

Bioarchaeology in Southeast Asia and the Pacific: Newsletter

Issue No 6
April 2010

Edited by Kate Domett
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Welcome to the sixth 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.

News

WESTERN PACIFIC

From: Professor Michael Pietrusewsky
University of Hawai'i

Email: mikep@hawaii.edu

Subject: *Fieldwork in the Mariana Islands*

Currently Michael Pietrusewsky is examining 12 skeletons from the Tinian Route 202, Tinian, CNMI (Commonwealth of the Northern Mariana Islands), for Swift and Harper Archaeological Resource Consulting.

July 2009: Michael Pietrusewsky, Michele Toomay Douglas, Moana Lee, Rona Ikehara, Joey Condit and Karen Kadohiro examined human skeletal remains from the Ylig Bay archaeological site, Yona Bay, Guam or International Archaeological Research Institute, Inc.

Report:

The Osteology of the human skeletons from the Ylig Bay archaeological site (66-09-1872), Yona, Guam. Final Report Prepared for: Parsons Transportation Group (PTG) and the Guam Department of Public Works (DPW) under Federal Highway Administration (FHWA), Archaeological Salvage, Data Recovery, Burial Recovery, Monitoring, and Mitigation of the Ylig Bay Archaeological Site. International Archaeological Research Institute, Inc.

Michael Pietrusewsky, Michele Toomay Douglas and Rona M. Ikehara-Quebral, 2009.

ABSTRACT: Human skeletal material from at least fifty-three burials excavated during the archaeological salvage, data recovery, burial recovery, monitoring, and mitigation of the Ylig Bay archaeological site (66-09-1872) for Parsons Transportation Group (PTG) and the Guam Department of

Public Works (DPW) under Federal Highway Administration (FHWA) at Ylig Bay, Guam are described. Skeletal completeness ranges from nearly complete (skull and infracranial skeleton) to burials that are represented by only a few bones. Preservation ranges from good to poor, the majority were described as fair to poorly preserved. The skeletons of four infants, two children, three late adolescents, sixteen young adults, five middle-age adults, and twenty-two adults whose exact age cannot be determined are represented in this series. Twenty-six of the adults (≥ 18 years) are male and thirteen are female. Another fourteen of the adults are of unknown sex. Metric and non-metric observations recorded in the skulls, infracranial skeletons, and teeth are summarized. Cranial, dental and skeletal morphology are consistent with Mariana Island skeletal series. Overall, the oral-dental health in the adults is good, with low rates of pre-mortem tooth loss, dental caries, dental abscessing, and dental enamel hypoplasia. Relatively high levels of alveolar resorption and moderate tooth wear were observed in these dentitions. None of the deciduous teeth exhibit dental enamel hypoplasias. The estimated stature for adult males ranges from 162 - 189 cm and for females the range is 162 - 173 cm. Congenital fusions of the fifth toe phalanges are noted in five individuals suggesting familial relationships. Healed fractures of the forearm bones in four males, one distal tibia fracture, spondylolysis in five adults, and other minor trauma are reported in these skeletons. No evidence for treponemal infection is found. Other pathological conditions observed include degenerative joint disease, craniostenosis, gouty arthritis, possible leprosy, and acute plastic bowing deformity. Several of the individuals buried at Ylig Bay exhibit skeletal evidence for strenuous physical activities, such as hyperflexion facets in the elbow, hyperextension facets of the toes, costo-clavicular sulcus, occipital superstructures, and generally robust and well marked muscle insertions.



Figure 1: A. Michele Toomay Douglas and Rona Ikehara in Guam and B. Mike Pietruszewsky at Angkor last year (Eds note: No not in the Pacific! But Mike still obviously has an interest in Southeast Asia!).

PACIFIC

From: Dr Hallie Buckley

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Subject: *Lapita Archaeological Sites in the Pacific*

In 2009 Dr Hallie Buckley and her students had a very busy year excavating human skeletal remains from Lapita period archaeological site in the Pacific Islands.

Watom Island, East New Britain, Papua New Guinea

In June three new skeletons were excavated from the SAC cemetery site on Watom Island East New Britain, Papua New Guinea. The excavation was co-directed by Dr Dimitri Anson (University of Otago and the Otago Museum) and Mr Peter Petchey (University of Otago) in collaboration with the PNG National Museum and Art Gallery. Two of these skeletons were badly disturbed however a superbly preserved complete crouched burial of an adult male was found towards the end of the excavation (Fig 1). Dr Buckley was fortunate to have the assistance of current and former students, Rebecca Kinaston, PhD candidate, Kasey Robb, MSc, and Ben Shaw, MSc.

Excavating on Watom is challenging: a lack of electricity, running water and living in tents and, as Fig 1 shows, the water table rises with the tide each day which and fills in the bottom of trench.

The analysis of the skeletons excavated in 2008 and 2009 is ongoing but some data concerning migration has been published in a recent volume of *Journal of Archaeological Science (JAS)* by Ben Shaw et al. (see recent publications list below).



Figure 1: Burial 15 excavated at Watom in 2009 (photo by Rebecca Kinaston)

Teouma, Efate Island, Vanuatu

In July Buckley and students Aimee Foster, PhD candidate and Rebecca Kinaston, PhD candidate participated in the large scale excavation of the site of Teouma on Efate Island in Vanuatu in collaboration with Dr Frederique Valentin from CNRS in Paris. The excavation was co-directed by Dr Stuart Bedford and Professor Matthew Spriggs of ANU and the Vanuatu National Museum. Eight new burials were found during this excavation. With the exception of 2007, this site has been excavated

every year since 2004 and has yielded the largest and best-preserved sample of Lapita-associated skeletons in the Pacific Islands which now stands at circa 82 individuals. The most exciting find in 2009 was that of a child of around 12 years of age at death with conus shell rings on each ankle (fig 2). While the shell rings were of particular interest to the archaeologists and add to our previously limited



Figure 2: Burial 59, 12 years old, excavated at Teouma in 2009 with conus shells at the ankles (photo H. Buckley).

knowledge of Lapita burial ritual, this is the first subadult individual from the site aged over 6 months of age at death as all other subadults were very young infants. As with all of the adults from Teouma, this child had the cranium removed sometime after original interment. Numerous publications from various aspects of the research on the Teouma skeleton remains have been coming out over the last year, notably one paper by Kinaston et al. in *JAS* which explores issues of infant mortality and maternal health through the use of stable isotopes.

Uripiv Island, off NE Malakula, Efate

In September Rebecca Kinaston participated in the second excavation of Lapita-associated skeletons on Uripiv Island under the Direction of Dr Stuart Bedford. Ten new burials were found from both Lapita and post-Lapita horizons at the site, including three well-preserved infants. This adds to the eight burials excavated in 2005 by Buckley and Tayles (Fig 3).

In 2009 Dr Buckley and Bedford were awarded a Marsden Fund grant for a project which involves continuing to excavate at Uripiv in 2010-2011. The primary objective of the new project is to use the slightly later Lapita skeletons from Uripiv to help put the early Lapita site of Teouma into a broader context. This grant is also funding a 2-year post-doctoral position to conduct stable isotope analyses of diet on the human and faunal remains from the site



Figure 3: Burial 5 from Uripiv island excavated in 2005 (photo by H Buckley).

and modern plants of Vanuatu. This will enable us to begin to understand the diet of the prehistoric Lapita people in Vanuatu and whether there were changes in diet over time in this archipelago.

Repatriation and receiving of collections at Otago

The skeletal collection from the Namu burial mound on Taumako island in the NE Solomon Islands was repatriated to the Solomon Islands National Museum in Honiara late in 2009 at their request.

The skeletal remains from Teouma excavated in 2004-2006 were returned to the Vanuatu National Museum where they will be curated and are available for further research.

The skeletal remains excavated at the Bourewa site in Fiji by Dr Patrick Nunn have been sent to Otago from Kyoto University for further research in our laboratory.

THAILAND

From: Dr Kate Domett, Jennifer Newton
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Subject: *Ban Non Wat 2009-2010 Excavations and New excavations at Ban Salao*

During December 2009 through to February 2010 excavations continued at Ban Non Wat under the direction of Nigel Chang and Kate Domett and in collaboration with the Thai Fine Arts Department. Kate was very ably assisted in the removal and analysis of the human remains by soon to be JCU PhD student Jennifer Newton, JCU Honours student Caitlin Evans and Alana Colbert who has just finished her Honours. Also helping with the burial recoveries were Nathan Harris, a Masters student from the University of Otago, and Jenna Down, an archaeologist from Canada (Fig. 1).



Figure 1: Jennifer Newton and Jenna Downs working on a BNW skeleton. (Image by Belinda Duke)

Work continued at Ban Non Wat with a total of three squares being excavated to continue to transect the site on a West – East axis and begin a North-South axis. A total of 18 burials were excavated this season, bringing the total for this project to 63 (although at this stage this equates to 59 individuals). The total number of burials from Ban Non Wat to date, including those begun by the University of Otago, is now at 699. The vast majority of the burials from this season were found in the more centrally

located square around the same burial depth as one another (probably Bronze Age), and consisted of



Figure 2: Ban Non Wat burial and the water table (Image by J. Newton)

both subadult and adult burials. A rising water table was experienced at this square, causing difficulties (Fig. 2).

