Australasian Society for Human Biology

33rd Annual Conference, 1st – 4th December 2019
Australian National University
Canberra, Australia

Human Biology: Evolving through Interdisciplinarity

Conference Programme and Abstracts

Australian National University

Sunday 1st December 2019	
6:00 – 8:00pm	**Welcome Drinks** – The Civic Pub, 8 Lonsdale Street, Braddon, ACT A drink and nibbles will be provided; additional drinks and food can be bought separately

Monday 2nd December 2019 – Sir Roland Wilson Building, 120 McCoy Circuit, ANU, Room 1.02	
8:15 – 8:45am	**Registration and Tea** Oral Presenters (all of today's speakers): upload presentations Poster Presenters: put poster on boards in first floor foyer
8:45 – 9:00am	**Welcome** Associate Professor A Behie
9:00 – 10:00am	**Keynote 1: Biological Anthropology for 2020 and Beyond: Achievements, Challenges and the Centrality of an Integrative Human Biology** Professor A Fuentes
10:00 – 10:20am	**Morning Tea**
10:20am – 12:20pm	**Session 1: Behavioural Response to Environmental Change** **Chairs:** Associate Professor D Judge and Ms K Cooke
10:20am	**Intra-Skeletal Remodelling and Behaviour in an Adult Male from Early Prehistoric Marshall Islands, Eastern Micronesia** JJ Miszkiewicz, L Matisoo-Smith, M Weisler
10:40am	**Using Cold-Induced Vasodilation (CIVD) Response Distributions of Asian Peoples as Indicators of Past Human Movement** B Floyd
11:00am	**The Influence of Olfactory Enrichment on the Behaviour of Two Captive New World Primates: Common Marmoset (*Callithrix jacchus*) and Black-Capped Capuchin (*Sapajus apella*)** *ZM Wowk, AM Behie
11:20am	**Revaluating Migration: Using $^{87}Sr/^{86}Sr$ Ratios to Explore Iron Age Thailand Mobility** *J Schalburg-Clayton, C King, H Buckley, S Halcrow, C Higham, L Shewan, C Stantis, D O'Reilly, K Domett
11:40am	**An Interdisciplinary Approach to Mapping Perinatal Exposure to Cyclone Related Stressors in Queensland, Australia – A Methodological Overview** *C Parayiwa, AM Behie
12:00pm	**Self-Domestication: Selection Against Physiological Masculinity in the Evolution of Human Sociability** *B Gleeson
12:20 – 1:20pm	**Lunch**
1:20 – 3:20pm	**Session 2: Diet and Behaviour** **Chairs:** Dr J Miszkiewicz and Mr C Birkmann-Little
1:20pm	**The Diet of the Cat Ba langur (*Trachypithecus poliocephalus*) on Cat Ba Island, Vietnam** *K Ruskin, AM Behie
1:40pm	**Diet, Exercise, and Body Composition in Three Solomon Islands Populations** G Kushnick, G Kenilorea, N Panda
2:00pm	**Climate Cooling, Population Displacement and Nutritional Stress in the Prehistoric Jomon Hunter-Gatherers of Japan** *M Vlok, H Matsumura, D Temple, H Ishijima, H Buckley
2:20pm	**Transitioning Human Diets in Greater Mtskheta, Georgia, Between the Late Bronze and Late**

**These are student presentations eligible for the* ASHB Student Prize.

	Antique Periods (1500 BC – AD 700) *N Langowski, CI Smith, VC Pilbrow
2:40pm	**Silent Settlers – Telling the Stories of Colonial New Zealanders Using Multi-Tissue Isotopic Analysis** CL King, P Petchey, R Kinaston, AR Millard, GM Nowell, DR Gröcke, P Roberts, J Zech, E Matisoo-Smith, H Buckley
3:00pm	**What Can Dental Caries Prevalence and Position Tell Us About Diet and Behaviour in Human Evolution?** I Towle, C Loch
3:20 – 3:40pm	**Afternoon Tea**
3:40 – 5:00pm	**Session 3: Mixed Species Interactions** **Chairs**: Dr B Floyd and Ms C Sumich
3:40pm	**The Impact of Tourist Presence on the Behaviour and Faecal Cortisol Levels of the Skywalker Hoolock Gibbon (*Hoolock tianxing*) in China** *J Williams, AM Behie
4:00pm	**The Hunting Pressure on Primates in Veun Sai-Siem Pang National Park, Cambodia** *SJ McGrath, AM Behie
4:20pm	**Brown Mouse Lemurs (*Microcebus rufus*) May Lack Opportunities to Learn About Predator Calls** AM Deppe
4:40pm	**Population and Habitat Assessment of Silvery Gibbons (*Hylobates moloch*) in Ujung Kulon National Park, Banten Province, Indonesia** N Malone, J Iskandar, R Partasasmita, B Iskandar, EN Rohmatullayaly, S Permana
5:00 – 6:30pm	**Session 4: Poster Reception** Presenters: please stand by your poster Nibbles and Drinks to be provided
	Detecting Bone Functional Adaptation in the Capitate of Extant Hominoids *E Bird, T Kivell, M Skinner
	Investigating the Relationship Between Osteon Variants and Remodelling Rates in Ancient Human Bone *KM Cooke, P Mahoney, JJ Miszkiewicz
	Childhood Health at Catanauan, Philippines: Employing New Methods to Identify Occurrence, Chronology and Duration of Linear Enamel Hypoplasia *I Crnkovic, R Crozier, V Paz, A Cares Henriquez, C McFadden, MF Oxenham
	What is a Riverine Diet? *S Karstens, H Allen, J Littleton
	Taphonomy and Burial at Roonka, Southeastern Australia J Littleton, S Middleton
	Temporal Consistency in the Human Response to Changing Stimuli: Bioarchaeological Considerations C McFadden, JJ Miszkiewicz
	A Comparison of Histomorphometric Relationships in the Anterior and Posterior Human Femoral Cortex *A Maggio, D Franklin
	Mortuary Ritual and Social Differentiation at Con Co Ngua, Northern Vietnam *B Muir, H Buckley, K Domett, A Willis, MF Oxenham

**These are student presentations eligible for the* ASHB Student Prize.

Studying the Absence: Endocasts and the Sylvian Fissure
*A Pearson, PD Polly, E Bruner

A New Approach to Estimating the Age-at-Death Distribution from Skeletal Remains
C McFadden, C Cave, M Oxenham

Where Are the Angkorian Dead? An Exploration Into the Mortuary Practices of the Angkorian Period
*M Stace

Preliminary Descriptions of Bone Histology in an Individual with a Possible Klippel-Feil Syndrome, Type III from Neolithic Northern Vietnam
*MM Walker, M Oxenham, TMH Nguyen, HH Trinh, J Miszkiewicz

Oral Health and Fertility from a Metal Period Site in Central Philippines
*BR Taylor, C McFadden, R Crozier, V Paz, MF Oxenham

**These are student presentations eligible for the* ASHB Student Prize.

Tuesday 3rd December 2019 - Sir Roland Wilson Building, 120 McCoy Circuit, ANU, Room 1.02	
8:15 – 8:40am	**Registration and Tea** Oral Presenters (all of today's speakers): upload presentations
8:40 – 9:40am	**Keynote 2: More Than Bones: The Multidisciplinary Investigation to Identify the Remains of Sergeant John Albert Collis, Royal Hamilton Light Infantry, Canadian Active Service Force** Dr S Lockyer
9:40 – 10:00am	**Morning Tea**
10:00am – 12:00pm	**Session 5: Skeletal and Historical Interpretations of the Past** **Chairs:** Dr R Hendershott and Ms Ashley McGarry
10:00am	**Pious Women, Reluctant Men? Some Cemetery Evidence on the Anglo-Saxon Conversion to Christianity?** C Cave
10:20am	**Does Skull Form Vary with Geography, Environment or Diet? Investigating Morphological Disparity in the Genus *Pan*** *A Pearson, K Ruskin, PD Polly
10:40am	**How Many Species Are Represented Among the *Australopithecus africanus* Mandibular Specimens From Sterkfontein and Makapansgat?** KL Balolia
11:00am	**The Impact of Ancestry and Behaviour on Bone Metabolism at Mán Bạc, Vietnam** *MM Walker, M Oxenham, TMH Nguyen, HH Trinh, JJ Miszkiewicz
11:20am	**Geometric Morphometric Analyses of Cranial Morphology in Capuchin Monkeys at the Genus and Species Level** *A Wulff, KL Balolia
11:40am	**Small-Pox Vaccine and the 1805 Attempted Settlement of Port Phillip Bay** P Roberts
12:00 – 12:40pm	**Lunch**
12:40 – 2:20pm	**Session 6: Forensic Anthropology** **Chairs:** Professor J Littleton and Ms J Williams
12:40pm	**Beyond the Laboratory: The Role of the Forensic Anthropologist in the Crime Scene** DM MacGregor
1:00pm	**Current Status of Research into the Estimation of Time Since Death in Human Bodies Found Decomposed** J Hayman, M Oxenham
1:20pm	**Investigating Burned Bone Using Portable X-Ray Fluorescence (pXRF) Spectrometry: Preliminary Results** *A McGarry
1:40pm	**Assessment of Ancestry in the Australasian Region Utilising the Postcranial Skeleton** *C Birkmann-Little, R Griffin, D Donlon
2:00pm	**Regression Analyses for Forensic Age Estimation Based on Quantification of Pubic Symphysis Metamorphosis in a Contemporary Malaysian Population** *S Hisham, N Abdullah, MHM Noor, D Franklin
2:20 – 2:40pm	**Afternoon Tea**
2:40 – 4:20pm	**Session 7: Methodological Advancement in Bioarchaeology** **Chairs:** Dr D Coall and Ms A Adams
2:40pm	**The Micro- and Molecular Analysis of Treponemal Disease**

**These are student presentations eligible for the* ASHB Student Prize.

	*KM Cooke
3:00pm	**"MicroPoly Sharp": Software Program for the Objective Analysis of Linear Enamel Hypoplasia (LEH)** *A Cares Henriquez
3:20pm	**Dental Anthropology and Medicine: An Overview of Methods and Application** M Edinborough, R Hardiman
3:40pm	**Detailed Study of An Ancient Egyptian Mummified Hand from the Department of Anatomy, University of Melbourne** *T Zhang, R Williams, R Glarin, G Mitchell, V Pilbrow
4:00pm	**Virtual Dissection and Volumetric Presentation of Egyptian Mummified Head Using 3D Open-Source Software, Drishti** *J Capodistrias, A Limaye, R Glarin, R Williams, V Pilbrow
4:30 – 5:30pm	**ASHB AGM**

**These are student presentations eligible for the* ASHB Student Prize.

Wednesday 4th December 2019 - Sir Roland Wilson Building, 120 McCoy Circuit, ANU, Room 1.02	
8:25 – 8:40am	**Registration and Tea** Oral Presenters (all of today's speakers): upload presentations
8:40 – 9:40am	**Keynote 3: Factors Impacting Maternal Morbidity and Mortality Through Time: Evidence From the Skeletal Record** Dr C McFadden
9:40 – 10:00am	**Morning Tea**
10:00am – 12:00pm	**Session 8: Early Life Development** **Chairs:** Associate Professor A Behie and Ms M Vlok
10:00am	**Infant Feeding Practices in Neolithic Northern Viet Nam: Early Childhood Diet and Stress in the Transition to Agriculture** *A Adams, S Halcrow, C King, M Miller, A Millard, D Gröcke, K Domett, HH Trinh, TMH Nguyen, TT Minh, M Oxenham
10:20am	**Interdisciplinary Perspectives on the Early Lives of Neolithic Individuals from Pain Haka, Flores** TM Smith, M Arora, C Austin, H Buckley, DR Green, R Kinaston, IS Williams
10:40am	**Morning Sickness: The Myths, Theories & Science** *J Sartori, AC Callan, P Roberts, M Tickner, M Cannon, J Quinlivan, DA Coall
11:00am	**Comparative Jaw Biomechanics During Ontogeny** *S Fung, HM Abraha, C Terhune, CF Ross, O Panagiotopoulou
11:20am	**The Nature and Extent of Sexual Dimorphism in Teeth and Fingerprints of Australian Twins** RJO Taduran, S Ranjitkar, T Hughes, G Townsend, AH Brook
11:40am	**Natal-to-Juvenile Pelage Change in Free-Living François' (*Trachypithecus francoisi*) and Cat Ba (*T. poliocephalus*) Langurs** R Hendershott, G Hu, C Groves, A Behie
12:00 – 12:40pm	**Lunch**
12:40 – 2:40pm	**Session 9: Social Networks and Care** **Chairs:** Dr N Malone and Ms N Langowski
12:40pm	**Grandparents Raising Grandchildren: Interdisciplinary Project Produces Policy Impact** DA Coall, R Marquis, F Robertson, J Dare, L Wenden, K Stratton
1:00pm	**The Household Anatomy of Fostering Children in Rural Timor-Leste** DS Judge, PM Thu, PR Spencer
1:20pm	**Grandmaternal Childcare Is Not Undermined by Grandparental Divorce in Europe** G Perry, M Daly
1:40pm	**Medieval Life on the Silk Roads: A Bioarchaeological Investigation of Two Medieval Cemeteries in Southwest Uzbekistan** R Kinaston
2:00pm	**Kin, Reciprocity and Need Explain Cooperative Networks in Natarbora in Rural Timor-Leste** *C Sumich, K Sanders, D Judge
2:20pm	**An Interdisciplinary Exploration of Perceived Grandparental Influence on Mother's Breasfeeding Behaviour** S Karthigesu, JS Chisholm, DA Coall
2:40 – 3:00pm	**Afternoon Tea**
3:00 – 4:20pm	**Session 10: Health and Teeth** **Chairs:** Dr P Roberts and Ms J Sartori

