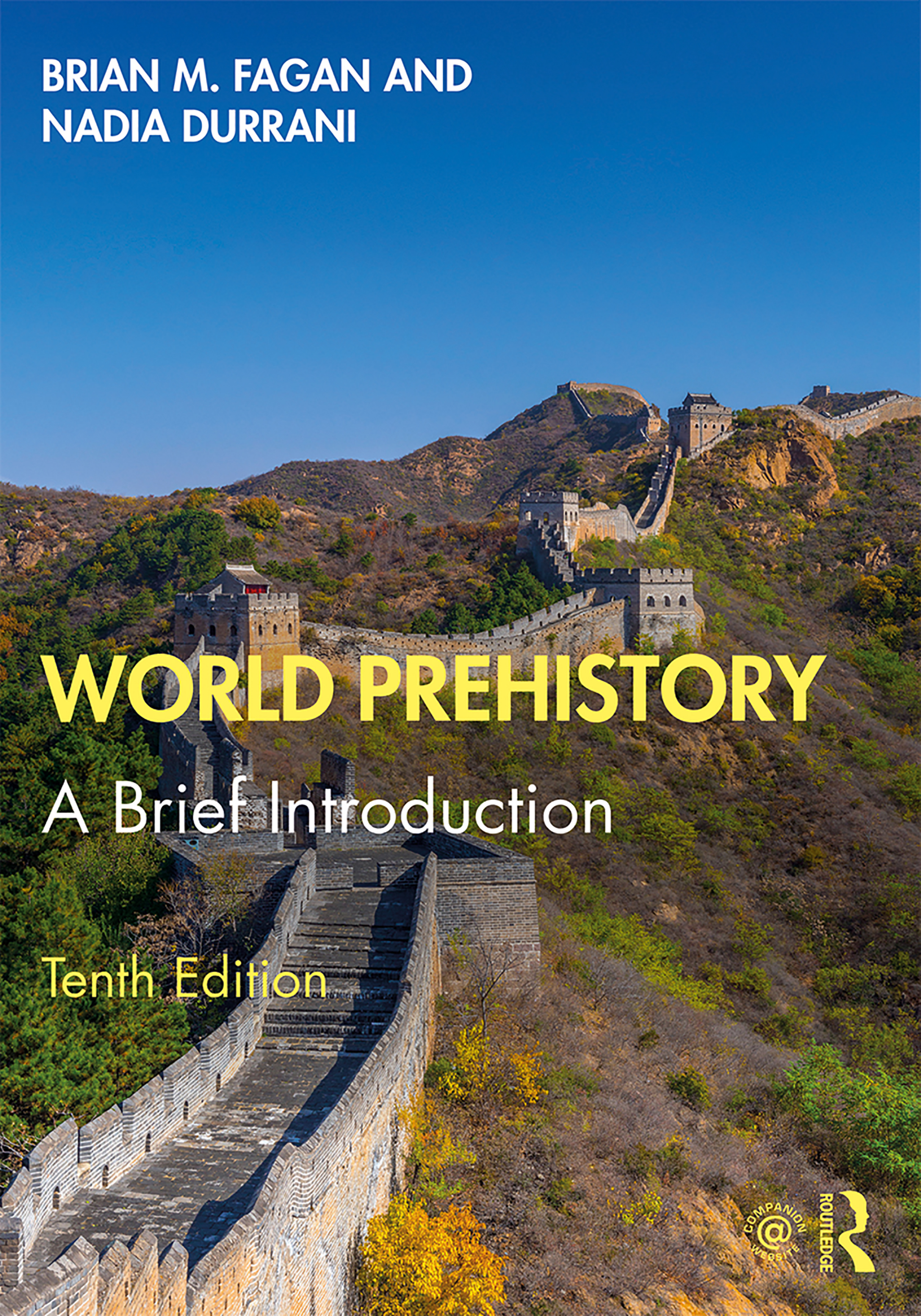

BRIAN M. FAGAN AND
NADIA DURRANI

WORLD PREHISTORY

A Brief Introduction

Tenth Edition

COMPANION WEBSITE
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World Prehistory

This popular introductory textbook provides an overview of more than 3 million years of human prehistory. Written in an accessible and jargon-free style, this engaging volume tells the story of humanity from our beginnings in tropical Africa up to the advent of the world's first urban civilizations.