The rather striking burial of a very large dog was also found this year (Fig. 3). More info can be found at:

http://www.jcu.edu.au/jcnn/world/JCUPRD1_052358.html

Kate and Allison Isepy had the honour of removing the dog which made an interesting change from



Figure 3: Dog burial at Ban Non Wat. (Image by Kate Domett)

excavating human burials. NOTE: Dogs have much longer spinous processes than humans making the

removal of the vertebrae a challenge! See more photos by joining the Ban Non Wat group on Facebook.



The opening of a new square at Ban Salao, an ‘unmoated’ Iron Age site about 6kms north of Ban Non Wat. The square at Ban Salao yielded one burial, a subadult, with an impressive array of burial artifacts and pottery (Fig. 4).

Figure 4: Ban Salao 18 month old skeleton (Image by Hayden Cawte)

From: Dr Siân Halcrow

Department of Anatomy and Structural Biology, University of Otago, New Zealand

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Subject: *New research in northeast Thailand.*

Dr Siân Halcrow (University of Otago) was successful in gaining a Fast Start grant from the New Zealand Marsden Fund. This grant will provide \$300,000 over three years to investigate health and social change in prehistoric South East Asia.

Today, over 850 million people, predominantly women and children, experience the plight of hunger, disease and poor living conditions, which had their ultimate beginnings with the development of agriculture and sedentism. The assessment of the effects of agriculture on society lies in understanding its history. In the general model, the advent of agriculture is a critical transformation in prehistory, affecting health, subsistence, demography and social organisation. However, recent work on health and demography in prehistoric Southeast Asia questions the explanatory value of the model for this region. Infant and child diet and weaning, sensitive indicators of population health and demography, have not been assessed in this region. We now have a unique opportunity to do so with the recent excavation of over 600 human burials at a Northeast Thai site covering an unusually long time span from the establishment of agriculture to the intensification of production. This project is a novel approach to test the model, incorporating an analysis of diet using tooth and bone chemistry of infants and children, bioarchaeological evidence of health, and funerary behaviour. This will enhance our understanding of the relationships between diet, health, mortality and social status as they contribute to demographic change with both the adoption of agriculture and its subsequent intensification. The Principal Investigator (Dr Siân Halcrow) will be working closely with Associate Investigators Dr Nancy Beavan Athfield from GNS Science, NZ, and Dr Nancy Tayles of the University of Otago.

CAMBODIA

From: Dr Andreas Reinecke (German Archaeological Institute) and Vin Laychour (Memot Centre - Phnom Penh)

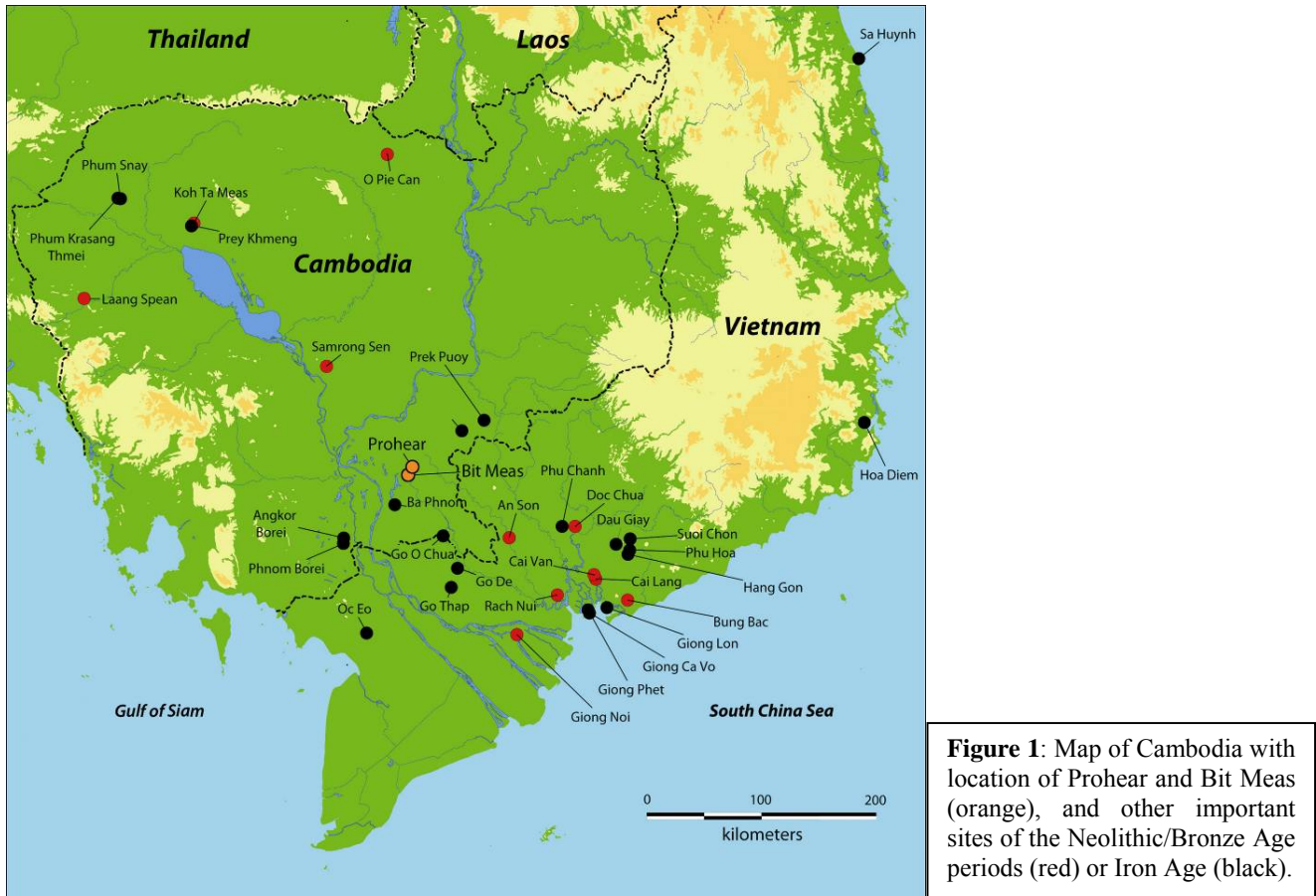
Email: reinecke@kaak.dainst.de and vlaychour@yahoo.com

Subject: *The Early Iron Age cemetery at Prohear, Prey Veng province in Southeast Cambodia: Excavations and results of new analyses.*

Prohear is a village in Prey Veng district about 22 km to the east-northeast from Prey Veng town (Fig. 1). In May 2007, archaeology students from Phnom Penh observed looting of prehistoric burials amidst Prohear and announced this to the archaeologists at the Memot Centre, who made a failed effort to stop the illegal digging. From March 2007 until the beginning of 2008, the cemetery in the center of Prohear was nearly completely destroyed. During this time dozens of bronze drums, hundreds of ornaments made from gold and silver, and thousands of stone beads were sold without any documentation.

The archaeological excavation could start not before February 2008, and was limited to the village road, the last undestroyed part of this cemetery. During the first two rescue campaigns in spring 2008 and 2009, four units (A-D) were set out on the road covering 45 meters in length and 2-3 meters in width (Fig. 2). Hitherto, the whole excavated area is more than 116 square meters with 52 burials detected, many of which are not completely preserved, but partly destroyed by digging in the past or present. We can imagine that of the cemetery's area of almost 20,000 square meters at least 1000

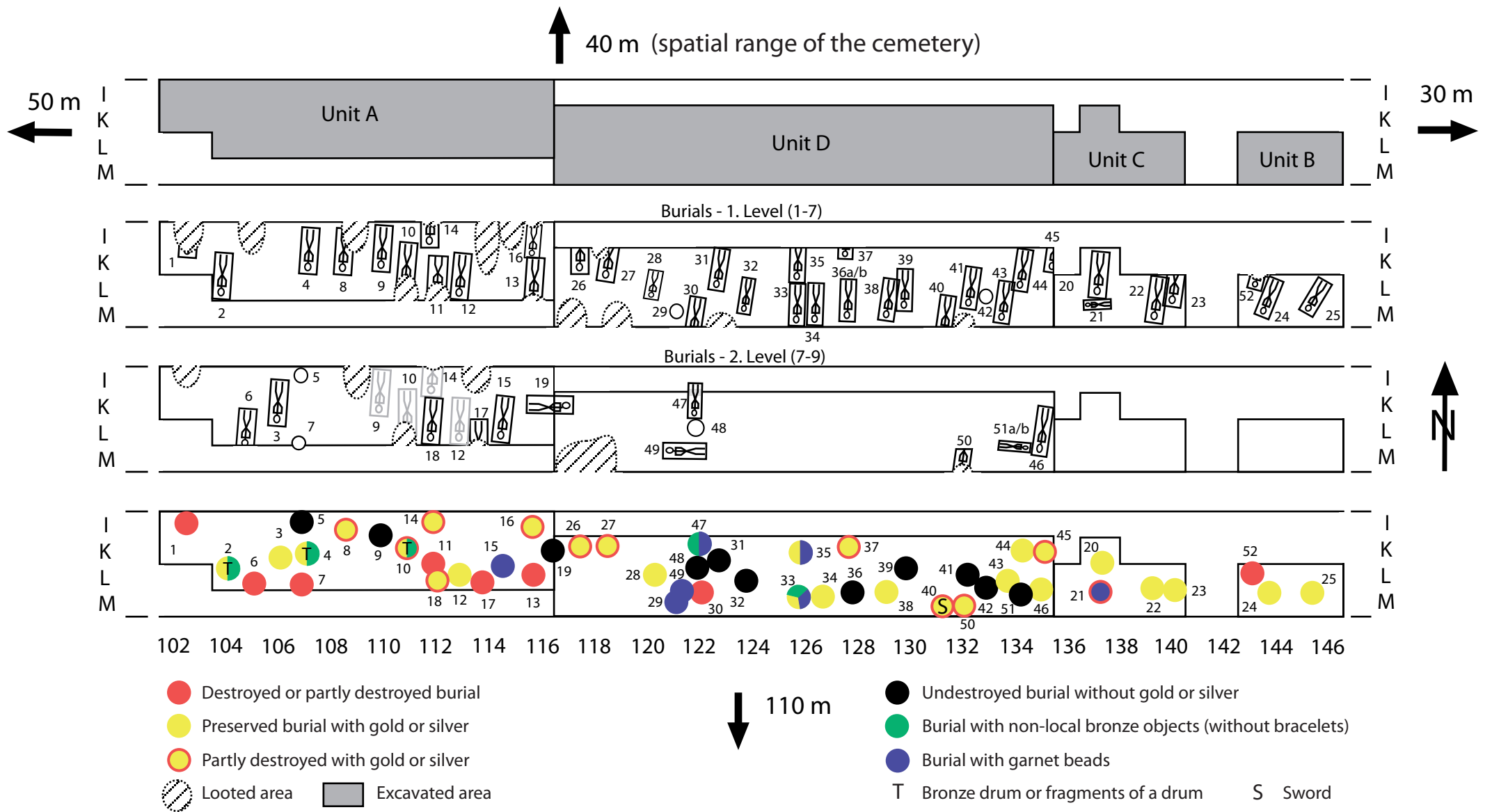
burials were looted. Despite the small area of the rescue excavations, about 500 offerings came to light, as well 2700 beads and many thousands of potsherds.



