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Edited by Graeme Barker and Candice Goucher

Excerpt

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I

Introduction

A world with agriculture

GRAEME BARKER AND CANDICE GOUCHER

This volume traces the origins of agriculture and the character of early agricultural communities across the world and surveys the development of the more complex social structures and cultural forms that agriculture enabled. Until around 11,500 years ago, when the world's climate changed from the Pleistocene (the 'Ice Ages', a period of dramatic and often abrupt transformations in temperature and precipitation regimes) to our own climatic era termed the Holocene, most of the world's population lived by various combinations of hunting, fishing, and gathering ('foraging'). A few thousand years later many societies in Eurasia, Africa, and the Americas relied wholly or partly on farming for their food. Arguably the most important event in world history, food production has been linked to significant changes in landscapes and populations that eventually supported the rise of urbanism, increasing complexity, and inequality that dominated the planet's history thereafter and enabled human populations to expand from perhaps 6 million at the end of the Pleistocene to over 7 billion today. The processes that led from foraging to farming and herding took thousands of years to unfold globally. Thus this volume necessarily has not only a global perspective but also a very broad chronology to capture the expansive timeframe of the origins and diffusion of agriculture worldwide. Our timeframe is broadly from the beginnings of the Holocene to the beginning of the Common Era, but in some cases the span may be even bigger, as in some parts of the world behaviours that presaged farming went back well into the Pleistocene and in some regions the diffusion and adoption of agriculture continued well into the first millennium CE and even into the second.¹

The *Oxford English Dictionary* defines agriculture as 'the science and art of cultivating the soil, including the gathering in of the crops and the rearing of

¹ Graeme Barker, *The Agricultural Revolution in Prehistory: Why did Foragers become Farmers?* (Oxford University Press, 2006).

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livestock', and farming as 'the business of cultivating land and raising stock', the mix of science, art, and business in these definitions nicely encapsulating the complex management strategies needed in food production, but also their economic potential. Domestication is commonly used to describe the process by which plants or animals are separated from the natural or wild population to the extent that the individuals within the population lose their ability to survive and produce offspring without human protection and manipulation. At the same time, however, there is increasing recognition that domestication is not a one-way process, and that when plants, animals, and humans are brought into close proximity, domestication has the potential to affect all three parties to the relationship rather than being just a question of humans learning ways to control plants and animals. Pastoralism is defined in the *OED* as 'the practice of keeping sheep, cattle, and other grazing animals', especially in 'the nomadic, non-industrial society that it implies' in a specialized economic system in which people rely mostly on their livestock (i.e. domestic animals) for their food, as opposed to systems of animal husbandry and stock-rearing in which the keeping of livestock is well integrated with, and frequently ancillary to, the cultivation of crops (Chapter 6). Though once thought to be a primitive form of husbandry that preceded plant cultivation, it is now recognized to be more usually a sophisticated economic system on the edge of, and intimately linked to, state-level agricultural societies.

The exploration of a world with agriculture invites a world historical approach. It demands an understanding that is simultaneously both global and local. Many scholars have examined local reverberations of the revolutionary transitions to food production. These often have been site-specific studies by archaeologists, who sometimes have placed their work in a wider context only by considering factors that may have led to the diffusion of agriculture via trade and migration. Until recently few authors have attempted to weave a global perspective. Critical to any broader study of agricultural origins is not only the mapping of expansive regional patterns, but also the interpretation of local ecologies that has framed the understanding of prehistoric behaviour. What continues to confound researchers is the answer to the seemingly simple question of why the advantages of agriculture apparently became obvious to many prehistoric populations in vastly different parts of the world.

Research traditions

By the middle of the nineteenth century archaeologists were classifying the hunter-gatherer societies of the Ice Ages, the makers of cave art in western