**These are student presentations eligible for the* ASHB Student Prize.

3:00pm	**Skeletal Evidence of Periodontal Status in the Melbourne Dental School Skull Collection** *R Cayetano, I Darby, R Hardiman
3:20pm	**Research program development using Melbourne Dental School tooth and skull collections** Hardiman R, Byrne S, Cayetano R, Craig PJG, Crombie F, Edinborough M, Evans M, Manton D, Owen J, Parashos P, Shewan L, Thomas CDL.
3:40pm	**Re-Assessing the Model of Iron Age Health Deterioration in Northeast Thailand: A View From Non Ban Jak** SM Ward, CL King, SE Halcrow, HR Buckley, CFW Higham, KM Domett, DJW O'Reilly, L Shewan
4:00pm	**How Enamel Deposition Affects Dental Traits: Examining Trait Correspondence Between Outer Enamel Surface (OES) and the Enamel-Dentine Junction (EDJ) in the Great Ape Dental Scoring System** V Pilbrow, T McGain
4:20 – 4:45pm	**Conference Close and Announcement of Student Prizes** Associate Professor A Behie
6.30pm	**Conference Dinner:** Akiba, 40 Bunda Street, Canberra ACT For those who have booked the conference dinner, we will meet at 6.30pm for a shared multi-course dinner and a drink (one free drink is included, others can be bought separately).

**These are student presentations eligible for the* ASHB Student Prize.

Infant Feeding Practices in Neolithic Northern Viet Nam: Early Childhood Diet and Stress in the Transition to Agriculture

*A Adams[1], S Halcrow[1], C King[1], M Miller[1], A Millard[2], D Gröcke[2], K Domett[3], HH Trinh[4], TMH Nguyen[4], TT Minh[4], M Oxenham[5]
[1]*University of Otago*
[2]*Durham University*
[3]*James Cook University*
[4]*Vietnamese Institute of Archaeology*
[5]*The Australian National University*

The process of weaning and childhood diet is central to questions of subsistence change in prehistory. The agricultural transition had lasting consequences for both culture and health, and is linked with changes to infant feeding behaviour, morbidity and mortality, and fertility. Breastfeeding, weaning, and childhood diet are biosocial practises, complicated by an interwoven relationship with stress. In particular, the availability of staple crops as complementary foods is hypothesised to allow earlier weaning in agricultural populations. Early life diet and stress can have life-long consequences for health of the individual and population. Understanding weaning behavior may increase understanding of the character of the transition in Southeast Asia, as it is a region of substantial ecological and biological variation and may not have followed trajectories of poor health and diet change seen elsewhere in the world. In order to characterise the nature of weaning during the agricultural transition in Southeast Asia, this research investigates the first isotopic analysis of breastfeeding for this region. Stable isotope analysis of incremental dentine isotopes allows for individual childhood dietary changes and stress episodes to be observed. This paper presents incremental isotopic evidence from seven individuals from Man Bac, a Neolithic site in Northern Vietnam, investigating early childhood changes of δ15N and δ13C, relating these patterns to maternal diet, weaning trajectory and physiological stress.

How Many Species Are Represented Among the *Australopithecus africanus* Mandibular Specimens From Sterkfontein and Makapansgat?

KL Balolia[1]
[1]*The Australian National University*

The number of species represented in the *Australopithecus africanus* hypodigm has long been a subject of debate and analyses of skeletal and dental remains suggest that the specimens currently attributed to *Au. africanus* may not be taxonomically homogeneous. In this study, I investigate whether more than one species is represented in the *Au. africanus* hypodigm from Sterkfontein and Makapansgat based on mandibular corpus shape variation at the positions of M1 and M2, using an extant hominid reference sample of *Homo sapiens*, *Pan troglodytes* and *Gorilla beringei*. I quantified mandibular corpus shape at M1 and M2 in *Au. africanus* mandibular specimens using data derived from 3D surface scans. I assessed mandibular shape variation using Procrustes variance values and Principal component scores, obtained by conducting a Principal components analysis. I performed Levene's statistic of homogeneity of variance between *Au. africanus* and each extant hominid taxon for PCs explaining more than 5% of the sample variation to assess whether corpus shape variation in the *Au. africanus* sample exceeds that of extant hominids. Results show a higher degree of shape variation at the position of M2 within the *Au. africanus* sample compared to extant hominid groups. Visualisations of shape extremes within *Au. africanus* indicate that this variation is associated with curvature of the lateral corpus region. The findings that mandibular corpus shape variation in the mandibular specimens from Sterkfontein and Makapansgat exceeds that observed in extant hominid taxa suggests that more than one species may be represented in the *Au. africanus* hypodigm.

Detecting Bone Functional Adaption in the Capitate of Extant Hominoids

*E Bird[1], T Kivell[1,2], M Skinner[1,2]
[1]*University of Kent*
[2]*Max Planck Institute for Evolutionary Anthropology*

As a central component of the midcarpal and carpometacarpal joints, capitate morphology is critical to the varying levels of stability and mobility in hominoid hands. Previous studies have focused on external morphology, highlighting the considerable mobility of the midcarpal joint in suspensory apes, the extension-limiting morphology of knuckle-walking apes, or the stabilising capitometacarpal joint morphology related to tool behaviors. However, the complex interaction between these bones and how varying morphological trade-offs in mobility and stability relate to actual wrist biomechanics is still poorly understood. As trabecular bone is known to remodel over the lifetime of an individual, internal bone organisation has the potential to reveal patterns of *in vivo* loading, thus its structure within the capitate may reveal new information about its function in the wrist. We investigate variation in capitate trabecular structure in extant hominoid taxa (n=71*)* and test the hypothesis that capitate internal bone structure will reflect peak mechanical loads of habitual forelimb behaviour. Our results indicate that trabecular architectural properties differ significant across the sample genera. Although both knuckle-walkers, *Pan* and *Gorilla* display divergent patterns of bone distribution within the capitate head. *Pongo* exhibited a wide degree of variation which could be consistent with a diverse range of wrist/hand positioning during locomotion. We find evidence in the

capitate head of *Homo sapiens* that trabecular patterning is consistent with the biomechanics of the distinct 'dart-throwers motion'. Results suggest a complex biomechanical loading environment in the wrist and highlight the need for further research in carpal functional adaption. This project has received funding from the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No. 819960).

Assessment of Ancestry in the Australasian Region Utilising the Postcranial Skeleton

*C Birkmann-Little[1], R Griffin[1], D Donlan[1]
[1]*The University of Sydney*

The principle aim of this study is to investigate the nature and extent of metric variation in the human postcranial skeleton between populations found in the Australasian region. Most research to date has focused on using cranial measurements or morphology however, the cranium is sometimes missing or unusable. Most ancestral research has been based on American data. This has led to the creation of a secondary aim of this study, to determine whether any differences could be found between two groups of European ancestry from different geographical locations. Measurements from the clavicle, humerus, radius, ulna, femur, tibia and fibula where included in this study. Samples to be examined were Australians and Americans of European ancestry, Americans of African ancestry, Australian Aboriginals and Thais. All data were collected from physical skeletal remains except for Australians of European ancestry which were collected from CT scans. Analyses between the two groups of European ancestry found statistically significant differences indicating they could not be used interchangeably. Thus, only Australians of European ancestry data were used for further analyses. Univariate results found several differences between ancestral groups, whilst discriminant function was able to allocate remains into ancestral groups with percentages ranging from 58-97.5% correct allocation with pooled sexes. When the sexes were separated the females achieved results of 65-97% and the males of 6196.1% correct allocation. This study may provide new tools for forensic anthropologists and may also assist in the identification of unknown remains leading to repatriation of individuals and identification of forensic cold cases.

Virtual Dissection and Volumetric Presentation of Egyptian Mummified Head Using 3D Open-Source Software, Drishti

*J Capodistrias[1], A Limaye, R Glarin[1], R Williams[1], V Pilbrow[1]
[1]*The University of Melbourne*

The study of Egyptian mummies has benefitted from using 3D imaging to conduct non-invasive analysis. However, there is lack in scientific literature surrounding methods for digital analysis and visual presentation of internal structures in three-dimensions (3D), in further scientific analysis or display. The University of Melbourne's Anatomy Department holds a single mummified head with no associated archival records. It was CT scanned by the Melbourne Brain Centre and assessed as belonging to a young female, aged 18-25 years. Evidence for cranial pathologies called Porotic Hyperostosis and considerable dental pathologies were observed. The aim of this project is to use non-invasive 3D segmentation techniques to develop a virtual specimen so students can study the tissues, the process of mummification and the various pathologies. Drishti, a free, open-source volumetric presentation program was used to develop a workflow for creating a video of the 3D mummy head model. Two imaging pathways were tested, the first used subprogram Drishti Render, the other required segmentation in Drishti Paint prior to transferring into Render. The Render-only pathway provided a higher definition model; however, the second pathway allowed for removal of unwanted noise and more accurate separation of the 4 tissue layers: bandage, soft tissue, bone and teeth. This presentation demonstrates virtual dissection through an animation video that shows slow rotation, clipping and gradual fading of tissue layers. This is the first ever virtual dissection of an Egyptian mummy using Drishti and shows the value of Drishti in providing high-resolution visualization and analysis of rare anthropological specimens.

"MicroPoly Sharp": Software Program for the Objective Analysis of Linear Enamel Hypoplasia (LEH)

*A Cares Henriquez[1]
[1]*The Australian National University*

MicroPoly Sharp is a software program that utilises recently published objective methods by A Cares Henriquez and M Oxenham for the identification and analysis of linear enamel hypoplasia (LEH) that are specifically designed for use with worn archaeological dental samples. The first two methods are the 'Micro Polynomial' method and the 'Common Cycle' approach, which are used for the objective identification of defects along the enamel surface of multiple teeth of the same individual. While the third is a set of distance-based exponential regression equations that are used for the objective estimation of LEH defect chronology and defect duration. Written in C# (programming language) and compiled using Visual Studio, this end-user-program eliminates the need for researchers to manually perform complex and time-consuming calculations in Microsoft Excel by automating the entire process of identification and analysis of LEH when using microscopic data. The primary motivation behind the development of this software is to ensure that the aforementioned methods are useful, usable, and accessible. The program's usefulness lies in its ability to significantly reduce the time required for the analysis of LEH from 30-

45 minutes per tooth, to under 5 minutes for multiple teeth of the same individual. Furthermore, due to the automated nature of the analysis, it not only improves the accuracy of the results by minimising the introduction of user errors but also their replicability and comparability.

Pious Women, Reluctant Men? Some Cemetery Evidence on the Anglo-Saxon Conversion to Christianity?

C Cave[1]

[1]*The Australian National University*

Mortuary archaeology in conjunction with biological anthropology and historical sources can infer many aspects of the life of a deceased individual and that of their community. Is a change in religion one of those aspects? In the Anglo-Saxon cemetery of Mill Hill, Deal, Kent, UK, the last two pagan individuals have been identified, albeit tentatively; consequently, it can be inferred that Christianity reached this community while this cemetery was in operation. This presentation will examine the demography of this cemetery in the ratio of male/masculine burials to female/feminine burials throughout its phases, alongside known historical timelines; it will suggest that the beginning of the conversion of the Anglo-Saxons to Christianity can be identified and that women were the first of this community to convert to Christianity. This evidence parallels that provided by historical sources, where women have converted before their husbands. It will examine the factors that lead to this conclusion and consider the possibility (or otherwise) that women led Christianisation of Anglo-Saxon England.

