



Australasian Society
for Human Biology

ASHB 2024

Conference Information Pack

Program

Abstracts



Introduction

With the significant rise in the cost of living, and the need to think more sustainably about how we approach conference attendance, we have decided to host the ASHB conference online in 2024. We hope that in doing so, we will also allow greater participation from the ASHB community at the in-person conference in Auckland in 2025.

The conference this year will take place from the 25th to the 27th of November 2024.

We are currently accepting abstracts for papers in the following formats:

- Standard conference presentations – 20 minutes, inclusive of 5 minutes for questions.
- Lightning round presentations – one slide with a 3-minute presentation.

The lightning round poster presentations will be a new feature for the 2024 conference, and are modelled on the highly successful [3-minute thesis competition](#), founded at the University of Queensland in 2008. This format offers students an fantastic opportunity to hone their skills at effective, and succinct, communication – something that will be invaluable in their future careers.

If you would like to present in either of these formats, please submit your abstract at the following link:

<https://www.australasianhumanbiology.com/conferences.html>

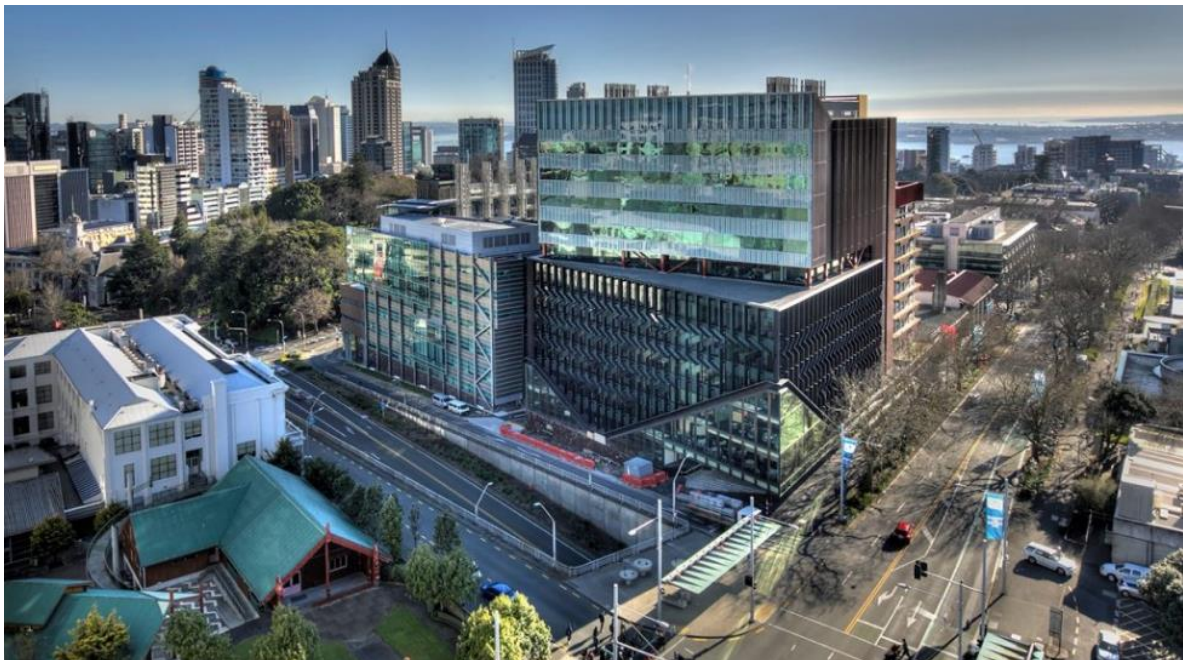


Figure 1: The 2025 ASHB Conference will be hosted at the University of Auckland.

Acknowledgement of Country

The Australasian Society for Human Biology acknowledges the Indigenous Custodians of the many traditional lands on which the conference delegates will be joining. We pay our respects to the Elders past and present, recognising that they hold the memories and traditions of culture and Country.

In-person conference hubs

We are aiming to organise regional conference hubs this year in major centres where delegates will be based. A list of hub convenors will be published ahead of the conference. If you are interested in being a hub convenor, please contact us at ashumanbio@gmail.com. The in-person hubs will provide a great way to enjoy the conference with other local ASHB members, with the daily sessions timed to also allow us to share a meal each day.

Hubs that are currently confirmed include:

- James Cook University, Townsville
- Griffith University, Brisbane
- Sydney University, Sydney
- Australian National University, Canberra
- University of Western Australia, Perth
- University of Auckland, Auckland NZ



Figure 2: We will be meeting in many beautiful places this year, including Naarm/Melbourne.

Pre-conference online social event

We will be hosting a pre-conference online social event this year where we can have a casual catch up with ASHB colleagues ahead of the conference. We will hold this event on the 24th of November at 4 pm AEDT.

Keynote speakers

Dr Rebecca Sear, Brunel University, London



Dr Sear is a demographer, anthropologist and human behavioural ecologist, who uses an interdisciplinary approach to understand human behaviour, through incorporating an evolutionary theoretical framework. Dr Sear is keen to promote a greater understanding of evolutionary explanations for human behaviour in the social and health sciences, and to facilitate interdisciplinary work more broadly. Dr Sear works on questions of demographic and public health interest, including fertility and reproductive development, child health and mortality, and health inequalities; and she has a particular interest in the family, and how family relationships influence these outcomes.

Keynote Abstract

21st century eugenics, scientific racism and academia: how science is manipulated to promote political ideology

Eugenics – the ideology that human populations can be ‘improved’ through policies such as selective reproduction – emerged as a popular political movement in the early 20th century. Its popularity ostensibly waned during the late 20th century, but eugenic ideology never went away, and discussion of eugenics is now resurging. In this talk, I will outline the instrumental role of academia in promoting eugenic ideology. I will focus particularly on the issue of scientific racism – the misuse of science to justify racial inequalities and hierarchies. Scientific racism aims to further the ideology that certain people and groups are inferior to others, a fundamental principle of eugenics. I will end by discussing how academia can counter this exploitation of the research community for political ends.

Dr Brenna Hassett, University of Central Lancashire, Preston

Dr Hassett is a biological anthropologist and archaeologist. Her research focuses on childhood, health, and growth in the past. Active research areas include dental anthropological approaches to understanding early development, health and growth in the transition to sedentary and agricultural living, and the history and practice of archaeology. She writes books for popular audiences on bones and teeth including 'Built on Bones: 15,000 Years of Urban Life and Death' and 'Growing Up Human: the Evolution of Childhood'. She is a Fellow of the Society of Antiquaries and is also one quarter of Team TrowelBlazers, a project advocating for equality and the recognition of women's contributions to the digging sciences.



Keynote Abstract

Life History under the microscope: what can we actually learn about human life history strategies by looking at growth?

Life history theory has formed a cornerstone of biological approaches to understanding the complex interplay between processes of growth and reproduction in determining the timing of life events from birth to death and all stops in between. A certain level of agency in our own species has left a trail of confusion, however, as the chronology of gestation, somatic growth, reproduction, and senescence are subsumed inside human cultures and societies and we are left fumbling after the outlines of life history strategies we so easily identify in other animals. This talk will look at the methods we have built to identify the chronology of life history in our species (and our relations), and what that data is actually telling us about our odd human lives, and particularly where the high-resolution chronology of growth locked in dental enamel can (and can't) take us.

Workshops

Introduction to Statistics

Facilitator: Dr Petra Vaiglova (Australian National University)

The workshop will provide participants with a basic understanding of how to design projects and interpret data in ways that are aligned with informative and reproducible statistical approaches. The focus will be learning to distinguish between descriptive and inferential statistics, asking questions that are based on estimation (rather than dichotomous) thinking, synthesizing existing knowledge using meta-analyses, and understanding how Open Science practices can help us fight the reproducibility crisis.

Discussion panel: Ethics in Biological Anthropology

Facilitators: Professor Siân Halcrow (University of Otago), Professor Alison Behie (Australian National University)

There is growing acknowledgement for the need to reflect on the ethics of our practices within biological anthropology, from working with non-human primates, aspects of the curation, use, and repatriation of human remains, and our work with local researchers and communities. Internationally, within bioarchaeology there is a growing awareness of the continuing impact of the profound lack of ethical standards in the collection, curation, and use of human skeletal remains for research and teaching purposes. Similarly, research methods for working with local communities are being challenged (e.g., ethnographic approaches which have a colonial history), and there is now a strong body of work applying Indigenous approaches to anthropological questions. This panel comprises a range of experts with diverse backgrounds in biological anthropology and at different career stages who will talk about the issues that are important in their praxis, including working with local researchers and communities, Indigenous research approaches, issues with the use, curation, and repatriation of human remains in museums, and the illicit trade of human remains.

Panel members

- Afua Adjei, independent researcher
- Aneka Anderson, University of Auckland, Te Kupenga Hauora Māori
- Alison Behie, Australian National University
- Siân Halcrow, University of Otago
- Damien Huffer, Honorary Research Fellow, School of Social Science, University of Queensland; Honorary Adjunct Professor, Dept of History, Carleton University; Co-founder, The Alliance to Counter Crime
- Jamie Metzger, Kaiārahi | Project Lead, Ngākahu: Te Korowai o te Aroha mo ngā Tūpuna | National Domestic Repatriation Programme, Te Papa Tongarewa

Conference fees

This year, we are asking delegates to pay a small fee to directly support the provision of student prizes in 2024 and travel prizes for the 2025 conference in Auckland. Registration for the conference will be **\$30 for ASHB members** and **\$50 for non-members**. You are also welcome to donate to support the student prizes and 2025 travel awards if you would like to.