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Europe, as Palaeolithic or Old Stone Age, and the first farming societies as Neolithic or New Stone Age. The latter were defined in particular by the first appearance (as then believed) of polished stone tools and pottery along with domestic plants and animals. The British archaeologist Hodder Westropp first coined the term Mesolithic or Middle Stone Age in 1872 (in his *Prehistoric Phases*) to describe the hunter-gatherers in Europe who were living after the Ice Ages, in our own climatic era, but before the development of farming. He described the Mesolithic as the Age of Barbarism when ‘man lived as the tiger lives, catching his prey by his superior cunning, strength and pluck’ and the Neolithic as the Age of Pastoralism when ‘the cow yields him milk and the goat yields him cloth; yet he wins these requisites from them not by murderous cunning but by tender love’.² He was one of those who thought that plant husbandry came later, in the Bronze Age, but by the 1880s it was recognized that the beginnings of plant and animal husbandry generally went together, and the Neolithic was defined in these terms. Although the Mesolithic/Neolithic nomenclature was first developed for Europe, the terms were commonly being applied in many other parts of the world in the opening decades of the twentieth century as the frameworks of prehistory were established.

The terminology is widely accepted as unsatisfactory, in particular the term Neolithic, though as with most unsatisfactory terminologies no better alternatives have been proposed. The latter may sometimes be used in the literature as a period descriptor (the ‘Neolithic period’), its use in this sense implying that everybody at that time in a particular region practised farming, while the evidence now shows that many people in fact lived by a mixture of farming, hunting, and gathering, or just by hunting and gathering; it may be used sometimes as an economic descriptor, as in the Neolithic Revolution, for example ‘Neolithic people’ (i.e. farmers) ‘lived alongside Mesolithic people’ (i.e. hunter-gatherers); it may sometimes be used as a descriptor of a ‘package’ of material culture, i.e. artefacts such as pottery and polished stone axes but also forms of settlement, houses, burials, etc., as well as domestic plants and animals, leading to descriptions of hunter-gatherers ‘adopting part of the Neolithic package’. Clearly it is essential for scholars writing about the beginnings of farming to explain what they mean by Neolithic and how they will use the term, as it is all too easy to slip from one use of the term to another, often unconsciously and sometimes in the same sentence!

2 H. Westropp, *Prehistoric Phases* (London: Bell & Daldy, 1872).

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Although he wrote mainly about Southwest Asia (the ‘Near East’) and Europe, the Australian (but UK-based) prehistorian Gordon Childe remains hugely influential for archaeologists interested in the origins of agriculture. In books such as *Man Makes Himself* (1936) and *What Happened in History* (1942) he proposed that farming probably began as a response by hunter-gatherers to the end of the Ice Ages and beginning of the modern climatic era.³ Though he was mistaken about the course of climate change in Southwest Asia (he thought that the beginning of the Holocene would have been characterized by the development of aridity, whereas we now know that it got wetter, not drier), the overall argument that hunter-gatherers turned to farming in the context of the changes to the world’s climate with the transition from the Pleistocene to the Holocene remains the dominant view for most scholars today. He famously proposed the term ‘Neolithic Revolution’ to encapsulate the process of changing from foraging to farming, on a par with later revolutions like the Industrial Revolution in its transformational character (even if it took millennia rather than centuries or decades like later socioeconomic revolutions): farming gave people a reliable food supply, in contrast with hunting and gathering, that allowed them to settle down (‘sedentism’), build stable communities, and create food surpluses that allowed population numbers to rise and set the stage for the development of cities and states (his ‘Urban Revolution’).

Childe’s ideas about a Neolithic Revolution were in many respects borne out by the explosion of archaeological fieldwork in regions such as Southwest Asia, Central America, and Peru in the 1950s and 1960s. Most of these expeditions represented the beginnings of a new kind of interdisciplinary archaeology involving specialists in archaeological science and ancillary disciplines who collected data sets from the excavated sites such as animal bones and carbonized seeds and other fragments of plants to track the beginnings of, respectively, animal and plant domestication, and to investigate (from sediment cores in the vicinity) fossil pollen and sedimentary indicators of the climatic and environmental contexts in which early farming was practised. Underpinning this work was the collection of organic material such as charcoal for the new dating method of radiocarbon or carbon 14 (¹⁴C) dating: this allowed archaeologists for the first time to date the sites they were excavating independently of other means, whereas Childe had only been able to date Neolithic sites in Europe, for example, by trying to show

