Canadian Association for Physical Anthropology
L'Association Canadienne D'Anthropologie Physique

46th Annual Meeting
46e Congrès Annuel

Program and Abstracts

Programme et Abstraits

LONDON

2018

Oct 31 – Nov 3

We gratefully acknowledge the following generous sponsors:

Major Sponsors:

Western University—Research Western
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Welcome to London, Ontario!

The City of London is in the traditional territory of the Anishinaabek, Haudenosaunee, Huron-Wendat, Attawandaron, and Lenape Indigenous peoples. This territory is covered by the Upper Canada Treaties, including Treaty 6, The London Township Treaty.

It is our great pleasure to welcome you to London for the 46th Annual Meeting of the *Canadian Association for Physical Anthropology / L'Association Canadienne D'Anthropologie Physique,* hosted by Western University. The meeting will be held at the same venue as used in 1997 and 2004, the Delta Hotel London Armouries, which is in the heart of downtown London. London, also known as "The Forest City", is home to many parks, museums, shopping districts and award-winning restaurants. We hope within the fullness of the schedule that you can take in some local sights and flavours.

At last count more than 170 of you have registered for this year's conference, including many students for Thursday's Professional Development Luncheon on Methods and Experiences with Public Engagement. We gratefully acknowledge the Social Science & Humanities Research Council of Canada and Western University for an Internal Travel Grant that made the luncheon possible, as well as our luncheon speakers, Dr. Tracey Galloway and Dr. Amy Scott.

We are pleased to present a program of nearly 120 presentations, including nine symposia, representing the breadth and innovation of Canadian research in biological anthropology. Amongst these are two symposia that honour the scientific, professional, and personal contributions of distinguished CAPA-ACAP members, Dr. Christine White and Dr. Larry Sawchuk. We feature one poster-only symposium with the majority of other symposia featuring a combination of podium and poster presentations. Due to the high number of symposia and podium presentations we are holding concurrent sessions on Friday afternoon.

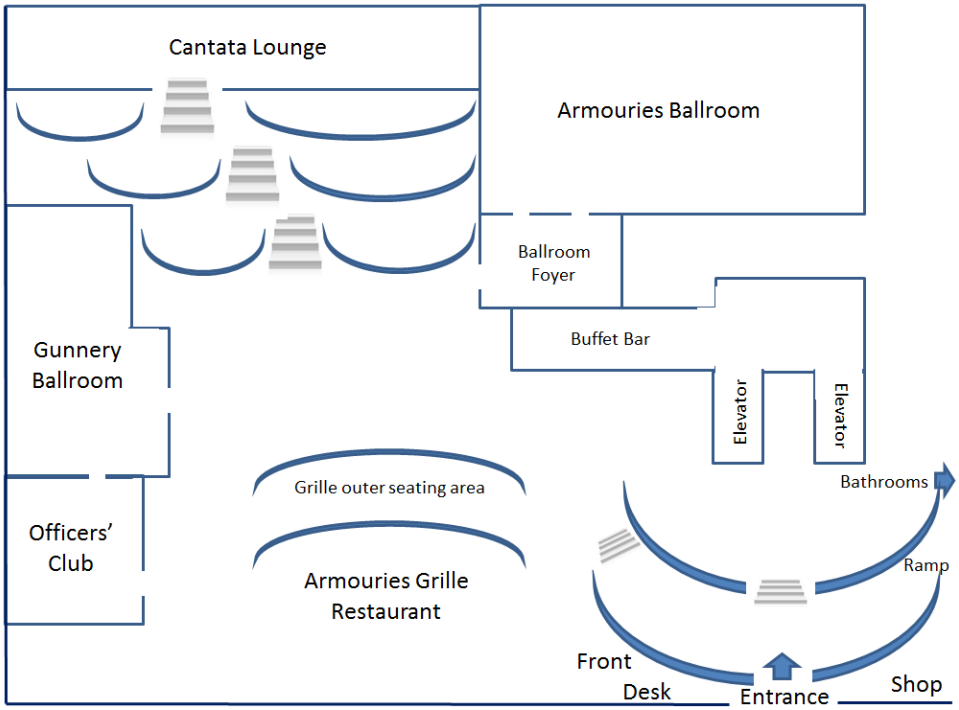
We hope you enjoy this Annual Meeting and we look forward to an informative and vibrant event!

Andrew Nelson, Andrea Waters-Rist, Jay Stock & Ian Colquhoun
The Organizing Committee for CAPA-ACAP 2018

Acknowledgements

We would like to acknowledge our hard-working student volunteer team, starting with the four coordinators, Lauren Gilhooly, Jillian Graves, Joanna Motley and Jennifer Willoughby. Thanks are also due to Andrew Arsenault, Hope Atkinson, Sydnee Badeen, Annika Graage, Hilary Hager, Elizabeth Jewlal, Jessica Lacerte, Teegan Muggridge, Kes Murray, Nicole Phillips, Lauren Poeta, David Seston, Julia Tucciarone and Katherine Willmore. Special thanks to Michael Rist, who designed the meeting logo and designed the front cover of this program. Cheryl Takahashi, CAPA-ACAP's web site designer, has worked tirelessly to keep the meeting web site up to date and to respond to the unceasing requests from the CAPA-ACAP team for special formatting of the meeting data. Finally, Sandra Garvie-Lok, Lesley Harrington and Katherine Bishop patiently answered all our questions about how they organized CAPA-ACAP 2017. Thanks to all!

We would also like to acknowledge our venue hosts, the Delta London Armouries and the Bull and Barrel Urban Saloon.



Layout of the Meeting Area of the Delta Hotels London Armouries

Thanks to the hard work of Jillian, Jennifer and the student volunteers, we're pleased to provide an interactive google map to help you navigate the downtown food scene. You'll find that here.

CAPA-ACAP 2018 Schedule at a Glance

Wednesday, October 31st

6:00pm – 9:00pm Registration

6:30pm – 9:00pm Welcome Reception (Cash Bar) – Gunnery Ballroom

Thursday, November 1st

7:30am – 5:45pm Registration

8:00am – 5:30pm Podium and Poster Sessions

12:10pm – 2:00pm Student Luncheon

7:00pm – 9:00pm CAPA-ACAP Pub Night @ The Bull and Barrel Urban Saloon

Gunnery Ballroom

8:00am – 5:30pm Poster Session 1 (poster set-up beginning 7:30am) – Includes posters from the White Symposium, the Diversity Symposium, and Contributed Posters on Paleopathology, Primatology, Anthropometry, Skeletal Biology, and Bioarchaeology

Armouries Ballroom

8:00am – 8:15am Introductions and Announcements by Dr Andrew Nelson, Head of the 2018 CAPA-ACAP Annual Meeting Organizing Committee, and Welcome Address by Dr. Juan Luis Suarez, Associate Vice President Research, Western University

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8:15am – 10:40am Podium Session 1 - Symposium: The Odyssey and the Mentor: The Contributions of Dr. Christine D. White to Biological Anthropology & Beyond

9:40am – 10:10am Coffee Break

10:40am – 2:45pm Podium Session 2 - Contributed Papers in Stable Isotopes, Bioarchaeology and Forensics

12:10pm – 2:00pm Lunch; Student Professional Development Luncheon on Methods and Experiences with Public Engagement by Dr. Tracey Galloway and Dr. Amy Scott

2:45pm – 5:30pm Podium Session 3 - Symposium: Strength in Diversity: Integrating Intersectional Perspectives into Contemporary Biological Anthropology

3:15pm – 3:45pm Coffee Break

Friday, November 2nd

7:30am – 5:00pm	Registration
8:00am – 5:00pm	Podium and Poster Sessions
5:00pm – 6:30pm	Business Meeting (Officer's Club)
6:30pm – 11:00pm	CAPA-ACAP Banquet (Armouries Ballroom) Entertainment provided by Chris Norley

Gunnery Ballroom in morning; Gunnery and Armouries Ballroom in Afternoon

8:00am – 5:00pm	Poster Session 2 (poster set-up beginning at 7:30) - Includes posters from the 3D Imaging symposium, the Paleoanthropology symposium, the Mobility symposium, and Contributed Posters on Stable Isotopes, Forensics, Human Biology, Biomechanics/Mobility and Primatology.

Armouries Ballroom

8:00am – 9:15am	Podium Session 4 - Symposium: 3D imaging: From the Macro to the Micro, from the Lab to the Field
9:15am – 12:00pm	Podium Session 5 - Contributed Papers in Paleopathology, Human Biology, Paleoprimatology and Primatology
9:45am – 10:15am	Coffee Break
12:00pm – 1:45pm	Lunch Break
1:45pm – 3:15pm	Podium Session 7 - Symposium: Developmental Origins of Disease: Biocultural and Evolutionary Insights from Working with Vulnerable Human and Non-Human Populations
3:15pm – 3:45pm	Coffee Break
3:45pm – 5:00pm	Podium Session 8 - Symposium: All the Ways we Move: Bioanthropological Perspectives on Movement

Gunnery Ballroom

1:45pm – 3:15pm	Podium Session 6 - Symposium: Palaeoanthropology Research by Canadian Scholars
3:15am – 3:45pm	Coffee Break
3:45pm – 5:00pm	Podium Session 9 – Open Session: Research in Primatology

Saturday, November 3rd

7:30am – 10:30am	Registration
8:00am – 11:35am	Podium and Poster Sessions
11:35am – 12:00pm	Student Prizes, Acknowledgements, Closing

Gunnery Ballroom

8:00am – 12:00pm	Poster Session 3 - Symposium: Education in Biological Anthropology

Armouries Ballroom

8:00am – 9:30am	Podium Session 10 - Symposium: If These Walls Could Speak: Anthropological Engagement with Hospital Research
9:30am – 9:40am	Introduction to Poster Session 3
9:40am – 10:10am	Coffee Break
10:10am – 11:35am	Podium Session 11 - Unraveling the Disease Experience: Larry Sawchuk's Contribution to Medical Anthropology and Beyond

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11:35am-12:00pm	Student Prizes, Acknowledgements, Closing Remarks and Welcome to CAPA-ACAP 2019

Presentation Notes:

Please see the annual meeting web site for presenter guidelines – click here

Podium presenters: Please be present to load your presentation onto the laptop (the machine is a PC) at least 15 minutes before presentations begin in the morning or at the beginning of the coffee/lunch break prior to your talk. A student volunteer will be present to assist.

Poster presenters: Please arrive at least 15 minutes before the start of the day's sessions to put up your poster and remember to take it down at the conclusion of the podium sessions. Student volunteers will be present with supplies for hanging posters and to provide assistance as needed.

CAPA-ACAP 2018 Schedule of Papers and Posters

Titles marked with an asterisk (*) are entered into the student prize competition.

Thursday, November 1st

Gunnery Ballroom

8:00am-5:30pm **Poster Session 1**. Includes posters from the White Symposium, the Diversity Symposium, and Contributed Posters on Paleopathology, Primatology, Anthropometry, Skeletal Biology, and Bioarchaeology
- Authors will be present for questions during the coffee breaks.
- Posters associated with a specific symposium are marked with an "(S)" and the short symposium title is listed in parentheses after the poster title.

1. (S) Toyne, J.M, Knudson, K.J. and Verano, J.W. Moche Mobility and Isotopic Inconsistencies: Taking on Research Challenges with Various Methods *(White symposium)*

2. (S) Maggiano, C., White, C., Stern, R., Salvador Peralta, J. and Longstaffe, F.J. Micro-isotopic Oxygen Variation Across Sequential Tissues in Human Bone: Seeking Sub-Seasonal Resolutions of Analysis *(White symposium)*

3. (S) Howie, L.A., Horn III, S.W. and Graham, E. Hey, Who Invited the Pots to the Isotope Party? Intersecting Material and Biological Identities and Social Network Dynamics at the Maya City Lamanai, Belize *(White Symposium)*

4. Lacerte, J.R. and Barrett, C.K. A Case of Probable Ankylosing Spondylitis among the Chiribaya of Southern Coastal Peru*

5. Motley, J. and James, A. Evidence of an Epidemic at the Church of Santa Maria Assunta at Pernosano, Italy*

6. James, A.R. A Probable Case of Type II Klippel-Feil Syndrome at the Early Modern Church of Santa Maria Assunta at Pernosano (AV, Italy)*

7. Britton, T.L. Local Perceptions of Primates and Protected Areas: An Ethnoprimatological Study of Conservation Challenges in the Pacoche Wildlife Refuge, Manabi, Ecuador*

8. MacAusland, A.D. The Effects of Rainforest Habitat Zones on Mantled Howler Monkey (*Alouatta palliata*) Feeding Behaviours

9. Merrigan-Johnson, C. Inter-sex Comparative Study on Tree Usage and Canopy Usage in the Mantled Howler Monkey (*Alouatta palliata*)

11. Garlie, T. and Joo Choi, H. Anthropometric Variation and the Theoretical Impact on Fit Accommodation for Military Clothing and Equipment for the United States Army

12. Valladares, K. Social Identities in Chimu Society: A Bioarchaeological Analysis of Burials from Chayhuac Walled Complex in Chan Chan site, Peru*

Thursday, November 1st continued

13. Scott, A.B. and Fonzo, M. From Acid to Alkaline: The Variation in Soil pH at the 18th Century Rochefort Point Cemetery and its Relationship to Mortuary Practices and Previous Site Use

14. Albanese, J. Evidence of a Horse as a Funerary Offering in a Mycenaean Tholos Tomb on Kefalonia, Greece: A Case Study Illustrating the Value of a Systematic (Re-)Assessment of all Skeletal Remains

15. Halliday, J. and Albanese, J. An Alternative Theoretical Approach for Understanding Patterns of Human Variation using Identified Skeletal Collections*

16. Cooper, D.M.L., Harrison, K., Hiebert, B., Pratt, I., Andronowski, J., Swanston, T. and Varney, T. Synchrotron Radiation Applications in Biological Anthropology: An Update on Capabilities of the Canadian Light Source Synchrotron

17. Kendall, C., Bozek, P., Schroeder, L. Sexual Dimorphism and Population Variation of the Human Nasal Aperture in 27 Disparate Populations

18. Shaver, S., Figura, K., Gooderham E., Bishop, B., Chervenka K., Garcia, C.T., João Valente, M., Albanese, J. and Cardoso, H. Data After the Fact? Field Photography to Post Hoc Hard Data*

19. Jewlal, E., Barr, K., Nelson, A.J., Laird, D.W. and Willmore, K.E. Examining the Link between Phenotypic Variation of the Skull and Variation in Development Using Two Mutant Mouse Models*

20. (S) Bogaert, K. Constructing Deviance: The Military Management of Male Behaviour During the First World War *(Diversity symposium)*

Armouries Ballroom

8:15am-10:40am **Podium Session 1**

Symposium: The Odyssey and the Mentor: The Contributions of Dr. Christine D. White to Biological Anthropology & Beyond

Chairs: J Marla Toyne and Linda Howie

Biological anthropology has been transformed with the development of bioarchaeology and biocultural anthropology and certain scholars have been instrumental in fostering key advances in knowledge, practice, pedagogy and thinking. Such advances do not begin or end with the birth of a new idea or perspective. Rather, they emerge as part of an ongoing conversation among a wider community of peers, novices, masters and apprentices, as ways of doing and thinking are forwarded, reflected upon, discussed, built upon and reimagined.

This symposium celebrates the scientific, professional and personal contributions of Dr. Christine D. White along the "road to advancement", in her roles as scholar, teacher, mentor, collaborator, colleague, and advocate for transdisciplinary research and training. Dr. White's contribution to research on stable isotope analysis of human skeletal and mummified remains is well known; however, her scholarly activity extends well beyond this focus, encompassing a broad spectrum of osteological, paleopathological, and regional bioarchaeological projects, research development initiatives, professional service and more. We invite scholars to present new and revisited "findings" and/or to explore the nature of Dr. White's contribution to the research dynamic at the heart of professional and academic development, and advancement of scholarly thought and practice. Traditional measures of scholarly impact, while important, offer a rather narrow and partial view of the totality of a scholar's far-ranging influences.

Thursday, November 1st continued

Through this symposium we will examine the synergy and cooperative interactions that contribute equally to Dr. White's scholarly impact both in and beyond the halls of academe.

8:15am-8:25am Toyne, J.M. Introduction.

8:25am-8:40am Katzenberg, M.A. The Pioneering Contributions of Christine White to Stable Isotope Analysis in Bioarchaeology

8:40am-8:55am Longstaffe, F.J. Two Worlds United

8:55am-9:10am Schwarcz, H., Prowse, T. and Emery, M. Tracing the Movement of Humans with Isotopes: Following Chris' Lead

9:10am-9:25am Spence, M.W., Olsen, K., Cabrera, O. and Longstaffe, F. San Jose 520 and the Early Growth of Teotihuacan

9:25am-9:40am Dolphin, A.E. Dental Bioindicators: Crafting New Collaborations and Approaches

9:40am-10:10am COFFEE BREAK

10:10am-10:25am Williams, L.J. and Wheeler, S.M. "What You Get Is How You Do It": Exploring the Mother-Infant Nexus at Kellis 2 Cemetery

10:25am-10:40am Hodgetts, L.M., Olsen, K.C., Morris, Z.H., Wheeler, S.M., Williams, L.J., Metcalfe, J.Z. and Szpak, P. Models of Graduate Supervision in Higher Education: What Chris White Taught us about Collaboration

- see Toyne et al. (1), Maggiano et al. (2) & Howie et al. (3) for poster contributions to this symposium

Armouries Ballroom

10:40am-2:45pm **Podium Session 2**
Contributed Papers: Research in Stable Isotopes, Bioarchaeology, and Forensics
Chairs: Yarida Chinique de Armas and Andrea Waters-Rist

10:40am-10:55am Chinique de Armas, Y., Rodriguez Suarez, R., Reyes, I., Buhay, W. and Roksandic, M. Stable Isotopes and Starch Analyses: New Insights into the Use of Plants among Archaic Age Populations in Cuba

10:55am-11:10am Munkittrick, J., Grimes, V. and Scott, A. Investigating Childhood Lead Exposure of early 18th Century French Inhabitants from the Fortress of Louisbourg, Nova Scotia

11:10am-11:25am Bishop, K.G., Garvie-Lok, S., Haagsma, M. and Karapanou, S. A Stable Isotope Analysis of the Shep-Herd Relationship in Thessaly, Greece during the Hellenistic Period*

Thursday, November 1st continued

11:25am-11:40am	Gooderham, E., Matias, A., Walshaw, S., Albanese, J. and Cardoso, H.F.V. A Comparative Growth Study in Medieval Islamic and Christian Portugal: Linear and Appositional Growth as Markers of the Social Environment*
11:40am-11:55am	Sawchuk, E., Pfeiffer, S., Cameron, M., Grillo, K. and Hildebrand, E. Bioarchaeology of Pillar Site Cemeteries around Lake Turkana, Kenya: Insights into Eastern Africa's First Herders
11:55am-12:10pm	Pfeiffer, S., Harrington, L. and Sealy, J. An Unusual Group Burial from the Late Holocene, South African Cape Coast
12:10pm-2:00pm	LUNCH – Student Professional Development Luncheon
2:00pm-2:15pm	Beresheim, A.C., Pfeiffer, S.K. and Grynpas, D.M. Ontogenetic Changes to Cortical and Trabecular Bone Microstructure in a Non-Weight Bearing Bone
2:15pm-2:30pm	Nahal, H., Marinho, L., Sparrey, C. and Cardoso, H.F.V. Assessing the Impact of High versus Low Velocity Thoracic Trauma: A Study of Experimental Rib Fracturing using Juvenile Pigs (*Sus scrofa*)*
2:30pm-2:45pm	Lamer, M., Spake, L. and Cardoso, H.F.V. Testing Methods for Juvenile Sex Estimation Using Long Bone Metaphyseal and Diaphyseal Measurements*

Armouries Ballroom

2:45pm-5:30pm **Podium Session 3**

Symposium: Strength in Diversity: Integrating Intersectional Perspectives into Contemporary Biological Anthropology

Chairs: James Gibb, Lauren Gilhooly, Samantha Stead

One of the main goals of contemporary biological anthropology is to document and understand the diversity of primate (human and non-human) biology across time and space. Like many scientific fields, biological anthropology is largely dominated by cis, straight, white men. How can a discipline tasked with representing primate diversity do so effectively if the longstanding biases in research funding, hiring practices, and the peer review process are not addressed? Integrating perspectives on sex, gender, sexual orientation, race, disability and language will push the theoretical and methodological endeavors of biological anthropology in new and valuable directions.

Several anthropological associations are making diversity and inclusive research methods a focus of both annual meetings and written reports. The American Association of Physical Anthropologists (AAPA) has been a prominent voice in these conversations, hosting podium sessions and panels dedicated specifically to addressing the slow, and often tumultuous, path towards diversity in academia. These individuals have encouraged explicit conversation while producing several research papers on the disastrous effects of harassment and discrimination on the well-being and career trajectory of students, postdoctoral fellows, and both adjunct and tenure track faculty within biological anthropology. Furthermore, they have demonstrated that this type of discrimination has profound impacts on our entire discipline and its ability to produce innovative and robust research.

We intend to follow the lead of the AAPA organizers and facilitate an environment where diversity of thought and lived experiences are not only welcome, but essential to the success of any biological

anthropology conference. Our session aims to bring together academics whose work transcends traditional approaches to science (i.e., patriarchal, heteronormative, Western-centric), with the goal of overcoming these barriers within the field of biological anthropology. We have intentionally appealed to scholars from both biological anthropology and other disciplines to learn from the myriad ways that researchers are challenging the conventional methods used to conceptualize, carry out, and disseminate academic research. Lastly, this session aims to identify how we can make biological anthropology a more inclusive space for the diversity of human experiences that researchers engage with as they progress within academia and beyond.

2:45pm-3:00pm	Poirier-Poulin, S. In English Please! Reflections on the Dominance of English Language in Primatology*
3:00pm-3:15pm	Schall, J.L. Assessing Sex and Gender in Forensic Anthropology*
3:15pm-3:45pm	COFFEE BREAK
3:45pm-4:00pm	Goodwin, R. Between the Needle and the Knife: Queer Theory and the Intersections of Gender in the Western Canadian Arctic
4:00pm-4:15pm	Gibb, J.K. Queering the Developmental Origins of Health and Disease: Towards More Inclusive Research and Policy Frameworks*
4:15pm-4:30pm	Stead, S.M. “Queer”ying ethology: An Assessment of the Literature on Same-Sex Sexual Behaviours in Non-Human Animals*
4:30pm-4:45pm	Lee, K.M.N. Cripping Menstruation: Reframing Menstrual Research using Critical Disability Studies and Crip Theory*
4:45pm-5:00pm	Meloche, H. and Albanese, J. Challenging Perceptions of Race in Forensic Anthropology: What Forensic Software Tells You it is Doing Versus What it is Actually Doing*
5:00pm-5:30pm	Discussion, led by Lauren Schroeder and Emőke Szathmáry

- see Bogaert (20) for a poster contribution to this symposium

Friday, November 2nd

Gunnery Ballroom (morning); Gunnery and Armouries Ballroom (afternoon)**

8:00am – 5:00pm **Poster Session 2 -** Includes posters from the 3D Imaging symposium, the Paleoanthropology symposium, the Mobility symposium, and Contributed Posters on Stable Isotopes, Forensics, Human Biology, Biomechanics/Mobility and Primatology

- Authors will be present for questions during the coffee breaks.
- Posters associated with a specific symposium are marked with an "(S)" and the short symposium title is listed in parentheses after the poster title.

** Due to the concurrent podium sessions on Friday afternoon, poster boards will be distributed between the Gunnery Ballroom and Armouries Ballroom over the lunch break (by the conference organizers), with afternoon symposium-affiliated posters being put in the corresponding podium session ballroom.

1. (S) Nelson, A.J. Knowles, N. and Kusins, J. The Skulls of Robert the Bruce: Photogrammetry, Artistry and Paleopathology *(3D – Imaging Symposium)*

2. (S) Saly, A. Close-Range Photogrammetry for Research: Still versus Video *(3D – Imaging Symposium)**

3. (S) Smith, A.C. Use of Basic Fuchsin Stain to Demonstrate Lamellar Band Interactions *(3D – Imaging Symposium)*

4. (S) Cuerrier-Richer, E. A Pilot Study for the Re-Evaluation of Skeletal Ancestry Traits using Three-Dimensional Technology *(3D – Imaging Symposium)**

5. Skalic, C., Albanese, J. and Dagdag, A. A Comparison of Fordisc 3.1 and AncesTrees using Cranial Measurements from an Identified Sample

6. Forbes, M., Finaughty, D., Miles, K. and Gibbon, V. Inaccuracy of Accumulated Degree Day Models to Estimate Post-Mortem Intervals in Two Terrestrial Habitats in Cape Town, South Africa*

7. Williams, D., McKerracher, L., Moffat, T., Barker, M. and Sloboda, D.M. Food Insecurity During Pregnancy among Women who Attend a Pregnancy Support Program in Hamilton, Ontario, from the Perspective of Public Health Workers

8. Mercado Malabet, F. The Influence of Reproductive Systems on the Probability of Extinction in Social Mammals: A Preliminary Simulation of the Influence of Breeding Systems on the Population Viability in *Eulemur fulvus* and *E. mongoz**

9. McConnan Borstad, C., Offenbecker, A. and Katzenberg, M.A. Do Dietary Isotope Values Reflect Non-Local Individuals at Prehistoric Paquime (Casas Grandes), Mexico?

10. Meijer, J., Dolphin, A.E., Yakymchuk, C. and Gervers, M. Interpreting Medieval Mobility from Burials at the Rock-Hewn Church of St. Georges, Gurat (France): Insights from Stable Isotope Analysis*

Friday, November 2nd continued

11. Prowse, T., Smith, T., Warrick, G. and Glencross, B. Canid Dietary Patterns: Stable Isotope Analysis from Five Huron-Wendat Village Sites in Ontario, Canada

12. Smith, T., Brickley, M., Ríos, L., Martínez, B., García-Rubio, A. and Prowse, T. Individual Breastfeeding and Weaning Histories in a Sample of Children from 19th Century Madrid, Spain Using Stable Isotope Analysis of Incremental Dentine Sections*

13. Peacock, T., Bourbou, C., D'Ortenzio, L., Kahlon, B., Prowse, T. and Brickley, M. Regional Mobility and Vitamin D Deficiency in Aventicum, Roman Switzerland (1st-3rd C. CE)*

14. Parker, K. Shorter, Taller, Weaker, Stronger: Changing Bone Geometry in Medieval Denmark*

15. MacKinnon, M. Correlations Between Upper and Lower Limb Robusticity in Forager Children Throughout Ontogeny*

16. (S) Stock, J.T. and MacIntosh, A.A. Diaphyseal Strength Indices and the Interpretation of Prehistoric Terrestrial and Marine Mobility *(Mobility Symposium)*

17. Richer, S.M. and Megyesi, M.S. Burial Location in the Manila American Cemetery and Memorial (MACM) and its Relationship to Taphonomic Condition of Skeletal Remains

18. (S) Kilpatrick, J. Quantifying the Center of Mass in Bifacial Tools *(Paleoanthropology Symposium)**

19. (S) Doran, K. The Fascination with Neandertals: Tracing Academic and Popular Attitudes from 2000 to 2018 *(Paleoanthropology Symposium)**

Armouries Ballroom

8:00am – 9:15am **Podium Session 4**

Symposium: 3D imaging: From the Macro to the Micro, from the Lab to the Field

Chairs: Ashley C. Smith and Alexandra Saly

While not a novel approach to assessing bone, 3D imaging has graduated to a more viable and reliable tool in recording and assessing both bone and the scene. As this symposium will demonstrate, the use of various 3D imaging modalities such as photogrammetry, laser-scanning imaging, laser scanning confocal microscopy, scanning electron microscopy, CT and microCT imaging that allow for more accurate landmark measurements, especially with regards to circumferential and longitudinal measurements of bone, as well as bone in situ both in the body and in the ground. 3D imaging has also been proven to be useful in the identification of sex and ancestry, particularly with regards to the cranium and femur as exact models can be created. 3D imaging can further be to used match up fractured cranial pieces to reconstruct a fractured skull without needed to manually reconstruct the elements. Further, we can use 3D imaging in the use of reproducing objects from a bioarchaeological approach thus allowing for greater study and use in the lab and classroom setting.

