



ABSTRACTS | Proceedings of the Australasian Society for Human Biology

Abstracts of papers and posters presented at the 27th Annual Scientific Meeting of ASHB

Sydney, Australia, 08-11 December 2013



Monday 09 December 2013

9:00-10:00 Keynote

“When should a dad care for his young?”

Professor Hanna Kokko, Research School of Biology, The Australian National University

10:00-10:30 Morning Tea

10:30-12:00 Podium Session 1: Primatology

Session Chair: Nicholas Malone, The University of Auckland

10:30 **Alison Behie et al.** Population Status of the Cat Ba Langur (*Trachypithecus poliocephalus*).

10:45 **Rebecca Hendershott.** Oral-Genital Behaviours among Tibetan macaques (*Macaca thibetana*).

11:00 **Amy King.** The Limits of the Social Brain Hypothesis as a Theory of Primate Cognitive Evolution.

11:15 **Kayla Ruskin et al.** The Effects of a Hurricane on the Diet and Nutrient Intake of Howler Monkeys and its Impact on the Recovery of the Population.

11:30 **Britta Nelson et al.** Sleeping Tree Selection by Northern Yellow-cheeked Crested Gibbons (*Nomascus annamensis*) in Cambodia.

11:45 **Ceridwen Boel & D Curnoe.** Hybrid Morphology in South East Asian Primates, and Detecting Hybrids in Human Evolution.

12:00-1:15 Lunch

1:15-2:30 Podium Session 2: Bioarchaeology I

Session Chair: Colin Groves, The Australian National University

1:15 **David Bulbeck.** Analysis of Crania from the Prehistoric Cemetery of Melolo, Sumba, Indonesia.

1:30 **Damien Huffer & G Perri.** A New Approach to More Accurately Reconstruct the Medullary Cavity in Cross-Sectional Geometric Analyses.

1:45 **Judith Littleton et al.** Interpreting Violence in the Early Bronze Age of Mongolia.

2:00 **Marc Oxenham & A Willis.** Con Co Nguá, a 5,500-6,000 BP Cemetery in Northern Vietnam: Preliminary Observations.

2:15-3:00 Afternoon Tea / Poster Session

Poster **Christine Cave & M Oxenham.** Old and Older: Extending the Age at Death of an Anglo-Saxon Cemetery Population.

3:00- 4:45 Roundtable Discussion: *Homo floresiensis*

Participants: Colin Groves, Maciej Henneberg, Debbie Argue & Charles Oxnard

Moderator: Marc Oxenham, The Australian National University

5:00 Annual General Meeting

Tuesday 10 December 2013

9:00-10:00 Keynote

Where Have All The Young Men Gone?

Emeritus Professor Charles Oxnard, Forensic Anthropology, University of Western Australia

10:00-10:30 Morning Tea

10:30-12:00 Podium Session 3: Human Biology and Human Evolution

Session Chair: Alison Behie, The Australian National University

10:30 **Kirrily Apthorp**. Making Sense of the Maba Man.

10:45 **Kate Domett et al.** Osteoarthritis in Prehistoric Ban Non Wat, Thailand: 2000 Years of Stasis.

11:00 **Bruce Floyd**. Do Growth-Promoting Early Environments Contribute to Proportional Changes in Shoulder Breadth?

11:15 **Debra Judge et al.** A Longitudinal Study of Child Growth in Transitioning Rural Timor Leste.

11:30 **Neil Mann**. Encephalization in Evolving African Hominids during the Pleistocene Epoch: Energy and Fatty Acid Considerations.

11:45 **Julie Spray**. How Ethnicity Gets Under the Skin.

12:00-1:15 Lunch

1:15- 2:30 Podium Session 4: Morphometrics and Forensic Anthropology

Session Chair: Nick Milne, University of Western Australia

1:15 **Alannah Pearson**. What Can Shape Analysis Tell Us about Evolution? A Study of Primate Crania.

1:30 **Claire Waldock et al.** The Geometric Morphometric Analysis of Sexual Dimorphism in the Gait Cycle.

1:45 **Denise Donlon & S Croker**. A review of Anthropological Casework Involving Non-human bones in an Australian Forensic Setting.

2:00 **Donna MacGregor & K Murray**. Forensic Case Study: Unusual Skeletal Age Variation within an Individual in Queensland.

2:15 **Jennifer Menzies et al.** Experimental Taphonomy near Belanglo State Forest and the Implications for Time-Since-Death Assessment Methods.

2:30-3:00 Afternoon Tea

Podium Session 4 resumes.

3:00 **Paige Brooker & N Milne**. Maturation and Ageing in the Adult Female Face.

3:15 **Nicholas McMahon & S Maloney**. The Influence of a Drinking Formula on Thermal Strains and Hydration in a Hot Working Environment.

3:30-5:00 Museum Visit

Visit your choice of the museums on campus at the University of Sydney. Museums available include the Shellshear Museum of Physical Anthropology & Comparative Anatomy; the Pathology Museum; the Macleay Museum (natural history); and the Nicholson Museum (archaeology and antiquities).

Wednesday 11 December 2013

9:00-10:00 Keynote

The Plastic Ear: Perceptual Relearning and Auditory Spatial Perception

Associate Professor Simon Carlile, School of Medical Sciences, The University of Sydney

10:00-10:30 Morning Tea

10:30-11:45 Podium Session 5: Bioarchaeology II

Session Chair: Judith Littleton, The University of Auckland

10:30 **Christina Adler et al.** Ancient DNA from Human Oral Microbiota Records Dietary Impacts of the Farming and Industrial Eras.

10:45 **Gina MacFarlane.** A Trial Method for Assessing Root Transparency and its Potential Use in Assigning Relative Age at Death to Mature Adult Skeletal Remains.

11:00 **Anna Willis & M Oxenham.** The Neolithic Demographic Transition and Oral Health: A Case Study from Japan.

11:15 **Rebecca Griffin et al.** Amino Acid Racemization: An Investigation of its Application to Age-at-Death Estimation of Archaeological Remains.

11:30 **Nancy Tayles et al.** Prehistoric Polynesians: Recent Research on Human Burials in Rima Rau Cave, Atiu, Southern Cook Islands.

11:45-1:00 Lunch

1:00- 2:15 Podium Session 6: Comparative Biology, Education and Physiology

Session Chair: Sarah Croker, The University of Sydney

1:00 **Jazmin Hawes et al.** Prenatal Vitamin D Deficiency and its Implications for Fetal Neurodevelopment.

1:15 **Hazel Richards et al.** Investigating the Relationships between Sexual Dimorphism, Body Size and Mating System in *Macropodidae*.

