



McDONALD INSTITUTE CONVERSATIONS

Far from the Hearth

Essays in Honour of Martin K. Jones

Edited by Emma Lightfoot, Xinyi Liu & Dorian Q Fuller

Far from the Hearth



(Above) Martin Jones at West Stow, 1972 (with thanks to Ian Alister, Lucy Walker, Leonie Walker, and West Stow Environmental Archaeology Group); (Below) Martin Jones in a millet field, Inner Mongolia, 2010. (Photograph: X. Liu.)





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Cover image: *Foxtail millet field near Xinglonggou, Chifeng, China, photographed by Xinyi Liu, September 2014.*

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Acknowledgements

The initial idea of editing this volume grew out of a conversation between Xinyi Liu and Graeme Barker at St John's College, Cambridge in June 2016. The editors subsequently discussed the provisional layout of the volume. By April of the following year, our list of agreed contributors was complete. Abstracts followed, and the chapters themselves soon after. First of all, the editors would like to pay tribute to our 36 authors, whose excellent work and timely contributions made it all possible.

For the last two-and-a-half years, the volume has been known as 'Fantastic Beasts' in order to keep it a secret from Martin. As we enter the final stage, we wish to extend our thanks to all who have ensured Martin remains blissfully unaware, including Lucy Walker, and we offer her our sincere thanks. We are extremely grateful to Harriet Hunt, Diane Lister, Cynthia Larbey and Tamsin O'Connell, who are kindly

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*Xinyi Liu, Emma Lightfoot and Dorian Fuller
August 2018*

Foreword

The 28-year term of Martin Jones as the first George Pitt-Rivers Professor of Archaeological Science witnessed, and in part created, a transformation in the fields of environmental and biomolecular archaeology. In this volume, Martin's colleagues and students explore the intellectual rewards of this transformation, in terms of methodological developments in archaeobotany, the efflorescence of biomolecular archaeology, the integration of biological and social perspectives, and the exploration of archaeobotanical themes on a global scale. These advances are worldwide, and Martin's contributions can be traced through citation trails, the scholarly diaspora of the Pitt-Rivers Laboratory and (not least) the foundations laid by the Ancient Biomolecules Initiative of the Natural Environment Research Council (1989–1993), which he chaired and helped create. As outlined in Chapter 6, Martin's subsequent role in the bioarchaeology programme of the Wellcome Trust (1996–2006) further consolidated what is now a central and increasingly rewarding component of archaeological inquiry. Subsequently, he has engaged with the European Research Council, as Principal Investigator of the Food Globalisation in Prehistory project and a Panel Chair for the Advanced Grant programme. As both practitioner and indefatigable campaigner, he has promoted the field in immeasurable ways, at critical junctures in the past and in on-going capacities as a research leader.

The accolades for Martin's achievements are many, most recently Fellowship of the British Academy. Yet it is as a congenial, supportive—and demanding—force within the Pitt-Rivers Laboratory that the foundations of his intellectual influence were laid. Here, each Friday morning, the archaeological science community would draw sticks to decide who would deliver an impromptu research report or explore a topical theme. Martin is among the most laid-back colleagues I have worked with, yet simultaneously the most incisive in his constructive criticism. As a provider of internal peer-review he was fearless without being unkind. The themed Pitt-Rivers Christmas parties were equally impactful—on one occasion Alice Cooper appeared, looking ever so slightly like our professor of archaeological science.