Beyond looking at the full element, 3D imaging can also be used to in a microscopic setting, examining individual osteons and their in vivo organization and relationships of individual lamellar bands. This demonstration can further be extended to the relationship between various osteons in a 3D plane. By better understanding the relationship between osteons, anthropologists will have a greater sense of the construction of bone and its function.

Friday, November 2nd continued

Lastly, 3D imaging can be used not just in the lab but in the field as well, providing a permanent record of the scene that can later be used in reconstruction and demonstrative purposes in both a medico-legal and bioarchaeological setting. Imaging at a scene varies in scale and purpose. Documenting the excavation procedure or capturing an outdoor scene to demonstrate relationships of objects to the landscape all provide details in a single inclusive manner often segmented in traditional scene methods of mapping and photography.

Overall, attendees of the symposium will have a greater understanding of the use and variability of 3D equipment and its use in both the field and the lab, and even extending into the classroom. Further, with newer technologies, physical anthropologists are able to work in more efficient ways for both time and cost. More importantly, this symposium will demonstrate that we are no longer confined to skeletal material itself but that 3D models and casts will allow us to better demonstrate osteological materials and their contexts to students and young scholars. newer technologies, physical anthropologists are able to work in more efficient ways for both time and cost. More importantly, this symposium will demonstrate that we are no longer confined to skeletal material itself but that 3D models and casts will allow us to better demonstrate osteological materials and their contexts to students and young scholars.

8:00am-8:15am	Ward, D.L., Silcox, M.T. and Viola, T.B. Challenges and Opportunities: Bony Labyrinth Shape Quantification
8:15am-8:30am	Selig, K.R. and Silcox, M.T. Using Three-Dimensional Dental Topographic Analysis to Examine Dietary Change in an Early Group of Eocene Primates; the Microsyopine Microsyopids
8:30am-8:45am	Spake, L., Meyers, J. and Cardoso, H.F.V. Reliability of Dental Development Scoring Methods across 2D and 3D CT Visualization Techniques*
8:45am-9:00am	Friedlander, H., Mayne Correia, P., Adeeb, S. and Stone, D. Differentiation of Perimortem Trauma from Heat Fractures in Cases of Cremation
9:00am-9:15am	Berezowski, V., Rogers, T.L. and Liscio, E. Evaluating the Morphological and Metric Sex of the Human Skull using 3D Technology*

- see Nelson et al. (1), Saly (2), Smith, A.C. (3) & Cuerrier-Richer (4), for poster contributions to this symposium

Armouries Ballroom

9:15am – 12:00pm **Podium Session 5**
Contributed Papers: Research in Paleopathology, Human Biology, Paleoprimatology and Primatology
Chairs: Maria Liston and Michael Schillaci

9:15am-9:30am	McCuaig, M and Schillaci, M.A. Preliminary Analysis of Non-Specific Stress Indicators and Survivorship in a Sample of Ancestral Native Americans*
9:30am-9:45am	Brickley, M.B. Taking a Biological Approach to Cribra Orbitalia and Porotic Hyperostosis: Potential Answers to Long-Standing Questions

Friday, November 2nd continued

9:45am-10:15am	COFFEE BREAK
10:15am-10:30am	Liston, M.A. What Else Troubled the Lepers? Co-morbidities in an Early Christian Cemetery in Thebes, Greece
10:30am-10:45am	Kirkpatrick, C.L. and Campbell, R.A. Warriors or Martyrs? Untangling the Trauma in Egypt's Fag El-Gamous Cemetery*
10:45am-11:00am	Fonzo, M., Scott, A.B. and Duffy, M. A Preliminary Analysis of Parasite Egg Recovery Methods from Pelvic Soil Samples*
11:00am-11:15am	Sharman, J. Anthropological Theory in Action: Liminality in Older Adults and Individuals with Chronic, Serious or Terminal Disease and the Role of Community Programs in Their Re-Assimilation
11:15am-11:30am	Shattuck, E.C. and Samson, E.R. The Effects of Childhood Adversity on Sleep Quality using Midlife in the United States (MIDUS) Data
11:30am-11:45am	Holmes, A.C. Preliminary Report on the Phylogenetic Systematics of European *Pliopithecoidea**
11:45am-12:00pm	Kalbitzer, U., Bergstrom, M.L., Campos, F.A., Carnegie, S.D., Jack, K.M., Melin, A.D. and Fedigan, L.M. The Link Between Female Sociability and Infant Survival in Capuchins: The Roles of Direct and Indirect Connections, Food Competition, and Energetic Status
12:00pm-1:45pm	LUNCH

Armouries Ballroom

1:45pm – 3:15pm **Podium Session 7**

Symposium: Developmental Origins of Disease: Biocultural and Evolutionary Insights from Working with Vulnerable Human and Non-Human Populations

Chairs: Ruby Fried, Tracey Galloway, and Luseadra McKerracher

Non-communicable diseases including heart disease, type II diabetes, and cancers now represent leading causes of illness and death, accounting for upwards of 70% of mortality globally (WHO 2017). As such, understanding their etiology has critical implications for public health as well as for making sense of contemporary human variation. Research focusing on the Developmental Origins of Health and Disease (DOHaD) strongly suggests that early life experiences affect health, resilience, wellbeing, and disease risk later in life. However, the bulk of this work has focused on lab studies of rodent models and on epidemiological patterns in Western or Westernized populations. So, it is unclear whether these apparent causal relationships between developmental exposures and health and disease expression are the same across all human populations, or among our closest relatives, nonhuman primates. If some or many of these relationships differ in magnitude, direction, or etiology, how and why do they vary? If they hold across both human and nonhuman primates, how and why do they do so, and how are these disease expressions understood, explained, and experienced by the populations affected?

Friday, November 2nd continued

This symposium, entitled "Developmental origins of disease: Biocultural and evolutionary insights from working with vulnerable human and non-human populations", will investigate some of the key tools biological anthropology can offer to address these questions. In particular, it will do two things:

1. Introduce the role of evolutionary ecological and biocultural theories in predicting and measuring adaptations and/or environment-dependent responses that may account for the development of these disease phenotypes.
2. Provide a broader perspective on links between early life exposures and later life non-communicable disease risks by empirically examining these phenomena in living and archaeological populations and in non-human primates.

This session brings together experts studying various aspects of DOHaD including but not limited to commensal microbes, hormone function, nutritional composition of parental and infant diets, genetic/genomic conflicts, and the external environment in small-scale human populations from Asia, Africa, and the Americas and in non-human primates. Speakers will highlight the role of biocultural and evolutionary ecological theories in novel or counterintuitive predictions. They will also discuss the ways in which their findings may be relevant to medical practice or public health policy.

1:45pm-2:00pm	Sloboda, D. An Introduction to the Developmental Origins of Health and Disease (DOHaD): Insights from Animal Model Studies, and Implications for the Bioanthropology of Health
2:00pm-2:15pm	D'Ortenzio, L., Kahlon, B. and Brickley, M.B. Sinking Our Teeth into Vitamin D Deficiency and the Developmental Origins of Health and Disease Hypothesis (DOHaD)
2:15pm-2:30pm	Fried, R.L. and Kuzawa, C.W. Biological Memories: Examining Early Indicators of Intergenerational Health Among Alaska Native Women and Children living in Anchorage*
2:30pm-2:45pm	Kim, A.K., Ryan, C.P., McDade, T.W., Kobor, M.S., Borja, J. and Kuzawa, C.W. Early Life Social Experiences as Predictors of Adult Depression in Cebu, Philippines: Investigating the Mediating Roles of the HPA Axis and DNA Methylation*
2:45pm-3:00pm	McKerracher, L.J., Moffat, T. and Sloboda, D.M. Food Insecurity, Pregnancy Complications, and the Developmental Origins of Health and Disease: New Insights from the Mothers to Babies (M2B) Hamilton Study
3:00pm-3:15pm	East, K.E. and Greff, M. Shaping Stress at the End of Life: Hair Cortisol Analysis in the Terry Collection
3:15pm-3:45pm	COFFEE BREAK

Friday, November 2nd continued

Armouries Ballroom

3:45pm – 5:00pm **Podium Session 8**

Symposium: All the Ways we Move: Bioanthropological Perspectives on Movement

Chairs: Michelle Cameron and Rebecca Gilmour

Human and non-human primate movement is explored in a number of ways across the subfields of biological anthropology. Some scholars look at smaller scale interactions between muscle and bone by analyzing muscle tissue, trabecular structure, and bone biomechanics. Others examine larger scale population dynamics on regional and global scales using genetic analyses, population affinity studies, and medical anthropology approaches. As biological anthropologists use a diverse range of methods and theoretical perspectives, this session addresses movement in an interdisciplinary way. Presenters will incorporate morphological, genetic, archaeological and geographic evidence to explore how movement, broadly construed, impacts both our physical bodies and our social lives. The papers presented will focus on innovative ways that researchers are engaging with activity and mobility. This symposium aims to unite biological anthropologists who look at how humans and our closest relatives move and inspire creative collaborations in the analysis of movement.

3:45pm-4:00pm	Harrington, L., Osipov, B. and Kurki, H.K. Exploring the Development of Upper Limb Strength through Asymmetry Measures in the Arm and Forearm
4:00pm-4:15pm	Komza, K. and Skinner, M.M. Trabecular Bone Structure of the First Metatarsal and its Implications for Plio-Pleistocene Hominin Locomotion*
4:15pm-4:30pm	MacIntosh, A., Longman, D., Roberts, R., Wells, J.C.K., and Stock, J.T. Selective Sacrifice of Reproductive Tissues under Ultramarathon-Related Energetic Stress: The Adaptive Significance of Variation in Lean and Fat Mass among Men and Women
4:30pm-4:45pm	Rabey, K.N. Exploring Frailty in Locomotion of Non-Human Animals
4:45pm-5:00pm	Gilmour, R.J. and Cameron, M.E. Movers and Shakers: Integrating Innovative Perspectives on Movement in Biological Anthropology

- see Stock & MacIntosh (16) for a poster contribution to this symposium

Gunnery Ballroom

1:45pm – 3:15pm **Podium Session 6**

Symposium: Palaeoanthropology Research by Canadian Scholars

Chair: Mirjana Roksandic

Update on research projects by Canadian scholars, members of the Palaeoanthropology Society of Canada (PASC) and their students. This forum is meant for the exchange of ideas by scholars and students of human evolution in its most encompassing meaning: including the study of primates, environment, tools, morphology and ancient DNA. In addition to presentations and posters, the forum will feature short research updates.

Friday, November 2nd continued

1:45pm-2:00pm Tocheri, M.W., Veatch, E.G., Sutikna, T., McGrath, K., Wahyu Saptomo, E., Jatmiko and Helgen, K.M. Temporal Shifts in the Distribution of Murine Rodent Body Size Classes at Liang Bua (Flores, Indonesia) Reveal New Insights into the Paleoecology of *Homo floresiensis* and Associated Taxa South Australia, Australia

2:00pm-2:15pm Chazan, M., Kolska Horwitz, L., Ecker, M., Morris, D., Koopowitz, C., Rhodes, S. and Berna, F. Renewed Excavations at Wonderwerk Cave, Northern Cape Province, South Africa

2:15pm-2:30pm Vallerand, A., Mailloux-Root, G., Laliberto, A., Negrino, F. and Riel-Salvatore, J. Middle and Upper Paleolithic Lithic Technology at Riparo Bombrini (Liguria, Italy)

2:30pm-2:45pm Brun, C., Martin-Moya, D., Negrino, F., Ribot, I. and Riel-Salvatore, J. Photogrammetry, Data Visualization and Public Outreach: A Case-Study from Riparo Bombrini

2:45pm-3:00pm Roksandic, M., Lindal, J., Radovic, P., Blackwell, B. and Mihailovic, D. The First Confirmed Neanderthal from the Central Balkans

3:00pm-3:15pm 5 minute research updates from the world of paleoanthropology

- Drapeau, M.S.M., Bisson, M.S. and Burke, A. Documenting the Prehistory of Zambia
- Schroeder, L. and Ackerman, R.R. The Hybrid Phenotype of the "Coywolf": A New Mammalian Model for Detecting Hybridization in Hominin Evolution.

- see Kilpatrick (18) & Doran (19) for poster contributions to this symposium

3:15pm-3:45pm COFFEE BREAK

Gunnery Ballroom

3:45pm – 5:00pm **Podium Session 9**
Contributed Papers: Research in Primatology
Chairs: Mary Pavelka and Fernando Mercado Malabet

3:45pm-4:00pm Pavelka, M., Hartwell, K., Notman, H., Wickberg, E. and DiFiore, A. Spider Monkey Social Organization: Does Genetic Evidence Support Observational Data?

4:00pm-4:15pm Gilhooly, L.J. and Colquhoun, I.C. Eye Contact, but Not Food, is Associated with Tourist-Directed Aggression from a Hybrid Macaque Group in Sabah, Malaysia*

4:15pm-4:30pm Steffens, T.S., Ramsay, M.S. and Lehman, S.M. Enter the Matrix: Habitat Use by *Microcebus spp.* in a Fragmented Landscape

4:30pm-4:45pm Samson, D.R., Vining, A. and Nunn, C.L. Sleep Influences Cognitive Performance in Lemurs

4:45pm-5:00pm Bolt, L.M., Schreier, A.L., Voss, K.A. and Barrickman, N.L. Natural and Anthropogenic Edge Effects and their Influence on Monkeys and Vegetation in a Fragmented Tropical Rainforest in Costa Rica

Saturday, November 3rd

Gunnery Ballroom

8:00am-12:00pm **Poster Session 3 -** *Symposium:* Education in Biological Anthropology
Chairs: Karyn Olsen and Sherry Fukuzawa
Note: There will be a podium introduction to this poster session from 9:30am to 9:40am in the Armouries Ballroom.

This poster session will showcase an increasing focus on teaching and learning in biological anthropology at higher education institutions across Canada. In recent years, the American Association for Physical Anthropologists (AAPA) has devoted time at their annual meeting to exploring issues related to teaching and learning in the discipline. Following the AAPA's lead, the annual meeting for the Canadian Association for Physical Anthropologists provides an excellent opportunity to bring together educators interested in reflecting broadly on the core knowledge, skills, and values we want to develop among our future students.

Learning environments in biological anthropology can differ significantly depending on the focus. As such, biological anthropology is uniquely positioned to provide diverse experiential and active learning experiences for our undergraduate and graduate students. Research demonstrates that engaging students in participatory learning has positive impacts on learning and student success. Ultimately, our goal is to explore the "what", "how", and "why" of bioanth-focused courses, laboratories, field schools, and other learning contexts, and to offer discipline-specific perspectives on teaching and learning.

Recognizing that educators in the discipline hold a variety of positions at their home institutions, we plan to engage research- and teaching-focused faculty, contract faculty, graduate students, and community collaborators in this symposium. The expectation is that contributing presentations will be diverse but with shared emphasis on pedagogical approaches in the discipline. Authors will be present for questions during the coffee break.

1. Fukuzawa, S., Dorland, S. and Criger, C. Students Reflect on the Relationship between Anthropology and Indigenous Peoples in Canada

2. Holder, S. and Reitsema, L.J. Engaging Bioarchaeology Undergraduate Students through Writing in the Discipline*

3. Jamieson, J. and Wood, C. Integrating Indigenous Perspectives in Teaching Practice: Benefiting from the Wisdom of Social Learning and Narrative

4. Waters-Rist, A.L. Creating a Free Massive Open Online Course (MOOC) in Bioarchaeology: Reflections on Two Years of Experience with "Osteoarchaeology: The Truth in Our Bones"

5. Ranlett, S., Eastham, L., Champaneri, P., Mahjoub, I., Smith, A., Yasui, E. and Fukuzawa, S. A Year in the Virtual Mystery Project: Current Results and a Multidisciplinary Future

6. Wood, C. and Saly, A. Creating and Excavating a Cemetery: Experiential Learning for Advanced Bioarchaeology

7. Olsen, K.C., Morris, Z. and Moreiras Reynaga, D. Engaging Biological Anthropology Students in Online Distance Education Courses

Armouries Ballroom

8:00am-9:30am **Podium Session 10**

Symposium: If These Walls Could Speak: Anthropological Engagement with Hospital Research

Chairs: Madeleine Mant and Alyson Holland

Contemporary hospitals are widely viewed as physical representations and symbols of health and healing; however, the historical use of hospitals is complex and intersects with socioeconomic status, medical knowledge, and political power. Hospitals began as charitable houses for those who were both poor and sick and rose to the bastions of health care that they now represent. Bioarchaeology and medical anthropology often draw upon datasets related to hospitals, institutions intimately tied to health and health care. The skeletal remains excavated from hospital cemeteries are important comparative samples, though the position of these individuals as patients may or may not be the explicit target of research. In medical anthropology, the interplay between hospitals as institutions, the personnel who exist within them, and the diseases they treat become a critical nexus.

This symposium will explore the representation of hospitals in anthropological work by highlighting researchers who work explicitly with hospital data. The presenters use a historical lens to illuminate the role that hospitals have played over the last few centuries and to bring attention to the evolving nature of the hospital as an institution. These papers form a series of temporally distinct snapshots, including discussing the interactions between hospitals and specific socio-cultural groups, such as Indigenous peoples or 19th-century merchant sailors, as well as the social impact of specific diseases, such as tuberculosis and the 1918 influenza, whose public perceptions are supported and maintained through medical institutions and datasets. The use of hospital datasets to capture demographic data and life events will be examined through the lens of the 1918 influenza in Malta, the healthcare experience of 19th-century British merchant sailors, and 19th- and early 20th-century Canadian peoples, including survivors of the Brandon Residential School. Finally, this session will conclude with a longitudinal look at shifting societal perspectives on hospitals and doctors to highlight the links between historical research and current healthcare discussions.

This session will highlight the perspectives of students of anthropology and medicine, emerging academics, and established scholars from institutions across Canada. Our goal is to engender discussion surrounding the vulnerable bodies of those experiencing illness through time and engage with anxieties over health care access, ethical questions of interrogating historical hospital records, and the privileged position of biomedicine in the West.

8:00am-8:15am Mant, M. For Those in Peril On and Off the Sea: 19th-Century Port Medicine at the St. John's General Hospital

8:15am-8:30am Hackett, P. Saskatchewan Population Health and Evaluation Research Unit: The Dynevor Hospital and First Nations Health Care in Manitoba and Beyond, 1908-34

8:30am-8:45am Nichols, K., Meyers, J., Gooderham, E., Spake, L. and Cardoso, H. Examining the Impact of Stress Experienced Prior to Admission to the Brandon Indian Residential School*

8:45am-9:00am Burke, S. Trauma and Childhood Tuberculosis in the 19th/20th Century: A Syndemic Perspective

Saturday, November 3rd continued

9:00am-9:15am Sawchuk, L.A. and Tripp, L. Trains and Transmission: The Spread of 1918 Influenza in Malta

9:15am-9:30am Holland, A. Doing Right in the House of God: Historical Perspectives to Current Challenges in the Societal Role of the Doctor

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9:30am-9:40am Olsen K. Introduction to Poster Session 3: Education in Biological Anthropology

9:40am-10:10am COFFEE BREAK

Armouries Ballroom

10:10am-11:40am **Podium Session 11**
Symposium: Unraveling the Disease Experience: Larry Sawchuk's Contribution to Medical Anthropology and Beyond
Chair: Lianne Tripp

This symposium will delve into the long and dynamic research and teaching career of Larry Sawchuk. As a professor at the University of Toronto, Scarborough in the Department of Anthropology for 44 years, he has mentored and influenced the research pathways of many Canadian Anthropology undergraduate and graduate students. Many of his students have gone on to become Anthropology professors, while others are working, researching and/or teaching in the field of health.

Larry's research has primarily focused on the bio-demography and health of small-scale populations in the 20th century Mediterranean. Early in his career, during the nascent years of the study primatology in Canada, Larry study the demography of the Barbary macaques in Gibraltar. Mid-career, Larry contributed to the deconstructing the mortality experience of the remains from the 19th century St. Thomas cemetery in Belleville Ontario. Throughout his career (as well as the present day), Larry's research topics have focused on infectious diseases: cholera, influenza, tuberculosis and undulant fever.

Participants will discuss an array of subjects. Ex-graduate students will discuss how fieldwork experience and co-authoring with Larry help shaped them as the scholars that they are today, especially in the study of infectious disease in the historical context. Other participants, whose study of contemporary health issues and policymaking, will discuss how Larry incited their interest in the field as undergraduate students and what policies they are currently developing in Toronto. One presentation will discuss how Larry's knowledge of epidemiology aided in PhD research of palaeopathology. Long-time colleagues and friends, will talk about Larry's 40 plus year contribution to the study of historical demography and health of the small-scale population of Gibraltar. The series of talks will showcase how Larry's longstanding influence on past and current students, and the far-reaching impact his research and teaching has had on many anthropology and health researchers. This symposium will bring together scholars from the fields of medical anthropology, bio-archaeology & paleopathology, public health and health sciences.

10:10am-10:20am Tripp, L. Introduction.

10:20am-10:35am Herring, A. and Bogaert, K.L. The Evolution of Lawrence A. Sawchuk

10:35am-10:50am Glencross, B. Social Epidemiology in Bioarchaeological Context

Saturday, November 3rd continued

10:50am-11:05am Tripp, L. and Burke, S.D. Case Studies and Colonies

11:05am-11:20am Gamble, B. Dr. Sawchuk: Inspiring Leader and Mentor

11:20am-11:35am Vanderlinden, L.D., Simone, M., Harvey, C., Thibault, S. and Speakman, J. No Services, City of Toronto Creating a Hookah By-Law: Toronto's Recent Policy Experience

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Armouries Ballroom

11:35am-12:00pm Student Prizes, Acknowledgements, and Closing Remarks …
and…
Warren Wilson and the CAPA-ACAP 2019 Organizing Team send this message: "*We extend a warm invitation to all for the 2019 CAPA-ACAP Meetings to be held at the Banff Centre from Wednesday, Oct. 23 to Saturday, Oct. 26. We look forward to seeing all of you in Alberta next year*!"

Evidence of a horse as a funerary offering in a Mycenaean tholos tomb on Kefalonia, Greece: A case study illustrating the value of a systematic (re-)assessment of all skeletal remains

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Several skeletal elements of at least one horse were identified from a tholos tomb used from about 1350 BC to after 900BC at Borzi Hill, Tzannata on Kefalonia, Greece. The tomb was excavated in the mid-1990s, but none of the human or faunal skeletal remains were analyzed until this project began in 2015. Evidence of sheep, goats, cows and dogs has been identified in various types of Late Helladic (LH) tombs, and this tholos tomb is consistent with that pattern. However, evidence of horses is exceptionally rare. There are approximately nine documented examples of horses in tombs from the entire LH (1550 BC to 1050 BC) and only two of those cases are from the LH III (1400 BC to 1050 BC). Cases from Dendra and Marathon suggest that two horses that drew a funeral cart were sacrificed on the spot while possibly still yoked. The case from Borzi follows a different pattern and is consistent with an example from a tholos tomb at Archanes on Crete during the contemporaneous Late Minoan (LM) III Period. Marks on the bones suggest that the horse at Borzi was chopped into pieces as in Archanes. All the skeletal elements from Borzi are likely from one horse that was between two and three years old based on dental evidence and epiphyseal union. This horse was in its prime and would have represented an exceptional offering made during the burial of a prominent individual, above and beyond inclusion in a monumental tholos tomb. The identification of the horse is critical to understanding: 1) mortuary practices in tholos tombs which seem to follow a different pattern than other tombs; 2) mortuary ritual and burial practices in general for this period; 3) the complex connection between the Ionian Islands and Crete; and 4) the significance of this specific tomb. This case study serves as an example of the value of a systematic (re-) analysis of human and animal bones from contemporaneous Bronze Age sites.

Ontogenetic changes to cortical and trabecular bone microstructure in a non-weight bearing bone

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This pilot study aims to explore ontogenetic changes in cortical and trabecular bone microstructure that are largely independent of locomotor maturation. Using a well-documented cemetery collection, Spitalfields, UK., of eighteen individuals with reliable historical records (n female=8, n male=9, n unknown=1; 0-20 years old), this project attempts to target microstructural variation associated with early life history events such as weaning and puberty. All bone samples were scanned at 14.4 um resolution using the SkyScan 1174 Micro-CT system, and quantitative parameters were derived using SkyScan Ct-analyser (CTAn, v. 1.8.1.3) software. Cortical variables included cortical bone mineral density (Ct.BMD), total bone area (Ct.B.Ar), cortical thickness (Ct.Th), average pore area (Po.Ar), and cortical porosity (Ct.Po). Maximum and minimum cross-sectional diameters were also recorded for each rib. Trabecular parameters included trabecular bone mineral density (Tb.BMD), bone volume fraction (BV/TV), trabecular thickness (Tb.Th), trabecular number (Tb.N.), trabecular separation (Tb.Sp), trabecular bone

pattern factor (TBPf), structural model index (SMI), connectivity density (Conn.D), and degree of anisotropy (DA). Cortical bone is more mineralized than trabecular bone, with the former demonstrating a strong linear increase with age. Ct.B.Ar, Ct.Th, and the major and minor diameters of the rib also demonstrate significant positive correlations with age. Tb.Sp significantly increases with age, while TBPf, SMI, and Conn.D significantly decrease with age. Although significant sex-based differences were not identified, visual inspection of the data suggests that boys have greater Ct.B.Ar and more mineralized bone than their female counterparts, but that girls have slightly thicker bone cortices. This indicates that the distribution of mass is further away from the bone centroid in boys, likely conferring a greater structural advantage. While highly speculative and possibly more indicative of inter-individual variation, peaks in Ct.Po at 2 and 13 years of age may be related to weaning and the adolescent growth spurt, respectively. Ontogenetic patterns in trabecular rib bone microstructure appear to mirror those observed in the upper and lower limb, but there is a slight age lag, probably reflecting the relatively slower growth of the thorax. This relatively new approach may provide tools for identifying human juvenile bone fragments and for exploring child growth.

