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978-0-521-19588-1 - The Great Transition: Climate, Disease and Society in the Late-medieval World: The 2013 Ellen McArthur Lectures

Bruce M. S. Campbell

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The Great Transition

In the fourteenth century the Old World witnessed a series of profound and abrupt changes in the trajectory of long-established historical trends. Trans-continental networks of exchange fractured and an era of economic contraction and demographic decline dawned from which Latin Christendom would not begin to emerge until its voyages of discovery at the end of the fifteenth century. In a major new study of this 'Great Transition', Bruce Campbell assesses the contributions of commercial recession, war, climate change, and eruption of the Black Death to a far-reaching reversal of fortunes which spared no part of Eurasia. The book synthesizes a wealth of new historical, palaeoecological and biological evidence, including estimates of national income, reconstructions of past climates, and genetic analysis of DNA extracted from the teeth of plague victims, to provide a fresh account of the creation, collapse and realignment of western Europe's late-medieval commercial economy.

BRUCE M. S. CAMPBELL is Emeritus Professor of Medieval Economic History at the School of Geography, Archaeology and Palaeoecology, The Queen's University of Belfast.

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The Queen's University of Belfast



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*For Anthony,
committed post-medievalist,
who in Berlin, Belfast and Mulroy kept company
with this book throughout its long gestation*

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Preface and acknowledgements

In retrospect I can see that this book marks the final stage of an academic journey which began when, aged 16 and on the recommendation of Mr Stow, deputy headmaster and head of geography at Rickmansworth Grammar School, I opted to study Geography, Economics, and Pure Mathematics with Statistics at Advanced Level. From that decision, so lightly taken, springs this book's focus upon economic progress or the want of it across a wide geographical area, the attention paid to climate and disease as agents of socio-ecological change, and the reliance upon the quantification and graphical representation of key variables and developments. In the 1960s regional geography was a core component of the geography curriculum and always began with a study of the physical environment before proceeding to a consideration of the relevant country or region's human geography. This was because, self-evidently, temperature, rainfall, terrain, geology, vegetation and ecology shape where people live, the natural resources available to them, how they make a living, their methods and routes of transport, and the kinds of physical and biological hazards to which they are exposed. Environmental history shares the same premises.

Including nature among the protagonists of historical change risks incurring the stigma of environmental determinism. As a geography undergraduate at Liverpool University I was taught about the environmental determinism of Elsworth Huntington and warned that this was something to avoid. Instead, I learned that, because people have choices and create institutions and technology, environmental conditions powerfully influence but rarely determine human outcomes. The existence of important interactions, both direct and indirect and either positive or negative, between nature and society was taken as axiomatic, as was the idea that natural processes operate in parallel with human processes and are equally worthy of study. The then comparatively young subject of ecology was introduced to us as, perhaps, the most effective and comprehensive theoretical framework for analysing, explaining and understanding environmental and human interactions at a hierarchy of nested

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scales from a single field to the entire world. The appeal of this holistic approach, with its capacity to accommodate and explain a wider range of variables and inter-relationships than neoclassical, institutional or Marxist economics, has stayed with me ever since. Moreover, without the requirement at this formative stage of my education to read extensively across the sub-disciplines of physical geography, I could not have engaged with the fast-growing modern scientific literatures on palaeoclimatology and the biology of plague upon which this book draws so extensively. What often seemed a chore and was certainly a challenge at the time has many years later stood me in good stead. So, in a very real sense, in this book I have returned to my academic roots.

It was in the early 1970s, as a postgraduate student at Cambridge undertaking detailed case studies of three late-medieval Norfolk manors under the wise supervision of Alan Baker, that the massive economic and demographic impacts of the Great European Famine of 1315–22 and Black Death of 1348–9 were first brought home to me. So far as I could see, neither catastrophe could be convincingly accommodated within the rival, but economically equally deterministic, Malthusian and Marxist interpretations of medieval economic history then in vogue. Nor, given my earlier training, was it satisfying to dismiss these catastrophes as providential exogenous shocks and enquire little further about why two once-in-half-a-millennium events should have occurred within the narrow space of a single generation. At that time, however, it was difficult to explore the environmental dimensions and contexts of these disasters in more detail for the relevant palaeoecological research had scarcely begun. Notwithstanding the compelling advocacy of Emmanuel Le Roy Ladurie's pioneering *Times of feast and times of famine*, historians could safely disregard historical climate change because so little was known about it.¹ Progress on this front has had to await the upsurge of research funding generated by contemporary anxieties about 'global warming', the arrival of laptop computers, and the advent of the World Wide Web, with the facility the last provides for storing, seeking and accessing the growing number of palaeoclimatic datasets so ingeniously derived from tree rings, ice cores, speleothems, lake varves, ocean sediments and much else. Here, the website managed by the United States National Oceanic and Atmospheric Administration (NOAA), at the National Climatic Data Center, has proved invaluable and deserves to be far better known by historians.² Would that it had existed when I was researching and writing my doctoral thesis.

