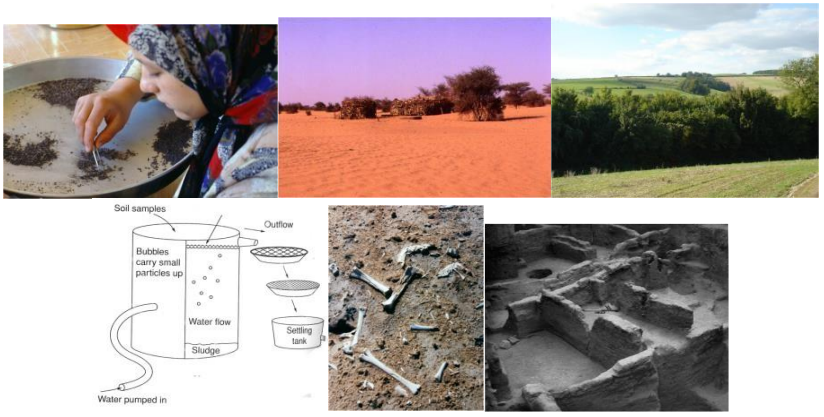
UCL Institute of Archaeology
2023-24

ARCL 0129:
Environmental Archaeology in Practice



MSc Core Course, 15 credits

Deadlines for coursework for this course:
Friday 1st March 2024 (target return by 1st April)
Friday 5th April (return by 5th May 2024)

Please refer to the IoA Student Handbook and IoA Study Skills Guide:
https://www.ucl.ac.uk/archaeology/current-students/ioa-student-handbook
https://www.ucl.ac.uk/archaeology/current-students/ioa-study-skills-guide
for instructions on coursework submission, IoA referencing guidelines and marking criteria, as well as UCL policies on penalties for late submission.

Course Co-ordinator: Louise Martin Room 303, Institute of Archaeology
Email: louise.martin@ucl.ac.uk
Office hours: Wednesdays 11-12noon in person, and by appointment for online
PGTA: Anna den Hollander, Room 306 IoA

1. MODULE OVERVIEW

Module description

This module introduces students to the major methods and approaches of current practices of environmental archaeology, through lectures and seminar discussions. Topics covered include introductions to site formation processes, dating techniques, sampling strategies, quantification of data-sets, applicability of biomolecular approaches, and analysis and interpretation in archaeobotany, geoarchaeology and zooarchaeology. The module also introduces discussion of environmental archaeology in commercial projects.

Module Aims

The principal aims of this core course are to develop a working knowledge of key methods in data analysis for environmental archaeology, including dating and the analysis of radiocarbon calibration, sampling strategies on-site and off-site, quantification of biological datasets, and approaches to statistical analysis. Problems in taphonomy of environmental datasets will also be introduced. This course is intended to provide the theoretical and analytical grounding for practical projects in zooarchaeology, archaeobotany and geoarchaeology

Module objectives

On successful completion of this course a student should:

- Have an overview of current on- and off-site environmental archaeology practices, specifically in relation to archaeobotany, zooarchaeology and geoarchaeology.
- Be familiar with assessing site formation processes, and assessing appropriate sampling and retrieval methods.
- Be aware of issues in the application and interpretation of dating techniques.
- Be familiar with laboratory analytical approaches for assessing taphonomy, and potential for assemblage analysis.
- Be familiar with approaches to quantification of environmental archaeology assemblages.
- Be familiar with assessing a range of material for their analysis potential, and assessing datasets for their interpretation potential.

Learning Outcomes

1) Critical analysis of arguments; verbal discussion skills;
2) Understanding of assessment of site formation processes;
3) Understanding of practical archaeobotanical, zooarchaeological and geoarchaeological sampling, assessment and analytical procedures;
4) Understanding how environmental archaeological data is created;
5) Written and oral skills in analysis and presentation;
6) Application of acquired knowledge to new situations.

Methods of Assessment

This module is assessed by 2 assignments:

1) Quantification Assignment (1000 words) 40%
2) Essay (2000 words) 60%

Communications

- **Moodle is the main hub** for this course.
- Important information will be posted by staff in the **Announcements section of the Moodle page** and you will automatically receive an email notification for these.
- Please post any general queries relating to module content, assessments and administration in the Moodle Q&A or via email if you prefer).
- For personal queries, please contact the co-ordinator by email.

