



UCL Institute of Archaeology

ARCL0128 RESOURCES AND SUBSISTENCE 2019-20 COURSE HANDBOOK

15-credit, core module in the MSc Environmental Archaeology Program



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Meeting Time and Place: [Term 1] THURS 11am-1pm, Room: 313 [Archaeobotany Lab]

PLEASE READ THIS HANDBOOK THOROUGHLY

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COURSE OVERVIEW

This course is intended to provide the theoretical grounding for practical projects in examining past subsistence systems through archaeozoology, archaeobotany, and geoarchaeological approaches.

Summary of the course contents

The seminars, readings and assignments cover the most important theoretical debates and methodological issues in the archaeological study of human subsistence, changes in subsistence practices and related human modifications of environments.

Summary of the method of delivery

The course consists of 10 x 2-hour sessions, by a mixture of lectures by the instructor(s) and seminar discussions, and presentations by students. Note: student presentations are required but do not affect the final mark.

Timetable:

- **3 Oct.: WEEK 1 - Course Introduction and the Anthropocene Earth *(DF)**
- **10 Oct.: WEEK 2 -The Evolution of the Human Diet: the Rise and fall of Dietary Diversity, and why it matters. *(MW)**
- **17 Oct.: WEEK 3 - Hunter-Gatherer(-Fishers), Introduction & Overview *(MW)**
- **24 October: WEEK 4: Origins of Agriculture & Domestication: over view(DF)**
- **31 October: WEEK 5 Student PowerPoint Presentations (Assignment 1, part 1)**

• **READING WEEK [5-9 Nov.] NO CLASSES**

- **14 November: - WEEK 6- Animal Domestication *(DF)**
- **21 November: WEEK 7 -Secondary Products revolution & Variables Of Pastoral Production *(DF)**
- **28 November: WEEK 8- Resource Intensification/the Intensification of Production *(MAK)**
- **5 December: WEEK 9 – Genetics, ancient DNA and its contribution to studying, domestication, agricultural transformations and migrations *(DF)**
- **12 Dec: WEEK 10 - Complex societies: Producers, Consumers, The Scale Of Surplus and social dimension of food and agriculture *(DF)**

***Instructor:** DF= Dorian Fuller, MW= Michele Wollstonecroft, MAK = Manuel Arroyo-Kalin

Aims, Objectives & Intended Learning Outcomes of the Course**Aims:**

This course is intended to provide the theoretical grounding for practical projects on past subsistence systems, subsistence change and related human modifications of environments using archaeozoology, archaeobotany, and/or geoarchaeological approaches. Altogether, the lectures, readings, class discussions, and assignments are designed to facilitate an improved understanding of the many forms and degrees of human-environment interactions, particularly human interactions with and influences on other organisms within their environments.

Objectives of the module:***On successful completion of this course a student should:***

- understand current debates about hunter-gatherer's subsistence, agricultural origins, intensification and social and cultural aspects of food procurement and production systems, as well as issues in human dietary selection, food preparation and consumption; and,
- be familiar with a wide range of case studies and data sets, their problems and possible interpretations, in order to
- be able to contribute constructively to knowledge-based debates on a range of current issues in past human resource use and major transitions in subsistence mode; and able to
- recognise and situate archaeological plant and/or animal assemblages within the spectrum of human subsistence system.

Intended learning outcomes***Enhanced skills in:***

- Critical analysis of theoretical models and arguments;
- Understanding of technical archaeozoology and archaeobotany publications;
- Comprehension of technical jargon relevant to subsistence, domestication and intensification, including arguments about how these issues are interpreted from archaeological datasets;
- Written analysis and presentation of ideas;
- Formal and informal oral presentation of ideas.

STUDENT WORKLOAD DISTRIBUTION ~ 150 HRS

Nature Of The Work	Hours
Lectures	10
Private reading	60-70
Seminars/ problem classes / tutorials	10
Required written work (e.g. essays/reports)	60-70

Coursework Information:

Coursework includes weekly readings and written summaries (i.e. an abstract) of one or two assigned reading, which are to be submitted to Moodle in advance of the class; the abstracts are required but not assessed for a mark. The final mark for the course is based two written assignments, which 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 Course Co-ordinator.

A practice essay will be assigned during the first weeks of class, for the purpose of identifying any problems that students may have with written coursework. It does not count towards the course assessment.

Students are not permitted to re-write and re-submit essays in order to try to improve their marks. However, students are encouraged, in advance of the deadline for a given assignment, submit for comment a brief outline of the assignment or consult directly with the course co-ordinator during office hours or via Moodle or email.

FOR ALL MARKED COURSEWORK students should put their Candidate Number on the blue cover sheet as well as on each page of the written work.

STUDENT ASSESSMENT

In this course, students are marked on two written assignments. *Note: that course co-ordinators will return your coursework after first marking within 4 weeks of submission.*

Assignment 1 (35% Of Course Mark): This assignment is a comparison of the subsistence practices of two small-scale societies from comparable environments.

It is in two parts: the first being a 10-15 min PowerPoint presentation, to be presented in class on *Week 5 Tues 30 Oct*), and the second part is a two-page written summary of the powerpoint presentation, *due on Friday 16 November (end of week 6)*.

*Only the second part (the written summary) of Assignment 1 is assessed for a mark. **Note:** The paper will be (first) marked and returned to students before the end of Term 1 so students can benefit from instructors feed-back before writing their second assignment (due in early Term 2).*

Assignment 1 Research Aims:

Each student is to examine the similarities and differences in the annual, seasonal, and regular food procurement routines of two small-scale societies from comparable but separate environments, to identify each groups' resource selection preferences, land-use and ecological interactions with their environments. Archaeological and/or ethnographic or ethnohistoric sources can be used. Students are to focus on what is **common** to both groups and what is **unique** to each, and consider potential explanations for these similarities and differences.

ASSIGNMENT 1 TOPICS: Students should choose from the list below and email their choice to the course instructor:

1. Comparison of subsistence systems of hunter-gatherers-fishers from temperate southeast Australia (e.g. the Mara) with a Neolithic group (or groups) of your choosing from Atlantic Europe: (examining similarities and differences in their terrestrial as well as aquatic resource exploitation practices.)
2. Comparison of the plant exploitation systems of the Baka forest Hunter-gatherers of Southern Cameroon, particularly their uses of yams, with the Enset-farming complex in southwest Ethiopia.

3. Comparison of Sami Reindeer-herding systems in Arctic and hunting-based system of the Inuit of the West-Central Canadian Arctic, focusing on animal resources.
4. Comparison of Sami Reindeer-herding systems with Canadian Plateau Hunter-gatherer Fisher systems focusing on plant uses, particularly trees.
5. Comparison of Mississippi Valley hunter-gatherer subsistence system with that of early Lower Yangtze wet rice farming systems. Consider how the river, and flooding, affected these subsistence systems.
6. A comparison of late Jomon hunter-gatherer-fisher economies with Northwest Coast subsistence practices. Consider how fishing, plant selection, resource management (e.g. tending, protection) and storage practices influenced mobility/sedentism.
7. Analysing human resource exploitation practices of groups living on islands with a Mediterranean climate: evaluate the similarities and differences in subsistence practices of California island hunter-gatherer-fishers and prehistoric Balearic island agriculturalists.

ASSIGNMENT 1, PART 1: GUIDELINES FOR POWERPOINT PRESENTATION

to be delivered in class Week 5 - Thursday, October 31, 2019. (**Note:** if the class has eight or more participants, students may be asked to work in pairs for the presentation.):

1. Use 10-15 PowerPoint slides *maximum*, not including references cited. (A separate slide for references cited should be shown at the end.)
2. Keep to the 10-15 minute time frame.
3. The Introduction should explain the geographic locations of the two groups under study and the relevance for the comparison in terms of the environments in which they live, and a general explanation of their socio-economic structures.
4. The body of the presentation should present and examine the major resources exploited by each of the groups in your study, including how they obtain those resources, species choice, resource focus (e.g. as staple, supplementary or occasional foods), and harvesting, collecting, hunting, and/or herding and culling practices. Students are encouraged to consider factors such as dietary diversity, forms of human-plant interactions, associated skills and knowledge, environmental management practices, labour organization, windows of resource availability, seasonal scheduling.
5. Students are encouraged to use charts and tables, preferably of their own making, to summarise the information, and to draw on a range of sources, which should be listed at the end of the PowerPoint. Tables and figures that are taken from other sources are also acceptable, and should be appropriately referenced on the slide and in the list of References Cited.
6. **Citations and References Cited:** At least 12 sources, at least 50% from the student's own research and up to 50% can be drawn from reading lists provided in the course handbook. Please carefully follow the guidelines for Harvard Referencing Style.
7. While it is only the written (second) part of this assignment that is assessed for a mark, students should aim for a high quality PowerPoint presentation so that the organization and content of the presentation can contribute to shaping the written work; tables and figures from these may also be used in the final paper.

8. A print-out or email copy of the PowerPoint should be submitted to the course instructor on or before the day class in Week 6.

ASSIGNMENT 1, PART 2: - GUIDELINES FOR WRITTEN PAPER, due Mon. 11 Nov, 2019.

Expected return by 19 November.

1. 2 pages of text (i.e. two sides of an A4) with 1.5 spacing.
2. Summarise the the differences between the two small scale societies that you have studied and consider possible explanations for these differences.
3. Figures and Tables and References Cited should be included but on a separate page (are not counted as part of the two page word limit).
4. Again, carefully follow the Harvard Referencing Style as consistent, appropriate referencing is assessed in all written work for this course.
5. This part of the assignment is to be produced by each student individually, even if the presentation was presented in pairs of students.
6. First marking of Assignment 1, Part 2 will be done before the end of Term 1 so students can apply the instructors feed-back to improving their second assignment (due in early Term 2).

Expected Learning Outcome Of Assignment 1:

- A Deeper and More Nuanced Understanding of The Diversity in Resource Exploitation Practices, Land Uses, and Ecological and Technological Expertise and Knowledge of Societies that are (Broadly) Classified Under Broad Titles such as “Hunter-Gatherer”, “Farmer” and “Pastoralist”;
- Enriched skills in reasoning and Critical Assessment of Multiple Sources;
- Enriched skills in Research Use of Library/ Archival facilities;
- Experience in the Production of Presentation Graphics at a Professional level;
- Experience in the Oral Presentation of Original Research Results;
- Time Limited Assessment, permitting use of sources, testing the employment of information learned in class, as well as appropriate choice of sources, and application of independent research skills.

If students are unclear about the nature of an assignment, they should discuss this with the Module Co-ordinator.

Assignment 2 Essay (65% of mark). 3400 words (3230 – 3517 words). Due: Tuesday 14 January, 2020. Expected return by 31 January.