1:30 **Michael Crowley.** The Effect of Texting on Driver Reaction Time and its Implications on Stopping Distance.

1:45 **Jennifer Donovan.** How children learn about DNA in our Changing World: Is it really *CSI*?

2:00 **Georgia Roberts.** Teaching Juvenile Osteology in Tertiary Institutions – A Review.

2:15-2:45 Afternoon Tea

Podium Session 6 resumes.

2:45 **Phillip Roberts.** Pathological Progression of Syphilis: A study of Cases with Multiple Admissions to Victorian Hospitals in the Nineteenth Century.

3:00 **Vern Weitzel.** Agent Orange and International Development.

3:15 Farewell and Student Award Presentations

Abstracts

Ancient DNA from human oral microbiota records dietary impacts of the farming and Industrial eras.

Adler C.¹, Dobney K.², Weyrich L.³, Kaidonis J.³, Walker A.⁴, Haak W.³, Bradshaw C.³, Townsend G.³, Sołtysiak A.⁵, Alt K.⁶, Parkhill J.⁴, and Cooper A.³

1. University of Sydney, 2. University of Aberdeen, 3. University of Adelaide, 4. Sanger Institute, 5. University of Warsaw, 6. University of Mainz

The importance of commensal microbes for human health is increasingly recognized, yet the impacts of evolutionary changes in human diet and culture on commensal microbiota remain almost unknown. Two of the greatest dietary shifts in human evolution involved the adoption of carbohydrate-rich Neolithic (farming) diets (beginning ~10,000 years before the present) and the more recent advent of industrially processed flour and sugar (in ~1850). Here, we show that calcified dental plaque (dental calculus) on ancient teeth preserves a detailed genetic record throughout this period. Data from 34 early European skeletons indicate that the transition from hunter-gatherer to farming shifted the oral microbial community to a disease-associated configuration. The composition of oral microbiota remained unexpectedly constant between Neolithic and medieval times, after which (the now ubiquitous) cariogenic bacteria became dominant, apparently during the Industrial Revolution. Modern oral microbiotic ecosystems are markedly less diverse than historic populations, which might be contributing to chronic oral (and other) disease in postindustrial lifestyles.

Making sense of the Maba Man.

Apthorp, K.¹

1. The Australian National University

The Asian hominin fossil record from the Middle Pleistocene has long been an area of debate amongst palaeoanthropologists. In particular, China, with its large number of hominin fossils displaying a mosaic of primitive and more developed features, has functioned as the battle ground for debates on 'replacement' versus 'regional' evolution, and the ongoing taxonomic inflation debate between splitters and lumpers. As a result, these 'intermediate' looking specimens have traditionally been grouped together by common features as archaic *Homo sapiens*, or more recently, *Homo heidelbergensis*. Within this group the Maba Man, a partial hominin cranium discovered in Southeast China in 1958, stands out as a fossil of particular interest due to a number of morphological features unique amongst the Chinese Middle Pleistocene fossils. Throughout the limited existing literature focussed on Maba, these features have been described as more commonly found amongst *Homo neanderthalensis*, and light of the recent extension of the geographical range of Neanderthals eastwards to Okladnikov Cave in Siberia, Teshik-Tash in Uzbekistan, and possibly even into Mongolia with the discovery of Salkhit fossil, a reassessment of the affinities of Maba is necessary. This project re-examines the morphology of Maba, and statistically compares cranial measurements from Maba and selected Chinese and Neanderthal specimens to determine the best species grouping for Maba. Analysis of the Maba fossil may indicate a need to rethink the dispersal and interaction of Homo groups in China during the Middle Pleistocene.

Population Status of the Cat Ba Langur (*Trachypithecus poliocephalus*)

Behie A.¹, Lees C.², Passaro R.³, Bach L.T.⁴, Dung L.V.⁵, Hendershott R.¹, Raffel M.⁶, and Rawson B.M.^{7,8}

1. The Australian National University; 2. IUCN SSC Conservation Breeding Specialist Group; 3. Cat Ba Langur Conservation Project; 4. Institute of Ecology and Work Protection; 5. Institute of Ecology and Biological Resources; 6. Allwetterzoo Münster; 7. IUCN SSC Primate Specialist Group; 8. Fauna & Flora International

The Cat Ba langur (*Trachypithecus poliocephalus*) has been consistently listed as one of the World's top 25 most endangered primates. Population assessments for the taxon have been limited in recent years and as such, information about population response to conservation interventions has been difficult to quantify. In June and July 2013 we conducted a population survey to determine the size and structure of the only remaining breeding populations of this species to provide a baseline against which future population monitoring can be assessed. There are currently only two breeding populations in existence: the sanctuary population and the Cua Dong population. The sanctuary population consists of 25 individuals, separated into four social groups and 2 solitary males. Groups were all unimale and ranged in size from 1 - 14 animals. The Cua Dong population consists of 22 individuals in 4 social groups (also all unimale) ranging in size from 2 to 10 individuals, including a 3 male bachelor group. In both populations the sex ratio is skewed with adult male to adult female ratios of 1:2 in the sanctuary and 1:1.4 in Cua Dong. Both populations also include more infants than juveniles, suggesting possibly high infant mortality. Using these results we conducted vortex analyses to determine population viability of each breeding population under different conservation planning scenarios including genetic supplementation through the translocation of individuals from isolated areas on the island.

Hybrid Morphology in South East Asian Primates, and Detecting Hybrids in Human Evolution

Boel C.¹, and Curnoe D.¹

1. University of New South Wales

With the advancement of genetic research techniques and the sequencing of archaic hominid genomes, the possibility of hybridization in human evolution is once again under consideration. However, limitations on the techniques and the limited availability of fossils mean that genetic research can't be our only avenue of investigation. The application of a complimentary morphological approach has often proven to be problematic. Despite a number of claims being made over decades of research, there are no widely accepted examples of hybridization in the human fossil record. Generally citing unusual combinations of modern and archaic features, claims are difficult to test - and the fact is that we have very little idea of what a hybrid in the human lineage would actually look like. Using 3D morphometrics and select non-metric characters, this study investigates the manifestation of hybridization in primate populations in South East Asia as an analogue for human evolution. Early work focuses on Chinese *Macaca*, which are well documented in range, morphology and genetics, and have indications of supraspecific gene flow over an extended period of evolutionary time. The preliminary results are compared to research of similar intent conducted on African primates, and the implications for the possibility of identifying hybrids in human evolution are considered.