Skeletal Evidence of Periodontal Status in the Melbourne Dental School Skull Collection

*R Cayetano[1], I Darby[1], R Hardiman[1]

[1]*The University of Melbourne*

Periodontal disease is the result of a chronic inflammatory response of the tissues surrounding the teeth to the accumulation of dental plaque. Examining skulls allows assessment of the alveolar bone and visualisation of its symptomatology during periodontitis which is restricted to radiographic measurements when the patients are alive. Inspecting the alveolar bone of the jaws in skulls may be one way to gain important information about the environmental effects causing health changes in individuals that lived long ago. The objective of this study was to investigate the skeletal signs of periodontal disease in the Melbourne Dental School Human Skull Collection. The main scope of this study was to gain additional insights into the oral health of the skulls. 30 human skulls contributing to the Melbourne Dental School Collection were assessed for skeletal evidence of periodontal status. The methods used to evaluate the periodontium include the extent of alveolar bone loss, the degree of root exposure and radiographic assessment of the dry bone structures. Teeth affected by periodontal disease were determined based on textural and architectural variations of their supporting structures and evidence of resorption of the cortical bone. The presence of dental calculus was also recorded. In the present study, 42% of teeth examined showed signs of being affected by periodontal disease, however, further investigation is needed to confirm these findings. This presentation will briefly outline the findings of the research and discuss how these findings can provide additional insights into the oral health and living conditions of the individuals when they were alive.

Grandparents Raising Grandchildren: Interdisciplinary Project Produces Policy Impact

DA Coall[1,2], R Marquis[1], F Robertson[1], J Dare[1], L Wenden[1], K Stratton[3]

[1]*Edith Cowan University*

[2]*The University of Western Australia*

[3]*Wanslea Family Services, Belmont, Western Australia*

The 2014 Senate Inquiry into grandparents raising their grandchildren highlighted the challenges these grandparents face when taking on full-time parenting responsibilities. The inquiry called for research to quantify these challenges and review the support available for these largely hidden families. To investigate this issue an interdisciplinary research team consisting of a human biologist, occupational therapist, public health expert, social worker and service provider was established to examine the implications of the caring role for grandparents, the voice of grandchildren, and the service and policy pathways for grandparents. Despite the competing demands of researchers and universities and not-for-profit human services organisations, this project through the diversity of methods utilised and its community engagement has had policy impact. Based on an initial research report of the first 300 grandcarers to complete our survey and extensive publicity through the media, attention was being brought to the plight of grandcarers. In the run up to this year's federal election this was harnessed in an election campaign 'A Fairer Future for Grandchildren.' As part of this grandcarers delivered 150 letters to the Prime Minister asking for support. Subsequently, the Australian Greens released a policy plan to support grandcarers. This presentation will describe the process through which this interdisciplinary, state-wide research project has influenced policy development in Australia.

**These are student presentations eligible for the* ASHB Student Prize.

The Micro- and Molecular Analysis of Treponemal Disease

*KM Cooke[1]

[1]*The Australian National University*

The ability to confidently identify Treponematosis in ancient human skeletal remains continues to be controversial, as Treponematosis often mimics other infections and requires complete skeletal preservation for diagnosis. This has resulted in two contentious debates in the field of treponemal palaeopathology: the determination of definitive markers of treponematosis for accurate diagnosis in the skeletal record, and the origins of the disease in Europe. In attempts to resolve these questions, several studies have turned to more invasive microscopic and molecular techniques. However, the successes and limitations of these must be understood for the application to be most effective and beneficial in the investigation of treponemal disease. The genetic analysis of *T. pallidum*, the treponematosis causing bacterium, has had some success in resolving the overarching debates of treponematosis, as has the histological assessment of bone affected by treponemal infection. The use of molecular methods, such as isotope analysis and FTIR, have only recently been identified, yet they may hold great potential in their future use with more research. However, these methods come with limitations, including the age and preservation of human remains, and ability to replicate results consistently. This study reviews not only the success, but also the limitations of these techniques. I argue that it is possible to determine which technique is best suited to specific cases where definitive identification of treponematosis is not possible by more traditional means. In taking a multifaceted approach, and utilising more invasive analytical techniques, answers to the origins and identification of treponematosis may be uncovered.

Investigating the Relationship Between Osteon Variants and Remodelling Rates in Ancient Human Bone

*KM Cooke[1], P Mahoney[2], JJ Miszkiewicz[1]

[1]*The Australian National University*

[2]*University of Kent*

Studies have documented several types of secondary osteons in cortical bone. These include drifting osteons that form tailed osteons in cross section, and Type II osteons that have undergone partial resorption and redeposition within the cement line. Previous studies have suggested drifting and Type II osteons correlate with age, biomechanics, diet, and mineral homeostasis. However, since their initial documentation, very little has been done to further our understanding of their biological significance. Here, we investigate whether the occurrence of Type II and drifting osteons is linked to changes in the products of bone remodelling that include osteon population density and Haversian canal area. Thin sections from an archaeological adult human collection from St. Gregory's Priory and cemetery in Canterbury UK (11^{th}-16^{th} centuries CE) (n=112), segregated by sex and social status, were examined for osteon variants. Type II osteons were found to be more prevalent in females, and were also associated with higher rates of remodelling ($p=0.003$). Drifting osteons were linked with increased bone remodelling ($p=0.05$) in the whole sample, and in those of low status ($p=0.045$). However, females did not follow this trend, whereby their remodelling rate decreased in the presence of drifting osteons ($p=0.04$). Males and those of higher status also presented with osteon variants, but showed no significant changes in remodelling rates. These results suggest an inconsistent association between osteon variants and bone remodelling. As such, until further investigation is conducted, these variants should be considered a result of natural variation.

Childhood Health at Catanauan, Philippines: Employing New Methods to Identify Occurrence, Chronology and Duration of Linear Enamel Hypoplasia

*I Crnkovic[1], R Crozier[2], V Paz[3], A Cares Henriquez[1], C McFadden[1], MF Oxenham[1]

[1]*The Australian National University*

[2]*University of Aberdeen*

[3]*University of the Philippines*

In bioarchaeological research, it is standard practise to analyse linear enamel hypoplasia (LEH) as an indicator of general physiological stress. LEH is a developmental defect of teeth, and can indicate periods and patterns of ill-health during childhood at individual and population scales. Identifying LEH occurrence, chronology and duration can provide more detailed insights into childhood stress events. However, the common lack of visible perikymata on tooth surfaces prevents possible LEH defects from being identified. Recent research proposes a new method, the Micro Polynomial Method, which can be employed when a tooth's perikymata are not visible. This poster reports on childhood health in the context of Napa Site, Catanauan, Philippines; a Metal Period site, using Cares Henriquez and Oxenham's (2017) method for teeth without visible perikymata, based on the evaluation of LEH in teeth that lack visible perikymata. Systemic LEH across multiple teeth was identified, with LEH chronology (age of occurrence) and stress duration assessed using Cares Henriquez and Oxenham's (2019) distance-based exponential regression model. Results are discussed within the context of previous LEH research in Southeast Asia, with this work contributing to the growing understanding of Metal Period health in Island Southeast Asia.

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Brown Mouse Lemurs (*Microcebus rufus*) May Lack Opportunities to Learn About Predator Calls

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Diurnal primates commonly modify their behaviour in response to predator calls, but comparatively little is known about how nocturnal primates perceive predator calls. Captive-born predator-naïve mouse lemurs failed to recognise predator calls suggesting learning may be required. I thus hypothesised that wild mouse lemurs would differentiate between predator and non-predator vocalizations. I presented wild brown mouse lemurs (*Microcebus rufus*) in Ranomafana National Park, Madagascar, with calls of three sympatric predators (goshawk, fossa and owl), three sympatric non-predators, and four novel, or less familiar, sounds. There was no evidence that brown mouse lemurs perceived any of the stimuli as dangerous as subjects did not alter their activity levels or spatial preferences after hearing a recording, nor did they significantly increase vigilance or exhibit fear behaviours during play-backs. Subjects were however more likely to move or change their gaze while hearing calls of sympatric animals. The lack of predator call recognition may be explained by a lack of opportunities that would allow brown mouse lemurs to associate predator calls with danger. Their solitary activity period, sleeping in shelters, and the rarity or high hunting success of predators provide few individual and social learning opportunities. With regards to diurnal raptors, ignoring calls and remaining inside day shelters might be the most optimal strategy to lower predation risk. Mouse lemur populations with higher predator encounter rates may perceive and respond to predator calls differently.

Dental Anthropology and Medicine: An Overview of Methods and Application

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Dental anthropology, as a subfield of biological anthropology, is a study of dentitions of past and present populations. The aim of dental anthropology is to give answers to some significant questions in anthropology. Those questions are usually regarding diet, health, and biological relations of individuals and populations. To answer these as well as may other research questions, dental anthropologists study development, microstructures, eruption, number, size, morphology, modifications, wear, and tooth pathologies, using a range of micro- and macroscopic techniques. An understanding of development, structure, form and function of teeth and dentitions is crucial to answer these questions accurately. However, these aspects have been frequently ignored in dental anthropological research. Conversely, dental science and clinical practice offer bodies of knowledge based on rigorously tested experiments on dental tissues. It is of utmost importance to integrate this knowledge and, when possible, experimental studies in dental anthropological research to gain reliable and testable results. This presentation gives an overview of techniques used in dental anthropology currently, their application in anthropological and archaeological research, with special focus on approaches with a dental science perspective.

Using Cold-Induced Vasodilation (CIVD) Response Distributions of Asian Peoples as Indicators of Past Human Movement

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This study evaluates cold-induced vasodilation (CIVD) response distributions of Asian peoples to help address the debate surrounding the geographic origins of Austronesian peoples. Evidence from small-scale studies suggests that CIVD responses negatively correlate with ancestral temperature regimes. The present study evaluates this claim more thoroughly using a large data set of 221 individuals from Southern to Northern China, mainland S.E. Asia, Southern India, the Philippines, Indonesia, Fiji, Tonga, Samoa, Tuvalu, the Cook Islands, Tahiti and New Zealand. It then uses the response distribution of participants from Oceanic Southeast Asia and Remote Oceania as compared to the distributions of other Asian participants to estimate where Austronesian ancestors originated. Participants submersed their right hands to wrist level in 8^{o}C water for 30 minutes. The average difference between middle finger skin and water temperatures measured every two seconds from five minutes post-submersion to the 30-minute point was the primary outcome variable. The primary predictor variable is the average of temperatures from the coldest months of the year between 1931 and 1960 from ancestral locations as reported by participants for grandparents or great-grandparents. While the predictor variable is a limited proxy for ancestral temperature regimes, results indicate a statistically significant association between net finger temperature and ancestral background temperature among Chinese, mainland Southeast Asians and Southern Indians ($N = 121$, $t = -5.73$, $P < 0.0005$, Adjusted $R^2 = 20.9\%$). Furthermore, the response distribution of Indonesian and Filipino participants is consistent with recent arguments of an Austronesian origin in or near Shan Dong Province.

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Biological Anthropology for 2020 and Beyond: Achievements, Challenges and the Centrality of an Integrative Human Biology

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[1]*University of Notre Dame*

Biological anthropologists are interested in human biology and the human experience in a broader ecological, evolutionary and phylogenetic context. We are interested in the body, the history of the body, and interactions of diverse bodies, communities, ecologies, and evolutionary processes. All of which have material components—how they function, what they're composed of, what their relations are to one another, what those histories of relations are, and how they shape ecologies. But, all of these elements also have social contexts; lived, experienced, remembered and perceived. The social realities of bodies, histories, communities, livelihoods, perceptions, and experiences are as central to the endeavor and inquiry of biological anthropology as the material. Biological anthropology is a constant dialectic between the social and the biological, but to do it well, we have to understand that those two things, in the human, are not separable. They are not distinct realms of patterns and processes. Understanding this entanglement is the challenge of biological anthropology. This challenge, this dialectic, is what biological anthropology is and must be. In this talk, I will engage where Biological Anthropology has been and where it is going, and what we need to face, understand, change and debate in order to get there.