ARCL0129: Term 2 Timetable 2023-24

Lectures/Seminars: Wednesdays 9-11am, Room 410, IoA

Week	Date	Topic	Lecturers
1	10 Jan	Course introduction; Site formation processes & on-site sampling strategies	LM
2	17 Jan	Analysing and interpreting crop processing	DF
3	24 Jan	Landscapes, soil-scapes & geoarchaeology	MAK
4	31 Jan	Sampling & quantification of fossil samples (archaeobotanical macro/micro, zooarchaeological, geoarchaeological)	LM
5	7 Feb	Quantification seminar and Q&A; data presentation in environmental archaeology	LM
6	14 Feb	READING WEEK	
7	21 Feb	Analysing and interpreting zooarchaeological signatures (prey size, transport, production/consumption, BSMs)	LM
8	28 Feb	Biomolecular approaches to environmental archaeology: stable isotopes, proteins, lipids and aDNA	RS
9	6 March	Dating methods: typology, sequencing, radiocarbon, calibration of 14C, OSL, Bayesian modelling	DF
10	13 March	Environmental archaeology in commercial projects	SW
11	20 March	The Anthropocene	DF

*Environmental processing day at Archaeology South East (ASE) to be scheduled around student timetables.

Course teachers

MAK - Manuel Arroyo-Kalin (IoA) (sabbatical from January 2023)
DF – Dorian Fuller (IoA)
LM – Louise Martin (IoA)
RS – Rhiannon Stevens (IoA)
SW – Sylvia Warman (Historic England, South West)

Weekly Module Plan

The module is taught through lectures and seminars (Term 2, Wednesdays 9-11am). Students will be required to undertake set readings in advance in order to be able to actively participate in discussion, and undertake some (non-assessed) activities during classes.

Workload

This is a 15 credit module which equates to 150 hours of learning time including session preparation, background reading, and researching and writing your assignments. With that in mind you should expect to organise your time in roughly this way:

20 hours	Staff-led teaching sessions (face-to-face lectures, seminars, tutorials, discussion-board sessions)
60 hours	Self-guided session preparation (reading, processing pre-recorded material, other online and/or offline activities), about 6 hours a week
30 hours	Data analysis, reading for, and writing, Assessment 1
40 hours	Reading for, and writing, Assessment 2

2. ASSESSMENT

Each assignment and possible approaches to it will be discussed in class, in advance of the submission deadline. If students are unclear about the nature of an assignment, they should discuss this with the module co-ordinator in advance (via office hours or class Moodle forum). You will receive feedback on your written coursework via Moodle, and have the opportunity to discuss your marks and feedback with the co-ordinator in their office hours.

For more details see the 'Assessment' section on Moodle. The IoA marking criteria can be found in the IoA Student Handbook (Section 12: Information on assessment). The IoA Study Skills Guide provides useful guidance on writing different types of assignment. For **penalties for late submission** see UCL guidance on penalties (Academic Manual Chapter 4 Section 3.12).

Assessment 1

Quantification Assignment, 1000 words, 40%,
Submission deadline Friday 1st March 2024

You will be given datasheets, a stratigraphic section and full explanation of the exercises for this assignment, which is aimed to assess the teaching and learning of the archaeobotanical and zooarchaeological approaches to quantification, and the geoarchaeological depositional context.

Assessment 2

Essay, 2000 words, 60%
Submission deadline Friday 5th April 2024

The essay is based around either a single archaeological case study, two contrasting case-studies, or an investigated archaeological landscape. Overall, there must be geoarchaeological, archaeobotanical and zooarchaeological data to evaluate to answer the Essay question:

Essay question: ***Evaluate the sampling strategy, quantification, presentation and interpretation of zooarchaeological, archaeobotanical and geoarchaeological data, in relation to the research aims of the project.***

For the essay you are specifically asked to assess: Did the project have research objectives (in relation to the zooarchaeology, archaeobotany, geoarchaeology)? Were site formation processes/taphonomy investigated? Was dating undertaken and taken into account in the analyses of assemblages? How was material selected/sampled for study? Is retrieval, collection well detailed? Was there a sampling strategy described? Were sample sizes sufficient? How was quantification undertaken? Is raw data presented? Are data patterns presented well, visually, and easily understandable? Are interpretations made valid? Are research questions addressed? Please use reading/sources from each course topic in your evaluation and critique.

A list of case studies that are a suitable focus for the essay will be circulated before reading week. Students are welcome to select their own but should consult with the course coordinator before starting to work on it.