Martin's roles as a research leader extended to several stints as head of the Department of Archaeology, chairing the Faculty of Archaeology and Anthropology and serving as a long-term member of the Managing Committee of the McDonald Institute for Archaeological Research. Having started his professional career as an excavation-unit archaeobotanist in Oxford, he was a long-standing proponent of the highly successful Cambridge Archaeological Unit. In the wider collegiate community, he is a Fellow (and was Vice-Master) of Darwin College and was the staff treasurer of the Student Labour Club. In all roles he fought valiantly and often successfully for the interests of his constituency. His capacity to fight for deeply held priorities while recognizing the value of diverse perspectives was of utmost importance. His nostalgic enthusiasm for the debate with archaeological science that was engendered by the post-processual critique is one signal of an underlying appreciation of plurality. His active support for the recent merger of the Divisions of Archaeology and Biological Anthropology, within our new Department of Archaeology, is another. As a scientist (Martin's first degree, at Cambridge, was in Natural Sciences) he values the peer-reviewed journal article above all scholarly outputs, yet has authored as many highly regarded books as a scholar in the humanities. His *Feast: Why humans share food* has been translated into several languages and won Food Book of the Year from the Guild of Food Writers. He views academia and society as a continuum, campaigning for archaeobotanical contributions to global food security (e.g. by promoting millet as a drought-resistant crop) and working with world players such as Unilever to encourage archaeologically informed decisions regarding food products.

That Martin's achievements and influence merit celebration is clear. That his colleagues and students wish to honour him is equally so. Yet does the McDonald Conversations series publish *Festschriften*? This is a semantic question. As series editor I am delighted to introduce a collection of important papers regarding the past, present and future of archaeobotany, representing its methodological diversity and maturity. That this collection concurrently pays respect to a treasured colleague is a very pleasant serendipity.

Dr James H. Barrett

Part I
Introduction

Introduction

Far from the Hearth

Xinyi Liu, Emma Lightfoot & Dorian Q Fuller

The essays in this volume honour a man whose research over the last four decades has exemplified the potential of archaeology, archaeological science and their cognate disciplines to address central questions about food and human nature. Martin Jones was a pioneer in the fields that have come to be known as archaeobotany and archaeological science. Whether working as an on-site archaeobotanist at British Iron Age sites in the 1970s and '80s, initiating the 'Ancient Biomolecule Initiative' in the 1990s, or researching past food globalization and the use of millet in the twenty-first century, Martin has repeatedly demonstrated how archaeology can be situated within our attempts to make sense of our own experiences of the contemporary world. While some of these challenges are currently very clear, for instance in relation to food security and climate change, others may only be appreciated with the benefit of hindsight.

Martin is question-driven. As a scientist he aspires to a depersonalized methodology, towards an approach that is replicable by all; on the other hand, he sees that the methodology cannot dictate the questions we ask. He explores the territory between two interpretative traditions, those who classify humans as biological organisms and those who consider the social person. He warns that one should avoid retreating into the safety of either these traditions, as it is the interconnection between social and biological discourses that sheds most light on the past.

This volume is organized around three major themes from Martin's career, and each is derived from a title of one of his books, chapters or papers. 'A Botanical Battleground' is named after his 1988 chapter 'The arable field: a botanical battleground'. This section includes six chapters that honour Martin's central role in the development of biomolecular archaeology and archaeobotany as disciplines. The second section, 'The Stomach and the Soul', is derived from a chapter in his book *Feast: Why humans share food* (2008), and this reflects his writings on the archaeology of food from evolutionary perspectives. The final section title, 'Between Fertile Crescents', is taken from his 2004

chapter 'Between fertile crescents: minor grain crops and agricultural origins' and connects to his more recent interest in food globalization in prehistory. The name of this monograph, *Far from the Hearth*, is the title of a chapter in *Feast*, in which he contrasts the evidence for lavish consumption (feasting) in the archaeological record with the tough lives of most people much of the time, as hunger was commonplace. This contrast sets up much of the tone of Martin's intellectual aspiration.

A botanical battleground

The first section honours not only Martin's early research in the application and development of archaeological science techniques, but also his fundamental role in the development of biomolecular archaeology as a discipline and in its early funding, without which many of us would not be here today.

The section starts with two papers that are directly inspired by this research. Dorian Fuller and Chris Stevens discuss and develop Martin's concept of the 'botanical battleground', that is the conceptualization of a field as a place where weed taxa compete with each other and with the crop, and in which farmers compete with weeds. They highlight the importance of these dynamic ecosystems and the contribution that archaeobotanists can make to agricultural research by adding time depth.

