

# Research Options Factsheet

Chelsea Meloche, Laure Spake, and Katherine L. Nichols

This factsheet pulls together nine common research options useful when working with Ancestors. For each, we provide a basic definition, a sense of the process involved, types of expected benefits, and points for further consideration. We indicate where these approaches have been used in chapters from this volume and include some additional resources that may be useful. Note that this list is not exhaustive. Meaningful consultation and collaboration with descendant communities, and their free, prior, and informed consent are essential as a first step. Methods should also be undertaken by qualified individuals and further research may be needed before projects begin.

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## OSTEOBIOGRAPHY

- Osteobiographies are the reconstructions of individuals' lives from their skeletal remains.
- *Process:* A bioarchaeologist or bioanthropologist will visually examine ancestral remains to estimate their sex, age, height, and potentially any health-related indicators of activity patterns, disease, or growth disruptions.
- *Benefit of this approach:* Minimally invasive but non-destructive physical (or digital, see below) examination of ancestral remains. They can tell us about Ancestors in accessible ways, particularly when contextualized with ancestral belongings.
- *For deeper consideration:* Depending on the preservation of the ancestral remains, not all traits may be possible to determine with accuracy.
- *See in this volume:* Schaepe and Rowley (Ch. 11), Forrest et al. (Ch. 12), Jacobs et al. (Ch. 14)

### Additional resources

Baadsgaard, Aubrey, Alexis T. Boutin, and Jane E. Buikstra. 2012. *Breathing New Life into the Evidence of Death: Contemporary Approaches to Bioarchaeology*. Santa Fe, NM: School for Advanced Research Press.

Schaepe, David M., Susan Rowley, Stó:lō Xyolhmet S'olhetawtxw Sq'éq'ip, Darlene Weston, and Mike Richards. 2015. *The Journey Home – Guiding Intangible Knowledge Production in the Analysis of Human Remains*.

<https://www.sfu.ca/ipinch/resources/reports/journeyhome/>.

Hebda, Richard J., Sheila Greer, and Alexander P. Mackie, eds. 2017. *Kwāḡāy Dān Ts'ínchì: Teachings from Long Ago Person Found*. Victoria, BC: Royal BC Museum.

## ARCHIVAL RESEARCH

- Archival research involves the investigation of historical documents, in tribal archives, museums, institutional archives, a Special Collections library, or other institutions. It is essential for provenance research.
- *Process*: Researchers typically contact relevant institutions. Sources include historic documents, letters, maps, photos, inventories, medical and other records, objects, and recordings.
- *Benefit of this approach*: Records are often primary sources, so direct historical data is collected.
- *For deeper consideration*: Records are sometimes incomplete, often in different formats, held in a variety of locations, or restricted. Research design and funding applications need to take these issues into account. Be aware that archival documents are sometimes personal accounts and should be evaluated accordingly.
- *See in this volume*: Aranui and Mamaku (Ch. 7), Bell and Hill (Ch. 10), Black and McCavitt (Ch. 9), Fforde et al. (Ch. 20), Nichols (Ch. 3), Forrest et al. (Ch. 12)

### Additional resources

“Archival Research Guide.” 2019. Georgia State University Library Research Guides. <https://research.library.gsu.edu/archivalresearch>

Skowronek Russell K. 2014. “Archival Research and Historical Archaeology.” In *Encyclopedia of Global Archaeology*, edited by Claire Smith. New York: Springer Online. <https://doi-org.proxy.lib.sfu.ca/10.1007/978-1-4419-0465-2>

Fforde, Cressida, Honor Keeler, Amber Aranui, Michael Pickering, and Alan Goodman. 2020. “Research for Repatriation Practice.” In *The Routledge Companion to Indigenous Repatriation: Return Reconcile Renew*, edited by Cressida Fforde, C. Timothy McKeown, and Honor Keeler, 541–563. London: Routledge.

## RADIOCARBON DATING

- Radiocarbon (C-14) or carbon dating estimates how old the Ancestors and/or their belongings are.
- *Process*: Researchers remove a sample of organic material, measure the proportion of isotopes of carbon present, and compare this against a reference standard.
- *Benefit of this approach*: This technique can establish an approximate understanding of how old ancestral remains and/or belongings are. Ancestral belongings made of a number of different materials (including bone, antler, charcoal, etc.) can be tested.
- *For deeper consideration*: This technique is generally only applicable to organic materials that are less than c. 60,000-years old. It can also be expensive to undertake and thus must be built into project budgets ahead of time.
- *See in this volume*: Schaepe and Rowley (Ch. 11)

### Additional resources

Beta Analytic Testing Laboratory. 2020. “How does Carbon Dating Work?” <https://www.radiocarbon.com/about-carbon-dating.htm>

Nash, Stephen. 2020. “The Scientific Sorcery of Radiocarbon Dating.” *SAPIENS*. <https://www.sapiens.org/column/curiosities/radiocarbon-dating-part-1/>

