SETTLING THE EARTH

In this worldwide survey, Clive Gamble explores the evolution of the human imagination, without which we would not have become a global species. He sets out to determine the cognitive and social bases for our imaginative capacity and traces the evidence back into deep human history. He argues that it was the imaginative ability to "go beyond" and to create societies where people lived apart yet stayed in touch that made us such effective world settlers. To make his case, Gamble brings together information from a wide range of disciplines: psychology, cognitive science, archaeology, palaeoanthropology, archaeogenetics, geography, quaternary science and anthropology. He presents a novel deep history that combines the archaeological evidence for fossil hominins with the selective forces of Pleistocene climate change, engages with the archaeogeneticists' models for population dispersal and displacement, and ends with the Europeans' rediscovery of the deep history settlement of the earth.

Clive Gamble is Professor of Archaeology at the University of Southampton and is one of the world's leading authorities on the archaeology of early human societies. He is founder of the Centre for the Archaeology of Human Origins at the University of Southampton. Gamble has travelled extensively to see first-hand the evidence for social change from our earliest past, and most recently visited every continent while filming an acclaimed six-part documentary entitled *Where Do We Come From?* for the UK's 5 network. He has held visiting positions at the Australian National University; the Museo de la Plata, Argentina; Boston University; and the universities of LaTrobe and Alaska. He is much sought after as a keynote speaker at international conferences and has been a frequent contributor to national radio. His many groundbreaking books include *The Palaeolithic Settlement of Europe* (1986); *Timewalkers: The Prehistory of Global Colonisation* (1993); *The Palaeolithic Societies of Europe* (1999), the 2000 winner of the Society of American Archaeology Book Award; *Archaeology: The Basics* (2001); and *Origins and Revolutions: Hominin Identity in Earliest Prehistory* (2007). In 2005, Gamble was awarded the Rivers Memorial Medal by the Royal Anthropological Institute in recognition of his outstanding contribution to the field, and in 2008, he won the Henry Stopes Medal from the Geologists' Association. He was elected a Fellow of the British Academy in 2000.

Settling the Earth

The Archaeology of Deep Human History

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For Lewis Binford

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I dedicate this book to Lewis Binford, friend and mentor since we first met in 1980. I'm only saddened that you are not here to see the result. You are much missed.

Glossary

Dates

C^{14}	Radiocarbon dating. All radiocarbon ages in this book have been calibrated.
b2k	Before AD 2000, equivalent to BP (before present)
ka	Thousand years ago b2k, based on science-based dating such as C^{14} and OSL
Ma	Million years ago, based on science-based dating such as K/Ar
OSL	Optically stimulated thermoluminescence dating
K/Ar	Potassium–argon dating
Molecular clock	Estimates based on mutation and coalescent rates
ka molecular	Indicates the basis of the age estimate

Climate

MIS	Marine Isotope Stage, divisions based on oxygen isotope readings of O^{18} (heavy) and O^{16} (light) from foraminifera skeletons in deep-sea cores. Oceans enriched with O^{16} indicate small ice sheets.
Milankovitch cycles	Predictable changes in the earth's orbit (eccentricity), rotation (precession) and tilt (obliquity) that force climate change
Stadial	Cold period, low sea level and ice advance

Interstadial	Warmer interval during a stadial
Interglacial	Warm period with temperatures equal to or above today's, high sea level
GS	Greenland stadial recognised in the ice cores
GI	Greenland interstadial
LGM	Last Glacial Maximum 25–18ka when ice sheets reached their greatest extent
Effective Temperature	A measure of productivity and the length of the growing season based on modern temperature, expressed in ET °C

Genetic

mtDNA	Mitochondrial DNA: only inherited through the female line
MSY	Male-specific segment of the Y chromosome: only inherited through the male line
HLA	A gene family which provides instructions for making a group of related proteins known as the human leukocyte antigen (HLA) complex. The HLA complex helps the immune system distinguish the body's own proteins from proteins made by foreign invaders such as viruses and bacteria.
Ancient DNA	The extraction of DNA from dead rather than living organisms
Haplogroups	Branches of the mitochondrial DNA phylogenetic tree that consist of a collection of related haplotypes and where each haplotype represents a unique pattern of DNA substitutions (Haplo = single)
Clade	A branch on a phylogenetic lineage resulting from a split in an earlier lineage that formed two new taxa
Motif	A distinctive and usually recurrent genetic sequence found in a geographical area and used to distinguish populations and their migration histories
Effective population size	Refers to how many individuals actually contribute alleles to the next generation as opposed to the total number of individuals in a population

Coalescence	When two genetic lineages find a common ancestor
Population bottleneck	Occurs when the size of a population is reduced for at least one generation. When the population is small, this can result in a faster reduction in genetic variation through the process of genetic drift. Such bottlenecks show up in mtDNA and MSY data.

Archaeology

FGH	Fisher-gatherer-hunter; used to describe modern societies and those before the advent of farming
FACE	The social activities of Fragmentation, Accumulation, Consumption and Enchainment that result in patterns in archaeological data
Encephalisation	Growth in brain size
EQ	Encephalisation quotient that scales brain to body size
Mode	Five modes are recognised among stone tools based on techniques of manufacture and dominant artefact type
Technounit	A discrete component of an artefact. When all the technounits in an artefact are added up, it provides a measure of its complexity.
PCT	Prepared Core Technology; e.g. Victoria West, Levallois, Prismatic blade
LCT	Large Cutting Tools; stone picks, cleavers and bifaces
Biface	Any piece of stone worked on both faces; e.g. Acheulean hand axes, Clovis projectile points
Core	What remains after a stone nodule has been knapped
Flake	Less than twice as long as it is wide
Blade	Must be twice as long as it is wide
A-List, B-List	An alternative way to group archaeological classifications
IUP	Initial Upper Palaeolithic

Web resources for skulls and stone tools

These have been selected for the illustrations they contain of stone tools, fossil skulls and climate data that supplement the text figures. There are many more to explore, while search engines will enhance the glossary.

The online *Encyclopedia of Quaternary Science* (2013) edited by Scott Elias and frequently updated is an essential on-line resource for all things ice age, including hominins.

A comprehensive array of hominin skulls can be found at the Smithsonian Institution's Human Origins Program. http://humanorigins.si.edu/evidence/human-fossils as well as some stone tools at its http://humanorigins.si.edu/evidence/behavior/tools.

Many images of Mode 2 artefacts from across Terra 2, and which bring home their variability, are at http://archaeologydataservice.ac.uk/archives/view/bifaces/index.cfm.

Old Stone Age.com has a range of resources in Old World Palaeolithic: http://www.oldstoneage.com/default.shtml.

The Centre for the Study of Human Origins has an interactive Human Evolution Explorer: http://www.nyu.edu/gsas/dept/anthro/programs/csho/pmwiki.php/Home/TheCenter.

For an interactive simulation of changing sea levels with a focus on Sunda and Sahul see Monash University's Sahul-Time: http://sahultime.monash.edu.au/.

Views of the Neanderthals from the Natural History Museum, London, are at http://www.nhm.ac.uk/nature-online/life/human-origins/early-human-family/neanderthals/index.html.