A truly global account, *World Prehistory* surveys the latest advances in the study of human origins and describes the great diaspora of modern humans in the millennia that followed as they settled Europe, Asia, and the Americas. Later chapters consider seminal milestones in prehistory: the origins of food production, the colonization of the offshore Pacific, and the development of the first more complex human societies based, for the most part, on agriculture and stock raising. Finally, Fagan and Durrani examine the prevailing theories regarding early state-organized societies and the often flamboyant, usually volatile, preindustrial civilizations that developed in the Old World and the Americas.

Fully updated to reflect new research, controversies, and theoretical debates, this unique book remains an ideal resource for the beginner first approaching archaeology. Drawing on the experience of two established writers in the field, *World Prehistory* is a respected classic that acquaints students with the fascinations of human prehistory.

Brian M. Fagan is one of the world's leading archaeological writers and an internationally recognized authority on world prehistory. He is an emeritus professor of anthropology at the University of California, Santa Barbara.

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10th Edition

Brian M. Fagan and Nadia Durrani

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To Victoria Pryor
with thanks for creative inspiration
and many kindnesses

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Preface

> Three thousand, four thousand years maybe, have passed and gone since human feet last trod the floor on which you stand, and yet, as you note the signs of recent life around you—the half-filled bowl of mortar for the door, the blackened lamp, the finger-mark on the freshly painted surface, the farewell garland dropped on the threshold—you feel it might have been but yesterday.… Time is annihilated by little intimate details such as these, and you feel an intruder.
>
> Egyptologist Howard Carter, notebook entry on Tutankhamun's tomb, November 26, 1922

Golden pharaohs, lost cities, grinning human skeletons: **archaeology** is the stuff of romance and legend! Many people still think of archaeologists as adventurers and treasure hunters, like Indiana Jones of Hollywood movie fame seeking the elusive Holy Grail. This enduring image goes back to the late nineteenth century, when archaeologists like Heinrich Schliemann could still find lost civilizations like Troy and excavate three royal palaces in a week. Today no archaeologists behave like Indiana Jones. They are scientists, not adventurers, as comfortable in an air-conditioned laboratory as they are on a remote excavation. The development of scientific archaeology from its Victorian beginnings ranks among the greatest triumphs of twentieth-century science.

Archaeology has changed our understanding of the human experience in profound ways. A century ago, most scientists believed humans were no more than 100,000 years old. Today we know that our origins go back at least 5 million years. Our predecessors assumed the Americas were settled in about 8000 BC and that farming began around 4000 BC. New excavations date the first Americans to at least 12,000 BC and the beginnings of agriculture to about 10,000 BC. Most important, archaeology has changed our perceptions of ourselves, especially of our biological and cultural diversity. Welcome to the fascinating world of archaeology!

The tenth edition of *World Prehistory* continues a long tradition of providing an interesting, jargon-free journey through the 5-million-year-old landscape of the human past. We hope you enjoy your sojourn in its pages.

Highlights of the Tenth Edition

The tenth edition of *World Prehistory* has been revised throughout to reflect the latest advances in the field. It includes suggestions by dozens of archaeologists and students who have taken the trouble to contact us after using previous editions.

This is an exciting time to be writing about archaeology. Many scientific advances are changing our perceptions about the past. The tenth edition contains important new discoveries about early human evolution, the late Ice Age, and the origins of agriculture. New and updated coverage of the field appears in every chapter, with an up-to-date Guide to Further Reading at the end of each chapter, along with a glossary of technical terms and one of archaeological sites and cultural terms at the end of this book.

Updating and Rewriting

- **New perceptions of world prehistory**. Chapter 1 includes important discussions of archaeology and alternative perspectives on the past, reflecting new thinking on this important topic.
- **Early human evolution**. Chapter 2 has been completely revised. It discusses the latest advances in the study of human origins, including the latest fossil discoveries in Ethiopia, Kenya, and South Africa.
- **Origins of modern humans**. Chapter 3 has received major revision. It covers new research into the controversial issue of the earliest modern humans and fresh perceptions of Neanderthal ancestry and behavior.
- **Origins of food production**. Chapter 5 incorporates expanded coverage of the latest theories on the origins of agriculture and animal domestication. Chapter 6, which describes the first farmers, incorporates the latest dates for early agriculture obtained from **accelerator mass spectrometry (AMS)** radiocarbon dating and the results of new research in eastern Turkey, where some of the earliest farming settlements in the world are being found.
- **Origins of states and civilization**. Chapter 8 includes current theoretical debates on the origins of state-organized societies, including the issues of factionalism and charismatic leadership. Chapters 9–14 offer an up-to-date description and analysis of the first civilizations, with expanded coverage of ancient Egyptian civilization, of African

kingdoms, and of south and Southeast Asian states. Chapters 12 and 13 offer more comprehensive analysis of highland and lowland Mesoamerican civilizations than in previous editions.