¹ Le Roy Ladurie (1971).

² www.ncdc.noaa.gov/data-access/paleoclimatology-data

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It was as a postgraduate that I began to calculate and gather data on crop yields from what I was beginning to discover was a veritable goldmine of manorial accounts, extending in time from the mid-thirteenth to the late fifteenth centuries. This exercise started with Norfolk and was funded from 1983 to 1984 by an Economic and Social Research Council (ESRC) personal research fellowship. The two Feeding the City Projects, undertaken in collaboration with Derek Keene, Jim Galloway and Margaret Murphy between 1988 and 1994 with funding provided by the Leverhulme Trust and ESRC, then extended the task to the ten counties closest to London. Subsequently it grew to become a project in itself, in the form of the ESRC-funded project ‘Crops yields, environmental conditions, and historical change, 1270–1430’, which ran from 2005 to 2007. Additional financial support was provided by the British Academy and a Margary Grant from the Sussex Archaeological Society, and invaluable research assistance was provided by Anne Drewery, David Hardy, Marilyn Livingstone, Christopher Whittick and Elaine Yeates. To the existing yield datasets on Norfolk and the ten Feeding the City counties were added the extensive yield calculations of Jan Titow and David Farmer for the estates of the bishopric of Winchester and Westminster Abbey, plus fresh series for demesnes belonging to Battle Abbey, Canterbury Cathedral Priory, Glastonbury Abbey and an assortment of other estates. The results, at both manorial and aggregated national level, are available online at www.cropyields.ac.uk and are referred to repeatedly in the following pages.

The whole idea for this crop-yields project arose from conversations I had been having with Queen’s University dendrochronologist Mike Baillie and the realization that tree rings and grain yields provide complementary but contrasting measures of past growing conditions. Two joint applications to the Natural Environment Research Council were unsuccessful before the ESRC eventually came up with the funding to create a matching 225-year dataset of English crop yields. The results proved more intriguing than I could have hoped, highlighting the paramount influence of weather conditions upon agricultural output and setting both the notorious harvest failures of 1256–7, 1292–5, 1315–16 and 1436–7 and the abundant harvests of 1325–7, 1376–8 and 1386–8 in a clearer environmental context. Especially striking was the indubitable evidence provided by both the grain-yield and oak-ring chronologies, together with an array of other dendrochronologies from around the world, of a major growth downturn in the late 1340s at the very time when the Black Death was carving its destructive path through the populations of western Asia, North Africa and Europe. For the first time it became apparent that a clear association existed between extreme weather, ecological stress and

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the eruption and spread of plague. Equally clear was the shared origin of both the Great European Famine and the Black Death in a common era of heightened climatic instability. This offered a whole new perspective on a familiar and much debated period. Mike Baillie's own thoughts about this complex episode are set out in his provocative short book *New light on the Black Death*, which is brim full of ideas and evidence and suggested to me several new directions in which I might take my own work. Without this fruitful dialogue with Mike Baillie, and without the tree-ring chronologies with which he plied me, this book, in its current form, could not have been written.