A first overview about the excavation, artifacts, burial rites, dates and analyses is already published (A. Reinecke, Vin Laychour and Seng Sonetra 2009) and is available by free download from the project website (see reference below).

At present, the finds are under restoration and analysis. Here we want to give an update about some yet unpublished results. Hitherto, the teeth of 19 individuals underwent strontium vs. oxygen isotopic analyses to detect ‘non-local individuals’ by Mike Schweissing, Bavarian State Collection for Anthropology and Palaeoanatomy in Munich. Overall, five of the analysed teeth from 19 individuals are clearly differentiated in their of strontium vs. oxygen isotope ratio values and must be seen as non-local individuals. Surprisingly, three in this group have also the ‘foramina molaris’ (see info below by Simone Krais & Seng Sonetra), and all are children between 5-9 years old (burials 27, 44, and 49).

Fig. 2: Overview of the excavation units A-D. (Overpage)



50 m

40 m (spatial range of the cemetery)

30 m

Unit A

Unit D

Unit C

Unit B

Burials - 1. Level (1-7)

Burials - 2. Level (7-9)

110 m

102 104 106 108 110 112 114 116 118 120 122 124 126 128 130 132 134 136 138 140 142 144 146

- Destroyed or partly destroyed burial
- Preserved burial with gold or silver
- Partly destroyed with gold or silver
- ▨ Looted area
- ▨ Excavated area
- Undestroyed burial without gold or silver
- Burial with non-local bronze objects (without bracelets)
- Burial with garnet beads
- T Bronze drum or fragments of a drum
- S Sword

Metal analyses of gold and silver objects are in progress. Based on the results from 30 already analyzed samples of 96 discovered gold-silver-objects, two-thirds contain more silver than gold. Three small rings are made of gilded silver and could have been come from the same workshop. Two of these have the same composition and were found in burials 3 and 4. This example indicates that through the analysis of metal artefacts it will be possible to recognize relationships between the dead; that they perhaps lived at the same period, or that they had the same source for their ornaments. Based on their composition, the samples can be divided into seven groups. For example, one group shows a palladium-platinum ratio that would fit well in a natural electrum from a placer. Moreover, two different groups of palladium-platinum ratios in the samples indicate that the gold or electrum came from at least two different regions. To sum up, one could say that the objects from Prohear were mostly made from natural electrum or from silver-gold alloys of different compositions. Besides, old metals may also have been reused.

Some finds and burial practices reflect cultural influences or far-distance relations. For instance, Kele in Guizhou province in southern China (about 1740 km to the north from Prohear) is hitherto the only site besides Prohear on which the same unusual custom of burying the head in a bronze drum is documented (Fig. 3). These parallels and the radiocarbon dates, which were increased during the last few months to include nine dated burials (Fig. 4), suggest that Prohear and Bit Meas, that is another completely looted site about 8 km to the south, maybe belong to a group of burial sites that contain the graves of both locals and elite peoples from Guizhou, Yunnan, Guangxi and Gaochi, who fled from the growing danger of expansion of the Han Empire between the end of the 2nd century BC up to 43 AD.

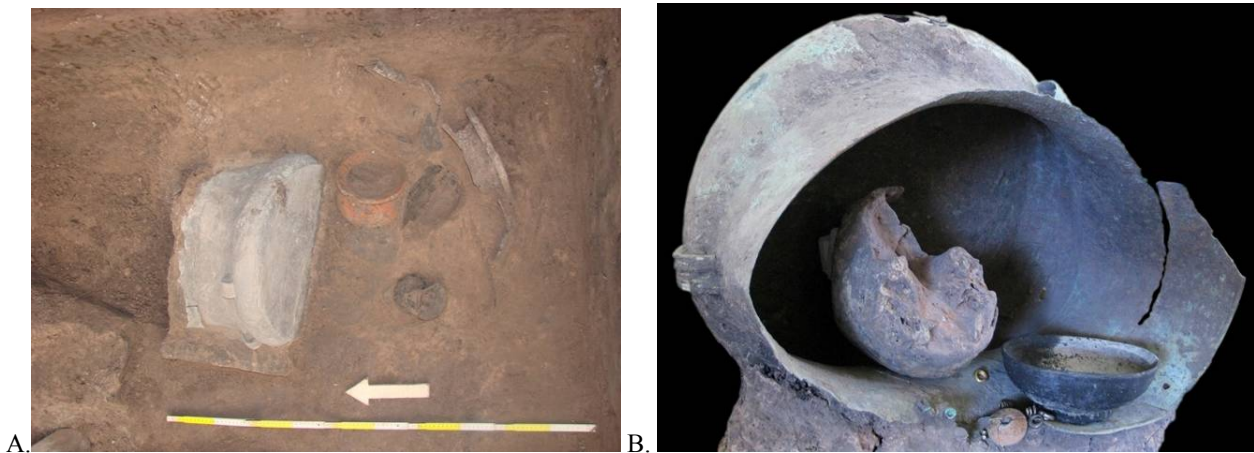


Figure 3: A. Head part of burial 4 with skull in a bronze drum. An orangeware pot beside many other ceramic vessels laid at the southern end of the burial (left). B. Position of skull and offerings inside the bronze drum after the soil was removed in the lab.

After finishing the restoration work, supported by funding from the German Embassy in Phnom Penh and the Federal Foreign Office's "Cultural Preservation Programme", a precious find collection from Prohear will be transferred to the National Museum in Phnom Penh for an exhibition that will be opened at the end of 2010. The Cambodian-German excavation at Prohear will continued in 2011.

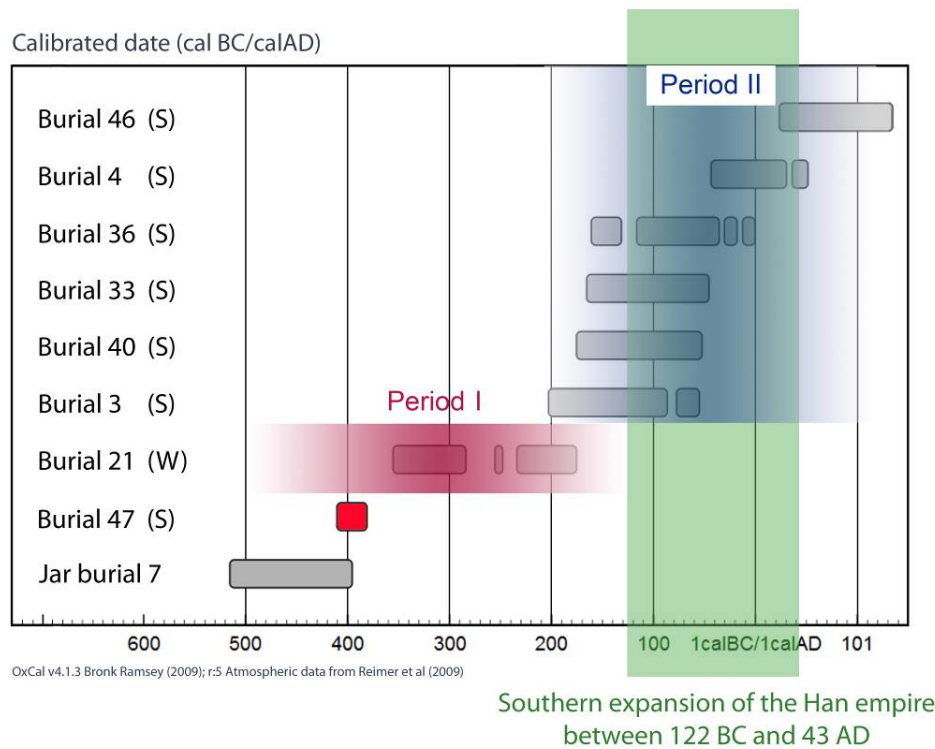


Figure 4: Radiocarbon dates from nine burials from mortuary period I (head orientation to the west or east) and period II (head orientation to the south, or slightly to the southwest) at Prohear. The radiocarbon date of burial 47 (red square) is possibly earlier than the archaeological context.