- **Revision and updating throughout**. The entire text, illustrations, and guides to further reading have been revised and updated on a page-by-page basis.

Feature Boxes

Three types of feature boxes, designed to amplify the narrative, enhance this book:

- **Climate change.** A series of boxes throughout the book describe ways in which climate change affected human societies.
- **Science**. These boxes introduce key dating methods and other scientific approaches such as radiocarbon and AMS dating, and environmental reconstruction.
- **Sites**. Most of the chapters include one or more boxes describing sites of unusual importance and some aspects of unusual interest.
- **Voices**. The Mesopotamian, Egyptian, and highland Mesoamerican chapters include special boxes featuring quotes from writings of ancient times, giving each an unusual voice.

New and Revised Art Program

The tenth edition's art program has been updated with new photographs and fresh or revised line art. The new illustrations provide additional background on recent discoveries, amplify the narrative, or replace older art with new pictures. Some expanded captions serve to integrate the illustrations more closely into the text.

Acknowledgments

Many colleagues, too numerous to list here, have advised us on this revision. We are deeply grateful for their encouragement and assistance, as well as for the reviews by anonymous colleagues. Last, our thanks to our editor, Matthew Gibbons, and his assistant, Katie Wakelin, at Routledge. They have turned a complex manuscript into an attractive book and have done all they can to minimize unexpected difficulties.

As always, we would be most grateful for criticisms, comments, or details of new work, sent to us at venbed@gmail.com

Brian M. Fagan and Nadia Durrani

A Note on Chronologies and Measurements

The narrative of prehistory in these pages is organized in as linear a fashion chronologically as is practicable. It is based on radiocarbon, potassium-argon, and tree-ring dating, as well as on historical documents. Although every effort has been made to make dates accurate, many of them should be recognized for what they are—statistical approximations. The time scales of prehistory are presented in two ways:

- At the beginning of most chapters, a timeline shows the reader the relative position of the developments described in that chapter within the broad prehistoric time frame.

The following conventions are used for dates in this book:

BP—Years before Present (years ago). In general, years before 40,000 BP are given in years before present, while dates after 12,000 BP are invariably expressed as AD/BC, unless the context is obvious.
Ma—Million years ago.
BC/AD—To avoid confusion, we use the common BC/AD identification for dates. Another common convention is BCE/CE (Before the Common Era/Common Era), which we do not use in this book.
"Present"—By scientific convention, "present" is AD 1950.

For clarity, all radiocarbon and potassium-argon dates are quoted here without their statistical errors. However, readers should be aware that such calculations exist for every chronometric date in this book.

All measurements are given in metric units, with miles, yards, feet, and inches equivalents, since this is now a common scientific convention.

Calibration of Radiocarbon Dates

The calibration of radiocarbon dates has now reached a high degree of refinement, as scientists develop ever more accurate time scales for the past 15,000 years, using tree-ring, coral, and ice-core data. It should be stressed that these calibrations are provisional, statistically based, and subject to modification, especially before 7000 BC. Wherever possible, calibrated radiocarbon dates are used in this book.

Part I

Prehistory

Introduction: Archaeology and Prehistory

- What is world prehistory and why is it important in today's world?
- The major developments in human prehistory.
- The basic principles of archaeology.

Chapter 1 explores the fascinating world of the remote human past that unfolds over at least 3 million years. Our journey is based on numerous disciplines, especially archaeology, which is unique, for it is the only science that explores the full span of human experience from our origins in Africa to the Industrial Revolution of two centuries ago, even World War I trench systems and modern-day Hollywood movie sets. Many people still assume that archaeologists spend their lives in distant lands, uncovering gold-laden royals, buried cities, and lost civilizations, like Indiana Jones of movie fame. The romantic stereotype has long vanished. Yes, many archaeologists do work in remote places, but most of us never encounter gold, let alone a lost civilization.

