiced, headhunting is a well known tradition in the Cordilleras of the Philippines. Whilst many ethnographic accounts exist, there has, to date, been no analysis of relevant material from an osteological perspective. Therefore, this study intends to address this issue by examining specimens, alleged to have been acquired through the practice of headhunting, for osteological evidence of such practices. By integrating this new data with the ethnographic accounts of local indigenous groups, this research will attempt to shed new light on the motivations, processes, and theories of headhunting.

Supervisor (Rebecca Crozier)

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***Those completed...***

**Marquesan pig husbandry: Investigating diet and drinking water through dental calculus**

Dawson, Laura

M.A. Thesis

The University of Auckland

The changing care of animals throughout prehistory is often linked to broader social and environmental processes. The development of chiefly hierarchies and the increasingly unstable climate in the Marquesas Islands, French Polynesia, are factors which likely influenced husbandry traditions. Specific details regarding the care can be difficult to uncover, however, and are traditionally restricted to stable isotope and osteological analyses on the animal remains. Here, dental calculus from Marquesan pig teeth was processed to extract starch grains and diatoms, direct evidence of plant diet and water consumption. Teeth from early occupation through to late pre-contact were used to understand changes through time. The yields of both were substantial enough to gather insight into this limited topic, where information was used to inform on husbandry practises, like mobility and diet. Diatom evidence indicates increasingly limited access to clean water through time; this is interpreted as

a reduction in mobility due to greater tethering and penning of the animals. The starch grain evidence, analysed through a discriminant function analysis, shows that pigs were fed agricultural cultivars throughout prehistory, including during periods when environmental conditions were poor and food resources limited.

## DOCTORAL PROJECTS

### *Those underway (recently submitted for examination)...*

- Jennifer Newton  
School of Medicine and Dentistry, School of Arts and Social Sciences, James Cook University,  
Townsville, QLD, Australia

#### **Health, diet and migration prior to the establishment of the Angkorian civilisation of Southeast Asia**

This project examines the health, diet and migratory patterns of prehistoric people of Southeast Asia prior to the establishment of the Angkorian Empire in the early 9<sup>th</sup> century. Until now, evidence suggests Southeast Asia *did not* follow the trend towards declining health experienced by the rest of the world during the rise of complex civilizations. The research sample included human skeletal remains from three prehistoric Southeast Asian sites. The remains selected from Ban Non Wat in northeastern Thailand spans the Neolithic to early Iron Age (~2500 – 500 BC) and includes new samples as well as previously published work. Also included is new data from two late Iron Age sites in northwestern Cambodia, Phum Snay (~500 BC – 500AD), and Phum Sophy (~AD 100 – 600). Previously published bioarchaeological work from other prehistoric sites encompassing the Neolithic to late Iron Age is used to identify general trends for Southeast Asia. This project hypothesized that the Neolithic to early Iron Age's stable environment and minimal social changes would not have negatively impacted the health of communities through these time periods. In contrast, the environmental and social changes throughout the Iron Age would impact diet and migratory patterns, causing a general decline of health into the late Iron Age.

Health was examined at all sites through the analyses of childhood stressors including cribra orbitalia, linear enamel hypoplasia, and stature, along with adult dental health. Through carbon isotope ( $\delta^{13}\text{C}$ ) analysis of the dental enamel this study was able to identify childhood diet at Ban Non Wat. Unfortunately, isotope analyses were not available for Phum Snay and Phum Sophy, therefore only dental health was used to identify aspects of diet at these sites. Migration was studied using strontium isotopes from dental enamel for Ban Non Wat. Phum Snay and Phum Sophy migratory patterns were determined from biological markers, such as dental modification. Through the examination of these three lines of evidence, the data for each site was examined independently to explain health, diet and migration, then combined with previously published work to identify general trends through Southeast Asian prehistory.

The evidence from the examination of health suggests the people of Ban Non Wat were generally healthy. The results across Southeast Asia demonstrate improvement of health into the early Iron Age, supporting previously published work. However, when compared to the broader context of the Iron Age in prehistoric Southeast Asia, both Phum Snay and Phum Sophy suggest a trend of declining dental health during the late Iron Age. In particular, it appears female health may have been more negatively impacted throughout the Iron Age, evident from increased stress and poorer dental health.

Analyses of  $\delta^{13}\text{C}$  values at Ban Non Wat indicate a gradual change of diet composition during the Neolithic to early Iron Age with minor variation in the middle of the Bronze Age. This suggests a change to a diet comprised mainly of  $\text{C}_3$  foods, with minimal impact from  $\text{C}_4$ . Other nearby sites also display  $\delta^{13}\text{C}$  values indicative of a mainly  $\text{C}_3$  diet, but were significantly different to Ban Non Wat based on overall contribution of

C<sub>3</sub>/C<sub>4</sub>. These differences are suggestive of groups in this region living as independent units into the early Iron Age. Phum Snay and Phum Sophy dental pathology profiles suggest a diet with a greater reliance on agricultural foods, following a trend from other Iron Age sites within Southeast Asia.