Comparative Jaw Biomechanics During Ontogeny

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Morphological variations of the adult non-human primate mandible (lower-jaw) have been linked to the high loading and deformation regimes elicited during feeding. Previous studies have shown that during unilateral post-canine chewing the balancing (non-chewing) side mandibular corpus is subjected to negative sagittal bending, lateral transverse bending and twisting. The working (chewing) side mandibular corpus experiences positive sagittal bending and sagittal shear, while the symphysis is sheared due to the torsion in the corpora. Although the biomechanics of the adult mandible are well understood, the form/function relationships of the mandible during ontogeny are unclear. During ontogeny the spatial requirements of the developing dentition result in reductions of the subcortical bone, making the jaw hollow in places where the teeth are forming (i.e., crypts). Depending on their number, location and size, hollowed elements such as crypts can reduce a structure's ability to resist deformation. Thus, we propose that presence of the developing dentition will increase stress and strain patterns in the developing primate jaw during chewing, consequently impacting on mechanical performance. To test this hypothesis we designed a comparative finite element analysis study of 8 juvenile and 8 adult Rhesus macaque jaws to assess our biomechanical predictions on the mandible throughout ontogeny during unilateral post-canine chewing. Preliminary results show that strain magnitudes and patterns in the symphysis and corpora are influenced by the developing dentition. Future research will elucidate the integration of mechanical and developmental trade-offs during ontogeny and the extent to which these trade-offs drive bone morphology.

Self-Domestication: Selection Against Physiological Masculinity in the Evolution of Human Sociability

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High sexual size dimorphism is often taken as suggestive of polygynous social or sexual systems. However, previous analysis among primates has shown a more direct association with levels of agonistic interaction in a general sense. This being the case, noted decline in human sexual dimorphism and robusticity from the mid Pleistocene suggests qualitative change in human social interaction. Assuming complex language and technological capacities in *Homo sapiens* relied on heightened sociability and collaboration, dampened levels of agonism likely contributed to these developments. Recent domestication experiments demonstrate that selection against aggressive reactivity leads to a range of heritable changes ('domestication syndrome'), including decline in sexual dimorphism. Given similarities between noted human evolutionary change and the features of domestication syndrome, several authors have suggested humans are a self-domesticated species. Two developmental mechanisms have been proposed as drivers of physiological domestication: (1) dampened neural crest cell migration and (2) reduced androgenic influences. Both have the capacity to influence designated masculine traits and features. Here I discuss proposed drivers of selection against reactive aggression and physiological masculinity in human evolution and suggest reductive scientific approaches might tend to obscure complex and multilevel socio-sexual interaction operating throughout human evolutionary history.

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Research program development using Melbourne Dental School tooth and skull collections.

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The Melbourne Dental School is custodian to a large number of human teeth and skulls as part of its learning and teaching and research collections. A new research group formed by anatomists, dentists, dental specialists, odontologists and representatives from related fields is embarking on a research program to answer questions about human health and disease, development and environments using these collections. These include questions about the range of morphological variations in the extracted teeth, the range and level of developmental defects in the teeth (which can indicate an individual's overall health at the time the teeth were developing), the presence/absence and sophistication of endodontic treatments over time, and the level of disease process or damage to dental tissues at the time of extraction (including presence of dental calculus).

Some of the proposed research techniques are destructive, and can only be performed once. There is an added opportunity cost for other techniques. This presentation will briefly outline the history, size and breadth of the collection. Following this will be a discussion of the proposed research program: the process undertaken to determine the order of investigations to be carried out to gain as much research data from the collection of teeth: from the least destructive/invasive to methods ultimately destructive to the material, as well as the ethical implications of destruction of tissue with contemporary techniques which leads to the prevention of further study with technologically advanced techniques not yet developed.Some initial/incidental findings will be presented.

Current Status of Research into the Estimation of Time Since Death in Human Bodies Found Decomposed

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How to develop a more accurate estimation of the time since death (TSD) in human bodies found decomposed or decomposing has exercised the minds criminal investigators and others of a scientific mind since the first recorded cases in 13th century China. In the modern era, scientific research has only been carried out in the last 200 years but, more intensively, only in the last 50 years. In that time there have been a number of seminal studies promising a 'breakthrough' in the accuracy of the estimation of TSD but despite these studies, increasing its accuracy remains as elusive as ever, mainly because of the various contexts in which bodies are found and the difficulty of factoring in the multiple variables affecting decomposition. If a more accurate estimation is to be found, it will depend on a multidisciplinary approach. This talk will outline some of the methods of research at present occurring which will hopefully increase the accuracy of the estimation of TSD in the future.

Natal-to-Juvenile Pelage Change in Free-Living François' (*Trachypithecus francoisi*) and Cat Ba (*T. poliocephalus*) Langurs

R Hendershott[1], G Hu[2], C Groves[2], A Behie[1]

[1]The Australian National University

[2]Deceased – included with permission from holders of IP; formerly associated with the Australian National University

This presentation discusses the timing, patterning, and implications of natal pelage loss for two species of limestone-dwelling Asian colobines – François' (*Trachypithecus francoisi*) and Cat Ba (*Trachypithecus poliocephalus*) langurs (FL and CBL, respectively). With 11-12 months of observation of each species, this study assesses the pattern of natal coat loss for three FL infants living in Mayanghe Nature Reserve (China) and three CBL infants living on Cat Ba Island (Vietnam), by considering three hypotheses: 1) FL and CBL will have *similar* timing and patterning of natal coat loss, 2) FL and CBL *timing* of natal coat loss is related to independence and allocare interest, and 3) FL and CBL *pattern* of natal coat loss is related to allocare interest and infanticide. Results indicate that the *pattern* of natal coat loss is similar in both species, although the *timing* is different. There does appear to be an association between increased independence and decreased group member interest in infants, suggesting that the *timing* of the natal coat loss signals degrees of dependence and promotes allocare. Finally, observations about the *pattern* of natal coat loss suggests that both species of langurs may be using a paternity cloaking approach to avoiding infanticide. Ultimately, it is unclear if FL and CBL are experiencing different degrees of infanticidal threat given the contradictory evidence, nor is it known how or if their divergent patterns of development are related to habitat quality.

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Regression Analyses for Forensic Age Estimation Based on Quantification of Pubic symphysis Metamorphosis in a Contemporary Malaysian Population

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In forensic anthropology, when the victim is unknown, a biological profile needs to be developed to narrow searches of known missing persons. Population-specific forensic standards are currently not available for Malaysians due to a lack of documented human skeletal repositories. Alternatively, this study establishes forensic age estimation standards by analysing multi-detector computed tomography (MDCT) scans from a clinical database. Bone data are acquired from pelvic CT scans obtained from Hospital Sultanah Aminah. Scans are anonymised upon receipt, with only sex, age and ancestry data retained. This study examines pubic symphysis metamorphosis following Brooks and Suchey (1990) on 3D volumetric reconstruction of CT images of 355 individuals (165 male; 190 female) aged from 15 to 83 years. High observer agreement (κ= 0.763-0.832) and a positive relationship between age and pubic symphyseal phase (r= 0.884-0.90) are demonstrated. Linear and polynomial regression analyses are then performed to formulate the predictive age estimation models from phase scores. The prediction accuracy rates (standard error of estimates, SEE) of the linear models are ±8.18 years for pooled sex, ±7.75 years for males, and ±8.57 years for female samples. The accuracy increased with cubic models (SEE±6.07, 7.51 and 6.92 years in male, female and pooled-sex samples, respectively). The accuracy of these models is comparable to other skeletal methods in different global populations.

The Household Anatomy of Fostering Children in Rural Timor-Leste

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Fostering of children involves the movement of a child out of the household of its biological parents to another household. Fosterage enables resource-limited natal households to reduce the number of children they must support. Foster parents may benefit from gaining the company, household labor, or other social benefits of a child, but this is tempered by the costs of rearing. We explore the links between contemporary fostering arrangements and child growth in the two rural sub-districts (Natarbora and Ossu) in rural Timor-Leste where 48% of households include a fostered child at some point. Using standardised anthropometrics and activity measures, we compare biological and fostered children. We then compare sending and receiving households' resource bases and composition to examine fostering decision-making. Using linear mixed models with repeated measures of children clustered in households and controlling for age, season, year, mother's height, sex and community, we found that z-height and z-BMI did not differ between fostered children and biological children; however, z-weight for fostered children less than 11 years of age was - 0.16 SD less than that of biological children. Thus, fostered children may experience a weight penalty early in life but this is not reflected in a long term growth penalty. Actigraph® records indicated no difference in activity levels between fostered and biological children. Households with a grandmother and/or fewer biological children were more likely to foster- in than those without. Households with salaries fostered more children. On average, fostering allows extended families to better distribute dependents across resource patches.

What is a Riverine Diet?

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The hunter-gatherer societies of the Murray valley are often described as relying on a 'riverine diet'. Generally, a 'riverine diet' is used to describe populations who live in close proximity to a river and/or demonstrate through isotopic analysis, or other means, that a proportion of their protein intake was derived from freshwater sources, rather than marine or terrestrial sources. However, not all riverine environments are created equal. There is instead a complex interplay between the river itself and the surrounding landscape that is highly localised as well as being variable over time. These factors, along with cultural practices, function to shape the role of aquatic resources within a broader dietary context. Through the use of ethnographic and environmental resources and dietary analyses, we consider these factors with regards to the Riverina, Mallee and Gorge sections of the Murray River in order to better understand the role of the river and its resources in shaping subsistence practices. In doing so we highlight the potential variation within a single river system and identify the parameters by which we might consider how to define a riverine diet within a given context.

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An Interdisciplinary Exploration of Perceived Grandparental Influence on Mothers' Breastfeeding Behaviour

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Breastfeeding is a highly evolved biological mechanism with proven positive effects on the health status of mothers and infants. But it has been rendered complex in societies with a strong influence of western medicine and heavy marketing of infant formula. The factors affecting rates of breastfeeding vary widely, however, the assumption that grandparents remain a source of influence across time and cultures is generally accepted. This assumption was explored through a mixed methods study informed by principles of human behavioural ecology and anthropology. Focus groups (N=73) were conducted with parents and grandparents followed by questionnaires (N=278) in Perth, Western Australia. Results showed that grandparents' breastfeeding experiences, beliefs and attitudes was found to indirectly influence parents' expectation to successfully breastfeed. In cases where grandmothers failed to breastfeed, mothers found it easier to justify formula feeding their infants. The positive breastfeeding attitude scores on the questionnaires did not have a significant effect on breastfeeding behaviour in parents or grandparents. This suggests the influence of external factors such as physiological challenges to breastfeeding, physical ecology of the mother and attitudes towards formula feeding. Maternal grandmothers reported offering the most advice regarding breastfeeding. However, the type of advice imparted and the effect of the advice on breastfeeding behaviour could not be discerned from this data. The intergenerational influence on breastfeeding seen in this study sample underscores the importance of breastfeeding education and support for parents and grandparents to ensure future generations benefit from this unique mammalian trait.

Medieval Life on the Silk Roads: A Bioarchaeological Investigation of Two Medieval Cemeteries in Southwest Uzbekistan

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During the Medieval period (ca. AD 2nd-16th c.), Central Asia was a hub of economic and cultural interaction that flowed along the Silk Roads-vast overland trade networks that linked East Asia, the Middle East and Europe. These networks famously facilitated the trade of material items, such as silk and lapis lazuli, which can be found in the archaeological record. However, little is directly known about the people who lived along the Silk Roads and how this vast interconnected network directly influenced their diet, health and day-to-day living. This paper presents the results of one of the first comprehensive bioarchaeological projects focused on Medieval cemeteries in Uzbekistan. Two cemeteries (Bobolangar and the Lungi Tepa) dating to the High Medieval Period (AD1000-1150), were excavated between 2017 and 2019. The aim of this research is to understand how people adapted to the harsh desert environment, procured their food, interacted with surrounding communities and cared for their sick and disabled in the context of the first globalised trade network. The research uses a biocultural approach that incorporates traditional osteological methods, ancient DNA and isotope analyses. These results are interpreted within current theoretical frameworks in Anthropology, including Niche Construction Theory and the Bioarchaeology of Care Model.

Silent Settlers – Telling the Stories of Colonial New Zealanders Using Multi-Tissue Isotopic Analysis

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The events of the colonial period shape New Zealand's politics and identity today, but the stories of many of the ordinary, grassroots, first colonial settlers have been lost to history. In this study we bring to light the stories of these early farmers and gold miners, using isotopic analysis to reveal individual stories of emigration, adaptation, and hardships. A series of excavations of unmarked burials and a forgotten cemetery in Otago (New Zealand) have given us a skeletal sample of 44 unknown adult individuals. We use strontium and oxygen isotope analysis to narrow down possible places of origin for these individuals, and carbon and nitrogen isotope analysis of dentine collagen, bone collagen, and hair keratin to assess changes to diet and stress status through life. We show the multi-cultural origin of these pākehā New Zealanders, dietary change as they moved to New Zealand, and potential episodes of physiological stress as they adapted to life across the world. In combining this isotopic evidence with osteological and further chemical analysis, as well as the historical record, we begin to reveal the stories of these silent settlers.