We are scientists, concerned with accurate portraits of the past. With its golden pharaohs and often little known civilizations, archaeology seems like a world of bold adventure and great heroes. But, as we shall see, there is far more to it than that, much of it fascinating but far from spectacular. Scientific archaeology lacks stirring tales and chronicles of bold exploration. Enter pseudoarchaeology, which strives to fill the void. Pseudoarchaeologists add legendary heroes and goods of the gods such as the Holy Grail and the Ark of the Covenant. Add nationalist agendas, like the notorious Nazi fables of the mid-twentieth century, and you have a volatile mix of mythic tales and adventure that are often flamboyant, adopted uncritically by popular writers, who draw on archaeological findings when it fits their fantasy narratives.

The lost continent of Atlantis, ancient astronauts landing in Peru, and colonists from the Antarctic settling near Lake Titicaca in Bolivia are but a few of the more long-lived fantasies. These tales often make for good reading, and those who believe in them do so as acts of near-religious belief. We forget that the early archaeology of well over a century ago had roots in the mythic and the supernatural. Much of today's crazy storytelling about the past, pseudoarchaeology, has been inspired by fantasies that congregate around archaeology. We were an inspiration for Indiana Jones, Lara Croft the tomb raider, and the characters in *The Mummy*. The mass media and scriptwriters, also authors of fiction and non-fiction, feed off us and what we discover, then craft it into fictional narratives. Now arrive the giants and ancient space travelers, ideas of magic wisdom and the occult, and such exotic beings as wise druids, generals battling in the Midwest atop elephants, and other fantasies developed in the writer's imagination. As for the archaeologists, they are misguided and arrogant, with a disdain for those in the know. One scholar has labeled all this "spooky archaeology." He's right.

Archaeologists study the surviving material remains of ancient societies of the remote and more recent past. They are highly trained experts engaged in the painstaking reconstruction of the past in all its bewildering complexity. Today's archaeologist works with scientists from disciplines ranging from genetics and forensic biology, to climatology and zoology. We are as at home in an air conditioned laboratory as we are on an excavation. Whereas a century-and-a-half ago an excavator was after spectacular finds and ancient palaces, their modern-day descendants dissect the past in fine-grained detail. We can identify left-handed stone tool makers of 2.5 million years ago (Ma), trace ancient human migrations with DNA, and use bone isotopes to reconstruct life histories of individuals who lived 4,000 years ago. Our work covers both history and prehistory.

History is the study of the past using written records. Such archives go back almost 5,000 years in Egypt and Mesopotamia, a mere blink in a human past that goes back over 3 million years. In Britain, this written past goes back to the Romans a mere 2,000 years ago, while in other places like the Amazon Basin, Australia, and much of tropical Africa, continuous historical records begin in the mid- to late-nineteenth century. Only oral traditions, passed verbally from one generation to the next, go back further, but their span is at most a few centuries. *Prehistory* is the past before written records, where archaeology comes to the fore as "deep history." The term *world prehistory* came into being during the 1960s, referring to the study of human prehistory on a truly global basis, something made possible by the development of radiocarbon dating during the 1950s. The world-wide perspective made it possible to study the development of human biological and cultural diversity in depth for the first time. As archaeology has become ever more international, it has reconstructed unwritten histories for societies large and small that have long been off the historical radar. These include the builders of Stonehenge, the Polynesians of the South Pacific, and the ancient Maya in Central America, to mention only a few.

Constructing world prehistory is a laborious, painstaking process that is unfolding in the face of massive destruction of the priceless archives of the remote past. Industrial development, mining, deep plowing, and road construction, also warfare, as well as looting, are destroying the record of the past before our eyes. Archaeological sites, artifacts, and other material remains of the past are finite. Once disturbed or destroyed they are gone forever, as is our collective cultural heritage. The human past faces a crisis. Why is this important? Archaeology is about a diverse humankind, its achievements and collective experience. Our remote ancestors learnt stone toolmaking, took up farming, and domesticated animals. They fashioned the first cities and civilizations, built Stonehenge and the Egyptian pyramids, as well as the imposing temples at Angkor Wat in Cambodia. Of course one cannot use the past to forecast the future, but the lessons from past experience are a vital part of our makeup, for our skills and emotional reactions are unchanged. We, like our forebears, are *Homo sapiens*, the wise people, capable of fluent speech, of coherent thought, endowed with remarkable toolmaking abilities, and power to think ahead. To study world prehistory is to study ourselves and our remote ancestors, as well as the challenges we've faced. Imagine facing the present and future without a past!