From: Simone Kraus (University of Freiburg) and Seng Sonetra (Memot Centre - Phnom Penh)

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Subject: *The skeletal remains from Prohear*

During two excavations in the village of Prohear in southeast Cambodia a total of 52 burials were discovered, of which 32 contained human remains. The predominant part of the skeletal remains was very poorly preserved, and restoration and reconstruction work was necessary before standard analyses were possible. From 24 individuals, teeth or even complete dentition remained (Fig. 1). As teeth contain various information about an individual, by studying these teeth we were able to gather information about age-at-death, pathological issues, diet and indications for kinship within the Prohear skeletal sample. By reason of the low number of individuals and the poor preservation, however, the collected data is not statistically representative.

Most of the burials were orientated to the south-southwest direction (Fig. 2). For most individuals age-at-death estimation was possible by examining the dentition. The replacement of deciduous with permanent dentition was used to estimate age at death for subadults while dental wear was used for adults. Eleven individuals (34.4%) were subadults, ten individuals (31.3%) were adult, and eleven individuals (34.4%) could be allocated to age-groups between subadult and adult. Bones

significant for sex estimation were preserved in only one case, which was determined to be within the female range (hyperfeminine). Osteometric analysis was not possible due to the deformation and poor preservation of the human remains. Six individuals (18.8%) had one to four foramina molaris, a little pit in the molar's exterior which is a genetic variant. Genetic variants appear population-specific and give indication for possible genetic kinship.



Figure 1: Jaw from burial 33. The teeth show strong wear and green coloration due to metal artifacts.

Paleopathological results were rare due to the poor preservation. One individual had a tumor on the left femur and a fracture of a metatarsal bone (Fig. 3). Another individual had cribra cranii and showed symptoms of an unspecific infectious disease on both femora. One of the most prominent characteristics of the preserved teeth was very pronounced tooth wear (Fig. 1), which is most likely due to the ingestion of food that contains particles of stone, dust or sand. Some individuals showed mild linear enamel hypoplasias (LEH) that indicates a period of growth disruption during the formation of the teeth. Also some cases of caries, calculus, tooth loss and periodontitis were observed.



Figure 2: Excavation of W-E directed Unit D in March 2009. The head orientation of the most inhumations to the south-southwest (to the right side of the photo) is identifiable despite missing skeleton remains above all due to the position of head ornaments or bracelets.



Figure 3: Individual from burial 13. Only parts of the lower extremities were preserved. A tumor can be seen on the upper part of the left femur. Sex determination wasn't possible, age-at-death was adult.

References:

Reinecke, Andreas, Vin Laychour, Seng Sonetra 2009: "The First Golden Age of Cambodia: Excavation at Prohear". Bonn. Free for complete download on website: <http://www.dainst.org/prohear>.

From: Louise Shewan, Nancy Beavan Athfield, Dougald O'Reilly, Kate Domett

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Subject: *Cambodian Fieldwork Progress Report: Australian Research Council Discovery Project "History in their Bones"*

Fieldwork commenced in December 2009 for the Australian Research Council Discovery Project led by Dr Dougald O'Reilly, *History in Their Bones: A diachronic, bio-archaeological study of diet, mobility and social organization in Cambodia*. As part of the aim to examine physical and isotopic variability in skeletal remains through time, the team directed investigation to two sites, namely Phum Sophy in NW Cambodia and the Burial Jar site Phnom Pel (Chi Phat) in the Cardamom Mountains, SW of Phnom Penh.

PHUM SOPHY

The team arrived in the Cambodian village of Phum Sophy early in December to undertake an excavation of the prehistoric (probably pre-Angkorian or Iron Age) cemetery. The team consisted of Drs Dougald O'Reilly (Project Director and lead archaeologist) and Louise Shewan (isotope analysis) from the University of Sydney, Nancy Beavan-Athfield (archaeometry, radiocarbon dating) from GNS Science in New Zealand, Kate Domett (Biological Anthropologist) from James Cook University in Townsville, Australia, Mr. Chiang Serai Vuthy and Mr. Ouk Sokha from the Cambodian Ministry of Culture and Fine Arts (MoCFA), and Mr Suy Pov our field assistant. During some of the excavation we were also joined by a team of eight archaeology students (Houn Savong, Pho Mala, Vitou Phiro, Heang Mesa, Sin Sovan Rattana, Norng Many, Thavy Saronich, Noeung Pyra and their teacher Mr Cheang Hunleng) from the Royal University of Fine Arts, Phnom Penh (RUFA).

We selected a site within the grounds of the Wat to excavate. This decision was influenced by the fact that most of the village of Sophy had suffered extensive looting by the local population. The excavation unit was set out adjacent to the western wall of the monastery. The unit was 2 m east-west and 3 m north-south. This initial test unit extended to the east making the area under excavation 3 x 5 m in total. Excavation revealed a total of six individuals among a series of disturbed burials including at least four adults and two subadults, numerous beads (glass and carnelian), pottery, bronze objects including a bangle, spindle whorls, worked shell iron objects and an iron curved knife.

While excavation continued, work was undertaken to document the human remains inside the stupa at Wat Sophy. This enormous collection of isolated bones (Fig.2, Fig 3), the result of local looting, serves to illustrate the scale of the heritage destruction at Phum Sophy. This material, analysed by Domett, will provide information regarding health, age, sex and pathology of the ancient inhabitants of the site. Of particular note is the presence in the Phum Sophy collection of dental ablation and tooth filing. The patterns show some similarities and some key differences compared to the nearby site of Phum Snay. Shewan and Beavan-Athfield extracted M1, M2 and M3 (molars, where available) and 1-3 small cranial bone samples from the skulls and loose mandibles in order to construct a comparative (isotopic and radiocarbon) dataset to the excavated remains we have obtained. The analysis of skeletal material and archaeological cultural material is ongoing. A second excavation of Phum Sophy is scheduled for December 2010.



Figure 2: The large collection of human bones resulting from extensive looting stored at the Sophy Stupa.



Figure 3: Students cleaning bones from the looted remains at the stupa of Phum Sophy,

CHI PHAT JAR SITE (PHNOM PEL), KOH KONG PROVINCE, CARDAMOM MOUNTAINS



Figure 4: Tep Sokha (RUFA) moving jars from ledges for examination of ceramics and their contents.



Figure 5: RUFA students working on coffin ledges.

An intensive eight day investigation of the burial jar and coffin sites 21 km north of Chi Phat (198 meters above sea level) ran from January 2nd, 2010. The local name for this site is “Phnom Pel.” It consists of secondary human burials placed in twelve “coffins” constructed from whole logs, and seven tall ceramic jars (Fig 4; Fig. 5).

The team for the archaeological investigation of Phnom Pel site was led by Dr Nancy Beavan-Athfield, and included the following specialists: Dr Louise

Shewan, Dr. Richard Armstrong, ANU (site mapping, geology and isotope specialist), Dr. Siân Halcrow, University of Otago, New Zealand (Biological Anthropologist), Mr. TEP Sokha, Royal University of Fine Arts (supervision of jar handling on site and ceramics conservation). We were accompanied by Mr Ouk Sokha and Mr. Cheang Serei Vuthy (MoCFA). The team also included five students and their teacher from the Archaeology faculty of RUFA: Mr Mous Chiang Liang, (teacher), Vidou Phirum, Kem Phirum, San Chanthoeurn, Pin Vichet and Heng Sokpheap.

Our research plan was innovative relative to typical archeological site investigations.

Excavation was not required, as all burial containers are placed on natural rock ledges. But more importantly, the Phnom Pel site is a cultural and heritage treasure of the Chi Phat commune. We wanted to maintain the integrity of the site while undertaking archaeological investigation and ensure the site was left intact after our work. Greatest importance was placed on leaving the jars and coffins as near to the way that they were found. The only exception to this would be to do on-site conservation and repair of broken or weakened jars (Fig. 6).



Figure 6: Tep Sokha reconstructing ceramic jar on the coffin ledge.

Work progressed exceptionally well in the narrow timeframe allowed. For the coffin ledges, we surveyed, mapped and photographed the site and the burial container positions, completed measurements of coffins and obtained small samples of wood, bone and grave goods such as glass beads for radiocarbon, stable isotope and elemental analysis. For the ceramics, we completed mapping jar placement, measurements of each jar, photography, and on-site conservation/reconstruction of four jars. Full

metric analysis was completed for all the skeletal remains (Fig 7). Sediments accumulated within coffins and jars were also sifted for artifacts.

Upon completion of field analysis and sampling for isotopic analysis, all skeletal material and finds were returned to their respective coffins and jars.

Highlights of the work was finding that many of the ceramics, both burial jars and additional grave furnishings, were similar to finds in other jar burial sites some 135km to the NE and along the same general range of the mountains. The discovery of two badly degraded metal finger rings also echoed finds in the site to the north called Khnorng Sroal. Glass beads found in Phnom Pel were also remarkably similar to finds at previous sites. The presence of coffins in Phnom Pel also provided new insights on variation in these burial practices. Previously, only one other site, Khnorng Perng, has yielded fragments of wood which had puzzled previous investigators; we now understand that these may have been remnants of coffins similar to our recent finds.

Post-fieldwork analysis is now underway and radiocarbon dating is awaited to determine if the Phnom Pel site is within the date range previously produced for the northeastern site of Khnorng Sroal, which was as early as 1440AD, to possibly as late as 1630AD.