Evaluating the morphological and metric sex of the human skull using 3D technology

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When faced with unidentified human remains, forensic anthropologists create a biological profile (sex, age and ancestry) to help the police narrow down the list of missing persons, and ultimately identify the unknown individual. The purpose of this research was to develop a combined morphological and metric cranial sex assessment method using three-dimensional (3D) technology in order to facilitate the move to digital documentation and analysis, while ensuring that the results are quantifiable and sufficiently accurate to be used in court. Using photogrammetric image capture techniques and Agisoft PhotoScan, this research imaged and created 3D models for 91 adult European individuals (20 known males, 20 known females, 51 hold out) from the William M Bass Donated Skeletal Collection, housed at the University of Tennessee Knoxville. 5 cranial traits, including the general size and architecture, supraorbital ridges, nasal aperture (height and width) and the mastoid process were digitally analyzed in 3D Studio Max to determine if there was enough separation between the male and female data to be used to assess the sex of unknown individuals. The principle component analysis demonstrated visible differences between the male and female control individuals, which warranted further investigation with a linear discriminant analysis. The LDA produced an overall accuracy rate of 90% when tested against the control individuals and 75% when tested against the hold out. In comparison to morphological and metric sex assessments done on the bone itself, this method proves to be easier to execute and eliminates certain biases, including landmark selection and measurement instrument errors. This novel method provides anthropologists with an easy and accurate means of assessing the cranial sex of unknown human remains, while producing a permanent record of the skull, which would be beneficial for both the legal system and the academic community.

A stable isotope analysis of the shep-*herd* relationship in Thessaly, Greece during the Hellenistic period

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Current research on ancient pastoralism in Thessaly, Greece is divided over the presence, prevalence, and effects of seasonal livestock movement, referred to as the 'agropastoral debate.' Examining this debate provides distinctive challenges because most methodologies require tangible evidence of habitation or landscape use, which is limited because of continuous pastoral mobility and poor site preservation. Despite these challenges, it is important to record this history for descendants of pastoral communities as it corresponds to aspects of identity, economy, and culture in ancient Mediterranean landscapes. At the 2016 annual CAPA-ACAP meeting we introduced the idea of examining the shep-*herd* relationship through a directed stable isotope analysis of sheep and goat tooth enamel. Here we present the preliminary findings from this study, and effectively re-examine the agropastoral debate. By analyzing carbon, oxygen, and strontium isotopes recorded from microsampled sheep and goat tooth enamel, we document trends in animal diet and mobility. Using this data we infer husbandry practices at three residential dwellings from two Hellenistic settlement sites (Kastro Kallithea and Farsalos), and ultimately assess animal mobility and the extent of animal management in ancient Thessaly.

Constructing deviance: the military management of male behaviour during the First World War

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During the First World War, men who did not uphold societal standards of masculinity, morality and sexuality were cast as pathological, and while in the military, such men were often diagnosed with conditions ranging from "feebleminded", or "mentally defective" to "moral imbeciles". Scholars have begun to problematize the conceptions of the hegemonic masculine ideal in the Canadian context, emphasizing that the First World War challenged, rather than reinforced, these ideals. The experiences of veterans who did not fit within narrowly defined parameters of masculinity, morality and heteronormative sexuality in Canada remain understudied. This poster explores these issues using the personnel files and pension records of 152 soldiers admitted as "mental cases" and treated at the Ontario Military Hospital at Cobourg. These files reveal the ways in which soldiers and military officials navigated the medicalization of socially constructed norms of masculinity, morality, and sexuality. This poster explores the range of narratives constructed around soldiers' pathologies, interrogating the social construction of deviance and the panel themes of diversity and intersectionality within a military context.

Natural and anthropogenic edge effects and their influence on monkeys and vegetation in a fragmented tropical rainforest in Costa Rica

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Forest fragmentation increases the amount of forest edge relative to interior. Edge effects can lead to loss of animal and plant species and decreased plant biomass near forest edges. Natural edges in forests serve as transition zones between landscapes and include rivers, while anthropogenic edges include human

settlement and cattle pasture. Both natural and anthropogenic edge effects are important to study in order to understand how intrinsic habitat variations affect wildlife and to better understand the impact of human-induced forest fragmentation. We examined the influence of three types of forest edge: natural river (riparian) forest edge, anthropogenic edge, and combined riparian and anthropogenic edge on mantled howler monkey (*Alouatta palliata*), Central American spider monkey (*Ateles geoffroyi*), white-faced capuchin monkey (*Cebus capucinus*), and plant populations at the La Suerte Biological Research Station (LSBRS) in Costa Rica. We predicted lower monkey encounter rate, tree species richness, and median diameter at breast height (DBH) at all edge types compared to interior, and that monkeys would show species-specific responses to edge based on body size and dietary adaptations. We expected that howler monkeys would show positive/neutral edge effects due to their large body size and folivorous diet, spider monkeys would show negative edge effects due to their large body size and frugivorous diet, and capuchins would show positive edge effects due to their small body size and varied diet. From May-August 2015-2017, we conducted population and vegetation surveys along riparian edge, anthropogenic edge, combined edge, and interior transects at LSBRS. Tree species richness and median DBH were significantly higher in the forest interior compared to anthropogenic edge (LRMs: $p = 0.046$), but there were no differences between other vegetation zones. Although overall monkey encounter rate did not vary between forest edges and interior, howler monkeys showed positive riparian edge effects compared to interior (GLMMs: $p = 0.021$). Our results indicate that diverse forest edges have varying effects on biota. Plants were negatively affected by anthropogenic forest edges, while mantled howler monkeys preferred riparian edge to other forest areas. Both findings have important implications for conservation planning in Neotropical forests.

Taking a *Biological Approach* to cribra orbitalia and porotic hyperostosis: Potential answers to long-standing questions

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Porotic lesions of the orbital roof and cranial vault are commonly found in archaeological human remains from many contexts and have also been identified in hominins and non-human primates. For many these lesions have become synonymous with anemia and are often used to investigate past lifeways. Anemia is one of the commonest conditions found in present day communities and high levels were probably also present in the past. Debate on the causes of cribra orbitalia and porotic hyperostosis and possible links between lesions has however continued for more than 30 years; the *comparative approach* to diagnosis, whereby lesions in a reference samples are compared to those found in archaeological bone has failed to provide clear answers. Such an approach has limitations where aspects of distribution and formation of lesions have not been critical for diagnosis or effective treatment in clinical medicine or biomedical research. The research reported here set out to investigate the potential of using the *biological approach* to paleopathological diagnosis, used by Don Ortner and recently proposed more formally by Simon Mays, to investigate porous cranial lesions and evaluate links between lesion types. Biomedical information on conditions that might result in the development of porous cranial lesions was evaluated. For all conditions the sequence and types of physiological changes were considered alongside potential co-occurrence; for anemia age-related changes in the normal distribution of marrow type and potential for conversion and re-conversion were reviewed. A wide range of conditions can produce porous lesions of the cranial bones, but combining careful evaluation of lesions found across the skeleton with biomedical information on marrow type and patterns of conversion with age were found to assist in suggesting a diagnosis. Results from this study show that it will be possible to suggest a diagnosis in many cases if the *biological approach* to paleopathological diagnosis is adopted.

Local perceptions of primates and protected areas: An ethnoprimatological study of conservation challenges in the Pacoche wildlife refuge, Manabi, Ecuador

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In the Pacoche Wildlife Refuge primate populations are at an increased risk of extinction due to habitat fragmentation and species isolation. Despite the precarious conservation status of the Endangered Mantled Howler monkey (*Alouatta palliata aequatorialis*), and the Critically Endangered White-fronted Capuchin (*Cebus albifrons aequatorialis*), primate research in the Ecuadorian coastal region remains thin at best. To address these concerns, and inform future conservation priorities, this study employs an ethnoprimatological approach to explore local perceptions of primates and protected areas. To achieve this goal, 22 semi-structured interviews accompanied by a photo-pile sorting activity were conducted between June and August 2018, with long-term resident agricultural workers in the Pacoche Refuge. Preliminary results of perceptions of primates indicate that howler calls are often interpreted as warnings prior to natural disasters or danger, in addition to announcing rainfall. Capuchin monkeys were reported to be aggressive, with many informants claiming to fear them. Many human-like traits were also associated with this species. This refers to capuchins depicted as “admirers” or “falling in love” with human bystanders in the forest due to their curiosity, and as “Christians” or “people” reported to perform “Hail Mary’s” when feeling threatened by humans. Despite these reported connections, the role primates play in the ecosystem was not acknowledged by participants. The importance of these species to the local community was predominantly associated with their role as tourist attractions. Results on protected area perspectives indicate a decrease in hunting and wildlife pet trade since the creation of the refuge in 2008. Though local cultural traditions such as primate meat consumption and using primate blood as a homeopathic remedy for asthma and respiratory infections are no longer commonly practiced, there is a lack of community engagement in park management, as well as misconceptions about conservation policies and priorities. Despite regulations, extraction of natural resources, particularly firewood and guadua bamboo remain common practices, and the sale of protected park land to investors from urban areas remains of concern. A key area for future research will be to understand the importance of how local perceptions can inform future conservation planning and thereby gain community support.

Photogrammetry, data visualization and public outreach: A case-study from Riparo Bombrini

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Increasingly, new technologies are being adopted by archaeologists and paleoanthropologists as part of the array of methods used to document and present the sites they excavate. The introduction of various forms of 3D imaging, such as photogrammetry, tridimensional scanning scan and Lidar, is gaining popularity among archaeologists as a way to digitize artifacts or sites themselves, which allows quantification of our research materials on an unprecedented scale. 3D imaging also allows us to standardize our working methods as well as our data; it also greatly facilitates the sharing of data between researchers and institutions, as well as with the public at large. This project that is the focus of this presentation is explicitly based on the use of in-field photogrammetry as a tool to reconstruct the evolving geometry of the collapsed rockshelter site of Riparo Bombrini, using digital photography as the main documentation instrument. The main goal is to create 3D models of the site using 2D photos, spatio-temporal landmarks and autocalibration software. Using this tool, we have been able to obtain a visual of the progression of the excavation on a daily basis, allowing in the future objective quantification of variables like excavated volume of sediment. The case-study provided by the site of Riparo Bombrini permits a discussion of the advantages and limitations of photogrammetry in archaeological practice and, because of its peculiar position in the Balzi Rossi site complex (NW Italy) also provides a valuable

context to highlight its potential as a promising tool for public outreach in the context of the touristic circuit developed by the Museo Preistorico Nazionale dei Balzi Rossi.

Trauma and childhood tuberculosis in the 19th/20th century: A syndemic perspective

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In 19th/20th century North America, an endemic era for tuberculosis, children suffering bone and joint tuberculosis were routinely admitted to hospitals and sanatoria. In the absence of streptomycin (until the 1940s), treatment regimens were often long-standing and difficult, typically using various casting methods (supplemented with heliotherapy) to encourage healing of affected bones or joints. Both portals of entry and patterns of lymphohematogenous dissemination of tuberculosis bacteria may influence the site of active disease in the body. Because bones are provided with a blood supply, they are vulnerable to bacterial infection. Understanding that blood supply is a key vulnerability involved in the delivery of tuberculosis bacteria, this paper explores the idea that increased vascularization associated with bone trauma and healing in childhood might be conceived as a potential risk for active skeletal tuberculosis disease. If traumas play a potential role in infectious disease risk, then a syndemic perspective, situated by way of example in the recent historic context, encourages the consideration of factors such as the nature of childhood lives and the risks and injuries to which children were exposed. Additional factors that intersect with broader environmental constructs, such as the nature of childhood nutrition, the quality of growth and development, and vitamin D status, underpin this syndemic perspective, since these factors can affect the whole nature of bone quality, bone healing, and overall resistance or vulnerability to tuberculosis in general.

Renewed excavations at Wonderwerk Cave, Northern Cape Province, South Africa

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In 2013, the Wonderwerk Cave Research Project shifted toward renewed excavation, although analysis of the collections is ongoing. Excavations currently consist of five different “operations” within the Oldowan and Earlier Stone Age (ESA) strata and Later Stone Age (LSA) strata in the area toward the cave entrance (extensions of Peter Beaumont's Excavation 1 and 2). The methodology of the renewed excavations focuses on detailed documentation of spatial data, as well as complete recovery and collection of multiple lines of evidence relevant to understanding site formation processes. This paper will present an overview of excavation methodology and results to date, with a focus on the later stages of the Acheulean sequence.

Stable isotopes and starch analyses: New insights into the use of plants among Archaic Age populations in Cuba

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The combination of starch and stable isotope analyses have changed our understanding of plant management among fisher-gatherer indigenous groups in Cuba, traditionally considered as homogeneous populations who depended on natural resources, without management of cultigens. In this paper we examine the subsistence strategies and food consumption patterns of the individuals from Guayabo Blanco, Cueva del Perico I, Cueva Calero, Canφmar Abajo and Playa del Mango sites by combining stable isotopes ($\delta^{13}C$ and $\delta^{15}N$) in bone collagen and starch analysis of dental calculus. Results suggest that at least two different food consumption patterns coexisted among "fisher-gathers" in Cuba: one consisting of a mixed diet where C3 and C4 plants were present, including cultigens such as *Ipomoea batatas*, *Phaseolus sp.* and *Zea mays*; while other groups had a diet likely characterized by an exclusive consumption of C3 plants. This evidence demonstrated the differential use and management of plants for indigenous populations from western and eastern Cuba since Archaic Age times, as an evidence of the diversity of dietary traditions. Multi-proxy starch and isotope analyses allow more refined understanding of subsistence practices in ancient populations.

Synchrotron radiation applications in biological anthropology: An update on capabilities of the Canadian Light Source Synchrotron

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The ability to probe histological structures non-invasively has resulted in anthropological applications becoming increasingly common at synchrotrons around the globe and the Canadian Light Source (CLS) is no exception. At the "Stones, Bones and Photons" satellite symposium of the 2010 annual CAPA-ACAP meeting an overview of bone imaging capabilities available at the BioMedical Imaging and Therapy (BMIT) beam lines of Canada's national synchrotron facility was presented. In the eight years since the symposium, the capabilities of the CLS have expanded and seen increasing application in fields of direct relevance to biological anthropology. This has included comparative, experimental, and discovery-based approaches that provide results illuminating bone growth, physical adaptation, and health for applications across bioarchaeology, biomedical science, anatomy, forensics, and paleontology. This poster will provide an updated overview of relevant capabilities, provide examples and outline how researchers (faculty and trainees) can access them via a scientific peer-review process. Specific application highlights in X-ray tomography techniques include large field of view imaging of bioarchaeological specimens, microscopic imaging of bone for ex vivo study of human and non-human samples as well as in vivo imaging to investigate cortical bone remodeling in 3D/4D within animal model systems. Elemental X-ray Fluorescence Imaging both at the CLS and at partnered facilities have seen application on bioarchaeological remains from both the Caribbean and the Arctic (Franklin Expedition). To conclude, new modalities for tomography and elemental mapping that are under development at the CLS facility will be discussed.

A pilot study for the re-evaluation of skeletal ancestry traits using three-dimensional technology

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In Canada, as of 2015, 204 cases of missing and murdered Indigenous women remained unsolved, making it a major concern for Canadian Indigenous communities, who are still pressing for the identification of these women. Forensic anthropology can contribute to the identification of victims by establishing a biological profile of the skeleton, including the evaluation of sex, ancestry and age from human remains. Ancestry assessment describes population affinity based on two criteria: morphological analyses, which examine size and shape of bone features, and metric analyses, which use skeletal measurements. Morphological analyses are difficult to reproduce and standardize, as they strongly depend on subjective judgments by anthropologists, based on their experience with human variation. This presentation will focus on the results of a pilot study conducted in the spring 2018. The purpose of this study was to determine if it is possible to improve the rigour of morphological analyses using 3D technology to quantify specific ancestry-related features. The study only focused on the shape of the orbits and nasal cavity as a test of the method. A sample of European female crania, originating from the J.C.B. Grant Collection curated at the University of Toronto's Anthropology Department, was compared to a sample of Canadian Indigenous female crania, originating from the Canadian Museum of History in Gatineau, QC. Both samples were imaged using a structured light scanner; the European sample was also imaged using photogrammetry to compare the techniques in terms of applicability. The 3D models obtained from both techniques were imported into a 3D analysis software, where the shape of the orbits and nasal cavity were measured. The measurements were statistically analyzed, in the hope of finding significant differences ($\alpha = 0.05$) between the two groups. Results indicated that for the right orbit, there was no significant difference between samples, which raises the concern whether orbit shape is a useful morphological trait for ancestry assessment. For the nasal cavity, there was a significant difference between samples, consistent with what has been observed morphologically, but some overlap remained present between groups, likely indicating some intrapopulation variation.

Dental bioindicators: Crafting new collaborations and approaches

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Teeth have long provided an invaluable source of information to biological anthropologists interested in a variety of topics, such as evolutionary relationships between species, reconstructing diets and activity, and the timing of morbidity events in past and contemporary populations. In recent years, amongst scholars from fields such as environmental science, microbiology, and public health, there has been a growing interest in exploring the ability of teeth to serve as "bioindicators" of human/environment interactions. This interest derives from the recognition that teeth provide a retrospective record of childhood environments, stressors and exposures, with the hope that they may also serve as true bioindicators, allowing for the monitoring of human population health and providing prospective assessments of childrens' functional outcomes later in life. Despite a flurry of research in terms of analytical techniques, and the establishment of large dental biobanks where teeth are accompanied by detailed longitudinal datasets documenting aspects of donors' lives, there is currently no consensus on the utility of dental bioindicators. Using case studies of elemental maps of biobanked teeth, this paper will explore developments in dental bioindicators research, and posit future limits and opportunities. Key to this endeavor is recognition of the essentially collaborative nature of bioindicators research, whereby bioanthropologists often serve as bridges linking diverse researchers in ways that stimulate the forward momentum of previously unimagined collaborations and outcomes.

The fascination with Neandertals: Tracing academic and popular attitudes from 2000 to 2018

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The paper examines the portrayal of Neanderthal behaviour in scientific and popular science literature. I have limited the review of the papers to 2000-2018 in order to get a sense of contemporary opinions in science and how they are translated into popular discourse. As representative of different approaches I examined three journals: Science (a high impact general science journal), Journal of Human Evolution (as the most prominent palaeoanthropological publication) and Scientific American (popular science journal with wide circulation). The papers were divided into those that interpret behavior from morphology/DNA and those that use tools. The questions posed are: are Neandertals being portrayed as being similar to modern humans or as different from them in their behaviour? Is the research more inductive or deductive? Two individuals, a "specialist" (BA in Paleolithic archaeology) and one "lay educated person", with a PhD in Music, scored the papers independently. The story of the Neandertal has captivated archaeologists since the discovery of the type specimen in 1856. M. Boule, in the early 20th century, depicted Neandertals as brutish, club swinging beasts. Then in the 1960's, with the discovery of the Shanidar cave site in Iraq, the portrayal Neandertal swung in the other direction. Scientific theories feed the popular imagination. The figure of the Neandertal is placed in prominence among fiction writers from H. G. Wells to Jean Auel. A big part of that fascination is the fact that Neadertals disappear at the arrival of modern humans in Europe. Placing the distinction between Neandertals and modern human under "behavioural modernity" the differences were no longer these differences were no longer morphological but cultural. All attempts to interpret behavior of Neandertals have been subject of controversy and debate among archaeologists. Current archaeological research paints a complex picture of the Neandertal as fully "humanized" people who created the Upper Palaeolithic tool technology Chatelperronian. They might have created art forms similar European Upper Paleolithic cave art and used ornamentation and jewelry. No longer are they the shadowy other that populated early imaginative accounts of our long-misunderstood cousins. Today, Neandertals are our cognitive equals. The same cognitively but different biologically.

Sinking our teeth into Vitamin D Deficiency and the Developmental Origins of Health and Disease Hypothesis (DOHaD)

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Interglobular dentine (IGD), a mineralisation defect in teeth, can be used to provide information on cases of vitamin D deficiency in both clinical and paleopathological research. With a growth of interest in the Developmental Origins of Health and Disease hypothesis (DOHaD), methods that permit identification of individuals who experienced previous episodes of deficiency could provide valuable additional data. This study investigated the use of the neonatal line that occurs in teeth during the birthing process, in conjunction with interglobular dentine (IGD), to determine the timing of vitamin D deficiency. Information on dental development was reviewed and data from previous work on IGD on the teeth of living (n=1) and archaeological individuals (n=3) was obtained. The age at which an episode of past vitamin deficiency occurred was approximated by assessing the location of IGD in the dentine. To evaluate the occurrence of IGD relative to prenatal and postnatal periods, the neonatal line was observed in enamel and its location extrapolated in dentine using ImageJ. First permanent molars and all deciduous teeth give information on intrauterine development and on the first 1000 days postnatally providing a direct window on maternal and fetal health. Two archaeological individuals had IGD that formed prenatally suggesting that their mothers experienced vitamin D deficiency at the time that dentine was forming in the fetus and the other individuals had a deficiency during the first 1000 days of life. Prenatal vitamin D status affects fetal mineral homoeostasis and influences fetal growth. Postnatal vitamin D

deficiency, in the first 1000 days, affects childhood growth and is fundamental for bone and tooth mineralisation and likely risk from non-communicable chronic disease. The neonatal line serves as a clear baseline for determining prenatal and postnatal events, particularly those related to vitamin D, calcium, and phosphate metabolism. These findings pave the way for further investigations on vitamin D deficiency related to fetal programming and can contribute directly to work on the DOHaD/first 1000 days theories.

Documenting the prehistory of Zambia

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Much of what is currently known about hominin origins and evolution in Africa comes from either East Africa or South Africa. Indeed, little is known about the role of Central Africa despite the fact that it lies between these two important regions and that it is a likely corridor of genetic communication and migration. This is due, in part, to the relative rarity of exposed older sediments. In that context, we focus our attention on the Luangwa Valley of eastern Zambia, which is located west of Lake Malawi, in an extension of the East African Rift. An amateur paleontologist has found over 500 fossil specimens, including a hominin talus, in secondary deposits along the Luangwa river. The faunal composition of the collection indicates that the bones likely date to the Middle Pleistocene, but some could be as old as the Pliocene. One isolated femur has been attributed to *Theropithecus cf. darti*, whose last known presence is 2.9 million years ago in Ethiopia and 3 or 2.5 million years ago in South Africa and constitutes the only possible evidence of Pliocene-age sediments. Given the uncertainty of dating composite assemblages, these dates remain tentative. The primary objective of our new project is to identify in situ fossiliferous sediments through systematic survey. This project is part of an integrated research program documenting the second half of the Middle Pleistocene in eastern Zambia, a period during which anatomically modern humans arose in Africa. Other parts of the project include paleo-climate modeling for the Middle Pleistocene (in collaboration with Francesco Pausata, Université du Québec à Montréal) and archaeological survey and excavations. The ultimate goal of the combined research program is to add to our knowledge of the biological and cultural evolution of hominins in the area.

Shaping stress at the end of life: Hair cortisol analysis in the Terry Collection

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Experiences of stress in the months leading up to death are shaped by a myriad of factors. One variable that has been clinically shown to impact the ways in which individuals experience stress later in life is the exposure to stressors during development. However, the relationship between early life stress and later stress experiences is difficult to study in bioarchaeology due to the complexity of the relationship and the limited data available from human skeletal remains. In this paper, I argue that by examining multiple forms of data it may be possible to weigh different explanations for the variations in stress response at the end of life. In particular, I examine hair cortisol concentrations and height to examine the relationship between developmental stress and the ways individuals from the Terry Collection respond to stressors in the months lead up to death. Hair cortisol concentrations have been accepted as a valid and reliable marker of stress in the clinical literature and height offers a crude proxy for early life conditions. Results indicate that people dying of cardiovascular conditions and cancer exhibit higher hair cortisol concentrations in the months leading up to death and are relatively shorter than people who died of sudden events or accidents. Although these results are preliminary and based on small sample sizes, they

suggest that the Developmental Origins of Health and Disease hypothesis offers one strong potential explanation for the variability seen in stress hormones at the end of life. Interpreting stress hormone activity in light of the impacts of early life stressors on the development of the neuroendocrine system offers a valuable and important perspective on the impact of stress through the life course.

A preliminary analysis of parasite egg recovery methods from pelvic soil samples

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Archaeoparasitology is an innovative sub-discipline of bioarchaeology that focuses on the recovery of long-surviving intestinal parasite eggs to analyze individual and community health profiles in archaeological populations. There has been little focus on the recovery of parasite eggs from excavated soil, as there are limited opportunities to collect and analyze this specific type of material. However, due to the ongoing effects of coastal erosion on Rochefort Point at the Fortress of Louisbourg, NS, large-scale excavation of an 18th century cemetery has allowed for the collection of this information-rich pelvic soil. This study is a preliminary test of parasite egg recovery methods from burial soil. Samples were collected from the anterior aspect of the sacrum and inside the cranial vault (control) of seven complete skeletons (six adults and one subadult) prior to excavation to test for parasite egg abundance. Micro-sieves (300µm, 160µm and 20µm) were used to collect the parasite eggs for morphological analysis. Within these seven individuals, multiple different parasite species were detected, including *Ascaris* species and *Enterobius vermicularis*. These results suggest that the method used for this experiment will yield parasite eggs for analysis in future archaeoparsitological studies. This research is significant in that it 1) validates and builds upon current methods for the recovery and analysis of parasite eggs from human pelvic soil samples, and 2) contributes to our understanding of the impact of human intestinal parasites on individual and population health at the 18th century Fortress of Louisbourg.

Inaccuracy of accumulated degree day models to estimate post-mortem intervals in two terrestrial habitats in Cape Town, South Africa

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In forensic death investigations, estimating the post-mortem interval (PMI), or time since death, is critical. An accurate PMI estimate increases the speed and accuracy of identifying the remains by narrowing the time frame in which the death occurred, thus reducing the pool of possible decedents. Cape Town, South Africa has a high murder rate where many homicide victims remain unidentified. There has been a tendency to broadly apply quantitative models of decomposition across biogeographically unique circumstances. A prime example is the widespread application of the total body score (TBS) and accumulated degree day (ADD) model developed by Megyesi et al. (2005), later refined by Moffatt et al. (2016). However, the appropriateness of applying a single model to a wide range of locations with unique geography and climates remains in question. The aim of the study was to evaluate and compare the accuracy of two existing models (i.e. Megyesi et al. 2005 and Moffatt et al. 2016) for estimating PMI in Cape Town, South Africa. Using pig carcasses, Finaughty established baseline data on the rates and patterns of terrestrial decomposition in summer and winter in two different locations. These areas of Cape Town are forensically significant, suffering from high murder rates, poor socio-economic conditions, and a dense population. Among the baseline data, Finaughty derived TBS values using the Megyesi criteria. The present study used these values to estimate the ADD per the Megyesi and Moffatt models, which would correspond to an estimated PMI. These estimated values were then compared to the actual ADD values. Estimates of ADD were inaccurate for both models in winter, and only partially in summer. The

Moffatt model was more accurate in the earlier decomposition stages, with the Megyesi model more accurate in later decomposition stages. These results indicate the Cape Town environments may contain factors that the two models do not consider, producing inaccurate PMI estimations at various total body scores. In conclusion, these findings point to the impracticality of applying models developed for one region to any other and support the need to establish regionally-specific equations for estimating PMI in a forensic context.