The prehistory outlined in these pages is concerned with the broad sweep of the past, and especially with four major developments. Humans first appeared in tropical Africa by 6 Ma. Studying human origins involves deciphering the complex environmental, anatomical, and behavioral changes among early hominins, and their changing environment. Human origins research, often called paleoanthropology, is an international, multidisciplinary enterprise.

The evolution of more recent humans like the Neanderthals and *H. sapiens* (ourselves) spans the past several hundred thousand years. The subject is an exciting one, wrought with debate and constantly revised by cutting-edge genetic analyses. We also describe the spread of modern humans across the Old World and, about 15,000 years ago, into the Americas.

Food production—agriculture and animal husbandry—was a watershed development in our history that occurred at different places and times through the world, sometimes as early as 12,000 years ago. Was food production an invention or a complex process? We investigate the different theories.

Some 5,000 years ago, the first preindustrial cities and civilizations appeared in Egypt and Mesopotamia. Similarly complex societies appeared at different locations in later times. We describe the major civilizations and discuss the theories that account for their rise and collapse.

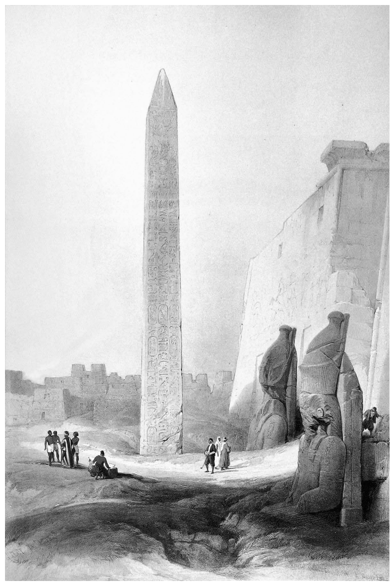
There's a temptation to think of prehistory as a ladder-like framework of biological and cultural evolution in time and space. Reality was much more complex, but this book is organized chronologically, for that is the way that archaeologists organize ancient societies in time and space. Many non-Western societies have an entirely different take on time, many of them thinking of it in cycles, such as those that define the changing seasons.

Archaeologists study ancient cultures, and often think of them in terms of adaptations to different environments. Rather impersonal, one might think, for, in the final analysis, archaeology and world prehistory are concerned with people, their interactions with one another as individuals and groups. Unfortunately, most of our evidence comes from material objects such as stone tools, pot fragments, and abandoned dwellings. Occasionally, however, we have a glimpse of the intangible, something that's especially important with early civilizations, where compelling ideologies were all-important.

Think of world prehistory as a play in several acts, and you are at a good starting point.

Chapter 1

Introducing World Prehistory



The temple of the sun god Amun at Luxor, Egypt, 1838, by David Roberts. (INTERFOTO/Alamy)

Chapter Outline

Prologue

Egypt: the Valley of the Kings, November 1922. The two men paused in front of the doorway that bore the seals of the long-dead pharaoh. They had waited six long years, from 1917 to 1922, for this moment. Silently, Howard Carter pried a hole through the ancient plaster. Hot air rushed out of the small cavity and massaged his face. Carter shone a flashlight through the hole and peered into the tomb. Gold objects swam in front of his eyes, and he was struck dumb with amazement.

Lord Carnarvon moved impatiently behind him as Carter remained silent.

"Can you see anything?" he asked, hoarse with excitement.

"Yes, wonderful things," whispered Carter as he stepped back from the doorway.

They soon broke down the door. In a daze of awe, Carter and Lord Carnarvon wandered through the antechamber of Tutankhamun's tomb. They touched golden funerary beds, admired beautifully inlaid chests, and examined the pharaoh's chariots stacked against the wall. Gold was everywhere—on wooden statues, inlaid on thrones and boxes, in jewelry, even on children's stools. Soon Tutankhamun was known as the golden pharaoh and archaeology as the domain of buried treasure and royal sepulchers. Tutankhamun's magnificent tomb is a symbol of the excitement and romance of archaeology.