In the following chapter, Chris Stevens and Dorian Fuller describe the various categories of weed seeds in terms of their seedbank ecology and how this ecology is related to and affected by agricultural practices. Using changes in weed flora through time, they show how a consideration of weed species can be used to 'paint a picture' of the history of British agriculture from the Neolithic to the present day. This analysis provides key insights into changes in intensity and location of cultivation, as well as into farming practices (e.g. tillage), harvesting strategies and processing techniques.

This is followed by two more methodological papers, starting with Victor Paz's chapter which gives

details of a determination system he has developed for macroscopic plant remains, particularly parenchyma. The paper calls for transparency in the chain of reasoning that led to an identification, allowing the reader to evaluate the determination and how secure it is. Where possible, determinations should be based on an actual reference collection, with samples matched between past and present, and based on the uniqueness of transformed archaeological remains.

The next chapter, by Carla Lancelotti and Marco Madella, discusses the historical development of phytolith studies from their 'discovery' in 1835 to the various ways they are used today. The authors then discuss how phytolith analyses add to our understanding of plant use, the origins of agriculture and agricultural techniques in the past.

Terry Brown looks back at genetic work and research on the origins of European agriculture. In retrospect, the chapter starts with a Biomolecular Palaeontology meeting in 1990 and reviews the some of the key debates around development of archaeogenetics over the past few decades. For 30 years, those multidisciplinary debates took place as conversations between geneticists and archaeologists. These dialogues have proved stimulating, challenging and enjoyable. Brown approaches this history as a participant and fellow-traveller with Martin.

The section concludes with a tribute to Martin's role in the development of biomolecular archaeology written by Terry Brown, Richard Evershed and Matthew Collins. They highlight how many scholars owe their careers to Martin, via the funding schemes that he was fundamental in initiating along with Geoff Eglinton, Gordon Curry and others. It is clear that, without Martin's sustained lobbying over many years, biomolecular archaeology would today be a much less vibrant area of research with significantly fewer archaeologists using biomolecular techniques to explore the human past.

The stomach and the soul

The second section focuses on papers emphasizing the social and cultural aspects of food, subsistence strategies and the rituals associated with food preparation and consumption. The idea that 'food is good to think with' has been central to Martin's research and thinking over many years and the papers presented in this chapter use ethnographic, archaeological and scientific evidence to explore a territory between social and biological aspects of food.

In the first chapter, Graeme Barker and colleagues explore shifting domesticatory relationships between people, plants and animals in the Kelabit

Highlands of interior Borneo. Through their proposed long landscape history, they show how the rainforest is a repository of memory of past generations and how plant translocations also 'enculture' the rainforest. They emphasize how the two local communities, the Kelabit and Penan, have very different concepts of the rainforest and a different relationship to rice farming. The Kelabit celebrate rice fields and rice cultivation and see themselves as forest domesticators. In contrast, the Penan are reluctant to separate themselves from the forest and its benevolent spirits. The authors suggest that this division has an antiquity of only a few centuries and that rice's 'need for people to grow it' was concurrent with new ways of living.

Cynthia Larbey then discusses how foraging and sharing of food became gendered. Drawing on ethnographic, primatological, archaeological and genetic data, she discusses how female foraging and subsequent sharing of plant foods increases the likelihood of children surviving to adulthood (through the birth of fatter babies, and more successful breastfeeding and weaning). This strategy can be seen today in the foraging strategies of modern hunter-gatherers and archaeological evidence suggests that it dates back to the time of early *Homo*.

In the following paper, Christine Hastorf considers the cultural and ontological perspectives that accompanied the (continued) domestication of the potato. In contrast to grain crops, potatoes reproduce asexually and in order to maintain diversity, and thus protect against disease and pests, farmers must regularly add new varieties into the farming system. Hastorf shows the importance of exchange in the robusticity of potato crops and how the need for exchange of tubers created a unique state of mind in the farmers and encouraged communication, innovation and cooperation.