This essay is of comparable length to that of a research paper that one might encounter in a journal. Students should therefore regard it as an opportunity to present a high caliber review with an original synthesis and/or ideas. Students should aim to draw on ca. 30 cited sources or more, moving beyond what is provided in the course reading lists to explore the topic with library and journal resources available at UCL. *Readings in this hand-out and discussed in seminars provide only a starting point.*

Assignment 2 Essay Topics. Please select a topic from the list below and email your choice to your instructor before the end of Term I:

1. Discuss the role of cultural niche construction in the changing human strategies for animal and plant exploitation evident at the terminal Pleistocene and/or early Holocene, in a region of your choice. Provide up to 3 case studies.
 2. "A Calorie is Not Necessarily a Calorie" Consider the dietary, ecological, economic and social implications of advances in food processing, food preservation and storage for prehistoric human societies, providing archaeological examples.
 3. What contributions can the study of plant remains, animal bones and geoarchaeology make to understanding the rise of complex societies? Provide at least 3 case studies.
 4. Evaluate the evidence for the initial spread of crops and livestock into a region of your choice.
 5. Compare and contrast approaches to investigating agricultural "intensification" highlighting the contribution of evidence from animals, plants and/or sediments. Outline avenues for further research.
 6. Consider how social class or gender divisions of labour and/or food consumption can be inferred from archaeobotanical and/or zooarchaeological evidence from hunter-gatherer or early farming sites. Provide at least 3 case studies.
 7. Consider the traditional ecological, biological and technological skills and expertise that are necessary for the accumulation, preservation and storage of food for future use; examine in detail how these activities are linked to resource selection, labour organisation, land-use, seasonality and seasonal scheduling. Discuss at least three case studies, which should include at least one hunter-gatherer and one farmer society.
 8. A topic of your own choosing, which must be approved by the course co-ordinator
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IMPORTANT UCL RULES FOR COURSEWORK LENGTH AND SUBMISSION

Word counts

Students are given a range that word counts must not exceed. The following should not be included in the word-count: title page, contents pages, lists of figure and tables, abstract, preface, acknowledgements, bibliography, lists of references, captions and contents of tables and figures, appendices.

Penalties will only be imposed if you exceed the upper figure in the range. There is no penalty for using fewer words than the lower figure in the range: the lower figure is simply for your guidance to indicate the sort of length that is expected.

The penalties for overlength work are as follows:

- For work that exceeds the specified maximum length by less than 10% the mark will be reduced by five percentage marks, but the penalised mark will not be reduced below the pass mark, assuming the work merited a Pass.
- For work that exceeds the specified maximum length by 10% or more the mark will be reduced by ten percentage marks, but the penalised mark will not be reduced below the pass mark, assuming the work merited a Pass.

Coursework submission procedures

- All coursework must normally be submitted **both as hard copy and electronically** unless instructed otherwise (However, bulky portfolios and lab books are normally submitted as hard copy only.)
- You should staple the appropriate colour-coded IoA coversheet (available in the IoA library and outside room 411a) to the front of each piece of work and submit it to the red box at the Reception Desk (or room 411a in the case of Year 1 undergraduate work)
- All coursework should be uploaded to Turnitin by midnight on the day of the deadline. This will date-stamp your work. It is essential to upload **all parts** of your work as this is sometimes the version that will be marked.
- Instructions are given below. **Please note that the procedure has changed for 2019-20, and work is now submitted to Turnitin via Moodle.**
 1. Ensure that your essay or other item of coursework has been saved as a **Word doc., docx. or PDF** document, Please include the module code and your candidate number on every page as a header.
 2. Go into the Moodle page for the module to which you wish to submit your work.
 3. Click on the correct assignment (e.g. Essay 1),
 4. Fill in the "Submission title" field with the right details: **It is essential that the first word in the title is your examination candidate number** (e.g. YGBR8 Essay 1), **Note that this changes each year.**
 5. Click "Upload".
 6. Click on "Submit"
 7. You should receive a receipt – please save this.
 8. If you have problems, please email the IoA Turnitin Advisers on ioa-turnitin@ucl.ac.uk, explaining the nature of the problem and the exact module and assignment involved.

One of the Turnitin Advisers will normally respond within 24 hours, Monday-Friday during term. Please be sure to email the Turnitin Advisers if technical problems prevent you from uploading work in time to meet a submission deadline - even if you do not obtain an immediate response from one of the Advisers they will be able to notify the relevant Module Coordinator that you had attempted to submit the work before the deadline

COURSE SCHEDULE TOPIC OUTLINE & READING LISTS

“Diet is a direct link between an organism and its environment” (Ungar, Grine and Teaford 2006:210)

WEEK 1. INTRODUCTION TO COURSE & SELECTED CASE READINGS FOR DISCUSSION:

Environmental archaeology can provide direct evidence of human subsistence practices and resource selection/modification decisions that set in motion (sometimes irreversible) changes to a resource and/or to the environment as well as to humans themselves (see Boivin et al. 2016; Ellis et al. 2013; Wollstonecroft 2011).

The impact of humans on the earth’s environments is an important theme of this course. The readings this introductory week are seminal papers in the ***Anthropocene discourse*** (e.g. Ellis 2015; Ellis et al. 2013; Ruddiman et al. 2016), an interdisciplinary debate in which environmental archaeology has made substantial and significant contributions. The debate considers the degree to which humans have contributed to changes in earth’s biosphere, the origins and antiquity of the human activities that have had the most impact, and when the impact first became visible archaeologically as well as in the natural world.

A second important theme of this course concerns how the resource selection decisions and subsistence practices (including routines, technology, task division, mobility/settlement) of past peoples were limited or promoted by environments, environmental change and the characteristics of the available resources themselves (as opportunities, challenges or constraints) (see for example, Fuller et al. 2014; Hillman 1989; Rindos 1989; Speth 2010, listed below) The contributions of environmental archaeology to understanding these types of issues is discussed by Wilkinson and Stevens (2003), which is on your reading list.

Students are strongly encouraged to familiarize themselves with the publications listed below as many of them will show up again on the reading lists as the term progresses, as well as in other courses.

CONSIDER:

What types of information about past human societies and the environments that they inhabited and/or exploited can be obtained through examining their resource selection & subsistence practices? How is this line of inquiry of relevance for addressing present day global concerns? Which of theoretical positions discussed in the papers below do you find the most compelling, and why?

WEEK 1 READINGS:

Key readings

ArchaeoGLOBE Project. 2019. Archaeological assessment reveals Earth’s early transformation through land use. *Science* 365 (6456): 897-902 (30 Aug. 2019). DOI: 10.1126/science.aax1192

Boivin, N.L., Zeder, M.A., Fuller, D.Q., Crowther, A., Larson, G., Erlandson, J.M., Denham, T. and Petraglia, M.D. 2016. Ecological consequences of human niche construction: examining long-term anthropogenic shaping of global species distributions. *Proceedings of the National Academy of Sciences USA [PNAS]* 113, 6388–6396.

- Harris, D. R. 1989. An Evolutionary continuum of people-plant interactions. In Harris, D.R. and Hillman, G.C. (Eds.) *Foraging and Farming, The Evolution of Plant Exploitation*, pp 11-26. Unwin Hyman, London.
- Broughton, J.M., Cannon, M.D. & Bartelink, E.J.2010. *J Archaeol Method Theory* 17: 371. <https://doi.org/10.1007/s10816-010-9095-7>
- Ellis, E. C. 2015. Ecology in an anthropogenic biosphere. *Ecological Monographs* 85, 287-331. <http://onlinelibrary.wiley.com/doi/10.1890/14-2274.1/full>
- Ellis, E. Kaplan, J.O., Fuller, D.Q., Varvus, S., Goldewijk, K.K. and Veerburg P.H. 2013. Used planet: a global history. *PNAS* 110: 7978–7985.
- Ellis, Erle, Nicholas R. Magliocca, Chris J. Stevens, Dorian Q Fuller (2018) Evolving the Anthropocene: linking multi-level selection with long-term social–ecological change. *Sustainability Science*. 13(1): 119-128
- Fuller, D. Q and L. Lucas (2017) Adapting crops, landscapes and food choices: Patterns in the dispersal of domesticated plants across Eurasia. In M. Petraglia, N Boivin and R. Crassard (eds) *Human Dispersal and Species Movement: From Prehistory to the Present*. Cambridge: Cambridge University Press. Pp. 304-331
- Laland, K. and O'Brien, M. 2010. Niche construction and archaeology. *J Archaeol Method Theory* 17:303–322
- Marlowe, F.W. 2005. Hunter-Gatherers and Human Evolution. *Evolutionary Anthropology* 14, 54-67.
- Murphy, Charlene and Dorian Q Fuller (2017) The Future is Long-term: past and current directions in environmental archaeology. *General Anthropology* 24(1): 1, 8-10
- Rindos, D.R. 1989. Darwinism and its role in the explanation of domestication. In Harris, D.R. and Hillman, G.C. (Eds.) *Foraging and Farming, The Evolution of Plant Exploitation*, 27-41. Unwin Hyman, London.
- Rosen, A.M. and Rivera-Collazo, I. 2012. Climate change, adaptive cycles, and the persistence of foraging economies during the late Pleistocene/Holocene transition in the Levant. *PNAS* 109, 3640–3645
- Rowley-Conway, P. and Layton, R. 2011. Foraging and farming as niche construction: stable and unstable adaptations. *Philosophical Transactions of the Royal Society B* 366, 849-862.
- Ruddiman, W.F., Fuller, D.Q., Kutzbach, J.E., Tzedakis, P.C., Kaplan, J.O., Ellis, E.C., ...He, F. 2016. Late Holocene climate: natural or anthropogenic? *Reviews of Geophysics* 54, 93-118.
- Shennan, S. 2002. *Memes, Genes and Human History. Darwinian Archaeology and Cultural Evolution*. Thames and Hudson, London. **Read Chapters 1, 2 and 6 (1. Why Darwinian archaeology and 2. Behavioural Ecology: The Evolutionary study of Behaviour. And 6 The archaeology of getting a living).**
- Smith, B. 2011. General patterns of niche construction and the management of 'wild' plant and animal resources by small-scale pre-industrial societies. *Philosophical Transactions of the Royal Society B* 366, 836-848.
- Speth, J.D. 2010. *The Palaeoanthropology and Archaeology of Big Game Hunting. Protein, Fat or Politics?* Springer, The Netherlands. **See Chapters 2 and 5 (2: How do we reconstruct hunting patterns in the past? 5: Were big game hunters targeting fat?)**

Stiner, M. and Kuhn, S.L. 2006. Changes in the 'connectedness' and resilience of paleolithic societies in Mediterranean ecosystems. *Human Ecology* 34, 693-712.

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

Wollstonecroft, M. 2011. Investigating the role of food processing in human evolution: a niche construction approach. *Archaeological and Anthropological Sciences* 3: 141-150.

Zeder, M.A. 2012. The Broad Spectrum Revolution at 40: Resource diversity, intensification, and an alternative to optimal foraging explanations. *J. Anthropological Archaeology* 31, 241-264..

A number of recent, useful papers can be found in ***The Oxford Handbook of the Archaeology of Diet*** (2015). Some chapters are on-line:

<http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199694013.001.0001/oxfordhb-9780199694013>

WEEK 2: THE EVOLUTION OF THE HUMAN DIET

***“Humans are well adapted for lean meat, fish, insects and highly diverse plant foods without being dependent on any particular proportions of plants versus meat”
(Lindeberg 2009, p. 43)***

In this session we examine theories about how our species came to have the dietary patterns that we see around us today, including: scholarly arguments about hominin diet based on evidence from palaeoanthropology, primatology, archaeology, biochemistry, and nutrition, including staple-isotope and zooarchaeological research.