Figure 7: Siân Halcrow doing skeletal analysis in the field.

MYANMAR

From: Anne-Sophie Coupey, Jean-Pierre Pautreau and Aung Aung Kyaw

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Subject: *Second fieldwork season at Ywa Gon Gyi burial site (Upper Burma).*

In January 2010, the site of Ywa Gon Gyi (Thazi township), has been excavated for the second time (first fieldwork in January 2009) by the Myanmar-French Bronze-Iron Age cooperation research project (Archaeological Department of Mandalay and French Archaeological Mission, C.N.R.S., UMR 6566, Rennes and Musée Guimet, with the help of French Ministry of Foreign Affairs). The excavation site was situated 600 meters west from Ywa Gon Gyi village and about 1.1 km north from Kan Thit Gon museum site.

We have extended the northern pit (100 m²) which revealed 27 graves (Fig. 1) and have made one test pit located about 80 meters west from the northern pit, which revealed one very disturbed grave. Another test pit was dug in the last west field; where we found at the surface some broken pieces of a coffin's bronze ornaments, but there were no archaeological remains.

Out of the 23 primary burials, more or less intact, 21 individuals were represented; out of the 4 reduced graves (ie. the skeleton is reduced in its primary grave), 7 deceased were represented. A total of 28 people have been discovered: 18 adults, 7 sub-adults and 3 individuals for which the age could not have been determined. For sub-adult, age was more precisely estimated than for adults, despite the poor preservation of the epiphyses: S61: 5-7 years old, S62: 9-10 years old, S75: 3 months old, S78: 8-10 years old, S60, 80 and 85C are adolescents.



Figure 1: Burials from Ywa Gon Gyi

All the deceased are approximately oriented with their head towards the north. All seem to have been buried in a supine position with upper and lower limbs positioned in a straight line. Several graves showed evidence of deposit of the corpse in a (wooden?) coffin. The main indications to prove the use of perishable coffins are: 1) Visible imprint of a coffin in the sediment (white lines on one or each side of the skeleton): S29/65, S67; and 2) Decay of the flesh into a space empty of sediment which is indicated by the bone's positions (collapsing of the ribs and the pelvic bones and lateral compression of the upper part of the body): S69, S71, S72, S84. Supple containers could also have been used (bamboo mat?): S78 for example.

Usually burials are primary and single, but four reduced graves (S62, 65(?), 70, 85) have also been found. S70 and 85 contained no artefacts. The bones of S62 could have been placed in a rectangular box and bones of S70 in a square box.

The main grave goods found in the primary burials were pottery vessels, often deposited at the feet of the deceased: globular pots and shallow bowls (from one to five vases per grave). Only two cylinder pots were discovered (S66 and S81). Animal bones were uncovered: bovine ribs in S67 and 84, small animal ribs in S75 and undetermined animal bones in S72, 81, 83. Few ornaments were found: red glass beads in S80 and S50 (2009) and two agate beads in S65. Metallic artefacts were very scarce: two copper alloyed anklets in S80 and three iron tools in S67 (2) and S80 (1).

Ywa Gon Gyi burials (for the layers excavated) seem to be dated at least during Iron Age (later than the 4th century BC). This site also provides a Neolithic settlement in which many potsherds, animal bones and stone tools (scrapers, strikers, grindstones, buffing wheels and polished axes and adzes) were uncovered. The pottery vases are easily distinguishable from Iron Age example shapes and decorative techniques employed were varied: impression, incision and addition of primary material (more than 20% of potsherds were decorated). The first comparisons with neighbouring countries seem to be very interesting. The site of Obluang in Northern Thailand shows exactly the same decoration patterns on ceramic vessels. Radiocarbon dates place the Neolithic occupation of Ywa Gon Gyi between the second half of the third millennium BC and the first half of the second millennium BC.

From: Dr Bob Hudson

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Subject: *Completing the sequence: excavations in 2009 confirm Neolithic, Bronze and Iron Age burials at Halin, Myanmar (Burma).*

Two new excavations in 2009, of a Bronze Age burial site (HL 29) and a series of Neolithic burials (HL 30) below a later Iron Age settlement, confirm that Halin, in Upper Myanmar (E 95.80564° N 22.45591°), was occupied from the pre-metal period, with populations most likely attracted and held there by the salt which is still extracted today from the topsoil (Hudson 2009). These two burials have been described in internal Myanmar Archaeology Department reports, written in Burmese, but the reports are not generally available. Earlier research at Halin by departmental archaeologists is included in a recent Burmese-language book published by the Ministry of Culture (San Win 2009).

In January 2010 I spent a week at Halin, excavating an earthenware production site which will be published once carbon dating results are in, and consulting on the analysis and periodisation of sites HL (for Halin) 29 and 30. Halin, for anyone who has braved the bumpy track that links the village to the Sagaing-Shwebo road to the west, is now much more accessible by car via a new road that cuts east and then south from Shwebo.

HL 29:

The 43 skeletons excavated were found at depths between 140 and 240 cms below present ground level, aligned with their heads orientated slightly west of north, between 340 and 350 degrees. This orientation is characteristic of earlier burials at Halin: the Iron Age inhumations are orientated to the east. At least one burial clearly involved a wooden coffin (Fig 1), for which a carbon date is expected later this year. Other burials contained dozens of pots.



Figure 1: HL 29. Outline of wooden coffin: seen as a darker area on the vertical face in front of the skull, extending beside and behind the skull: the outer 10cms of the excavated surface is clay. (Photo: Bob Hudson)

Artifact finds included bronze axes and spears, stone beads, and polished stone rings (Fig 2). More than 30 stone rings were found, in some cases, three on one skeleton. Hundreds of small bone sequins had been used for some kind of decorative object on the head of one skeleton, and at the waist of another (Fig 2). Two skeletons each wore more than 25 bone rings on their arms (Fig 3). Some, but not all, of the burials contain dozens of earthenware pots. One putative distillation pot, with hollow pillars to allow vaporised alcohol to pass through from below and condense in the pot, was found.

The excavation was conducted in the mid-year rainy season of 2009, to take advantage of the softer soil. Several skeletons at the lower levels of the pits were badly damaged as water collected

around them. It is planned to preserve the excavation as a site museum, with pumps or drainage to keep the water at bay.

HL 30.

HL 26 (Fig 4), a site excavated a few years ago, yielded no metal artifacts, and was thus assumed to be a Neolithic site. A single polished stone ring was also unearthed in 2009 during cleaning. However only half a dozen skeletons were found, and the absence of *any* artifacts other than the one ring suggests that- to put it delicately- the excavators, local people already experienced in unofficial excavations of their own, may not have reported all the finds. However the 36 skeletons at HL 30 come



Figure 2: HL 29 Polished stone rings, bone sequin waist decoration. (Photo: Bob Hudson)



Figure 3: HL 29 Both arms loaded with bone bracelets, plus a bronze bracelet on the right wrist, a shell-beaded headdress and belt, and dark red, green and rock crystal beads, this individual was also buried with a bronze spear head and the axe (Photo: Bob Hudson)

with a convincing and distinctive Neolithic assemblage. One nice archaeological feature of this excavation is the stratigraphy, with clear differentiation between the Neolithic cemetery and an iron-age habitation site above the burials. The burials are orientated northward, with a layer of stone placed above some of the skeletons. Some burials include cordmarked pottery, and one piece has painted black decoration. Pottery is uncommon: even one piece in a burial is exceptional. However every burial comes with half a bivalve shell. Animal remains feature in at least two burials. One has the skeleton of a 50 cm snake between the shins (Fig 5), one has a pair of deer antlers across the upper legs (Fig 6), and there is a separate fragment of deer antler that may be associated with another burial. There are several polished stone bracelets, and one made of bone (Fig 7). Small perforated shells are used as beads, and there are also several cowrie shells. There two polished stone adzes, both lying between the legs of skeletons.

There are several child skeletons, one with unerupted teeth visible (Fig 8). Other children are buried with a stone bracelet and one of the rare pots (Fig 9). One intriguing find is some small stone beads. They are dark red in colour. According to all the evidence so far on Southeast Asian beads, they should

not be carnelian at so early a site. In the absence of permission to take a sample for analysis, we will for now call them dark red stone beads.