3. RESOURCES AND PREPARATION FOR CLASS

Preparation for class

You are expected to read the **Essential Readings** in advance of lecture/seminars each week, **and a selection of the recommended readings in your own time**. Completing the readings is essential for your effective participation in the activities and discussions that we will do, and it will greatly enhance your understanding of the material covered. **Further readings are provided via the Online Reading List** for you to get a sense of the range of current work on a given topic and for you to draw upon for your assessments. The online reading list is accessible through the Moodle page of the module, or directly here:
https://ucl.rl.talis.com/modules/arcl0129.html

Recommended basic texts and online resources

Banning, E. A. (2000) *The Archaeologist's laboratory. The Analysis of Archaeological Data.* Springer/Kluwer

Branch, N, Canti, M, Clarck, P, Turney C. (2005). *Environmental Archaeology: Theoretical and Practical Approaches*. London: Hodder Arnold

O'Connor, T & Evans, J. (2005). *Environmental archaeology: principles and methods*. Stroud : Sutton. INST ARCH BB 6 [NB this is available as an ebook in IoA library 2021]

Wilkinson, K. and Stevens, C. (2003). *Environmental Archaeology. Approaches, Techniques & Applications.* Tempus, Stroud.

Also see UK national guidelines on environmental archaeology:

https://historicengland.org.uk/images-books/publications/environmental-archaeology2nd/environmental_archaeology/

4. SYLLABUS & WEEKLY READING LIST

Week 1: Course introduction; site formation processes, sampling (LM)

https://historicengland.org.uk/advice/technical-advice/archaeological-science/environmental-archaeology/

https://historicengland.org.uk/images-books/publications/environmental-archaeology-2nd/environmental_archaeology/

Week 2 Analysing and interpreting crop processing (DF)

The session introduces some of the main analytical approaches applied to archaeobotanical datasets, which inform on cereal crop production and consumption practices, crop husbandry and management practices, and the stages of crop processing. Discussion also focuses on how different plants and plant parts enter the archaeological record.

Essential:

Hillman, G. C. (1981). Reconstructing Crop Husbandry Practices from Charred Remains of Crops, in *Farming Practice in British Prehistory* (R. Mercer ed.), pp. 123-161. Edinburgh: University Press.

Or alternatively:

Hillman, G. (1984). Interpretation of archaeological plant remains: The application of ethnographic model from Turkey, in *Plants and Ancient Man: studies in palaeoethnobotany* (W. van Zeist and W. Casparie eds.), pp. 1-41. Rotterdam: Balkema [INST ARCH BB 5 VAN; with 1 copy at issue desk]

Harvey, E. and Fuller, D. Q. (2005). Investigating crop processing through phytolith analysis: the case of rice and millets. *Journal of Archaeological Science* 32, 739-752

Jones, G. E. M. (1987). A statistical approach to the archaeological identification of crop processing, *Journal of Archaeological Science* 14: 311-323

Stevens, C. J. (2003) An investigation of consumption and production models for prehistoric and Roman Britain, *Environmental Archaeology*, 8, 2003, 61-76

Additional reading:

Fuller, Dorian Q & Chris J. Stevens (2009). Agriculture and the development of complex societies. In A. Fairbairn & Ehud Weiss (eds). *From Foragers to Farmers. Papers in Honour of Gordon C. Hillman*. Oxbow Books, Oxford. Pp. 37-57.

Reddy, Seetha N. (1997). If the threshing floor could talk: integration of agriculture and pastoralism during the Late Harappan in Gujarat, India, *Journal of Anthropological Archaeology* 16: 162-187 [INST ARCH PERS; also available on-line]

Jones, G. E. M. (1984). Interpretation of archaeological plant remains: Ethnographic models from Greece, pp. 42-61 in W. Van Ziest and W. A. Casparie (eds.) *Plants and Ancient Man - Studies in Paleoethnobotany*. Rotterdam: A.A. Balkema.

Jones, Martin K. (1985). Archaeobotany beyond subsistence reconstruction, in *Beyond Domestication in Prehistoric Europe* (G. W. Barker and C. Gamble eds.), pp. 107-128. New York: Academic Press [ISSUE DESK IOA BAR 2]

Van der Veen, Marike 1992. *Crop Husbandry Regimes*. Sheffield Archaeological Monographs. Chap 7. [INST ARCH DAA 100 VAN]

Van der Veen, Marike and G. E. M. Jones (2006) A re-analysis of agricultural production and consumption: implications for understanding the British Iron Age, *Vegetation History and Archaeobotany* 15(3): 217-228 [download through www.springerlink.com]

Wilkinson, K. and Stevens, C. J. (2003). *Environmental Archaeology. Approaches, Techniques, Applications*. Tempus. Pp. 136-167, 175-208

Dung vs. Crop-processing Waste

Miller, N. and T. L. Smart (1984). Intentional burning of dung as fuel: a mechanism for the incorporation of charred seeds into the archaeological record, *Journal of Ethnobiology* 4: 15-28 [INST ARCH PERS]

Miller, Naomi F. (1996) Seed eaters of the ancient Near East: Human or Herbivore?, *Current Anthropology* 37(3): 52 1-528