**These are student presentations eligible for the* ASHB Student Prize*.*

Diet, Exercise and Body Composition in Three Solomon Islands Populations

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The rates of overweight and obesity in Oceanic populations are the highest in the world, and this has caused an epidemiological transition where non-communicable diseases (such as diabetes) have begun to take a relatively more important role in shaping morbidity and mortality than communicable ones (such as malaria). At the same time, these societies are undergoing tremendous social change. Many are abandoning traditional practices, including those related to diet and activity—two phenomena that are clearly important for obesity, but how they are related is still poorly understood. Here, we present the results of a study of the role of activity and diet in shaping body composition in three communities in the Solomon Islands. Previous research suggests that Polynesian ethnicity and an urban lifestyle are two of the most important risk factors for obesity in the Solomon Islands. To disentangle the relative contribution of these and other factors, we analyse interview and anthropometric data from a sample of 110 people from three communities: one rural Melanesian population (Kwara'ae villages in Malaita Province); one urban Melanesian population (Auki, the capital of Malaita Province); and, one rural Polynesian population (Rennellese villages in Rennell-Bellona Province). Our approach is biocultural and interdisciplinary, using theory and methods from public health, human biology, and biological anthropology.

Transitioning Human Diets in Greater Mtskheta, Georgia, Between the Late Bronze and Late Antique Periods (1500 BC- AD 700)

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The archaeological record of Greater Mtskheta, Georgia, reflects increasing urbanisation, social complexity and foreign influence between the Late Bronze and Late Antique periods (1500 BC - AD 700). Mtskheta was settled by farmers and pastoralists in the Late Bronze-Early Iron Age (LBA-EIA, 1500-500 BC). By the Hellenistic and Roman Late Antique (RLA) periods, the area was urbanised and formed the capital of the Iberian Kingdom (300 BC-AD 700), hosting a dense, socially stratified population with extensive political and trade connections. This research uses carbon and nitrogen stable isotope analyses of faunal and human remains from Greater Mtskheta to examine the characteristics of diet across synchronous populations between 1500 BC-AD 700. The results demonstrate that the LBA-EIA populations consumed mixed C3 and C4 resources ($\delta^{13}C$ $\bar{x}$ = -15.8‰, n = 63), likely including millet. Diets differed significantly between LBA-EIA sites, suggesting that local communities maintained independent subsistence strategies ($\delta^{13}C$: p = <0.001; $\delta^{15}N$: p = <0.001, n = 3). C4 consumption declined in the later Hellenistic Period ($\bar{x}$ = -17.4‰, n = 21), and was largely abandoned in favour of C3-resources by the RLA Period ($\bar{x}$ = -18.1‰, n = 95). Greater Mtskheta diets were highly consistent between sites in the RLA Period, suggesting subsistence was more standardised under the Iberian Kingdom. This isotopic record of transition from C4 to C3 diet mirrors contemporary dietary changes in other regions of the Caucasus, suggesting shared climatic, economic or cultural drivers in selecting resources across the region during this period.

Taphonomy and Burial at Roonka, Southeastern Australia

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Apart from representativeness, a major issue for bioarchaeological reconstructions is preservation of human remains. Poor preservation can lead to serious underestimation of the total number of burials there was in a site. Biased preservation can result in skewed demographic distributions. These two processes are very clear in the Australian record. Along the Murray River, probably one of the most populous areas prior to European contact, traditional Aboriginal burial grounds are most often in sand bodies. They are uncovered due to wind erosion but the difference between estimates of total number of burials based on surface exposure versus excavation tends to be an order of magnitude. In addition, the representation of nonadults among recorded burials varies between excavated sites, surveyed burial clusters and surveyed isolated burials. Is the difference due to different burial practices or to the poorer preservation of children's remains? At Roonka, excavated in the late 1960s/1970s, it is possible to address these issues: the site is large (more than 200 individuals), part of it was fully excavated very carefully, and all remains have been inventoried. Using the anatomical preservation and bone representation indices we identify significant differences in preservation by age and by location. We use these differences in preservation to begin to model site formation processes and demographic biases with the aim of reconstructing estimates of the total number of burials and the demographic profile of the burials.

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More Than Bones: The Multidisciplinary Investigation to Identify the Remains of Sergeant John Albert Collis, Royal Hamilton Light Infantry, Canadian Active Service Force

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As a result of the First and Second World Wars as well as the conflict in Korea, there are more than 27,000 Canadian service members who have no known grave. The skeletal remains of those service members are found every year through a number of different types of modern human activity. The Casualty Identification Program does everything in its power to identify the recently discovered skeletal human remains of service members deemed to be Canadian. There are many variables acting on each case, sometimes producing situations that the Program did not expect and has to rectify. This presentation will discuss the Casualty Identification Program's mandate as well as a case study showcasing some of the unusual, quirky and surprising turn of events revealed by the investigation into the remains of Sergeant John Albert Collis, Royal Hamilton Light Infantry, Canadian Active Service Force who was killed in action on 25 July 1944. This investigation required a multidisciplinary approach requiring an in-depth historical analysis, an anthropological analysis, a dental analysis by the Canadian Forces Forensic Odontological Response Team and finally, DNA analysis. The remains of Sergeant Collis were interred at Commonwealth War Graves Commission's Bretteville-sur-Laize Canadian War Cemetery, in Normandy, France on 7 June 2019 during a Government of Canada commemorative ceremony for the 75th anniversary of D-Day and the Battle of Normandy. In attendance were Sergeant Collis's grandson, nephews, and other family members, as well as Second World War veterans, the Commander of the Canadian Army, and Canadian and local French dignitaries.

Beyond the Laboratory: The Role of the Forensic Anthropologist in the Crime Scene

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The role of forensic anthropologists extends beyond the laboratory. Though a full skeletal assessment is best suited to a laboratory style environment, the experienced anthropologist can provide valuable advice and assistance within the crime scene. This advice and/or assistance may include: (i) discriminating human from non-human remains, (ii) identifying traditional remains from contemporary remains, (iii) disarticulation patterns and potential search areas, (iv) anticipated rates of decay, assistance with commingled remains, and (v) guidance with the recovery of remains from various depositional environments i.e. surface, burial at various depths. This expertise can greatly assist the crime scene examiner and investigators with real-time interpretation and decision making. Utilising this expertise onsite or early in an investigation can have substantial benefits in time and resource management to a policing agency. This presentation will discuss the role of the forensic anthropologist within the scene and provide examples of this role within the Australian Army and Queensland Police Service. These examples will include the (i) various Army cases including the Terendak repatriations of 25 servicemen and 8 family members from Malaysia in 2016, which was conducted by the Australian Army's Unrecovered War Casualties unit (UWC-A); (ii) the Morcombe scene examination in 2011 using various investigative and forensic police specialists, and a (iii) post blast scene involving three individuals from a caravan in North Queensland in 2016 involving the various forensic and DVI personnel.

A Comparison of Histomorphometric Relationships in the Anterior and Posterior Human Femoral Cortex

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Cortical bone histomorphometry for forensic age-at-death estimation generally examines only the anterior aspect of the femoral mid-shaft, as the posterior aspect involves insertion of the adductor muscles–*linea aspera.* Biomechanical strain in the posterior aspect is believed to result in increased bone remodeling and osteon density, thus affecting the reliability of estimating age-at-death; as osteons increase in density there is typically a corresponding decrease in geometric variables, such as osteon area and Haversian canal diameter. The present study aims to test the following: i) whether the inverse relationship between osteon density and osteon geometry are reflected in a modern Australian sample of known age and sex; and ii) whether this relationship differs between the anterior and posterior aspects of the femoral mid-shaft. The study sample comprises 216 femoral microradiograph cross-sections (117♂, 99♀) of recorded age (18–97 years) from the Melbourne Femur Reference Collection (MFRC) at the University of Melbourne. Mean intact, fragmentary and total osteon population density, and mean osteon and Haversian canal area, perimeter, diameter, and circularity were measured using *ImageJ* across six 1mm^{2}ROIs per aspect. The results of this analysis will be presented and interpreted in relation to recorded chronological age and sex. This research will contribute to an overall understanding of microstructural variation in the human femoral mid-shaft and provides useful information for forensic age-at-death estimation using histomorphometry.

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Population and Habitat Assessment of Silvery Gibbons (*Hylobates moloch*) in Ujung Kulon National Park, Banten Province, Indonesia

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In the conservation and tourist site of Ujung Kulon National Park (UKNP), Banten Province, Indonesia, human livelihoods and primate populations persists amidst an array of land-use policies and practices. Despite ancestral beliefs designated UKNP a sacred forest where activities such as the gathering of forest products is forbidden, encroachment by the approximately 50,000 people residing within the park's buffer zone (±19,500 hectares) is commonplace. UKNP's status as a World Heritage Site, and the refuge of the last 60-70 Javan rhinos (*Rhinoceros sondaicus*), ensures its continued prominence among tourists, researchers and conservationists. This research focuses on the endangered silvery gibbon (*Hylobates moloch*), endemic to West and Central Java. In June-July 2019, we conducted initial surveys of silvery gibbon habitat to assess individual and group densities, as well as to identify the presence and extent of habitat alteration within the national park boundary. Additionally, ethnographic insights were obtained by participant observation and the collection of semi-structured interview data with a variety of stakeholders including rice farmers, local officials and spiritual pilgrims. Gibbon groups range in relative proximity to human activities, and appear not to avoid the localities with the most prevalent (though non-destructive) forms of human activity. Finally, we discuss these findings in relation to recent population viability analyses, and report on the impacts and ongoing challenges caused by the Sunda Strait tsunami of 22 December 2018.

Factors Impacting Maternal Morbidity and Mortality Through Time: Evidence From the Skeletal Record

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Bioarchaeological accounts of maternal morbidity and mortality have been limited by the inability to measure the population prevalence of maternal deaths and lack of reliable skeletal indicators of childbirth. Further, our understanding of fertility has been reductive and often fails to consider the range of factors and implications it represents. This presentation explores the potential implications of fluctuating fertility and population density for maternal morbidity and mortality in antiquity. Using modern epidemiological research on the causes of maternal morbidity and mortality, bioarchaeology can begin to explore this facet of life and death in past communities. The relationship between fertility and maternal mortality is complex and non-linear, with high fertility having potential to cause increased maternal mortality through more pregnancies per woman (exposure), greater risk of death with high order pregnancies, reduced interbirth interval, and pregnancies in higher risk age categories (very young or geriatric pregnancies). Conversely, reduced maternal mortality may cause high fertility due to the decreased cost of childbirth and extended childbearing period through increased life expectancy. In addition to fertility, maternal morbidity and mortality are further impacted by population density. Urbanisation in the modern world may increase access to care and thereby reduce morbidity and mortality, however, in the deep past a contrary relationship may be anticipated based on decreased hygiene and greater exposure to infectious disease. Considered contextualisation is essential to our understanding of maternal morbidity and mortality through time.

A New Approach to Estimating the Age-at-Death Distribution From Skeletal Remains

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This poster reports on recent research by the Australian National University Centre for Palaeodemography and Palaeoepidemiology, which uses a proportional measure to estimate the age-at-death distribution and, when combined with a seriation method, may subsequently be used to estimate age for individuals. Traditional methods of estimating age suffer several challenges, including decreasing accuracy with increasing age, age mimicry of the reference population, and difficulty reconciling accuracy with precision. A new method is proposed for estimating the age-at-death distribution with a focus on middle and older adults. As the age-at-death distribution is sensitive to changes in the fertility rate, it was hypothesised that the D0-14/D (the number of individuals who died aged 0-14 years divided by the total population) fertility proxy may be able to estimate the proportion of individuals that might be expected to die in each five-year age group over 35 years. The method permits the estimation of individual age when used in conjunction with seriation methods by assigning ordered individuals into five-year categories. The method has been tested on two samples of known age, the Spitalfields crypt and St Thomas' Church cemetery collections, and found to provide greater accuracy over previously applied methods. Recommendations are made for the application of this method.