3 V.G. Childe, *Man Makes Himself* (London: Watts, 1936), and *What Happened in History* (Harmondsworth: Penguin, 1942).

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direct or indirect links in their material culture with pharaonic Egypt, which had dated historical records going back to around 3000 BCE. (The scale of the revolution represented by ¹⁴C dating can be conveyed by the fact that the first dates for the beginnings of the Neolithic in Europe, in Greece, placed the sites at around 6000 BCE, not 3000 BCE!) In Southwest Asia excavations of sites such as Jericho in Israel (by Kathleen Kenyon), Jarmo in Iraq (by Robert and Ann Braidwood), and Ali Kosh in Iran (by Frank Hole and Kent Flannery) showed that by around 8000 BCE, a thousand or so years into the Holocene, people were living in villages of small houses made of packed mud, using polished stone tools (the first Neolithic pottery here was not made until a few thousand years later), growing crops such as wheat, barley, and legumes, and keeping domestic animals such as sheep and goats, pigs, and cattle.⁴

Rather similar ‘village farming communities’ were revealed by parallel work in other parts of the world, using different mixes of domesticated plants and animals, such as maize and other vegetables in parts of the Americas and rice and pigs in China. In combination, this phase of research indicated that the Neolithic Revolution began in a few ‘hearths of domestication’, in particular Southwest Asia, China, eastern North America, Central America, Peru, and the African Sahel, and that farming then spread to neighbouring regions, most commonly as a result of a migration by farmers, though in some cases as a result of the adoption of farming by hunter-gatherers coming into contact with farmers.

Pathways to agriculture

Given that most of the world’s population relies on a small number of plants and a smaller number of animals for most of its food, it is easy to assume that the advantages of farming must have been obvious to any prehistoric hunter-gatherers given the opportunity to engage in it. For archaeologists, this assumption received a severe dent in the late 1960s and 1970s from the publication of ethnographic studies of the few remaining

4 K. Kenyon, ‘Earliest Jericho’, *Antiquity*, 33 (1959), 5–9; R.J. Braidwood and B. Howe, *Prehistoric Investigations in Iraqi Kurdistan*, Studies in Oriental Civilization 31 (University of Chicago Press, 1960); F. Hole and K.V. Flannery, ‘The prehistory of south-west Iran: a preliminary report’, *Proceedings of the Prehistoric Society*, 33 (1967), 147–206; F. Hole et al., *Prehistory and Human Ecology of the Deh Luran Plain*, Memoirs of the Museum of Anthropology 10 (Ann Arbor: University of Michigan, 1969).

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populations of present-day hunter-gatherers. Even in the arid Kalahari desert, for example, the small bands of !Kung San people still living there by hunting and gathering were shown not to live an uncertain hand to mouth existence but to enjoy a secure diet of preferred and less attractive emergency foods, and to spend far less time and effort each day securing them than neighbouring subsistence farmers – they spent as much time socializing as they did securing their food supply. The ‘downside’ was that they needed to stay mobile, not accumulate lots of possessions as everything had to be carried from one campsite to another, and keep their numbers down (as the mother on the move could only carry one baby) so infanticide was not uncommon. Even so, ethnographies such as those of the !Kung San were influential in persuading archaeologists to think about scenarios for the origins of agriculture in which, rather than hunter-gatherers seeing the advantages of agriculture as obvious, external ‘push’ factors such as climate change or population pressure might have pushed hunter-gatherers into adopting the farming life. More recent thinking has tended to postulate internal ‘pull’ factors such as social competition or shifts in ideology as possible mechanisms by which hunter-gatherers might have been induced consciously or unconsciously to begin to engage in farming.

Relying on the direct evidence gleaned from the visual analysis of animal bones and seeds, early archaeologists developed limited models for reconstructing the processes of intensification and transformation. Tropical and subtropical regions of the world offered very little in the way of well-preserved sites, particularly in comparison with dry and arid expanses of Eurasia and Africa. Many of these limitations have now been overcome by systematic investigations in the radically different habitats on all continents, employing both traditional studies of cultigens but also analyses of starch residues (a breakthrough for studying the use of root crops such as yams, taro, and sweet potato in tropical regions). Biomolecular techniques have also revolutionized research on the origins and early history of farming, such as using DNA in modern plants and animals and ancient DNA in archaeological bones and seeds to model domestication histories; analysing the isotope chemistry in human and animal bones from archaeological excavations to establish the diets of the living populations and, in some cases, their migration histories; and analysing organic residues attached to artefacts to identify foodstuffs such as cereal residues on the surfaces of stone tools, or traces of milk, milk products, and animal fat (the latter now identifiable to different species) in the fabrics of pottery sherds. The study of the origins and early history of agriculture requires the concerted efforts

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of a multidisciplinary archaeology and cognate disciplines, and is being enriched by an ever widening array of scientific techniques of analysis and interpretation.