Hillman, G. C., A. J. Legge and P. A. Rowley-Conwy (1997). On the charred seeds from Epipalaeolithic Abu Hureyra, *Current Anthropology* 3 8(4): 651-655

Charles, M. (1998). Fodder from Dung: the Recognition and Interpretation of Dung Derived Plant Material from Archaeological Sites, *Environmental Archaeology* 1: 111-122 [INST ARCH PERS]

Taphonomy and Plant Assemblage Formation (excluding crop-processing)

Asouti, E., and P. Austin (2005) Reconstructing woodland vegetation and its relation to human societies, based on the analysis and interpretation of archaeological wood charcoal macroremains. Environmental Archaeology 10: 1-18.

Cappers, R. (1995). A palaeoecological model for the interpretation of wild plant species, *Vegetation History and Archaeobotany* 4: 249-257

Grieg, J. (1981). The investigation of a medieval barrel-latrine from Worcester, *Journal of Archaeological Science* 8: 256-282 [Teaching Collection 1759; INST ARCH PERS]

Hastorf, C. (1991). Gender, space and food in prehistory. In: *Engendering Archaeology* (eds J. Gero & M. Conkey), pp. 132-159. Oxford: Blackwell.

Hillman, G. C. (1989). Late Palaeolithic plant foods from Wadi Kubbaniya in Upper Egypt: dietary diversity, infant weaning, and seasonality in a riverine environment, in *Foraging and Farming* (D. R. Harris and G. C. Hillman eds.), pp. 207-233. London: Unwin and Hyman [INST ARCH HA HAR, or Issue Desk IOA HAR 6]

[Alternative reading: G. Hillman, E. Madeyska and J. Hather. (1989) Wild plant foods and diet at late Palaeolithic Wadi Kubbaniya : the evidence from charred remains, in *The prehistory of Wadi Kubbaniya Vol. 2.* (Fred Wendorf, Romuald Schild and Angela E. Close eds.). Dallas, Tex. : Southern Methodist University Press: Pp. 162-242. Teaching Collection 918; EGYPTOLOGY QUARTOS E 7 WEN]

Martinoli, Daniele. (2009). Reconstruction of local woodland vegetation and use of firewood at two Epipalaeolithic cave sites in southwest Anatolia (Turkey). In A. Fairbairn & Ehud Weiss (eds). *From Foragers to Farmers. Papers in Honour of Gordon C. Hillman.* Oxbow Books, Oxford. Pp. 161-170

Mithen, S. (ed.) (2000). *Hunter-gatherer landscape archaeology : the Southern Hebrides Mesolithic project, 1988-1998*. Cambridge : McDonald Institute for Archaeological Research. [Read section on plant remains and their interpretation]

Wollstonecroft M (2002) "The Fruit of their labour: plants and plant processing at EeRb 140 (860 ± 60 uncal to 160± 50 uncal B.P.) a late prehistoric hunter-gatherer-fisher site on the southern Interior Plateau, British Columbia, Canada". Vegetation History and Archaeobotany 11: 6170

Marston, J.M. (2009) Modeling wood acquisition strategies from archaeological charcoal remains. *Journal of Archaeological Science* 36: 2192-200

Shackleton, C.M. and F. Prins (1992) Charcoal analysis and the "Principle of Least Effort" - A conceptual model. *Journal of Archaeological Science* 19: 631-637.

Zutter, C. (1999). Congruence and Concordance in Archaeobotany: Assessing Micro- and Macrobotanical Data sets from Icelandic Middens, *Journal of Archaeological Science* 26: 833844.

Week 3a: Sedimentary/soil archives and site formation processes (MAK)

All environmental archaeological enquiry needs consideration of site formation processes before sampling strategies are designed and implemented. This session discusses various considerations with off- and on-site formation processes. Specifically we review key sedimentary processes and soil forming dynamics that define the contexts studied by environmental archaeology.

Essential:

Goldberg & Macphail (2006) *Practical & Theoretical Geoarchaeology*. Oxford: Blackwell Science. Chapters 3-7

Gladfelter, Bruce G. (1977). "Geoarchaeology: The Geomorphologist and Archaeology." *American Antiquity* 42 (4):519-538

Karkanas & Golberg (2017) *Reconstructing Archaeological Sites*. Chichester: John Wiley & sons. Chapter 2

Also see this online resource:

English Heritage (2004). *Geoarchaeology: Using earth sciences to understand the archaeological record*. Swindon: English Heritage Publications.

Recommended:

Keene, P. (1982). "The examination of exposures of Pleistocene sediments in the field: a self-paced exercise." *Journal of Geography in Higher Education* 6(2): 109-121.