Important dates

Abstract submissions due: 27 September 2024

Conference Registration due: 20 October 2024

Program released: 30 October 2024

Pre-conference social: 4 pm AEDT, 24 November 2024

Conference dates: 25 to the 27 November 2024

Auckland conference: scheduled for late November/early December 2025

Important links

Conference registration: <https://forms.gle/sQpga7sGGi5DJWM38>

Program Summary

Pre-conference social: 4 pm AEDT, 24 November 2024

Monday 25th November 2024

Session	Perth	AEDT	Auckland
1	8:00 – 9:40 am	11 am – 12:40 pm	1:00 – 2:40 pm
2 (Lightning round)	9:45 – 10:15 am	12:45 – 1:15 pm	2:45 – 3:15 pm
Break	10:15 – 11:00 am	1:15 – 2:00 pm	3:15 – 4:00 pm
3	11:00 am – 12:40 pm	2:00 – 3:40 pm	4:00 – 5:40 pm

Keynote address (Dr Sear) 5 pm **AEDT** (2:00 pm Perth, 7:00 pm Auckland)

Tuesday 26th November 2024

Session	Perth	AEDT	Auckland
4 and 5 (concurrent)	8:00 – 9:40 am	11 am – 12:40 pm	1:00 – 2:40 pm
Break	9:40 – 10:30 am	12:40 – 1:30 pm	2:40 – 3:30 pm
3	10:30 am – 12:10 pm	1:30 – 3:10 pm	3:30 – 5:10 pm

Keynote address (Dr Hassett) 5 pm **AEDT** (2:00 pm Perth, 7:00 pm Auckland)

Wednesday 27th November 2024

Session	Perth	AEDT	Auckland
7	8:00 – 9:40 am	11 am – 12:40 pm	1:00 – 2:40 pm
8 (Lightning round)	9:45 – 10:15 am	12:45 – 1:15 pm	2:45 – 3:15 pm
Break and AGM	10:15 – 11:25 am	1:15 – 2:25 pm	3:15 – 4:25 pm
9	11:25 am – 1:05 pm	2:25 – 4:05 pm	4:25 – 6:05 pm

Awarding of Student Prizes: 4:05 pm AEDT (1:05 pm Perth, 6:05 pm Auckland)

Thursday 28/11/2024

Discussion panel: Ethics in Biological Anthropology

12 noon AEDT (9 am Perth, 2 pm Auckland) to 1 pm AEDT (10 am Perth, 3 pm Auckland)

Facilitators: Professor Siân Halcrow (University of Otago), Professor Alison Behie (Australian National University)

There is growing acknowledgement for the need to reflect on the ethics of our practices within biological anthropology, from working with non-human primates, aspects of the curation, use, and repatriation of human remains, and our work with local researchers and communities. Internationally, within bioarchaeology there is a growing awareness of the continuing impact of the profound lack of ethical standards in the collection, curation, and use of human skeletal remains for research and teaching purposes. Similarly, research methods for working with local communities are being challenged (e.g., ethnographic approaches which have a colonial history), and there is now a strong body of work applying Indigenous approaches to anthropological questions. This panel comprises a range of experts with diverse backgrounds in biological anthropology and at different career stages who will talk about the issues that are important in their praxis, including working with local researchers and communities, Indigenous research approaches, issues with the use, curation, and repatriation of human remains in museums, and the illicit trade of human remains.

Panel members:

- Afua Adjei, Bioarchaeologist, Independent
- Anneka Anderson, Medical Anthropologist, Senior Lecturer, The University of Auckland, Te Kupenga Hauora Māori
- Alison Behie, Primatology, Professor, The Australian National University
- Siân Halcrow, Bioarchaeologist, Professor, University of Otago
- Damien Huffer, Illicit trade of human remains, Honorary Research Fellow, School of Social Science, University of Queensland; Honorary Adjunct Professor, Dept of History, Carleton University; Co-founder, The Alliance to Counter Crime
- Jamie Metzger, Repatriation expert, Kaiārahi | Project Lead, Ngākahu: Te Korowai o te Aroha mo ngā Tūpuna | National Domestic Repatriation Programme, Te Papa Tongarewa

Panel organisation:

Each author will present 3-4 mins max on the ethical issues they face within their own research. This will include dealing with questions: What are the most pressing ethical issues you see for your practice today; there is a push for the development of ethical policies for societies and institutions around the world; and how do you feel biological anthropology is placed to contribute to such initiatives? This will then be followed up with

a Q & A moderated by chair Siân Halcrow about how we, as a discipline, may be able to contribute to address and improve these concerns.

Workshop: Introduction to Statistics

2 pm AEDT (11 am Perth, 4 pm Auckland) to 3 pm AEDT (12 noon Perth, 5 pm Auckland)

Facilitator: Dr Petra Vaiglova (Australian National University)

The workshop will provide participants with a basic understanding of how to design projects and interpret data in ways that are aligned with informative and reproducible statistical approaches. The focus will be learning to distinguish between descriptive and inferential statistics, asking questions that are based on estimation (rather than dichotomous) thinking, synthesizing existing knowledge using meta-analyses, and understanding how Open Science practices can help us fight the reproducibility crisis.

Notes: * denotes the student is being considered for the student award

Author denotes that they will deliver the paper

Day 1

Session 1

Perth	AEDT	Auckland
8:00 – 9:40 am	11 am – 12:40 pm	1:00 – 2:40 pm

Sex Differences in Romantic Love: An Evolutionary Perspective

Adam Bode*, Severi Luoto and Phillip S Kavanagh.

Mortuary practices and paleodemography at the Kolana cemetery site on Alor Island, East Nusa Tenggara, Indonesia

Pratiwi Yuwono*, Melandri Vlok, Fayeza Shasliz Arumdhati, Anna Pineda, Renaud Joannes-Boyau, Maxime Aubert, Marlon Ririmase, Harriyadi, Rama Siswantara, Mahirta and Stuart Hawkins.

Investigating bone diagenesis in adult femora from the churchyard of St Anne, Belgium

Alexandra Walsh*, Lolita Trenchat, Katrien Van de Vijver and Eline M.J. Schotsmans

Investigating osteoporosis at Iron Age Non Ban Jak, Northeast Thailand

Jessica Hurst*, Kate Domett, and Anna Willis

Evidence of Care in the Grave; a Bioarchaeology of Care case study of Osteoarthritis in Early Bronze Age Ireland

Stephanie Robinson

Session 2 – Lightning round

Perth	AEDT	Auckland
9:45 – 10:15 am	12:45 – 1:15 pm	2:45 – 3:15 pm

Peptides in teeth indicate biological sex in poorly preserved ancient individuals

Ella Patrick, Judith Littleton, Caitlin Smith and Martin Middleditch

The Palaeobiology of the Late Miocene hominid *Hispanopithecus laietanus* faciodental complex with reference to the contemporary hominids *Rudapithecus*, *Graecopithecus* & *Sivapithecus*

David W. Cameron

Obesity and placental function: Is the role of adiponectin established?

Rebekah Skuba*, David A. Coall, Julie Sartori and Jemma Berry

Decrease of sex hormones during menopause contributes to risk of Alzheimer's Disease

Chloe Tselis*, Ella Crossley, Tahlia Smerdon, Melandri Vlok

Understanding Anosmia in COVID-19: Viral Entry and Olfactory Dysfunction

Edward Black*, Sumanth Bodidi, Amal Joseph, Oliver Somy and Melandri Vlok

Stature Variation of Population in Indonesian Islands

Rizka Fitri Ana

Session 3

Perth	AEDT	Auckland
11:00 am – 12:40 pm	2:00 – 3:40 pm	4:00 – 5:40 pm

Sex Estimation by Discriminant Function Analysis of Long Bones in Prehistoric Southeast Asian Populations

Sophorn Nhoem* and Kate Domett

Development, validation and application of a three-dimensional scanning method for measurement of dental arches and tooth crowns

Dilan Patel*, Sadaf Sassandi, Angela Gurr, Matthew Brook O'Donnell, Maciej Henneberg and Alan Henry Brook

Applications of Resilience Theory in Bioarchaeology: A Reinterpretation of Social Change at late Prehistoric Non Ban Jak, Upper Mun River Valley, Thailand

Phoebe E. Barnes*, Stacey M. Ward

Examining the Grave Goods of Non Ban Jak to determine how Personhood was established and reinforced at an Iron Age Thai site

Claire E. Weeden* and Stacey M. Ward

Endometriosis aetiology theories and pathophysiological impact on pregnancy

Erin Burtenshaw*, Lauren Mitnovetsky, Lucy Williams and Melandri Vlok

Day 2

Session 4 – concurrent

Perth	AEDT	Auckland
8:00 – 9:40 am	11 am – 12:40 pm	1:00 – 2:40 pm

Combining dental, skeletal and historical data enhances understanding of a rare South Australian archaeological sample

(11 am AEDT)

Angela Gurr, Alan Henry Brook and Matthew Brook O'Donnell

Parent-offspring conflict in age at weaning in a sample of British women

(11:20 am AEDT)

David Waynforth

Scaling of femur bone histology in anatomical and lifestyle contexts

(11:40 am AEDT)

Justyna J. Miszkiewicz, Rita Hardiman

Resource Competition in Family Care: How Spousal Care Influences Grandchild Support

(12 noon AEDT)

Hans Hämäläinen, Antti O. Tanskanen, Mirrka Danielsbacka

Incorporating virtual reality into practical skill training

(12:20 pm AEDT)

Jemma Berry, Sara Hansen, Luke Brook, Wyatt De Souza, Brennen Mills

Session 5 – concurrent

Perth	AEDT	Auckland
8:00 – 9:40 am	11 am – 12:40 pm	1:00 – 2:40 pm

Life in the Industrial Revolution: Histological Evidence for Survived Early Life Stress in Teeth of Adults and Children from New Bunhill Fields Burial Ground, London (1821-1853 AD)

(11 am AEDT)

Lucy Kavale-Henderson*, Annie Sohler-Snoddy, Charlotte King, Claire Cameron, Hallie Buckley, and Carolina Loch

Multi-Indicator Knee Ossification Timings on Computed Tomography: A Bayesian Comparison of Contemporary Australian and American Subadults

(11:20 am AEDT)

Taliah Swart*, Clair Alston-Knox, Samantha Rowbotham, Soren Blau and Nicolene Lottering

Reconstructing nursing behaviour in captive macaques from tooth dentine

(11:40 am AEDT)

Emma L. Sudron*, Janaína N. Ávila, Jelmer Eerkens, Katie Hinde, Yue Wang, Ian S. Williams; Tanya M. Smith

Mortuary Practices in Iron Age Siberia. Understanding the freezing effect by studying ancient and modern human remains

(12 noon AEDT)

Lolita Trenchat*, Gino Caspari, Marco Milella, Shari Forbes, Michelle Drapeau and Eline M.J. Schotsmans

A comparative evolutionary investigation into Pan thanatology

(12:20 pm AEDT)

Katherine H. McLean*

Session 6

Perth	AEDT	Auckland
10:30 am – 12:10 pm	1:30 – 3:10 pm	3:30 – 5:10 pm

Increasing the accuracy of measuring dental arch dimensions: validating new 3D software
Toby Hughes, Angela Gurr, Matthew Brook O'Donnell, Jamal Giri and Alan Henry Brook.

The impacts of human self-domestication on testosterone levels, and social cohesion
Ariella Cappe*, Dominique Hussin, Noa Jacobson, Toby Kaldor, Melandri Vlok

A New Look at an Old Face: The Hoà Binh Late Pleistocene Pongo skull and other faciodental fragments from breccia caves in Vietnam – a morphometric assessment with taxonomic implications

David W. Cameron, Russell L. Ciochon, Vu The Long, Viet Nam Academy of Social Sciences, Institute of Archaeology, Hanoi, and Nguyen Anh Tuan

Exploring a biocultural approach for the identification of trans individuals in forensic archaeology

Lawrence J.A. Clarkson*, Stacey M. Ward

How does testosterone levels influence aggressive behaviours in males versus females?