Since time immemorial, humans have been intensely curious about their origins, about the mysterious and sometimes threatening world in which they exist. They know that earlier generations lived before them, that their children, their grandchildren, and their progeny, in turn, will, in due course, dwell on earth. But how did this world come about? Who created the familiar landscape of rivers, fields, mountains, plants, and animals? Who fashioned the oceans and seacoasts, deep lakes, and fast-flowing streams? Above all, how did the first men and women settle the land? Who created them—how did they come into being? Every society has creation stories to account for human origins. However, archaeology and biological anthropology have replaced legend with an intricate account of human evolution and cultural development that extends back to around 3.3 Ma. This chapter describes how archaeologists study and interpret human prehistory (the past before writing).

Why Are Human Prehistory and Archeology Important?

Why should we be concerned about hundreds of thousands of years of the human past? And, for that matter, why does archaeology matter in today's rapidly changing world?

Our species, *H. sapiens*, emerged in Africa over 300,000 years ago—becoming fully skeletally modern by 120,000 years ago. These "anatomically modern humans" (AMHs) are assumed to have possessed the same cognitive potential as any modern human, enjoying fluent speech, the ability to think and imagine things, plan ahead, and solve complex qualities. Using these qualities, our forebears peopled the globe, developed complex art, cultivated the soil and domesticated animals, fashioned elaborate civilizations and great cities, crossed oceans, created music and literature, and pursued scientific endeavors. We *H. sapiens* are the same species. Despite individual variation, we all share the same intellectual potential, and often display the same emotional responses to events—even if our cultures differ. Modern-day emergency preparedness experts find that human reactions to disasters like Hurricane Katrina have changed little over the centuries and millennia. The victims of the great volcanic eruption that overwhelmed Roman Pompeii in AD 79 reacted with terror in the same way. Of course, archaeologists are not in the business of looking back to forecast the future, but we provide valuable insights into past human behavior that still have relevance today. As the American archaeologist Rosemary Joyce wisely remarked in 2008, "The contemporary world is a product of the past, not just a repetition of it." The Greek and Roman authors Thucydides and Pliny the Younger made the same point. We study the people of the past to understand ourselves—and that's what world prehistory is all about and why archaeology is so important.

This book, like archaeology, is about people in all their bewildering complexity. It is also about the ways in which we are similar and different, and how these differences came about. Thanks to its massive time span, we can look far beyond the narrow confines of the history books, which span a mere 5,000 years, and build a uniquely rich picture of human existence. Most important of all, archaeology gives a voice to all those without written history—those living in very early times, the world's anonymous oppressed, the silent poor, or children. Many early archaeologists believed that the human past unfolded in an orderly progression from the simple to the complex with Victorian industrial civilization at the pinnacle. Ethnocentrism, racism, and imperialism played an important role in this approach. Today's portrait of the past is far more complex, based on fine-grained research that conjures up narratives from scatters of tools, house foundations, food remains, and all manner of other clues. Thanks to these research works, we now know that ancient societies were far more diverse than often assumed. Imperial Rome was a positive Tower of Babel of foreigners from all corners of the empire. Medieval London was a hotchpotch of migrants. So was Teotihuacán, a great city in the Valley of Mexico in AD 600, with entire neighborhoods of foreign traders. Here, then, is one of archaeology's great contributions—deciphering human diversity and thereby combatting such evils as ethnocentrism and racism.

With its long time span, archaeology provides unique insights into ways in which ancient societies adapted to long- and short-term climate change. These range from Ice Age glacial periods and intervening warmer interglacials over the past 2.5 million years to sea level rise triggered by global warming after the Ice Age, starting about 15,000 years ago, and El Niño events caused by the warming waters of the Pacific that brought drought or torrential rains to areas like coastal Peru, northeast Brazil, Southeast Asia, and northern China. Climatic events like drought cycles strongly affected ancient Maya civilization and contributed to the abandonment of pueblos in the American Southwest. A revolution in the study of ancient climate using ice cores, deep sea borings, tree-rings, and cave stalagmites—to mention only few methods—has allowed us to assess the major impact of climate on our past. We will describe examples at intervals in later chapters.