Mallol C, Mentzer SM. (2017) Contacts under the lens: Perspectives on the role of microstratigraphy in archaeological research. *Archaeological and Anthropological Sciences* 9, 1645–669. (doi:10.1007/s12520-015-0288-6)

Phillips, J. D., & Lorz, C. (2008) Origins and implications of soil layering. *Earth-Science Reviews, 89*, 144-155.

Simonson, Roy W (1959) "Outline of a Generalized Theory of Soil Genesis." *Soil Science Society of America* 23 (2):152-156.

Additional:

Ferring CR. (2017) Alluvial Settings. In *Encyclopedia of Geoarchaeology* (ed AS Gilbert), pp. 4–14. Dordrecht: Springer Netherlands. (doi:10.1007/978-1-4020-4409-0_150)

French, C. A. I (2016) Colluvial settings. In AS Gilbert (ed) *Encyclopaedia of Geoarchaeology*. New York: Springer, pp. 157-170

Goudie, A. S. (2017). Eolian Settings: Sand. *Encyclopedia of Geoarchaeology*. A. S. Gilbert. Dordrecht, Springer Netherlands: 239-245.

Walkington, H. (2010). "Soil science applications in archaeological contexts: A review of key challenges." *Earth-Science Reviews* 103(3-4): 122-134.

Zárate, M. A. (2017). Eolian Settings: Loess. *Encyclopedia of Geoarchaeology*. A. S. Gilbert. Dordrecht, Springer Netherlands: 233-239.

Week 3b. Understanding the depositional context (MAK)

Designing an appropriate sampling strategy in environmental archaeology, one permitting comparison of environmental evidence through space and time, depends

on our ability to sequence: develop a sequence of contexts. In this session we will examine some of the key challenges that arise in developing sequences for environmental archaeological research.

Essential:

Dempsey EC, Mandel RD. (2017) Living Surfaces. In *Encyclopedia of Geoarchaeology* (ed AS Gilbert), pp. 486–492. Dordrecht: Springer Netherlands. (doi:10.1007/978-1-4020-4409-0_136)

Goldberg, P. & MacPhail, R. (2006) *Practical & Theoretical Geoarchaeology*. Oxford: Blackwell Science. Chapters 8, 10 and 11

Karkanas, P. & Goldberg, P. (2018) *Reconstructing Archaeological Sites*. Chichester: John Wiley & sons. Chapter 1

Week 4/5: Sampling and Quantification of fossil samples (archaeobotanical macro/micro, zooarchaeological, geoarchaeology) (LM)

Sampling and quantification are essential aspects of the study of fossil assemblages in environmental archaeology. In this session, we examine different sampling strategies and review the various measures of abundance that have been used in data analysis, the latter with a view to understanding their assumptions, biases, and appropriate uses. You will also be introduced to **Assignment 1**: Quantification & Stratigraphy Assignment.

Essential:

Orton, C. (2000). *Sampling in Archaeology.* Cambridge: Cambridge University Press. Chapters 3 and 6. INST ARCH AK 10 ORT

Also see resources at:

https://historicengland.org.uk/advice/technical-advice/archaeological-science/environmental-archaeology/

Essential: Quantification

Cannon, M. (2001) Archaeofaunal Relative Abundance, Sample Size and Statistical Methods, *Journal of Archaeological Science* 28, 185-195.

Gifford-Gonzales, D., (2018). *An Introduction to Zooarchaeology*. Springer International. Cham, Switzerland. **Available online through library** (Chapter 10: Zooarchaeology's Basic Counting Units).

Jones, G. E. M. (1991). Numerical analysis in archaeobotany, In *Progress in Old World Palaeoethnobotany* (W. Van Zeist, K. Wasylikowsa, and K-E Behre eds.), p.63-.

Additional reading: Environmental Sampling

Courty, M., Paul Goldberg, Richard Macphail.(1989). *Soils and micromorphology in archaeology.* Cambridge: Cambridge University Press, 1989. [ISSUE DESK IOA COU 1]

Dobney, K., Hall, A., Kenward, H. and Milles, A. (1992). A working classification of sample types for environmental archaeology. *Circaea* 9, 24-26. INST ARCH Periodicals

French, C. A. I. (2003). *Geoarchaeology in Action: Studies in Soil Micromorphology and Landscape Evolution*. London: Routledge. Ch 4 12

Jones, Martin K. (1991). Sampling in palaeoethnobotany, in *Progress in Old World Palaeoethnobotany* (W. Van Zeist, K. Wasylikowa, and K.-H. Behre eds.), pp. 53-63. Rotterdam: Balkema

Lyman, R.L. and Ames, K. (2004) Sampling to Redundancy in Zooarchaeology: lessons from the Portland Basin, Northwestern Oregon and Southwestern Washington, *Journal of Ethnobiology*, 24/2.