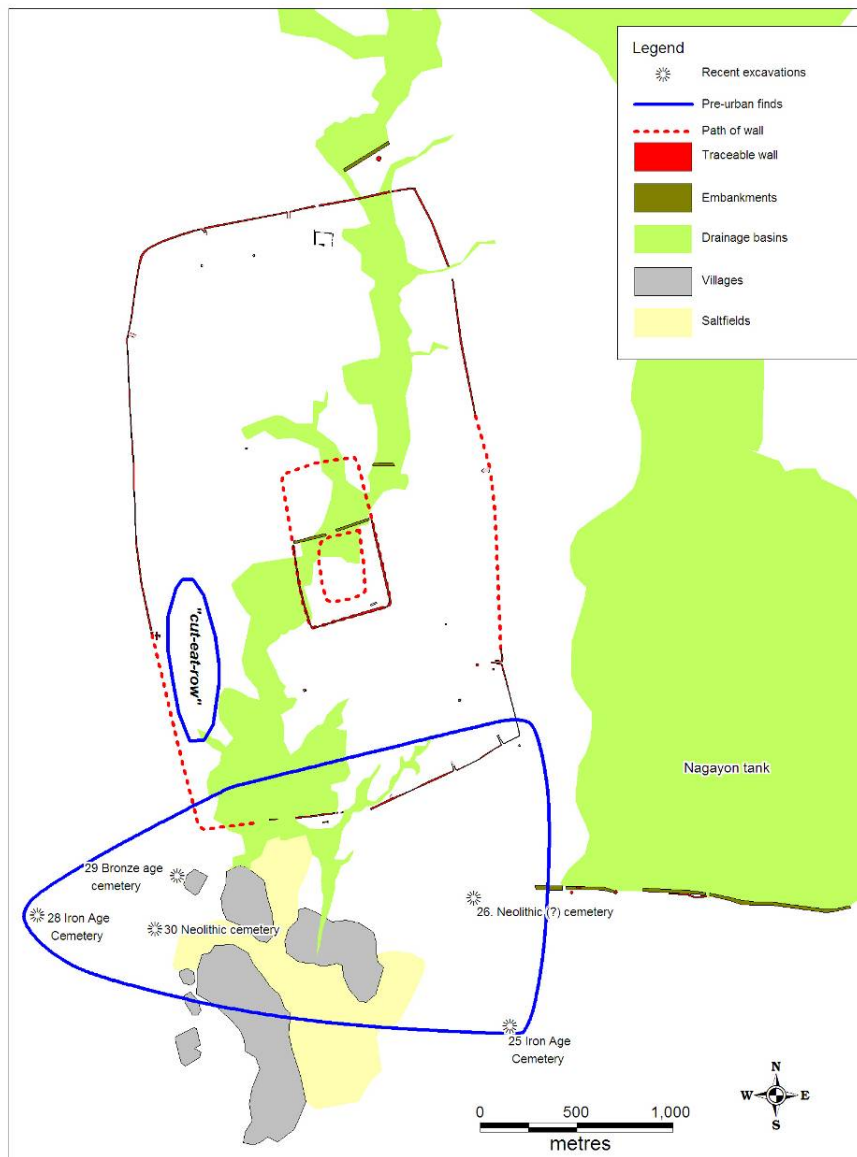


Figure 4: Halin: location of recently excavated inhumation burials. In 2010, treasure hunters also revealed the location of a previously unreported pre-urban cemetery within the First Millennium CE city walls where they dig for stone beads. The local name for this site, *pya-sa-dan*, translates as “cut-eat-row”: when you cut into the row of skeletons, you find beads that enable you to “eat” or earn your living. (Plan: Bob Hudson)

Thoughts.

Assuming that no material has been removed since the excavation, what we seem to see at HL 30 is a site, in which what we might call hunter-gatherer, food is significant (or hunter-gatherer trophies, at least), but pots of cooked food, including alcohol, have not become part of the cemetery assemblage. The bivalve shell somehow unites the dead of this community. Children can be buried with items that many of the adults do not have in their graves, such as a stone bracelet. Might this suggest that these children have an inherited status?

In the bronze site, HL 29, social differentiation seems to be strongly marked by varying amounts of personal goods, as suggested by the two figures wearing the armloads of bone rings. The inclusion of



Figure 5: HL 30 Snake skeleton, brushed with water to improve view. (Photo: Bob Hudson)

pots which presumably held food or drink (though we can detect no residue) suggests either a graveside feast, or the provision of supplies for the deceased. Might each member of the funeral party have deposited one pot? Not every burial in this group involves a large number of pots (Fig 10), even those of the figures with the bone rings who we might suppose by their possessions to have been of high status. So are we perhaps seeing two phases of Bronze Age funeral behaviour?

Halin now presents us with a habitation sequence from Neolithic to modern. Up until the urban period, when cremation became the norm, this sequence is represented by open excavations, preserved as site museums. This has been something of an end in itself to the Myanmar heritage authorities, based in part on the not-unreasonable notion that visitors to an archaeological site are fascinated by skeletons. A more extensive and internationally-based scientific analysis of the materials, either through artifact studies or physical anthropology, will require delicate negotiations with the local stakeholders.



Figure 6: HL 30 Skeleton with deer antlers and the ubiquitous bivalve shell. (Photo: Bob Hudson)



Figure 7: HL 30 Skeleton with bone ring on right wrist. (Photo: Bob Hudson)



Figure 9: HL 30 Child skeletons with pot and stone ring. (Photo: Bob Hudson)



Figure 8: HL 30 Child skeleton, with un-erupted canines and premolar. (Photo: Bob Hudson)



Figure 10: HL 29 The pots in the lower part of the picture are 1 metre above the skeleton. (Photo: Bob Hudson)

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INDIA

From: Gwen Robbins

Department of Anthropology, Appalachian State University, Boone, NC, USA

Email: www.appstate.edu/~Robbinsgm

Subject: *Bioarchaeology and climate change: a view from Indian prehistory.*

Robbins G. (in press) *Bioarchaeology and climate change: a view from Indian prehistory*. University Press Florida in the book series: *Bioarchaeological Interpretations of the Human Past: Local, Regional, and Global Perspectives*, Clark Larsen (series editor).

"During the second millennium B.C. hundreds of villages were founded in peninsular India. The people of the Deccan Chalcolithic period relied on farming drought-resistant barley and wheat. They raised cattle, sheep and goats. They maintained hunting and foraging traditions and utilized the resources gathered from local lakes and forest habitats for subsistence, construction, and fuel. Throughout this time, Chalcolithic people successfully colonized the peninsula from Rajasthan and Madhya Pradesh to Gujarat and down to the southern edge of Maharashtra despite the challenges of living in a semi-arid climate and unpredictable monsoon rainfall. By 1500 B.C. their settlements were thriving, populations were growing, large regional centers were established. Yet, around 1000 B.C., the majority of these settlements were deserted.

The principle explanation for culture change during the Deccan Chalcolithic has been that climate change precipitated abandonment of agriculture and eventually led to the collapse of settlements in this region. Bioarchaeologists have suggested that the abandonment of agriculture at Inamgaon was actually a boon for infant health, because it led to increasing dietary diversity and improvements in sanitation conditions due to declining settlement density. Recently, new paleoclimate reconstructions have changed our view of Holocene climate in the subcontinent. It appears that unpredictable monsoon and reduced rainfall were well established prior to the florescence of villages during the Deccan Chalcolithic and these changes are unlikely to have led to the abandonment of settlements.

In this book I use evidence from paleoecology, archaeology, and human skeletal material to construct a new vision of life and death at three villages occupied during the second millennium B.C. I will demonstrate the application of a new technique for constructing demographic profiles from the age pyramid of a subadult sample (method in press at *International Journal of Osteoarchaeology*) and a technique for estimating body mass in subadult skeletons (method in press at *American Journal of Physical Anthropology*). Once body mass has been estimated, it is possible to detect emaciation in the subadult skeleton and compare the prevalence of starvation among populations.

Based on my findings, I will make inferences about the effects of ecological change on demography (fertility, mortality, life expectancy, and population growth) and childhood growth at Inamgaon, Daimabad, and Nevasa. My results indicate a new model for understanding climate and culture change for this period of Indian prehistory.

Questions about human interactions with the environment thousands of years ago in India are interesting from an academic standpoint but the insights we gain into the past are relevant in a contemporary context as we face the consequences of continued population growth, unsustainable lifestyles, degradation of local environments, and large-scale climate changes. It is particularly interesting to examine human responses to climate change in prehistoric India given that more than 500 million Indian people are currently living in villages that demonstrate some aspects of continuity with the lifestyle found in villages of 3000 years ago. These people, and many other human populations that live in semi-arid regions at low latitudes will arguably face the greatest magnitude of effect from the current global climate changes. Having a longer view on the challenges, strategies, and consequences

of human responses to the environment may prove helpful as we all develop strategies for dealing with contemporary and future interactions between human society and the environment. This book is an attempt to begin the inquiry into the strategies that have come before, the successes and failures of our predecessors."

Dr. Gwen Robbins is an assistant professor of biological anthropology at Appalachian State University in Boone, NC. Her research is focused on South Asian prehistory and her interests include age estimation and paleodemography, bone biology and ontogeny, and paleopathology. Gwen also recently completed work on the osseous remains from the Donner Party campsite in California, where she and a group of undergraduate students used bone histology to determine human versus non-human status of a sample of 85 burned, fragmentary bones recovered from the hearth. While no evidence for cannibalism was uncovered at the site, this analysis did lead to new insights about the starvation diet at the site and the struggle for survival among the families trapped there. This research is forthcoming in *American Antiquity*.

Recent Publications

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Robbins G. (in press) Bioarchaeology and climate change: a view from Indian prehistory. University Press Florida: *Bioarchaeological Interpretations of the Human Past: Local, Regional, and Global Perspectives*, Clark Larsen (series editor).

Robbins G., P. Sciulli, and S. Blatt (in press) Estimating Body Mass in Subadult Human Skeletons. *American Journal of Physical Anthropology*.

Scott, R. and H.R. Buckley. Biocultural Interpretations of Trauma in Two Prehistoric Pacific Island Populations from Papua New Guinea and the Solomon Islands. *American Journal of Physical Anthropology*. (in press).

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Conference Details

PAPERS PRESENTED AT RECENT CONFERENCES

- ***Indo-Pacific Prehistory Association***

Hanoi, Vietnam. Sunday 29th November to Saturday 5th December 2009

Abstracts are available from the following website.