We then move to the Early Natufian, with Manon Savard's paper exploring the relationship between subsistence and sedentism in non-agricultural societies. Using Hallan Çemi, Turkey, as her example, she considers the archaeobotanical remains in the light of the combined models of Optimal Foraging Theory and the Broad Spectrum Revolution, that is, the idea that when hunter-gatherers became settled they altered their subsistence strategy from one focused on hunting high-ranked animals (which required migration) to one focused on a wider range of resources, including lower-ranked ones (available locally). The archaeobotanical data show that, while a wide range of plant resources is present in the Hallan Çemi assemblage, only a few of those species are present in significant quantities. In particular, she highlights how 'underestimated plants', in this case club rush

and knotgrass, may have been the staple foods that made sedentism possible before the emergence of agriculture. Nevertheless, she also considers the possibility that permanent structures do not equate with permanent occupation and emphasizes that these sites may be important nodes in the landscape, with abundant and reliable resources worthy of the investment of time and effort required for the construction of permanent structures.

Turning to the East, the chapter by Leo Hosoya and colleagues shifts the focus from animal/plant domesticates to cooking methods. Soot/burnt marks on cooking pots from prehistoric China and Japan are analysed. Two case studies are presented—the Japanese Jomon-Yayoi-Kofun cultures and the Neolithic lower Yangtze in China—in an attempt to reconstruct the daily meals of ancient rice-eating communities.

Concluding this section, Gilly Carr, Marie Louise Stig Sørensen and Dacia Viejo Rose discuss food as heritage. They consider two examples of approaches to food as heritage today: UNESCO's recognition of intangible cultural heritage, which includes food; and the specific case of the use of food in the discussion of war and the occupation of the Channel Islands. Both cases highlight ways in which food is important beyond subsistence; how the cultural values and meanings associated with food can be used as markers of identity, togetherness and social bonds, as well as how food can contribute to conversations about history, places and ways of doing things.

Between fertile crescents

In recent years, the major focus of Martin's research has been the spread of crops across vast distances in prehistory, particularly the spread of wheat and barley from the Near East across Eurasia to China and the spread of millet species from China westwards as far as Europe. The two Fertile Crescents referred to are the well-known Near Eastern Fertile Crescent, and the 'eastern fertile crescent'—the early Neolithic sites in the Yellow River region and sites along the eastern edge of the Loess Plateau, which form 'China's Fertile Arc' (Liu *et al.* 2009). The papers in this section all address aspects of the archaeology associated with this research theme, as well as the methodologies we can use to address it.

The first chapter in this section, by Xinyi Liu, Giedre Motuzaite Matuzeviciute and Harriet Hunt, returns to the question of millet origins raised in Martin's (2004) chapter 'Between fertile crescents: minor grain crops and agricultural origins'. The chapter reviews recent advances in understanding broomcorn millet origins and spread through three

kinds of evidence: genetics; the earliest archaeological evidence in China; and new finds in Central Asia and Europe. Over 10 years, the Asian millets have moved from a poorly understood peripheral resource to a well-charted core feature of Old World prehistoric agriculture and its globalization.

The contribution from Emma Lightfoot, Xinyi Liu and Penelope Jones discusses how carbon isotope analysis can be used to identify the consumption of C₄ plants in the archaeological record. Specifically, they call for greater consideration of edible C₄ plants other than the known major crops (e.g. millet, maize and so on) in isotopic studies. To illustrate the potential problem, they identify edible C₄ plants grown in three different regions (Sicily, Italy; Haryana, India; and the south coast of Peru) and consider how the proportion of edible C₄ plants growing in each of these regions could affect archaeological interpretations of stable isotope results.

We move then to archaeogenetic analyses with a chapter written by Harriet Hunt and colleagues which discusses how genetic analyses have been used to consider domestication geographies. They use a diverse range of crops to illustrate how thinking has developed from the centres of origin concept developed by Vavilov to debates over single or multiple domestications. They also consider the implications of protracted domestications and ongoing gene flow on the use of genetic data to infer the geography of domestication.