Biological memories: Examining early indicators of intergenerational health among Alaska Native women and children living in Anchorage

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Rates of obesity and associated diseases, including type II diabetes and cardiovascular disease, have increased dramatically among the Alaska Native population within the relatively short time period of 20-30 years. Research on dietary changes has received a great deal of attention, largely attributing these upward trends to an increasing proportion of store-bought foods relative to traditional foods. While it is clear that an individual's diet across his/her lifespan is important for his/her own health, recent research has begun to show that a person's metabolic health has origins reaching back to one, perhaps two, generations. Maternal health before and during pregnancy, including body mass index and blood sugar levels, shapes a prenatal environment that may promote suboptimal fetal and infant growth patterns that increase the risk of developing obesity and metabolic dysregulation later in life. In addition to diet, maternal health is often associated with social, economic, and food insecurity factors. As such, with a respectful and culturally appropriate execution, this research project explores both the potential intergenerational impacts of maternal health, and early-life sociodemographic and dietary correlates of fetal and infant growth. Survey data is from in-person interviews of approximately 200 Alaska Native mothers at the Outpatient Pediatrics Clinic at the Alaska Native Medical Center (ANMC) in Anchorage, AK. Medical record data on select maternal pregnancy measures, birth outcomes, and infant measures provide clinical and biological data for this study. Results from this study will be presented from a lifespan perspective with an orientation toward health professionals, individuals interested in a lifespan approach to epidemiology and demography, as well as those who want to learn more about early origins of health and disease. Through identifying new ways to reduce obesity, diabetes, and cardiovascular disease across generations the present study aligns with the visions, missions and initiatives of Southcentral Foundation, ANMC, the Alaska Native Tribal Health Consortium, and Healthy Alaskans 2020. Taking a lifespan perspective by examining potential intergenerational impacts of maternal body composition, food insecurity, and infant diet, this study holds promise to illuminate potential solutions to the rise of obesity-related health problems experienced by the Alaska Native population.

Differentiation of perimortem trauma from heat fractures in cases of cremation

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The analysis of cremated human remains is difficult to undertake, especially attempting to discern perimortem trauma from heat fractures. It is crucial to have a firm understanding of bone biomechanics, both on fresh and dry bone, as well as fracture properties associated with various types of trauma. As of now, there is limited knowledge on how cranial and irregular bones, such as the os coxae, break down under heat. This research therefore focuses on the differentiation of trauma fractures from heat fractures on cranial and irregular bones. This project utilized five human calottes and five human hemipelves, donated by the Anatomical Gifts Program (AGP) at the University of Alberta. Prior to partial cremation,

the remains were traumatized by either blunt or sharp force trauma; two were left untouched as control units. Post-cremation, 180 mixed traumatic and heat fractures were analyzed to discern the two. Virtual reconstruction via 3D modeling of each fracture was done to provide a curvature analysis of the fractures, by looking at the fracture boundary lines, slopes, and variances in the microscopic details of the fracture walls. The analysis showed distinct differences, on a microscopic level, between traumatic fractures and heat fractures. The qualitative analysis of this research proved to be successful. The results obtained from this study will lead to a better understanding of the implications surrounding the differentiation of perimortem trauma from heat fractures on cranial and irregular bones. This will greatly aid in the development of quantitative studies of heat trauma.

Students reflect on the relationship between Anthropology and Indigenous Peoples in Canada

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In the Truth and Reconciliation Commission of Canada's Calls to Action (#10 & 63), public education is identified as a crucial component in the process of reconciliation (Truth and Reconciliation Commission of Canada, 2015). Long-term change is dependent on revising the education curriculum to promote respectful and informed relationships between Indigenous and settler communities. This means that Indigenous content and knowledge must be inter-woven within the Canadian education system to avoid the perpetuation of biased and disjointed concepts of Indigeneity (Battiste, 2013). This requires a universal understanding of the impact of historical effects of colonialism on Indigenous peoples in Canada (Styres, 2017). This poster will outline the involvement of the Indigenous Elder at the University of Toronto Mississauga in a first-year undergraduate course in the introduction to archaeology and biological anthropology (N=800 students). In an initial guest lecture, the Elder challenged students in the course to reflect on their own biases and stereotypes of Indigenous Peoples in Canada. A second lecture involved a dialogue between an Ontario archaeologist and the Elder that emphasized the historical relationship between anthropologists and Indigenous people in Canada as researchers and subjects respectively. Students wrote critical reflections on their changing assumptions regarding the role of Indigenous people in the anthropological interpretation of artifacts as sacred symbols that are part of a living culture. In this poster, an overview of the students' reflections in this particular course is discussed to emphasize the impact of the involvement of the Indigenous Elder on student engagement in the course material. This poster will outline the prospects, as well as the challenges, for increasing Indigenous knowledge and content across the curriculum.

Dr. Sawchuk: Inspiring leader and mentor

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I have known Dr. Larry Sawchuk for over 25 years, as an undergraduate and graduate student, mentoree, colleague and peer. This presentation, based on my experiences with, and knowledge of Dr. Sawchuk will share why I believe he is truly an inspirational leader and mentor for both students and colleagues. This perspective will be supported by providing examples of his contributions to supporting excellence in teaching through; 1) enabling practical problem-solving skills that are transferable to future careers be it in the workplace or in academia, 2) providing numerous individual reading and research courses for undergraduate students, 3) mentoring and training students at international locations (i.e., Gibraltar and Malta) to conduct research and subsequently to co-author papers, and 4) developing and implementing the original Health Studies Program at the University of Toronto, Scarborough Ontario. The best leaders and

mentors are said to those individuals who “walk the talk”? Clearly, Dr. Sawchuk through his actions and commitment to academic excellence and mentoring leads the way for both students and his peers.

Anthropometric variation and the theoretical impact on fit accommodation for military clothing and equipment for the United States Army

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The design and development of military personal protective equipment (PPE), clothing and individual equipment (CIE) and workspace environments requires a detailed understanding of human body size shape information. For over the past 150 years the US military has undertaken a multitude of anthropometric surveys to collect critical body dimensions to aid in the welfare of US Army Soldiers and in the design and development of military products. This paper highlights a comparative anthropometric analysis from different population groups among United States military personnel between 1988 and 2012, based on the DoD race categories; White, non-Hispanic, Black, non-Hispanic, Hispanic, Asian, Hawaiian/Pacific islander, Native American, and Other. The main purpose of these comparisons is to quantify the disaccommodated proportion in each population group relative to military accommodation rates (90%, 95%, 98%). These accommodation rates vary depending on the type of equipment being evaluated and become more stringent as the equipment becomes more protective (i.e., 90%, 95%, or 98%) and will influence the overall disaccommodation rates of the user population. When a 90% accommodation rate was applied, all male population groups were accommodated at more than 90% (92% to 100%). However, all female population groups, except for Native American, were accommodated at less than 90% (69% to 87%). As the accommodation rate increased, from 90% to 95% or 98%, the accommodated proportion of all population groups became larger than 90%, except for one population group. Female Asians were accommodated at only 69% when the accommodation rate was set to 90%, 82% when set to 95%, and 89% when set to 98%. The overall results suggest that it is important to consider population origins for evaluating accommodation rates because setting specific boundaries may exclude individuals differently based upon their background and thus affect the overall fit of CIE, PPE and the usability of military workspaces. This work will help identify accommodation rates for different military products.

Queering the Developmental Origins of Health and Disease: Towards more inclusive research and policy frameworks

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In 2016, the National Institute of Health (NIH) announced the formal designation of Sexual and Gender Minorities (SGM) as a “health disparity population”, making NIH funds specifically available for research within these communities. This designation came after years of research documenting that SGM peoples experience increased risk for a range of non- communicable health conditions, largely independent of the HIV/AIDS crisis. This paper explores the literature on the developmental origins of health and disease (DOHaD) to elucidate any unique developmental pathways that may contribute to this health disparity for SGMs. At present, the language of DOHaD and reproductive biology more broadly, often excludes SGM peoples. No attempts have been made to include SGM individuals in the iconography or interventions that make up DOHaD’s engagement with the public. The frequent usage of terms like maternal or mother, and images of pregnant cis-gendered bodies do not accurately represent a significant portion of people. Some fertility clinics in Toronto report that up to 30% of their clients are LGBTQ+ (Epstein, 2008). Queering DOHaD is paramount to ensure that all groups of people are included in health policy and research, regardless of how they experience stress, reproduce and or create their families.

Eye contact, but not food, is associated with tourist-directed aggression from a hybrid macaque group in Sabah, Malaysia

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Primate tourism has been heralded as an important conservation and education tool that can also provide reliable employment for residents of primate habitat countries. An important drawback, however, is that human-primate contact increases the risk of cross-species disease transmission. Numerous macaque species (*Macaca sp.)* have been studied at popular tourist locations where provisioning and physical contact are common, which means that rates of direct contact and intense aggression are also common. This study aimed to better understand how to improve primate tourism by examining human-macaque interactions when tourist behavior is policed by local staff. We studied a hybrid group of long-tailed (*Macaca fascicularis*) and pig-tailed macaques (*M. nemestrina*) at Sepilok Orang-utan Rehabilitation Center in Sabah, Malaysia. We hypothesized that: i) macaque aggression would be less intense and less frequent compared to sites with low staff intervention; ii) there would be an association between specific human behaviours and macaque aggression; iii) the presence of human food and food cues would be rare and not associated with human-directed aggression. We used instantaneous scan sampling and ad libidum sampling to assess tourist-macaque interactions from November 2016-August 2017.When present, macaque aggression included open mouth threats, lunges, and grabbing. Aggression was not easily predicted and typically followed sustained eye contact and involved one of three specific macaques. Food and food cues were not significantly associated with human-directed aggression and the majority of tourist-macaque interactions were peaceful (89.8%, N=316). We did not witness any intense physical aggression, such as biting or scratching. Macaque aggression was infrequent and less intense compared to sites featuring provisioning by tourists. Unlike published studies at other sites, eye contact between humans and macaques was the only human behaviour that significantly increased an individual's odds of receiving aggression from a macaque (OR 15.19) and food was not associated with aggression. Since macaques do not appear to be avoiding tourists, it is crucial that visitors' access to food is limited and their behavior is monitored by staff. This will reduce human-directed aggression, stress, and the potential for cross-species disease transmission.

Movers and shakers: Integrating innovative perspectives on movement in biological anthropology

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This paper reviews new analytical and theoretical perspectives regarding the movement of human and non-human primates. In biological anthropology, there is at times a disconnect between researchers investigating large-scale population movements, such as moving across continents and landscapes, and individual-level physiological and anatomical processes, such as how habitual activities impact bone structure. Some researchers explore questions of movement and mobility using physiological methods, including assessments of how diverse tissues respond to activity, while others focus on the analysis of anatomical structures. In this presentation we review how Canadian biological anthropologists have used new methods to approach old questions in innovative ways, and how they have begun to integrate diverse approaches. For example, some scholars are broadening our view of how we negotiate our environment by characterizing intergroup and evolutionary variation in movement experiences; others are exploring how movement influences individuals and groups through the life course. The presenters in this session represent scholars investigating how movement has shaped the bodies of both contemporary living groups and individuals who moved in the past. These disparate fields can and will continue to work together to

produce more nuanced ways of examining past and present human movements. This presentation introduces and explores how we can start to bridge these varied perspectives in our future work, leading to stronger interpretations of human and non-human lived experiences.

Social epidemiology in bioarchaeological context

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This presentation provides a historical overview of epidemiology in bioarchaeological research, and explores the role of social epidemiology, that is concern with those determinants of health that are embedded in the social world when investigating disease, injury and disability in the past. Recent work by bioarchaeologists mainly focuses on theoretical, methodological and analytical shortcomings in palaeoepidemiology and palaeopathology with a nod to the importance of contextualized investigations that draw on available archaeological, historical and/or cultural data. Some have even gone as far as to invoke a social epidemiology in bioarchaeology. While there is no question that social epidemiology has come of age in public and occupational health as well as other sectors, is social epidemiology inherent in and a strength of palaeoepidemiology? Here, I discuss issues raised from within the discipline of social epidemiology including: the use of models, the importance of Interdisciplinarity, the need to personalize populations, potential global applications, and the influence of health care. This survey suggests that while it will still be necessary to grapple with an array of conceptual, methodological and analytical problems, palaeoepidemiology is poised to bridge the biological and social, and expand research on social factors influencing illness and disability in antiquity.

A comparative growth study in Medieval Islamic and Christian Portugal: linear and appositional growth as markers of the social environment

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It is well established that growth and development in children is affected by the stress they experience. This study evaluates how children that lived from the 8th to 17th centuries in Santarém, Portugal during either the medieval Islamic or medieval late Christian Periods may have experienced different social environments leading to differential development. The medieval Islamic Period spanned the 8th-12th centuries during a time of enlightenment known as the Golden Age of Islam, whereas the medieval late Christian Period of the 13th-17th centuries is portrayed as time of social upheaval. Based on our understanding of the potential differences in the social environment between the two periods, we predicted that children would exhibit different patterns of growth. It would be expected that when compared, children that lived during the medieval late Christian Period would present as having decreased long bone length-for-age and appositional growth-for-age. Plots for both linear and appositional growth were compared with data from the Denver Growth Study. Results show that both populations exhibited stress to a degree in which it impacted growth, however no significant difference was found for children that lived in different time periods. Therefore our hypothesis of differential growth based on time period was not confirmed. Several factors contributed to this result, of which the most significant limitations were sample size and examining such a large time-scale. Furthermore, we must question how the medieval Late Christian Period is portrayed and what role buffers may have against the impact of the social environment to growth of individual children.

Between the needle and the knife: queer theory and the intersections of gender in the Western Canadian Arctic

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Queer theory is often equated with sexuality research in archaeology and biological anthropology (Blackmore 2011), but a queering of the archaeological record actually allows us to challenge all aspects of (hetero)normativity in archaeological practice (Croucher 2005; Blackmore 2011). Queer is "whatever is at odds with the normal, legitimate and the dominant" (Halperin 1995:62), and it allows us to replace binaries—including those related to gender—with a proliferation of differences. Instead of focusing on a normative and binary (male/female) understanding of gender created and perpetuated by archaeologists and other heritage professionals, a queering of the archaeological record asks us to focus on examples of objects, spaces, or individuals that deviate from these norms. This paper will provide an overview of the gendered landscape of arctic archaeological research, including a retrospective survey demonstrating the simplistic and binary ways arctic archaeologists have commonly discussed gender in their research. Additionally, I will examine examples of individuals or groups who deviate from normative, binary gender roles drawn from both the arctic ethnographic record and from interviews conducted with Inuvialuit elders and knowledge holders. Finally, this paper will consider the archaeological implications of viewing gender outside of simple binaries and how to move forward in our examinations of the material record. This paper is intended as an archaeological case-study showing one way to "queer" interpretations of anthropological data, however the recommendations provided by this study can be useful to non-archaeological anthropologists who wish to move beyond simplistic and binary interpretations of sex and gender in their own research.

Saskatchewan Population Health and Evaluation Research Unit: The Dynevor Hospital and First Nations Health Care in Manitoba and beyond, 1908-34

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For the first half of the 20th century tuberculosis (TB) was unmatched as a cause of death among Canada's Indigenous people. Following the Second World War, in a fundamental reversal of prior policy, the newly created Department of National Health and Welfare established a systematic program aimed at combatting tuberculosis among the nation's Indigenous people. Central to this was the acquisition of an extensive network of institutions across the country, each renovated to serve as TB sanatoria. One earlier model for this was the Dynevor Indian Hospital, a 50-bed facility located in southern Manitoba that was acquired by the Department of Indian Affairs from the Anglican Church in 1939. By this time Dynevor had an almost 50-year record as a hospital, a record that has gone largely unnoted in the historical record. In this presentation I examine this early period of care for Manitoba's First Nations people. Drawing on the hospital's records (1908-1934) I focus on the nature of the health conditions dealt with, and their outcomes, as well as the patients who were treated (including age, extent of confinement, and community of origin). In this way I will provide context to help expand our understanding of Indigenous health and healthcare in Manitoba leading into the modern anti-TB era.

An alternative theoretical approach for understanding patterns of human variation using identified skeletal collections

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The Terry Collection (USA) and the Coimbra Collection (Portugal) are two of the most widely studied skeletal reference collections and have been used extensively in developing and testing methods for estimating age, sex, stature and race/ancestry. The research potential of these collections stems from the accuracy and quality of the documentary data that are available for each skeleton and for each collection as a whole. Since these collections are considered "identified", many researchers who use these collections have been too quick to ascribe the variation to some of the readily available documentary variables such as "source" of the collection or "race" and ignore other biocultural sources of variation. Individuals in both collections have been considered poor from a socioeconomic standpoint, however "poverty" is complex and its impacts on the skeleton will vary. This study examines the skeletal and documentary data within a historical context for these two collections using an alternative approach that borrows from Ecomarxist and Ecofeminist theories. The results from this research suggest that the general patterns of variation are derived from complex socio-economic and political factors that have had different affects by collection. Although people from Portugal are by definition European, the pattern of variation seen on the Coimbra Collection is not consistent with the European-Americans in the Terry Collection. The overall pattern of stunting in the Coimbra Collection is very pronounced, and European-Americans from the Terry Collection consistently cluster with African-Americans from the Terry Collection and not Europeans from the Coimbra Collection. This study presents evidence that can help to better understand the varied impacts of poverty within a greater biocultural context and challenges the biological reductionist notion that patterns of variation are associated with racialized groups.

Exploring the development of upper limb strength through asymmetry measures in the arm and forearm

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Cross-sectional geometry of the upper limb has been used to characterize habitual manipulative activities in modern and prehistoric populations. The ontogeny of handedness and arm strength asymmetry remains under-examined, and may lend insights into the timing and extent to which juveniles competently perform the daily activities of adulthood. We explored biomechanical asymmetry along the diaphysis of the humerus and ulna to examine how upper limb strength is produced through growth. We are interested in determining whether the arm and forearm express asymmetry equally, which regions of the diaphyses express side dominance most strongly, and the developmental timing of these characteristics. We studied archaeological burials of hunter-gatherer sub-adults (n=91) from four geographically diverse areas in order to examine these questions among physically active (non-sedentary) populations. Our analysis shows that the humerus is more asymmetrical than the ulna, and that the distal humerus and mid-shaft ulna are the most asymmetric regions of the diaphysis. Side dominance is evident beginning in mid-late childhood, but is not uniformly expressed in older juveniles. This points to differentiation in habitual manipulative activities among adolescents, however the data illustrate a level of underlying fluctuating asymmetry or measurement error that may be important in discriminating a functional signal in biomechanical properties of the diaphyses.

The evolution of Lawrence A. Sawchuk

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This talk traces Larry's evolution from a dark-haired, mustachioed student at the University of Manitoba to his present form, a white-haired, clean shaven Full Professor at the University of Toronto. Relying on the excellent memories of the authors, written correspondence, and photographic evidence, with no claims of scientific rigour, we reflect on our time with Larry to celebrate the career of our most memorable mentor.

Models of graduate supervision in Higher Education: What Chris White taught us about collaboration

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We take this opportunity to reflect on what Chris White has taught us about the meaning of mentorship. The literature on mentoring suggests that effective mentors are insightful, supportive, willing to promote others, and highly skilled collaborators. Chris is unquestionably all of these things. For us, Chris' openness and inclusive approach to collaboration is at the heart of her abilities as a mentor, and something we all try to implement in our current roles. We provide examples, drawn from our interactions with Chris, of the way she builds relationships, guides through role modeling, supports and encourages without proscribing, and fosters a professional and collegial research network. While we work in diverse academic contexts, we all draw regularly on the strategies we learned from Chris, including setting clear expectations, talking openly about work/life balance, and allowing students to pursue their intellectual curiosity. She also taught us the importance of sharing food with colleagues! Chris continues to inspire us to work collaboratively in all aspects of what we do, from research to teaching and beyond.

Engaging bioarchaeology undergraduate students through writing in the discipline

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Instruction on writing in the discipline provides the opportunity to integrate course content and writing into a holistic learning experience. The purpose of this study is to examine whether instruction and assignments in a writing-intensive course at the University of Georgia (UGA) enhanced student perceptions of material learned, writing skills developed, and writing in the discipline of bioarchaeology. Students enrolled in the Spring 2018 course, ANTH 4265: Bioarchaeology, were instructed in writing in the discipline of bioarchaeology through lecture, workshops, activities, and a final paper. In addition to submitting their final paper to the instructor via the course eLC, students were instructed to submit their final paper to UGA's peer-reviewed undergraduate journal, The Classic Journal, for publication. To evaluate perceptions, students were asked to indicate their level of agreement with a series of statements via an anonymous student response form for the Writing Intensive Program at UGA. Out of 16 students,

93% agree or strongly agree that writing assignments enhanced their learning of subject matter and that the writing they did for class built on their previous writing skills and 100% agree or strongly agree that assignments helped them to understand the ways of writing in bioarchaeology. Results from student forms indicate that instruction enhanced writing skills, understanding of subject matter, and writing in the discipline.

Doing right in the house of God: historical perspectives to current challenges in the societal role of the doctor

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Historically, doctors have undergone a series of shifts in their social position. Originally doctors were patient-oriented, with their practice based on reassurance and companionship. Similarly, 18th century doctors drew their social position from the patients they associated with. It was not until the 19th century, with the technical advancements in treatment that became available, that doctors' knowledge eclipsed that of the general public and their practice became paternalistic. With information becoming more readily available, we are seeing a shift away from paternalism to the creation of physician-patient partnerships. This has caused a schism in the medical world between proponents of the old and new systems, which plays out in medical education as new doctors learn how to practice from established role models. This paper discusses the results of semi-structured interviews with 25 medical students at McMaster University to explore how students view the changing social role of the doctor. Students were asked questions related to their perceptions of the "good" doctor and medical professionalism. The results show that as students progress through medical education, the majority develop more paternalistic views once they have had practical experience. Where first year students saw patients as guiding their medical interactions, final year students characterized patients as often unable to understand the complexities of medicine. The majority of medical students viewed good doctors as those with technical knowledge and compassion, but not necessarily those who engaged patients in their own medical management. These views reflect the continuing influence of 19th century medical culture and draw attention to a developing identity crisis of physicians who are attempting to renegotiate their place in relation to patients and their practice. Physicians are being asked to return to a patient care model that more closely reflects the earliest practice of medicine and to shift from being guardians of medical knowledge to consultants. These changes reflect the growing knowledge base of the public that is embedded in social movements that value autonomy and inclusiveness as the basis of a new biomedical model.

Preliminary report on the phylogenetic systematics of European *Pliopithecoidea*

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Pliopiths [Pliopithecoidea] are a clade of extinct catarrhine primates that inhabited Eurasia from 18 to 6 million years ago. Known primarily from fossilized dental remains, pliopiths have remained a poorly understood taxonomic group since their discovery by Édouard Lartet in 1837. This study presents a systematic phylogenetic analysis of dental and mandibular characters from 11 European pliopith species. The characters used in this analysis are largely non-metric and qualitative in nature. The report presented here is part of a larger, ongoing research project that seeks to decipher more about the phylogeny, biogeographic distribution, and dispersal patterns of the first Eurasian catarrhine primates. Characters were polarized using closely related anthropoid taxa from Egypt (Parapithecoidea, Propliopithecoidea) and extant Platyrrhines as outgroups. Initial results support the validity of Pliopithecoidea as a distinct anthropoid clade composed of two families Pliopithecinea and Crouzeliinea. The designation of *Epipliopithecus vindobonensis* as distinct genus, which forms a sister taxa relationship to *Pliopithecus*, is

also supported. Finally, this study shows that the four species assigned to *Plesiopliopithecus* (*P. auscitanensis*, *P. lockeri*, *P. rhodanica*, *P. priensis*) can be synonymized into a single operational taxonomic unit, *Plesiopliopithecus lockeri*.

Hey, who invited the pots to the isotope party? Intersecting material and biological identities and social network dynamics at the Maya City Lamanai, Belize

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For the ancient Maya residing at the urban center Lamanai, the period encompassing the Maya Collapse (A.D. 750-1150) and the arrival of Spanish Friars, who built a Roman Catholic church there by roughly A.D. 1570, was a time of significant changes in the fabric of day-to-day life. Widespread economic and political reconfiguration across the Maya Lowlands seriously impacted both community and extra-local affairs. Networks of socio-economic interaction and affiliation were disrupted and reshaped, and people were on the move, seeking to establish new connections and even relocate to more advantageous environs. The large skeletal population (over 300 individuals) and extensive pottery collections (tens of thousands of vessels) relating to this time have been the focus of detailed isotopic, microscopic, and geochemical investigations to determine the geographic origins and movement of people and material goods. Our study leverages this rare, robust data set to explore the interrelationship of biological and material indicators of identity and mobility. As Lamanai's story is ultimately one of community resilience, we focus on the social dynamics of community integration processes that enabled this outcome. Drawing from the extensive osteological and isotopic data on personal identity and residential mobility, and the stylistic, petrographic, geochemical, and microstructural data on the development of local ceramic manufacturing traditions and exchange, this paper examines: 1) how individual and collective social identities and relationships changed, and 2) how social dynamics of community integration may have mitigated real and perceived pressures on multiple scales.

A probable case of Type II Klippel-Feil Syndrome at the Early Modern Church of Santa Maria Assunta at Pernosano (AV, Italy)

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Klippel-Feil syndrome was first described in 1912 during an autopsy performed by Klippel and Feil, during which a patient with a short neck, low hairline and limited cervical mobility was found to display congenital fusion of two cervical vertebrae. Modern prevalence of Klippel-Feil syndrome is estimated at 1 in 30,000-40,000, with only several recorded instances of identification in the bioarchaeological record in individuals dating from the Neolithic onwards. However, both in medical, clinical and paleopathological literature there exist widespread discrepancies regarding the exact requirements for definitive diagnosis of Klippel-Feil syndrome its precise etiology, and the suite of traits and skeletal aberrations that are often found to co-occur in individuals presenting signs of the syndrome. The present study investigates the diagnosis of a probable case of Type II Klippel-Feil syndrome (characterized specifically by the fusion of the axis and C3 vertebrae) in a non-adult individual aged approximately 9-14 years disinterred from the early modern church of Santa Maria Assunta in Pernosano, located inland of the Bay of Naples, Italy. While this individual presents many of the classic signs of Type II Klippel Feil syndrome, the individual also displays a range of additional skeletal abnormalities not previously reported in relation to this specific pathology, making it a potentially unique case for consideration in the paleopathological record.