A further spin-off from my crop yields project was an ambitious collaborative project undertaken with Steve Broadberry, Mark Overton, Alex Klein and Bas van Leeuwen to reconstruct the national income of England from 1270 to 1700 and of Britain from 1700 to 1870. This began in 2007 with funding from the Leverhulme Trust and was finally completed in March 2014 when the manuscript of *British economic growth 1270–1870* was delivered to Cambridge University Press. My considerable debt to this project will be apparent from the many citations to it, for it has provided more soundly based quantitative estimates of population, agricultural, industrial and service-sector output, gross domestic product (GDP) and GDP per head than any hitherto available. Further, through meetings convened by Steve Broadberry and Kevin O'Rourke in conjunction with the project 'Historical patterns of development' (HI-POD), funded by the European Commission's 7th Framework Programme for Research (Contract Number SSH7-CT-2008-225342), I became better acquainted with the work of Paolo Malanima, Leandro Prados de la Escosura, Jan Luiten van Zanden and other historical national income accountants (all of whom have been generous in sharing data). Their estimates have enabled me to place England's exceptionally well-documented late-medieval economic development within a broader comparative context. The copious detailed publications on the Flemish textile industry by John Munro, who sadly died before this book could be completed but with whom I have shared many stimulating conversations, have also enabled me to integrate Flanders into the narrative. To him, along with the late Larry Epstein, I also owe the connection made between warfare, rising transaction costs and commercial recession in the early fourteenth century. As a monetarist, John would, I trust, have approved of the emphasis placed in Section 5 upon scarce bullion as a contributory factor to the prolonged post-Black Death economic and commercial contraction.

Meanwhile, in 2004, after sixteen years spent teaching medieval and early modern British and Irish economic history, I had joined the newly established School of Geography, Archaeology and Palaeoecology in the

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Queen's University of Belfast, where I offered what proved to be a popular final-year module entitled 'Hazards, humans and history: human–environment interactions during the last millennium'. With reference to Britain and Ireland, this module set out to explore the influence and impact of environmental risks and hazards upon human populations, societies and economies over the last millennium. Due attention was paid both to extreme events, exemplified by famines, livestock epidemics, plagues and other disasters (always a hit with students), and more subtle shifts in human environment relations, such as changes in growing conditions and human morbidity. Students were asked to reflect upon why some societies were particularly vulnerable to natural hazards and others more resilient. The contents and approach of this module informed both my original book proposal to Cambridge University Press (which had the working title 'The anatomy of a crisis: Britain and Ireland 1290–1377') and the successful fellowship application I made at about the same time to the Wissenschaftskolleg zu Berlin (familiarily known as Wiko). The timing of these initiatives, of course, meant that if the British national income project overran, which it did, I would be left with two books to submit to CUP at more-or-less the same time (one co-authored, the other solo authored). This has delayed delivery of both but with the compensation that each has benefited from being closely informed by the other.

Work on *The Great Transition* commenced in earnest in the almost ideal working environment provided at Wiko in October 2010. I am grateful to Gregory Clark for nominating me, to the Rector and governing body for electing me and to the Kolleg for funding me. Here, in an interdisciplinary and collegial environment and with first-class library support, I discovered the NOAA website, came to appreciate the global dimensions of the climate reorganization that occurred between *c.*1270 and *c.*1420, and as a result swiftly began to reconceive my original narrowly-British book proposal. Almost immediately, in October 2010, further momentum was lent to this task by publication of the breakthrough paper by Haensch and others that finally confirmed beyond doubt that *Yersinia pestis* was indeed the pathogen responsible for the Black Death. It quickly became clear that I needed to engage with this fast-moving field of biological research, in which teams of plague researchers at Marseille, Mainz and now Oslo appear to be vying with each other. For me as an economic historian this has meant entering hitherto uncharted academic territory. At Wiko I was helped and encouraged by biologists Janis Antonovics and Mike Boots. More recently, comments and leads offered by a lively group of biologically aware medievalists and historians of disease led by Michelle Ziegler, Monica Green and Ann Carmichael have helped keep me up to

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speed. I am particularly indebted to Ann Carmichael for her informed and constructive comments on an earlier draft of those sections that deal with the Black Death. Responsibility for the views contained, both here and elsewhere in the book, nevertheless remains my own.

At a plague workshop convened by Richard Hoyle at the University of Reading in September 2013 I had the pleasure of hearing and meeting prominent aDNA researcher Barbara Bramanti, who led the Mainz plague team but has now transferred to Oslo, where a radical rethinking of all three plague pandemics is taking place.³ Leading Norwegian plague historian Ole Benedictow was also at that meeting and kindly offered some helpful responses to my own paper. While I have not heeded all his recommendations his intervention has nonetheless saved me from claiming more than the available evidence will currently allow. His own views, informed by a close reading of the reports of the Indian Plague Commission and the extensive medical literature generated by the Third Pandemic, also served as a reminder that almost everything about the Black Death – its geographical origin, activation, hosts and vectors, mechanisms of transmission and spread, and case fatality rate – remains controversial. This is not a subject about which any prudent historian can afford to be dogmatic.