CONSIDER:

What features of the human diet that can be traced to our hominoid ancestors? What features of our diet do we share with the great apes? What features of the diet are unique to Homo? What features of the diet are unique to Homo sapiens? What is the role of culture, particularly tools but also ecological knowledge and its dissemination across and between generations, in the evolution of the human diet?

WEEK 2 READINGS:

Butterworth, P.J., Ellis, P.R. and Wollstonecroft M., 2016. "Why protein is not enough: the roles of plants and plant processing in delivering the dietary requirements of modern and early Homo." In Hardy, K and Kubiak-Martens, L. (Eds.) *Wild Harvest: Plants in the Hominin and Pre-Agrarian Human Worlds*, 31- 54. Oxbow books, Oxford.

The following three papers should be read together and in sequence:

Carmody, R.N., Weintraub, G.S., Wrangham, R.W. 2011. Energetic consequences of thermal and nonthermal food processing. *PNAS* 108, 19199-19203.

Wollstonecroft, M.M., Ellis, P.R., Hillman, G.C., Fuller, D.Q. and Butterworth, P.J., 2012. A calorie is not necessarily a calorie: Technical choice, nutrient bioaccessibility, and interspecies differences of edible plants. *PNAS* 109, E991

Carmody, R.N., Weintraub, G.S., Wrangham, R.W. 2012. Reply to Wollstonecroft et al.: Cooking increases the bioavailability of starch from diverse plant sources. *PNAS* 109, E992.

Cerling, T.E., Manthi, F.K., Mbuu, E.N., Leakey, L.N., Leakey, M.G., Leakey, R.E., Brown, F.H., Grine, F.E., Hart, J.A., Prince Kaleme, Roche, H., Uno, K.T. and Wood, B.A. 2013. Staple isotope-based diet reconstructions of Turkana Basin Hominins. *PNAS* 110, 10501-10506.

- Conklin-Brittain, N.L., Wrangham, R.W. and Smith C.C. (2002) A two-stage model of increased dietary quality in early hominid evolution: the role of fibre. In *Human Diet: Its Origin and Evolution*, Ungar, P.S. and Teaford, M.F. (Eds.) 61-76. Westport: Bergin and Garvey.
- Cordain, L. Miller, J.B., Eaton, S.B. Mann, N, Holt, SHA and Speth, J.D. 2000. Plant-animal subsistence ratios and macronutrient energy estimations in worldwide hunter-gatherer diets. *American J. Clinical Nutrition* 71, 682–92.
- Haaland, R. 2007. "Porridge and pot, bread and oven: Food ways and symbolism in Africa and the Near East from the Neolithic to the Present." *Cambridge Archaeological J.* 17, 165–82.
- Hillman G and Wollstonecroft M. 2014."Dietary Diversity: Our Species-Specific Dietary Adaptation". In Stevens, C.J., Nixon, S., Murray, M.A. and Fuller, D.Q. (Eds.) *The Archaeology of African Plant Use*, 37-49. UCL Institute of Archaeology Publication (Left Coast Press), London.
- Hublin, J., Richards, M.P. (Eds.), 2009. *The Evolution of Hominin Diets: Integrating Approaches to the Study of Palaeolithic Subsistence*, Springer, The Netherlands
- Johns, T. 1999. The chemical ecology of human ingestive behaviours. *Annual Review of Anthropology* 28: 27–50.
- Jones, M. 2009. Moving North: Archaeobotanical evidence for plant diet in Middle and Upper Palaeolithic Europe. In *The Evolution of Hominin Diets: Integrating Approaches to the Study of Palaeolithic Subsistence*, Hublin J. and Richards, M.P. (Eds.), 171-180. Dordrecht, The Netherlands: Springer.
- Leach, H.M., 1999. Food processing technology: its role in inhibiting or promoting change in staple foods. In, Gosden G. and. Hather, J.G. (Eds.) *The Prehistory of Food: Appetites for Change*. Routledge, London, 129–138.
- Lee-Thorp, J., Likius, A., Mackaye, H.T., Vignaud, P., Sponheimer, M. and Brunet, M. 2012. Isotopic evidence for an early shift to C4 resources by Pliocene hominins in Chad. *PNAS* 109, 20369-372.
- Leonard, W.R., and Robertson, M.L. 1994. Evolutionary perspectives on human nutrition: the influence of brain and body size on diet and metabolism. *American J. Human Biology* 6, 77-88.
- Lindeberg, S. 2009. Modern human physiology with respect to evolutionary adaptations that relate to diet in the past. In J. J. Hublin and M. P. Richards (Eds.), *The Evolution of Hominin Diets: Integrating Approaches to the Study of Paleolithic Subsistence*, 43–57. Dordrecht: Springer.
- Marlowe, F.W. 2005. Hunter-Gatherers and Human Evolution. *Evolutionary Anthropology* 14, 54-67.
- Milton, K.I. 2002. Back to basics: why foods of wild primates have relevance for modern human health. *Nutrition* 16, 480-483.
- Munro, N.D. and Bar-Oz, G. (2005) Gazelle bone fat processing the Levantine Epipalaeolithic. *J. Archaeological Science* 32, 223-239.
- Shennan, S. 2002. *Memes, Genes and Human History. Darwinian Archaeology and Cultural Evolution*. Thames and Hudson, London, **read Chapter 3: Culture as an evolutionary system.**
- Sherratt, A. 1991. Palaeoethnobotany: from crops to cuisine. In Queiroga, F. and Dinis, A.P. (Eds.) *Paleoecologia e Arqueologia* II, pp 221-236. Vila Nova de Famalicao: Centro de Estudos Arqueologicos Famalicenses
- Smith, B. 2011. General patterns of niche construction and the management of 'wild' plant and animal resources by small-scale pre-industrial societies. *Philosophical Transactions of the Royal Society B* 366, 836-848.

Speth, J.D. 2010. *The Paleoanthropology and Archaeology of Big Game Hunting*. Protein, Fat or Politics? Springer, The Netherlands. **See Chapter 12: Big-Game Hunting: Protein, Fat or Politics?**

Speth, J.D. 2001. Boiling vs. baking and roasting: a taphonomic approach to the recognition of cooking techniques in small mammals. In Rowley-Conwy, P.A. (Ed.), *Animal Bones, Human Societies*, pp 89-105. Oxford, Oxbow Books.

Speth, J. and Spielman, K.A. 1983. Energy source, protein metabolism and hunter-gatherer subsistence strategies. *J. Anthropological Archaeology* 2: 1-31.

Snodgrass, J.J., Leonard, W.R. and Robertson M.L. 2009. The energetic of encaphalization in early hominids. In Hublin, J.J. and Richards, M.P. (Eds.), *The Evolution of Hominin Diets: Integrating Approaches to the Study of Palaeolithic Subsistence*, pp 15-30. The Netherlands: Springer.

Sponheimer, M., Dufour, D.L., 2009. Increased dietary breadth in early hominim evolution: Revisiting arguments and evidence with a focus on biogeochemical contributions. In Hublin, J.J., Richards M.P. (Eds.) *The Evolution of Hominin Diets: Integrating Approaches to The Study of Palaeolithic Subsistence*, pp 229–240. Springer, The Netherlands.

Stahl, A. B. 1984. Hominid dietary selection before fire. *Current Anthropology* 25, 151–68.

Stahl, A. B. 1989. Plant-food processing: Implications for dietary quality. In D. R. Harris and G. C. Hillman (Eds.), *Foraging and Farming: The Evolution of Plant Exploitation*, pp 171–96. London: Unwin Hyman.

Wandsnider, L. 1997. The roasted and the boiled: Food composition and heat treatment with special emphasis on pit-hearth cooking. *J. Anthropological Archaeology* 16, 1-48.

Wollstonecroft, M. 2011. Investigating the role of food processing in human evolution: a niche construction approach. *Archaeological and Anthropological Sciences* 3: 141-150.

Wollstonecroft M., Ellis P. R., Hillman G. C., Fuller D. Q (2008) Advancements in plant food processing in the Near Eastern Epipalaeolithic and implications for improved edibility and nutrient bioaccessibility: An experimental assessment of sea club-rush (*Bolboschoenus maritimus* (L.) Palla). *Vegetation History and Archaeobotany* 17 (Suppl. 1), S19–27.

Wrangham R., Jones, J. H., Laden, G., Pilbeam, D. and Congklin-Brittain, N. L. 1999. The raw and the stolen: cooking and the ecology of human origins. *Current Anthropology* 40, 567–94.

Winterhalder, B., and Goland, C. 1997. An evolutionary ecology perspective on diet choice, risk, and plant domestication. In K. J. Gremillion (Ed.), *People, Plants and Landscapes: Studies in Palaeoethnobotany*, pp 123–60. Tuscaloosa: University of Alabama Press.

Zink, K.D. & Lieberman, D.E. 2016. Impact of meat and Lower Palaeolithic food processing techniques on chewing in humans. *Nature* 531, 500–503

Ecological models of food selection/food avoidance

Breslin, P.A.S. 2013. An evolutionary perspective on food review and human taste. *Current Biology* 23, Special Issue, R409–R418.

Dominy N.J., Lucas P.W., Osorio D., Yamashita N. 2001. The sensory ecology of primate food perception. *Evolutionary Anthropology* 10, 171–186.

Johns, T. 1999. The chemical ecology of human ingestive behaviours. *Annual Review of Anthropology* 28, 27

WEEK 3: HUNTER-GATHERER-FISHERS

In this session we examine the contributions of environmental archaeology to studies of hunter-gatherers. We discuss several models that classify hunter-gatherer groups by their subsistence practices

Key topics to consider:

- How does mobility influence site-location and settlement patterns?
- How does seasonality of resources influence site-location (e.g. “
- Degree of specialisation on resources
- Degree of specialisation of types of sites
- Degrees of interaction/interdependence between communities

Questions to ask of site data include:

- Is the site permanently or temporarily (possibly seasonally?) occupied?
- Is it a single occupation, or was it repeatedly occupied?
- Is there evidence for exploitation at the site of only locally available resources, or a wider range of resources?
- What part of a temporal cycle does a site represent?
- What part of the economic system does the site represent?

Also consider different emphases of models, such as:

- Central-place foraging models (Winterhalder 2001; Bird & Bird 1997)
- gender-based differences (Hawkes 1996)
- role of juvenile foragers (Bird & Bird 2000; Hawkes et al. 1995; Bock 2007; Tucker and Young 2007)
- diet-breadth models (Kelly 1995; Stiner & Munro 2002)
- patch-choice models (Kelly 1995; Winterhalder 2001)
- Evolutionary aspects of hunter-gatherer behavioural ecology (Hawkes et al.1997)
- Niche construction (Rowley-Conwy and Layton 2011, Smith 2011)
- Resilience theory (Rosen and Rivera-Collazo 2012.)