The author's personal observation of two additional possible cases of individuals afflicted by Type II Klippel Feil syndrome from two other sites in the same region of southern Italy dating to the late antique and high medieval periods respectively, provide further evidence for consideration in support of the strong genetic basis for this syndrome.

Integrating Indigenous perspectives in teaching practice: Benefiting from the wisdom of social learning and narrative

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Our poster will provide an opportunity to discuss the employment of Indigenous pedagogical practices, and the benefits associated with the integration of social learning and narrative in teaching practice. Given the Truth and Reconciliation commissioner's call to action with respect to "education for reconciliation", as teachers, we have the responsibility to contribute to the process of decolonizing the academy by ensuring Indigenous perspectives figure prominently in our classrooms. The holistic nature of Indigenous learning focused on connectedness, reciprocal relationships and a sense of place, emphasizes the consequences of one's actions, and gives students? a sense of generational roles and responsibilities. ANT 340 is a third year osteological theory and methods course at the University of Toronto Mississauga with an enrolment of 25 to 50 students. Students first attend an ethics lecture and read associated materials introducing the importance and relevance of ethical codes, and common ethical issues in bioanthropology. Indigenous educators are then handed over the reins to the 3-hour class, with no restrictions placed on the topics, or the trajectory of the discussion. Students are required to write a reflective paper on their experience. For three years running, the success of the implementation of Indigenous social learning and a narrative-based approach to convey course curricula is evident in the high level of student engagement, emotional investment apparent in the student reflective papers, and the course evaluation comments. The outcome is an authentic understanding of Indigenous perspectives of bioanthropology, and the promotion of an overarching goal in First Peoples' culture - the passing of knowledge to the next generation to improve life for future generations. In this way students understand the contribution of the discipline of anthropology, and grasp the relevance their own actions and how they "as individuals" can make a difference in the present.

Examining the link between phenotypic variation of the skull and variation in development using two mutant mouse models

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Background: Craniofacial abnormalities account for one third of congenital defects in humans. These congenital defects can be regarded as extreme demonstrations of normal variation. Thus, one way to study the developmental mechanisms responsible for craniofacial abnormalities is to measure and compare the resultant phenotypic variation expressed by individuals with skull anomalies. This range of expressed variation is referred to as phenotypic variation, while the developmental potential for variation is called phenotypic variability. Understanding this developmental potential will allow us to connect developmental mechanism with the phenotypic range exhibited by a trait, and thus provide insight into the mechanistic underpinnings of abnormal development. Previous studies of phenotypic variability have assumed that phenotypic variability can be estimated using measures of expressed phenotypic variation. While this relationship is intuitive, it has never been tested empirically. Thus, the fundamental question remains, can phenotypic variation be used to measure phenotypic variability?

Methods: We have used genetically modified mouse models wherein two different mutations in the same gene encoding for connexin-43 (Cx43G60S/+ and Cx43I130T/+) result in a similar pattern of craniofacial defects—one being more markedly severe than the other. This step-wise phenotype allows us to determine if the same developmental disruption results in the same patterns of phenotypic variation. 3D landmark data was collected from μCT images of newborn skulls on homologous structures that reflect the full skull morphology. Using geometric morphometrics, we have quantified among- and within-individual variation of these 3D landmark configurations.
Preliminary Results: Skulls of both mutants were more variable than their wildtype littermates the more severe mutation causing the greatest variation. The cranial base showed the greatest morphological changes across genotypes including alterations to shape and size. Significance & Future Directions: This study addresses a fundamental gap in our understanding of how (or if), patterns of variation relate to the developmental mechanisms underlying the phenotype. Filling this knowledge gap will allow us to make stronger predictions of the developmental basis for altered skull morphology including those phenotypic changes associated with human evolution. Future studies will address this relationship in adult mouse skulls as well as the biomechanical implications.

The link between female sociability and infant survival in capuchins: the roles of direct and indirect connections, food competition, and energetic status

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In many primates, females form complex and highly differentiated relationships with other female group members, and there is increasing evidence that socially well-integrated females exhibit higher fitness. In accordance with observations from baboons and macaques, we were able to show a link between social integration and infant survival in a previous study on white-faced capuchin monkeys (*Cebus capucinus imitator*). Two theoretically important questions that still require more attention in primatology, in general and for our study species specifically, are 1) which dimensions of social relationship confer such fitness benefits (e.g., direct vs. indirect relationships), and 2) how they confer these benefits (e.g., advantages in feeding competition). To address the first question, we reanalyzed our long-term data from capuchin monkeys using a multi-model inference approach to compare the importance of different social network parameters on infant survival. For the second question, we assessed whether social integration was related to urinary C-peptide levels (which reflect energetic status in primates), depending on food availability and the potential degree of feeding competition. The most important network parameter was ‘eigenvector centrality’, which reflects the social integration of the individual plus the social integration of the bond partners and, therefore, reflects both direct and indirect relationships. However, contrary to our prediction, we were not able to detect a relationship between social integration and energetic status. Taken together, our results indicate that, for a female, being central within the group is the most important social factor determining the survival of her infants. This supports our previous finding that spatial centrality is an important factor in our species. However, this centrality does not seem to confer an advantage in feeding competition, and the mechanism by which maternal sociality is linked to infant survival in capuchins and other primate species remains to be determined.

The pioneering contributions of Christine White to stable isotope analysis in bioarchaeology

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Chris White was one of the pioneers of stable isotope analysis for addressing specific questions about past dietary adaptations. She was the first person to suggest that pathological conditions might influence stable nitrogen isotope ratios. She was the stable isotope expert of Mesoamerican bioarchaeology and she made significant contributions to Nubian bioarchaeology. She had many productive collaborations with geochemists, with whom she analysed oxygen isotopes from bone phosphate, and other bioarchaeologists. Her many contributions on several continents have had a lasting influence on the direction of research in each of these areas.

Sexual dimorphism and population variation of the human nasal aperture in 27 disparate populations

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The human nasal aperture has been studied in various populations for both its sexual dimorphism within populations and its size differences between cold- and warm-adapted populations. Here, we report the sexual dimorphism scores of the nasal aperture for the New Mexican Hawikku Puebloans along with the Howell's data set, a total of 2456 individuals (46 Hawikku, n=18 males, n=28 females; 2410 Howell's, n=1255 males, n=1155 females). Hawikku was a Zuni pueblo that was the site of the Spanish first contact with the Puebloan Indigenous populations in 1539AD. Howell's data set is a skeletal collection of 28 various populations from around the world. We compared the male and female lengths of the nasal aperture (nasion-prosthion height, nasal height, and nasal breadth) from each population for their sexual dimorphism. In addition, we used a series of statistical analyses to test whether cold-adapted populations had a significantly differently sized nasal aperture than do warm-adapted populations. We found that the measurements for the nasal aperture vary markedly in their sexual dimorphism, between 63.6% and 93.9%. In addition, we found no direct link between the size of the nasal aperture between cold- and warm-adapted populations nor were there substantial, repetitive trends illustrating differences between cold- and warm-adapted populations. These results corroborate previous findings and add to the present literature studying the nasal aperture. Our data builds upon these previous works through the addition of new samples and by being the most robust analysis of the nasal aperture for both studies of sexual dimorphism and geographic variation.

Quantifying the center of mass in bifacial tools

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Acheulean handaxes have received considerable scholarly attention over the last 200 years due to their abundance, longevity, and wide geographic distribution. They are known from sites throughout Africa, as well the Near East, Europe, and parts of Asia. They represent humans' longest lasting tool industry, appearing about 1.9 ma until roughly 200 ka. As the first tools made by form shaping, with some specimens achieving a high degree of symmetry, they are often argued to reflect the cognitive abilities of their makers. Although often associated with Homo erectus, they appear to have been the product of at least two or more species of early Homo. Most research to date has focussed on the role of symmetry in handaxe design, their potential utilitarian and non-utilitarian functions, and levels variability in the morphology between specimens within an assemblage or between group means of assemblages. Recent

years have seen the application of three-dimensional (3D) digitisation of handaxe assemblages and related 3D analyses of their shape. The current proposal is based on doctoral research using 3D digitisation and 3D analyses of assemblages in order to study the internal mechanics of handaxes and its role in their design. Specifically, a protocol has been developed to analyse the Center of Mass (CM) in the design of Acheulean bifacial tools and treats the CM as a quantifiable morphological variable. The proposed paper will focus on patterns that the new protocol has identified in the location of balance (CM) of Acheulean bifacial tools, how they relate to traditional handaxe typologies, and their importance in overall handaxe morphology and manufacture. The result of the analysis demonstrates that the methodology successfully differentiates between different handaxe forms, or typologies, such as pointed and ovate forms. Although the methodology was developed for analyzing Acheulean handaxes it can be used for studying shape variation in bifacial tools in general.

Early life social experiences as predictors of adult depression in Cebu, Philippines: Investigating the mediating roles of the HPA axis and DNA methylation

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A strong body of recent literature suggests a strong link between early life psychosocial stress and altered adult neuroendocrine profiles as well as poor mental health across cultural contexts. Insights from the developmental origins of health and disease interpret these long-term impacts on adult biology and health as possible biological and developmental adaptations to early life environmental conditions, yet the exact biological mechanisms that underlie the durable impacts of early life stress on adult health are unknown. These relationships have also been understudied in low- and middle-income countries where the burden of mental illness is substantially higher and where social and environmental contexts of stress may vary. Using data from a large, longitudinal study of Filipino adults in Cebu, Philippines, this study examines the neuroendocrine and epigenetic correlates of early life stress and depression using data from the Cebu Longitudinal Health and Nutrition Survey (CLHNS). Our results confirm previous findings which report a direct relationship between early life stress and adult depression. Diurnal cortisol activity, specifically bedtime cortisol, however, did not explain this pathway at age 21. Additionally, we found no significant epigenetic variation among adults at the same age with histories of childhood stress and adult depression. These findings suggest alternative biological and social pathways by which early life stress shape adult depression in this sample of Filipino adults.

Warriors or martyrs? Untangling the trauma in Egypt's Fag El-Gamous cemetery

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In late antiquity, the Egyptian Fayum is known to have been inhabited by soldiers and mercenaries who were granted land for their services during the Greco-Roman Period. Griggs et al. (1993) reported that among the adults (excavated in 1992 from the expansive Roman-Byzantine Fag El-Gamous cemetery), 24 percent died violently as indicated by trephinations in the skulls caused by sharp objects such as swords knives or axes, with nearly all of those violent deaths found in strata corresponding to the third and fourth centuries AD [during which time period the adjusted rate of violence is 58 percent]. They attributed this

rise in traumatic injury to early Christian persecution, which further supported their hypothesis that Christianity had blossomed in the Fayum much earlier than previously believed. This paper presents the preliminary results of an ongoing study of traumatic injury among the deceased of Fag El-Gamous cemetery in Seila, Fayum, Egypt, as seen in the human remains stored in the on-site storage magazine. The purpose of this study is to determine the amount, severity and types of traumatic injury evident in the skeletons of this cemetery population. Evidence of trauma was documented photographically and through the use of prototypic trauma documentation forms created by Roselyn Campbell. These forms and the associated guidelines were helpful in ensuring that all relevant information was consistently documented and analysed, and will be published in the near future. Burial contexts of trauma victims were also considered in an effort to identify any patterns that may reveal additional information. Through this preliminary study it is expected that the overall rate of skeletal trauma in the Fag El-Gamous skeletal collection will be far lower than the aforementioned percentage cited from the 1992 field season. A significant number of the examined injuries appear to be the result of high impact sharp-force trauma. Although it can be difficult to ascertain the motives or the circumstances behind most traumatic injury, one individual, in particular, is most certainly the victim of a violent act having succumbed to multiple severe perimortem wounds inflicted by at least one sharp implement.

Trabecular bone structure of the first metatarsal and its implications for Plio-Pleistocene hominin locomotion

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Changes in first metatarsal (MT1) morphology within the hominin clade are crucial for reconstructing the evolution of a forefoot adapted for human-like gait. Studies of the external morphology of the MT1 in humans, non-human apes and fossil hominins, have documented changes in its robusticity, epiphyseal shape and its articulation with the medial cuneiform. Furthermore, trabecular bone has been shown to vary in structure between human and nonhuman species with different locomotor repertoires in various skeletal elements. Here we test whether trabecular structure in the MT1 reflects different loading patterns in the forefoot across extant great apes and humans, and within this comparative context, infer locomotor behaviour in two fossil hominins from Swartkrans, South Africa. Microtomographic scans were collected from the MT1 of *Pongo sp*. (n=6), *Gorilla gorilla* (n=10), *Pan troglodytes* (n=10), *Homo sapiens* (n=11), as well as SKX 5017 (*Paranthropus robustus*), and SK 1813 (Hominin gen. sp. indet.). Trabecular structure was quantified within the head and base using a 'whole-epiphysis' approach with medtool 4.2. We found that modern humans displayed relatively higher bone volume fraction (BV/TV) in the dorsal regions of the bone and higher overall degree of anisotropy (DA), whereas great apes showed the opposite condition, reflecting dorsiflexion at the metatarsophalangeal (MTP) joint in the former and plantarflexion in the latter. Both hominin fossils displayed low DA, with SKX 5017 showing a hyperdorsal distribution of trabecular bone in the head that is within the range of humans, while SK 1813 showed a more central trabecular distribution not seen in any other taxon. We suggest that *P. robustus* (associated with SKX 5017) adopted habitual bipedalism characterized by hyperdorsiflexion at the MTP joint; although it is unclear to which locomotor behaviour this was linked. Whilst low DA in both fossils suggests increased mobility of the MT1, differences in their trabecular distributions could indicate variable locomotion in these Plio-Pleistocene hominins.

A case of probable ankylosing spondylitis among the Chiribaya of Southern Coastal Peru

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Ankylosing spondylitis (AS) is characterized by chronic inflammation of the apophyseal and costovertebral joints of the spine and sacroiliac joint of the pelvis, resulting in eventual ossification of the connective tissue. The case study presented here describes a middle-aged, female individual with pathological indicators of ankylosing spondylitis from the Chiribaya culture (AD 900-1300) of southern, coastal Peru. While paleopathological cases of AS are well documented throughout the pre-Columbian Americas, there are fewer reported cases of females with AS in the archaeological record and in modern, medical contexts. Of the 79 adult Chiribaya individuals examined, this individual represents the only recorded case of probable AS. This frequency, 1.27% (1/79), is similar to the estimated frequency of 1.3% (4/303) for AS in a sample of skeletons from several medieval (AD 600-1400) Croatian cemetery sites, but slightly lower than a reported frequency of 5.9% (5/89) for seronegative spondyloarthropathies (including AS) in a contemporary Chiribaya (AD 1200) skeletal sample from northern Chile. The presence of this condition in the Peruvian Chiribaya supports previous bioarchaeological research that suggests seronegative spondyloarthropathies were present in Pre-Columbian populations from the Andean region.

Testing methods for juvenile sex estimation using long bone metaphyseal and diaphyseal measurements

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Sex estimation is a valuable component in any biological profile; however, methods for juvenile sex estimation have proven to be problematic to develop. Due to the similar growth trajectories between juvenile males and females, it is difficult to distinguish between them prior to puberty. Stull et al. (2017) have developed juvenile sex estimation models using long bone diaphyseal and metaphyseal measurements, however, their models have only been internally validated. In this study, we test the models developed by Stull et al. (2017) on an external population from Lisbon, Portugal, in order to determine whether their models are generalizable and transportable enough to be applied in the field. Our findings suggest that the models developed by Stull et al. (2017) are overfit to the original study population, and thus yield poor accuracy results when applied to our external population. Through this study, we emphasize the importance of externally validating prediction models, particularly if these models are intended to be applied on individuals of unknown ancestry.

Cripping menstruation: Reframing menstrual research using critical disability studies and crip theory

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Menstruation deserves theoretical discussion outside of traditional medical and feminist frameworks. Medical models often focus on considerations of impairment, diagnosis, and cure. Various theoretical approaches have used metaphors of taboo, purity/pollution, Nature/Culture, production/reproduction, control, and failure to interrogate the menstrual cycle. Critical disabilities studies and crip theory are relatively recent and still developing areas of inquiry that are built from, among other things, the intersection of queer theory, trans theory, and traditional disabilities studies. These theoretical frameworks include a move away from medical and social models of understanding bodies and propose instead that we think of disability as political/relational. Menstruation, or the lack thereof, is neither consistently

ability or disability. What are the political/relational consequences of using words like normal, natural, accommodation, discomfort, and pain to describe menstruation, and how else could we theorize about this bodily phenomenon. How might the crip concepts of temporality, visibility, and compulsory abled-ness lead us down different avenues of inquiry in biological sciences? In this talk I will focus on endometriosis as I use crip theory and critical disabilities studies to reframe research perspectives on menstruation. I will challenge medicalized and naturalized narratives of menstruation and reproductive health and encourage researchers to rethink dominant paradigms.

What else troubled the lepers? Co-morbidities in an Early Christian Cemetery in Thebes, Greece

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It is possible in paleopathology to be so overwhelmed by evidence of some significant pathology that it is easy to overlook what other pathologies may be expressed in the skeletons of sufferers, patients, or victims. Yet particularly in the pre-modern world, people could have been exposed to multiple pathogens, developed tumors, suffered repeated traumas, and ended their lives with a record of multiple significant pathologies. An early Christian (5th century CE) cemetery located in the ancient Sanctuary of Ismenian Apollo in Thebes, Greece has revealed a remarkable number of individuals with multiple pathologies. The cemetery is thought to be associated with an, as yet unidentified, early hospice or hospital, probably attached to a monastery. The common factor among the individuals appears to be leprosy, and primary or secondary lesions probably associated with leprosy are found in multiple individuals within graves, in every grave that contained more than isolated bone fragments. (Some graves were cleared in earlier unpublished excavations.) The primary symptoms of leprosy include rhinomaxillary syndrome, penciling or knife-edge deformities of the metatarsals, and erosion or atrophy of the phalanges of hands and feet. Secondary symptoms include bacterial infections of bone resulting from injuries to anesthetic extremities and orthopedic distortions caused by loss of motor function. But having leprosy did not prevent other diseases from affecting these people, and comorbidities are common in the sample. Primary and metastatic cancers, benign tumors, brucellosis, rheumatoid arthritis, fractures, and developmental defects, as well as more common pathologies such as osteoarthritis, osteoporosis, caries and AMTL are all found co-occurring in individuals with primary or secondary skeletal symptoms of leprosy. The fact that so many of the pathologies from all causes are severe suggests that this cemetery served a community of those who could not be cared for by family, and turned to the charity of the early Christian church. By the 5th century CE, the Church is known to have instituted the first hospitals open to any who needed care. This cemetery provides the first evidence for such an institution in late Roman/early Christian Thebes.

Two worlds united

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In Christine White’s opus, physical anthropology was master and isotopes a means. Her early Nubian mummy studies demonstrated the hair keratin isotope record of diet and stress almost to death and invoked a provocative seasons-of-death concept. In a model study of climate-society-political interactions, she correlated social and political restructuring, diet shifting and water scarcity. Oft overlooked was her early attribution of elevated nitrogen-15 in tissues to organic fertilizer, a process now well accepted and fittingly expanded by a White student. White and students also showed that disease can shift N-isotope baselines, further confounding the “you are what you eat” mantra. Christine demonstrated how bone and tooth O-isotopes identify breastfeeding and weaning patterns, thus revealing intimate responses to environmental circumstances. Is not putting such a face on ancient people’s lives the noblest goal of anthropology? In Peru, Christine pioneered hair isotope records to identify pilgrimage and land use. Her students refined hair isotope analysis to account for hair’s own mortality cycle and combined

isotopic and stress hormone analysis to identify consequences of cyclical movement across the landscape. In Mesoamerica, Christine and co-investigators laid out an isotopic framework for Maya diet and connected it to ecological, political and societal changes and collapse. Others later interrogated this substantial database using then novel statistical approaches. Christine's conclusions withstood such testing by the new arithmetic! Another series of Christine's papers provided bone and tooth O-isotope baselines for place of origin. How power, state-building and society were managed during political and ecological changes was shown through the identification of foreigners versus commoners, and high- versus low-status individuals and that sacrifice had many meanings and even more guises was abundantly demonstrated. Christine and I have collaborated since 1991 when our then VP Research "knocked our heads together" to insist that this new faculty member had great ideas and I had the ironmongery to bring them to life. What a career-changing moment. I knew nothing of anthropology or biomineralogy and chemistry of tissues, and even less about what their stable isotopes might reveal. What followed was no random walk to excellence. All this I learned from Christine. Two worlds united.

The effects of rainforest habitat zones on mantled howler monkey (*Alouatta palliata*) feeding behaviours

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Rainforest fragmentation due to agriculture is isolating forest animal populations and increasing edge effects. Understanding the effects of the altered habitat zones on individual species is important for maintaining ecosystems and preventing further degradation of fragments. For large-bodied animal species such as primates, forest fragmentation and edge effects may cause altered behaviour. The effects of fragment size and edge habitat on the mantled howler monkey (*Alouatta palliata*) were studied in two forest fragments (Large Forest= 0.935 km^2 and Small Forest=0.35 km^2) at La Suerte Biological Research Station, Costa Rica. I predicted that both fragment size and edge habitat would alter the feeding activity budgets, such that monkeys would spend a higher percentage of time feeding in the smaller forest fragment and in non-forested areas due to higher population density and lower abundance of preferred food. I also predicted that the percentage of time feeding would be higher in edge habitat compared to forest interior due to increased threat of predation. 22.5 hours of data were collected on 48 individual animals in June-July 2018 using 30-minute point samples with points taken at 2-minute intervals. Edges were defined as visible forest boundaries and were further classified as anthropogenic or natural. Partly in line with predictions, monkeys spent the highest percentage of time feeding in non-forested areas (22.5%) but spent a higher percentage of time feeding in the Large Forest (17.9%) compared to the Small Forest (13.7%). Percentage of time spent feeding was highest in forest interior (20.8%) and anthropogenic edge (18.8%), but lower in natural edge (7.9%). My results showed mixed support for predictions and demonstrate the behavioural adaptability of mantled howler monkeys to differing forest edge conditions and fragment sizes.

Selective sacrifice of reproductive tissues under ultramarathon-related energetic stress: The adaptive significance of variation in lean and fat mass among men and women

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Sexual dimorphism in fat and lean masses is well-known, and reflects differential investment strategies related to reproduction. Men invest preferentially in lean mass, important for sexual signaling and male-male competition, while fat mass tends to be stored viscerally, playing an important role in immune function. Women invest preferentially in peripheral fat reserves, important fuel for pregnancy and lactation, while lean mass is maintained at substantially lower levels for a given height than men. Sex differences in tissue investment, and in the costs and benefits of fat and lean mass, mean that variation in these tissues can significantly affect survival under severe energetic stress related to infection, dieting, or adversity. However, the significance of fat and lean masses for survival when energetic stress is due to extreme expenditure, such as during prolonged terrestrial locomotion, remains unclear. We examine differences in pre- and post-race fat and lean masses by sex and performance among ultramarathon runners competing in a 5-day, 230 km footrace in dry, hot conditions, and test whether or not men and women sacrifice different tissues. We found that female finishers began the race with significantly higher fat mass than men, lost more of it during the race, and finished with significant declines in fat mass but not lean mass. In contrast, male finishers began the race with significantly more lean mass than women, lost more of it during the race, and finished with significant declines in lean mass but not fat mass. Female finishers utilized significantly more of their fat reserves and significantly less of their lean mass than non-finishers, with no such significant performance-related differences found among men. Our results demonstrate the selective sacrifice of reproductive tissues under ultramarathon-related energetic stress, with each sex preserving the tissue with higher survival costs (men: fat mass; women: lean mass). We highlight the functional role of female reproductive fat depots, the reproductive and functional role of lean mass for men but the cost of lean mass for women, and ultimately the role that locomotion-related selective pressures may have played in shaping variation in soft tissue among and between the sexes.

Correlations between upper and lower limb robusticity in forager children throughout ontogeny

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Measures of cross-sectional geometry are widely utilized as a means of exploring habitual behaviours of past peoples through skeletal remains. Bone is more susceptible to remodeling during growth than once growth has ceased, and thus juvenile bones are more responsive to strain from mechanical loading than adult bones. This study investigates correlations between upper and lower limb robusticity in forager children, to explore whether measures of robusticity increase in a consistent manner between the upper and lower limbs throughout ontogeny. Midshaft measurements of cross-sectional geometry (TA, Imax, Imin) from femora and humeri of 100 individuals from Holocene foraging populations were analysed (Indian Knoll, n=31; Later Stone Age, n=53; Point Hope, n=16). Pearson correlation analyses indicate that measures of humeral and femoral robusticity are significantly correlated throughout ontogeny. Children aged less than 1 year show the strongest correlations between upper and lower limb robusticity for all measures. Children aged 1-5 years in this sample demonstrate the weakest correlations between upper and lower limb robusticity, although the correlations are statistically significant. This potentially represents the onset of walking and associated development of lower limb strength. Correlations in the oldest age category (12-17 years) were asymmetric, although all statistically significant, with the right humerus showing stronger correlations than the left. Results of this study may suggest a more systemic

bony response to activity during ontogeny leading to increased robusticity throughout the skeleton, rather than localized responses in certain limbs.

Microisotopic oxygen variation across sequential tissues in human bone: Seeking sub-seasonal resolutions of analysis

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Variation in the oxygen isotopic composition ($\delta^{18}O$) of bone bioapatite provides useful information for reconstructing past climate conditions and landscape mobility due to the connection between bone $\delta^{18}O$ values and those of consumed water. Because bone is a biostratigraphic tissue, formed in microscopic layers, it is theoretically possible to assess $\delta^{18}O$ variation across sequentially formed tissues, transforming the nature of isotopic investigation by significantly increasing the resolution of analysis. Unfortunately, traditional isotopic sampling of human bone assumes that secondary bone remodeling disrupts the sequential nature of the tissue and opts instead for analysis of bulk powders that obliterate micro-isotopic variation. Recent studies on human endosteal primary bone growth have identified large, often greater than 1 mm, deposits of drifted, incremental primary bone, called endosteal lamellar pockets (ELPs). The current project uses secondary ion mass spectrometry (SIMS) to target this feature for high spatial resolution $\delta^{18}O$ analysis in a modern individual. Results show patterned sinusoidal variation in $\delta^{18}O$ consistent across multiple tests of the same ELP, with peaks and troughs typically interpreted, in non-human tissues, as seasonal variation. By this interpretation, the SIMS/ELP technique sampled $\delta^{18}O$ at roughly monthly intervals, over more than a decade of deposited tissue in this individual. Further, the bone formation rate suggested by this isotopic variation is consistent with primary lamellar bone formation rates reported elsewhere. Implications for this exploratory study are significant in that high spatial resolution $\delta^{18}O$ analysis could permit completely new questions regarding within- lifetime change in health, migration, and weather useful for analyzing trade, outsiders, and military influence. Results also encourage the development of similar techniques for forensic and war-dead identification and for tracking bone formation rates in clinical and anatomical investigations.