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Temporal Consistency in the Human Response to Changing Stimuli: Bioarchaeological Considerations

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Traditionally, the goal of bioarchaeological research has been to reconstruct the lives and lifestyles of past people. Studies have primarily relied on inferences made from archaeological contexts, ethnographic data, and skeletal analyses. However, the ongoing developments in modern paradigms within demography, epidemiology, and skeletal biology are yet to be routinely incorporated into bioarchaeological interpretations. Here, we give an overview of selected models and methodologies within experimental skeletal biology, and modern demography and epidemiology to illustrate their application in bioarchaeological contexts. This is explored theoretically using individual and population case studies. Firstly, we use the Utah Paradigm of bone functional adaptation to highlight the key ways in which bone tissue responds to biomechanical stimuli in an individual. Then, we evaluate the extent to which this principle is incorporated into ancient human behavioural interpretations. We then explore the range of fixed population responses, particularly fertility and mortality, to stimuli, such as availability of resources, disease, and stress. Finally, we extract key theoretical points for consideration in future bioarchaeology methods, including 1) segregating human skeletal data based on juvenile and adolescent bone modelling, and adult remodelling phases, 2) leveraging modern data to understand the relationship between fertility, stress, disease and the age-at-death distribution in the past. In conclusion, we encourage the use of validated models and methods in bioarchaeological questions, because while the stimuli change, the range of human responses is fixed.

Investigating Burned Bone Using Portable X-Ray Fluorescence (Pxrf) Spectrometry: Preliminary Results

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Burning is a transformative process that reduces the body down to small fragments largely clear of bone organics. As the organic components combust, there is an associated alteration to the inorganic components, ultimately leading to visible structural changes that inhibit bone identification. The methodologically challenging nature of burned bone is further compounded when the remains are commingled, making differentiating individuals and identifying the varied processes which led to their commingling that much more difficult. Current strategies for resolving commingling either centre on qualitative approaches such as osteometric sorting, or destructive, expensive and time-consuming techniques such as DNA or Stable Isotope analysis, methods which are not always suited to fragmentary burned bone. XRF spectrometry, capable of measuring chemical element concentrations, has the potential to fill this methodological gap. The objectives of the present pilot study are to assess the appropriateness of using portable XRF in re-associating individuals within burned commingled contexts. Experimental analysis was conducted on 100 long bone fragments belonging to five fleshed sheep (*Ovis aries*). The fragments were each burned for 30 minutes at different temperatures and then measured using pXRF to determine if a) chemical variation was sufficient enough to allow the identification of burned individuals; and b) whether the chemical components of bone change with exposure to heat, thus enabling the investigation of burning context. The results of this pilot study will contribute to the development of a fast, non-destructive and inexpensive method for distinguishing individuals and burning condition in burned commingled human bone assemblages.

The Hunting Pressure on Primates in Veun Sai-Siem Pang National Park, Cambodia

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Veun Sai-Siem Pang National Park (VSSPNP) in Cambodia is an area of high biodiversity value and home to six confirmed primate species. Local people in the surrounding villages rely on the national park for food and income. In recent years the number of loggers and the use of guns in VSSPNP has increased, however the hunting pressure on primates is unknown. This study investigates the current hunting pressure on primate species within the park by conducting semi-structured interviews with local people in five villages adjacent to VSSPNP. All participants were 18 years or older and identified as the head of the family or the primary resource collector. Of the 96 participants interviewed, 63.54% were current hunters with 37.70% of current hunters targeting primates. The pygmy slow loris *Nycticebus pygmaeus* is the most frequently hunted primate in VSSPNP, as it provides a high level of income for villagers who kill and sell the animals for traditional medicine. The most sought-after primate for use as a pet is the northern yellow-cheeked crested gibbon *Nomascus annamensis*, with 43.75% of participants willing to keep one as a pet. Despite this, *N. annamensis* is rarely hunted in VSSPNP, which may be due to a lack of hunting equipment, as it was reported most frequently as the reason for not hunting other primates in the area. This study provides important insight into the hunting pressure on primates in VSSPNP, which will be incorporated into future conservation management plans for the park to maintain species diversity.

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Intra-Skeletal Remodelling and Behaviour in an Adult Male from Early Prehistoric Marshall Islands, Eastern Micronesia

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Fragmented skeletal remains pose difficulty when reconstructing ancient human behaviour. However, in the absence of adequate gross anatomical data, histology can be used to study skeletal form because adult bone tissue adapts to function through microstructural remodelling. Here, we tested whether cortical bone histomorphometry from mechanically disparate bones in one ancient individual could be indicative of his lifestyle. We studied a middle-aged adult male recovered from a prehistoric village site (MLEb-5, TP6) on Ebon Islet, Ebon Atoll (Marshall Islands, 1720 cal BP median date). As Pacific islanders have a long history of engaging in behaviours that rely on strenuous arm use (such as gardening and food preparation), we hypothesised increased or similar bone remodelling events in the individual's arms when compared to his legs. Four histological sections were prepared using samples from the right posterior midshaft femur, left proximal radius, right posterior distal humerus, and an unsided and unnumbered rib shaft fragment. Geometric properties and densities of secondary remodelling products (Haversian canals), adjusted by bone size, were indeed higher in the humerus (21.34/mm^2) and the radius (10.81/mm^2), when compared to the femur (9.76/mm^2), and showing expected variability relative to the rib which was used as a control bone. The humerus may have also experienced faster secondary osteon infilling events given its lower average Haversian canal area (2854.36 μm^2) when compared to the femur (2974.19 μm^2). Our results identify skeletal adaptation to increased arm load, showing value in sampling fragmented human remains for ancient behavioural interpretations in the Pacific.

Mortuary Ritual and Social Differentiation at Con Co Ngua, Northern Vietnam

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Death is one of the few universal experiences across all societies, with every society developing their own rituals and practices. As such, mortuary archaeology can provide an insight into the rituals and cosmologies of past societies. Additionally, it is also recognised that the study of burials can provide information about social organisation and differentiation in the past. While there is a developing corpus of research on mortuary practices in Southeast Asia, little information is available on funerary practices in mid-Holocene hunter-gather Vietnam. The aim of this project is to investigate the cemetery site of Con Co Ngua, an early 7th millennium BP site ascribed to the Da But culture, located in Northern Vietnam. The present research was exploratory in nature, seeking to examine the site and skeletal assemblage for patterns in mortuary ritual and potential social differentiation. As such, the site was investigated statistically and spatially, with age-at-death and sex compared to the variables of burial position, burial orientation, and the presence or absence of ritual post-mortem body mutilation. The results of the analyses indicate that while there was no difference in burial treatment by sex, there were significant differences in burial treatment by age, specifically between adults and subadults. Furthermore, there was very little found in terms of spatial clustering, with the only variable demonstrating any type of clustering being burial position. These results contribute to a greater understanding of mortuary ritual and social differentiation, not only for the Da But period, but for the region as a whole.

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An Interdisciplinary Approach to Mapping Perinatal Exposure to Cyclone Related Stressors in Queensland, Australia – A Methodological Overview

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Climate change continues to not only impact our natural environment but also the health of the biological organisms that inhabit it. Research into causal links between climate change and human health outcomes requires an interdisciplinary approach that factors in the intersection between the environment, population health and climate variation. Focusing on the Australian state of Queensland, this study will use Geographic Information System methods to explore a relationship between maternal location during pregnancy and are as affected by severe tropical cyclone events at both the population and individual level. To predict the impact of maternal exposure to a sudden environmental change during pregnancy, evolutionary theory within biological anthropology is used to understand how human reproductive strategies have evolved and the trade-offs that can occur between maternal survival and current/future reproduction. Trade-offs can support increased incidences of preterm (<37 weeks gestation) and low birthweight (<2,500g) births in unstable perinatal environments presented by cyclone events and these outcomes are tested through epidemiological health surveillance methods using over a decade of geo-coded perinatal health records provided by the Queensland state health department. Areas affected by cyclone events are identified using disaster recovery funding data. Individual experiences of a disaster event are captured through an online survey that captures maternal location and personal experiences. Findings from this study will provide a valuable holistic picture, over space and time, of how the location of a woman's pregnancy can influence the immediate and long-term outcomes of her unborn child better informing targeted climate change adaptation strategies.

Studying the Absence: Endocasts and the Sylvian Fissure

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The brain does not preserve in the fossil record and palaeoneurologists must rely on endocasts, moulds of the endocranium, to infer fossil brain morphology. Sulcal patterns on the external surface of the brain are often used in comparative neuroanatomy to infer differences in brain macroanatomy between species. For the application to fossil species, variation in sulcal patterns has been used to infer the emergence of the modern human brain morphology compared to early fossil hominins and extant non-human primates. Unfortunately, sulcal patterns are only partially preserved as imprints on the endocranial surface with many sophisticated morphometric analyses unable to determine more than generalised differences between modern humans and fossil *Homo*. Previous approaches have relied on comparing sulcal patterns between endocasts, however, the absence of complete preservation of sulcal patterns on fossil endocasts limits the ability to conduct reliable comparisons. Here we use Magnetic Resonance Imaging (MRI) of the *in vivo* human brain in 21 individuals (10 males, 11 females) to investigate the extent of sulcal pattern variation in the Sylvian fissure, an important neuroanatomical region often well-preserved in endocasts. From the external surface of the *in vivo* human brain, we categorise sulcal types in two rami of the Sylvian fissure. We then compare the extent of Sylvian fissure sulcal pattern loss between the *in vivo* human brains and traditionally published endocasts from extant and fossil *Homo*. Sulcal pattern variation from external brain morphology informs on the extent of variation which can aid in the identification of potential sulcal variants preserved on endocasts, furthering understanding of the differences between fossil and extant species.

Does Skull Form Vary With Geography, Environment or Diet? Investigating Morphological Disparity in the Genus *Pan*

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Cranial variation is known to be a mix of taxonomic, structural, and functional components, but our understanding of the evolutionary factors contributing to specific aspects of this diversity are not well known. To what extent is the amount of variation within great apes linked to the heterogeneity of the environments they inhabit? Most hominid species are allopatric suggesting that speciation and diversity are strongly linked to geographic range. Cranial morphology is strongly distinct between the species, with more subtle differences found among subspecies. We compared cranial disparity within and between these groups to the variation in several factors: geographic range size, variation of climatic variables within their ranges, variety of habitat within their ranges, and diversity of diets. A sample (n = 45) of Computed Tomography (CT) scans of museum specimens with preserved locality information from *Pan paniscus* (n = 9), *Pan troglodytes troglodytes* (n = 10), *Pan troglodytes schweinfurthii* (n = 17), and *Pan troglodytes verus* (n = 9) were generated into three-dimensional (3D) virtual crania. A total of 45 3D coordinates were virtually registered on the ectocranial surface to capture cranial form and analysed with standard geometric morphometric methods to compare size and shape. Cranial variation was analysed by first calculating morphological disparity as a numeric value estimating cranial size and shape variation for each taxon. Similar values were calculated summarising dietary and environmental variation specific to each taxon. Lastly, an evaluation of the correlation between morphological disparity, geographic range size, dietary and environmental variation was conducted for the genus *Pan*. The close association between geographic range, environmental variation and dietary breadth are important to understand how past environmental fluctuations might have affected primates and suggest which taxa might be more affected by such specific changes. Expansion to include more taxonomic variation, dietary breadth, range size and environmental conditions is appropriate.

Grandmaternal Childcare is Not Undermined by Grandparental Divorce in Europe

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A large literature indicates that divorced grandparents interact with and care for their grandchildren at reduced rates compared to those whose marriages remain intact. One example is a sophisticated analysis of data from SHARE (the Survey of Health, Ageing and Retirement in Europe) by Žilinčíková & Kreidl (2018; *Advances in Life Course Research*). We challenge this generalisation with new analyses of data from the same survey. It is important to distinguish grandmaternal childcare from that provided by grandfathers, and also to distinguish care of uterine grandchildren (the children of daughters) from agnatic grandchildren (the children of sons). Grandmothers without partners are older, less healthy, and poorer, on average, than married grandmothers, and net of the effects of these confounds, we find that divorced grandmothers actually provide significantly *more* childcare than their married counterparts. How mutual assistance and reciprocity between grandparents and their children play into these between-group differences will be discussed.