READINGS WEEK 3:

Alexander, D. 1992a. Environmental units. In Hayden, B. (Ed.), *Complex Culture of the British Columbia Plateau: Traditional Stl'atl'imx Resource Use*, pp 47-98. University of British Columbia Press, Vancouver.

Alexander, D. 1992b. A reconstruction of prehistoric land use in the Mid-Fraser River area based on ethnographic data. In Hayden, B. (Ed.), *Complex Culture of the British Columbia Plateau: Traditional Stl'atl'imx Resource Use*, pp 99-176. University of British Columbia Press, Vancouver.

Bird, D.W. and Bliege Bird, R.L. 1997. Contemporary shellfish gathering strategies among the Meriam of the Torres Strait islands, Australia: testing predictions of a central place foraging model. *J. Archaeological Science* 24, 39-63.

Bird, D.W. and Bliege Bird, R. 2000. The ethnoarchaeology of juvenile foragers: shellfishing strategies among meriam children. *J. Anthropological Archaeology* 19, 461-76.

Bock, J. 2007. What Makes a competent adult forager? In Hewlett, B.S. and Lamb, M.E. (Eds.) *Hunter-Gatherer Childhoods: Evolutionary, Developmental and Cultural Perspectives*, 109-128. Transaction Publishers, New Brunswick, New Jersey.

Cohen, M. N. 1991. *Health and the Rise of Civilization*. Yale University Press. **Chap. 4** [History of infectious disease] & **Chap 5** [Changes in Human Diet]. [INST ARCH JF COH or DMS Watson: ANTHROPOLOGY E 130 COH]

Note: If you are not familiar with traditional anthropological evolutionism (bands-tribes-chiefdoms-states, which Cohen uses as a general framework then you should also read Chap. 3]

Kelly, R.L. 1995. *The Foraging Spectrum: Diversity in Hunter-Gatherer Lifeways*. Washington: Smithsonian Institution Press. **Chapter 3: foraging and subsistence (especially optimal foraging theory).**

Douglas Deur (2002) Plant Cultivation on the Northwest Coast: A Reconsideration. *J. Cultural Geography*, 19:2, 9-35, DOI: 10.1080/08873630209478287

Hather, J.G. and Mason, S.L.R. (Eds.) 2002. *Hunter-Gatherer Archaeobotany: Perspectives from the northern temperate zone*. UCL Institute of Archaeology, London.

Keeley, L.H. 1999. Use of plant foods among hunter-gatherers: a cross-cultural survey. In Anderson, P.C.(Ed.), *Prehistory of Agriculture: New Experimental and Ethnographic Approaches*, pp 6–14. Monograph 40, University of California Press: Los Angeles.

Kelly, R.L. 1995. *The Foraging Spectrum: Diversity in Hunter-gatherer Lifeways*. Smithsonian Institution Press: Washington, D.C.

Kubiak-Martens, L. 2002 New evidence for the use of root foods in pre-agrarian subsistence recovered from the late Mesolithic site of Halsskov, Denmark. *Vegetation History and Archaeobotany* 11, 23 – 32.

Munro, N.D., Bar-Oz, G. 2005. Gazelle bone fat processing the Levantine Epipalaeolithic. *J. Archaeological Science* 32, 223–239.

Riede F. 2011 *Adaptation and niche construction in human prehistory: a case study from the southern Scandinavian Late Glacial*. *Phil. Trans. R. Soc. B* 366, 793–808. doi:10.1098/rstb.2010.0266

Rindos, D. 1989. Darwinism and its role in the explanation of domestication. In D.R. Harris and G.C. Hillman (Eds.), *Foraging and Farming: The Evolution of Plant Exploitation*, pp 27-41. Unwin Hyman: London.

Romanoff, S. 1992. Fraser Lilloet Salmon Fishing. In Hayden, B. (Ed.), *Complex Culture of the British Columbia Plateau: Traditional Stl'atlimx Resource Use*, pp 222-265. University of British Columbia Press, Vancouver

Rowley-Conway, P. and Layton, R. 2011. Foraging and farming as niche construction: stable and unstable adaptations. *Philosophical Transactions of the Royal Society B* 366, 849-862.

Smith B. D. 2011 *General patterns of niche construction and the management of 'wild' plant and animal resources by small-scale pre-industrial societies*. *Phil. Trans. R. Soc. B* 366, 836–84

Stiner, M.C., N.D. Munro and T.A. Surovell. 2000. The tortoise and the hare: small-game use, the broad-spectrum revolution, and Palaeolithic demography. *Current Anthropology* 41, 39-73.

Tucker, B. and Young, A. 2007. Growing up Mikea: Children's Time Allocation and Tuber Foraging in Southwestern Madagascar. In Hewlett, B.S. and Lamb, M.E. (Eds.) *Hunter-Gatherer Childhoods: Evolutionary, Developmental and Cultural Perspectives*, pp 147-174. Transaction Publishers, New Brunswick, New Jersey.

Turner, N.J. 1992. Plant resources of the Stl'atl'imx (Fraser River Lillooet) People: A window into the past. In Hayden, B. (Ed.), *Complex Culture of the British Columbia Plateau: Traditional Stl'atl'imx Resource Use*, pp 405-469. University of British Columbia Press, Vancouver.

Weiss, E., Wetterstrom W, Nadel D, Bar-Yosef O. 2004. The broad spectrum revisited: evidence from plant remains, PNAS 101, 9551-9555.

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, 61-70.

Wollstonecroft M, Ellis PR, Hillman GC, Fuller D.Q. 2008. "Advancements in plant food processing in the Near Eastern Epipalaeolithic and implications for improved edibility and nutrient bioaccessibility: an experimental assessment of sea club-rush (*Bolboschoenus maritimus* (L.) Palla)". *Vegetation History and Archaeobotany* 17 (Suppl. 1), S19-S27.

Further readings on Gender and hunter-gatherer subsistence practices

"Archaeologists who assume a rigid division of labor characterizes

all modern human societies risk projecting their Western beliefs onto the archaeological record" (Kent 1998:39). 1998 Invisible Gender—Invisible Foragers: Southern African Hunter-Gatherer Spatial Patterning and the Archaeological Record. In *Gender in African Prehistory*. Susan Kent, ed. Pp. 39–67. Walnut Creek, CA: AltaMira Press.

Bodenhorn, B. 1990. "I'm not the great hunter, my wife is": Inupiat and anthropological models of gender. *Études/Inuit/Studies* 14, 55-74.

Hawkes, K., OConnell, J.F. and Blurton Jones, N. G. 2001 Hunting and nuclear families: some lessons from the Hadza about mens work. *Current Anthropology* 42, 681-709

Hunn, E.S., 1981. On the relative contribution of men and women to subsistence among hunter-gatherers of the Columbia Plateau: a comparison with Ethnographic Atlas summaries. *J. Ethnobiology* 1, 124-134.

Kuhn, S.L. and Stiner, M.C. 2006. What's a mother to do? The division of labor among Neandertals and modern humans in Eurasia. *Current Anthropology* 47, 953-981.

Milton, K. 1997. Real men don't eat red deer. *Discover*, June 1997: 46-53.

Speth, J.D. 1990. Seasonality, resource stress, and food sharing in so-called "egalitarian" foraging societies. *J. Anthropological Archaeology* 9, 148-188.

WEEK 4. ORIGINS of PLANT DOMESTICATION and AGRICULTURE, with a focus on the Near East

In this session we examine general principles involved in the study of agricultural origins, including defining domestication of plants and animals, cultivation and pastoralism, and review some of the kinds of archaeological and other evidence that can be used to investigate them. A range of additional readings, and some beginnings readings for different world regions are provided below.

BASIC READINGS WEEK 4:

CONSIDER: What are the meanings of the terms: "*Plant Management*", "*Cultivation*", "*Domestication*" and "*Agriculture*"?

To be sure that you understand the vocabulary used in the discussion of the origins of agriculture, as well as the debates and state of knowledge, everyone should read these two articles:

Harris, D.R. and Fuller, D.Q. 2014. Agriculture: Definition and Overview. In Smith, C. (Ed.), *Encyclopaedia of Global Archaeology*, 104-113. New York: Springer.

Fuller, D Q., T. Denham, M Arroyo-Kalin, L. Lucas, C.J. Stevens, L. Qin, R.G. Allaby and M. D. Prugganan. 2014. Convergent evolution and parallelism in plant domestication revealed by and expanding archaeological record. *PNAS* 111, 6147-6152.

Further readings by D. R. Harris will enhance your understanding of the issues in the archaeology of the origins of agriculture, and how our understanding has change over the past ~40 years:

Harris, D. R. 1977. Alternative pathways toward agriculture. In Reed, C. (Ed.) *Origins of Agriculture*, pp 179-243. Mouton Press, The Hague. [INST ARCH HA HAR; or INST ARCH HA REE, 3 hr. reserve]

*Harris, D.R. 1989. An evolutionary continuum of people-plant interaction. In *Foraging and farming: the evolution of plant exploitation*, Harris DR and Hillman GC, (Eds.), pp 11-26. London: Routledge, [reprinted in Denham & White 2007 textbook]

Harris, D. R. 1996. Introduction: themes and concepts in the study of early agriculture. In *The Origins and Spread of Agriculture and Pastoralism in Eurasia*, Harris, D. (Ed.), pp 1-9. London: UCL Press. [INST ARCH HA HAR, with 1 copy at issue desk]

Harris, D. R. 2008. Agriculture, cultivation and domestication: exploring the conceptual framework of early food production. In Denham, T., Iriarte, J. and Vrydaghs, L. (Eds.), *Rethinking Agriculture. Archaeological and Ethnoarchaeological Perspectives*, pp 16-35. Left Coast Press, Walnut Creek.

Global overviews

Larson, et al. (2014). Current perspectives and the future of domestication studies. *PNAS* 111, 6139–6146.

Purugganan, M. D. and Fuller, D.Q. 2009. The nature of selection during plant domestication. *Nature* 457, 843-848

Over the past ~25 years archaeobotany has been applied at more sites and in more regions. As a result, our understanding of the timing, speed and sequences of plant domestication has changed. Compare the seminal experiments and analyses of Harlan (1967) and Hillman and Davies (1990) with more recent work by Tanno and Willcox (2006), Fuller (2007), Fuller, Asouti and Purugganan (2011) (below).

Harlan, J.R. 1967. A wild wheat harvest in Turkey. *Archaeology* 20, 197 – 201.

Hillman, G. C. and Davies, M. S. 1990. Measured domestication rates in wild wheats and barley under primitive cultivation, and their archaeological implications. *J. World Prehistory* 4, 157–222.

Tanno, K. and Willcox, G. 2006. How Fast Was Wild Wheat Domesticated? *Science* 311, 1886.

Fuller, D.Q. 2007. Contrasting Patterns in Crop Domestication and Domestication Rates: Recent Archaeobotanical Insights from the Old World. *Annals of Botany*, Volume 100, 903–924, <https://doi.org/10.1093/aob/mcm048>

Fuller DQ, Asouti E, Purugganan MD. 2011. Cultivation as slow evolutionary entanglement: comparative data on rate and sequence of domestication. *Veget Hist and Archaeobot* 43, 1–15.