The past surrounds us on every side and its remains, be they spectacular monuments like the Parthenon, the Pyramids of Giza in Egypt, or the stupendous buildings of Angkor Wat in Cambodia are part of the common heritage of humankind. Archaeologists are deeply involved in cultural tourism and in the conservation of the world's archaeological sites, which are endangered by industrial development, and looting, on every side. We are all stakeholders in this past, be we archaeologists, tourists, descendants of ancient Maya groups, or members of a small community in the Midwest. Increasingly, today's archaeologists are working with stakeholders to conserve, preserve, and research the past for future generations. If we lose this priceless heritage to greed and vandalism, warfare and industrial activity, or promiscuous construction, we lose our credibility as thinking human beings. We owe the past not only to ourselves and to still unborn generations but also to those who created it. The only way we can know ourselves is to understand our past, and that's what archaeology does and why world prehistory is part of our human fabric.

"In the Beginning"

Thanks to generations of fine-grained research, we now know that human evolution is something that reaches back many millions of years. Science provides us with a long perspective on ancient times. Contrast the scientific method with traditional religious beliefs that seek to explain the complexities of life, such as the classic origin myth of the Mataco Indians from South America, which begins with cosmic fire. "After the Great Fire destroyed the world and before the little bird Icanchu flew away, he roamed the wasteland in search of First Place. The homeland lay beyond recognition, but Icanchu's index finger, of its own accord, pointed to the spot. There he unearthed the charcoal stump that he pounded as his drum. Playing without stopping, he chanted with the dark drum's sounds…. At dawn on the new Day, a green shoot sprang from the coal drum and soon flowered as Firstborn Tree…. From its branches bloomed the forms of life that flourished in the new World…." (Sullivan, 1988, p. 92) Like all such accounts, the tale begins with a **primordium** (the very beginning) in which a mythic being, in this case Icanchu, works to create the familiar animals, landscapes, and plants of the world, and then its human inhabitants. Icanchu and his equivalents in a myriad of human cultures throughout the world create order from primeval chaos, as God does in Genesis 1.

Myths, and the rituals and religious rites associated with them, function to create a context for the entire symbolic life of a human society, a symbolic life that is the very cornerstone of human existence. The first human beings establish the sacred order through which life endures from one generation to the next. This kind of history, based on legend and myth, is one of symbolic existence. Creation legends tell of unions between gods and monsters or of people emerging from holes in the earth after having climbed sacred trees that link the layers of the cosmos. They create

Figure 1.1 A late Ice Age masterpiece: a clay bison from Le Tuc D'Audoubert, France. (World History Archive/Alamy)

indissoluble symbolic bonds between humans and other kinds of life such as plants, animals, and celestial beings.

The vivid and ever-present symbolic world has influenced the course of human life ever since humans first acquired the power of creative thought and reasoning. Modern humans of late Ice Age Europe depicted mythical animals and the symbolism of their lives in cave paintings more than 30,000 years ago (see Chapter 4). They modeled clay bison in dark chambers deep beneath the earth (Figure 1.1). The sculptures seemed to flicker in the light of firebrands during powerful rituals that unfolded far from daylight. So compelling was the influence of the unknown powers of the cosmos and of the gods that inhabited it that the Maya and other Central American civilizations created entire ceremonial centers in the form of symbolic landscapes to commemorate their mythic universe (see Chapters 12 and 13).

Today, modern science has chronicled an extremely lengthy and unfolding prehistory. This story is based on scientific research, something quite different from the creation legends that people use to define their complex relationships with the natural and spiritual worlds. These legends are deeply felt, important sources of cultural identity. They foster a quite different relationship with the past than that engendered by archaeology, which seeks to understand our common biological and cultural roots and the great diversity of humanity.

Mythic Heroes and Vanished Civilizations: The Curiosities of Pseudoarchaeology

Golden pharaohs, lost civilizations, buried treasure—archaeology seems like a romantic world of high adventure and exciting discovery. A century ago, much archaeology was indeed a matter of exotic travel to remote places. It was still possible to find a hitherto unknown civilization with a few weeks of digging. Today, archaeology is a highly scientific discipline, concerned more with minute details of ancient life than with spectacular discoveries. But an aura of unsolved mysteries and heroic figures still surrounds the subject in many peoples' eyes—to the point of obsession. The discovery of the tomb of the pharaoh Tutankhamun added fuel to the flames of speculation about still-undiscovered ancient civilizations, like Atlantis, overwhelmed by a cataclysm in the remote past, and the mysterious sunken continent of Mu, said to lie under the Pacific. Mu has long been discredited, but Atlantis still haunts archaeology, a vanished state that promises untold wealth to its fortunate discoverers. No one has found it, of course, because it simply does not exist, despite an average of a new claim a year. Welcome to the realm of what one can call pseudoarchaeology, or as one recent student of the subject has aptly called "spooky archaeology."