Maturation and Ageing in the Adult Female Face

Brooker P.¹, and Milne N.¹

1. The University of Western Australia

This study investigated the signs and patterns of female facial ageing. 46 landmarks were digitised on 3D photographs of 142 Caucasian female faces (between 20 and 85 years), and the landmark data were analysed using geometric morphometrics. The analysis showed that the female face exhibits age-specific shape variation, and follows a distinct pattern of ageing across the lifecycle. Geometric morphometrics could detect significant changes between face shapes in different decades of life, but these changes were more subtle in the 20s, 30s and 40s. Further examination of the shape variation within the pre- and post-menopausal groups demonstrates that there is a different ageing trajectory in the two groups; pre-menopause the changes are more gradual, post-menopause they are rapid changes. More specifically, different changes are observed between the two groups, and these changes are happening at different rates. Changes unique to the pre-menopause group were thinning lips (mostly observed in the lower lip) and increased height of the philtrum, giving the appearance that the mouth moves down with advancing age. In addition, the earlobes grew longer, the nose widened at the superior alare, and the face increased in width at the level of the tragi. Changes unique to the post-menopause group were increased upper face height and reduced mandibular ramus heights, reduction in the area of the eyes, and concavity of the midcheeks. Additionally, the nose increased in length, height and width at the alar. Based on these findings, it is apparent that ageing is not linear, rather profound ageing changes occur after menopause. Geometric morphometric analysis is effective in discerning age-related changes in size, shape and position of facial features, but it cannot detect texture changes in the skin, such as wrinkles and folds.

Analysis of Crania from the Prehistoric Cemetery of Melolo, Sumba, Indonesia

Bulbeck, F.D.¹

1. The Australian National University

Excavations at Melolo on Sumba, eastern Indonesia, have produced one of the largest known prehistoric assemblages of crania in Island Southeast Asia. The age of the burials is unknown but is suspected to date to the first millennium CE. Craniometric analysis identifies affinities with crania from western Africa (Dogon), Northeast Asia and Polynesia (especially Hawaii). The Polynesian affinity is intriguing but its significance is challenged by the other affinities for Melolo crania with two locales, Africa and Northeast Asia, whose inhabitants would not be expected to be closely related to late prehistoric Sumbanese. What may be of more relevance is that the Melolo craniometric affinities depart strongly from recent eastern Indonesian craniometric affinities, which lie with Southwest Pacific and Southeast Asian groups (notably Tasmanians, Filipinos and New Britain Tolai). This finding suggests that eastern Indonesia's current status as a sharp transition zone between inhabitants of "southern Mongoloid" and "Melanesian" appearance may be a late phenomenon produced by population incursion from the islands to both the west and the east. An incursion from the west is reflected by eastern Indonesia's standing as the easternmost limit of traditional metallurgy, rice agriculture and the use of Malay as a lingua franca, while an incursion from the east is indicated by the dispersal of "Papuan" languages across eastern Indonesia as far west as Sumbawa.

Old and Older: Extending the age at death of an Anglo-Saxon cemetery populationCave C.¹, and Oxenham M.¹

1. The Australian National University

Although historical studies tell us that many people lived to a 'ripe old age' in the past, skeletal studies struggle to confirm this; consequently misconceptions about the age of death of people in antiquity abound. This is largely because skeletal methods to age adults are based on degeneration which, individuals due to differences in genetics, lifestyle and health etc, is widely variable; it is also affected by taphonomic processes. Therefore, the oldest age category of a cemetery populations is often as low as '45+' or even '40+'. Recently, a method for extending the age at death in a cemetery population was trialled using data from the Anglo-Saxon cemetery at Worthy Park, Kingsworthy, Hampshire (Cave & Oxenham, forthcoming). This poster will test this method on another Anglo-Saxon population, that of Mill Hill, Deal, Kent. The methodological approach is based on the principle that occlusal tooth wear is significantly correlated with age and that a sampled population can be seriated from youngest to oldest based on degree of tooth wear. Using Scott's dental scoring technique, the molars of 56 (out of 84) individuals from Mill Hill were scored, then ranked in use-wear order. Where an individual lacked a particular molar, a regression function was developed to estimate the missing value. A suitable population profile (from a population of known age at death) was developed as a model for the Mill Hill sample and individuals were allocated to more specific age categories through the dental seriation, thus extending the age at death for the cemetery.

The Effect of Texting on Driver Reaction Time and its Implications on Stopping DistanceCrowley, M.¹

1. Canning College, Western Australia

Texting while driving has become a central topic for parliamentary debate both locally and internationally. However, there remains an austere lack of research into just how this may impede on the reaction time of a driver; as noted by Cooper et al. (2011, p. 5), perhaps the principal reason for this is the difficulty to conduct a truly reflective investigation of on-road texting and driving, without endangering the participants and others on the road. To address the need for evidential support a simulator was designed to test driver reaction time. Ten participants took part in the simulation. The time to respond to stop signals with and without texting was determined. The mean time without texting was 1.112 seconds; the mean time whilst texting was 2.523 seconds. These times were significantly different at a critical value (T-crit) of 0.05. These results and the design of the equipment used have promising application for improving our understanding of texting whilst driving and may be useful for future public policy discussion. The simulators may be relatively cheaply constructed and could be used in schools as part of public driver education.

Osteoarthritis in Prehistoric Ban Non Wat, Thailand: 2000 Years of StasisDomett K.M.¹, Evans C.¹, Tayles N.², and Chang, N.¹

1. James Cook University; 2. University of Otago

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.

A Review of Anthropological Casework Involving Non-Human Bones in an Australian Forensic Setting

Donlon D.¹, and Croker S.L.¹

1. University of Sydney

It is commonly understood that the distinction between human and non-human bones is an important initial stage in a forensic investigation involving skeletal remains, as it determines the subsequent treatment of the scene. It is also apparent that the identification of bones can be difficult depending on the condition of the remains and the skill and experience of the operator. Significant time and resources by both police and anthropologists are spent to identify and manage such bones. A frequently quoted statistic is that approximately one-third of bones forwarded to morgues for expert identification are non-human in origin. However, an analysis of cases presented to the NSW Department of Forensic Medicine in Sydney shows that the percentage of non-human bones mistaken for human bones is now over 60%. This study looks at the types and numbers of non-human bones that are mistaken for human bones, and in what circumstances. Possible reasons for the higher percentage of such cases at the NSW Department of Forensic Medicine compared with other institutions are explored. Suggestions are made for a way to help resolve this common problem. Data presented in this study may prove useful in supporting expert witness testimony and generating future research models.

How children learn about DNA in our Changing World: Is it really CSI?