Sophie Pollard*, Rose Borland, Daniela Laman, Leoma Johnson and Melandri Vlok

Day 3

Session 7

Perth	AEDT	Auckland
8:00 – 9:40 am	11 am – 12:40 pm	1:00 – 2:40 pm

Stochasticity in age-at-death: Implications for bioarcheology as assessed through generative modelling

Bronwyn Wyatt*, Amy Anderson, Stacey Ward and Laura A. B. Wilson

170 years on: Exploring the Higher Mortality Rate of Women aged 40-64 years during the 1854 Soho Cholera Outbreak

Samantha Maitland*

Congenital blindness and neuroplasticity: The brain can rewire itself to heighten other compensatory senses in blind individuals

Luke Armstrong, Renée Joseph, Suhita Suryawanshi, Lauren Young*, Melandri Vlok

More than Childbirth: Unveiling the Risks of Marriage on Women's Mortality in Tang Dynasty China

Yan Liu*

Investigating hyperflexion and multistage mortuary practices in archaeological and forensic human remains

Anna G. Cohen*, Isabelle Crevecoeur, Stephane Rottier and Eline M.J. Schotsmans

Session 8 – Lightning round

Perth	AEDT	Auckland
9:45 – 10:15 am	12:45 – 1:15 pm	2:45 – 3:15 pm

Challenging perceptions: Health and stigma in the gold mining period of Otago, New Zealand

Kirsten Rutten*, Hallie Buckley, and Stephanie Woodley

Paleopathological Evidence: Non-Ban Jak, Northeast Thailand

Z Callanan, K Domett, P Horwood, S E Halcrow, H Buckley, D O'Reilly, L Shewan, and C Higham

The Development of Trichromatic Vision in Catarrhines

Oscar McLelland*, Claudia Thomas, Sidney Mahinya, Pia Langlois, Brayden King, Melandri Vlok

Bare to the bone: a comparison of human bone quality analysis using dual-energy X-ray absorptiometry (DXA) before and after skeletonization

L Michelman*, K Domett, A Trollope, and H Anscorb

Comparative Analysis of Advanced Imaging Techniques for Sex Estimation

Isabella Crebert*, Ray Nickson, Dilan Seckiner, and Xanthe Mallett

PFAS chemical exposure results in significant delays in female pubertal development

Myfanwy Hill-Caulfield*, Grace Smee, Sarvani Thapaliya, Joseph Wang, Emma Wong, and Melandri Vlok

Care In Biological Anthropology

Heather Battles and Judith Littleton

Session 9

Perth	AEDT	Auckland
11:25 am – 1:05 pm	2:25 – 4:05 pm	4:25 – 6:05 pm

Demography of a Pioneer Cemetery: now and then

Christine Cave

Evolutionary–developmental (evo-devo) dynamics of hominin brain size

Mauricio González-Forero

Osteological sex estimation vs. proteomic sex determination – what effect do our techniques have on the way we view the people of the past?

Charlotte L. King, Anne Marie Snoddy, Torsten Kleffman, Peter Petchey and Hallie R. Buckley

How consistent are interpretations of finger-fluting dimensions with different approaches to gathering data?

Bruce Floyd and Heather Battles

Molar Enamel Thickness Variation in Baboons

Akiko Kato, Maya Bharatiya, Leslea J. Hlusko, W. Scott McGraw, Larissa Swedell and Tanya M. Smith

Abstracts

Stature Variation of Population in Indonesian Islands

Rizka Fitri Ana, Universitas Brawijaya

Studying human variation is crucial for understanding human adaptation and evolution. Indonesia, with its unique landscape, requires further research on human variation from multiple perspectives. With multiple islands, Indonesia's landscape may lead to unique human variations due to the island effect. Factors such as population history and humidity also contribute to human variation, but human stature and body mass represent practical responses to available diets on each island. Therefore, this study aims to investigate the variation of human stature and body mass in Indonesia based on its islands. The data for this study will be collected from Pulungan et al.'s (2018) research published in *Acta Scientific Paediatrics*, which includes more than 300,000 data points on the height and weight of children and adolescents from 33 Indonesian provinces. The data from different islands will be analyzed using statistical tests such as ANOVA or Mann-Whitney U test in SPSS. The expected results will be discussed in relation to possible factors influencing the variation and similarity, such as diet, migration, population history, and climate. In conclusion, this study aims to provide insights into the variation of the future Indonesian population.

Congenital blindness and neuroplasticity: The brain can rewire itself to heighten other compensatory senses in blind individuals

Luke Armstrong (School of Health Sciences, The University of Notre Dame Australia, Sydney), Renée Joseph (School of Health Sciences, The University of Notre Dame Australia, Sydney), Suhita Suryawanshi (School of Health Sciences, The University of Notre Dame Australia, Sydney), Lauren Young (School of Health Sciences, The University of Notre Dame Australia, Sydney), Melandri Vlok (School of Health Sciences, The University of Notre Dame Australia, Sydney)

Congenital blindness is vision loss or severe visual impairment that is present at time of birth. Research has suggested that congenital blindness has considerable impact on the development of the brain, post-birth. Individuals with congenital blindness typically establish new neural pathways in the absence of vision, enhancing compensatory sense and cognitive functions. Furthermore, regions of the brain directly associated with visual processing can have significant size reduction. This review assesses the evidence for compensatory pathways in the brain given loss of visual processing pathways. Research demonstrates that increased white matter connectivity in the frontal and temporal lobes is associated with enhanced language processing and increased cortical volume and multisensory integration (of the non-visual senses) appears to enable greater potential for better cognition, memory, and heightened smell, taste, touch, and hearing. These factors allow for development of alternate strategies for navigating the environment without sight. However, overall findings are varied regarding adaptive neuroplasticity, indicating confounding factors are at play, such as key development periods, that require further research to be teased out.

Applications of Resilience Theory in Bioarchaeology: A Reinterpretation of Social Change at late Prehistoric Non Ban Jak, Upper Mun River Valley, Thailand.

Phoebe E. Barnes, School of Archaeology and Anthropology, Australian National University, Acton, ACT 2601, Australia; Stacey M. Ward, School of Archaeology and Anthropology, Australian National University, Acton, ACT 2601, Australia.

The Iron Age site of Non Ban Jak (300-800 CE) has formed the focus of recent bioarchaeological research exploring biosocial responses to widescale environmental and economic change in the Upper Mun River Valley of northeast Thailand (UMRV). The use of resilience theory can provide new and more nuanced perspectives on social change. From this perspective, 'resilience' refers to a community's ability to adapt to change, while 'rigidity traps' are actions taken by the community that unintentionally prevent biosocial adaptation to a given circumstance, resulting in unintended consequences such as increased physiological stress. We aim to demonstrate the applicability of resilience theory in Southeast Asian bioarchaeology through applying this perspective to published information on the site of Non Ban Jak. This reinterpretation suggests several rigidity traps reduced resilience at Non Ban Jak, including the gradual institutionalisation of a rigid social structure; a rigid connection to place, cemented through the practice of house burial; and decreased dietary diversity. This decreased social resilience may be reflected in decreased physiological resilience, as indicated by evidence of deteriorating health over time. Overall, several biosocial factors should be considered together to gain a greater understanding of human actions and reactions to change.

Care In Biological Anthropology

Heather Battles, University of Auckland; Judith Littleton, University of Auckland

We review the current state of research and thinking on 'care' across the subfields of biological anthropology (bioarchaeology, evolutionary anthropology, primatology). We also review literature on care in other fields, asking what work beyond our discipline can bring to our thinking in biological anthropology.

After first considering the range of what is meant by 'care' in academic work, we identify a number of essential aspects of 'care': relationality, social and physical transaction, embedded practice, multiple scales, and frequent moral conception. We discuss recurrent debates and tropes in care literature, such as care as a uniquely human trait, as altruistic, and as rational choice. We consider issues of variation and ambiguity, and finally identify a number of domains in which thinking about care can be productive and revealing for bioanthropology.

We argue that as bioanthropologists, care is good to think with. We suggest that rather than engaging with care as a labelling exercise, thinking through care and its diversity might push us into new directions. We advocate for avoiding of imposing prejudgment on the forms of care, recognising the biases of our data, and considering cross-cultural diversity.

Incorporating virtual reality into practical skill training

Jemma Berry, Edith Cowan University; Sara Hansen, Edith Cowan University; Luke Brook, Edith Cowan University; Wyatt De Souza, Edith Cowan University; Brennen Mills, Edith Cowan University

There are a variety of skills Forensic Scientists require when undertaking crime scene investigations, ranging from meticulous documentation, through to appropriate evidence collection, packaging and handling. Teaching these individual forensic skills in classroom and laboratory settings is relatively straightforward, however these skills are rarely undertaken in isolation.

To provide an environment in which students could apply their knowledge and develop their “big picture” skills, we have developed a progressive learning pathway that combines virtual reality (VR) and live crime scene simulations. The VR crime scene provides students with guided instructions and instant feedback in a low-risk environment, while allowing them to make and learn from their mistakes in real-time. Following this with an analogous live simulation has provided a stepped learning pathway that builds on techniques and protocols incrementally, fostering confidence in a safe learning environment and more thoroughly preparing students for the complexities of crime scene investigation.

Despite the advantages of using VR to immerse students in an authentic learning environment and provide an accessible experience for all, we found that very few students had prior experience with VR technology. Additional support needed to be provided to guide students through the simulation, requiring extra time to reach completion and an increase in student frustration. To address this challenge, we have incorporated a short, pre-VR equipment tutorial into our learning pathway, allowing for a smoother transition from theory to practice and improving student outcomes.

Understanding Anosmia in COVID-19: Viral Entry and Olfactory Dysfunction

Edward Black (School of Health Sciences, The University of Notre Dame Australia, Sydney), Sumanth Bodidi (School of Health Sciences, The University of Notre Dame Australia, Sydney), Amal Joseph (School of Health Sciences, The University of Notre Dame Australia, Sydney), Oliver Somy (School of Health Sciences, The University of Notre Dame Australia, Sydney), Melandri Vlok (School of Health Sciences, The University of Notre Dame Australia, Sydney)

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is the virus that causes coronavirus disease 2019, more commonly known as COVID-19. Olfactory dysfunction, such as anosmia (complete loss of smell) and hyposmia (a reduced sense of smell), is a commonly reported symptom among COVID-19 patients. In 2021, 60.5% of COVID-19 patients reported smell loss, which underscores the prevalence of this symptom. These symptoms are usually temporary but can severely impact quality of life, particularly if they persist after the virus subsides. This review investigates the mechanisms by which SARS-CoV-2 causes anosmia and hyposmia in infected patients. Studies show that SARS-CoV-2 enters host cells by binding to angiotensin-converting enzyme 2 (ACE2) receptors, which are expressed in various cells, including those in the olfactory epithelium. This binding facilitates viral entry, aided by transmembrane serine protease 2 (TMPRSS2), which enables the fusion of the viral envelope with

the host cell membrane. In the olfactory system, the infection of supporting cells—including sustentacular cells—leads to hyposmia and, in severe cases, anosmia, by disrupting the critical support and function of olfactory neurons, essential for detecting smells. In addition to ACE2 and TMPRSS2, Neuropilin-1 (NRP1) may further enhance viral entry, particularly in cells with low ACE2 expression, thereby increasing the potential for olfactory dysfunction. Understanding these mechanisms may contribute to developing targeted clinical interventions for olfactory dysfunction in COVID-19 patients.