In a field where new datasets and papers are proliferating so fast, it is difficult to resist the temptation to privilege data gathering and the tracking of the latest publications over analysis, synthesis and writing. Invitations to present conference and seminar papers have therefore been invaluable in spurring me to make sense of the material I have been collecting and providing opportunities to test reactions to it. Participation in the following conferences, workshops and meetings has been material to advancing my thinking and understanding: the Mellon Foundation's Sawyer Seminar Series 2010, 'Crisis, what crisis? Collapses and Dark Ages in comparative perspective', held at Cambridge in May 2010; 'Historical climatology: past and future', held at the German Historical Institute, Paris, in September 2011; 'Climate change and big history', a panel convened at the 2013 meeting of the American Historical Association in New Orleans (with follow-up lecture and seminar presentations at Columbus Ohio and Pittsburgh); 'The coldest decade of the millennium? The Spörer Minimum, the climate during the 1430s, and its economic, social and cultural impact', held at the Historical Institute,

³ European Research Council project: 'MedPlag: The medieval plagues: ecology, transmission modalities and routes of the infections', Centre for Ecological and Evolutionary Synthesis, University of Oslo. Scientific conference, 'The past plague pandemics (Justinian, Black Death, Third) in light of modern molecular life science insights', Oslo, 19–20 November 2014: <http://english.dnva.no/kalender/vis.html?tid=63069>.

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University of Bern in December 2014; and ‘Famines during the “Little Ice Age” (1300–1800): socio-natural entanglements in premodern societies’, at the Centre for Interdisciplinary Research, University of Bielfeld in February 2015. I am indebted to John Hatcher, Franz Mauelshagen, Gregory Quenet, John Brooke, Patrick Manning, Chantal Camenisch and Dominik Collet for their invitations to speak at these meetings and to the other participants for their instructive contributions. Thanks are also due to Bernd Herrmann, Michael North, Mathieu Arnoux, Bob Allen, John Watts, Paul Slack, Negley Harte and Leandro Prados de la Escosura for invitations to present papers at the universities of Göttingen, Greifswald, Paris 7, Oxford, the Institute of Historical Research, London, and the Fundación Ramón Areces, Madrid.

In April 2009 the Datini Institute at Prato, of which I was then a committee member, devoted its 41st study week to ‘Economic and biological interactions in pre-industrial Europe from the 13th to the 18th centuries’. Wim Blockmans wisely presided over this pioneering meeting which revealed just how resistant some historians can be to venturing off what they consider to be *piste*. It was therefore a pleasure to hear eloquent advocacy of an environmental approach to history from Bernd Herrmann and Richard Hoffmann. The latter’s splendid introductory *Environmental history of medieval Europe* was published in the nick of time for me to draw upon it in the final stages of revising this volume. It was narrowly preceded by John Brooke’s *A rough journey* and Geoffrey Parker’s *Global crisis*, which have sat on my desk reminding and inspiring me to press on and get my own very different treatment of an earlier global crisis completed. Reassuringly, both books have been as long in gestation as my own, testifying to the time that it takes to research and write mature environmental history.

The invitation to present the 2012/13 Ellen McArthur Lectures at the University of Cambridge (delivered in February 2013: podcasts available at www.econsoc.hist.cam.ac.uk/podcasts.html) galvanized me into bringing together and synthesizing the mass of historical, palaeoclimatic and biological evidence I had been assembling and which by then threatened to overwhelm me. Writing these four lectures also provided me with a more effective structure for integrating the environmental and human sides of my story. Given the academic stature of previous Ellen McArthur lecturers, delivering these lectures was a daunting enough commission in itself. In the Mill Lane lecture theatre I was given sterling practical assistance by Chris Briggs and Leigh Shaw-Taylor, while at Trinity Hall I was accommodated and hosted in great comfort by Martin and Claire Daunton. Further hospitality, encouragement and feedback were provided by David Abulafia, Alan Baker, Judith Bennett, John Hatcher

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and Richard Smith. Revising these PowerPoint-supported lectures for the very different medium of the written word has taken the greater part of two-and-a-half years (including time out to finish *British economic growth*). Readers who watch the podcasts before delving into the text will discover that the latter is a greatly expanded, updated and revised version of the lectures. They will also find that the podcasts provide the most effective introduction to the book.