How Enamel Deposition Affects Dental Traits: Examining Trait Correspondence Between Outer Enamel Surface (OES) and the Enamel-Dentine Junction (EDJ) in the Great Ape Dental Scoring System

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The Great Ape Dental Scoring System is a newly devised set of three-dimensional reference plaques showing discretely occurring dental traits in extant great apes, with application for standardising terminology and documenting dental variation in fossil hominoids. Dental traits are scored at the OES; however, the homology between traits at the OES and the developmental precursor EDJ is unclear. The purpose of this project is to test the extent to which enamel deposition affects the manifestation of dental traits at the OES. A total of 254 teeth from 11 gorillas and nine chimpanzees were scanned with a micro-CT scanner. The OES and EDJ surface meshes were generated by segmenting the enamel and dentine using open-source 3D visualisation program, Drishti. A total of 185 graded traits were scored on the incisors, canines, premolar and molars. The correspondence between the OES and EDJ was recorded as 'true' where the score was the same, or 'graded' where the score deviated by one. Results show that 'true' correspondence was slightly higher in gorillas (68%) than chimpanzees (66%), which may be explained by the thinner enamel in gorilla dentition. Similarly, protrusions such as cingula, tubercles, cones and crests had stronger true correspondence in gorillas. In contrast, foveae, wrinkles and accessory ridges had stronger true correspondence in chimpanzees, fitting with the crenulated dental morphology in chimpanzees. In both taxa, 95% of the traits showed 'graded' correspondence. While clarifying the role of enamel deposition, this study provides validating proof of concept of the Great Ape Dental Scoring System.

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Small-Pox Vaccine and the 1805 Attempted Settlement of Port Phillip Bay

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A footnote on page 177 of, then, First Lieutenant James Tukey 1805 book detailing the voyage of *HMS Calcutta* and the Merchant ship *Ocean* attempted settlement of Port Phillip Bay claims that his ship had attempted to transport small-pox vaccine 'matter' to Australia. He, also, suggests that he had knowledge that *HMS Glatton* had also attempted to import small-pox vaccine to Sydney in 1802. He notes that in both cases the vaccine did not survive the voyage. The context of this note was an observation of small-pox scarring on the face of an Aboriginal man that Tuckey had met while surveying Port Phillip Bay. Small-pox vaccination in 1805 was in its infancy. In 1796 Edward Jenner had discovered that cowpox infection provided cross immunity to small-pox . Prior to this the practice of 'variolation' had been introduced to England via Turkey in 1721. 'Variolation' was essentially inducing small-pox via a small dosage of the live virus. It is not clear which form of 'vaccine' the *Calcutta* and the *Glatton* might have been attempting to transport to Australia. James Tuckey's footnote raises numerous questions which Dr Roberts will raise in this presentation, with the hope of starting a discussion on why the Royal Navy was trying to import small-pox vaccine to Australian colonies and what the implications of this were.

The Diet of the Cat Ba langur (*Trachypithecus poliocephalus*) on Cat Ba Island, Vietnam

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The Cat Ba Langur (*Trachypithecus poliocephalus*) is one of the 25 most threatened primates in the world. The taxon is endemic to Cat Ba Island and there is currently very little data available on the diet of the species. The aim of this study was to investigate the diets of three groups of langurs in the Cua Dong area. Data were collected on the time spent feeding, and the plant species and plant part being eaten between May 2016 and April 2017 using five-minute focal animal samples from dawn to dusk. Overall, the langurs were found to spend 29% of their active period feeding. Their annual diet consisted of 66.6% leaves, 12.5% fruit (ripe and unripe), 3.6% flowers, 2.6% stems, 1.9% seeds, 1.6% bark and 0.9% petioles. The diet varied according to the season. During the wet season the diet consisted mostly of young leaves and fruit (46.7% and 23.1% respectively), while more mature leaves, flower, stems, bark and seeds were consumed during the dry season to make up for the lack of fruit. They were observed to feed on 56 different plant species that belonged to 52 different genera from 34 families. There were 15 species consumed more than 1% of the time and they accounted for 69.1% of the diet however, none of these were among the 10 most common species in the vegetation quadrants.

Morning Sickness: The Myths, Theories & Science

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Morning sickness is a phenomenon that occurs in over eighty percent of pregnancies worldwide. There are many myths and theories related to morning sickness however no origin has been identified. To understand nausea and vomiting in pregnancy (NVP), symptoms must be considered within an evolutionary and physiological framework. Interestingly, vomiting in pregnancy appears to be unique to the human species, which from an evolutionary perspective may be the result of human adaptation to a highly invasive placenta. Because reproduction rather than health is central to natural selection some human adaptations or the consequential effects are not always viewed as favourable, from our twenty first century medical point of view. The aim of this current research is to investigate the role of morning sickness in pregnancy. Pregnant women (n = 630) were recruited from antenatal groups attending two major hospitals in Perth, Western Australia. Expectant mothers participated in a cross-sectional survey consisting of a maternal health questionnaire and gross placental examination using manual and digital photographic analysis. Data analysis and findings will be discussed in relation to pregnancy induced nausea and vomiting pathways, maternal characteristics (e.g. BMI and mode of conception), pregnancy related influences (labour, placental measures and birth weight) and psychosocial data such as EPDS scores and nurturance scores. Findings from this study will lead to greater theoretical and clinical understanding of morning sickness. This is important for expectant mothers, clinicians and caregivers ,in providing detailed information necessary for the effective management and treatment of symptoms.

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Revaluating Migration: Using $^{87}Sr/^{86}Sr$ Ratios To Explore Iron Age Thailand Mobility

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Upper Mun River Valley (UMRV), Thailand, during the Iron Age (600-900AD) is notable for the intensification of wet rice agriculture, development of social stratification, and increase in population size. It is unknown to what extent improved agricultural models or nonlocal migrants contributed to the growing size of villages. Isotopic analysis is a useful tool for examining prehistoric population mobility, specifically the isotope strontium. Strontium isotope ratios ($^{87}Sr/^{86}Sr$) reflect the underlying geology of a region and are incorporated into dental tissue during an individual's childhood, allowing for their origin to be traced. Previous studies in the UMRV using $^{87}Sr/^{86}Sr$ ratios have suggested there was limited long-distance migration within the region but have not extensively assessed the bioavailable strontium in the region to which ratios must be compared. Baseline $^{87}Sr/^{86}Sr$ ratios, taken from local geology, flora and faunal, are important to define a more precise local range, and has the potential to more confidently identify nonlocals. This paper establishes a $^{87}Sr/^{86}Sr$ baseline isoscape to which human values, taken from dental enamel, can be reinterpreted, and presents the reanalysis of previously determined $^{87}Sr/^{86}Sr$ ratios from Iron Age sites in the UMRV. This paper will also present newly determined population values from Non Ban Jak, the best preserved and largest Iron Age skeletal samples in the region, to further assess the levels of population mobility in the region. By investigating this mobility, we may better understand the impact migration, trade relations, and knowledge exchange had in developing social complexity in the UMRV.

Interdisciplinary Perspectives on the Early Lives of Neolithic Individuals From Pain Haka, Flores

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A recent study of prehistoric dental remains from the French site of Payre has demonstrated the efficacy of integrating approaches from diverse fields such as archaeology, isotope geochemistry, oral biology, and public health for understanding hominin evolutionary biology. Here we take a similar approach to probe the early lives of five juveniles from Pain Haka, a large open-air Neolithic burial site on the island of Flores, Indonesia dated from 2200 to 3000 years ago. We characterise tooth development and developmental stress histologically, followed by documentation of trace element distributions and oxygen isotopes via two cutting-edge mass spectrometry methods. Molar formation times are similar to contemporary modern human populations. Several individuals show pronounced non-specific stress indicators (internal accentuated lines) during the first few years of life. Nursing behaviour appears varied, ranging from one individual that is likely to have ceased breastfeeding prior to 9 months of age to another who may have nursed for 7 or more years. In the former instance, this individual shows major developmental disruptions and possible skeletal remineralisation during the second year of life. Elevated barium values suggest that it may have resumed nursing in tandem with a younger sibling, surviving until approximately 6 years of age. Oxygen isotope analysis reveals approximately annual precipitation cycles and oxygen isotope ratios that are similar to contemporary large-bodied Indonesian primates. This interdisciplinary approach reveals patterns of ancient behaviour, early life health, and seasonal environmental variation with unprecedented detail.

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Where Are the Angkorian Dead? An Exploration Into the Mortuary Practices of the Angkorian Period

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The study of mortuary practices is fundamental to understanding past societies. *Srah Srang*, located in the city of Angkor, is the only Angkorian burial ground found thus far. This study explores the burial practices of the Angkorian period and the relationship between religion, social hierarchy and the *Srah Srang* burial assemblage. Extensive archaeological research has been conducted on the Angkorian period in Cambodia, however, few studies have considered mortuary analyses. A large quantity of burial evidence exists for *Srah Srang* and has been studied to appraise the mortuary practices of the Angkorian period and religion and social status as evaluated in the assemblage. The legacy data of Bernard Philippe Groslier was examined to help create a database for the site of *Srah Srang* and to explore key aspects of the Angkorian mortuary practices. *Srah Srang* is important for the investigation of the mortuary practices of the Angkorian period, evident through cremated remains being buried in large funerary vessels. This study aimed to breach the gap in Angkorian archaeological investigation and in addition, the wider archaeological context.

Kin, Reciprocity and Need Explain Cooperative Networks in Natarbora in Rural Timor-Leste

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Resource sharing, a potential form of altruism, is well-established in human behavioural ecology and is linked to the evolution of human life-history. In Timor-Leste, resources are low, and households are food insecure. Social networks may be one strategy to cope with variation in food availability. This study aims to identify what the characteristics of sharing networks in Timor-Leste are and whether the network characteristics vary with resource type. We investigate resource networks for seven resource types in the south-coastal community of Natarbora in rural Timor-Leste using a personal networks research design, and link sharing strategies to specific resource types. We used personal network research design (PNRD) to avoid the assumption of independence among events and because interviews resulted in incomplete networks. We recorded recalls of resource exchanges in the preceding month by 99 households in Natarbora. We analysed networks using Categorical Principle Components Analysis (CATPCA) of alter and respondent descriptors for sharing events. Kinship, expected reciprocity with neighbours, and “needy” recipients were the three major independent characteristics of networks. We associated these independent network characteristics with resource types using Linear Mixed Models of component scores on resource type with household identity as a random effect. Money was shared with kin while food and labour by expected reciprocity with neighbours. Land and land access were given to poorer households with no access to agricultural land. We go beyond previous studies and investigate the sharing of multiple resources in one community. Our findings are consistent with the ecological literature on resource sharing.

The Nature and Extent of Sexual Dimorphism in Teeth and Fingerprints of Australian Twins

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Human teeth and fingerprints have similar embryological origins from epithelial-mesenchymal interactions. The aims of this study were to determine the nature and extent of sexual dimorphism in the teeth and fingerprints of Australian twins; and to investigate the influences of genetic, epigenetic and environmental factors. Serial casts of primary and permanent teeth, and rolled ink fingerprints of individuals aged 8 to 10 years from a single cohort of monozygotic and dizygotic Australian twins (103 males and 112 females) were gathered and analysed. The teeth dimensions measured were mesiodistal (MD) and buccolingual (BL) diameter. Molars were scored for expression of Carabelli's tubercle. The fingerprint traits recorded were ridge count (RC) and white lines count (WLC). Fingerprint pattern (FP) was classified by type. Data were statistically analysed using R statistical software. Results showed sexual dimorphism in both primary and permanent teeth, with the latter showing greater magnitude of differences than the former. There were some sexual dimorphism observed in the fingerprints. The correlations between teeth and fingerprints were found to be statistically significant but low in magnitude. The findings provide further evidence that the development of teeth and fingerprints are outcomes of Complex Adaptive Systems.

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Oral Health and Fertility from a Metal Period Site in Central Philippines

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This research aims to summarise the dental health and conditions observed on the Locality 1, Catanauan, Philippines skeletal sample. It reports on the prevalence of dental caries, antemortem tooth loss, alveolar defects and calculus for the 117 individuals within the sample. Fertility was assessed based on the proportion of subadults in the population. Oral health and fertility were then compared to five other Metal Period/Iron Age sites from both Mainland and Island Southeast Asia. The results showed that the Catanauan sample had low prevalences of the oral conditions recorded and a low fertility rate. When compared to other contemporaneous Southeast Asian sites, this is towards the lower end of what has been previously reported. The relationship between fertility and dental caries was evaluated, with clustering between mainland and island sites observed. The three Island sites had lower fertility and caries, whereas mainland sites had higher fertility and therefore higher caries. A possible hypothesis for this observation is the influence of differing lifeways between ISEA and MSEA on fertility, with mainland communities going through intensification of wet-rice agriculture during this time. The analysis of oral health and fertility in the Catanauan assemblage adds to our knowledge of dental health in Metal Period/Iron Age Southeast Asia, and highlights potential differences in fertility between ISEA and MSEA. This finding supports the purported relationship between fertility and dental disease previously hypothesised by Willis & Oxenham (2013).

What Can Dental Caries Prevalence and Position Tell Us About Diet and Behaviour in Human Evolution?