<http://arts.anu.edu.au/arcworld/ippa/19thcongress.htm>

Conference Review: 19th Congress of the Indo-Pacific Prehistory Association (IPPA), Hanoi, Vietnam (29th November - 5th December)

At the end of November 2009 scholars and students from around the globe came together for a specialist conference in Indo-Pacific archaeology. The 19th Congress of the Indo-Pacific Prehistory Association (IPPA) was held at the Vietnam Academy of Social Sciences in Hanoi, Vietnam. Organised by Peter Bellwood (Australian National University) in collaboration with the Vietnam Academy of Social Sciences and the Vietnam Institute of Archaeology, the seven-day conference ran multiple sessions involving hundreds of papers. Academics and students alike presented their past, current and future research in East Asian and Pacific prehistory. Presentations covered a wide range of topics from the Pleistocene to more recent prehistory, including: bioarchaeology; ceramics; ecology; geoarchaeology; maritime archaeology; metallurgy; monuments; mortuary practices; textiles; trading; and zooarchaeology. After a brief introduction and a plenary session in Vietnamese, the presentations were underway. The first day ended with a buffet meal, which gave plenty of opportunities for socialising and anticipating on the week ahead.

With around 400 presenters in a total of 38 sessions, there is not the space for a discussion of all the topics here. So, this review will focus sessions relevant to bioarchaeological research. Central to this topic was the daylong session convened by Siân Halcrow and Nancy Tayles, from the University

of Otago, New Zealand entitled "The contribution of bioarchaeology to the study of social identity in Southeast Asia and the Pacific". Siân Halcrow began with an overview of bioarchaeology in prehistoric mainland Southeast Asia, explaining how establishing social identity is fundamental to the construction of societies and culture. Throughout the day we heard from presenters from New Zealand, Australia, Thailand, Vietnam, the Philippines, Malaysia and the United States. The morning talks focussed on how burial practices, along with biological evidence can be used to explore the issues of personhood, disability, and social status. Other papers investigated kinship and diet through the use of isotopes, and occupation by musculo-skeletal stress markers. After lunch, the presentations addressed the identification of sex and gender, with discussions of sex assessment and sexual dimorphism. The final papers of the day took us to bioarchaeological research in the Pacific, including papers using DNA and isotopic methods of analysis. This very successful session highlights the usefulness of combining skeletal biology with mortuary archaeology to understand a broad range of different aspects of social identity. A smaller session emphasising the funerary archaeology with a similar theme of investigating social identity was also of great interest. Papers explored a diverse range of contemporaneous mortuary practices from various countries. Talks highlighted how burial orientation, body position, cremations, secondary burials, funeral containers and spatial arrangement have the potential for understanding the society. The conference was very well structured, with numerous presentations running smoothly in parallel. In fact, the biggest problem encountered was the decision over which talks to attend! Mid-week there was a rest day, although for most an opportunity for socialising with fellow colleagues on a tour around Hanoi. The day ended in a wonderful reception dinner at the Museum of Ethnography. The penultimate day included presentations in tribute to the life-long contributions to Indo-Pacific archaeology made by Peter Bellwood, as he is now retiring from his post as IPPA secretary. Ian Glover, Graeme Barker, and Charles Higham, expressed their gratitude by giving heartfelt talks and their personal thanks for all that Peter has achieved.

This was an informative, enjoyable and stimulating conference which provided the opportunity for people interested in a wide range of topics to come together and share ideas, findings and interests. The only disappointment is that we will have to wait another four years until the next one!

By Angela Clark (PhD candidate, University of Otago, New Zealand)

Article Adapted from:

Clark, A.L. (2010) Review of the 19th Congress of the Indo-Pacific Prehistory Association (IPPA), Hanoi, Vietnam (29th November - 5th December). 11th *British Association for Biological Anthropology and Osteoarchaeology Annual Review*. 11:49-50

• ***Australasian Society of Human Biology***

The abstracts from the 21st (Dunedin, 2007) and 22nd (Adelaide, 2008) have been published in *HOMO - Journal of Comparative Human Biology*. Volume 60, Issue 3, Pages 185-294 (May 2009)

The 23rd ASHB conference was held on Rottnest Island, Western Australian 1st - 4th December 2009. Abstracts will again be published in *Homo*.

- **79th Annual Meeting of the American Association of Physical Anthropologists**

Albuquerque, New Mexico. 14th – 17th April, 2010

Abstracts are available from this website:

<http://physanth.org/annual-meeting/2010/>

Pietruszewsky, M., Toomay Douglas, M., Swift, M., Harper, R. and Fleming, M.A. (2010). An assessment of health and lifestyle among pre-1521 Chamorro from Saipan, Commonwealth of the Northern Mariana Islands. *American Journal of Physical Anthropology* S50:189

- ***Pacific Island Archaeology in the 21st Century: Relevance and Engagement***

Koror, Palau from July 1-3, 2009

Papers given at the ‘Physical Anthropology and Bioarchaeology in the Pacific Symposium’:

1. Human Body Size and Stature in Early Palau

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Archaeological and linguistic evidence indicates that the earliest Palauans were probably part of the Austronesian expansion that began around 4,500 years ago and reached the islands sometime after 3,500 BP. Although archaeological evidence exists from around 3,300 BP, remains of the inhabitants have been limited to fragments retrieved from several burial caves. The discovery of a stratified cemetery at Chelechol ra Orrak in 2000, dating to around 3000 BP, now presents us with opportunities to study some of the earliest Palauans and gain insight into their health, diet, demography, and biological affinities. This paper will briefly review the discoveries at Orrak, and what we have learned concerning these issues, and then explore body size (stature and body mass) in more depth. Not surprisingly, we find that early Palauans resemble their temporal and geographic neighbors in Oceania and Insular Southeast Asia in both measures of body size. In comparison to modern Palauans there seems to have been little change in stature over the last three millennia while mass has increased by approximately 50%. Reasons for this change in mass could be linked to modern lifestyles although underestimation by regression formulae used for estimating body mass from skeletal material cannot be discounted.

2. Health in an historic archaeological skeletal series from Malesso, Guam: dental and skeletal indicators of health

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This paper examines health and lifestyle during the historic period (ca 1856) on Guam through an analysis of osseous indicators of health in the skeletal remains of 20 individuals excavated during the MDCI Corp. Monitoring Project by International Archaeological Institute Inc. (IARII #200419) at Malesso on the southwest coast. The 20 individuals include six subadults and 14 adults (13 males, one female). Preservation ranges from good to poor while completeness ranges from nearly complete skeletons to a few bones. Dental enamel hypoplasias in the deciduous teeth in the three subadults suggest late-term intrauterine stress. In adults, oral-dental health is good with low rates of dental caries, alveolar defects, periodontal disease, tooth wear, and dental enamel hypoplasia. Estimated stature for four adult males ranges from 162-188 cm; estimated stature for the single female is 155 cm. Skeletal indicators support a physically strenuous lifestyle, but there is also evidence for general biological stress and six adults have evidence for treponemal infection. Epidemic infectious diseases (e.g., measles, small pox) are recorded around the time these people lived and died. Though no direct evidence for acute infectious disease is seen, indirect evidence suggests several individuals may have been susceptible to acute disease. Limited comparisons with other skeletal series from the Mariana Islands are made.

3. Preliminary Findings from the Naton Beach Site, Tumon Bay, Island of Guam

David G. DeFant and Joanne Eakin

SWCA Environmental Consultants, Guam, U.S.A.

Excavation of the Naton Beach Site on Guam's Tumon Bay has resulted in the recovery of approximately 170 human skeletons dated between approximately 2800-2300 BP. These inhumations represent one of the largest and best preserved early (pre-1500 BP) mortuary samples yet identified in Micronesia. This discovery offers tremendous potential to increase our understanding of early settlement in the Marianas and the relationship of these people to groups throughout the Western Pacific.

In comparison with more recent prehistoric Marianas burial samples, the early Naton Beach skeletons exhibit significant differences in artifact association and mortuary treatment. Grave goods associated with the early mortuary features include complete or nearly complete ceramic vessels, shell bead necklaces, shell bracelets, stone adzes, shell adzes, stone pestles, shell fish gorges, stone net sinkers, large unmodified oyster shells, a shell fishhook, and a shell net sinker.

Osteological analysis of the early Naton Beach Site skeletons is ongoing. Preliminary data suggest an atypical age distribution dominated by adult interments and distinctive cranial

morphological attributes. Comparison of the metric and non-metric attributes of these early people with those collected from more recent skeletal series, offers a unique opportunity to broaden our understanding of the relationship between the Pre-Latte and Latte Period cultural complexes.

4. Oxygen, Carbon and Nitrogen Isotope Analyses of Skeletal Remains from Archaeological sites in the Philippines

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Reconstructions of ancient human diet by $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ using collagen and hair, and geographical variation amongst populations by $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ using tooth enamel, have proven to be effective tools for understanding the interaction between environment and culture in the past. This study is an attempt to establish the possible diet and movements of some pre-contact groups in the Philippines. The island-province of Batanes northernmost part of the Philippines is located about 200 km from the north coast of Luzon and about 150 km from Taiwan. Approximately 21 individuals excavated on Batan Island were associated with the boat-shaped and primary jar burials (355±70 B.P.). Preliminary analysis of bone collagen from Batanes individuals show a wide variation of dietary protein sources and a diet more dependent on a marine ecosystem (-16.6‰ for $\delta^{13}\text{C}$ and 9.7‰ for $\delta^{15}\text{N}$). The 13th century old mummies from Kabayan in Benguet Mountain Province, northwest of Luzon showed an average value of -17.3‰ for $\delta^{13}\text{C}$ and 9.0‰ for $\delta^{15}\text{N}$ indicating riverine diet resources. Pre-contact human remains excavated from Romblon Island (14th-15th century), Central Philippines have an average $\delta^{13}\text{C}$ value of -17.8‰ and 10.2‰ for $\delta^{15}\text{N}$, suggesting they were mostly dependent on marine and C4 plant dietary resources. While other human remains from Lal-lo shell midden sites, Northern Philippines (1000 BP) had -20.1‰ for $\delta^{13}\text{C}$ and 11.4‰ for $\delta^{15}\text{N}$ and from Sta. Ana, Manila (about 1095 AD) showed -14.4‰ for $\delta^{13}\text{C}$ and 12.2‰ for $\delta^{15}\text{N}$ values. Both sites show a reconstructed diet more dependent on terrestrial resources.