For those in peril on and off the sea: 19th-century port medicine at the St. John's General Hospital

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The health and wellness of seafaring individuals in the mercantile marine has been underrepresented in anthropological and historical explorations of transatlantic trade. The experience in Canada, in particular, has received little attention. Nineteenth-century admission records to the St. John's General Hospital have recently been made available for analysis; records are extant from 17 May 1886 to 30 December 1899. During this period there were 5995 admissions to the hospital, 362 of which were individuals employed either by the Royal Navy or the mercantile service: 359 men and three women. Individuals were most frequently admitted due to traumatic conditions, respiratory diseases, and sexually transmitted infections, results which resonate with previous historical studies of seafaring health. Interestingly, Spearman's correlation coefficient revealed a strong positive relationship between the ranked reasons for admission between seafaring males and the total male hospital sample, suggesting that, overall, males of varied occupational backgrounds were seeking hospital attention for similar conditions. Cross referencing individual seafarer's hospital admission with crew list agreements from the Registrar General for Shipping and Seamen allowed for an examination of time spent in port before admission, a unique

contribution to historical maritime studies of health. This work sheds light upon the healthcare experience of mercantile seafarers provided in the key port city of St. John's, Newfoundland using primary documents, emphasizing the value of hospital records in broader studies of occupational risks and hygiene.

Do dietary isotope values reflect non-local individuals at prehistoric Paquime (Casas Grandes), Mexico

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Paquime, a major settlement in northern Chihuahua, Mexico, reached its peak as a ritual and economic centre during the 13th and 14th centuries CE and was later abandoned. Recent Sr and O isotopic analyses of tooth enamel indicate that some of the individuals buried at the site were likely from further south, while others are isotopically similar to people further north in the Mimbres area (Offenbecker 2018). Although maize was a prominent part of the diet throughout the larger region, it is possible that dietary stable isotopes will similarly reflect regional differences. Therefore, we compare new data on dietary isotopes with the Sr and O isotopes. We report the $\delta^{13}C$ and $\delta^{15}N$ bone collagen and dentine from 58 individuals and the $\delta^{13}C$ enamel carbonate values from same individuals who were determined to be local or non-local in origin (n=81). These data are compared to see if diets were isotopically different between local and non-local individuals. The results show no significant differences in the mean $\delta^{13}C$ and $\delta^{15}N$ collagen and dentine values between the local and non-local individuals excavated from Paquime. Two possibilities are considered, the timing and tissue turnover differences between the collagen and tooth enamel obscuring earlier dietary isotopic signatures or non-local individuals had similar C4/CAM plant-dominated diets. There are also no significant differences in enamel carbonate values between local and non-local individuals, suggesting that a difference in the timing of tissue deposition and turnover is not a major factor. Lack of differentiation is likely because of non-local individuals coming from environments where the isotopic background is similar to Paquime, resulting in similar dietary stable isotope values. This does not preclude the consumption of different foods with similar isotopic values, however, and the proportions of foods in the diet may also have been different, especially plant and animal-based proteins. The presence of non-local individuals is important to be aware of when interpreting dietary values, as these could confound interpretations of resource use within a site. Further analyses that incorporate other demographic variables, as well as refinement in reconstructing trophic level, offer other interpretations of past diet.

Preliminary analysis of non-specific stress indicators and survivorship in a sample of ancestral Native Americans

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Non-specific stress indicators are often used in bioarchaeology to assess whether an individual or a population was healthy. The purpose of our study was to use Kaplan-Meier survival curves to examine whether indicators of non-specific stress are associated with decreases in cumulative survivorship in a composite sample of ancestral Native Americans from the American Southwest. The survival curves for those who died with indicators of nonspecific stress were compared to the curves for those who died without such indicators using Mantel-Cox log-rank tests. Age at death was used as the time to terminal event, and all individuals with complete data were included, i.e., no censored cases. We assumed that both groups, those with and those without nonspecific-stress indicators, experienced similar average fertility. The indicators of non-specific stress used in our study included porotic hyperostosis, cribra orbitalia,

enamel hypoplasia, and skeletal infection. The data used in this study were gathered from the Western Hemisphere Dataset. Specifically, we used the data collected from ancestral Puebloan groups from Colorado and New Mexico in the United States. The results of our analysis indicated that there were not significant differences in cumulative survival associated with non-specific stress indicators in these ancestral Native Americans, though the difference associated with enamel hypoplasia of deciduous dentition was nearly significant. Our findings suggest that neither the presence nor absence of non-specific stress indicators is necessarily informative regarding mortality risk within an archaeologically-derived skeletal population. By extension, we suggest that health comparisons among populations based on non-specific stress indicators might also be problematic, insofar as such indicators are assumed to reflect increased mortality risk.

Food insecurity, pregnancy complications, and the Developmental Origins of Health and Disease: New insights from the Mothers to Babies (M2B) Hamilton study

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Twelve percent of Canadian households experience food insecurity, wherein food quantity and quality are insufficient to feed all household members appropriately. In managing food insecurity, mothers are relatively more likely than other household members to eat irregularly; to eat energy-dense, nutrient-poor diets; and to live with metabolic disease (e.g. diabetes). Given these disproportionate effects of food insecurity on mothers, we might expect food insecurity to impact pregnancy health and fetal development. An evolutionary perspective predicts that fetuses will respond to cues about nutrient availability in the outside environment in ways that will increase their probability of survival postnatally. Specifically, under food insecure conditions, fetuses should hormonally manipulate the flow of nutrients from maternal blood (e.g. reducing maternal insulin sensitivity, elevating sustained maternal blood glucose levels), securing additional resources for themselves to build large, robust brains and bodies. We tested this idea using data from the Mothers to Babies survey, a health and nutrition survey of 350 pregnant women living in Hamilton, ON. We found that mothers who reported experiencing food insecurity were relatively likely to be diagnosed with one or more pregnancy complications, controlling maternal and gestational ages. The most common diagnoses were gestational diabetes and hypertension. These complications, while potentially beneficial to fetal/infant survival over the short-term, have negative health consequences over the longer-term. Fetuses exposed to such complications are at increased risks of developing metabolic disorders in adulthood. We should act now to improve food security during pregnancy, to reduce incidence of pregnancy complications and linked adult disease.

Interpreting medieval mobility from burials at the rock-hewn Church of St. Georges, Gurat (France): Insights from stable isotope analysis

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Within Gurat, a small village located in the region of Poitou-Charentes in southwestern France, is a hand-carved limestone cave church that developed into a hermitic site by the High Middle Ages (1001-1300 AD). Gurat is unique in that few bioarchaeological studies of monastic collections, particularly in France, have been conducted. This research represents the first effort to understand who the people at Gurat were,

where they might have travelled from, and why, by employing strontium isotope analysis. Dental and skeletal tissues from fourteen individuals excavated at the cave church site were analysed for their strontium isotope content via laser ablation multi-collector inductively coupled plasma-mass spectrometry (LA-MC-ICP-MS). For the purposes of interpretation the cut-off range (0.7086 to 0.7106) as established by the human bones from the site as a whole will be utilized. Human bone $^{87}Sr/^{86}Sr$ ratios were calculated by taking the average of two ablated samples from the cortical bone (N=14, mean = 0.7096, SD = 0.0005) for each individual. Two lines were sampled from each human tooth, with ablation Line 1 (N = 10, mean = 0.7168, SD = 0.0040) being located in earlier-forming enamel, and ablation Line 2 (N = 10, mean = 0.7169, SD = 0.0047) being located in later-formed enamel. The $^{87}Sr/^{86}Sr$ values in human bone samples from Gurat indicate that all individuals likely lived near Gurat for at least the last few years of their lives. However, $^{87}Sr/^{86}Sr$ values yielded from tooth enamel samples indicate that during childhood the Gurat individuals were mobile, and originated from regions isotopically dissimilar to Gurat. Furthermore, given that two pilgrimage routes passed near the village, it is likely that many travelers passed through the village of Gurat. Additionally, since Cistercian monks practiced transhumance during the Medieval period, and many of the Gurat individuals do appear isotopically to have origins from highland regions in France (i.e. the Massif Central), it is possible that these individuals engaged in seasonal migration between high and lowland regions. Therefore, the preliminary data presented here have demonstrated that, through strontium isotope analysis, the Gurat individuals were likely migrants to the Gurat cave church.

Challenging perceptions of race in forensic anthropology: What forensic software tells you it is doing versus what it is actually doing

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Fordisc is described as a tool that can aid investigators in estimating the sex and “race” of unidentified individuals using skeletal measurements. While some testing of the cranial option in Fordisc have been conducted, systematic testing using postcranial data have been lacking. In this study we test if Fordisc can provide useful information in a forensic investigation utilizing measurements of the femur and innominate from a sample of 105 identified cases who would be considered either “black” or “white” using racial concepts common in forensic anthropology. Fordisc calculates a discriminant function (DF) based on which measurements are selected to allocate an unknown into a given group. A well-known problem with DF is that it will force an allocation even if the unknown is not a member of any of the groups. The DF will provide a “best fit” which is not necessarily a good fit. One solution has been to calculate typicality probability (TP) post hoc, and Fordisc calculates TP three different ways. The TP is always between 0 and 1, and a value of 0.05 or lower indicates that the allocation to a given group should not be considered correct. In Test 1 we used five standard femur measurements, and in Test 2 we used five femur and two innominate measurements. All trails were done blind. Fordisc correctly allocated 57% of the sample in Test 1, and 72% of sample in Test 2. Given that all the test cases were “white” or “black” and Fordisc only allows for discrimination between “white” and “black” using post cranial data, the result are not much better than chance. Furthermore, the typicality probabilities (regardless of how they were calculated) failed to identify the incorrect allocations in about nine out of every ten cases where the allocation was incorrect. Fordisc does not provide information that would be useful in a forensic investigation as often as it seems to, while at the same time the software perpetuates a racialized approach to considering human variation in a forensic context.

The influence of reproductive systems on the probability of extinction in social mammals: A Preliminary simulation of the influence of breeding systems on the population viability in *Eulemur fulvus* and *E. mongoz*

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Despite decades of research on the conservation biology and population dynamics of social species, there is a limited understanding of the reasons why two ecologically-similar, sympatric species can exhibit different probabilities of extinction while facing similar environmental challenges in their common habitat contexts. As the number of species considered to be under a critical threat of extinction increases, conservation efforts are growing to better understand the reasons why certain species become extinct while others are able to adapt relatively more efficiently. To this end, my present research seeks to examine the influence that variation in the breeding systems of social mammals has on the capacity of their populations to adapt to environmental perturbations and avoid extinction. I hypothesize that the capacity of a species to persist in disturbed and difficult-to-predict environments rests on the flexibility that their breeding system permits during their recovery from negative perturbation events. To examine the relationship between the breeding system of social mammals and their capacity to avoid extinction, I developed a series of preliminary population viability analysis (PVA) models using mock-populations that simulate the breeding patterns of the Near Threatened common brown lemur (*Eulemur fulvus*) and the Critically Endangered mongoose lemur (*E. mongoz*). These two species were selected because they both occur in sympatry in the wild while experiencing extirpation at different probabilities. As such, I predict that the variation in their respective conservation status is partially driven by their specific breeding system: pair-bonded in *E. mongo*z and polygamous in *E. fulvus*. PVA models for both species were developed in Vortex 10 (ver. 10.3.3.0) and analyzed using the vortexR package (ver. 1.1.5). Population parameters for each species where synthesized using the observations collected during the summer-season of 2018 and previous research published on each species. The preliminary results of this research show that in comparison to the *E. fulvus* model, the pair-bonded *E. mongoz* population-model exhibits a higher tendency to collapse due to density-dependent processes, as well as demographic and environmental stochastic perturbations. Moving forward, the results of this research will be compared to long-term research on the population biology of these two species.

Inter-sex comparative study on tree usage and canopy usage in the mantled howler monkey (*Alouatta palliata*)

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The evolution of tree and tree canopy usage over many generations in an environment plays a fundamental role in the behavioural ecology of the mantled howler monkey (*Alouatta palliata*). This sexually-dimorphic species may be expected to show sex differences in tree usage due to differences in male and female body size. My study compares the habitat usage of male and female howler monkeys in different tree canopy areas and different tree sizes in order to elucidate sex differences. Due to the increased body size of males, I predicted that males would require larger and stronger tree supports than females. Specifically, I predicted that when compared to females, males would spend a greater percentage of total time and in the inner tree canopy area, and would use trees with larger average diameter at breast height (DBH). I predicted that females would spend a greater percentage of total time in the middle and outer tree canopy areas and would use trees with smaller DBH due to their smaller body sizes. 105 hours of data were collected on individual monkeys using 30-minute point samples with points taken every 2 minutes. Data were collected in June-August 2018 on 195 adult males and females at the La Suerte

Biological Research Station in Costa Rica. My results showed mixed support for my predictions. Males spent greater percentages of total focal time in the inner and middle canopy areas of trees (inner canopy: 18.74% of time for males vs. 11.7% for females, middle canopy: 40.54% of time for males vs. 28.7% for females), while females spent greater percentages of total focal time in the outer canopy areas of trees (59.3% of time for females vs. 39.5% of time for males). Contrary to predictions, males used trees with lower average DBH than females (65.54 cm for males vs. 100.68 cm for females). Understanding the role that sex differences play in tree usage in the mantled howler monkey can help inform conservation plans and aid in species survival.

Evidence of an epidemic at the Church of Santa Maria Assunta at Pernosano, Italy

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In 2003, a roughly square burial pit dating to the mid-17th century was excavated in the southwest portion of an extensive cemetery complex beneath the modern Church of Santa Maria Assunta at Pernosano in the Campania region of southern Italy. Recent analysis of both the physical remains and their manner of interment indicate that a minimum number of 33 individuals consisting of adult males, females and non-adults were buried in this pit in a single deposition episode, and subsequently covered with a layer of burnt lime. That such a large number of individuals displaying no apparent signs of peri-mortem trauma were buried together in a concentrated area and in such a haphazard manner relative to the cemetery's other interments, presents compelling evidence that these individuals may have been victims of one of the epidemics of plague known to have affected this region at this time. Extant historic records indicate Pernosano endured multiple outbreaks of plague during the 17th century and in the preceding century, most notably in 1594, the summer of 1600, and unremittingly from 1656-1658, with the lattermost epidemic recorded as reducing the neighboring town of Lauro to only half the previous number of citizens. In 1654, immediately prior to the 1656 epidemic, it is also recorded that the community of Pernosano allowed the modern-day church to be built above a pre-existing high-medieval church dating to the 10th century, thereby permitting the earlier church to be converted into a series of crypts serving the new church above. The burial pit here under scrutiny was located in the southwest corner of the right nave of the medieval church. This study describes preliminary research assessing historic, archaeological and bioarchaeological evidence in tandem to determine whether these individuals were likely victims of an epidemic. Owing to contemporary documentary evidence, disorganized placement of individuals, deliberate placement of a burnt lime layer above the burial pit, and the range of demographic profiles reconstructed from recovered human remains, there is compelling evidence that these individuals were indeed victims of one of the aforementioned documented epidemics.

Investigating childhood lead exposure of early 18th Century French Inhabitants from the Fortress of Louisbourg, NS

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The heavy metal lead is particularly toxic to children, but was ubiquitous throughout the cultural environments of the Atlantic World during the 18th century. Since teeth form during childhood and lead exposure reflects individuals' interactions with their physical and cultural environments, this tissue presents an intriguing means to examine childhood health through lead concentration and migration using lead isotope analyses. These analyses have yet to be applied in a French or French colonial context. The original founding population of the Fortress of Louisbourg, Nova Scotia was relocated from the fishing settlement and military fortification of Placentia, Newfoundland following the loss of the French territory

due to the Treaty of Utrecht in 1713. The Block 3 cemetery was in use from 1713 to 1720, representing individuals who died following the relocation and during the early occupation. This paper will present the lead concentrations and isotope ratios of sixteen individuals from Louisbourg's Block 3 cemetery. Resulting data are compared to contemporary contexts from fishing settlements in Newfoundland and previously published data from Europe. This comparison will explore the potential of lead isotope analyses as a tool to understand migration within the Atlantic World. Lead analyses also allow us to focus on childhood experiences often neglected in archaeology and to compare these experiences within a Northern Atlantic fishing context.

Assessing the Impact of high versus low velocity thoracic trauma: A study of experimental rib fracturing using juvenile pigs (*Sus scrofa*)

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Forensic anthropologists are often unable to use the same techniques that they use on adults to assess trauma on juveniles, due to differences in bone properties (e.g. structure, elasticity). Little experimental data has focused on rib fractures, although they are one of the most common injuries sustained due to trauma. This study will provide experimental data that informs how juvenile porcine torsos behave under conditions of high versus low velocity impact to further understand the effects of compressive trauma on the juvenile thorax. A juvenile porcine model was used to examine the effects of experimental impact to the torso at two different loading rates: static (0.01 m/s), and dynamic (0.4 m/s). Additionally, the torsos were tested in two distinct starting positions (anterior and lateral) under the two loading rates. A total sample of twelve juvenile pigs aged approximately one week and weighing between 1.5-2.1 kilograms were used. The sample was separated into four sub-sample groups, each with three specimens, to assess for differing velocities and impact positions. The first sub-sample assessed the effects of static loading with impact occurring in an anterior to posterior direction. The next sub-sample assessed static loading with the torso being impacted in a lateral position. The remaining two sub-samples assessed the effects of impact in the same two starting positions under dynamic loading. Macroscopic analysis revealed that of the total sub-sample (n=363 ribs), only 29 ribs fractured. Of these fractured ribs, the percentage fractured on the right and left side was 79.31%, and 20.68%, respectively. Additionally, the percentage of fractures that were complete and incomplete was 41.37%, and 58.62%, respectively. Fractures that occurred due to static loading accounted for 51.72% of the sub-sample, and 48.27% were due to dynamic loading. Lastly, 75.86% of fractures occurred in an anterior impact position, and 2.41% occurred in the lateral position. Further analysis, including the documentation of the specific fracture location on the rib shaft, as well as a thorough characterization of the fracture morphology (macro and microscopically) will enhance the current knowledge the forensic community has on the effects of compressive trauma to the juvenile thorax.

The skulls of Robert the Bruce: Photogrammetry, artistry and paleopathology

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King Robert the Bruce led Scotland to independence from England in 1324AD. He is recognized as a fierce warrior and a brilliant military tactician, but using today's lexicon, he would be seen by the English as a terrorist. Many years after his death, an English historian/monk wrote that Robert the Bruce was a leper, and that claim has oft been repeated in the historical literature. In1818 his skeleton was encountered during renovations to the abbey where he was buried, and a mold was made from his skull, from which several casts were made. Various paleopathologists have examined the casts offering differing opinions of whether the lesions of *facies leprosa* can be identified (loss of the central incisors and erosion of the anterior nasal spine). However, neither historians nor paleopathologists have yet come to a consensus on the diagnosis. The research described here uses photogrammetry to create 3-dimensional models of 9 of the 12 know copies of the cast in order to assess whether the features expressed on the casts can be reliably used to make a diagnosis. Photogrammetric software (Agisoft) was used to create 3D meshes, which were then compared pair-wise using the mesh comparison tools in Mimics. The results demonstrate that there were at least two original molds and that the artist heavily retouched the models by hand, thereby altering the original surface. The detailed analysis of the suite of skulls suggest that the condition of the alveolus varies so greatly, that its features cannot be reliably used to make a diagnosis. However, the anterior nasal spine is consistently expressed, and it is not consistent with the pattern expressed in leprosy. This leads us to the conclusion that Robert the Bruce did not have leprosy, and the 14th century historical reference was likely a literary insult designed to denigrate the Scottish King.

Examining the impact of stress experienced prior to admission to the Brandon Indian Residential School

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By using publicly available student admission forms, we explore the health and growth impacts faced by Indigenous children who were admitted to the Brandon Indian Residential School (IRS). In this paper, we present preliminary research focused on anthropometric data of children who were taken from: (1) their home community; (2) those having attended day schools; and (3) those being transferred from another boarding school. The height-for-age z-scores were calculated and compared to the World Health Organization Child Growth Standards. We did not find that children who had previously been taken to either a day or boarding school had decreased height-for-age when compared to children who had been taken directly from their home community. While this indicates that children entering the Brandon IRS did not have significantly impacted growth, we cannot assess how living at the Brandon IRS may have further influenced their growth. Research into the long-term growth effects of Indigenous children is hindered by unavailable historical records, however, this line of inquiry aims to contribute to a growing body of literature around the long-lasting repercussions of the Indian residential schooling system in Canada.

Engaging biological anthropology students in online distance education courses

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Enrollment in online courses at Canadian higher education institutions has more than doubled since 2011 and now represents an estimated 8% of all undergraduate courses taught at Canadian universities. Although the demand for online courses may be increasing, teaching and learning online remains challenging for both instructors and students across disciplines in many ways. This presentation reports on one teaching strategy devised for an anthropology course that addresses many of these common issues. "Introduction to Biological Anthropology and Archaeology" is a fully online, first year course offered by the University of Western Ontario. Key learning outcomes for this course include being able to identify the kinds of questions anthropologists ask about past people and their environments, and the ability to ask questions relating to common debates in biological anthropology and archaeology. Critical challenges to successful online courses involve maintaining a connected community of students, implementing engaging learning activities, and providing prompt feedback to student contributions. Unsatisfactory learning experiences can result from deficits in any one of these areas. To meet these challenges and achieve course learning outcomes, we developed the "Ask a Bioarchaeologist" activity. Students participated in two mini-guest lectures (one video and one podcast) and developed questions to pose to the guest instructors. In addition to watching/listening, students also read popular news articles related to the instructors' research areas and worked through reflection questions. In a follow-up, student questions were pooled and posted with answers from the guest instructors. We believe this activity meets the challenges outlined above by 1) replicating real-world academic communities in which peers assess research in a public forum, 2) actively engaging all students in developing questions that grapple with anthropological concepts, and 3) providing timely feedback through instructor responses to questions. This presentation includes our perceptions of the quality of questions submitted by students. High quality submissions applied, analyzed, synthesized or evaluated concepts and avoided knowledge or comprehension type questions. We also share future design ideas that will engage students synchronously and reduce time input required from instructors.

Shorter, taller, weaker, stronger: changing bone geometry in medieval Denmark

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The Black Friars cemetery in Denmark was in use from the first half of 13th century until AD 1607 with two distinct interment phases: the medieval or monastic phase (AD 1240-1536) and the post-medieval or public phase (AD 1536-1607). This poster explores biomechanical properties of the adult skeletal material interred in the Black Friars cemetery (Odense, Denmark). Femoral length, cortical area (a measure of compressive and tensile strength), second moments of area (measures of maximum and minimum bending rigidity), section moduli (measures of maximum and minimum bending strength), and polar section modulus (a measure of torsional bending strength) were calculated from 162 CT scanned femora. Biomechanical analysis was undertaken at five locations along the diaphysis (20%, 35%, 50%, 65%, and 80%) in order to compare patterns in bone strength between the medieval and post-medieval periods as well as changes in bone with age. The analysis demonstrates a decrease in femoral length between the medieval and post-medieval periods. A general decrease in bone strength from the medieval to post-medieval period is also observed. Temporal decreases in bone strength seem to occur in males more than females, possibly suggesting that lifestyle changed more significantly for males than females after the Protestant reformation (AD 1536). A general decrease in bone strength after the age of 40 years is noted in females. In males, bone strength is significantly stronger among males who died between the ages of 40 to 55 years, then decreases in to senility. Mean femoral length is also significantly less among males aged

40 to 55 years. Statistically significant results are not seen for femoral length changes with age in females. The results are discussed in the context of changing socio-economic conditions which worsened with increasing urbanization in post-medieval Denmark and explored with respect to differential frailty, as posited in the osteological paradox.

Spider monkey social organization: Does genetic evidence support observational data?

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Observational data on a population of wild spider monkeys suggests that they live in societies of related resident males in association unrelated immigrant females. Male-male social behavior also suggests that group males cooperate to defend access to group females from outside males, and share reproductive opportunities within the group. We conducted a genetic analysis of this population to assess the genetic evidence for these interpretations. From fecal samples we extracted DNA and genotyped 39 individuals at 11 loci. We then calculated estimates of relatedness between dyads and compared adult male-male to adult female-female dyads. We also determined paternity for 12 immatures. The results did not indicate that males were more closely related to one another than were females, as would be expected if males are resident and females are immigrants. However our analysis of the distribution of paternity among the adult males showed no significant difference between the observed distribution of sires and what would be expected by chance, supporting our interpretation that group males share reproductive opportunities in the group.

Regional mobility and Vitamin D Deficiency in Aventicum, Roman Switzerland (1st-3rd c. CE)

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This study investigates the relationship between vitamin D deficiency and regional mobility in three individuals (2 males, 1 female) from En Chaplix, a Roman period cemetery in Aventicum, Switzerland. Skeletal evidence for vitamin D deficiency was confirmed histologically through the presence of IGD (interglobular dentine). Three permanent teeth spanning birth to 19 years from each individual (n=9 total) were examined for age and severity of episodes. The presence of IGD indicated that all three individuals were deficient in early childhood (ages 1-4 years), and two of the individuals had evidence of later deficiency at 10+ years. With the absence of active rickets, which is often a good indication of levels of vitamin D deficiency within a community, the mobility of the three adults was investigated using stable oxygen isotopes. A central incisor and a third molar were tested from each individual to compare residence from 6 months to 4 years and 9-12 years of age. $\delta^{18}O$ results indicate that all three individuals originated in the non-mountainous regions of Switzerland. A044, the male with no evidence of later deficiency, had limited variation between the two teeth, indicating he lived in the same area from birth until M3 crown formation (9-12 years of age). A020 and A036, who both were deficient during adolescence had higher $\delta^{18}O$ values (by 1.3) in the third molars. We hypothesize that the variation in $\delta^{18}O$ values for A020 and A036 is due to childhood mobility, although the isotope values are still within ranges expected for Central/Eastern Europe. The combined IGD and $\delta^{18}O$ results suggest that adolescent deficiencies in A020 and A036 could be attributed to changes in location, and the variety of social and cultural factors brought about by regional mobility, including changes in diet, clothing, and sun exposure.

With few studies on mobility from this region, this study contributes an important perspective on health and mobility in the Roman Empire.

An unusual group burial from the late Holocene, South African Cape coast

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Along Milnerton Beach, immediately north of Cape Town, several Later Stone Age burials were found in the 1980's and 90's. They were in close proximity, near a river mouth and lagoon. Modern housing construction destroyed the context in the late 1990s. Each individual was buried with some adornment, the men having more ostrich eggshell (OES) beads, the women having fewer OES beads but also some bone beads. Other grave goods included an OES flask and a tortoise carapace bowl. Milnerton Beach burials differ from expected Later Stone Age interments in this region, which are normally single and without adornment or grave goods. We have done new analyses on a group of four people who were buried together: two women, two men, ages ranging from late teen to old adult. Radiocarbon dates around 1850 B.P. (uncalibrated) confirm their contemporaneity with one another and with other skeletons from nearby. Stable isotope values from bone collagen are consistent with coastal foraging. While the context implies four catastrophic, coincident deaths, evidence for interpersonal violence is equivocal. Signs of peri-mortem long bone damage are absent; damage to the cranium of the older woman may reflect at least one powerful blow. The dates correspond with the earliest dates for domestic stock in the region, perhaps a time of new social conflicts. Unusual in many ways, the Milnerton beach burials appear to reflect fatal conflict, but the context and the combatants remain unknown.