Turner, A. (1984) Sub-sampling animal bone assemblages: reducing the work-load or reducing the information? *Circaea* 2/2, 69-75.

Veen, M. van der, and Fieller, N. (1982). Sampling seeds. *Journal of Archaeological Science* 9 (3) 287-298. INST ARCH Periodicals

Additional reading: Quantification

Quantification of Environmental Data Banning, E. A. (2000) The Archaeologist's laboratory. The Analysis of Archaeological Data. Springer/Kluwer, Chapters 5, 10, 11

Grayson, D.K. (1984) *Quantitative Zooarchaeology*: Topics in the analysis of Archaeological Faunas. Orlando: Academic.

Hubbard, R. N. L. B. and A. Clapham (1992). Quantifying macroscopic plant remains, *Review of Palaeobotany and Palynology* 73: 117-132

Lyman, R.L. (1994). 'Quantitative units and terminology in zooarchaeology' *American Antiquity* 59(1) pp36-71.

Lyman, R.L. (2008). *Quantitative Paleozoology*. Cambridge: Cambridge University Press.

Marshall, F. and Pilgram, T. (1993) NISP vs MNI in Quantification of Body Part Representation, *American Antiquity* 58.

Pearsall, D. (1989). *Palaeoethnobotany: a handbook of procedures*. Left Coast Press. 80. Rotterdam: Balkema [INST ARCH BB VAN, with 1 copy at issue desk]

Peres, Tanya M. (2010) 'Methodological Issues in Zooarchaeology'. *In Integrating Zooarchaeology and Paleoethnobotany: A Consideration of Issues, Methods, and Cases*, edited by Amber M. VanDerwarker and Tanya M. Peres, 15–36. New York, NY: Springer New York, 2010. https://doi.org/10.1007/978-1-4419-0935-0_2.

Reitz, E. and Wing, E. (1999). Zooarchaeology. Cambridge: Cambridge University Press.
Marean, C.W. and Spencer, L.M. 1991. 'Impact of carnivore ravaging on zooarchaeological measures of element abundance', American Antiquity 56 (4), 645-658.

VanDerwarker, Amber M. (2010) 'Correspondence Analysis and Principal Components Analysis as Methods for Integrating Archaeological Plant and Animal Remains'. In *Integrating Zooarchaeology and Paleoethnobotany: A Consideration of Issues, Methods, and Cases*, edited by Amber M. VanDerwarker and Tanya M. Peres, 75–95. New York, NY: Springer New York, 2010. https://doi.org/10.1007/978-1-4419-0935-0_5.

VanDerwarker, M. (2010) 'Simple Measures for Integrating Plant and Animal Remains'. In *Integrating Zooarchaeology and Paleoethnobotany: A Consideration of Issues, Methods, and Cases*, edited by Amber M. VanDerwarker and Tanya M. Peres, 65–74. New York, NY: Springer New York, 2010. https://doi.org/10.1007/978-1-4419-0935-0_4.13

Wright, Patti J. (2010) 'Methodological Issues in Paleoethnobotany: A Consideration of Issues, Methods, and Cases'. In *Integrating Zooarchaeology and Paleoethnobotany: A Consideration of Issues, Methods, and Cases*, edited by Amber M. VanDerwarker and Tanya M. Peres, 37–64. New York, NY: Springer New York, 2010. https://doi.org/10.1007/978-1-4419-0935-0_3

Week 6: Reading week: NO CLASS

Week 7 Analysing and interpreting zooarchaeological signatures: prey size, transport, production/consumption, bone modifications. (LM)

Zooarchaeological analyses can aid interpretations of site formation processes, through bone surface modifications and taphonomy; zooarchaeological data had also been used to discuss faunal diversity, and both human and environmental factors which affect it; in addition, body part and ageing data has been key in discussion of sites as production or consumption locations. This lecture/seminar introduces the main analytical approaches to understanding zooarchaeological signatures.

Essential:

Gifford-Gonzales, D., (2018). *An Introduction to Zooarchaeology*. Springer International. Cham, Switzerland. **Available online through library** (Chapter with excellent taphonomy coverage: 11 Bone breakage, 12 Animal action on bone, 13 Taphonomy, 14 Butchery, 15 Processing, 19 for Bone Transport, 20 for Nutritionally Driven selective bone transport, 21 Bone density)

Stiner, M.C., Munro, N.D. and Surovell, T.A., (2000). The tortoise and the hare: small-game use, the broad-spectrum revolution, and Paleolithic demography. *Current anthropology*, *41*(1), pp.39-79.