Donovan J.¹

1. University of Southern Queensland

The world has changed since Piaget's studies indicated that children transition from concrete to abstract thinking at age 14, yet this paradigm still dominates Australian curriculum, delaying concepts such as atoms, DNA, and genes until Years 9 and 10. Today's children live in a world saturated by the mass media, seemingly exposed to complex concepts at much earlier ages, but surprisingly little research has probed the influence of the mass media on children's conceptual understandings. Mass media research has focused on opinions, beliefs, and behaviours in areas such as body image, self-esteem, risk-taking, and violence. Prior research established that children from Year 5 are developing ideas about genetics that ASHB members "blamed" on *CSI*. This paper reports on mixed modes doctoral research that entailed surveying 141 children aged 10-12 years in rural and remote Australia to ascertain their usage of the mass media. In-depth interviews conducted with 62 of these children probed their understandings of genes and DNA, and the possible sources of those understandings. Children viewed an average of 800 hours of TV each year and 80% cited TV as a source of their information about genes and DNA. Over a quarter of the interviewees have done their own research into these topics, but half of the children believed that DNA is only in the blood, skin, hair, fingerprints, and saliva. Is *CSI* friend or foe? These findings have garnered significant public attention and calls for more and better science to be taught in primary schools.

Do Growth-Promoting Early Environments Contribute to Proportional Changes in Shoulder Breadth?Floyd, B.¹

1. University of Auckland

This study investigates the extent to which improvements in developmental environments may influence shoulder breadths. As environments become more growth-promoting, increases in leg lengths contribute disproportionately to changes in stature. Here I evaluate whether shoulder breadths tend to be greater among offspring who show greater increases in lower leg lengths relative to their parents. I also evaluate whether shoulder breadths are influenced to a greater extent than sitting heights. Judging the extent of such developmental allometry is an important, if indirect, step in assessing the potential for reductions in endemic diseases to account for greater body sizes and breadths found in Polynesia as compared to probable source populations. Results of regression analyses of data from 107 Taiwanese parents and offspring indicate that offspring with longer lower legs than their parents tend to have broader shoulders than their peers ($\beta = -0.216 \pm 0.093$ SE; $T_{106} = -2.327$; $p = 0.022$). When individuals' sitting heights were included, however, the relationship was weakened ($\beta = -0.148 \pm 0.089$ SE; $T_{106} = -1.653$; $p = 0.101$). Further evaluation reveals that while improvements in developmental settings do tend to result in much taller offspring, with longer legs and modestly greater shoulder breadths, similar increases in sitting height also occur so that the ratio between shoulder breadth and sitting height tends to decrease slightly. These outcomes suggest indirectly that the relatively broad bodies of Polynesians are not likely to be the result of improvements in developmental environments related to loss of endemic parasites, like malaria.

Amino Acid Racemization: An Investigation of its Application to Age-at-Death Estimation of Archaeological RemainsGriffin R.¹, Moody H.², and Collins, M.³

1. University of Sydney; 2. University of Edinburgh; 3. University of York

In both archaeological and forensic research, determining the age-at-death of human skeletal remains is of great importance. However, current morphological and histological techniques often produce very broad age ranges and show bias in age estimation of young and old adults. As a result, there is a real need for the development of new techniques, which could potentially improve the accuracy of age estimation. In this paper, we present the results of testing of a potential new age estimation method, known as amino acid racemization. Because amino acid racemization is a chemical process, it should occur at the same rate in all individuals, and hence provide more accurate age estimates than is currently possible using morphological age indicators. Amino acid racemization in tooth dentine has proven very successful in age estimation of forensic remains, but has had limited success in estimating age for archaeological populations due to the degradation of dentine over long periods post-mortem. The method presented here aims to avoid the problems encountered by previous researchers by analysing dental enamel, which is believed to be better preserved in the burial environment. While the method can accurately estimate age in living individuals, its performance on archaeological remains differs between populations. This paper will explore possible explanations for the varying performance of the method and their implications for the use of enamel in biomolecular archaeology.

Prenatal Vitamin D Deficiency and its implications for Fetal NeurodevelopmentHawes J.¹, Tesic D.¹, Zosky G.², Smith J.¹, Mark P.¹, Wyrwoll C.¹

1. University of Western Australia; 2. Telethon Institute for Child Health Research

In utero environmental cues cause adaptations to the physiological and structural phenotype of the fetus, impacting on the ability of an individual to adjust to alterations in the post-natal environment. Adverse maternal environmental factors have been found to increase the risk of adult-onset diseases. Vitamin D is a steroid hormone which plays a role in neuronal differentiation and proliferation. It is estimated that 30-50% of Australian women have insufficient vitamin D levels. Rats subjected to vitamin D deficiency throughout gestation had pups with altered brain morphology and neurotrophins that developed altered behaviour in adulthood, however there is a species and even strain specific response to prenatal vitamin D deficiency. Balb/c mice were placed on either a deficient (0 IU/kg) or control (2,195 IU/kg) diet for 5 weeks before being mated with a control male and were maintained on the diet until the mothers were sacrificed on embryonic day (E) 14.5 or E17.5. Levels of Bdnf, a neurotrophin important in learning and memory and neuronal migration, was significantly decreased in deficient pups ($p < 0.001$). Deficient pups also had down-regulated levels of Cntnap2 ($p < 0.01$), another gene implicated in neuronal migration. Foxp2, a transcription factor and a gene implicated in neuronal differentiation, was significantly decreased at E14.5 and significantly increased at E17.5 in vitamin D deficient pups compared to controls. Vitamin D deficiency decreased whole brain tyrosine hydroxylase, a dopaminergic precursor ($p < 0.01$). These data show vitamin D status can have significant effects on developing fetal brains.

Oral-Genital Behaviours among Tibetan Macaques (*Macaca thibetana*)Hendershott R.L.¹

1. The Australian National University

Socio-sexual behaviour among primates may be instigated by a number of contexts and may serve to decrease group tension in stressful situations. It may also assist in the formation of bonds to assist with male movement up the hierarchy. This study addresses the oral-genital socio-sexual behaviours used by Tibetan macaques (*Macaca thibetana*) at a provisioned site in Anhui Province, China. Behaviours (bridging, genital-licking, mutual genital-licking, three-way genital-licking) are broken down by age-sex class, potentially arousing contexts (such as tourist or food presence), rank of initiator, and kinship in bridging dyads. Seventy-nine hours and 22 minutes were spent observing a group of three adult males, nine adult females, and 22 non-adults. There were 237 bridges, 146 genital-licks, 37 mutual genital-licks and 15 three-way genital-licks observed. Behaviours were heavily dependent upon the age-sex class of the participants. While bridges were most common among adult dyads of the same sex, all other behaviours were more common among non-adults. Food presence had no detectable effect while tourists decreased the likelihood of genital licking and bridging, suggesting the behaviours are not being used to mitigate group tension. In adult dyads, there was an effect of both rank and kinship among females, which was absent among males. Dominant females initiate bridges, usually with their kin. This study adds to the growing knowledge of socio-sexuality in Tibetan macaques.