In English Please! Reflections on the dominance of English language in primatology

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Critical research on diversity and inclusiveness in science tends to focus on issues related to race, class, gender, and sexual orientation. Nonetheless, the language we use to express ourselves is a major component of the way our science is perceived and transmitted (or not) worldwide, and thus also generates situations of privilege and exclusion. Too often, issues related to language are ignored in these debates. Building on Frans de Waal's (2003) notion of "linguistic monopoly", this paper proposes a critical reflection on how the dominance of English language in the field of science, and more precisely in the field of primatology, creates a hierarchy of knowledge and creates privileges for researchers who are native English speakers. Articles that are not written in English often fail to cross national borders and are ignored by the large scientific community, and articles written in "bad" English fail to be published in strong peer- reviewed journals and are ridiculed. This process generates a structure in which native English speakers produce a knowledge that is "secure" and can hardly be challenged by non-native English speakers.

Canid dietary patterns: Stable isotope analysis from five Huron-Wendat Village sites in Ontario, Canada

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We examine stable carbon isotope collagen (δ^{13}Ccol) and stable nitrogen isotope collagen (δ^{15}Ncol) values in bone collagen from 48 dogs (*Canis familaris*) recovered from five Huron-Wendat village sites in Ontario to understand canid dietary patterns. All of the archaeological specimens are dog skeletons from well-dated contexts including: the Middle Ontario Iroquoian (MOI circa A.D. 1250-1400) Robb Site (AlGt-4), the Late Ontario Iroquoian (LOI A.D.1400-1580) Mantle (AlGt-344) and Seed-Barker (AkGv-1) sites, and the Contact period (CP A.D. 1600-1650) Ball (BdGv-3) and Ossossané sites (BeGx-25). Seventeen dogs are identified as originating from either a midden (N=9) or a house (N= 8) context. Published data for a large faunal assemblage from the contact period Kelly-Campbell Site (BcHb-10) are used to characterize the local/regional food web. Preliminary assessment of the δ^{13}Ccol and δ^{15}Ncol data demonstrates subtle temporal, between village, and within site differences in canid diet. Variability in δ^{13}Ccol values is greatest during the MOI and Contact periods, with the highest values recorded for LOI sites. This general trend of increased isotopic values during the LOI is also observed in humans and has implications for using dogs as proxies in human dietary studies. Dietary variability in the CP originates from significantly lower δ^{13}Ccol values for the Ball site compared to those for Ossossané. Nitrogen isotope ratios gradually increase through time with significant differences between the MOI and CP time periods. When considering location of remains, variability in the isotope data is highest in midden dogs compared to house dogs. While there is not a statistically significant difference between midden dog and house dog mean δ^{13}Ccol values, there is a statistically significant difference between mean δ^{15}Ncol values with house dogs having higher values. This evidence is considered in relation to dog ecology, and the roles of dogs in Huron-Wendat society.

Exploring frailty in locomotion of non-human animals

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Modifications that lead to age-related dysfunction may be initiated at any point during life-history events and have cascading effects during the remaining lifetime of an individual. Many questions on the effects of age on metabolism, bone, muscle structural properties, and locomotor changes remain open. Frailty, which is observed clinically in humans, is the inability to carry out activities of daily living. Gait frailty is evidenced by slower walking speed, changes in limb loading, and reduced movement fluidity, all of which could lead to injury and predation in the wild, unless non- human animals develop compensatory gait strategies. I hypothesized that the locomotion of animals will be less affected by aging compared to humans; animals will experience senescence (e.g., reduced fertility, metabolic dysfunctions, decreased immunity, lesions across several organs) but more limited decrease in locomotor performance than humans. Ten adult C57BL mice (4 months) and 20 aged mice (24 months) were encouraged to walk freely across a force platform and filmed with a GoPro camera. All observations for sifakas were made at the Duke Lemur Center. A total of eleven adults were studied (13.8 ± 7.0 years old). Temporal gait parameters, peak vertical ground reaction forces, speed, and loading rates were collected for each animal. ANOVAs were conducted to test for differences between age groups. No significant changes in locomotor mechanics were found in the mice sample. The mice did lose bone mineral density in their hind limbs, decreased in muscle size, and lowered their fast-twitch fibre-count in the soleus muscles with increasing age. However, mice continued to move quickly, fluidly, and competently. No spatiotemporal or kinetic gait variables measured between the sifakas were significant. There was a slight but significant reduction

in locomotor velocity between the two age groups. These two captive animal models show that a robust locomotor performance throughout the lifetime of an individual persists despite of old age. Although further investigation is needed, especially in primates, I suggest that aging as a trait that impairs survival and fertility may only have evolved in modern humans where a community exists to support frail individuals.

A year in the virtual mystery project: Current results and a multidisciplinary future

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The Virtual Mystery Project employs Problem-based learning (PBL), an active learning strategy where students work in small collaborative groups to investigate open-ended case scenarios. PBL has been shown to develop critical thinking through problem-solving by giving students an opportunity to apply theoretical learning to practical situations (Dolmans & Schmidt, 1996; Loyens, Jones, Mikkers & vanGog, 2015; Wood, 2003). The Virtual Mystery Project implements the PBL approach in the context of a large (n=800), introductory bioanthropology and archaeology course, with sub-field-specific scenarios, and hands-on access to artifacts and specimens. The challenge of implementing PBL in large courses is that this self-directed learning method requires additional resources to facilitate the ongoing dialogue of a small group experience (Fukuzawa, Boyd & Cahn, 2017; Kelgeris & Hurren, 2011). In the past, the Virtual Mystery Project overcame this challenge by using the self-release functionality of the institutional management engine and, in the past year, has welcomed an expanded roster of scenarios tailored to teaching assistant expertise and student interests. The results of this iteration of the project will be presented in this poster. In response to this student feedback, and in the interest of expanding access to the Project to other Departments at the University of Toronto and other institutions, we have collaborated with Computer Science to develop a customized user-interface for the Virtual Mystery Project. This poster will demonstrate the Virtual Mystery Project as an effective, multidisciplinary teaching method that uses online technology and hands-on access to materials to increase student engagement by presenting them with practical scenarios through a customized user-interface.

Burial location in the Manila American Cemetery and Memorial (MACM) and its relationship to taphonomic condition of skeletal remains

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The mission of the Defense POW/MIA Accounting Agency (DPAA) is to provide the fullest possible accounting of U.S. service members lost in past conflicts. As part of this identification effort, individuals buried as unknowns in American military cemeteries are being disinterred. Remains associated with World War II losses from a POW camp cemetery are part of these ongoing disinterments. These burials are being analyzed and identified at the DPAA Laboratory in Hawaii. At the DPAA, identification is based on a variety of methods, including anthropological and DNA analyses; and dental and radiographic comparisons. The condition of the remains affects what analysis can be performed (e.g. stature or age estimation) and whether DNA testing is successful. Although initial observations of these remains reveal they are generally in poor condition, there is some taphonomic variation in the presence of vivianite crystals, colour of the remains, cortical bone integrity, and overall preservation. Given that the remains

were buried in the MACM for over 60 years, one possible factor contributing to these observed taphonomic differences is their location within the cemetery.

This pilot study examines eighty-four caskets disinterred from MACM and associated with the POW camp losses. The burial environment (e.g. presence of water in the grave) and casket condition (e.g. compromised with holes) were noted for all burials based on disinterment photographs. For an available subset of the burials, the condition of the remains was observed by documenting their colour, cortical bone integrity (degree of cracking and flaking), fragmentation, and the presence of vivianite crystals. Raw percentages of successful DNA testing based on elements sampled were calculated. These data were mapped onto the burial location of each casket within MACM. The purpose of this study is to provide insight into the relationship between burial location within the MACM and the taphonomic condition of these remains. This analysis may help DPAA recognize locations within the cemetery where caskets (and the remains) may be degrading relatively faster. Given the large number of American unknowns buried in MACM these findings may enable DPAA to prioritize future disinterment operations to maximize identification potential.

The first confirmed Neanderthal from the Central Balkans

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Neanderthals are a European fossil hominin group associated with Mousterian technocomplex; all Mousterian sites in Europe are deemed Neanderthal. Recent research in the Balkans and Eastern Mediterranean Area indicates that Neanderthal presence cannot be assumed based on the stone tool evidence only, it has to be demonstrated. Here we present several specimens with morphological features consistent with Neanderthals, recovered from the Mousterian levels of the Pesturina cave (Serbia). Based on the associated ESR dates, these specimens demonstrate the presence of Neanderthals in the Central Balkans between MIS 5d and MIS 3.

Close-range photogrammetry for research: Still versus video

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Three-dimensional imaging is no longer a foray into using expensive, highly specialized and cumbersome machines, as methods like photogrammetry provide an accessible imaging technology to researchers. With continuous innovations in how data can be captured, an appropriate method to produce detailed and accurate models for research must consider balancing time and available equipment. Through presentation by poster format, a case study analysis will evaluate still-frame photography and video recording for close-range photogrammetry with considerations for research application. When visiting research collections, the time required to image specimens dictates the sample size that can be collected. The time required for photogrammetry must be balanced from the time imaging specimens, preparation of files before processing including converting formats or extracting stills, and processing time. Should time be dedicated to the collection with a focus on gathering data in the original files with still-frame photography, or afterwards with processing the digital files to create the final models? Presently, all specifications must be evaluated by the researcher as no comparison of time, method and quality of output is presented for those working within research facilities. The case study looks at femora from the medical collection at Nagasaki University, Japan which were imaged with a Nikon DSLR camera with still-frame

photography and high definition video. All models were rendered with Agisoft PhotoScan. RAW files were converted to TIFF as the base-line method, and video frames were extracted with PhotoScan and externally with VLC Media Player. The three approaches produced three models with different requirements for time, preparation and processing. Comparison of the models considers time requirements at each stage and final model quality from the point cloud densities. The density of the point cloud is a result of the amount of information used to create the models; greater input produces detailed replicas and less information produces smoothed copies. Innovative research and documentation will benefit from the most accurate digital replication. Identifying the higher quality models and time requirements at each stage will aid researchers in selecting the parameters for photogrammetry and method best suited for their conditions.

Sleep influences cognitive performance in lemurs

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Primates spend almost half their lives asleep, yet little is known about how sleep influences their waking cognition. We hypothesized that diurnal and cathemeral lemurs differ in their need for consistent, non-segmented sleep for next day cognitive function in a variety of fitness relevant tasks: including long-term memory consolidation, self-control, foraging efficiency, and sociality. Specifically, we tested the hypothesis that the strictly diurnal *Propithecus* is more reliant on uninterrupted sleep for cognitive performance, as compared to four other lemur species that are more flexibly active (i.e., cathemeral). We experimentally inhibited sleep and tested next day performance in 30 individuals of five lemur species over 960 total nights at the Duke Lemur Center in Durham, North Carolina. We used a pair-wise study design for two pairs of lemurs from each species, where the experimental pair experienced a sleep restriction and/or deprivation protocol while the control pair experienced normal sleeping conditions. We validated effectiveness of the protocol via actigraphy and infrared videography. Our results suggest that normal, non-disrupted sleep improved memory consolidation for all lemurs. Additionally, on nights of normal sleep, diurnal lemurs showed greater improvement in foraging efficiency tasks than cathemeral lemurs. Social behaviors changed in species-specific ways after exposure to experimental conditions, and self-control was not significantly linked with sleep. Based on these findings, the links between sleep, learning, and memory consolidation appears to be evolutionarily conserved in primates.

Bioarchaeology of pillar site cemeteries around Lake Turkana, Kenya: Insights into eastern Africa's first herders

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Early herders in eastern Africa constructed elaborate, megalithic cemeteries ~5000 years ago overlooking what is now Lake Turkana in northwestern Kenya. There are at least six "pillar sites" around the lake, with the largest containing an estimated >580 individuals in a central mortuary cavity. The sites are the earliest known monumental architecture in sub-Saharan Africa. They represent an unusual mortuary tradition not seen before or since, and were built during a time of rapid change as pastoralism entered the

basin and Lake Turkana shrank by ~50%. Excavations at three sites on the west side of the lake have yielded a minimum of 49 individuals from primary and secondary burials, as well as hundreds of isolated bone and tooth fragments. This collection presents new possibilities for studying the beginnings of pastoralism in eastern Africa, a period with few known sites or human remains. Although the pillar site skeletons are highly fragmentary, they are nevertheless informative about the individuals' sex and age, body size and proportions, dental traits that may reflect diet, traumatic events in their lives, and instances of degenerative, metabolic, and infectious disease processes. Periosteal molds of upper and lower long bone midshafts (n=37 elements) reveal patterns of early herder terrestrial mobility when compared to other past populations, such as those from the southern African Later Stone Age. Skeletal analysis of those buried within pillar sites provides new, important perspectives on what life was like for people transitioning to food production while coping with major environmental change.

Trains and transmission: The spread of 1918 influenza in Malta

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Comparatively little attention has been paid to the public transportation system and role in the spread and impact on influenza. The island of Malta is uniquely situated to explore this question because the transportation system was a binary one, in which some communities were serviced, and others were not, and train service continued to operate during the epidemic period. A proportionate analysis was performed on influenza rates in communities along the railway route and those not along the route. Our analysis shows that communities on the railway line had significantly higher influenza morbidity and mortality rates. Of particular note is that there was a significant difference during the peak of the epidemic in October, 1918; settlements serviced by train had a mortality rate of 29.3 per 1000 living as compared to 22.30 per 1000 ($p < 0.001$). During the second and third waves of the pandemic, differences in influenza morbidity rates never exceed 3.25 per 1000, and only in some cases were rates higher along the train route. An examination of the influenza epidemic during 1921/22 did not show a significant difference based on location and access to train services. Another respiratory disease, measles, during the epidemic of 1916, showed that communities served by Malta's other transportation service- the Tram line, exhibited significantly higher rates than those communities not along the tram line. The Tram service was not operating during the influenza epidemic of 1918, however. It is likely that the dispersion of the influenza virus was curtailed because of the cessation of Tram service during the epidemic due to the lack of coal during the Great War.

Assessing sex and gender in forensic anthropology

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There were at least 2,115 reported killings of trans- and gender diverse people in 65 countries worldwide between 2008 and 2016 (Transgender Europe 2016). Violent death is always tragic, but the trans community faces additional issues in these circumstances. The identification of the deceased begins with a physical description of the body (for skeletal remains this is known as a biological profile), which is subsequently compared to descriptions of missing persons. In the case of trans and gender diverse people a description of their physical remains, including biological sex, may have little correlation with their social identity, delaying and often confusing the issue of identification. The purpose of this presentation is to explore how the field of forensic anthropology has the potential ability to assess for gender identity when constructing the biological profile. Because of the disconnect between their physical appearance and their gender identity, some people choose to physically modify their bodies in order to better reflect their

gender. These processes may include surgical modifications, such as genital alterations and facial feminization surgeries (FFS) for trans-women. FFS can involve forehead reduction, rhinoplasty, brow lift, and chin reduction (Altman 2012). Since females generally have smaller, smoother facial features, most of the surgical procedures involve the shaving down, or reduction of bone on certain areas of the face. This reduction of bone should be reflected in a metric sex assessment because this would affect the size of the measurements taken, potentially impacting the outcome of a skeletal analysis. Currently, forensic anthropology has a binary conceptualization of sexual variation that limits the incorporation of gender into the creation of the biological profile (Jones 2014). There is little to no research on the skeletal features of trans individuals, or the impact of FFS on traditional methods of evaluating the sex of a skull. Once we understand the skeletal indicators of FFS, forensic anthropology can develop guidelines for correctly recognizing and supporting the identification of trans-women.

Tracing the movement of humans with isotopes: following Chris' lead

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Isotopic labels in bone and teeth provide clues as to the origin of the owner of the skeleton, as well as providing some records of their life-long mobility. Oxygen ($\delta^{18}O$) and strontium ($^{87}Sr/^{86}Sr$) ratios have proven to be the most effective for this purpose, and have been used both in early historic settings (e.g., Roman age sites) as well as more recent and even current forensic settings. Chris White famously pioneered the use of this isotopic pair in her study of the Mesoamericans. However both techniques suffer from challenges having to do with the geochemistry of O and Sr respectively. The vagaries of O sourcing are well known, ranging from use of bottled water to climate-induced changes in sources of water. The assumptions behind Sr isotope usage may be even greater, however, because plant-derived Sr which enters the human diet directly or indirectly is derived from the surficial layers of the earth, and their composition may have little relationship to bedrock isotopes. In the absence of appropriate faunal controls, use of geological data should be treated cautiously.

From acid to alkaline: The variation in soil pH at the 18th Century Rochefort Point Cemetery and its relationship to mortuary practices and previous site use

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Skeletal preservation is a primary consideration of bioarchaeological research where sample representativeness not only affects the type of analyses that can be completed but also influences the demographic understanding of a population. Soil acidity has long been regarded as the primary factor affecting skeletal preservation; however, secondary considerations of mortuary practices and site use are arguably just as significant. This study compares soil acidity to skeletal preservation at the Rochefort Point cemetery at the Fortress of Louisbourg, taking into consideration the previous use of this cemetery site as part of the Carrerot property and variable mortuary practices between the French and New Englanders. Twenty-nine soil samples, collected from individual burials at the time of excavation, showed pH levels ranging between 5.0 (acid) and 7.0 (neutral). There was a clear correlation between increased skeletal preservation and more neutral pH, as expected. However, the location of individual interments in relation to the Carrerot property structures also likely influenced these pH levels, in addition to the differing mortuary treatments including coffin use and burial Department. While many studies of soil acidity focus on cross-site comparisons, this study highlights the extreme intra-site variation that may be present, and the need to consider previous site use and mortuary practices when trying to understand

differential skeletal preservation and what to expect when working within complex cemetery assemblages.

Using three-dimensional dental topographic analysis to examine dietary change in an early group of Eocene primates; the Microsyopine Microsyopids

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Micro-CT scanning is becoming a standard part of the anthropologists' toolkit, providing the opportunity to create accurate digital representations of even very small specimens. For example, high-resolution, three-dimensional (3D) reconstructions of teeth can be created from micro-CT scans, which can be used to collect various two and three- dimensional measurements. A suite of metrics, known collectively as dental topographic analysis (DTA), have previously been used to quantify the dental morphology of living primate taxa, which provides a framework to test hypotheses about dietary adaptations of fossil primates. Using DTA, we examined the dietary adaptations of three extinct microsyopid plesiadapiforms (stem-primates) known from the early Eocene of the Big Horn Basin, Wyoming. The climate of the early Eocene is characterized by intense flux, with periods of cooling and warming, which provides an opportunity to study the effects of geologically rapid climatic events on the ecology of extinct animals. A climatic and species turnover event, known as Biohorizon A, represents a period of global cooling, in which several species go extinct and several new species appear. During Biohorizon A, *Arctodontomys wilsoni* goes extinct and is replaced by *A. nuptus*. From there, data suggest that *A. nuptus* gave rise to *Microsyops angustidens* after the climatic event. We used DTA to test for differences in the dietary adaptations of these species to examine how diet and climate relate in early primates. Our results indicate that as global temperatures cooled leading up to the biohorizon event, *A. wilsoni* gradually became more insectivorous and less omnivorous. When *A. nuptus* appeared, this species was adapted to an insectivorous diet, but was not as insectivorous as *A. wilsoni*. When temperatures began to warm, *A. nuptus* became more omnivorous until giving rise to the omnivorous *M. angustidens*. These results suggest that climate change likely influenced the dietary adaptations of early primates and that *A. nuptus* was able to replace A. *wilsoni* as it was better adapted to an omnivorous diet. In sum, our study highlights how the application of 3D technology provides a means to study the ecology of extinct taxa.

Anthropological theory in action: Liminality in older adults and individuals with chronic, serious or terminal disease and the role of community programs in their re-assimilation

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Being in a liminal space, in terms of one's own identity and place within the community, is an uncomfortable, disorienting place. Originally conceived as a place occupied mid-rite for a limited time, after which one's new place in society and/or aspect of identity is taken on, the liminal state has, in some modern instances, lost the feature of re-assimilation of liminal individuals into the community or made it the sole responsibility of the liminal individual. These modern instances can occur after diagnosis of chronic, serious, or terminal disease - i.e. in patients; in older adults; and at the end of life. Modern societies seem to no longer understand their role or have a well-defined role in helping such liminal individuals regain their new place or new identity. As a result, people in these liminal phases may struggle and become isolated, which may result in poorer physical and/or mental health outcomes. However, modern communities can relearn how to help re-assimilate these individuals, to help them find their "new normal", by way of community programs and networks. Two examples are outlined in this presentation: Compassionate City Burlington, which aims to build community capacity around end-of-life care, and PACE Burlington, a program involving healthcare, social engagement opportunities and wellness

activities for older adults, in order to enhance wellness and aid in successful aging. These and other community programs support older adults and people with serious, chronic or terminal disease to remain in their own homes in their communities. In terms of liminality, these programs help individuals find their "new normal" and re-assimilate within the confines of their health status, age, and/or stage of life - to regain or re-form their identities in their current conditions, and to reclaim their (new) place within the community.

The effects of childhood adversity on sleep quality using midlife in the United States (MIDUS) data

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Research has repeatedly shown that adverse childhood events, both social and environmental, can have significant negative effects on adult health and health behaviors. Examples from the anthropological and public health literature include increased infections, altered hypothalamic-pituitary-adrenal (HPA) axis activity, and increased heart disease risk. Additionally, there is mounting evidence linking disturbed or disrupted sleep patterns with poor health, including altered immune and inflammatory responses and increased mortality risk. Using cross-sectional data from MIDUS (n = 1203, mean age = 53, 49.7% male, 97% Caucasian), we hypothesized that childhood adversity (as measured by an index of emotional, physical, and sexual abuse and neglect) would predict worse subjective (i.e., sleep diary) and objective (i.e., actigraphy) measures of sleep. Using linear mixed effects models, childhood adversity positively predicted increased sleep latency (i.e., longer time between lights out and sleep onset; $\beta = 0.1$, $p = 0.049$). There was an interaction effect between Other Ethnicity and childhood adversity, such that Native Americans, Hawaiians, and individuals who reported other ethnicities and who had a greater history of childhood abuse/neglect demonstrated greater sleep fragmentation as measured by wake after sleep onset (WASO; $\beta = 0.28$, $p = 0.04$). There were no other associations between childhood adversity and subjective or objective measures of sleep quality. Thus, we report preliminary evidence that childhood adversity can negatively influence adult sleep patterns both directly through interaction effects. Future research in a more diverse data set can further elucidate the interaction effect and determine if the childhood adversity and sleep pathway contributes to adverse health effects.

Data after the fact? Field photography to post hoc hard data

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As we all know, hindsight is 20/20 and often we wish we had collected more data after the fact or data goes missing through lost field forms, computer problems, or other unforeseen issues. This methodological paper explores the value and accuracy of scaled and unscaled field photographs and the ability to extract reliable data for later research such as stature, age, and sex estimations. This paper serves as an experimental research project which used photography and field measurements collected from the 2018 Simon Fraser University bioarchaeological field school to address how missing field data may not truly be lost. ImageJ software was used to take measurements in millimetres from a plan-view scaled photograph and an unscaled orthogonal photograph from a single burial which were then compared to

known measurements collected in the field. The known long bone lengths and breadths were compared to the digitally obtained measurements from the scaled photograph. In the unscaled photograph, one known length and breadth measurement were each used as scale to collect the remaining digitally obtained measurements. The difference of long bone lengths and long bone breadths were compared directly to quantify the variation between the measurements. Results showed that if scaled plan photographs are taken, photographic distortion and lack orthogonatility will result in increasingly inaccurate digital measurements away from the scale (>50 mm), although they can be fairly accurate when taken close to the scale (within 1mm). Orthogonal photographs are ideal to collect digital measurements and can potentially replace actual measurements if bones are in the right position, bone edges are clearly seen, and there are no other features obscuring the view.

A comparison of Fordisc 3.1 and AncesTrees using cranial measurements from an identified sample

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Many forensic anthropologists are still using racial categories for identification purposes since it aids in narrowing the search for identifying an individual and also assists the public when a description of an unknown is given in hopes that someone will identify them. Forensic techniques have been developed based on biased race determination methods that do not work. Problems are then created when discussing the topic of race because race can mean many different things to any one individual, especially to forensic anthropologists who cannot find a common methodology to determine “race” within police investigations. Due to this, the computer software accuracy of AncesTrees and Fordisc using Howell’s data reference used by forensic anthropologists in these investigations has come into question. This thesis explores the use of race within forensic anthropology. The results show that AncesTrees had 37% accuracy and Fordisc had 36.1% accuracy. This research helps show that race is a social construct and promotes racial stereotyping for investigators and forensic anthropologists and does not prove to be beneficial in identification investigations.

An introduction to the Developmental Origins of Health and Disease (DOHaD): Insights from animal model studies, and implications for the bioanthropology of health

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In recent decades, epidemic levels of chronic disease states – including obesity, diabetes, and cardiovascular diseases – have prompted investigations globally into their causes and consequences. Though initially considered to be determined largely by genetic and behavioural factors, this paradigm now appears insufficient to explain the continued propagation of non-communicable diseases. It is now established that perturbations during critical developmental windows (especially maternal physiological conditions during pregnancy) result in (mal)adaptations that confer long-term disease risk, rather than health. In our work, we have investigated how early life adversity impacts reproductive and metabolic outcomes. We show that both insufficient caloric intake and nutrient excess impairs ovarian growth and development and results in premature ovarian aging through pathways defined very early in the neonatal ovary. Furthermore, our work builds on previous experimental and clinical studies demonstrating the nature and extent of the influence of mothers’ metabolic status on the developing fetus. An altered substrate and inflammatory profile programs the offspring, resulting in a maladapted physiology and increased disease risk. In this regard, we show that diet-induced obesity modifies maternal gut microbial communities. These shifts in gut community composition may affect maternal metabolism through altered production of bacterial metabolites, impacting intestinal permeability and immune function. Maternal

metabolic compromise results in adverse fetal environments that influence placental function and, ultimately, (mal)adaptations in offspring. We're now working with social scientists to translate this knowledge beyond the basic science and epidemiological research communities, such that it can be used clinically, in public health messaging, and in policy development.