Understanding Anosmia in COVID-19: Viral Entry and Olfactory Dysfunction

Edward Black (School of Health Sciences, The University of Notre Dame Australia, Sydney), Sumanth Bodidi (School of Health Sciences, The University of Notre Dame Australia, Sydney), Amal Joseph (School of Health Sciences, The University of Notre Dame Australia, Sydney), Oliver Somy (School of Health Sciences, The University of Notre Dame Australia, Sydney), Melandri Vlok (School of Health Sciences, The University of Notre Dame Australia, Sydney)

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) is the virus that causes coronavirus disease 2019, more commonly known as COVID-19. Olfactory dysfunction, such as anosmia (complete loss of smell) and hyposmia (a reduced sense of smell), is a commonly reported symptom among COVID-19 patients. In 2021, 60.5% of COVID-19 patients reported smell loss, which underscores the prevalence of this symptom. These symptoms are usually temporary but can severely impact quality of life, particularly if they persist after the virus subsides. This review investigates the mechanisms by which SARS-CoV-2 causes anosmia and hyposmia in infected patients. Studies show that SARS-CoV-2 enters host cells by binding to angiotensin-converting enzyme 2 (ACE2) receptors, which are expressed in various cells, including those in the olfactory epithelium. This binding facilitates viral entry, aided by transmembrane serine protease 2 (TMPRSS2), which enables the fusion of the viral envelope with the host cell membrane. In the olfactory system, the infection of supporting cells—including sustentacular cells—leads to hyposmia and, in severe cases, anosmia, by disrupting the critical support and function of olfactory neurons, essential for detecting smells. In addition to ACE2 and TMPRSS2, Neuropilin-1 (NRP1) may further enhance viral entry, particularly in cells with low ACE2 expression, thereby increasing the potential for olfactory dysfunction. Understanding these mechanisms may contribute to developing targeted clinical interventions for olfactory dysfunction in COVID-19 patients.

Sex Differences in Romantic Love: An Evolutionary Perspective

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Evolutionary selection pressures, most notably sexual selection, have created (and continue to sustain) many psychobehavioral differences between females and males. One such domain where psychobehavioral sex differences may be prominent is romantic love. The ways in which females and males experience and express romantic love differently has been studied in psychology as well as in the arts down the ages; however, no studies have focused specifically on romantic love using validated measures of romantic love focusing solely on people who are currently experiencing this form of love. This study investigated sex differences in features and aspects of romantic love among 808 young adults experiencing romantic love. Univariate and multivariate analyses were used to identify sex differences in the number of times participants had fallen in love, when they fell in love relative to when they started their romantic relationship, intensity of romantic love, obsessive thinking about a loved one, and commitment. Univariate analyses identified small sex differences in number of times in love, love progression, intensity of romantic love, and obsessive thinking about a loved one. Multivariate analyses, controlling for several variables believed to influence romantic love, found a small association between biological sex and obsessive thinking about a loved one. There were also very small associations between biological sex and number of times in love, love progression, and intensity of romantic love. The findings are considered with reference to two evolutionary theories: sexual selection and the theory of co-opting mother infant bonding in the evolutionary history of romantic love.

Endometriosis aetiology theories and pathophysiological impact on pregnancy

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Endometriosis is a chronic gynaecological condition experienced by many women between menarche and menopause - characterised by ectopic extrauterine growth of tissue similar to the uterus lining. Some women are asymptomatic, which exacerbates diagnostic barriers, but many women experience debilitating dysmenorrhoea, irregular menses, menorrhagia, mental health complications and reduced fertility. Further research is necessary to address critical gaps in the current clinical understanding of endometriosis - clinically manifesting as widespread underdiagnosis and misdiagnosis due to its unclear aetiology, wide and variable set of symptoms and lack of definitive non-invasive diagnostic strategies. To address these gaps, this research project aims to explore aetiological theories and how endometriosis pathophysiology impacts the menstrual cycle, conception, and adverse pregnancy outcomes. Four prominent aetiological theories, which exist in the recent literature will be explored: retrograde menstruation, immune dysregulation, cell metaplasia and mobile stem cells. Furthermore, pathophysiological outcomes of endometriosis including anovulation, impaired folliculogenesis, hydrosalpinx and ovarian oxygen deficiency will be evaluated in terms of their impact on the menstrual cycle and chances of conception. The extent of this negative physiological impact will be considered in direct comparison to healthy menstrual and pregnancy physiology. Finally, the influence of these pathophysiological complications will be extrapolated to understand their correlation with

infertility rates and adverse pregnancy outcomes - including ectopic pregnancies, preterm births, placenta previa, gestational hypertensive disorders, stillbirths and miscarriages.

Paleopathological Evidence: Non-Ban Jak, Northeast Thailand

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Focusing on the paleopathological evidence from the skeletal remains discovered during the excavation of Non Ban Jak, Northeast Thailand, this study aims to identify and understand health and social responses to infectious disease, in ancient Southeast Asian populations. Dating from the late Iron Age to early Historic period, this site offers an opportunity to examine a relatively well-preserved collection of 215 individuals. Set within a One Health framework, the study integrates human, animal, and environmental health, examining how pathogens affected human populations and their relationships with animals and the environment. Pathological changes indicative of leprosy, tuberculosis, and other infectious diseases have been identified within the Non Ban Jak community, providing insights into disease epidemiology in prehistoric Thailand. Consideration will be given to the impact these infectious diseases had on the Non Ban Jak community, exploring healthcare practices, societal reactions to contagious outbreaks, and the role infectious disease has in shaping social stratification, migration, and demographics. This interdisciplinary approach underscores the adaptive responses of the Non Ban Jak people to ongoing health challenges and investigates modifications in behaviour and community structure in response to disease prevalence. Looking to the future, research should seek to incorporate DNA and proteomic analysis to identify pathogenic sequences and specific biomarkers. Providing direct evidence of the Mycobacterium complex, unravelling the molecular mechanisms of the human body's response to this deadly contagion.

A New Look at an Old Face: The Hoà Binh Late Pleistocene Pongo skull and other faciodental fragments from breccia caves in Vietnam – a morphometric assessment with taxonomic implications

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Here we provide a morphometric analysis of the Hoà Binh adult female Pongo skull along with other near contemporary Late Pleistocene fragmentary faciodental material from northern Vietnam. The Hoà Binh specimen (Late Pleistocene) is shown to be specifically distinct from extant *P. pygmaeus*, *P. abelii* and *P. tapanuliensis*. Based on its large size and unique morphology to the extant species we allocate it to the large Pongo species observed in the nearby Lang Trang Cave, *P. ciochoni* (80 ka). The same applies to the unallocated Nguom Rockshelter hominid (Late Pleistocene) which is similar in size and shape to the Hoà Binh specimen. The other large unallocated mandibular fragment and M1-M2 of Keo Leng Cave, specimen KL 66-103 (42-20 ka), is distinct from extant and all other fossil hominids. As such it cannot be allocated to

P. ciochoni, or any extant Pongo species, and it cannot be allocated to the smaller species P. devosi, indicating it represents a new Late Pleistocene species of Pongo.

The Palaeobiology of the Late Miocene hominid Hispanopithecus laietanus facioidental complex with reference to the contemporary hominids Rudapithecus, Graecopithecus & Sivapithecus

David W. Cameron, School of Medicine and Psychology, The Australian National University.

This presentation examines the anatomical and morphometric facioidental complex of Hispanopithecus to assess its proposed derived 'Asian' morphotype facial features while retraining a more primitive 'African' dental morphotype. This combined with its positional and locomotion repertoire provides a unique opportunity to examine the adaptation of this hominid in relation to developmental and functional process. The three other contemporary hominids, Rudapithecus, Graecopithecus and Sivapithecus, are used to further explore likely mosaic evolutionary forces (associated with adaptations) helping to define the life trajectory of these Late Miocene fossil hominids.

The impacts of human self-domestication on testosterone levels, and social cohesion

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The self-domestication hypothesis maintains that humans evolved through selection against aggression, fostering greater social cohesion and enabling the formation of complex societies. Pleistocene modern human communities were primarily nomadic, hunter-gatherer groups in which cooperation was essential for survival amid fluctuating resources and low yields. Over time, this cooperation likely drove evolutionary transformations, reducing aggression and enhancing social bonds to lay the foundation for more stratified societal structures. Experimental research into the relationship between domestication, lowered aggression and social cohesion has been demonstrated through the Belyaev fox experiment. Results of this study plausibly mirror human evolutionary processes by demonstrating testosterone reduction through selection against aggression. With focus on the evolutionary implications, less is understood about the underlying physiological mechanisms that underpin this process. In this study, we sought to identify the physiological mechanisms behind this aggressive reduction, focusing on two fundamental hypotheses: (1) in utero-testosterone changes and/or (2) neural crest cell (NCC) development. In hypothesis one, we draw upon a Cieri et al. (2014)'s study on human craniofacial feminization to demonstrate that testosterone/receptor reduction resulted in observable skull feminisation, evidencing evolutionary hormonal adaptations. The second hypothesis draws upon research by Wilkin et al. (2014), proposing that domestication syndrome is associated with structural hypoplasia caused by changes to NCC migration pathways. Collectively, these findings suggest that human self-domestication was driven by either, or both, in-utero hormonal adaptations or structural modifications involving NCCs, resulting in reduced aggression and enhanced social cooperation. Considering current gaps in empirical studies,

future research should focus on further unravelling the hormonal and neural underpinnings of self-domestication to better understand human biosocial evolution.

Demography of a Pioneer Cemetery: now and then

Dr Christine Cave, Australian National University

The cemetery of a pioneer community displays different demography to that of a long-used cemetery. This is because frontiers are usually peopled by the young and robust, with a strong bias towards male pioneers. As time progresses, the demography of the cemetery will become more normal.

This paper will examine two frontier cemeteries, one still in use today, and one from Early Anglo-Saxon England.

The modern Australian cemetery had its first interment in the 1970s; it served a community of farmers in newly opened irrigation country and displays many of the distinctive patterns of a classic frontier cemetery. The early Anglo-Saxon cemetery of Mill Hill, Deal, Kent provides clues that it may also be a pioneer cemetery. One anomaly displayed in this cemetery is the large proportion of young dead, less than 25 years old at death, giving it an abnormal demographic profile.

Can examination of it as a pioneer cemetery, in comparison with the modern, known pioneer cemetery confirm its pioneer status, or suggest another reason for the demographic anomaly?

Exploring a biocultural approach for the identification of trans individuals in forensic archaeology

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Members of the trans community are disproportionately impacted by discrimination, marginalisation, and violence in many parts of the world today, with at least 321 trans and gender diverse people reported murdered between 1 October 2022 and 30 September 2023 worldwide. Despite the disproportionate impacts of crime on the trans community, there is a serious lack of anthropological methods available for identifying the skeletonised remains of these individuals, leading to misidentification and misgendering of the deceased. This pilot study aimed to explore biocultural signals of trans identity, to determine whether taking a more holistic approach to skeletal identification could assist the identification of trans people in forensic investigations. A preliminary literature review was conducted, and information collected regarding potential biocultural markers that could be used to support the identification of trans individuals. These were separated into items that supported an individual's social transition (wigs, packers, clothing etc.), hormonal support (blockers and androgens) and surgical affirmations ('top' surgeries, 'bottom' surgeries, facial surgeries, etc.). Considering the multitude of transitional pathways, when taken as a whole, these markers can make accurate identification much more probable. This review suggests that research on individual transition pathways is biased towards biological markers of transitions and that there is a major lack of research around the biocultural

aspects of transition. Highlighting the need for further research into this topic to capture the diverse ways individuals may transition across Australia's multicultural society.