A New Approach to More Accurately Reconstruct the Medullary Cavity in Cross-Sectional Geometric Analyses

Huffer D.¹, and Perri G.²

1. University of Sydney; 2. The Australian National University

Long bone cross-sectional geometry analysis has by now become a well-established subfield of human bioarchaeological science, with new work continuously being published and applications ranging from reconstructing ancient and historic subsistence patterns and mobility patterns, growth and development across the lifespan, to understanding the biomechanics of bipedalism and quadrupedalism in fossil hominins and extant primates. A number of methods have been developed to collect such data, each with their own positive and negative attributes. While the use of CT (computed tomography) scanned sections is usually considered the most accurate method to obtain cross-sectional properties, considerable financial expense and logistics continue to make the taking of CT Scans of several sections for numerous individuals prohibitive, however the inclusion of periosteal and endosteal contours (and properties) can provide the most relevant data for purposes of bioarchaeological analysis. This paper describes a new method for obtaining cross-sectional properties from digital reconstructions created using periosteal latex casts, cortical thickness measurements at cross-section, and transfiguration formulae suited to any image processing software. Femoral and tibial cross-sections from the Iron Age Italian assemblage of Alfadena (*c.* 2600-2400BP) were used to test this method, with results demonstrating a 99% equivalency between original CT scans and reconstructions using the new method.

A Longitudinal Study of Child Growth in Transitioning Rural Timor Leste

Judge, D.¹, Sanders K.¹, Reghupathy N., Skarin D., and Schmitt L.¹

1. University of Western Australia

Approximately 58% of children in Timor are stunted, 19% wasted, and 45% underweight (TLDHS, 2010). This longitudinal study of rural Timor Leste families assesses the impacts of individual characteristics (age and sex), family structure, and residential location on children's size for age. Herein, we focus on the results of measures between 2009 and 2012 in mountainous Ossu, rural East Timor. Household interviews and measures of weight, height, upper arm circumference and BMI were recorded for 485 children in 113 households. Repeat measures are available for 337 children. Growth measures were standardized for age and sex using the World Health Organization standards. Overall growth measures are low compared to international standards but similar to health census data for Timor Leste as a whole. Aspects of family structure associated with child growth were child's age, number of adults in the household and fostering status of the household. Older children's standardized scores for BMI, weight and mid-upper arm circumference (MUAC) were significantly lower than those of children aged 2 years and under; the effect on BMI was more dramatic for male children. Increasing numbers of adults in the household positively influenced BMI amongst infants and teenagers. Both fostered and biological children living in fostering households had better growth than children in non-fostering households; particularly for infants and male children. Weight measures reflect short-term deprivations associated with the rainy season and are exacerbated by poor agricultural production.

The Limitations of the Social Brain Hypothesis as a Theory of Primate Cognitive Evolution

King A.¹

1. The Australian National University

The social brain hypothesis (SBH) is arguably the most influential explanation for the evolution of primate cognition. In essence, the SBH claims that the demands of group living (social complexity) have selected for increased brain size in primates. In this paper, I demonstrate that as a theory of primate cognitive evolution, the SBH is limited in scope and that it is necessary to place the SBH into a broader theoretical framework to truly understand how and why primate cognition evolved. Principally, I argue that this framework should: 1) view cognition as embodied and consider how cognitive evolution has not been restricted to the neocortex; 2) appreciate that developmental processes may be just as important as selective pressures in explaining cognitive evolution; and 3) recognise that specific benefit hypotheses (such as the SBH) need to be reconciled with the increasingly accepted notion of primate 'general intelligence'.

Interpreting Violence in the Early Bronze Age of Mongolia

Littleton J.¹, Frohlich B.², and Amgalantugs T.³

1. University of Auckland; 2. Smithsonian Institution; 3. Mongolian Institute of Archaeology

The early Bronze Age of Mongolia saw the establishment of pastoral modes of subsistence. We have explored this through the analysis of human remains and burial practices from khirigsuurs (burial mounds) in the Khovsgol and Khovd regions (northern and western Mongolia). One significant find, however, has been indications of interpersonal peri- and postmortem violence. In this paper we describe the evidence of trauma on four individuals and then explore two alternative explanations: one that the violence is associated with systematic raiding which is often observed among pastoral societies or two, that the violence is the consequence of systematic punishment and the maintenance of social cohesion. We assess these alternatives through analysis of the pattern of injuries as well as the archaeological record.

Forensic Case Study: Unusual skeletal age variation within an individual in Queensland

MacGregor D.M.^{1,2}, and Murry K.P.²

1. Queensland University of Technology; 2. Queensland Police Service

On the 1st of July 2007, police scientific officers attended bushland within an industrial area approximately 18 kilometres South - West of Brisbane in response to the location of human remains. The human remains were completely skeletonised and associated with items of clothing as well as flyscreen spline containing cervical vertebrae looped around a tree. Paperwork within an item of clothing which had been deteriorated due to the decomposition process provided crucial information which aided with the identification of the deceased. On the 3rd of July 2007, a forensic anthropologist from the police attended the Queensland Health & Scientific Services morgue to assist with the post-mortem of the skeletal remains. The biological profile of this individual was established however the age range was difficult to limit using traditional aging techniques. The individual's profile was consistent with a male, Aboriginal, approx 175-185cm, and age between 25-60 years at death. Extensive pathology was observed within the sternum and manubrium indicating previous thoracic surgery. The presentation will address the unusual skeletal variations observed in this individual.

Encephalization in Evolving African Hominids during the Pleistocene Epoch: Energy and Fatty Acid Considerations

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The Pleistocene is the geological epoch which lasted from about 2,588,000 to 11,700 years ago, spanning the world's recent period of repeated glaciations. The severe climatic changes during these ice ages had major impacts on the fauna and flora, impacting living space and food resources available to existing African primates. However this time period also correlates with fossil evidence of expanding ranges of certain primates, bipedalism, encephalization and stone tool use for animal butchering, initially scavenged and later hunted and a general dietary shift which included both increased energy density of the diet and availability of uniquely animal food fatty acids involved in brain cell formation arachidonic acid (AA, 20:4n-6) and docosahexaenoic acid (DHA, 22:6n-3). There is debate regarding the precise animal foods involved, either freshwater fish and shellfish at a land-water interface, or given the energy density of bone marrow and AA and DHA availability in brain and organ tissue form herbivorous animals available on the African savannah an inland scenario is possible. Fatty acid (AA and DHA) and energy density were identified for African fresh water fish and muscle, liver, subcutaneous fat, bone marrow and brain tissues in wild, African ruminants. Based on 100g edible samples, energy content of African fresh water fish was 119 kcal compared with 126 kcal, 488 kcal and 745 kcal respectively for brain, bone marrow and subcutaneous fat of African ruminant animals respectively. The AA content of fish was 270 mg compared with 533, 0 and 20 mg in the ruminant animals. The DHA content of fish was 549 mg compared with 861, 0 and 0 mg in the ruminant animals. Ruminant brain, bone marrow and subcutaneous fat all provide higher levels of energy than equivalent quantities of fish. Also AA and DHA content of ruminant brain tissue is approximately double that of fish. Given the range and quantity of ruminant game on the African savannah during the Pleistocene (even if scavenged and not hunted), the availability of energy and fatty acids essential for hominin brain development were more abundant than in fish.