Use of basic fuchsin stain to demonstrate lamellar band interactions

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Three-dimensional imaging of bone is on a microscopic level is still relatively novel in the field of human osteology but can render some important information. The purpose of this project is to demonstrate the usefulness of using basic fuchsin stain to develop a three-dimensional image of bone microstructure using a laser-scanning confocal microscope. This project used 3 human femora, three human ribs, and three pig ilia damaged fragments to examine the microstructure using basic fuchsin stains. Testing was done using a Carl Zeiss LSM800 at the 10x, 20x, and 64x magnification, with an emission wavelength setting of 543nm; the emissions wavelength best used to view basic fuchsin stain. Using the elements described, the results of this project found that it is possible to develop three- dimensional imaging of lamellar interactions within osteons, as well as develop edge geometry of fracture sites. Further, this project found that the LSM800 is better at higher magnifications such as 64x magnification than at 10x or 20x. Lower level magnification was better able to demonstrate the relationship between collagen and bone mineral, while the higher-level magnification demonstrated lamellar band interaction and the inter-lamellar space.

Individual breastfeeding and weaning histories in a sample of children from 19th Century Madrid, Spain using stable isotope analysis of incremental dentine sections

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This research examines the breastfeeding and weaning histories of 12 sub-adults interred in an infant and children's cemetery located under the Trinitarias Church in Madrid, Spain. We employ stable isotope analysis of dentine serial sections of deciduous incisors and molars in order to estimate the duration of breastfeeding, and the age at which weaning was initiated and completed. When the data were plotted in relation to estimated age, the $\delta^{15}N$ profiles fell into three general patterns: rising $\delta^{15}N$ values with age, decreasing $\delta^{15}N$ with age, and a mixed pattern characterized by an increase in $\delta^{15}N$ values following an initial decrease. The $\delta^{13}C$ values predominately showed a decrease in $\delta^{13}C$ values with age. Through the combined analysis of stable carbon and nitrogen isotopes, the highest $\delta^{15}N$ and $\delta^{13}C$ values occur between the ages of 10 and 14 months. These findings indicate breastmilk was the primary source of dietary protein up to this age. The results also indicate that weaning was complete around the age of three years, for those individuals who survived to that age. Finally, the combined $\delta^{15}N$ and $\delta^{13}C$ isotope data in four individuals point to evidence of stress in their lives. Two of the individuals showed increasing $\delta^{15}N$ values and decreasing $\delta^{13}C$ values over a one-year period suggesting nutritional or physiological stress during weaning. The other two showed signs of potential chronic stress throughout infancy and early childhood characterized by steadily increasing $\delta^{15}N$ values with steadily decreasing $\delta^{13}C$ values. These findings suggest that the process of weaning in 19th century Madrid began slightly later in a child's life, and was a more gradual process, in comparison to samples from other, more industrialized, European cities. This may be related to the delayed impact of the Industrial Revolution in 19th century Spain, and its influence on the role of women in the home and workforce.

Reliability of dental development scoring methods across 2D and 3D CT visualization techniques

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Computed tomography (CT) scan databases are becoming an increasingly common source of information for biological anthropology. One advantage of CT data over traditional radiographs is that it can be manipulated in two and three dimensions to allow precise visualization of structures in their original location. However, while visualization capabilities have developed quite rapidly, methods for estimating age from dental development have remained grounded in traditional two-dimensional methods. Previous studies have confirmed the comparability of scoring in traditional orthopantomograms (OPT) and CT, but have been restricted to 2D CT visualization techniques. In this study, we test whether 2D scoring methods can be accurately applied to CT scans across 2D and 3D visualization techniques. Two observers scored a total of 20 teeth from 3 individuals aged 2 to 8 years at death. Two visualization techniques available in any visualization software were used. The first is slab maximum intensity projections (MIPs) applied to oblique slices (2D visualization). The second is simple three-dimensional surface rendering with a minimum threshold value equal to the typical minimum value of dentin (3D). Dental formation was assessed using the Moorrees, Fanning and Hunt (MFH) stages. Inter observer agreement was assessed using a weighted Cohen's kappa. Results show excellent agreement between observers in 2D visualization (kappa = 0.91). However, agreement between the observers in the 3D visualization was poorer (kappa = 0.68). Intra-observer consistency of scoring between 2D and 3D modalities was poor (kappa = 0.73). Disagreement was most substantial in deciduous teeth, where a simple threshold does not discriminate well between bone and dentin. In these cases, more precise segmentation is necessary to accurately score dental formation. The segmentation process can be labor-intensive and accuracy of segmentation is known to vary based on observer experience. While 3D visualizations can be useful tools in assessing developing dentition, standard 2D visualization algorithms are easier to use and provide better results, particularly when observers are relatively inexperienced in 3D visualization.

San Jose 520 and the early growth of Teotihuacan

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San Jose 520 is a small, early, low-status residence just outside the limits of the ancient Mexican city of Teotihuacan. A series of 29 stable oxygen isotope compositions from two burials suggests that the site was occupied by newcomers who had migrated to the area from elsewhere. Their adaptation to their new circumstances and their role in the larger economy of Teotihuacan include ceramic manufacture. This adds one more example to the various forms of immigration to Teotihuacan that Christine White has identified in the course of her isotopic analyses of site materials.

“Queer”ying ethology: An assessment of the literature on same-sex sexual behaviours in non-human animals

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For decades, writers have discussed how humans identify with the animal kingdom in a way that reflects current political and social views. Although research is often touted as objective, it is not exempt from these biases and assumptions. For example, while same-sex sexual behaviours have been reported in over 450 species, systematic research on this topic is relatively scarce. Here, I assess the current representation of these behaviours in the scientific literature. In September 2017, I conducted a targeted search on Web of Science using key words such as “homosexual”, “same-sex” and “gay” paired with “animal”. I sought primary research articles that specifically describe or investigate same-sex sexual behaviours in mammals. I found 64 research papers with 76% investigating these behaviours in non- human primates. Despite few articles overall, I found a general increase the number published yearly, suggesting that in the future, we will see more research on this topic. This is likely due to a growing acceptance of same-sex relationships in humans. Many studies show that these behaviours in animals are critical for social order and cohesion. Thus, they are likely more important than their current representation in the literature suggests. Furthermore, studies on these behaviours in animals are often cited in human political and social spheres, from court cases to media articles. As such, it is researchers’ responsibility to accurately represent the occurrence and prevalence of same-sex sexual behaviours in non-human animals to the non-scientific community.

Enter the matrix: Habitat use by *Microcebus Spp.* in a fragmented landscape

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Forest loss has resulted in fragmented landscapes containing high levels of matrix in Madagascar. Accelerating habitat fragmentation also increases the isolation between habitats. Use of matrix by lemurs may be required to maintain gene flow between increasingly isolated populations. Therefore, it is important to understand how lemurs move through fragmented landscape and to what degree they use the matrix. We investigated matrix use in two *Microcebus* spp. in a fragmented landscape. We tested the hypothesis that lemurs use matrix at lower levels than fragmented forest and that *Microcebus murinus* are more capable of dispersing through matrix than *Microcebus ravelobensis*. To compare matrix versus fragmented forest use by *Microcebus* spp. we visually surveyed four areas of matrix and adjacent forest fragments during nocturnal walks along line transects. We compared the mean observations of *Microcebus* per km walked in matrix transects (N=4) to fragment transects (N=4) using a Welch T-test for un-paired samples. We did not use a statistical test to compare the mean distance from the nearest forest for *M. murinus* (N=4) versus *M. ravelobensis* (N=2) due to small sample sizes. We found that there was no significant difference in observations of *Microcebus* per km walked in matrix (M=0.385, SD=0.577) compared to fragment (M=1.863, SD=2.41) transects ($t(6)= 1.192$, $p=0.31$). We found that the mean distance from forest was greater for *M. murinus* (M=149.69 m, SD=50.36 m) than *M. ravelobensis* (M=77.99 m, SD=41 m). *Microcebus* spp. appear to readily use the matrix. We suggest that Microcebus may use matrix for movement between fragments, dispersal events, or diet supplementation. *M. murinus* penetrates further into the matrix than *M. ravelobensis*. Our study highlights that *Microcebus* use the matrix and that *M. murinus* and *M. ravelobensis* may use matrix differently. Further research is needed to understand why and how *M. murinus* is a more capable disperser than *M. ravelobensis*, and how much matrix facilitates movement for each species. We suggest future studies should include more systematic survey of lemurs in different matrix types and not only within fragment and continuous forest.

Diaphyseal strength indices and the interpretation of prehistoric terrestrial and marine mobility

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Long bone cross-sectional geometry has often been used to infer patterns of habitual activity in prehistoric populations, yet interpretations of observable variation are confounded by allometric scaling and individual genetic and hormonal differences. Indices of relative skeletal rigidity between limb bones provide a means of investigating variation in the body, are inherently size-free, and are likely to reflect individual variation in mechanical loading. Diaphyseal strength indices have been useful in detecting signatures of terrestrial mobility and the use of the upper limbs in locomotion among primates and fossil hominins. Terrestrial mobility and watercraft use are important components of adaptation to different natural environments, enabling different patterns of logistical mobility and large-scale human migrations. Our knowledge of watercraft use in prehistory is limited due to the perishable nature of relevant material culture. A method of detecting the use of watercraft in the past, and its relationship to terrestrial mobility, would improve our understanding of prehistoric behavioural ecology and human dispersals. This paper compares ratios in long-bone cross-sectional geometric properties of humeri, femora, and tibiae to investigate whether they can be used to differentiate patterns of terrestrial mobility and watercraft-dependent foraging strategies from biomechanical properties. We compare populations historically known to be dependent on watercraft use for subsistence and locomotion (Andaman Islanders; Yaghan; Inuit); archaeological populations thought to rely upon terrestrial locomotion (Iberomaurusian; Later Stone Age South Africans and Tanzanians; Natufians), and modern female athletes of known patterns of habitual activity (rowers, soccer players, controls). The results demonstrate that known watercraft users (protohistoric foragers and modern athletes) have greater humero-femoral and humero-tibial strength ratios. Foragers with high levels of terrestrial logistical mobility have high tibio-femoral strength ratios. These results suggest that the relative strength of skeletal elements reflects a signature of the intensity of manual loading during locomotion. The results of this study support the application of lower limb bone strength ratios to interpret terrestrial mobility, and provide a new biomechanical approach to infer past watercraft use in prehistoric contexts.

Temporal shifts in the distribution of murine rodent body size classes at Liang Bua (Flores, Indonesia) reveal new insights into the paleoecology of *Homo floresiensis* and associated taxa South Australia, Australia

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Liang Bua, the type locality of *Homo floresiensis*, is a limestone cave located in the western part of the Indonesian island of Flores. The site's relatively continuous stratigraphic sequence spans the past ~190 ka and contains ~275,000 taxonomically identifiable vertebrate skeletal elements, ~80% of which belong to murine rodent taxa (i.e., rats). Six described genera are present at Liang Bua (*Papagomys*, *Spelaeomys*, *Hooijeromys*, *Komodomys*, *Paulamys*, and *Rattus*), one of which, *Hooijeromys*, is newly recorded in the site's deposits, being previously known only from Early to Middle Pleistocene sites in central Flores. Measurements of the proximal femur (n = 10,212) and distal humerus (n = 1,186) indicate five rat body size classes ranging from small (mouse-sized) to giant (common rabbit-sized) are present. The proportions of these five classes across successive stratigraphic units reveal two major changes in rat body size distribution due to significant shifts in the abundances of more open-habitat-adapted medium-sized rats versus more closed-habitat-adapted smaller-sized ones. One of these changes suggests a modest increase in available open habitats occurred ~3 ka ago, likely the result of anthropogenic changes to the landscape related to farming by modern human populations. The other and more significant change occurred ~60 ka and suggests a rapid shift from more open habitats to more closed conditions at this time. These data suggest that the abrupt reduction of medium-sized rats, along with the disappearance of *H. floresiensis*, *Stegodon florensis insularis* (an extinct proboscidean), *Varanus komodoensis* (Komodo dragon), *Leptoptilos robustus* (giant marabou stork), and Trigonoceps sp. (vulture) at Liang Bua ~60-50 ka ago, is likely the consequence of these animals preferring and tracking more open habitats to elsewhere on the island. If correct, then the precise timing and nature of the extinction of *H. floresiensis* and its contemporaries must await new discoveries at Liang Bua or other as yet unexcavated sites on Flores.

Moche mobility and isotopic Inconsistencies: Taking on research challenges with various methods

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Dr. Christine White's bioarchaeological research across Central America combines anthropological questions with the scientific analysis of human remains, framed by knowledge of the historical and geographical context. She has established her authority as a leading investigator of ancient human mobility using oxygen isotopes to explore social complexity and urbanism in the past. This has been demonstrated not only through her published scholarship, but also her training of students and collaborations with colleagues to advance methods and develop new regional studies. One of these avenues is the use of multi-isotope tracers as proxies for lifetime mobility using early and later forming

tissues, such as human tooth and bone. Huacas de Moche, Peru (AD 100-800) is an ideal archaeological complex to test this investigatory approach, where human sacrifices and interregional interactions are expected to show patterned isotopic variability. However, the carbonate-oxygen, phosphate-oxygen, and strontium isotope ratios from the same paired tissues do not all produce data that support the same interpretations about individual life histories. Several individuals are possible "foreigners" using one data set, but identified as locals using another. Results indicate that isotopes may not always yield consistent information. More robust interpretations require us to test research parameters and validity of data and consider the influence of regional environmental conditions, preservation, and the resolution of different isotopic variables.

Case studies and colonies

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As two PhD recipients (circa 1999 and 2017) who have emerged from Larry Sawchuk's decades of graduate mentorship, we pause to reflect on the many lessons learned. While Larry is an established researcher, he continues to be a life learner, embracing the challenges, the gaps and limitations, which come associated with historically-entrenched population research. Because Larry aims to elevate scholarship, he instills in his students the virtues of seeking assistance from community members and collaborating with scholars from diverse disciplines to broaden cultural knowledge, theoretical perspectives, and statistical analyses. Larry never loses sight of what it means to be an anthropologist, the need to, first and foremost, incorporate a holistic perspective in research. Numbers and statistics on their own are meaningless without a broad understanding of culture and society. A second point of emphasis is the case study methodology that underpins Larry's anthropological fieldwork, an approach made evident by decades of careful, detailed, and intensive research. Larry's high standards in work ethic and scholarship guide his expectation that his graduate students, even the most junior, will dive into 'the deep end' of manuscript writing and article submission. By providing limited but necessary guidance, Larry's students have always been afforded opportunities to develop important skills in academic publishing early on in their careers, joining in on various research projects and learning how to work collaboratively and constructively. To enrich this whole process, Larry has maintained a long tradition of bringing his graduate students to the field, whether that be Gibraltar or Malta, invaluable experiences that have had real, tangible influences on the development of our graduate and research careers.

Social identities in Chimu Society: A bioarchaeological analysis of burials from Chayhuac Walled Complex in Chan Chan site, Peru

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This study analyzes the funerary treatment, material culture and osteological remains of 30 Chimu individuals buried in three different funerary settings within the Chayhuac Walled Complex in Chan Chan, to explore the hypothesis that these individuals were part of a singular social group that shared similar dimensions of identity. It seeks to understand why they were interred there after the original function of the Chayhuac Walled Complex ended. Chan Chan was the capital of the highly hierarchical Chimu polity, which arose in the North Coast of Peru around 900 A.D. and was conquered by the Inca Empire in 1470 A.D. Chimu funerary practices show a tendency towards standardized practices and present some sacrificial contexts. The biological characteristics of the Chimu individuals buried in Chan Chan are still not clear, given that they are usually represented by a small number of individuals and most of the data is contained in unpublished reports. This research uses the framework of identity studies in Bioarchaeology, grounded in Gender Archaeology and Social Memory approaches. The results suggest

that these individuals shared a unique set of identities and that their interment was related to their collective identities, the importance of the monument, and the construction of communal memory. The study places the new data obtained in a broader context of Chimu and Andean funerary practices, and ultimately sheds new light onto the Chimu social world.

Middle and Upper Paleolithic lithic technology at Riparo Bombrini (Liguria, Italy)

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This paper presents an overview of the ongoing SSHRC-funded research on the Ligurian Middle-Upper Paleolithic site of Riparo Bombrini from 2002 to 2018 as well as the preliminary results of a comparative study of Mousterian and Proto- Aurignacian lithic technology. The site is a collapsed rockshelter in the Balzi Rossi site complex and is interesting in part for having yielded closely-dated Mousterian and proto-Aurignacian levels. Abundant lithic artifacts, faunal remains, marine shells, ochre and personal ornaments have been recovered at the site, which provides material to assess the degree of behavioral differences between the last Neanderthals and the first Homo sapiens in this part of the world. As well, it has been possible to reconstruct the paleoenvironmental framework of this transition, which allows us to place shifts in Paleolithic population dynamics and raw material procurement patterns in their broader context. As concerns Riparo Bombrini's lithic record, we present here preliminary results of a comparative analysis of the late Mousterian and the Proto-Aurignacian assemblages recovered in 2017. Its originality lies in the fact that a single analytical protocol was used to document the assemblages, allowing us to directly highlight and quantify similarities and differences in typology, fragmentation, alterations, artifact dimensions and lithology across both archaeological "cultures". These data complement more traditional techno-typological descriptors that help us highlight the characteristics of the Mousterian and the Proto-Aurignacian, to test the hypothesis that the two attest to fundamental behavioral differences between Neanderthals and modern humans. We conclude with a discussion to offer an explanation of the different patterns of behavior and to integrate this new analysis within the results of previous lithic analyses at Riparo Bombrini.

No services, City of Toronto creating a hookah by-law: Toronto's recent policy experience

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Policy Issue/Context: In 2013, Toronto explored whether it could join Vancouver in addressing health harms from hookah smoking through prohibition. Policy approaches required careful consideration given Toronto's increasing prevalence of youth hookah smoking, large number of hookah establishments and communities for whom hookah use is a social and cultural practice. Background research: Independent air quality measurements in Toronto hookah establishments (by Ontario Tobacco Research Unit), confirmed significant health risks of hookah smoking and second- hand smoke exposure (for patrons and employees), strengthening the case for prohibition. Toronto Public Health (TPH) reviewed policy and legislative approaches to regulating hookah use. We assessed the nature of hookah businesses; most are licensed as food or entertainment establishments, a minority offer hookah smoking as their main business activity. Further, TPH consulted many stakeholders, including businesses, patrons, researchers and cultural organizations. Analysis: Consultations indicated mixed views on prohibition; business owners were particularly concerned about economic impacts. There was low public and stakeholder awareness of the health harms from hookah smoking. TPH identified prohibition through the City's licensing bylaw, supported by a public education strategy, as the most effective and health protective way to address this

issue. Outcomes: In 2015, Toronto City Council voted to prohibit hookah use at all licensed establishments in Toronto with implementation on April 1, 2016. Health organizations and youth advocates were influential in championing the by-law through deputations at City of Toronto Committee meetings. Four businesses unsuccessfully challenged Toronto's authority to pass the by-law. Once all appeal periods expired mid-2017, progressive enforcement was added to existing targeted education efforts, resulting to date in one-third fewer businesses offering hookah. Implications: Toronto's experience provides data to evaluate effectiveness of local strategies and to inform anticipated provincial regulatory change. This public health initiative illustrates the need for thorough consultation and broad data on local context to gain approval for and effective implementation of protective health policies.

Challenges and opportunities: Bony labyrinth shape quantification

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The bony labyrinth acts as a hard case surrounding the membranous labyrinth, the soft organs and fluid of the inner ear responsible for detecting sound and motion during life. After death, and these organs have decayed, the bony labyrinth is a continuous, curved, hollow space within the petrous portion of the temporal bone. This structure is composed of the cochlea, vestibule, and three semicircular canals whose shape is thought to closely correspond with their function. Additionally, the bony labyrinth is as adult shape and size by 19 weeks gestation and has been found to experience relatively low osteon turnover compared to the rest of the skeleton. The close relationship between structure and function as well as unique ontogeny in the bony labyrinth makes it a good opportunity to study sensory and locomotor evolution in humans. However, early analysis of labyrinthine shape relied on destructive methods, primarily dissection, due to the structure's location within the cranial base. Despite obvious drawbacks, dissection still led to the discovery of several inner ear pathologies. In the past 30 years, computed tomographic (CT) advances have provided the opportunity to visualize the structure digitally in three dimensions, but the complex shape of the bony labyrinth has continued to make quantifying its form challenging. Initial CT-based shape analysis focused on linear measurements and angles, but Geometric Morphometrics and other processing tools more completely capture the complex three-dimensional shape of the labyrinth in greater detail. Here, we describe how the process of segmenting the volume of the bony labyrinth from the cranium can facilitate the collection of linear and angular measurements, as well as landmark data. We also show how shape analyses of the bony labyrinth midline can facilitate comparisons between groups of samples scanned at different resolutions and on different scanners. In conclusion, the combination of CT and 3D Geometric Morphometric tools allows us to identify subtle, yet significant differences in a unique region of the cranium.

Creating a free Massive Open Online Course (MOOC) in Bioarchaeology: Reflections on two years of experience with "Osteoarchaeology: The Truth in Our Bones"

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Bioarchaeology, also known as human osteoarchaeology, is a topic that garners international interest but for which University education is absent, limited or unaffordable in many parts of the world. One goal of Massive Open Online Courses (MOOCs) is to provide universally available, affordable education and broaden the reach of experts in various fields. In 2016, the Faculty of Archaeology at Leiden University, The Netherlands, commissioned the creation of a MOOC in human osteoarchaeology using the online learning platform Coursera. Led by Dr. Andrea Waters-Rist, as of 2018 the course has had over 15,000 enrollments with over 10,000 classified as active participants indicating the completion of at least some of

the online assignments. Organized into five main "weekly" themes covering osteobiography (sex, age-at-death, and stature estimation), paleopathology, paleodiet, mobility and migration, and activity reconstruction, the course is free for anyone to take irrespective of educational background and location. Each "weekly" theme consists of five to seven approximately 10-minute instructional videos, often concluding with a short interview with an expert discussing an interesting case-study. The course is almost completed automated with participants required to complete multiple choice tests and peer-graded short written assignments after each theme. The course re-launches every month and users may proceed at their own pace. The amount of time needed to create this MOOC is estimated to have equaled a full-year University course, which far exceeded expectations, however the overall reach of the course, as well as the positive user experience (review score of 4.7/5.0), speaks its impact. Users consistently comment that they gained a lot of knowledge and are now keen to keep up on bioarchaeology research thereby improving understanding and support for our field.

Food insecurity during pregnancy among women who attend a pregnancy support program in Hamilton, ON from the perspective of public health workers

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We are facing a health crisis related to chronic diseases and many of the risk factors begin in the earliest life stages. Nutrition before conception and during pregnancy has been linked to long-term health outcomes and is called the Developmental Origins of Health and Disease (DOHaD). Two focus group interviews with public health workers who run a pregnancy support program (Welcome Baby) around Hamilton, ON were conducted as part of a study called Mothers to Babies that seeks to support health and nutrition in Hamilton during the preconception and prenatal period. Using NVivo (v12) software and a thematic analytical approach, we structured main themes emerging from the transcripts of these interviews. Food insecurity emerged as a global theme and was operationalized as inadequate access to appropriate food to support a healthy and active life. Key thematic connections include: hunger and nutritional inadequacy as an individual and community-wide problem; structural determinants such as housing instability, poverty and inadequate government support driving food insecurity; and family-level social factors contributing to impacts of food insecurity on pregnant women. Many of the women who attend Welcome Baby in Hamilton have insufficient supports to address their food and nutrition needs as the financial, social, and structural determinants of food security often present barriers to mobilizing the knowledge or resources available to them. Food insecurity has a number of adverse health consequences that can be magnified during pregnancy, resulting in poor long-term health outcomes and increased chronic disease risk for both mother and developing infant. A community-centered approach is the first step at uncovering the specific and localized early risk factors for chronic disease expression.

"What You Get Is How You Do It": Exploring the mother-infant Nexus at Kellis 2 Cemetery

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Good bioarchaeological research involves sustained fieldwork and integrated knowledge of relationships among biological, environmental and social impacts, generating vivid and authentic data which render situations three- dimensional. This dynamic approach, more strategically stated by Dr. Christine White as

"what you get is how you do it", has served us well over our years of study in the Kellis 2 Cemetery in Dakhleh Oasis, Egypt, specifically when encountering broad social questions related to maternal and infant morbidity and mortality in this early Romano- Christian community (AD 50-450). Even though breast-fed, infants living in communities with adequate food access experience a period of particularly high health risks during periods of complementary feeding between 6 and 36 months. The most vulnerable of these children die during this period characterized as the "valley of death", which represents both a biological and cultural reality. Those who survive are the "vulnerable survivors". Using the Kellis 2 cemetery sample, we questioned the effects of the biological and cultural disruptions occurring within the mother- infant nexus during this critical period of physiological adjustment. Maternal, fetal, and infant (N=210) δ13C and δ15N profiles were produced from dentin and bone collagen and hair to evaluate adverse biological factors simultaneously present during pregnancy, weaning and illness. Our results indicate that, within this valley of death at Kellis, there are three situations in which feeding practices and health interact within the mother-infant nexus: 1) the mother's ability to meet the nutritional demands of their infants during prolonged breastfeeding, 2) undernutrition as a result of exposure to a health insult, such as infection or gastrointestinal distress, at a time when the child is losing passive immunity received from the mother, and 3) children being weaned on foods without adequate protein quality and content at a time when the child may already be undernourished. The findings of this study suggest that risks of malnutrition may start shortly after birth, and the vulnerable survivors who escape the valley of death at such a young age may be even more susceptible and predisposed to environmental stressors than previously considered.

Creating and excavating a cemetery: Experiential learning for advanced bioarchaeology

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Our poster describes a collaborative, experiential learning approach to teaching ANT 441: Advanced Bioarchaeology. We employ collaborative learning (where students work on a common task, share information, support one another and then reflect on the process), as an alternative to what can be perceived as the overemphasis on competition in an academic setting. While a number of international field schools offer practical experience in the excavation of human remains from a cemetery context for academic credit, we found most students cannot afford these field schools, and/or must work during the summer months (when excavation opportunities are offered) to support their education costs. Our cemetery project provides a low-cost alternative where participants gain the basic skills to excavate, recover and document a burial, and acquire a clear understanding of the importance of contextual information for burial interpretation. We facilitate learning by establishing the project objectives, providing associated learning tasks, and guiding the weekly cemetery project meetings. Students are given the freedom to decide the analyses needed to achieve their goal, learn to articulate their rationale in using particular methods of analysis, perform collaborative data analysis and assess the accuracy and logic of one another's contributions - becoming more experienced, independent researchers as a result. We promote the participation and learning of all group members by monitoring students' learning, managing time and resources, and checking that students are on task and engaging with the group process. The course project is divided into a series of manageable learning assessments that build on each other, and increase in complexity. We found scaffolding reduces anxiety over completion of a complex assignment, gives those who procrastinate a solid starting point, offers more opportunities for support and feedback, affords the opportunity to make mistakes in a safe environment, and provides students with a solid sense of accomplishment as they progress through the steps. Students gain critical thinking, decision making, and problem solving skills through an iterative process as new variables are introduced, and ultimately comprehend the advantages and challenges of a collaborative culture of shared responsibility.