One assumption that has underpinned a great deal of scholarly as well as popular writing about the origins of agriculture has been that it was probably a 'one-way journey of progress' from being a hunter-gatherer to becoming a farmer, a journey with the goal of learning how to domesticate and manage the plants and animals whose products fill our supermarket shelves today. The academic literature is full of models envisaging a step-like sequence of ever more intensive modes of plant and/or animal exploitation, from more or less opportunistic foraging to established systems of farming, much as Hodder Westropp envisaged in 1872. However, there are examples of late Pleistocene and early Holocene hunter-gatherers engaging in subsistence practices that in one form or another presaged the later relationships to the landscape and natural resources within it that we characterize as agriculture; of 'failed' experiments in managing plants and animals that today are regarded as natural weeds in the case of plants or natural game in the case of animals; of hunter-gatherers whose experiments with food production were ultimately unsuccessful moments of intensification, creating temporary farmers and herders, who in time reverted back to foraging and hunting for subsistence.

Like modern scientists, however, some experimenters either unwittingly or intentionally manipulated the genetic make-up of plant and animal populations, selecting for traits and characteristics that were more productive or more pleasing and thus preferred. By complex mixes of historically contingent decision-making, these early food producers altered the ecology of the planet. Their subsistence strategies also represented a revolutionary commitment to specific environmental niches that range from dry Sahel to verdant river valleys. Agricultural success often demanded settled populations, who in turn wrought further changes on their landscapes. Sometimes settling down led to the intensification of plant use and food storage, as transitional systems of food production gave way to full-blown domestication. In the Andes, the domestication of camelids such as llama and alpaca occurred around the same time as *Chenopodium* (quinoa). In Southwest Asia, many farmers living in tell (mound) villages continued to rely on hunted meat. Elsewhere, mixed strategies expanded the domestication of plants together with raising livestock, but the elaboration of these new practices was uneven and uncertain. In many parts of the world the domestication of plants and the onset of cereal agriculture predated the domestication and herding of

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animals, but the relationship appears to be reversed in Africa (Chapter 18). Perhaps the dominant message from this book is that the global pathways to food production were many and varied.

The development of agriculture was a profoundly human trajectory, bewilderingly complex and often contradictory in its implications. Human and environmental relationships were transformed as the balances recognizable in the Pleistocene shifted in favour of the survival and expansion of human populations at the expense of the rest of the planet during the Holocene. The world with agriculture has secured for the human species its primacy and dominance over the natural world, with all the uncertainties that the industrialized exploitation of selected plants and animals and associated population expansion represent for the sustainable health of the planet. With the development of a world with agriculture, world history became a human story.

The chapters in this volume consist of three kinds, organized into two groups. The first group (Chapters 2–7) takes a series of themes that we selected in order to illustrate some of the wide range of methods and approaches, including non-archaeological as well as archaeological, that we can call on in the study of the origins and diffusion of agriculture. Their authors were encouraged to explore major research questions, and illustrate their particular approaches, at the global scale. For the periods discussed in this volume, archaeology is the primary source of information about material life before the era of written record-keeping, but as the opening chapters following this introduction illustrate, we can also call on subjects as diverse as genetics and linguistics for invaluable insights into past domestication histories and the dispersal of domestic animals and plants, and frequently the movement of people associated with these. The second group of chapters (Chapters 8–23) are archaeology-based, and discuss current understanding of the beginning of agriculture and the character of early agricultural societies on a region-by-region basis, each regional summary (Chapters 8, 10, 12, 14, 16, 18, 20, 22) being accompanied by a case study (Chapters 9, 11, 13, 15, 17, 19, 21, 23) illustrating in more detail a particular archaeological site or set of sites. Part of the rationale for choosing the system of regional summaries and accompanying focused case studies was so that the latter could convey to the non-archaeological reader in some detail the range of data typically making up the ‘archaeological record’ of a site and to illustrate how archaeologists attempt to draw robust and careful inferences from the observations that they make about it, and the patterns that they detect in it, in ways very different from how the subject is

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sometimes presented by the popular media as romantic story-telling and speculation unfettered by evidence!