Investigating hyperflexion and multistage mortuary practices in archaeological and forensic human remains

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Archaeoethanatology aims to distinguish natural taphonomic actions from intentional human manipulation to reconstruct funerary practices. One hypothesis that has been proposed by researchers posits that extremely tight flexion of the lower limbs, termed 'hyperflexion,' could be indicative of a multistage mortuary process in which reduction of soft tissue mass (eg mummification) preceded interment. This study explores this correlation as part of a larger experiment conducted at the Australian Facility for Taphonomic Experimental Research (AFTER). Six human donors were buried on the left side in flexion. Four donors were buried in a fresh state and two donors were naturally mummified by desiccation prior to burial. The donors were excavated after ~4 to 7 years of burial, to investigate the difference in skeletal position between the two groups. The results supported the hypothesis, with one 'mummy' donor presenting hyperflexion and both presenting taphonomic evidence of a multistage deposition. Additionally, the results found that soil compaction had not tightened joint angles of non-mummified individuals, as previously hypothesised in archaeoethanatology. The project also compared the reliability of 2D and 3D techniques in measuring joint angles from skeletal remains, establishing by what parameters hyperflexion can be defined. The novel flexion measuring methods were then applied to archaeological burials from Çatalhöyük (Türkiye), Gurgy (France), and Fox Hill (Sudan) to explore scope of application and recognise potential evidence for multistage mortuary practices. Although the results should be supported by further studies, this project permitted an investigation into the previously unexplored correlation between hyperflexion and multistage mortuary practices.

Comparative Analysis of Advanced Imaging Techniques for Sex Estimation

Isabella Crebert, University of Newcastle; Ray Nickson, University of Newcastle; Dilan Seckiner, University of New South Wales; and Xanthe Mallett, University of Newcastle.

Virtual anthropological approaches are increasing in popularity for forensic human identification, specifically for constructing a biological profile. Such technological advancements have allowed forensic anthropologists to rapidly document and assess human remains in both medicolegal and humanitarian contexts. This presentation will compare three commonly employed advanced imaging techniques used to aid forensic human identification – computed tomography (CT), surface scanning, and photogrammetry – with a focus on using these technologies for sex estimation from the mandible. Each technology is assessed based on the precision of measurements, accuracy, speed, cost, portability, level of training and software requirements in a forensic context. This project highlights that while CT continues to be considered the ‘gold standard’, structured light scanners and photogrammetry offer significant practical advantages for virtual skeletal analysis. Despite their precision and reliability, CT machines are expensive, difficult to transport, and require significant training to operate and utilise relevant software. Alternatively, structured light scanners (SLS) are easy to transport and do not demand significant training to operate. Further, photogrammetry is cost effective, yields an accuracy of 75% for sex estimation, requires minimal training, and the necessary equipment is easily transported. It should be noted that the intention of this research is not to replace CT, but to recommend alternatives for situations where CT cannot be accessed.

Resource Competition in Family Care: How Spousal Care Influences Grandchild Support

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Objectives

Family members are the most important providers of informal help and a key source of well-being for individuals across societies. However, family members can also compete over the limited resources available within a family. Evolutionary theory predicts that family resources are typically directed toward younger generations due to their greater reproductive value. However, care needs within a family can change over time. Here, we investigate how changes in spousal care are associated with the provision of grandchild care among European grandparents.

Research Design

We use data from the Survey of Health, Aging, and Retirement in Europe, collected from individuals aged 50 and above in eight waves between 2004 and 2021 across 19 countries. We employ asymmetric fixed-effects regression models to investigate whether starting or stopping the provision of regular spousal care is associated with the frequency of grandchild care provided over time.

Expected results

We expect that when individuals start to provide regular spousal care, it results in a decrease in the frequency of grandchild care provided. Conversely, when grandparents stop providing

spousal care, we assume that it is associated with an increase in the frequency of grandchild care. However, the effects of these changes may not be symmetrical; that is, the magnitudes of the effects of transitions into and out of spousal care on grandchild care may differ significantly.

Discussion

The results are discussed in the context of resource competition within families. This study improves our understanding of potential conflicts over caregiving responsibilities between close family members.

How consistent are interpretations of finger-fluting dimensions with different approaches to gathering data?

Bruce Floyd, University of Auckland; Heather Battles, University of Auckland

Debates surround interpretations of evidence of finger-fluting, channels drawn in soft limestone cave sediments. Recent studies vary in media and methods used to collect related evidence. We evaluate whether direct measurement of fingers or fluting impressions in clay and on iPad surfaces yield consistent interpretations from the same individuals. Do measurer, or measurer-methods interactions, influence outcomes?

Following ethics approval, data were collected from 26 participants. We measured their D2 to D4 finger widths directly with callipers, and indirectly as finger-fluting widths in clay or on an iPad surface twice for each participant. Student measurements were compared with those taken by one staff member (Floyd). Repeated measures analyses evaluated three finger widths as the outcome variables and method, measurer, or their interaction across individual participants as the predictor variables.

Evidence gathered suggest that real differences in finger-fluting dimensions, as opposed to statistical error related to media/method or measurer, may be reliably identified. Media/methods were consistently associated with repeated measurements of the same participants' impressions ($p \leq 0.0005$), and in differences between right- and left-hand impressions ($p \leq 0.0007$). Neither measurer ($p \geq 0.18$) or measurer by method interactions ($p \geq 0.92$) were significant in any test.

Importantly, although real differences in dimensions may be consistent across different media/methods, this does not necessarily support claims that individual finger-flutings in limestone caves may be reliably assessed with respect to age, sex, or individual identity. These results simply suggest that statistical tests evaluating these questions may be accomplished using the media and methods described.

Evolutionary–developmental (evo-devo) dynamics of hominin brain size

Mauricio González-Forero, Unaffiliated

Brain size tripled in the human lineage over four million years, but why this occurred remains uncertain. Here, to study what caused this brain expansion, I mathematically model the evolutionary and developmental (evo-devo) dynamics of hominin brain size. The model recovers (1) the evolution of brain and body sizes of seven hominin species starting from brain and body sizes of the australopithecine scale, (2) the evolution of the hominin brain–body allometry and (3) major patterns of human development and evolution. I show that the brain expansion recovered is not caused by direct selection for brain size but by its genetic correlation with developmentally late preovulatory ovarian follicles. This correlation is generated over development if individuals experience a challenging ecology and seemingly cumulative culture, among other conditions. These findings show that the evolution of exceptionally adaptive traits may not be primarily caused by selection for them but by developmental constraints that divert selection.

Combining dental, skeletal and historical data enhances understanding of a rare South Australian archaeological sample

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Having published Bioarchaeological studies of a rare sample of early European migrants to South Australia, our aim is now to expand the multidisciplinary approach to include examining historical documents to increase understanding of the migrants' lifestyles and the challenges they faced.

Materials & Methods: Skeletons of 50 subadults and 20 adults buried (1847-1927) in unmarked graves at St Mary's Anglican Church Cemetery, Adelaide, were investigated. Macroscopic, radiological and large and small-volume Micro CT methods were applied to the teeth. Bones were examined macroscopically. The historical documents investigated were the logs of British ships carrying migrants from 1836 to 1885 and St Mary's Parish Records.

Results: The adults had poor oral health with extensive caries, severe periodontal disease, marked tooth wear and substantial ante-mortem tooth loss. The teeth of both subadults and adults had evidence of enamel hypoplasia and interglobular dentine. The skeletal material demonstrated metabolic deficiencies of vitamin C and/or iron, spina bifida, and infectious diseases, e.g., tuberculosis. The voyage to South Australia was long and arduous, with some ships recording higher morbidity and mortality. Diseases, e.g. cholera and scarlet fever rapidly spread on the crowded ships. Many deaths at sea were infants suffering from diarrhoea. Parish burial records indicate similar causes of death for infants in the colony, while for adults the causes were trauma, pulmonary, and gastrointestinal conditions.

Conclusions: Combining the evidence from bioarchaeological examinations and historical documents increases insight into the health and the diseases affecting these early migrant settlers to the new colony of South Australia.

PFAS chemical exposure results in significant delays in female pubertal development

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Per- and polyfluoroalkyl substances (PFAS) have recently received significant attention in both science and media for their abundance in household products and the natural environment due to contamination, as they pose significant risks on the health of human populations that are exposed to them. Recent studies have revealed the increasing prevalence and penetrative ability of bio-accumulative PFAS. These reports are alarming as there is mounting evidence of significant associations between PFAS and disruptions in endocrine and metabolic pathways essential for normal physiology. In this review we synthesise the literature surrounding the impact of PFAS on secondary sex development and maturation during puberty in females. We found that PFAS has been associated with inhibition and dysregulation of the female endocrine system, negatively impacting pubertal development and post-pubertal physiological processes associated with female sex hormone production. Exposure has been correlated with a delay in menarche, growth peaks, and breast development. Further evidence has connected PFAS to bone fragility, obesity and a tentative association with β -cell damage and type 2 diabetes indicative of long-term chronic conditions resulting from endocrine disturbances. These conditions contribute to significant adulthood morbidity burdens. Future research is required to account for varying methodologies and samples of study, which are compounded by reverse causalities such as the dependent relationships between BMI, menstruation, and growth.

Increasing the accuracy of measuring dental arch dimensions: validating new 3D software

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When new software is used in craniofacial research, it is essential that its validity is established. Within our group customised 3D software for analysis of the dentoalveolar complex has been developed. To determine its validity detailed intra-observer and inter-observer reliability in dental arch measurements were investigated. Digital images of 80 scanned dental casts (maxillary and mandibular) from 40 individuals, 20 with hypodontia and 20 controls, matched for age, sex and ethnicity were studied. Digital landmark data-points were manually placed on the occlusal plane of 3D STL files of the dental arches by two trained operators (A.G. and J.G.). Multiple measurements were undertaken: Inter-canine width (IC), inter-molar width (IM), arch length (AL) and arch circumference at the gingival margin (AC). Intra Class Correlation, Krippendorff's alpha and Dahlberg statistics were used to analyse intra and inter-operator reliability. Each statistical

method provided similar findings. Intra-observer and inter-observer results showed less variation in the IC and IM measurements than in AL and AC. The ICC intra-observer values were IC (0.99), IM (0.93), AL (0.71) and AC (0.34); Inter-observer: ICC values were: IC (0.99), IM (0.92), AL (0.68) and AC (0.61). There were no significant differences found in the accuracy of measurements between hypodontia and control patients. The higher reliability statistics for IC and IM as compared to AL and AC may relate partly to the number of landmarks required for the latter parameter. The results provide a basis for further development, automation of landmark placement and software refinement.