Geographical variation and movements were studied by $\delta^{18}\text{O}$ analysis using the teeth enamel. Average $\delta^{18}\text{O}$ in individuals from the Kabayan site (N=6; -10.03‰) in the mountainous region are lower than average $\delta^{18}\text{O}$ in individuals from Batanes (N=21; -7.72‰) and Romblon (N=9; -8.76‰) which are both islands. Variation of $\delta^{18}\text{O}$ values within the island series implies mobility compared to the inland series; less variation in the Kabayan sample (±0.3‰) than that in the Batanes (±0.9‰) and Romblon (±0.8‰) samples. The Batanes site shows more variation among individual values of $\delta^{18}\text{O}$ that indicates possible migration.

5. Reconstructing Palau paleodiet through stable isotope ratio analysis of human bone

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Human skeletal remains recovered from three archaeological sites in Palau, Micronesia, dating between ca. 3000 – 1500 cal. BP, were tested for light stable isotope ratios to determine patterns of human paleodiet. Bone collagen yields were very good on the pilot sample, with nine of ten adult individuals yielding acceptable atomic C:N ratios (avg. 3.3). Results from bone collagen suggest a strong marine component with moderately enriched $\delta^{15}\text{N}$ values (avg. 11.6‰) and $\delta^{13}\text{C}$ values (avg. -15.2‰), suggesting significant consumption of marine food resources. Bone apatite $\delta^{13}\text{C}$ values (avg. -8.1‰) suggest consumption of enriched dietary carbohydrates, which could potentially include products such as sugar cane or seaweed. Analysis of additional samples and associated fauna should clarify these results and refine both marine and terrestrial components of Palauan paleodiet. Results correspond well with complementary archaeological evidence demonstrating that early Palauans were heavily dependent on marine food resources. This is the first isotopic analysis conducted on prehistoric individuals from Palau and one of only a few studies for Micronesia.

6. Dental indicators of health in early Neolithic and Iron age skeletons from Taiwan.

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Examining several indicators of oral/dental and physiological health and lifestyle (dental caries, antemortem tooth loss - AMTL, alveolar defects, dental calculus, linear enamel hypoplasia-LEH, and dental attrition) this study investigates biocultural implications of changes in subsistence from the earliest Neolithic to later Iron Age Taiwan. The archaeological human skeletal assemblages investigated include 1) Nan Kwan Li East (NKLE) ($n=24$ individuals), a site located in Tainan County in southern Taiwan associated with the Tapenkeng culture (c. 5000 years BP), the earliest Neolithic cultural sequence in Taiwan and 2) Shih San Hang- SSH ($n=23$ individuals)], an Iron Age site located in (c. 1800-500 years BP). The main hypotheses tested is that higher frequencies of indicators of stress will be observed in the later Iron Age skeletons than in the earliest Neolithic skeletal series and variation in individual indicators of health will be observed between males and females.

Contrary to expectations, low frequencies of dental caries, alveolar defect, and AMTL were observed in both series. Likewise, significantly lower frequencies of LEH were observed in the SSH assemblage. As expected, significantly higher frequencies of extreme dental attrition were observed in the NKLE series and significantly higher frequencies of calculus were observed in the SSH series. With the exception of dental calculus, the overall health of the later Iron Age series was slightly better than

the earliest Neolithic ancestors of Taiwan's aborigines. Significant differences in frequencies of these indicators for males and females were not observed.

This research was supported by National Research Council of Taiwan.

UPCOMING CONFERENCES

- *Australasian Society of Human Biology*

This year's ASHB conference is to be held at the University of Auckland in New Zealand around the end of November/beginning of December.

Graduate Student Projects

HONOURS PROJECTS

Those underway...

- Caitlin Evans, James Cook University, Townsville, Australia
Supervisor: Dr Kate Domett

The main aim of this thesis is to examine the prevalence of osteoarthritis within the major lower joints (hip, knee, ankle and feet) from the Neolithic and early to mid Bronze Age skeletal remains from Ban Non Wat, Thailand. Within this broad aim, two major questions will be addressed. First is a methodological issue. There is much debate on the types of pathological lesions which should or should not be included in an assessment of osteoarthritis and these will be examined and compared in this thesis for the sample from Ban Non Wat. Namely, the relationship between the development of marginal and intra-articular osteophytes, (lipping), articular surface degeneration (known as pitting or porosity), and eburnation as direct evidence of the presence of osteoarthritis. Only the latter is considered pathognomic of osteoarthritis. Once an accurate methodology is established, the second major focus will be to make temporal comparisons between the Neolithic and Bronze Age people at Ban Non Wat. Are there differences in the pattern of joints most affected by osteoarthritis? Are males affected more commonly than females in one or other group? Does osteoarthritis have an earlier onset in one group compared to the other? Lastly an attempt will be made to place the patterns of joint involvement in these samples within the archaeological context from which they came. This is one of the more difficult questions as osteoarthritis has a number of possible aetiologies. These will be

explored in detail to determine if one or other aetiology can be deemed the most likely cause in prehistoric Ban Non Wat.

- Nathan Harris, University of Otago, Dunedin, New Zealand.

Email: harna912@studentmail.otago.ac.nz

Supervisor: Dr Nancy Tayles

Subject: *The Application of anthropologie de terrain to Ban Non Wat, Thailand*

Anthropologie de terrain is a methodology used to reconstruct the funerary processes of past societies. Through careful examination of the spatial positioning of skeletal elements within the grave it is possible to make inferences about the ways in which people were treated in death. This method is currently being applied to burials from the site of Ban Non Wat, excavated between 2002 and 2007 under the *Origins of Angkor* research project. The research is being carried out as part of an MSc degree at the University of Otago based on photographs and field drawings from excavations. Burials from the Neolithic and Bronze Ages are being examined, with the Iron Age excluded due to the fragmentary and disturbed nature of the burials. By comparing burial protocols between individuals it may be possible to make inferences about social organisation as well as the ways in which these people viewed both death and each other. Burial practices will be compared over time, between males and females, different age groups, and between individuals with differing amounts of grave goods. Preliminary results of analysis of the Bronze Age burials were presented at the *Indo Pacific Prehistory Association* conference last year in Vietnam. These results showed that burials were predominantly primary single interments placed in either coffins, some type of wrapping, or directly in the ground. No evidence was found that burial procedures changed significantly over time within the Bronze Age, or that individuals were being treated differently based on either age or sex. The research is nearing completion and should be finished mid year.

Those recently completed...

- Alana Colbert, James Cook University, Townsville, Australia

Supervisor: Dr Kate Domett

An osteobiographical study of three individuals from Ban Non Wat, northeastern Thailand.

Thailand's Bronze Age is an important turning point towards the eventual development of society in the region. It was a period of many changes that included increased agriculture, larger population density and increased trade. The graves are the best preserved record of Bronze Age inhabitants. They contain not only the individual but a variety of artefacts that offer insights into their community. This study analyses three of these Bronze Age burials (Burial 671, 672 and 676) found at Ban Non Wat in northeast Thailand. The aims of this study were to develop an osteobiography of each individual and analyse the associated grave goods in order to determine what they can say about the individual and

their community. An osteobiography uncovers the life history of an individual as recorded in their skeleton. The thesis uses an agency based approach by focusing on the individual.

The results from the study of the skeleton and artefacts were then compared to other studies in Thailand and South East Asia in order to place the individuals in their environmental and cultural context. These results offered insights into trade and communication between Ban Non Wat and other communities. The focused study on these individuals offered an opportunity to investigate the key factors that had an impact on them and those around them. Burial 671 provided an opportunity to look at the effects a traumatic injury had on his life and his community. Burial 672 offered a challenge to provide reasons of why he was buried in such a different way to every other burial at the site. Burial 676 provided an insight into how childhood growth disruptions occurred and may have continued to affect her adult life. The agency approach provided a detailed look into the lives of these people and those around them. If a general population based study was solely conducted on these individuals particular information may have been overlooked, for example the broken femur of burial 671 may have been a statistic rather than realising what it would have meant for the individual and those around him. The agency approach overall allows for an understanding of just of a few of the individuals at Ban Non Wat, that would have most likely been lost in the huge amount of data uncovered from the site. While the rest of the over 600 burials found at the site never had the chance to tell their story, this study has provided three individuals with the chance to tell theirs.

DOCTORAL PROJECTS

Those underway...

- Angela Clark, University of Otago, New Zealand

Angela is examining the levels of sexual dimorphism in adult skeletal remains at Ban Non Wat, Thailand, during the Intensification of Agriculture in Prehistoric Southeast Asia. A large sample size and long chronology of Ban Non Wat, will provide a good temporal investigation of environmental factors affecting body shape and size.

Supervisors: Dr. Nancy Tayles and Dr. Siân Halcrow.