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The prevalence and position of carious lesions are often used to infer diet and behaviour in archaeological samples. In this study, caries prevalence was recorded in several extant primate and fossil hominin samples, and comparisons were made with published frequencies. Each tooth was macroscopically recorded, with lesion position and severity also noted and described. Ten carious teeth (14 lesions) were recorded in the South African fossil hominin specimens. All 14 lesions were on posterior teeth. In contrast, anterior teeth most commonly had carious lesions in extant apes. In particular, female chimpanzees had a high rate of lesions (9.30% of teeth). This supports previous studies showing wild non-human primates commonly suffer from anterior carious lesions, whereas in hominin and captive primates' posterior teeth are most affected. This likely reflects behaviour and dietary differences, with certain primates using their anterior teeth to process sugary and acidic foods (e.g., fruits) creating a cariogenic microenvironment at the front of the mouth. Similar processes likely explain why posterior tooth surfaces are predominantly affected in hominin groups. Caries prevalence typically ranges between 1–5% of teeth in non-agricultural hominin samples, with groups substantially above or below potentially indicating an unusual or specialised diet. Cariogenic biofilms and foods were common in the oral environment of most hominin groups. Further comparisons with extant primate species of differences in prevalence and position in the oral cavity may provide further insight into diet and behaviour in archaeological samples.

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Climate Cooling, Population Displacement and Nutritional Stress in the Prehistoric Jomon Hunter-Gatherers of Japan

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The pre-Neolithic Jomon of Japan (~15,000 to 2,300BP), were complex foragers known for their use of food storage to sustain large sedentary populations. During this period, various significant environmental changes occurred resulting in considerable social change. In particular climate cooling following the Holocene Thermal Maximum (~5,000 years ago), resulted in significant population decline and relocation from inland and eastern areas of Japan. This relocation has been argued to coincide with increasing nutritional stress as availability of terrestrial resources declined. Prior research including assessment of non-specific stress through linear enamel hypoplasia and cribra orbitalia demonstrated little evidence for increase in nutritional stress. Our research aimed at identifying specific nutritional disease (such as scurvy, rickets and osteomalacia) and evaluating the presence of anaemia, to identify whether there was an increase in nutritional stress with climate cooling in the western Honshu of Japan. Two sites: Ota (Middle Jomon) and Tsukumo (Final Jomon) were assessed for skeletal evidence of specific nutritional disease. High levels of scurvy and anaemia were identified at Ota and Tsukumo. However, the levels of scurvy at Tsukumo were statistically significantly higher than that at Ota (n=42, fisher's exact, p=0.000). Similarly, slightly higher levels of possible iron deficiency anaemia were identified in Tsukumo compared to Ota but this was not statistically significant (n=37, fisher's exact, p=0.429). This outcome presents supporting evidence for increased nutritional stress following climate cooling in the prehistoric western Honshu of Japan.

Preliminary Descriptions of Bone Histology in an Individual with a Possible Klippel-Feil Syndrome, Type III from Neolithic Northern Vietnam

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Bone cell function can be altered by pathological conditions and this information can be reconstructed using ancient human bone histological techniques. While previous studies have assessed the effects of immobilisation on bone metabolism in individuals from historic and modern contexts, and animal models, the effects of paralysis on bone modelling and remodelling have not yet been addressed in ancient humans. A differential diagnosis of a young adult male (MB07H1M9) from the Mán Bạc population in Northern Vietnam (3,500-3,800 cal. BP) suggests that he may have suffered from Klippel-Feil Syndrome, Type III, likely due to a congenital fusion of the spine. It is probable that his lower, and potentially upper, limbs were paralysed for at least ten years prior to death. In order to assess the extent to which his bone physiology was affected by a lack of functional adaptation to mechanical stimuli, samples of bone were studied from his anterior mid-diaphyseal humerus, and posterior mid-diaphyseal femur. Preliminary data suggest an almost complete cessation of bone remodelling, showing abnormal distribution and geometric properties of his cortical bone tissue. Ongoing analyses will elucidate in detail the histological changes in his bones. This study is the first to describe bone microstructural analysis of potential paralysis in the archaeological record.

The Impact of Ancestry and Behaviour on Bone Metabolism at Mán Bạc, Vietnam

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The influence of genetics on human bone microstructure has been alluded to in various analyses and has been studied at different bone hierarchical levels. However, research into its effect on bone histomorphometry in ancient human samples has not yet been undertaken. As bioarchaeological analyses can use histology to make inferences about past human behaviour, understanding ancestral effects on bone microstructure needs elucidating to improve broadscale, inter-population analyses of archaeological human samples. We test this using posterior femoral midshaft sections from n = 18 individuals of the Northern Vietnamese, Mán Bạc burial population (3,500-3,800 cal. BP) across three cranio-dental ancestral morphologies were defined: 1) Australo-Papuan, 2) North/Southeast Asian, and 3) mixed. Products of bone remodelling were measured using static histomorphometry techniques, and analysed in relation to femoral diaphyseal robusticity, accounting for age and sex. Comparing these within the population and ancestral groups yielded almost entirely consistently statistically significant biomechanical results as reconstructed from bone remodelling products ($p < 0.05$). Further, our findings indicate sex-based differences in behaviour, and more strongly support the ancestral underpinning on bone microstructure in this sample. The Australo-Papuan group had consistently larger secondary osteon morphologies, greater densities, and more robust diaphyseal shafts when compared to the other groups. Overall, this study suggests that ancestry is an important factor when human long bones aim to maximise strength and minimise mass to achieve metabolically optimised bone structures.

Re-Assessing the Model of Iron Age Health Deterioration in Northeast Thailand: A View From Non Ban Jak

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A biocultural model of health deterioration has been proposed for the Iron Age (420BCE-500CE) of the Mun River Valley in northeast Thailand. This model posits that agricultural intensification, naturally-and anthropogenically-driven environmental change, and social changes such as increased hierarchisation influenced host-pathogen dynamics, leading to increased stress in Iron Age communities. However, data supporting this model are limited due to poor Iron Age bone preservation and until recently, little research had been directed at understanding the links between social change and health. Relationships between social inequality and non-specific stress have now been examined in 196 individuals from the late Iron Age site of Non Ban Jak. In contrast to existing arguments for Iron Age hierarchy and a uniform health deterioration, this research suggests an ongoing transition to hierarchy and demonstrates the presence of heterogenous health impacts dependent on individual identity. Based on these findings, this paper advocates for the refinement of the model of health deterioration. Issues highlighted include the need for consideration of how social standing shapes societal roles and in turn, host-pathogen interactions and health; how selective mortality and frailty shape health in Iron Age communities; and the nature and timing of hierarchisation and their implications for health. Historical sources are shown to provide information on the social context of the past, broadening the scope of environmentally-and economically-focused models. Lastly, it is argued that models of health change need to account for both site-specific and individual-level processes, highlighting the need for more nuanced considerations of health in the past.

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The Impact of Tourist Presence on the Behaviour and Faecal Cortisol Levels of the Skywalker Hoolock Gibbon (*Hoolock Tianxing*) In China

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The tourism sector is a fast-growing contributor to the global economy and nature-based tourism (NBT) and particularly in Asia and Africa, it is booming. Through the creation of jobs and revenue NBT has the potential to combat deforestation in regions that are economically poor, but which are often areas of high biodiversity value. Inspired by the success of gorilla tourism in Uganda and Rwanda several tourism projects have been initiated in Southeast Asia and China utilising gibbons. Despite the existence of these programs no research has been done to investigate the impact of tourism on the behaviour of gibbons. We investigated the behavioural and stress response of a group of Skywalker hoolock gibbons (*Hoolock tianxing*) to the presence of tourists at Mt. Gaoligong National Nature Reserve (GNNR) in Yunnan, China. We found that the gibbons spent more time scanning their surroundings (*Bartlett* $\chi^2 = 14.33$, $df = 1$, p-value < 0.01) and less time inactive (*Bartlett* $\chi^2 = 11.38$, $df = 1$, p-value < 0.01) when in the presence of tourists. We did not find that the presence or not of tourists from day to day resulted in elevated faecal cortisol levels however we have not as yet determined whether their long-term exposure to tourists may be a factor in this finding. Our findings do indicate the presence of tourists is having an effect on the behaviour of Skywalker hoolock gibbons and highlights the importance of scientific research in implementing successful, low impact NBT programs.

The Influence of Olfactory Enrichment on the Behaviour of Two Captive New World Primates: Common Marmoset (*Callithrix jacchus*) and Black-Capped Capuchin (*Sapajus apella*)

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Environmental enrichment provides stimuli necessary for the optimal physiological and psychological well-being of animals. Due to primates having highly developed visual systems, there have been limited attempts to quantify the benefit of olfactory enrichment in captive populations. This research aimed to determine how a range of biologically relevant and non-relevant odours influenced behaviours in two captive new world primate species, *Sapajus apella* and *Callithrix jacchus*, at the National Zoo and Aquarium, Canberra. I hypothesised that while both species would respond to olfactory conditions, that their varying reliance on olfactory pathways would result in the *C. jacchus* group reacting to a greater extent. To address these aims, I presented three odours (rosemary oil, banana essence and white-tailed deer urine, *Odocoileus virginianus*) four times each to the two species using a 12-week randomised schedule. Using instantaneous scan sampling I measured inactivity levels, and the frequency direct cloth enrichment interactions (DCIs). Results of a group-level analyses showed both species significantly responded to different olfactory conditions presented, represented through a decrease in levels of inactivity. *S. apella* responded to banana in terms of both inactivity and DCI frequencies whereas *C. jacchus* was alternatively influenced by rosemary and deer urine in terms of reducing inactivity levels, reflecting the species' greater use of olfactory pathways for behaviour, however conditions did not affect DCI frequencies. These results highlight the potential of olfactory stimulus to be successfully used as a beneficial environmental enrichment for captive primates, supporting the constructive and ongoing development of enrichment programs at the National Zoo & Aquarium.

Geometric Morphometric Analyses of Cranial Morphology in Capuchin Monkeys at the Genus and Species Level

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Primatologists have long debated the systematics of capuchin monkeys, often examining cranial variation both interspecifically and between the two proposed genera, *Cebus* and *Sapajus*, to gain insights into their taxonomy. In this study, we employed geometric morphometric techniques to investigate cranial size and shape differences among capuchin monkeys at the genus and species level. We collected 3D landmark data for two *Cebus* species (*C. albifrons* and *C. capucinus*) and two *Sapajus* species (*S. apella* and *S. libidinosus*). We hypothesised that more substantial size and shape differences would exist between *Sapajus* and *Cebus*, compared to intraspecific differences between *C. albifrons* and *C. capucinus*. Our analyses revealed that *Cebus* and *Sapajus* are better differentiated by cranial shape than size, though *Sapajus* exhibits consistently larger values than *Cebus* in all cranial size measurements. Additionally, *C. capunicus* and *C. albifrons* are significantly different from each other in cranial size, but not in cranial shape, with *C. capucinus* exhibiting larger mean values in size. Overall, our results support the claim that *Sapajus* and *Cebus*, and *C. capucinus* and *C. albifrons* belong to distinct taxonomic groups and confirms geometric morphometric analyses as a valuable tool in distinguishing among capuchin taxa.

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Detailed Study of an Ancient Egyptian Mummified Hand From the Department of Anatomy, University of Melbourne

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The anthropological collections of the Anatomy department, University of Melbourne include two mummified specimens, presumably Egyptian: a severed head and a right hand. However, no archival information is associated with these specimens. Previous analysis revealed the head belonged to a female, aged between 18-25 years from the Ptolemaic Period of ancient Egypt. The aim of this project was to assess the time period, sex, age at death, and stature of the individual represented by the hand; and comment on the potential relationship between the hand and head specimens. The hand bones were scanned at the Melbourne Brain Centre, then reconstructed by manually segmenting the CT scans, then 3D printed. Sex and stature of the individual were estimated by comparing the measurements of the hand bones with known populations according to criteria in the literature; age of the individual was estimated utilising ossification stages of digits and carpals. The bandage was analysed by scanning electron microscopy and dated by radiocarbon techniques. Results indicate that the hand belonged to a female, above 18 years of age, with an estimated stature of approximately 154.66 cm. The bandage sample, dated to 359-115 BC during the Ptolemaic Period, was identified as linen, which was used as mummy wrappings in ancient Egypt. Our study revealed a circumstantial match between the hand and head specimens. The provenance of the specimens is still unknown, but could be attributed to Professor Frederic Wood Jones, former department head, who was involved in archaeological excavations in ancient Egypt.

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