On Southwest Asia

Arranz-Otaegui, A., Colledge, S., Zapata, L., Teira-Mayolini, L. C., & Ibáñez, J. J. (2016). Regional diversity on the timing for the initial appearance of cereal cultivation and domestication in southwest Asia. *Proceedings of the National Academy of Sciences*, 113(49), 14001-14006.

Asouti, E. and Fuller, D.Q. 2013. A Contextual Approach to the Emergence of Agriculture in Southwest Asia: Reconstructing Early Neolithic Plant-Food Production. *Current Anthropology* 2013 54: 299-345

Colledge, S. and Conolly, J. (2018): Plant domestication, production intensification and food storage at Pre-Pottery Neolithic A Dhra', *Levant*, DOI:10.1080/00758914.2018.1424746

Fuller, Dorian Q, Leilani Lucas, Lara Gonzalez Carretero, and Chris Stevens (2018) From intermediate economies to agriculture: trends in wild food use, domestication and cultivation among early villages in southwest Asia. *Paleorient* 44(2): 59-74

Fuller, D. Q. and L. Gonzalez Carretero (2018). The archaeology of Neolithic cooking traditions: archaeobotanical approaches to baking, boiling and fermenting. *Archaeology International* 21: 109-121

Kislev, M., E. Weiss and A. Hartmann. (2004). Impetus for sowing and the beginnings of agriculture: ground collecting of wild cereals. *PNAS* 101, 2692-2695.

Maeda, O., Lucas, L., Silva, F., Tanno, K. I., & Fuller, D. Q. (2016). Narrowing the harvest: Increasing sickle investment and the rise of domesticated cereal agriculture in the Fertile Crescent. *Quaternary Science Reviews* 145: 226-237

Snir A, Nadel D, Groman-Yaroslavski I, Melamed Y, Sternberg M, Bar-Yosef, O. and Weiss, E. . 2015. The Origin of Cultivation and Proto-Weeds, Long Before Neolithic Farming. *PLOS ONE* 10(7): e0131422. <https://doi.org/10.1371/journal.pone.0131422>

Weide, A., Riehl, S., Zeidi, M., & Conard, N. J. (2015). Using new morphological criteria to identify domesticated emmer wheat at the aceramic Neolithic site of Chogha Golan (Iran). *Journal of Archaeological Science*, 57, 109-118.

Willcox, B. 2013. The Roots of Cultivation in Southwestern Asia. *Science* 341, 39.

Willcox, G., Buxo, R. and Herveux, L. 2009. Late Pleistocene and early Holocene climate and the beginnings of cultivation in northern Syria. *The Holocene* 19, 151-158.

Consider the following Hillman et al. (2001) paper and Colledge and Conolly's (2010) critique

Hillman, G., Hedges, R., Moore, A., Colledge, S. and Pettitt, P. 2001. New evidence of Lateglacial cereal cultivation at Abu Hureyra on the Euphrates. *The Holocene* 11, 383–93.

Colledge, S. and Conolly, J. 2010. Reassessing the evidence for the cultivation of wild crops during the Younger Dryas at Tell Abu Hureyra, Syria. *Environmental Archaeology* 15, 124-138.

Americas

Dillehay, T D and Piperno, D. 2014. Agricultural Origins and Social Implications in South America. In: Renfrew, C & Bahn, P (eds.) *The Cambridge World Prehistory*. Cambridge: Cambridge University Press.

Ford, R. 1985. *Prehistoric food production in North America*. Museum of Anthropology, University of Michigan, Ann Arbor, Michigan.

Oliver José R. 2008 The Archaeology of Agriculture in Ancient Amazonia In: Silverman H. and W.H. Isbell (eds.) *Handbook of South American Archaeology* New York: Springer 185-216

Pearsall Deborah M. 2008 Plant Domestication and shift to Agriculture in the Andes in: Silverman H. and W.H. Isbell (eds.) *Handbook of South American Archaeology* New York: Springer 105-120

Smith, Bruce D. 2001. Documenting plant domestication: The consilience of biological and archaeological approaches, *Proceedings of the National Academy of Science USA* 98(4): 1324-1326 [Teaching Collection; this article can be downloaded through the UCL network from <http://www.pnas.org/all.shtml>]

Smith, B.D. 2015. A Comparison of Niche Construction Theory and Diet Breadth Models as Explanatory Frameworks for the Initial Domestication of Plants and Animals. *J Archaeol Res* 23: 215. <https://doi.org/10.1007/s10814-015-9081-4>

Stahl Peter. W. 2008 Animal domestication in South America In: Silverman H. and W.H. Isbell (eds.) *Handbook of South American Archaeology* New York: Springer 121-130

Compare Rindos' evolutionary perspective on the origins of agriculture with that of Zeder 2016 –below.

Rindos, D.R. 1984. *The Origins of Agriculture: An Evolutionary Perspective*. New York, Academic Press. **Read Chapter 1: Evolution, Agriculture and Paradigms, pages three to 37 read Chapter 4: The Evolution of Domestication, pp 138-189.**

Rindos, D. 1996. Symbiosis, instability, and the origins and spread of agriculture. In O'Brien, M. (Ed.), *Evolutionary Archaeology: Theory and Application*, pp 209-235. University of Utah Press, Salt Lake City

Zeder, M. 2016 Domestication as a model system for niche construction theory. *Evol Ecol* 30:325–348

The following Basic Readings provide useful analyses of the processes associated with agricultural origins, the features and consequences of particular pathways outside the Near East:

Arroyo-Kalin Manuel. 2010 The Amazonian Formative: crop domestication and anthropogenic soils. *Diversity* 2, 473-504.

- Fuller, D., Castillo, C. 2016. Diversification and cultural construction of a crop: the case of glutinous rice and waxy cereals in the food cultures of Eastern Asia. In Lee-Thorp, J., Katzenberg, M. (Eds.), *The Oxford Handbook of the Archaeology of Diet*. Oxford University Press.
- Fuller, D.Q., Stevens, C., Lucas, L., Murphy, C.A., Qin, L. 2016. Entanglements and entrapment on the pathway toward domestication. In Der, L., Fernandini, F. (Eds.), *Archaeology of Entanglement*, pp 151-172. Left Coast Press, Walnut Creek, CA.
- Kingwell-Banham, E., Petrie, C., Fuller, D. (2015). Early agriculture in South Asia. In Barker, G., Goucher, C. (Eds.), *The Cambridge World History Volume 2: A World with Agriculture, 12,000 BCE–500 CE.*, pp 261-288. Cambridge University Press, Cambridge.
- Lyons, D. and D'Andrea, A.C. (2003). Griddles, ovens and agricultural origins: an ethno-archaeological study of bread baking in Highland Ethiopia. *American Anthropologist* 105, 515-530.
- Murphy, C., Fuller, D. 2016. the transition to agricultural production in India: South Asian entanglements of domestication. In Schug, G., Walimbe, S. (Eds.), *A Companion to South Asia in the Past*. John Wiley & Sons
- Shelach-Lavi, G., Teng, M., Goldsmith, Y., Wachtel, I., Stevens, C. J., Marder, O., ... & Polissar, P. (2019). Sedentism and plant cultivation in northeast China emerged during affluent conditions. *PLoS one*, 14(7), e0218751.
- Silva, F., Stevens, C.J., Weisskopf, A., Castillo, C., Qin, L., Bevan, A., Fuller, D.Q. 2015. Modelling the Geographical Origin of Rice Cultivation in Asia Using the Rice Archaeological Database. *PLOS ONE*, 10 (9), doi:10.1371/journal.pone.0137024
- Stevens, C. J., & Fuller, D. Q. (2017). The spread of agriculture in Eastern Asia: Archaeological bases for hypothetical farmer/language dispersals. *Language Dynamics and Change*, 7(2), 152-186.
- Winchell, F., Brass, M., Manzo, A., Beldados, A., Perna, V., Murphy, C., ... & Fuller, D. Q. (2018). On the origins and dissemination of domesticated sorghum and pearl millet across Africa and into India: a view from the Butana Group of the Far Eastern Sahel. *African Archaeological Review*, 35(4), 483-505.
- Yang, X., Wu, W., Perry, L., Ma, Z., Bar-Yosef, O., Cohen, D. J., ... & Ge, Q. (2018). Critical role of climate change in plant selection and millet domestication in North China. *Scientific reports*, 8(1), 7855.

Useful reference books on domestication

- Zohary, D., Hopf, M. and Weiss, E. 2012. *Domestication of Plants in the Old World*, fourth edition. Oxford University Press. [Third edition, 2000, available INST ARCH HA ZOH]
- Smartt, J. 1990. *Grain Legumes: Evolution and Genetic Resources*. Cambridge University Press. [Inst Arch BB 5 SMA]
- Smartt, J and Simmonds, N. W. (Eds.) 1995. *Evolution of Crop Plants*, second edition. Longman Scientific and Technical, London. [INST ARCH HA SMA]
- Zeuner, F. E. 1963. *A History of Domesticated Animals*. Hutchinson, London. [INST ARCH BB 3 ZEU, also on reserve]
- Clutton-Brock, J. .1999. *A Natural History of Domesticated Mammals / second edition*. Cambridge University Press, Cambridge. [INST ARCH HA CLU]

Hillson, S.W. 2000. Dental pathology. In Katzenberg, M.A. and Saunders, S.R. (Eds.), *Biological Anthropology of the Human Skeleton*, 249-287 Wiley-Liss, New York.

Piperno, D. 2006. *Phytoliths: A Comprehensive Guide for Archaeologists and Paleoecologists*. Alta Mira Press, Lanham, Maryland.

Torrence, R. and Barton, H. (Eds.) 2006. *Ancient Starch Research*. Walnut Creek: Left Coast Press.

General models & evidence for agricultural spread into Europe

Alexander, J. A. 1978. Frontier studies and the earliest farmers in Europe. In Green, D., Haselgrave, C. and Spriggs, M. (Eds.), *Social Organisation and Settlement*, pp13-29. BAR International Series 47, Oxford. [INST ARCH BB 2 Qto GRE, or INST ARCH AH GRE]

Colledge, S., Conolly, J. and Shennan, S. 2005. The evolution of Neolithic farming from SW Asian origins to NW European limits. *European J. Archaeology* 8, 137-156.

Conolly, J., Colledge, S. and Shennan, S. 2008. Founder effect, drift, and adaptive change in domestic crop use in early Neolithic Europe. *J. Archaeological Science* 35, 2797-2804

Coward, F., Shennan, S., Colledge, S., Conolly, J. and Collard, M. 2008. The spread of Neolithic plant economies from the Near East to Northwest Europe: a phylogenetic analysis. *J. Arch Sci* 35, 42-56.