Investigating osteoporosis at Iron Age Non Ban Jak, Northeast Thailand

Jessica Hurst, James Cook University; Kate Domett, James Cook University; Anna Willis, James Cook University

Osteoporosis is a systemic disease characterised by reduced bone density and deterioration of bone microarchitecture that increases skeletal fragility and fracture risk. Skeletal health and the onset of osteoporosis are influenced by biological and lifestyle factors that occur throughout the life course, including peak bone mass (PBM) attainment in young adulthood, levels of physical activity, nutritional intake, disease, and age- and sex-related hormones. Imbalance in any of these can disrupt bone maintenance processes and cause bone loss. The impact of these biological and lifestyle factors for ancient populations was likely much different to those of today. Therefore, research on how these factors impacted the prevalence of osteoporosis in past populations can provide valuable insights into whether susceptibility to OP was influenced by changes in biology and lifestyle over time. Osteoporosis in a sample from the archaeological site of Non Ban Jak (NBJ) in Northeast Thailand was investigated using metacarpal radiogrammetry to quantify the cortical thickness of bone. Second metacarpals of forty-one adult individuals from NBJ were radiographed and measured, producing a cortical index (CI) for each person. The mean CI for the total sample was 60.58 and the CI range was 37.06 to 91.71. The mean CI decreased with increasing age in the female sample as expected, and there was high variability in CI ranges for both males and females, reflecting their different life experiences. These findings are considered through an individual-level analysis of those with the lowest CI values to explore possible causes of reduced bone mass and the prevalence of primary and secondary osteoporosis at NBJ.

Molar Enamel Thickness Variation in Baboons

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Molar enamel thickness has played an important role in studies of primate taxonomy, phylogeny, and functional morphology, although its variation among hominins is poorly understood. Baboons parallel hominins in their widespread African distribution, dietary flexibility, and radiation during the last few million years. In order to further explore primate enamel thickness variation, we quantified average enamel thickness (AET) in baboons from equatorial Africa (*Papio anubis*, *Papio cynocephalus*, *Papio hamadryas*) and southern Africa (*Papio ursinus*). Enamel area and enamel-dentine junction (EDJ) length were measured from mesial sections of 51 mandibular molars scanned with micro-computed tomography, and enamel cap area was divided by EDJ length, yielding AET in mm. An increasing trend in AET from M1 to M3 was evident, necessitating comparisons within molar positions. *Papio ursinus* had the highest AET, and *Papio anubis* showed the lowest AET. Baboons from temperate environments have thicker molar enamel than those from equatorial Africa, a latitudinal trend also found in our previous study of macaques (Kato et al. 2014: *Am. J. Phys. Anthro.* 155:447–459). This is consistent with Andrews and Martin's (1991) hypothesis that thick molar enamel is an adaptation for expanded dietary breadth driven by increased seasonality and colonization of temperate environments. Additional research is needed to determine if thick enamel in baboons and macaques is a response to relatively more hard-object feeding or increased abrasion from grit or phytoliths, and how this relates to preferred versus fallback foods.

Life in the Industrial Revolution: Histological Evidence for Survived Early Life Stress in Teeth of Adults and Children from New Bunhill Fields Burial Ground, London (1821-1853 AD)

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The British Industrial Revolution (c1750-1860) negatively impacted the health and living conditions of many people. Paleopathological research suggests urbanization and industrialization was associated with an increase in physiological stressors including infectious disease, metabolic disease and poor nutrition. Subsequently, emigration to colonies such as New Zealand grew throughout the mid-19th century, as people sought to improve their life circumstances overseas. Here, we investigate survived experiences of physiological stress

preserved in first mandibular molars (M1) of adults and children interred in the New Bunhill Fields Burial Ground, Southwark, London (1821-1853 AD). This analysis provides a proxy for those that chose or were unable to emigrate from Britain. M1 enamel formation begins in utero and completes around 2.5-3 years of age, preserving a record of disruptions to growth. Samples were prepared according to established methods, and composite digital images were taken using light microscopy. Images were analyzed in FIJITM to identify accentuated lines (ALs), indicators of enamel formation disruption. All individuals exhibited multiple episodes of enamel growth disruption (subadult (≤ 17 years) range 2-15 ALs per tooth, adult (≥ 18 years) range 6-19 ALs per tooth). Preliminary analyses revealed no apparent differences in the mean occurrence of ALs in subadults (9.1 ALs per tooth) compared to adults (10.4 ALs per tooth). The wider range of AL occurrence in subadults potentially reflects the death of some children prior to crown completion. Further analysis will elucidate childhood experiences of physiological stress during rapid socioeconomic change and compare British emigrants to New Zealand with their population of origin.

Osteological sex estimation vs. proteomic sex determination – what effect do our techniques have on the way we view the people of the past?

Charlotte L. King, University of Otago; Anne Marie Snoddy, University of North Carolina at Greensboro; Torsten Kleffman, University of Otago; Peter Petchey, Southern Archaeology Ltd; Hallie R. Buckley, University of Otago.

Osteological methods for sex estimation are fundamental in biological and forensic anthropology, offering critical insights into the biological identity of skeletal remains. However, despite their efficacy, these methods are not infallible. Accuracy rates can vary with factors such as age, population affinity, and skeletal preservation impacting their reliability. Recent advancements in peptide analysis, however, present a promising avenue to address these limitations. In particular, the examination of sex-chromosome linked isoforms of the amelogenin molecule in dental enamel, offers a molecular, rather than morphological, approach to sex determination.

In this paper we discuss how peptide analysis of historic New Zealand cemetery samples has added to our understanding of these populations. We show what can happen when osteobiographies are constructed for individuals for whom osteological sex estimation was inaccurate - providing a cautionary tale for bioarchaeologists. We also highlight the uses of peptide analysis in identifying individuals, particularly non-adults for whom osteological sex estimation is not possible.

More than Childbirth: Unveiling the Risks of Marriage on Women's Mortality in Tang Dynasty China

Yan Liu, the University of Auckland

Previous studies of nuns consistently show lower mortality, raising the question: is this due to their lifestyle or the lack of reproduction? While most research has focused on European women, this study leverages the unique data provided by Tang Dynasty epitaphs (618–907 CE) to explore the question. The analysis compares female mortality across three groups with varying reproductive and marital statuses: eunuch wives, who married but did not reproduce (n=37), bureaucrat wives, who married and reproduced (n=764), and unmarried religious women (n=61). Two male groups, eunuchs (n=117) and bureaucrats (n=1666), serve as a comparison.

Summary statistics show significant differences in females' age at death ($p < 0.001$, f value = 8.903), with the reproductive group showing the poorest survival. Unmarried religious women have the highest mean age at death (57.8), followed by eunuch wives (55.2), with bureaucrat wives showing the lowest (49.0). Conversely, no significant difference is found between the two male groups which have different social roles ($p = 0.635$). Kaplan-Meier survival curves show that the two non-reproductive groups, eunuch wives and unmarried religious women, have higher survival probabilities than the reproductive group (bureaucrat wives) from their 20s, but the survival curve of eunuch wives sharply declines from age 50, converging with bureaucrat wives in their late 50s.

These results suggest that reproductive risks are crucial in shaping female mortality, and no childbirth improve survival but only before 50s. Marriage and the associated social roles appear to introduce additional risks that disproportionately affect women in post-reproductive ages.

170 years on: Exploring the Higher Mortality Rate of Women aged 40-64 years during the 1854 Soho Cholera Outbreak

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Sex differentials in mortality for certain age groups have persisted since the seventeenth century. Evidence of historic age-specific excess female mortality exists for all-cause and cause-specific mortality, including many of the infectious disease epidemics common in the nineteenth century. In England, aggregate data concealed excess female mortality, contributing to the under-exploration of this issue. The elevated mortality for women during the nineteenth century has encouraged the broader debate over whether women were largely positively or negatively impacted by industrialisation and urbanisation. Existing explanations in the literature commonly attribute women's elevated mortality to cultural-specific burial and bereavement practices. Often, this involved women preparing the body by washing and dressing in grave clothes and the custom of keeping the body at home before burial. To test these assumptions, I investigate the underlying factors contributing to the elevated mortality experiences of 145 women aged 40-64 years during the 1854 cholera outbreak in Soho, London. The relative importance of burial practices contrasted with influences of occupation, social class, and marital status are explored. Findings indicate that cultural-specific burial and bereavement practices alone were unlikely the cause of increased cholera mortality rates for these women (38.8/1000 population) compared to men (27.2/1000 population). Instead, a combination of occupation, social class, and marital status are likely to have been associated, with broad links to industrialisation and

urbanisation. This study strengthens the existing literature on excess female mortality in the past, as well as the determinants that produce the unique experiences of women during infectious disease outbreaks.

A comparative evolutionary investigation into Pan thanatology

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Comparative evolutionary thanatology focuses on the nature and evolution of death and death-related behaviours. A critical topic is the Concept of Death (CoD), the comprehension of what death and dying entail. The CoD's extent and complexity varies between taxa, with the comprehensive human CoD often viewed as a defining trait of our species. There exists robust research on the human CoD from a growth and development perspective, however, what interested me was how it differs from that of our closest relatives. The level of difference may help answer how early in our lineage this CoD evolved—which may contextualise early hominin social behaviours.

In the absence of other extant Homo species, I looked to genus Pan. If a human-like CoD is present in Pan then it was likely present in the genera's LCA, and, as such, in pre-sapiens archaic hominins.

In children, CoD is assessed using interview and language-based frameworks, however, there exists no equivalent system for non-human primates. For this preliminary study, I thus modified linguistic frameworks to create a non-verbal behaviour-classification system. I utilised this to systematically review available written and video evidence of chimpanzee and bonobo behaviours surrounding dead conspecifics and heterospecifics.

Analysing my data within this framework, I found strong evidence of a comprehensive CoD. Chimpanzees and bonobos appear to comprehend multiple facets of death, including non-functionality and irreversibility, in a manner analogous to that of humans. I draw connections between this CoD and phenomena such as grief and mourning, analysing the implications for human evolution.

The Development of Trichromatic Vision in Catarrhines

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Trichromatic vision provides us with greater levels of visual information about our world and aided our ancestors in survival due to an improved ability to detect different colours. This advantage stems from the development of a third type of cone cell which allowed for an improved distinction between red and green wavelengths of light. Whilst early primates were dichromats, trichromacy arose in catarrhines due to a duplication of the LWS opsin pigment. Three cone types then developed as the duplicated genes became more distinct over time leading to unique opsins. Platyrrhines can also be trichromats, but this is predicated upon polymorphic copies of the same gene encoding for LWS opsin. Consequently, trichromacy in platyrrhines is less common and present only in heterozygous females since the gene is sex linked. There is also a recognised concomitant decline in olfactory abilities in catarrhines compared to other primates. This review investigates the evolutionary advantages of trichromacy (in association with olfactory loss) in humans and other extant primates since most vertebrates are dichromats. We conclude that trichromacy aided catarrhines in the detection of ripe fruit or young red foliage, and also may have improved socio-sexual signalling and predator identification, increasing chances of survival. The research highlights the significance of these evolutionary drives in the development of our sensory systems.

Bare to the bone: a comparison of human bone quality analysis using dual-energy X-ray absorptiometry (DXA) before and after skeletonization

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The analysis of bone quality in human skeletal remains is essential within both forensic and archaeological contexts and is integral to the reconstruction of past life histories at both an individual and population-based level. Incorporating modern clinical methods into bioarchaeology and forensic anthropology is crucial to ensure the advancement of methods in these fields. Osteoporosis is a common metabolic bone disease characterised by low bone density, reduced bone quality, and increased risk of fracture. It is of significant interest to studies of overall bone health in the archaeological, clinical, and forensic disciplines and continues to become more prevalent as the average ages of modern populations increase. While cross-sectional geometry, radiography, and histology contribute to our understanding of osteoporosis and the factors that may have affected skeletal health in life, they have limitations. DXA (dual-energy X-ray absorptiometry) is a targeted imaging method used to test for osteoporosis in clinical contexts by analyzing bone mineral density (BMD). DXA is non-destructive and non-invasive, as it tests bone quality in living patients. This ongoing study aims to determine if DXA can be used to accurately analyze human skeletal remains and thereby improve investigative accuracy of osteoporosis and overall bone quality to mimic clinical investigations. To do so, we measure and compare changes in DXA scan results from both the soft tissue and skeletal stage

in the same person. Preliminary results indicate that DXA may be a promising investigative avenue for studies of human bone health not limited to living individuals. Overall, this research aims to provide an additional method in support of a multi-disciplinary approach to the study of human bone health across time and improve studies of bone health in bioarchaeological and forensic research.