A Trial Method for Assessing Root Transparency and its Potential Use in Assigning Relative Age at Death to Mature Adult Skeletal Remains

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1. The University of Auckland

Determining age at death in human skeletal remains can be especially problematic in mature adults. Standard scoring systems tend to have broad over-lapping age ranges past 50 years of age, with auricular surface scores (ASS) being the only exception. Due to the error associated with older adult age estimations, these individuals are often recorded simply as >45. An alternative suggestion is to assign an age order to this group rather than risk unreliable age estimations. Whilst AU scores offer one method for assigning order, the inclusion of additional age scores based on root dentine transparency (RDT) may help to minimize potential error associated with only one source. RDT age estimates have been successfully applied to older individuals, however studies differ as to its reliability as a stand alone method. One possible reason for the variable error rates could be a lack of clear operational definitions associated with RDT measurements. This study developed a new method for recording RDT on intact teeth using deciles to measure transparent dentine on digital images. Possible sources of error are also investigated in order to produce a set of clear operational definitions. A sample of 47 adults from two London cemeteries (1700 to 1850) were aged using RDT and ASS and results compared. A strong correlation ($r \sim 0.70$, $p = 0.00$) was shown, although the RDT scores tend to be older than the ASS. These results allowed a relative age at death order to be constructed while also detecting individuals whose age assessments may be particularly doubtful.

The Influence of a Drinking Formula on Thermal Strains and Hydration in a Hot Working Environment

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1. University of Western Australia

The maintenance of adequate hydration in workers exposed to hot working environments is an ongoing health and welfare concern. Strenuous labour in a hot environment escalates sweat losses resulting in substantial electrolyte losses that cannot be replaced by water alone. The study examined the efficacy of a new carbohydrate-electrolyte fluid, Thorzt, and water on hydration status and thermal strain in an outdoor work environment. Six male workers at a mine site consumed 4 different drinking protocols (Thorzt ad libitum, water ad libitum, Thorzt in fixed amounts, and water in fixed amounts) on four 12-hour testing days immediately before, during, and after their shift. Body mass, maximal voluntary contraction, reaction time, heart rate, respiration rate, core temperature, skin temperature, perception of thirst and exertion, urine colour, urine osmolality, urine specific gravity, blood glucose concentration, haemoglobin, and blood pressure were measured. There was no evidence that Thorzt improved hydration status or alleviated thermal strain. Whether that conclusion would be obtained in hotter conditions is not known at this stage. Nonetheless, the higher blood glucose concentration on Thorzt has the potential to enhance worker's capacity, task completion rate, increasing the time to exhaustion, and reducing the risk of hypoglycaemia. Thorzt also offers the ability to improve an individual's reaction to a stimulus, which is highly beneficial in a hazardous work setting. The findings of this study suggest Thorzt is as effective as water in the maintenance of cardiovascular function and hydration when ambient temperature does not exceed 31°C if fluid intakes and fluid losses are comparable.

Experimental Taphonomy near Belanglo State Forest and the Implications for Time-Since-Death Assessment Methods

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1. University of Sydney

Experimental taphonomic studies are of increasing interest to forensic scientists. It has always been difficult to measure the effects of environmental factors on deteriorating skeletal material in a way that can be translated into a practical application, such as the assessment of time-since-death for human skeletal remains. Taphonomic studies allow empirical evidence concerning weathering and the effects of environmental impacts to be collected. The primary aim of this experimental study is to record macroscopically visible changes to bones as they weather and to compare these changes between species. This is to assess the viability of using non-human bone as a proxy for human in forensic research. Skeletal elements from humans, kangaroos and pigs have been placed on the ground surface in an Australian bush environment near Belanglo State forest. The location chosen means that results can also be tested against genuine forensic cases. Changes recorded thus far have tended to highlight differences in deterioration processes, not only between species, but also between elements. In particular, differences were noticed in weight loss rates in the larger elements such as femora and tibiae. Greasiness and mycological activity were also noticeably variable between species. These aspects are of significance in terms of forensic research, particularly as non-human bones are often viewed as suitable proxies for human bone in this field. The results from this study, as it progresses, will enhance our current understanding of taphonomic processes for the region and should enable the advancement of forensic practice in relation to time-since-death assessment methods.

Sleeping Tree Selection by Northern Yellow-cheeked Crested Gibbons (*Nomascus annamensis*) in Cambodia Nelson B.¹, Behie A.¹, Frechette J.², and Rawson B.³

1. The Australian National University; 2. The University of Florida; 3. IUCN SSC Primate Specialist Group; 4. Fauna & Flora International

This study examines tree use and sleeping related-behaviour of Northern yellow-cheeked crested gibbons (*Nomascus annamensis*) in northeastern Cambodia. This study identifies the characteristics of sleeping and calling trees selected by the gibbons and tests four hypotheses related to sleeping tree selection (predation avoidance, thermoregulation, food access, and territory defence) adding to a long-term ecological study. The location of sleeping and calling trees were recorded along with measurements of tree characteristics including height, DBH, height of the lowest branch, canopy volume, and liana coverage. This resulted in a sample size of 50 sleeping trees and 171 calling trees in which 38 and 69 were measured, respectively. The gibbons selected 11 tree species for sleeping and 17 species for calling. They most frequently slept in (58%) and called from (64%) the same three tree species (*Dipterocarpus costata*, *Shorea thorelii*, *Anisoptera costata*). The gibbons selected tall, often emergent, sleeping and calling trees that were significantly taller and larger than control trees. The majority of sleeping trees (53%) had lianas present. The results of this study support the predation avoidance hypothesis as the primary evolutionary influence on sleeping tree selection by *N. annamensis*. This study also confirms the high degree of selectivity in gibbon sleeping and calling tree preference and highlights the need for tall trees of these particular species in *N. annamensis* habitat. These findings begin to fill the gap in knowledge on this newly described species and provide guidance for conservation and targeted forestry management to reduce the impacts of (illegal) logging.