All academics stand on the shoulders of others. I am in awe of the patience with which generations of historians have painstakingly extracted systematic information from the archives and amazed at the ingenuity and tenacity with which scientists have derived meaningful information from the most unexpected and often intractable sources, including algae deposited on the ocean shelf and the dental pulp of skeletons. My debt to a legion of scholars working individually and in teams will be apparent from the citations. I am especially grateful to all those who have placed their datasets online and whose journal articles are available on open access. Among historical works, Janet Abu-Lughod's *Before European hegemony*, which transcends conventional historical boundaries and chronologies, has been a particular inspiration. Frank Ludlow read and commented upon the greater part of the text and kept me up to date respecting current dating of the eruptions of Quilotoa and Kuwae. Others who have either shared ideas and materials or rendered help include Martin Allen, Lorraine Barry, Ken Bartley, Steve Broadberry, John Brooke, Jan Esper, Bas van Leeuwen, Scott Levi, Marilyn Livingstone, Tim Newfield, Cormac Ó Gráda, Richard Oram, Terry Pinkard, Larry Poos, Leandro Prados de la Escosura, David Reher, Steve Rigby, Ben Sadd, Philip Slavin, Jacob Weisdorf and Ting Xu. Gill Alexander, with whom I have worked for over four decades, drew Figures 1.2, 2.1, 2.9, 2.15, 3.19, 3.22, 3.25, 3.27, 4.9 and 4.10 with her customary eye for cartographic veracity and then uncomplainingly converted all the other figures into the CMYK TIF format required by the Press. At CUP Michael Watson has sent timely email reminders to prick my conscience and then waited like patience on a monument for the finished manuscript. Richard Hoffmann was the well-chosen anonymous referee who read the entire manuscript in draft and whose wise and constructive comments have been of great assistance in helping me sharpen the volume's focus and improve its presentation. The published version is the better for his recommendations, as it is for the eagle-eyed copy-editing by Ken Moxham. This is a great publishing house to work with and its production team have done a magnificent job.

Publication might have occurred sooner had I not, in September 2010, taken on renovation of the then derelict Agent's House on the Mulroy

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Estate, Co. Donegal, and with it the complete replanting of its extensive windswept and long-abandoned cliff-top garden. Fortunately, in February 2012 an early-retirement package from the Queen's University of Belfast, my employer of over thirty-eight years, gave me the time to combine gardening and writing. Thus, in the final stages of writing it is here in my first-floor study overlooking the twice-daily tidal race through the narrow and newly bridged neck of Mulroy Bay that this book has taken final shape and the whole of it been written, re-written or revised. As pressure to finish it has mounted, Martin McGroddy, Shaun Boyce and Willie Caldwell have successively taken the strain of developing and maintaining the garden and thereby freed me up to stay indoors plugging away at my computer, although many's the day when blue Donegal skies, fresh air and the sparkling sea have made me wish I could exchange tasks with them. Diana's devoted company has made the long hours at the keyboard less lonely and Sampson and, more recently, Freia have insisted that I occasionally take a break and give them and myself some fresh air and exercise. Whether this has helped or hindered me from finishing the book I cannot quite decide.

At Mulroy, the powerful ebb and flow of Atlantic tides, winter alternation between maritime mildness and bitter Arctic cold, spells of incessant rain, fierce gale-force and sometimes hurricane-force winds, irrepressible germination of weeds, invasive growth of Japanese Knotweed, and seasonal progression from short winter days to brief summer nights have served as constant reminders of the independent and sometimes relentless power of nature. Back in Belfast, flags, marches and protests testify to the determined human pursuit of other agendas, of which some of the most irreconcilable were set in train in this remote northwest corner of Eurasia during Parker's seventeenth-century *Global crisis*. Here, in the north of Ireland, nature and culture clash and co-exist as in few other places. What elsewhere is tacit is here explicit. The same, I hope, is true of this book.

Mulroy, 7 June 2015

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Abbreviations

ACA	Arid Central Asia
aDNA	ancient deoxyribonucleic acid
DSI	Drought Severity Index
ENSO	El Niño Southern Oscillation
GDP	gross domestic product
LIA	Little Ice Age
MCA	Medieval Climate Anomaly
NAO	North Atlantic Oscillation
Poly.	Polynomial
SNPs	single nucleotide polymorphisms
TSI	Total Solar Irradiance
VEI	Volcanic Explosivity Index (range 1–8)