Colledge, S. and Conolly, J. 2014. Wild plant use in European Neolithic subsistence economies: a formal assessment of preservation bias in archaeobotanical assemblages and the implications for understanding changes in plant diet breadth. *Quaternary Science Reviews* 101. 194-

Zeder, M. 2008. Domestication and early agriculture in the Mediterranean Basin: Origins, diffusion, and impact. *PNAS* 105, 11597–11604

WEEK 5. STUDENT POWERPOINT PRESENTATIONS

(Assignment 1, Part 2, see pages 4 and 5 of this handbook)

WEEK 6. ANIMAL DOMESTICATION

This session will focus in more detail on the zooarchaeological evidence for animal domestication and inferences of how early herds were managed. It also touches on the issue of initial herd dispersals, such as from southwest Asia to Cyprus, and later dispersal towards Europe.

READINGS WEEK 6:

Axelsson, E. Axelsson¹, Ratnakumar, A., Arendt, M-L., Maqbool, K., Webster, M.T., Perloski, M., Liberg, O., Arnemo, J.M., Hedhammar, A. & Lindblad-Toh¹, K. 2013. The genomic signature of dog domestication reveals adaptation to a starch-rich diet. *Nature* 495, 360-364.

Craig, O. E. et. al. 2005. 'Did the first farmers of central and eastern Europe produce dairy foods?' *Antiquity* 79, 882–894.

Curry, Andrew 2013 Archaeology: The milk revolution, *Nature* 500, 20-22.
<http://www.nature.com/news/archaeology-the-milk-revolution-1.13471>

Evershed, R.P. et al. 2008. Earliest date for milk use in the Near East and southeastern Europe linked to cattle herding. *Nature* 455, 528-531..

Harris, D.R. 2002. Development of agro-pastoral economy in the Fertile Crescent during the Pre-Pottery Neolithic period. In Cappers, R. and Bottema, S. (Eds), *The Transition from Foraging to Farming in Southwest Asia*, Berlin: Ex Oriente. [Teaching collection 2130]

Helmer, D.L., Gourichon, L., Monchot, H., Peters, J. and Segui, M.S. 2005. Identifying early domestic cattle from pre-pottery Neolithic sites on the Middle Euphrates using sexual dimorphism. In Vigne, J.-D., Peters, J., and Helmer, D. (Eds.), *The First Steps of Animal Domestication*, pp 86-95. Oxbow Books, Oxford.

Henton, E., Meier-Augusten, H. and Kemp, H. F. 2010. The use of oxygen isotopes in sheep molars to investigate past herding practices at the Neolithic settlement of Catalhöyük, central Anatolia. *Archaeometry*, 52 issue 3.

Larson, G., & Fuller, D. Q. (2014). The evolution of animal domestication. *Annual Review of Ecology, Evolution, and Systematics*, 45, 115-136.

Mason, I. L. (Ed.) 1984. *Evolution of Domesticated Animals*. Longman Scientific, London. [INST ARCH HA MAS]

Vigne, J.-D., Carrere, I., Saliege, J.-F., Person, A., Bocherens, H., Guilaine, J. and Briois, J.-F. 2000. Predomestic cattle, sheep, goat and pig during the late 9th and the 8th millennium cal. BC on Cyprus: preliminary results of Shillourokambos (Parekklisha, Limassol). In Mashkour, M., Choyke, A., Buitenhuis, H. and Poplin, F. (Eds.), *Archaeozoology of the Near East IVA*, 83-106. ARC Publicatie 32, Groningen. [Teaching collection 2427; INST ARCH DBA 4 BUI]

Hongo, H., Meadow, R. H., Oksuz, B. and Ilgezdi, G. 2005. Sheep and Goat Remains from Çayönü Tepesi, Southeastern Anatolia. In Buitenhuis, H., Choyke, A., Martin, L., Bartosiewicz, L. and Mashkour, M. (Eds.), *Archaeozoology of the Near East VI. Proceedings of the sixth international symposium on the archaeozoology of southwestern Asia and adjacent areas*, 113-24. ARC-Publicatie, Groningen.

Hongo, H., Pearson, J., Oksuz, B., Ilgezdi, G. 2009. The Process of Ungulate Domestication at Çayönü, Southeastern Turkey: A Multidisciplinary Approach focusing on *Bos* sp. and *Cervus elaphus*. *Anthropozoologica*, 44, 63-78.

Peters, J., von den Driesch, A., Helmer, D. 2005. The upper Euphrates Tigris Basin: cradle of agro-pastoralism? In *The First Steps of Animal Domestication*, Vigne, J.-D., Peters, J. and Helmer, D. (Eds) pp 96-123. Oxford: Oxbow Books.

WEEK 7. SECONDARY PRODUCTS REVOLUTION

It has long been recognized that domestication made possible a range of further exploitation strategies which gradually were adopted and developed by human societies. Termed “secondary products” by Sherratt, these activities have been searched for, initially with little success. However, in the case of dairying, the last decade has seen a series of initiatives which have led to the identification of milk residues in ceramics. Elsewhere, less work has been done on intensified agricultural production. This seminar will consider the progress that has been made so far and consider ways in which future lines of investigation may develop.

WEEK 7 READINGS:**Animal Secondary Products**

Sherratt, A. 1981. Plough and pastoralism: aspects of the secondary products revolution, in Hodder, Isaac, G. and Hammond, N. (Eds.), *Pattern of the Past: Studies in Honour of David Clarke*, 261-305. Cambridge University Press, Cambridge. [Teaching collection 523] [also reprinted in Sherratt, Andrew. *Economy and society in prehistoric Europe: changing perspectives* [DA 100 She]

alternatively

if pressed for time, see Sherratt's entry 'secondary products revolution' in the Oxford Companion to Archaeology (Fagan, B. (Ed.) 1996. [Inst Arch AG Fag]

O'Brien., M.J. & Bentley, R.A. 2015. The role of food storage in human niche construction: An example from Neolithic Europe. *Environmental Archaeology* 20, 364-378. *This paper discusses developments in dairying and the evolution of lactose persistence in humans*

Milk and residues

Copley, M.S., Berstan, R., Dudd, S.N., Aillaud, S., Mukherjee, A.J., Straker, V., Payne, S. and Evershed, R.P. 2005. Processing of milk products in pottery vessels through British Prehistory. *Antiquity* 79, 895-908.

Craig, O.E., Chapman, J., Heron, C., Willis, L.H., Bartosiewicz, L., Taylor, G., Whittle, A. and Collins, M. 2005. Did the first farmers of central and eastern Europe produce dairy foods? *Antiquity* 79, 882-894.

Dudd, S.N. and Evershed, R.P. 1998. Direct demonstration of milk as an element of archaeological economies. *Science* 282, 1478-1481.

Entwistle, R. and Grant, A. 1989. The evidence for cereal cultivation and animal husbandry in the southern British Neolithic and Bronze Age. In Milles, A., Williams, D. and Gardner, N. (Eds.), *The Beginnings of Agriculture*, pp 203-215. BAR International Series 496.

Halstead, P. 1996. Pastoralism or household herding? Problems of scale and specialization in early Greek animal husbandry. *World Archaeology* 28, 20-42.

Halstead, P. 1998. Mortality models and milking: problems of uniformitarianism, optimality and equifinality reconsidered. *Anthropozoologica* 27, 3-20.

O'Brien, M. and Laland, K.N. 2012. Genes, culture and agriculture: an example of human niche construction. *Current Anthropology* 53, 434-470. [With comments.]

O'Brien, M.J. and Bentley, R.A. 2015. The role of food storage in human niche construction: An example from Neolithic Europe. *Environmental Archaeology* 12, 364-378.

Simoons F.J. 1979. Dairying, milk use and lactose malabsorption in Eurasia: a problem in culture history. *Anthropos* 74, 61-80.

Spangenberg J.E., Jacomet, S. and Schibler, S. 2006. Chemical analyses of organic residues in archaeological pottery from Arbon Bleiche 3, Switzerland – evidence for dairying in the late Neolithic. *Antiquity* 33, 1-13.

Cash crops

Fuller, D. Q. 2008. The spread of textile production and textile crops in India beyond the Harappan zone: an aspect of the emergence of craft specialization and systematic trade. In Osada, T. and Uesugi, A. (Eds.), *Linguistics, Archaeology and the Human Past Occasional Paper 3*, pp 1-26. Research Institute for Humanity and Nature, Indus Project, Kyoto. [ISBN978-4-902325-16-4] {download here: <http://www.homepages.ucl.ac.uk/~tcrndfu/downloads.htm#crops> }

Fuller, D. Q., & Stevens, C. J. (2019). Between domestication and civilization: the role of agriculture and arboriculture in the emergence of the first urban societies. *Vegetation History and Archaeobotany*, 28(3), 263-282.

McCorriston, J. 1997. The fiber revolution. *Current Anthropology* 38, 517-550. [with commentaries] [can be downloaded through the college network from: <http://www.journals.uchicago.edu/CA/journal/contents/v38n4.html>]

Sherratt, A. 1980. Water, soil and seasonality in early cereal cultivation, *World Archaeology* 11: 313-329. [Teaching collection 170] [also reprinted in Sherratt, Andrew. *Economy and society in prehistoric Europe: changing perspectives* [DA 100 She]]

Sherratt, A. 1999. Cash-crops before cash: organic consumables and trade. In Gosden, C. and Hather, J. (Eds.) *The Prehistory of Food. Appetites for Change*, 13-34. London: Routledge.

Stump, D. 2006. The development and expansion of the field and irrigation systems at Engaruka, Tanzania. *Azania* XLI: 69-94

Vigne, J.D. and Helmer, V. 2007. Was milk a “secondary product” in the Old World Neolithisation process? Its role in the domestication of cattle, sheep and goats. *Anthropozoological*, 42 <http://sciencepress.mnhn.fr/sites/default/files/articles/pdf/az2007n2a2.pdf>

WEEK 8. AGRICULTURAL INTENSIFICATION AND LAND USE

Integrating environmental data with archaeological discoveries within reliable chronological frameworks and at variable scales, geoarchaeology serves as a key approach for the investigation of agricultural development and long-term land use. This session will first briefly introduce and review theories, methods and advantages/disadvantages of geoarchaeology in the study of early agriculture

READINGS WEEK 8:

Barker, G. 2006. *Agricultural Revolution in Prehistory*. Cambridge University Press, Cambridge.

Bayliss-Smith, T.P. and Hviding E. 2015. Landesque capital as an alternative to food storage in Melanesia: Irrigated taro terraces in New Georgia, Solomon Islands, *Environmental Archaeology*, 20:4, 425-436.

Brookfield, H. C. 1972. Intensification and disintensification in Pacific agriculture. *Asia Pacific Viewpoint* 13, 30-48. [Teaching collection 159]

Brookfield, H. C. 1986. Intensification intensified. Review of prehistoric Intensive agriculture in the tropics. *Archaeology in Oceania* 21, 177-181.

Brookfield, H.C. 2001. Intensification and alternative approaches to agricultural change. *Asia Pacific Viewpoint* 42 (Special Issue), 181–192.

Castillo, C., Higham, C., Miller, K., Chang, N., Douka, K., Higham, T., Fuller, D. Q. (2018) Social responses to Climate Change in Iron Age Northeast Thailand: new archaeobotanical evidence. *Antiquity* 92 (365): 1274-1291

French, C. 2003. *Geoarchaeology in Action: Studies in Soil Micromorphology and Landscape Evolution*.