Con Co Ngua, a 5,500-6,000 BP Cemetery in Northern Vietnam: Preliminary Observations

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1. The Australian National University

Con Co Ngua is a water logged cemetery and midden site situated in a low lying valley, 3 km from the Ma River and some 30km from the current coastline in Thanh Hoa province, Northern Vietnam. It was first excavated in 1979-1980 by the Institute of Archaeology, Hanoi revealing approximately 100 burials and a wealth of lithics, coarse pottery and animal remains. Unfortunately limited excavation records were kept thus limiting our understanding of the stratigraphy, dating and distribution of burials in the site. A 2011 test excavation proved the viability of returning to Con Co Ngua, and in 2013 I led a 2 month excavation of a 12 x 7m trench that uncovered 146 human burials. In this presentation we discuss the context of this somewhat unique mid-Holocene hunter-gatherer cemetery as a prelude to some preliminary observations on the demographic composition of the cemetery, the spatial patterning of the burials, including orientation, and the deposition of the burials (with particular attention to the manner of internment using field anthropology approaches, and, finally, the apparent change in burial practices from the early phases through to final phase. We will also provide some tentative interpretations of these findings in the context of what is the oldest pre-Neolithic pottery using forager cemetery in Southeast Asia.

What Can Shape Analysis Tell Us about Evolution? A Study of Primate Crania

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1. The Australian National University

Using a small sample of extant primate cranial CT data (n=21), this study aims to examine what shape analysis of individual cranial bones can reveal about the evolution of the Primate Order. The genera used consist: *Pongo*, *Gorilla*, *Homo*, *Hylobates*, *Pan*, *Macaca* and *Colobus*. Using Geometric Morphometrics to examine shape changes in the frontal, occipital and temporal bones, these regions were then analyzed for phylogenetic signal using Unweighted Squared-Change Parsimony, examining if evolutionary forces played a role in the development of these cranial regions. The morphometric data were plotted onto the molecular-based tree and phylogenetic signal examined. A reasonably significant signal (p-value 0.02) to quite significant (p-value 0.01) was discovered for all bones with correlation occurring between size and phylogeny. This relationship suggests that there is a connection between evolutionary forces impacting on the size of the bone and correlation with the current molecular understandings of the taxa used. This preliminary study reveals that further analysis of these regions with higher landmark density and larger sample sizes is appropriate and will hopefully yield more informative results about evolutionary impact on primate cranial development.

Investigating the Relationships between Sexual Dimorphism, Body Size and Mating System in *Macropodidae*

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1. University of Western Australia

This study investigated sexual dimorphism in body size and limb proportions in relation to mating systems among the *Macropodidae*. Species were categorised into monogamous, polygynous or promiscuous mating systems based on existing literature. Linear measurements of crania and limb bones of over 1600 sexed museum specimens across 32 species were taken, and functional indices of the limbs were calculated. Cranial lengths were adjusted for age (molar index) using linear regression for each species, and means for each sex were taken. These means were highly correlated with published data on species' mass. Indices did not change with age, enabling calculation of male and female species means. Dimorphism within a species was represented by male-to-female ratios of mean cranial lengths and indices. Dimorphism in cranial length, tibioradial index and metatarso-radial ratio increased significantly across mating systems, with a weak trend observed in intermembral index also. This corresponds with increased frequency of male-male agonistic encounters in the more promiscuous systems, which is known to be a good indicator of levels of male competition in primates. As male macropodids use their upper limb as weapons during fights, to grapple, hit and push their opponents (Jarman 1989), the increased male competition in more promiscuous species could be driving an increase in sexual selection on these weapons. A longer forelimb may provide better reach, and an elongated radius could represent a longer distal segment adapted for increased speed (Howell 1965), all of which would afford advantage to a male in winning a fight.

Teaching Juvenile Osteology in Tertiary Institutions – A Review

Roberts G.L.¹

1. La Trobe University

While many tertiary institutions around the world currently teach human osteology courses, there are very few which are solely dedicated to juvenile/developmental osteology. This paper presents a review of how juvenile osteology is being taught in eight countries – Australia ($n=3$), New Zealand ($n=2$), Canada ($n=3$), the United States ($n=13$), the United Kingdom ($n=3$), Denmark ($n=1$), the Netherlands ($n=1$) and Lithuania ($n=1$). Data for twenty-seven institutions were collected through interviews, surveys and reviewing course descriptions. Responses were sought on the mode, content and length of the course, required prerequisites, target audience and the main factors inhibiting the expansion of teaching juvenile osteology. Results show that the majority of juvenile osteology is being taught a course component of adult osteology ($n=23$; 85%). Only three dedicated juvenile osteology courses are currently on offer, ranging in length from five days to 15 weeks. Course prerequisites were required in 63% ($n=17$) of cases, with the main target audience being undergraduate students ($n=16$; 59%). The majority of courses teach both dentition and osteology ($n=20$; 74%), with an average of two weeks devoted to the subject within general osteology courses. Of the respondents who commented, the primary factor identified as inhibiting future teaching was the lack of teaching collections ($n=8$; 53%).

Pathological Progression of Syphilis: A Study of Cases with Multiple Admissions to Victorian Hospitals in the Nineteenth Century

Roberts P.¹

1. The Australian National University

This is a presentation of four syphilis cases admitted multiple times to the Royal Melbourne Hospital from the 1850s to the 1870s. The four cases display a wide variety of pathological progression from the disease syphilis. The four individuals are:

- Elizabeth H's first admission describes her as a 15 year old from Scotland admitted for 'congenital syphilis'. By her final admission she has 'necrosis' of both legs and has lost her nose.
- Patrick W, first admission describes him as a 27 year old farmer from Ireland admitted for 'Rheumatism'. By his final admission he had admission descriptions of 'necrosis of the femur' and 'necrosis of the shoulder'. He died from 'Constitutional Syphilis Exhaustion'.
- Caroline K, first admission describes her as a 26 year old nurse admitted for a 'diseased tibia'. By her final admission she had received admission descriptions for 'hysteria', 'pleurodynia', 'debility', and head and chest pain. She was then transferred to the benevolent asylum.
- Edith A, first admission describes her as a 28 year old domestic servant from Kent admitted for 'fever'. By her final admission she had received admission descriptions for 'congestion of the brain', 'pneumonia' and 'febris and vomiting'.