Madgwick, R. and Mulville, J., (2015). Reconstructing depositional histories through bone taphonomy: extending the potential of faunal data. *Journal of Archaeological Science*, *53*, pp.255-263.

Additional reading

Klein, R.G. (1989). Why does Skeletal Part Representation Differ Between Smaller and Larger Bovids at Klasies River Mouth and other Archaeological Sites? *Journal of Archaeological Science* 16, 363 -381.

Madgwick, R., Mulville, J., (2015). Feasting on fore-limbs: conspicuous consumption and identity in later prehistoric Britain. *Antiquity* 89(345), 629-644.

Marshall, F. and Pilgram, T., (1991). Meat versus within-bone nutrients: another look at the meaning of body part representation in archaeological sites. *Journal of Archaeological Science*, *18*(2), pp.149-163.

Sykes, N., (2007). Taking sides: The social life of venison in Medieval England, in: Pluskowski, A. (Ed.), *Breaking and Shaping Beastly Bodies: Animals as Material Culture in the Middle Ages*, Oxbow, Oxford, pp. 149-160. **MAIN HISTORY 82 CE PLU**

Taphonomy

Lyman, R.L. (1994). *Vertebrate Taphonomy*. Cambridge: Cambridge University Press. **I BB 3 LYM** - Chapters 1 & 2

Orton, D. (2012). 'Taphonomy and Interpretation: an analytical framework for social zooarchaeology', *International Journal of Osteoarchaeology*, 22(3): 253-378

Week 8: Biomolecular approaches to environmental archaeology; stable isotopes, proteins, lipids and aDNA (RS)

Environmental archaeology increasingly draws on biomolecular approaches such as stable isotope analyses, protein extraction, lipid and residue analyses and aDNA analyses to assess palaeogenetics of biological material. These two sessions (week 7 and 8) introduce you to the various archaeological science approaches, research applications, and discusses issues of extraction, sampling and interpretation.

Essential:

Ben-David, M., & Flaherty, E. A. (2012). Stable isotopes in mammalian research: a beginner's guide. *Journal of Mammalogy*, 93(2), 312–328.

Lee-Thorp, J. (2008). On isotopes and old bones. *Archaeometry* 50: 925-950.

Richards, M.P. (2019) Isotope Analysis for Diet Studies. In Richards M.P. and Britton K. (2019) *Archaeological Science: An Introduction*. Cambridge University Press.

Britton, K. (2020). Isotope Analysis for Mobility and climate studies. In M. Richards & K. Britton (Eds) *Archaeological Science: An introduction* (pp.99-124). Cambridge: Cambridge University press.

Montgomery, J. (2010). Passports from the past: Investigating human dispersals using strontium isotope analysis of tooth enamel. *Annals of Human Biology* 37(3): 325-346.

Pollard, A.M. and Heron, C (2008) *Archaeological Chemistry*. Royal Society of Chemistry (Chapter 11)

Brown, T.A. and Brown, K. (2011) *Biomolecular Archaeology*. Wiley-Blackwell (Chapter 3 and 4)

Pauskin, L. (2020) Proteomics: Advantages, Applications, and Relevance to Archaeology.https://journals.uvic.ca/index.php/midden/issue/view/1489/184#page=20

Racimo, F. et al (2019). Beyond broad strokes: sociocultural insights from the study of ancient Genomes. https://arxiv.org/pdf/1911.00755.pdf

Skoglund, P. & Mathieson,I. (2018). Ancient genomics of modern humans: The first decade. *Annual Review of Genomics and Human Genetics* **19**:381-404.

Week 9: Lecture and seminar: Dating methods: typology and sequencing, radiocarbon, calibration of 14C, OSL, Bayesian modelling (DF)

This session introduces the potentials and problems of the various dating techniques commonly applied to environmental remains, and outlines best practice and guidelines for the use of particularly radiocarbon and dendrochronology, and introduces Bayesian modelling. Students undertake class exercises with radiocarbon calibration approaches.

Essential:

https://historicengland.org.uk/advice/technical-advice/archaeological-science/scientific-dating/

Bayliss, A., and Bronk Ramsey, C., (2003) Pragmatic Bayesians: a decade of integrating radiocarbon dates into chronological models, in *Tools for constructing chronologies: crossing disciplinary boundaries* (eds. C. E. Buck and A. R. Millard), 25–41, SpringerVerlag. 10

OR

Bayliss, A., (2015). Quality in Bayesian chronological models in archaeology. *World Archaeology*, *47*(4), pp.677-700.

Bronk Ramsey, C., (2008). Radiocarbon dating: revolutions in understanding. *Archaeometry*, *50*(2), pp.249-275.