Fuller, D.Q & Qin, L. 2009. Water management and labour in the origins and dispersal of Asian rice. *World Archaeology* 4, 88-111.

Jarman, M.R., G.N. Bailey and H.N., Jarman. 1982. *Early European Agriculture: Its Foundation and Development*. Cambridge University Press, Cambridge.

Kidder, T.R., Liu, H.W. and Li, M.L. 2012. Sanyangzhuang: early farming and a Han settlement preserved beneath Yellow River flood deposits. *Antiquity* 86: 30-47

Mithen, S. & E. Black 2011. *Water, Life and Civilisation: Climate, Environment and Society in the Jordan Valley*. Cambridge University Press, Cambridge.

Sherratt, A.1980. Water, soil, and seasonality in early cereal cultivation. *World Archaeology* 11, 313-330.

Styring AK, Charles M, Fantone F et al (2017a) Isotope evidence for agricultural extensification reveals how the world's first cities were fed. *Nature Plants* 3:17076. <https://doi.org/10.1038/nplants.2017.76>

van der Veen, M. 2005. Gardens and fields: the intensity and scale of food production. *World Archaeology* 37:2, 157-163, DOI: 10.1080/004382405

Further Recommended reading.

Ember, C.R. 1983. The relative decline in women's contribution to agriculture with intensification. *American Anthropologist*, New Series, Vol. 85, 285-304.

Carter, S. and Davidson, D. 1998. An evaluation of the contribution of soil micromorphology to the study of ancient arable cultivation. *Geoarchaeology* 13: 535-547.

Kirch, P. V. 1994. *The Wet and the Dry. Irrigation and Agricultural Intensification in Polynesia*. University of Chicago Press. **Read Introduction, pp.1-20 but especially pp. 15-20.**

Leach, H.M. 1999. Intensification in the Pacific. *Current Anthropology* 40, 311-339. [with commentaries].

Macphail, R. I., Courty, M.A., et al. 1990. Soil micromorphological evidence of early agriculture in north-west Europe. *World Archaeology* 22, 53-69.

Morrison, K. 1996. Typological schemes and agricultural change: beyond Boserup in precolonial South India. *Current Anthropology* 37, 583-608. [with commentaries].

WEEK : 9. Genetics, ancient DNA and its contribution to studying, domestication, agricultural transformations and migrations *(DF)

This session will provide an introduction to some of the implications of the genomics and ancient DNA revolution for archaeology and especially environmental archaeology through a discussion.

Basic premises:

A) Some genomes are simply inherited maternally intact (mitochondria, plant chloroplast), or father to son (Y-chromosome). The rest of the genome (most of it) recombines and mixes up 50% from each parent. (But in self-pollinating plants the mother and father may be the same!)

B) Genetics does not provide as straight forward answers about prehistory as you might expect! It finds patterns of relationship but there may be more than one historical process to explain those relationships. Analyses either focus on shared ancestry (phylogeny and/or coalescence) or hybridization (network models, structure, principle components) an the reality is likely some combination of the two.

Genetic changes: mutations, drift that removes or shift frequency if variants and relates to population size and time, selection that removes or increases variants as adaptation, some changes may piggy back selection).

C) Most genetics papers tell just-so stories, but really you should be looking for strong inference from multiple working hypothesis and some sort of model testing for the best fitting hypothesis (story testing not story testing: see below)

The reading list below develops some themes and approaches to analysing genetic data for archaeological, population history questions. As general background I suggest thre things: (1) Kristiasen's discussion of genetics and language in Europe (2) Gerbault et al "Storry testing paper"; and (3) the Shapiro & Hofreiter review on the state ancient DNA research. Beyond that read some of the pairs or trios of papers listed after the first 3 readings and be prepared to discuss them.

1) Kristiansen, K., Allentoft, M. E., Frei, K. M., Iversen, R., Johannsen, N. N., Kroonen, G., ... & Sikora, M. (2017). Re-theorising mobility and the formation of culture and language among the Corded Ware Culture in Europe. *Antiquity*, 91(356), 334-347.

2) Gerbault, P., Allaby, R. G., Boivin, N., Ruzdinski, A., Grimaldi, I. M., Pires, J. C., ... & Arroyo-Kalin, M. (2014). Storytelling and story testing in domestication. *Proceedings of the National Academy of Sciences*, 201400425.

3) Shapiro, Á., & Hofreiter, M. (2014). A paleogenomic perspective on evolution and gene function: new insights from ancient DNA. *Science*, 343(6169), 1236573.

In an ideal world, think about working through the list below in order. Otherwise choose one of these pairs or trios of papers to read and consider.

4 + 7 [Pigs in Europe], then compare with humans (#15) or dogs (#16)

7 + 8 [Pigs in Europe vs. Pigs in Asia] then compare with humans in India (#6) or dogs in Europe (#16)

4+ 9+ 16 Comparing domesticates: Pigs, Barley and dogs

10 + 11 + 12 [Debates on rice]

13 + 14 Ancient hominins (Neanderthals and Denisovans- the first papers.

14 + 18 The legacy of Denisovans and adaptaions from ancient genomes

15 + 17 The peopling of Europe based on aDNA. Consider alongside #1

5 + 6 + 19 The peopling of South Asia

Phylogeny, phylogeography: examples from animals and humans

4) Larson G, Dobney K, Albarella U, Fang MY, Matisoo-Smith E, et al. 2005. Worldwide phylogeography of wild boar reveals multiple centers of pig domestication. *Science* 307:1618–21

This study demonstrated how phylogeny of maternally inherited markers, when combined with geographical distribution could suggest something where domestication took place and the geography of dispersal – but it misses some of the story! A fundamentally similar approach underlay the first 20 or so years human genetics and the inference of migration histories, as in the two examples below.

5) Kivisild, T., Bamshad, M. J., Kaldma, K., Metspalu, M., Metspalu, E., Reidla, M., ... & Papiha, S. S. (1999). Deep common ancestry of Indian and western-Eurasian mitochondrial DNA lineages. *Current Biology*, 9(22), 1331-1334.

6) Kivisild T, et al. (2003) The genetic heritage of the earliest settlers persists both in Indian tribal and caste populations. *Am J Hum Genet* 72:313–332.

But look how the European pig story becomes more complicated with ancient DNA. This shows how the history recorded in genetic evidence may be incomplete due to poor sampling. Sampling is needed not just across space but across time, to account for lineage extinction/ extirpation.

7) Larson, G., Albarella, U., Dobney, K., Rowley-Conwy, P., Schibler, J., Tresset, A., ... & Bălăçescu, A. (2007). Ancient DNA, pig domestication, and the spread of the Neolithic into Europe. *Proceedings of the National Academy of Sciences*, 104(39), 15276-15281.

Now consider how the situation in China and SE Asia contrasts with that of Europe, thus implying very different systems of pig management and domestication processes over the long-term. The phylogenetic patterns on regional wild and domesticated populations are different in different reasons, we need to explain this in terms of different traditional management practices.

8) Larson G., Liu R, Zhao X, Yuan J, Fuller DQ, Barton L, Dobney K, Fan Q, Gu Z, Liu X-H, Luo Y, Lv P, Andersson L, Li N. Patterns of East Asian pig domestication, migration and turnover revealed by modern and ancient DNA. *Proc Natl Acad Sci USA*. 2010; 107(17): 7686-7691

What about plant domestication? Barley should be a straight forward self-pollinating case (outcrossing is estimated to be ~2%). Selected data from across the genome data again indicates phylogeographic patterns that separate east and west which is supported by a structure analysis of admixture (e.g. Saisho & Purugganan 2007).

9) Saisho, D., & Purugganan, M. (2007). Molecular phylogeography of domesticated barley traces expansion of agriculture in the Old World. *Genetics* 177: 1765–1776

Now consider rice origins: single origin or more? What is the genetic picture? What about maternal versus nuclear markers, whole chromosomes versus whole genomes? What role for hybridization?

10) Londo JP, Chiang Y, Hung K, Chiang T, Schaal BA. Phylogeography of Asian wild rice, *Oryza rufipogon*, reveals multiple independent domestications of cultivated rice, *Oryza sativa*. *PNAS*. 2006;103:9578–83.

11) Molina J, Sikora M, Garud N, Flowers JM, Rubinstein S, Reynolds A, et al. Molecular evidence for a single evolutionary origin of domesticated rice. *PNAS*. 2011a;108:8351–6.

12) Choi, Jae Young, Adrian E. Platts, Dorian Q Fuller, Yue-le Hsing, Rod A. Wing, and Michael D. Purugganan (2017) The rice paradox: Multiple origins but single domestication in Asian rice. *Molecular Biology and Evolution* 34 (4): 969-979. DOI: 10.1093/molbev/msx049

Ancient hominin genomes that rewrote Out of Africa stories and brought in new tools for admixture studies:

13) Green, Richard E., Johannes Krause, Adrian W. Briggs, Tomislav Maricic, Udo Stenzel, Martin Kircher, Nick Patterson et al. "A draft sequence of the Neandertal genome." *science* 328, no. 5979 (2010): 710-722.

14) Reich, David, Richard E. Green, Martin Kircher, Johannes Krause, Nick Patterson, Eric Y. Durand, Bence Viola et al. "Genetic history of an archaic hominin group from Denisova Cave in Siberia." *Nature* 468, no. 7327 (2010): 1053.

Structural analysis: identifying ancestral populations and extent of admixture. Ancient genomes can be included in these analyses.

15) Skoglund, P., Malmström, H., Raghavan, M., Storå, J., Hall, P., Willerslev, E., ... & Jakobsson, M. (2012). Origins and genetic legacy of Neolithic farmers and hunter-gatherers in Europe. *Science*, 336(6080), 466-469.

Dogs follow people

16) Ollivier, M., Tresset, A., Frantz, L. A., Bréhard, S., Bălăşescu, A., Mashkour, M., ... & Bartosiewicz, L. (2018). Dogs accompanied humans during the Neolithic expansion into Europe. *Biology letters*, 14(10), 20180286.

This brings us to the developing "BIG DATA" potential of aDNA and genomics

17) Haak, W., Lazaridis, I., Patterson, N., Rohland, N., Mallick, S., Llamas, B., ... & Fu, Q. (2015). Massive migration from the steppe was a source for Indo-European languages in Europe. *Nature*, 522(7555), 207.

18) Marciniak, Stephanie and George H. Perry (2017) Harnessing ancient genomes to study the history of human adaptation. *Nature Reviews Genetics* 18: 659–674

19) Narasimhan VM, Nick J Patterson, et al. (2019) The Formation of Human Populations in South and Central Asia. *Science* 365 (6457): 999; eaat7487 (6 Sept. 2019). DOI: 10.1126/science.aat7487

WEEK 10 - Complex societies: Producers, Consumers, The Scale Of Surplus and social dimension of food and agriculture *(DF)

In this class we examine issues where food and food production are taken in new directions by hierarchical and complex societies, including the role of processing, storage, conspicuous consumption. In all human societies, food procurement, production and consumption are known to be culturally mediated. Increasingly, archaeologists have come to recognise that the social dimensions of subsistence and consumption have had a significant bearing on the archaeological record. The division of labour and differential access to resources, be it by gender, age, social status/rank, that have shaped human societies in the past, will likewise have shaped the form and content of archaeological sites and the distribution of sites over the landscape.