Scaling of femur bone histology in anatomical and lifestyle contexts

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Lifestyle factors, such as exercise and diet, are key in determining healthy bone remodelling. However, remodelling is also spatially limited by the anatomical form of bones. The extent to which these anatomical and lifestyle variables interact in humans is currently poorly understood. We hypothesised that femur midshaft size and biomechanical properties would have a scaling effect on the size and density of products of remodelling (secondary osteons), independently of age and sex, and that this effect would manifest under different lifestyle conditions. We examined femur midshaft microradiographs in 73 donors from the Melbourne Femur Research Collection. We measured femoral cortical/total area (CA/TA), the ratio of axes of the largest and smallest femur rigidity areas, Haversian canal to osteon area ratio (H.Ar/On.Ar), and total population density of complete and partially remodelled osteons from the anterior, posterior, medial, and lateral anatomical axes. Out of all the variables, logged CA/TA and H.Ar/On.Ar were statistically significantly highly negatively correlated and showed consistently negative allometry relationships in the entire sample, in males only, and in a sub-group that consisted of individuals who were physically inactive but well nourished. We identified a scaling link between the femur cortex and osteon lamellar bone such that larger midshafts grew smaller osteons. However, this relationship was not obvious in females and other age and lifestyle groupings. Our findings suggest effects of allometry on gross and microscopic femur measures, which should be considered in anthropological and clinical analyses of bone histology.

Development, validation and application of a three-dimensional scanning method for measurement of dental arches and tooth crowns

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We aim to develop a new 3D imaging methodology, test its validity for dental arch and tooth crown measurements, compare its accuracy with the gold standard caliper technique, and apply it to a sample of orthodontic models. Maxillary and mandibular dental study models of 137 pre-orthodontic patients (69 hypodontia, 68 matched controls) were scanned to produce stereolithographic images. Custom software was developed based on MATLAB, and open-source MeshLab software. For tooth crowns, mesio-distal, bucco-lingual and crown height were measured. Linear mixed effects models were applied to arch dimensions, generalised estimating equation models were applied to tooth dimensions and univariate analyses conducted on each model. Intra-operator and inter-operator error tests in arch length and tooth intercuspal distances produced high levels of accuracy for Technical Error of Measurement, and Intraclass Correlation Coefficient values. The accuracy of digital measurements exceeded that using calipers. Hypodontia had a measurable effect on arch morphology. The maxillary arch was more affected than the mandibular arch. There were both generalised and localised effects on arch dimensions in hypodontia compared to the control group. Tooth dimensions were significantly smaller in hypodontia patients. Males with hypodontia had greater phenotypic changes. In summary, an innovative 3D-scanning methodology for measurement of dental arches and teeth on digital study models has been developed, validated and applied. This accurate new method can be extended to surface area, volume and geometric morphometrics. There is potential for automating point selection using machine learning. The hypodontia findings enhance knowledge concerning the Complex Adaptive System of dental development.

Peptides in teeth indicate biological sex in poorly preserved ancient individuals

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The ability to determine biological sex can be difficult in archaeology and forensics, particularly in subadult or poorly preserved human remains. A method has recently been developed to extract peptides from tooth enamel to identify sex chromosome isoforms AMELX and AMELY from the Amelogenin protein. The purpose of my research was to see if this method can be used to identify biological sex in very poorly preserved ancient teeth.

Using 42 teeth from Bahrain dating to between C2300-500 years old, we optimised the method of peptide analysis to accommodate the fragility of these teeth. Contrary to expectations we identified 25 individuals who had low quantities of SIRPPYPSY, the AMELX associated sequence. The more commonly reported pattern is that the AMELY associated sequence SMIRPPY is harder to detect. An alternative for AMELX, YEVLTPLK, produced a significantly higher amount of this isoform of AMELX and sex estimation was successful for all samples. This work demonstrated

that with specific optimizations and accounting for what we think are diagenetic effects, sex estimation using Amelogenin peptides can be used, even when teeth are ancient and poorly preserved.

How does testosterone levels influence aggressive behaviours in males versus females?

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Testosterone levels are known to have a significant influence on aggression in both males and females by activating the subcortical brain, in particular the amygdala, which serves as the brain's emotional processing centre. However, given the different levels of basal testosterone in males versus females, this review assesses whether there is a variable impact of increased testosterone on aggression levels between the biological sexes. Overall, in males elevated testosterone can result in more physical and psychological aggression. Whereas females with higher testosterone levels tend to exhibit more indirect forms of aggression, such as competitiveness and assertiveness, rather than physical forms of aggression. However, other factors such as social level also mediate mean testosterone levels in both females and males. For populations of focus regarding aggression, such as prison populations, the differential effects observed (where high plasma testosterone levels were associated with more violent crimes in both males and females) are multifactorial. Further, testosterone works in tandem with both cortisol and serotonin to regulate aggression levels physiologically. Cortisol, a stress hormone acts to counterbalance this effect by enabling the prefrontal cortex to exert cognitive control over impulsive tendencies, promoting self-regulation and rational thought. Serotonin also plays a crucial role in regulating impulsivity. Ultimately it reveals that while testosterone increases the potential for aggression, the balancing effects of cortisol and serotonin help to regulate and control these impulses. These hormonal dynamics underscore the complex ways in which sex and hormone levels influence not only the presence of aggression but also its form and expression.

Evidence of Care in the Grave; a Bioarchaeology of Care case study of Osteoarthritis in Early Bronze Age Ireland

Stephanie Robinson, Independent Researcher

Bioarchaeology of Care methodology has always highlighted the importance of interpreting results within their cultural context. While the pathological changes might outline the clinical impacts, it is only when these are considered within the lifeway context can we identify a model of care. However, not all pathological changes allow for an easy transition from clinical to impact. Osteoarthritis is one of the most common pathological changes identified, however one of the most difficult to interpret within Bioarchaeology of Care due to the lack of a direct clinical link between joint changes and the severity of pain or functional limitations. The Early Bronze Age in Ireland has traditionally been interpreted as a period of socio-political change in Ireland. While the social structure of this period has traditionally been a key focus of research, recently there has been a move towards exploring broader and richer understandings of the lived experience of this period. Associated with a broad re-analysis of the inhumations of the Early Bronze Age in Ireland, multiple cases of suspected health-related care were identified. This case study explores an example where the burial context of an individual suggests a higher requirement for health-related care than what can be interpreted from the remains alone. Alongside exploring the place of osteoarthritis within discussions of health-related care, this case also acts as a reminder of the importance of considering all available evidence when considering the Bioarchaeology of Care.

Challenging perceptions: Health and stigma in the gold mining period of Otago, New Zealand

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In the 1860s and early 1870s, the population in Otago, New Zealand, underwent significant changes due to a series of gold rushes. Although the substantial demographic shifts and socioeconomic changes associated with the influx of gold-seekers are well described in historical records, the diseases that accompanied them are not. In particular, the stigmatisation associated with sexually transmitted infections (STIs), such as syphilis and gonorrhoea, means that their prevalence and health effects on the population, particularly females, are not well understood. Despite this, many popular culture depictions from books often exaggerate the levels of prostitution and STIs within these frontier populations. This study examines the prevalence, demographics, and treatment differences, both medically and socially, between males and females suffering from syphilis and gonorrhoea. Data were aggregated and analysed using patient records from Dunedin and Dunstan hospitals, focusing on syphilis and gonorrhoea admissions between 1864 and 1869. Additionally, thematic analysis was undertaken on excerpts from archival newspaper articles relating to patients within the aggregated data to explore themes about how these individuals were perceived. These analyses showed that there were rises and falls in STI cases, possibly corresponding to goldfield activity, and allowed for the identification of common demographic characteristics, along with how stigma influenced the treatment and societal responses to these infections. By providing insights into the biological and social contexts of this frontier era, this research contributes to a deeper understanding of

historical public health responses and societal perceptions of people with STIs in colonial New Zealand.

Obesity and placental function: Is the role of adiponectin established?

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Despite this clear pathway, whether adiponectin is expressed in the placental tissue of humans is widely debated, with some studies finding evidence of expression and others unable to find evidence of expression. Interesting, all studies that have investigated adiponectin expression within the placenta have used the same laboratory techniques, so why are they not producing the same result? This review examined eight studies that investigated adiponectin expression in the human placenta. Of the eight studies published in peer reviewed journals, 50% of the studies found evidence of adiponectin expression while the other half did not. The study population and technique used in each study were compared to potentially understand why different results are being generated.

Sex Estimation by Discriminant Function Analysis of Long Bones in Prehistoric Southeast Asian Populations

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Biological sex estimation is an integral part of reconstructing the biological profile of an individual in forensic anthropological and bioarchaeological contexts. Formulating population specific discriminant function equations for metric variables is vital for reconstructing biological sex of fragmentary skeletal remains. This study aimed to develop multivariable and univariable sectioning point sex estimation equations from long bones of prehistoric Thailand and Cambodia people dated from 4700 to 1450 BP. A total of 481 individuals (236 females and 245 males) with 997 long bone measurements were analysed. Discriminant function analysis was used to analyse sexually dimorphic measurements from long bones of humeri (177 females and 183 males), femora (169 females and 178 males), and tibiae (139 females and 151 males). Stepwise and direct multivariable functions offered the highest accuracies of 97.3% for humeri, 97% for femora and 96.7% for tibiae compared to univariate function. The recommended univariate measurements for use in sex estimations with high cross-validation accuracies are the humeral epicondylar breadth (89.1%), femoral maximum head diameter (87.1%) and tibial midshaft circumference (88.3%). These equations are applicable for use in sex estimation for the specific prehistoric Southeast Asian populations to improve our understanding of the prehistoric demography. Further evaluation and validation of the equations are required to test whether these equations can also be applied to estimate biological sex of contemporary Southeast Asian populations.