Our focus then moves to two papers discussing the archaeobotany of China. The first, by Haiming Li and Guanghui Dong, focuses on Early Bronze Age archaeobotanical remains of both wheat and barley from Lijiaping in the northeastern Tibetan Plateau. The authors discuss the adoption of barley in this region around 1700 BC and compare it to the preferential adoption of wheat in the nearby Hexi corridor. They highlight the advantages that both wheat and barley had over the previous staples, foxtail and broomcorn millet, particularly in terms of cold tolerance and crop yield. They conclude that the differential adoption of wheat and barley between the northeastern Tibetan Plateau and the Hexi corridor relates to the environmental and climatic conditions of these two regions being better suited to barley and wheat, respectively.

The final paper of this monograph, by Zhijun (Jimmy) Zhao, discusses the timing and route of the introduction of wheat into China, a focus of Martin's more recent research. Zhao reviews the archaeobotanical finds of early wheat remains, providing a critical assessment of the evidence. From these data, he shows that wheat was introduced to China between 4500 and 4000 years ago, and that it was introduced

along at least two routes. The first of these is a grassland route, from West Asia through Central Asia and the Eurasian Steppe to northern China and then the middle and lower reaches of the Yellow River. The second route, the oasis route, went from West Asia through Central Asia and then to the Pamir Mountains and oases on both sides of the Tarim Basin, then to the Hexi Corridor and on to the Loess Plateau of northern China.

Concluding notes

The chapters in this volume, like much of Martin's own work, are devoted to the archaeology of food. The emphasis is not only on food itself, but also on the communities which produced and consumed it. The interdisciplinary studies presented elucidate the spatial and temporal scales of recent developments of the field. In this volume, readers will find articles discussing a wide range of time periods and environments. Many of the articles involve original thinking; they are often imaginative, and some are controversial. Some of them begin with a tentative answer, drawn from a wealth of experience and insight and guesswork, which should drive future research. Readers will also find that this book highlights some approaches that emerged in the 1990s at the time when Martin was involved in the 'Ancient Biomolecules Initiative'. These approaches have become the foundation for aspects of archaeogenetics, residue analysis and isotopic studies that are now integral features of modern archaeological science and archaeobotany. Furthermore, the book provides a number of examples that explore the territory between the biological organism and the social person, two perspectives that have ghettoized the various studies of the human condition into separate social and biological discourses that so often fail to interconnect.

Finally, we see recent developments in Eastern Eurasia, about which little was known archaeobotanically in the earlier part of Martin's career and to which he has contributed. The recent florescence, over the last decade or so, has been an exciting time with massive strides made towards a better understanding of Asian prehistory. Martin played an important role in bringing some novel methodologies to that enterprise. The main consequence of all of these new discoveries has been to encourage us to reflect on the assumptions we have held in a western context, including our assumptions about what agriculture actually is.

Agriculture represents a dynamic ecology formed of competing crops and weeds and changing social practices. The recognition of these dynamics has been critical to Martin's thinking, from his earlier experience in West Stow Environmental Archaeology Group to his work in the Thames Valley through to the transcontinental perspective on 'minor' crops. His career has helped to make archaeobotany and biomolecular archaeology similarly dynamic fields.

References

- Jones, M.K., 1988. The arable field: a botanical battleground, in *Archaeology and the Flora of the British Isles: Human influence on the evolution of plant communities*, ed. M.K. Jones. Oxford: Oxford University Committee for Archaeology, 86–92.
- Jones, M.K., 2004. Between fertile crescents: minor grain crops and agricultural origins, in *Traces of Ancestry – Studies in honour of Colin Renfrew*, ed. M.K. Jones. Cambridge: McDonald Institute for Archaeological Research, 127–35.
- Jones, M.K., 2008. *Feast: Why humans share food*. Oxford: Oxford University Press.
- Liu, X., H.V. Hunt & M.K. Jones, 2009. River valleys and foothills: changing archaeological perceptions of North China's earliest farms. *Antiquity* 83, 82–95.