Week 10 Readings

Brumfiel, E.M. and Earle, T.K. 1987. Specialization exchange and complex societies: an introduction. In Brumfiel, E.M. and Earle, T.K. (Eds), *Specialization, exchange and Complex Societies*, pp 1-9. Cambridge University Press, Cambridge.

Hamilakis, Y. 1999. Food technologies/technologies of the body: the social context of wine and oil production in Bronze Age Crete. *World Archaeology* 31, 38-54.

Hayden, B. 1996. Feasting in prehistoric and traditional societies. In Wiessner P. and Schiefhövel, W. (Eds.) *Food and the Status Quest*, pp 127-147. Berghahn Books, Providence & Oxford.

Fuller, D.Q. and Stevens, C.J. (2009) Agriculture and the development of complex societies: an archaeobotanical agenda. In Fairbairn, A. and Weiss, E. (Eds.), *Ethnobotanist of Distant Pasts: Essays in Honour of Gordon Hillman*, pp 37-57. Oxbow Books. Oxford.

Fuller, D. Q., & Stevens, C. J. (2019). Between domestication and civilization: the role of agriculture and arboriculture in the emergence of the first urban societies. *Vegetation History and Archaeobotany*, 28(3), 263-282.

Lepofsky, D., Kusmer, K., Hayden, B., Lertzman, K.P. 1996. Reconstructing prehistoric socioeconomies from palaeoethnobotanical and zooarchaeological data: an example from the British Columbia Plateau. *J. Ethnobiology* 16, 31-62.

Sherratt, A. 1999. Cash-crops before cash: organic consumables and trade. In Gosden, C. and Hather, J. (Eds.), *The Prehistory of Food. Appetites for Change*, 13-34.: Routledge, London.

Food, Agriculture and Social Status

Caplan, P. 1994 *Feasts, Fasts, Famine: Food for Thought*. Oxford: Berg.

Crabtree, P.J. 1996. Production and consumption in an early complex society: animal use in Middle Saxon East Anglia. *World Archaeology* 28, 58-75.

Dietler, M. and Hayden, B. (Eds.) 2001. *Feasts. Archaeological and Ethnographic Perspectives on Food, Politics and Power*. Washington: Smithsonian Institution Press. **[Not required for this seminar, but a valuable compilation, with good case studies]**

Fuller, D.Q. 2005. Ceramics, seeds and culinary change in prehistoric India. *Antiquity* 79, 761-777.

Goody, J. 1982. *Cooking, Cuisine and Class: A Study In Comparative Sociology*. Cambridge University Press, Cambridge.

Gumerman, G., IV 1997. Food and complex societies. *J. Archaeological Method and Theory* 4: 105-139.

Hall, M. 1986. The role of cattle in southern African agropastoral societies: more than bones alone can tell. *South African Archaeological Society, Goodwin Series*, 5, 83-7.

Gender and food production:

Bentley G.R., Aunger R., Harrigan A.M., Jenike M., Bailey R.C., Ellison P.T. 1999. Women's strategies to alleviate nutritional stress in a rural African society. *Social Science & Medicine* 48, 149-162

Burton, M.L. and White. D.R. 1984. Sexual Division of Labor in Agriculture. *American Anthropologist*, New Series, 86, 568-583

Elizabeth M. Brumfiel 1992. Breaking and entering the ecosystem - gender, class, and faction steal the show. *American Anthropologist*, New Series, 94, 551-567

Ember, C.R. 1983. The relative decline in women's contribution to agriculture with intensification. *American Anthropologist*, New Series, 85, 285-304.

Howard P.L. 2003. Women and a plant world: an exploration. In Howard P.L., (Ed.) *Women & Plants. Case Studies on Gender Relations in Biodiversity Management & Conservation*, pp 1-31. London: Zed Press.

Lancaster, C.S. 1976. Women, horticulture, and society in Sub-Saharan Africa. *American Anthropologist* 78, 539-564

Hamilakis, Y. 2003. The sacred geography of hunting: wild animals, social power and gender in early farming societies. *British School at Athens Studies* 9, 239-24

Pollock, D.K. 2005. Food and sexual identity among the Culina. In Counihan, .M. and Kaplan, S.L. (Eds.) *Food and Gender: Identity and Power*, pp12-29. The Netherlands: Harwood Academic Publishers.

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

Linderholm, A. C. H. Jonson, O. Svensk, K. Liden. 2008. Diet and status in Birka: stable isotopes and grave goods compared. *Antiquity* 82, 446-461.

Wright, K. 2000. The social origins of cooking and dining in early villages of Western Asia. *Proceedings of the Prehistoric Society* 66, 89-121.

Food Traditions: socially and culturally-mediated food preferences and avoidances

Curet A.L. and Pestle W.B. 2010. Identifying high-status foods in the archeological record. *J. Anthropological Archaeology* 29, 413–431.

Fuller, D. Q. and Rowlands, M. 2009. Towards a long-term macro-geography of cultural substances: food and sacrifice tradition in East, West and South Asia. *Chinese Review of Anthropology* 12, 1-3

Goody, J. 1982. *Cooking, Cuisine and Class: A Study In Comparative Sociology*. Cambridge University Press, Cambridge.

Gumerman, G. 1997. Food and complex societies. *J. of Arch. Method and Theory* 4, 105–139.

Haaland, R. 2007. Porridge and pot, bread and oven: food ways and symbolism in African and the Near East from the Neolithic to the Present. *Cambridge Archaeological J.* 17, 165-182.

Hesse, B. 1995. Husbandry, dietary taboos and the bones of the ancient Near East: zooarchaeology in the post-processual world. In *Methods in the Mediterranean – historical and archaeological views on texts and archaeology*, Small, D. (Ed.), pp197-232. Leiden: E.J. Brill.

Linderholm, A. C. H. Jonson, O. Svensk, K. Liden. 2008. Diet and status in Birka: stable isotopes and grave goods compared. *Antiquity* 82, 446-461.

Lepofsky D., Kusmer K.D., Hayden B., Lertzman, K.P. 1996. Reconstructing prehistoric socioeconomies from paleoethnobotanical and zooarchaeological data: an example from the British Columbia Plateau. *J. Ethnobiology* 16, 31-62

Meigs, A. 1987. Food as a cultural construction. *Food and Foodways*, 2, 341-357.

Miracle, P. and Milner, N. (Eds.) 2002. *Consuming Passions and Patterns of Consumption*. McDonald Institute Monographs, Cambridge.

Nabhan, G. P. 2005. *Why Some Like It Hot: Food, Genes and Cultural Diversity*. Island Press,

Washington, D.C.

Prentiss A. M., Lyons N. , Harris L.E. , Burns M.R.P. , Godin T.M. 2007. The emergence of status inequality in intermediate scale societies: A demographic and socio-economic history of the Keatley Creek site, British Columbia. *J. Anthropological Archaeology* 26, 299–327.

Sakamoto, S. 1996. Glutinous-endosperm starch food culture specific to Eastern and Southeastern Asia. In Ellen, R. and Fukui, F (Eds.), *Redefining Nature*, 215-231. Barg, Oxford.

Simoons, F. 1994. *Eat Not This Flesh – Food Avoidances from Prehistory to the Present Day*. (2nd edition; 1st edition 1961). University of Wisconsin Press, Madison. **See Ch. 2 on pork and Ch. 3 on beef.**

Smith, M.L. 2006. The archaeology of food preference. *American Anthropologist* 108, 480-493.

Twiss, K. 2012. The archaeology of food and social diversity. *J. Archaeological Research* 20, 357-395.

Yen, D.E. 1975. Indigenous food processing in Oceania. In Arnott, M.L. (Ed.), *Gastronomy, the Anthropology of Food Habits*, pp 147- 168. Mouton Publishers, The Hague.

APPENDIX A: POLICIES AND PROCEDURES 2019-20 (PLEASE READ CAREFULLY)

This appendix provides a short précis of policies and procedures relating to modules. It is not a substitute for the full documentation, with which all students should become familiar. For full information on Institute policies and procedures, see the **IoA Student Administration section of Moodle**: <https://moodle.ucl.ac.uk/module/view>

For UCL policies and procedures, see the Academic Regulations and the UCL Academic Manual:
<http://www.ucl.ac.uk/srs/academic-regulations> ; <http://www.ucl.ac.uk/academic-manual/>

GENERAL MATTERS

ATTENDANCE: A register will be taken at each class. **If you are unable to attend a class, please notify the lecturer by email. Students are normally required to attend at least 70% of classes.**

DYSLEXIA: If you have dyslexia or any other disability, please discuss with your lecturers whether there is any way in which they can help you. Students with dyslexia should indicate it on each coursework cover sheet.

COURSEWORK

LATE SUBMISSION: Late submission will be penalized in accordance with current UCL regulations, unless formal permission for late submission has been granted.

The UCL penalties are as follows:

- The marks for coursework received up to two working days after the published date and time will incur a 10 percentage point deduction in marks (but no lower than the pass mark).
- The marks for coursework received more than two working days and up to five working days after the published date and time will receive no more than the pass mark (40% for UG modules, 50% for PGT modules).
- Work submitted more than five working days after the published date and time, but before the second week of the third term will receive a mark of zero but will be considered complete.

GRANTING OF EXTENSIONS: Please note that there are strict UCL-wide regulations with regard to the granting of extensions for coursework. You are reminded that Module Coordinators are not permitted to grant extensions. All requests for extensions must be submitted on a the appropriate UCL form, together with supporting documentation, via Judy Medrington's office and will then be referred on for consideration. Please be aware that the grounds that are acceptable are limited. Those with long-term difficulties should contact UCL Student Support and Wellbeing (SSW) to make special arrangements. Please see the IoA website for further information. Additional information is given here

<http://www.ucl.ac.uk/srs/academic-manual/c4/extenuating-circumstances/>

RETURN OF COURSEWORK AND RESUBMISSION: You should receive your marked coursework within one month of the submission deadline. If you do not receive your work within this period, or a written explanation, notify the Academic Administrator. When your marked essay is returned to you, return it to the Module Co-ordinator within two weeks. You must retain a copy of all coursework submitted.

CITING OF SOURCES and AVOIDING PLAGIARISM: Coursework must be expressed in your own words, citing the exact source (**author, date and page number**; website address if applicable) of any ideas, information, diagrams, etc., that are taken from the work of others. This applies to all media (books, articles, websites, images, figures, etc.). **Any direct quotations from the work of others must be indicated as such by being placed between quotation marks.** Plagiarism is a very serious irregularity, which can carry heavy penalties. It is your responsibility to abide by requirements for presentation, referencing and avoidance of plagiarism. Make sure you understand definitions of plagiarism and the procedures and penalties as detailed in UCL regulations: <http://www.ucl.ac.uk/current-students/guidelines/plagiarism>

RESOURCES

MOODLE: Please ensure you are signed up to the module on Moodle. For help with Moodle, please contact **Charlotte Frearson** (c.frearson@ucl.ac.uk)