Wood, Rachel. 2012. “Explainer: What is Radiocarbon Dating and How Does it Work?” *The Conversation*. <http://theconversation.com/explainer-what-is-radiocarbon-dating-and-how-does-it-work-9690>

## ORAL HISTORY INTERVIEWS

- Oral history interviews are used to gather community knowledge around a site, person, event, or time. The telling of these histories promotes counter-colonial remembering and cross-cultural understanding. Often essential to community-based projects, they can supplement findings and inform interpretations.
- *Process:* Researchers conduct open-ended or semi-structured (guided by questions but not set in stone) interviews with community members. Interview participants tend to be identified by community partners.
- *Benefit of this approach:* Interviews ensure community perspectives are valued.
- *For deeper consideration:* Oral histories may or may not align with findings from other approaches. Interviews will typically require ethical review by both partner communities and institutional review boards. Honoraria, transcription procedures and costs, and analyses should all be built into project and funding plans.
- *See in this volume:* Bell and Hill (Ch. 10), Jacobs et al. (Ch. 14), Nichols (Ch. 3), Schaepe and Rowley (Ch. 11)

### Additional resources

Denzin, Norman K., Yvonna S. Lincoln, and Linda Tuhiwai Smith, eds. 2014. *Handbook of Critical and Indigenous Methods*. Thousand Oaks, CA: SAGE Publications, Inc.

Scott, Greg, and Roberta Garner. 2013. *Doing Qualitative Research: Designs, Methods, and Techniques*. New York: Pearson.

## DIGITAL RECORDING OR SCANNING

- 3-D scanning, photogrammetry, and computed tomography (CT) scans can be used to create digital models of ancestral remains to be used for analyses and examination (e.g., to construct an Osteobiography).
- *Process:* Researchers/Technicians use the selected method to scan ancestral remains (and/or belongings too). Digital images can then be examined at high resolutions to complete non-invasive analyses.
- *Benefit of this approach:* Minimally invasive and non-destructive approach. Features or graves can be scanned in the field to preserve positioning information. Scans can be stored for future use after reburial.
- *For deeper consideration:* Data management and storage can be complicated by funding issues; access and ownership stipulations should be decided early.
- *See in this volume:* Spake et al. (Ch. 16)

### Additional resources

Errickson, David, and Tim Thompson. 2017. *Human Remains, Another Dimension: The Application of Imaging to the Study of Human Remains*. Cambridge, MA: Academic Press.

Novotny, Anna C. 2019. "Implementing Photogrammetry in Three Bioarchaeological Contexts: Steps for In-field Documentation." *Advances in Archaeological Practice* 7, no. 1: 87-96.

Wrobel, Gabriel D., Jack A. Biggs, and Amy L. Hair. 2019. "Digital Modeling for Bioarchaeologists." *Advances in Archaeological Practice* 7, no.1: 47-54.

## NON-DESTRUCTIVE SURVEY METHODS

- Non-destructive survey and scanning methods help to identify sites or anomalies from a distance and prior to excavation.
- *Process:* Researchers can use remote sensing technologies (e.g., aerial photography, satellite imaging, LiDAR) to survey large areas. Electromagnetic methods like Ground Penetrating Radar (GPR) and Electromagnetic Ground Conductivity (EM38) can help with subsurface mapping.
- *Benefit of this approach:* These methods can survey large or small areas to identify objects or anomalies on the landscape. They can also help identify high-potential areas for excavation.
- *For deeper consideration:* These methods can be quite expensive, so these costs need to be built into project budgets. There are many types of electromagnetic equipment, some can be easily carried and are suitable for uneven and irregular terrain, while others need to be pushed on a cart, requiring level and smooth areas. Time should be allotted to set up grids in advance.
- *See in this volume:* Nichols (Ch. 3), Simons et al. (Ch. 1), Supernant (Ch. 19)

### Additional resources

- Conyers Lawrence B. 2013. *Ground Penetrating Radar for Archaeology*, 3<sup>rd</sup> ed. Lanham, MD: AltaMira.
- Killam, Edward W. 2004. *The Detection of Human Remains*, 2<sup>nd</sup> ed. Springfield, IL: Charles C. Thomas.
- Solla, Mercedes, Belén Riveiro, Marcos X. Álvarez, and Pedro Arias. 2012. “Experimental Forensic Scenes for the Characterization of Ground-Penetrating Radar Wave Response.” *Forensic Science International* 220: 50-58.