The contribution of genetics and linguistics

Nothing could illustrate better the formidable contribution of archaeological science to the study of agricultural origins and dispersals than the first of the thematic chapters, on ‘archaeogenetics’, by Martin Richards and his collaborators Maria Pala, Pedro Soares, and Gyaneshwer Chaubey (Chapter 2). It provides an excellent introduction to the revolutionary collaborations between archaeologists and geneticists and their impact on the spatial and chronological mapping of specific lineages within a species. As early as the 1980s, genetic studies of modern populations, combining information on genealogies, the geographic distribution of lineages, and time depths from calculated mutation rates, began to unravel some of the key questions of prehistory on a truly global scale, including migrations that accounted for the spread of humans out of Africa and across continents. Archaeogenetic research on the Holocene has focused on the persistent questions about the diffusion of farming and herding, especially in Europe, where the combination of inferences from modern population genetic histories and the increasingly robust analysis of ancient DNA in human and animal bones and seeds from archaeological sites have completely retold the old Neolithic narrative. More broadly, the scientific evidence derived from genetic and morphological data emphasizes more than ever the continuous process of the agricultural revolution. In the past decade, along with studies of stable isotopes, archaeogenetics has constituted one of the most promising sources of information about the movements of recent humans and the changes in diet, plants, and animals that shaped their menus and lives.

In Europe the model of ‘leapfrogging’ colonization movements and assimilation by indigenous hunter-gatherers, taken as the most robust interpretation of current genetics studies, is in accord with current readings of the archaeological record there, as Alasdair Whittle describes in Chapter 22. Europe is fortunate in having a growing data set of ancient DNA to compare and contrast with the modern data. Though interesting insights about domestication histories and dispersals have been drawn from genetic studies of present-day data from the Americas, Africa, and Southeast Asia, it is more difficult than commonly acknowledged to separate signals of Neolithic migrations from the many subsequent migrations of the last few thousand years. In the case of horse domestication processes on the Eurasian steppes,

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for example, quite apart from the effects of major historical events like the Mongol invasions, millions of horses were moved across the steppes during the course of the twentieth-century world wars and, especially, in the Soviet programme of agricultural collectivization in the 1920s and 1930s. As Chapter 2 concludes, the next phase of research needs to involve the systematic collection of ancient DNA for comparison with the models based on modern data sets.

Chapter 3 takes up the more familiar shared ground of historical linguistics and archaeology, an intersection that emerged in the nineteenth century, and which Christopher Ehret and others have explored for the past three decades.⁵ While archaeological evidence can reveal the material life of past communities, linguistics can also document the intangible transformations in technology and ideas. The potential for using language to understand change over time and across space has been mined particularly successfully from the African continent. Like the genetic studies of modern populations, historical linguistics produces a set of lineage relationships that can be interpreted in terms of patterns of historical transformations. The assumption is that when and where such changes took place may be detectable in modern language sets, given that established agricultural systems incorporate new vocabularies to express the technical processes of breeding, herding, and cultivation. Ehret takes the reader through the processes of reconstructing ancestral protolanguages, which may be storehouses for early vocabularies related to agricultural practices. Since language history has been used to trace migrations of speakers, this evidence is also useful for locating origins and mapping the spread of agriculture. Thus it is argued that the dispersal of the proto-Niger–Congo family of speakers (sometimes called the ‘Bantu migration’) eventually carried farming and herding from West and Central Africa eastwards and southwards across the continent, eventually supplanting many hunting-gathering-fishing communities along the way. Ehret argues for the complementary nature of the two primary sources of evidence, linguistics and archaeology, and suggests new directions for an increasingly global view of the recovery of the origins and diffusion of agriculture. The arguments of linguistic studies are also discussed in several of the regional chapters, though it is clear that some of the earlier linguistic work made overly simplistic assumptions about agricultural origins and dispersals, given how archaeological research is showing that the development of agricultural systems could

5 C. Ehret and M. Posnansky (eds.), *The Archaeological and Linguistic Reconstruction of African History* (Berkeley: University of California Press, 1982).