Migratory indicators at Ban Non Wat suggest long-distance migration sharply declined or ceased in the late Bronze Age, but may have continued into the Iron Age through short distance routes. Social and biological patterns from Phum Snay and Phum Sophy suggest extensive movement and/or trade with many groups near and far during the late Iron Age.

This study finds that the stability of the environment and smaller population sizes allowed the inhabitants of prehistoric Southeast Asian communities to utilize local resources and live generally well into the Iron Age with improving health. However, throughout the Iron Age a decline of health, in particular for females, corresponded with changes to diet, increased fertility and settlement sizes, which may have been at least partially caused by the environmental changes. Increased settlement size and extensive exchange routes during the late Iron Age may have linked emerging new diseases and increased health problems. This research suggests Southeast Asia *does* follow a similar trend of declining health as a result of diet changes, migratory patterns and environmental changes as other complex societies around the world have shown, but these changes occurred at a much later time period in Southeast Asia - in the late Iron Age.

Supervisors: Drs. Kate Domett, Nigel Chang and Associate Professor Sean Ulm

- Helen Cekalovic  
School of Medicine and Dentistry, School of Arts and Social Sciences, James Cook University,  
Townsville, QLD, Australia

### **Health and Society in Southeast Asia: The Transition from the Late Bronze Age to Iron Age.**

Bioarchaeological studies incorporate components of bioanthropological and archaeological research. Alone each discipline presents valuable information, but when these disparate methods are used in combination to examine past societies, a holistic interpretation can result.

The purpose of this study is to develop a methodology that quantifies the overall health of individuals based on skeletal remains found in archaeological contexts. The Southeast Asian Health Index was inspired by the Western Hemisphere Health Index. The challenge in devising a health index for Southeast Asian skeletal remains from archaeological contexts is multifaceted. The index must be relevant at an individual level, easily reproduced by any user and include health attributes that are collected as standard from skeletal remains.

In this thesis, the Southeast Asian Health Index is developed and forms the basis of a series of bioarchaeological analyses. The index comprises the following attributes; age at death, dental health (alveolar bone health, caries and ante-mortem tooth loss), trauma, growth (enamel hypoplasia and long bone length), degenerative joint disease, childhood cranial and orbital lesions, and other pathological conditions. The structure of the health index enables comparison of individual health attributes as well as overall community health.

As a way to test this index, the transition period from the Late Bronze Age to Early Iron Age in northeast Thailand was investigated using health and social indicators. The two sites examined were Noen U-Loke and Ban Non Wat. The health of individuals within each time period, Mid Bronze Age, Late Bronze Age, Early Iron Age, and Mid Iron Age, were compared with societal indicators, seen in burial treatment.

Five hypotheses were tested in this study based on the results of the Southeast Asian Health Index and individual burial treatments. Two hypotheses are based solely on the Southeast Asian Health Index.

Firstly, it is hypothesised that the health of the people of Ban Non Wat and Noen U-Loke improved from the Late Bronze Age to Iron Age. It was found that overall health improved through time, but with complexity. This complexity was evident in the testing of the second hypothesis. In addition, patterns regarding individual

health attributes could be identified. For example, this included an improvement in male dental health over time, whereas female dental health remained static.

The second hypothesis stated that health differentiation could be seen between archaeological sites in the same region. The context of the settlement impacts the health of the village. In this study, the newly established village of Noen U-Loke, in the Early Iron Age, showed a distinct difference to the well established village of Ban Non Wat.

Based on relationships between the Southeast Asian Health Index and burial treatments, two further hypotheses were tested.

The third hypothesis asserts that there is a correlation between burial treatment and health. A number of correlations between health and burial treatment were identified. These suggest that females buried with ornaments had poorer health, as did males with animal bones. It is postulated that these burial goods may be medical aides or amulets for the afterlife.

The fourth hypothesis tests the assertion that a correlation between health and burial treatment reflects social identity. It was identified that when health data is used in combination with burial treatment data, social identity was more reasonably distinguished than by using burial goods alone. The combination of health data with burial treatment enabled additional context, which ultimately altered interpretations of social identity based solely on burial goods. In one case, the interpretation of occupation suggested by the burial goods was refuted by the health data.

The final and fifth hypothesis relates to burial treatment and tests if society became more stratified from Late Bronze Age to Iron Age. Based on the sample, no evidence of stratified society could be identified.

Overall it was found that the Southeast Asian Health Index provides a sound method of identifying relative health for individuals, groups and populations through time. Used in combination with archaeological contextual information it can provide multidisciplinary interpretations. The use of burial treatment data, rather than estimations of wealth to identify social identity, is distinctively different to previous studies. This study provides a unique bioarchaeological methodology, combining health and social status, to produce additional interpretations.

Supervisors: Drs. Kate Domett and Nigel Chang