Additional:

Telford, R., Heegaard, E., Birks, H. (2004) The intercept is a poor estimate of a calibrated radiocarbon age. *The Holocene* vol. 14: 296 - 298.

Zeidler, J., Buck, C., Litton, C. (1998). Integration of Archaeological Phase Information and Radiocarbon Results from the Jama River Valley, Ecuador: A Bayesian Approach *Latin American Antiquity*, Vol. 9: 160-179.

Millard, A (2006). Bayesian Analysis of Pleistocene Chronometric Methods. *Archaeometry* 48 (2), 359–375. doi: 10.111 1/j. 1475-4754.2006.0026 1 .x

Additional reading: Dendrochronology

Baillie, M.G.L. (1995). *A Slice Through Time: dendrochronology and precision dating.* B.T. Batsford Ltd, London. 176pp.

Bridge, M. C. (1995). Tree rings, sequence matching and response function. In: Statistical Modelling of Quaternary Science Data. [Eds. Maddy, D. & Brew, J.] *Quaternary Research Association Technical Guide* No. 5, Pgs 107- 123. QRA, Cambridge.

Eckstein, D., Baillie, M.G.L. & Egger, H. (1984). Dendrochronological Dating. Handbook for Archaeologists No.2, European Science Foundation: Strasbourg. 55pp. INST ARCH AJ 10 ECK; INST ARCH Issue Desk AJ 10 ECK

Hillam, J. (1998) Dendrochronology: Guidelines on producing and interpreting dendrochronological dates. Ancient Monuments Laboratory. English Heritage, London. 35pp. INST ARCH AJ 10 DEN; INST ARCH Issue Desk AJ 10 DEN

Kuniholm, P.I., Kromer, B., Manning, S.W., Newton, M., Latini, C.E., Bruce, M.J. 1996 13 Anatolian tree rings and the absolute chronology of the eastern Mediterranean, 2220-718 BC. Nature 381, 780-783.

Morgan, R.A. 1975. The selection and sampling of timber from archaeological sites for identification and tree-ring analysis. Journal of Archaeological Science 2, 221-230.

Week 10: Environmental Archaeology in Commercial Projects (SW)

In any archaeological situation, the need to understand the policy for archaeological remains on land, and how archaeology/heritage should be recorded or preserved, is paramount. In the UK, guidance is provided through Policy Documents (from the Secretary of State ultimately). In an increasingly commercial world, the place of environmental archaeology (what should be recorded, preserved, stored) needs consideration. In this session, Dr Sylvia Warman (Historic England Science Advisor) will lead a discussion on the role of environmental archaeology in archaeological 'unit' work, commercial archaeology, or CRM.

Essential: Please skim through these links before the session:

https://historicengland.org.uk/advice/technical-advice/archaeological-science/

http://planningguidance.communities.gov.uk/blog/policy/

Week 11: The Anthropocene & Environmental Archaeology (DF)

Course overview (aims, objectives, theory, assessments, deadlines), followed by lecture/seminar on the Anthropocene. Please read the essential reading in advance, in preparation for discussion (DF, MAK)

Essential:

Edgeworth, Matt, Erle C Ellis, Philip Gibbard, Cath Neal, and Michael Ellis. (2019). "The chronostratigraphic method is unsuitable for determining the start of the Anthropocene." *Progress in Physical Geography: Earth and Environment 43* (3):334-344. doi: 10.1177/0309133319831673.

Ellis, E.C., Fuller, D.Q., Kaplan, J.O., Lutters, W.G. and Blum, J.D., (2013). Dating the Anthropocene: Towards an empirical global history of human transformation of the terrestrial biosphere dating the Anthropocene. *Elementa: Science of the Anthropocene*, 1.

Ruddiman WF. (2018). Three flaws in defining a formal 'Anthropocene'. *Progress in Physical Geography*, 11. (doi:10.1177/0309133318783142)

Recommended:

Edgeworth, M., Benjamin, J., Clarke, B., Crossland, Z., Domanska, E., Gorman, A.C., Graves-Brown, P., Harris, E.C., Hudson, M.J., Kelly, J.M. and Paz, V.J., 2014. Archaeology of the Anthropocene. *Journal of contemporary archaeology*, *1*(1), pp.73-132.

Ruddiman, William F. "The anthropocene." *Annual Review of Earth and Planetary Sciences* 41 (2013): 45-68.

Stephens, L., Ellis, E. and Fuller, D., (2020). The deep Anthropocene. *Online: https://aeon.co/essays/revolutionary-archaeology-reveals-the-deepest-possibleanthropocene (a letöltés ideje: 2020. október 31.)*.