## ANCIENT DNA (aDNA)

- Ancient DNA (aDNA) involves the study of DNA extracted from Ancestors, animals, and plant remains.
- *Process:* aDNA researchers remove a small sample from a bone or tooth to extract DNA. Methodological improvements continue to reduce the amount of material.
- *Benefit of this approach:* aDNA can provide information on the biological sex of an Ancestor, diseases that may have been present, past diets, track ancestral lineages, and potentially even link Ancestors to living descendants.
- *For deeper consideration:* aDNA work is ethically complicated and can have very real and potentially negative impacts on living communities. The use of DNA as primary or sole evidence in identity-based claims (i.e., repatriation or land claims) can be problematic. Questions of permissions and access (i.e., who speaks for the Ancestors) need to be carefully considered. Co-operative agreements that clearly identify who controls the intellectual property rights are essential to protect community rights.
- *See in this volume:* Bader et al. (Ch. 13), Walker (Ch. 19)

### Additional resources

Bardill, Jessica, Alyssa C. Bader, Garrison Nanibaa’ A, Deborah A. Bolnick, Jennifer A. Raff, Alexa Walker, and Ripan S. Malhi. 2018. “Advancing the Ethics of Paleogenomics.” *Science* 360, no. 6387: 384–385.

Summer internship for INdigenous peoples in Genomics (SING) Consortium.

<https://www.singconsortium.org/>

Walker, Alexa, George Nicholas, Daryl Pullman, Alan Goodman, and the Bioarchaeology and Genetics Working Group. 2014. “Ancient DNA (aDNA): What is It? Why is it Important?”

[http://www.sfu.ca/ipinch/sites/default/files/resources/fact\\_sheets/](http://www.sfu.ca/ipinch/sites/default/files/resources/fact_sheets/)

## STABLE ISOTOPE ANALYSIS

- Stable isotope analysis examines the levels of different isotopes, including carbon, nitrogen, strontium, sulfur, and others, to investigate questions related to diet and mobility patterns of humans and animals in the past.
- *Process:* Researchers remove a small sample from bones, teeth, or hair and measure the levels of different isotopes to compare against known baselines.
- *Benefit of this approach:* This technique can give direct insight into the types of food that Ancestors ate and how they moved around in the past. Very small amounts of material are necessary, but the investigation of multiple isotopes may require more.
- *For deeper consideration:* This technique is destructive and requires a sample of organic material, like bone, teeth, or hair (but these can come from non-human sources like animals found with Ancestors). Use of isotope analysis for provenancing can be problematic (see Fforde et al 2020 and Ch. 20 in this volume).
- *See in this volume:* Glencross et al. (Ch. 15), Forrest et al. (Ch. 12), Fforde et al. (Ch. 20)

### Additional resources

Cheung, Christina. 2019. "Why Did Chinese Farmers Switch to Wheat?" *Sapiens* November 19, 2019. <https://www.sapiens.org/archaeology/chinese-farmers/>

Fforde, Cressida, Honor Keeler, Amber Aranui, Michael Pickering, and Alan Goodman. 2020. "Research for Repatriation Practice." In *The Routledge Companion to Indigenous Repatriation: Return Reconcile Renew*, edited by Cressida Fforde, C. Timothy McKeown, and Honor Keeler, 541–563. London: Routledge.

Lee-Thorp, Julia. 2009. "On Isotopes and Old Bones." *Archaeometry* 50, no. 6: 925–950.

Montgomery, Janet. 2010. "Passports from the Past: Investigating Human Dispersals Using Strontium Isotope Analysis of Tooth Enamel." *Annals of Human Biology* 37(3): 325.

Nehlich, Olaf. 2015. "The Application of Sulphur Isotope Analyses in Archaeological Research: A Review." *Earth-Science Reviews* 124: 1–17.

## PALEOPROTEOMICS

- Paleoproteomics is the analysis of proteins present in ancient biological materials. It is similar in concept to aDNA but investigates amino acids rather than nucleic acids. The data is handled in a similar way as aDNA data.
- *Process:* Researchers use small samples of bone, ivory, or skin to identify different animal species (using Zooarchaeology by Mass Spectrometry [ZooMS]). Proteins can also be analyzed in the dental calculus of Ancestors to examine their health and diets.
- *Benefit of this approach:* Amino acids can preserve better than nucleic acids meaning that paleoproteomic analysis may be possible when aDNA analysis is not.
- *For deeper consideration:* This approach is very new, and some analytical problems remain. Unlike aDNA, paleoproteomics does not identify lineages.

### Additional resources

Buckley, Michael. 2018. "Paleoproteomics: An Introduction to the Analysis of Ancient Proteins by Soft Ionisation Mass Spectrometry." In *Paleogenomics: Genome-Scale Analysis of Ancient DNA*, edited by C. Lindqvist and O. Rajora, 31-52. New York: Springer.

Krakowka, Kathryn. 2018. "Science Notes – Pondering the Possibilities of Proteomics." *Current Archaeology*, March 28, 2018. <https://www.archaeology.co.uk/>

Tarlach, Gemma. 2018. "Paleoproteomics Lets Researchers Study the Past Anew." *Discover*, January 3, 2018.