Reconstructing nursing behaviour in captive macaques from tooth dentine

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Nitrogen isotopes ($d^{15}\text{N}$) have been used to study weaning behaviours in non-human primates, including rhesus macaques (*Macaca mulatta*) and chimpanzees (*Pan troglodytes verus*). Isotopic models of captive animals often inform interpretation of human data, particularly in archaeological tissues (i.e., tooth dentine and bone). However, $d^{15}\text{N}$ patterns have typically been obtained from non-human primate tissues with a fast turnover (i.e., blood serum, faeces, hair, nails), and have not been reliably studied in the dentine of teeth. Here, we apply to macaque tooth dentine a validated protocol for the measurement of human dentine $d^{15}\text{N}$ at high temporal resolution with a Sensitive High Resolution Ion Microbe (SHRIMP). We sampled $d^{15}\text{N}$ on an approximately weekly basis in the first molar dentine of two captive rhesus macaques. By relating dentine spot position to enamel formation times, we found a slight postnatal $d^{15}\text{N}$ rise of ~ 1 ‰. Both animals then displayed a gradual decline of ~ 5 -6 ‰ in $d^{15}\text{N}$ after birth, with the isotopic signal of weaning cessation coinciding with separation of the infants from their mothers due to multiweek hospitalisations beginning at 284 days of age. By applying a high-resolution sampling approach for $d^{15}\text{N}$, we have precisely related these values to the individual's early life history. Having captured a reliable signal of cessation of suckling in these animals, we can now begin to untangle nursing from episodic stress in other captive macaques, and by proxy in humans.

Funded by the Australian Research Council (FT200100390, LE220100083).

Multi-Indicator Knee Ossification Timings on Computed Tomography: A Bayesian Comparison of Contemporary Australian and American Subadults

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Objectives: The estimation of skeletal age has important implications in medicolegal investigation, including for forensic anthropology casework in human identification, as well as living age estimation for immigration or legal proceedings. This study aimed to document knee ossification timings using morphological and epiphyseal indicators on post-mortem computed tomography (PMCT), and to explore interpopulation variation by comparing matched American and Australian subadult cohorts.

Methods: PMCT data was collected for 402 individuals (228 males, 174 females) from the Victorian Institute of Forensic Medicine (Australia), and 445 individuals (233 males, 202 females) from the New Mexico Decedent Image Database (America). Thin-slice data for each individual was visualised as multiplanar reconstruction and an ordinal scoring system applied to assess development of 11 skeletal indicators on the femur, tibia and fibula. High repeatability was exhibited by intra-rater (ICC=0.99) and inter-rater (ICC=0.89) agreement. Transition analysis elicited maximum likelihood estimates for maturation, with age parameters established using a multivariable Bayesian model in R.

Results: Active knee epiphyseal fusion was exhibited in Australian males between 12-18 years, and females between 10-16 years, with completed fusion no earlier than 16 and 14 years, respectively. In the American samples, active fusion timings in males occurred between 11-16 years, and in females between 11-15 years. Sexual dimorphism was demonstrated, with interpopulation differences most prominent in later-adolescent to early adult males.

Conclusion: Recalibrated age reference values for knee ossification are presented on PMCT, reflecting current medicolegal best-practice guidelines for Australian and American subadults.

Mortuary Practices in Iron Age Siberia. Understanding the freezing effect by studying ancient and modern human remains.

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The site of Tunnug 1, in Southern Siberia, includes a burial mound dating to the Late Bronze Age and, on its periphery, a cemetery associated to the Kokel culture (2nd-4th c. CE). The excavation of this later funerary area between 2018-2019 returned forty-six burials. The cold environment and permafrost soil resulted in the recovered human remains having been subject to different freezing cycles for centuries. Accordingly, macroscopic and microscopic analysis of the skeletal remains from Tunnug 1 may offer the opportunity to explore the taphonomic effects of freezing on bone, while allowing at the same time inferences on the funerary practices of these steppe cultures during the Late Bronze Age. To better understand taphonomic processes that take place in a cold environment, and to discriminate human behaviour from natural processes, experiments with human remains were realised at the experimental taphonomy facilities of REST[ES] (Research on Experimental and Social Thanatology) in Bécancour (Quebec, Canada), known for its long and cold winters, and at the Australian Facility for Taphonomic Experimental Research (AFTER) in Australia. In addition to archaeo-anthropological observations, bone samples from the experimental sites, as well as from the archaeological site of Tunnug 1 were studied by histology and micro-tomography to identify the effect of freezing on bone microstructure. Preliminary results suggest an association between freezing and micro-cracking of bone structure. This study is part of a suite of analyses aiming to ultimately increase our knowledge about mortuary practices during the Kokel culture.

Decrease of sex hormones during menopause contributes to risk of Alzheimer's Disease

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Alzheimer's Disease is an age-related neurodegenerative disorder of the brain that destroys memory, thinking, and everyday cognitive tasks. It is one of the most common diseases amongst the elderly population and remains the primary cause of death for women in Australia. Menopause typically occurs 1-2 years prior to the last menstrual cycle when the woman's ovaries decrease in the production of sex hormones. The aim of this review is to evaluate the hormonal mechanisms that place menopausal women at greater risk of developing Alzheimer's disease compared to pre- and perimenopausal women. We then assess whether hormone replacement therapy (HRT) can reduce the risk of the disease in menopausal and postmenopausal women. Research suggests the depletion of oestrogen levels specifically in postmenopausal women is a key risk factor in the development of Alzheimer's Disease. The decreased production of oestrogen that occurs during menopause leads to the accumulation of amyloid beta plaques, leading to cell death and a decrease in grey and white brain matter, contributing to the

acceleration of the disease. However, when assessed in context, many lifestyle and biological factors complicate this relationship, leading to variable efficacy of HRT on a population level. A concerning confounding factor in the current research is the role of ageing in general degeneration of the body that occurs alongside menopause. Further long-term, and context specific studies are needed in order to comprehensively investigate the relationship between the hormonal changes during menopause and female ageing as normal physiological process on the timing of Alzheimer's disease onset.

Investigating bone diagenesis in adult femora from the churchyard of St Anne, Belgium

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Histotaphonomy provides a deeper look at bone degradation on a microscopic level. The degree of microstructural taphonomic changes, in particular bacterial degradation, expands the knowledge of taphonomy and could potentially be used for the reconstruction of mortuary treatment. Across literature, there is little information on the impacts of bone completeness and lime treatment on bacterial degradation. This study analysed 36 samples from 17 broken and 19 complete femurs, recovered from a lime-treated, secondary deposition from the 19th – early 20th century cemetery of St Anne, Belgium. These thin sections were compared to six femoral samples from unlimed, primary burials of the same location. Each sample was analysed and scored qualitatively by two observers and quantitatively with image analysis software, using the Oxford Histological Index (OHI). Histological preservation varied across the bone samples and between the three groups of complete secondary, broken secondary and complete primary bones. Similarly, there was no clear difference in preservation between the limed and unlimed bones. This indicates that the application of lime when the bones were moved to their secondary deposition, after at least 70 years of burial, did not stop the bacterial degradation in the bone. Other observations included a high amount of primary lamellar bone in 16 of the bone samples, likely related to the low socio-economic status of the workers buried at the cemetery. In summary, the thin sections from secondary deposition of 19th century burials showed mixed preservation. The original and post-depositional treatment could not be reconstructed based on histotaphonomic analysis.

Parent-offspring conflict in age at weaning in a sample of British women

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In evolutionary theory, parent-offspring conflict arises when a parent and their offspring's fitness benefits differ or clash with regard to giving and receiving acts of parental care. In most situations the infant demands more than their mother is willing to give. Weaning is an example in which such conflict can be observed. In this case, it is typical for an infant to benefit from an extended period of breastfeeding, while the mother receives greater benefits by weaning to invest in future reproduction. This presentation explores weaning conflict in a cohort of breastfeeding British women, and attempts to understand the roles of conflict arising from the infant side, such as low birthweight, poor growth and health problems, as well as conflict arising from the maternal side, including women's work and childcare constraints.

Examining the Grave Goods of Non Ban Jak to determine how Personhood was established and reinforced at an Iron Age Thai site

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In bioarchaeology, personhood theory is used to understand how ancient individuals defined themselves within, and in relation to, members of their community, and is often investigated through the study of grave goods and contextual information. Although personhood has been explored in regions such as South America and Europe, it has received little research focus in Southeast Asian bioarchaeology to date. To understand the interplay between individualism and community in Southeast Asia, this project aimed to investigate personhood at late Iron Age (300-800CE) Non Ban Jak, northeast Thailand. This site is unique for its large, well preserved skeletal assemblage (n=199), double-peaked mound structure, and use of residential burial. Using a novel, New Statistical approach, we reanalysed published mortuary and skeletal data. Forest plots were used to visualise proportional differences in the presence of different types and categories of grave goods between individuals by age-at death, sex and paleopathology. When considered from a personhood approach, individual differences in grave goods can indicate where an individual was able to create a distinct identity within their community, especially as grave goods are often placed by the community during mortuary rituals. Results showed that the types of grave items received varied according to facets of the identity, suggesting that although Non Ban Jak focused predominately on communal relationships, there were opportunities to assert individuality.

Stochasticity in age-at-death: Implications for bioarcheology as assessed through generative modelling

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The age at which an individual dies is determined by numerous factors, many of which are unpredictable. The impacts of stochasticity on individual exposure to health insults is a critical component of the processes that shape age-at-death distributions in mortality samples but is under explored in bioarcheology owing to the data limitations of skeletal assemblages.

The present study employs an agent-based model to examine the predictive value of birth frailty on age-at-death in a generated cohort, and tested for how this may vary when altering the likelihood of exposure to health insults. Birth frailty, when also accounting for varying exposure likelihood scenarios, was found to account for 18.7% of the observed variation in individual age-at-death. Analysis stratified by exposure likelihood demonstrated that birth frailty alone, however, explains 10.2%–12.1% of the variation observed across these exposure likelihood scenarios. These findings demonstrate that the stochasticity associated with exposure to health insults (i.e., severity of health insult) and mortality likelihood are driving the majority of variation observed.

Stochasticity of stressor exposure and intrinsic stressor severity are underappreciated but powerful drivers of mortality in this simulation. These findings have implications for the interpretation of age-at-death as a measure of frailty, especially in small samples where stochasticity may ‘swamp’ any true difference arising from a factor of interest.

This study demonstrates the potential value of simulation modelling for bioarchaeological research to address issues known to impact interpretation of research using skeletal remains, but which cannot be directly examined using them.

Mortuary practices and paleodemography at the Kolana cemetery site on Alor Island, East Nusa Tenggara, Indonesia.

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The Austronesian dispersal from East Asia into the Indo-Pacific during the Late Holocene heightened socio-political complexity with the introduction of domesticates, pottery technology, and elaborate mortuary practices characteristic of the Neolithic to Metal age periods of the region. Mortuary practices are a useful proxy for understanding changes in social complexity. Yet the effects of Austronesian dispersal on the culture and belief systems of the peoples in the insular region of Wallacea at the gateway into the Pacific is poorly understood. This study focuses on reconstructing the mortuary practices, as a proxy for ritualized behavior, at the recently discovered Kolana cemetery site on Alor Island, eastern Indonesia. Situated in a non-Austronesian speaking enclave the Kolana cemetery site has the potential to inform on indigenous interactions with Austronesian colonists. Field anthropology and BioProfile analyses have revealed evidence of mortuary practices from at least 19 burials including adults and non-adults in various positions and orientations spanning multiple time periods. This indicates the cemetery was used for a long time. Burial practices at Kolana include jar burials, primary flex and extended burials, and unique grave goods that share some similarities to burial practices documented in other parts of Island Southeast Asia and the Pacific during the Late Holocene indicating shared belief systems across this vast region. Kolana has revealed some subtle differences that include the use of multiple small pots containing secondary burials inside a large pot suggesting that a great deal of regional variation in mortuary practices is unknown.