More work is required before conclusions may be made regarding what these observations may add to the collective understanding of syphilis progression. However, the purpose of this presentation is to show the value of using the archives to study infectious disease progression in a way that would not be possible using modern data or through studying skeletal remains.

The Effects of a Hurricane on the Diet and Nutrient Intake of Howler Monkeys and its Impact on the Recovery of the Population

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1. The Australian National University; 2. University of Sydney

In 2001, Hurricane Iris caused widespread damage to the Monkey River forest, which is home to a well-studied population of black howler monkeys (*Alouatta pigra*), providing a unique opportunity to study various aspects of the monkeys' recovery. Post-hurricane, the howlers experienced three periods of population change: decline, stabilisation and recovery. For each of these periods the changes to diet and nutrition were investigated using nutritional geometry. The amount of time that the howlers spent consuming fruit was found to significantly increase over the three periods (3.44% to 39.20%) ($\chi^2=38.720$, $p<0.001$), while the amount of time spent feeding on new leaves significantly decreased over the three periods (55.13% to 15.97%) ($\chi^2=30.257$, $p<0.001$). The amount of time spent consuming mature leaves remained relatively stable over all three periods (approximately 33%) and made up a greater proportion of the diet than new leaves during the periods of population stabilisation and recovery. The proportion of protein that the howlers consumed decreased between the periods of decline and stabilisation (64.23% to 49.87%) and then increased slightly during the period of recovery (52.86%), while the proportion of carbohydrates increased (16.47% to 29.10%) and then decreased (27.93%). This suggests that carbohydrates were the limiting factor in population growth. When compared to other animals, the howlers had a diet that contained a much higher proportion of protein and a much lower proportion of carbohydrates than other primate species with similar diets and instead had a proportion of protein that was similar to cats, which are obligate carnivores.

How Ethnicity Gets Under the Skin

Spray J.S.¹

1. University of Auckland

The possibility of ethnic differences in stress responses was explored among 26 students in a year six class in a relatively affluent, ethnically diverse school in Auckland, New Zealand. The ways in which ethnicity may contribute to variation in HPA axis functioning has been a subject of recent anthropological and developmental research. Observed differences in stress hormones such as cortisol have been thought to reflect the embodiment of ethnic differences in experience; usually framed in terms of adversity or early contextual disadvantage for minority ethnic groups. Working from prior analyses that indicate these children's self-defined social relationships can influence cortisol variability, it was hypothesized that an individual's ethnic background might variably contribute to the nature of their social relationships, thus indirectly contributing to variation in stress responses. While ethnicity did not appear to influence either social group composition or cortisol patterns in a systematic way, ethnographic data suggest that ethnicity does subtly shape the way individuals experience the social life of the classroom. This implies that ethnic background can contribute to biological responses via their social relationships. The difficulties of using ethnicity as a meaningful system of classification, and the complexity of pathways through which ethnicity as perceived by self or others might contribute to variation in stress responses in this group are discussed.

Prehistoric Polynesians: Recent Research on Human Burials in Rima Rau Cave, Atiu, Southern Cook Islands

Tayles N.¹, Buckley H.R.¹, Clark A.¹

1. University of Otago

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.

The Geometric Morphometric Analysis of Sexual Dimorphism in the Gait Cycle

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1. University of Western Australia

Gait analysis has traditionally measured motion patterns using kinematic (joint angle change) analysis, however such methods have not been able to identify the more subtle differences in individual gait patterns. This study aimed to holistically examine the patterns of the change in the shape of the body during the gait cycle using geometric morphometric techniques. As a proof of concept for this new method, we attempted to identify sexual dimorphism in the gait cycle. Twenty-eight landmarks were placed on the torso and legs of 6 male and 8 female subjects, and the 3D coordinates of the landmarks were recorded in the gait laboratory in the School of Sports Science, Exercise and Health at the University of Western Australia. The gait cycle trials were adjusted to 61 frames representing the stance phase from heel strike to toe off, and the change in the shape of the body was analysed using adapted geometric morphometric techniques to produce gait signatures characteristic of each individual. The variation in the gait signatures were analysed with a further principal components analysis. These methods were able to detect significant sexual dimorphism even after the effects of sexual body shape and size differences were factored out.

Agent Orange and International Development

Weitzel V.¹

1. Australia Viet Nam Society

This paper is about an epidemic that was too important to eradicate. During the Second Indochina War, which ended in 1975, allied forces dispersed Dioxin contaminated herbicides over Viet Nam's jungle, igniting the worldwide controversy over 'Agent Orange' (AO). Forest loss from herbicides is documentable, but establishing a causal relationship between Dioxins and disease is problematic. Hence, more controversy. For three decades, Viet Nam demanded 'justice' while the United States denied responsibility. Diplomatic probes met mutual distrust. Hopeful initiatives repeatedly failed. Our ANU-sponsored electronic network collapsed under unaccustomed, angry chatter of advocates and denialists, veterans and bereaved families. NGOs avoided AO as 'too political'. In 2007, Charles Bailey of Ford Foundation (now Aspen Institute) tried a different approach, asking a Vietnamese eminent persons panel to negotiate with governments and donors privately. The panel launched an Action Plan in July, 2010 to upbeat publicity and a string of projects. This changed the dialogue. But the problem is large, funding is not assured, and feedback from intended beneficiaries is poor. An international literary genre has grown up around Agent Orange and its consequences worldwide. Almost lost in this deluge is the story of the effort to provide meaningful Development assistance to disabled people in Viet Nam. This story continues.

The Neolithic Demographic Transition and Oral Health: A Case Study from Japan

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1. The Australian National University

Recently, an alternative approach, using the Neolithic Demographic Transition (NDT) and Fertility models, to interpreting oral health patterns in prehistoric Southeast Asia has been posited. New oral health data from the Neolithic site of An Son, southern Vietnam and a reassessment of published data from other Neolithic, Bronze and Iron Age sites found a clear pattern of elevated rates for oral disease in the Neolithic followed by a marked improvement in oral health during the Bronze and Iron Ages. However, across, all time periods rates of carries and antemortem tooth loss were higher for females than for males in all samples. In light of the physiological predisposition of females (particularly when pregnant) to poorer oral health and the health predictions of the NDT model, the strength of using the two combined models provides a more parsimonious interpretation for oral health in Southeast Asia. This paper explores the potential of using the NDT and Fertility models in the interpretation of oral health in other areas of Northeast Asia. Specifically, we reassess the published data for carries from prehistoric Japan where a dietary-behaviour model has been used to interpret oral health. Our results suggest that using this alternative interpretive model works well. The discussion focuses on the implications of these findings, further elucidating our understanding of oral health and the adoption of agriculture in prehistoric Asia.