The mysteries of the past attract many people, especially those with a taste for adventure, escapism, and science fiction. They prefer narratives with mythic heroes, journeys of adventure, and spectacular deeds or bloody wars of conquest—gullible nineteenth-century readers devoured tales of great European warriors, who fought across the Midwest from the backs of war elephants. Nonsense, of course, but the author made a fortune. Such tales were bestsellers a century-and-a-half ago, and pseudoarchaeology like this still flourishes today. In our world of sensation and instant gratification, the technicalities of archaeological discovery pale into insignificance alongside popular tales of epic adventure that provide eloquent, fast-moving adventure stories, preferably revolving around ancient wisdoms known only to a few. The data are illusory, but the stories persist, among them the specious tales of ancient astronauts said to have landed thousands of years ago in southern Peru, where they created civilization, compiled by Erich von Daniken. His books made millions, but are scientific nonsense, something which matters not to those who believe in his theories with fanatical devotion. We archaeologists are old fuddy-duddies, who are arrogant and just plain wrong—not among the enlightened.

Another more recent example comes from the pen of British journalist Graham Hancock. He has claimed that a great civilization flourished under Antarctic ice 12,000 years ago. (Of course, its magnificent cities are buried under deep ice sheets, so we cannot excavate them!) Colonists spread to all parts of the world from their Antarctic home, occupying such well-known sites as **Tiwanaku** in the Bolivian highlands and building the Sphinx by the banks of the Nile. Hancock weaves an ingenious story by piecing together all manner of controversial geological observations and isolated archaeological finds. He waves aside the obvious archaeologist's reaction, which asks where traces of these ancient colonies and civilizations can be found in Egypt and other places. Hancock fervently believes in his far-fetched story, and, being a good popular writer, he has managed to piece together a best-selling book that reads like a "whodunit" written by an amateur sleuth. His readers love his fantasy adventures.

Flamboyant pseudoarchaeology of the type Hancock espouses will always appeal to people who are impatient with the deliberate pace of science and to those who believe in faint possibilities. It is as if a scientist tried to reconstruct the contents of an American house using **artifacts** found in Denmark, New Zealand, South Africa, Spain, and Tahiti. Nonscientific nonsense like this comes in many forms. There are those who believe that the lost continent of Atlantis once lay under the waters of the Bahamas and that Atlanteans fled their sunken homeland and settled the Americas thousands of years ago. Others fantasize about fleets of ancient Egyptian boats or Roman galleys that crossed the Atlantic long before Columbus. All these bizarre manifestations of archaeology have one thing in common: they are overly simple, convenient explanations of complex events in the past, based on such archaeological data as their author cares to use.

Inevitably, too, archaeology has become entangled in agendas of politics and its historical ideologies. We archaeologists provide the raw material, which is then permeated with nationalist ideologies. For example, claims that the roots of Hindu nationalism lie in the 4,000-year-old Indus civilization (see Chapter 11) cannot be supported by conventional scholarship, but this is irrelevant to the people who create such tales of the past. They *believe* in a mythology that has a political agenda and is wrapped in cherished mythologies. Much pseudoarchaeology attracts devoted followers, whose beliefs in, say, Atlantis or ancient astronauts are as powerful as religious faith. The real science of the past is based on rigorous procedures and meticulous data collection, its theorizing founded on constantly modified hypotheses tested against information collected in the field and laboratory—in short, archaeological, biological, and other evidence. But it's only fair to point out that the roots of archaeology once lay in mystery and mythology. Today's archaeologists still pursue mysteries of the past and reconstruct stories of the past, but based on carefully, and systematically collected data. Archaeology has become a rigorous science, but pseudoarchaeology persists.

What be done to combat the excesses of pseudoarchaeology? There is no simple answer, for, in truth, one is challenging deeply held beliefs. Do we work with proponents of extravagant theories, challenge them face-to-face, or just ignore them? One answer is, of course, that the more people who are exposed to the remarkable achievements of archaeology, the less credibility pseudoarchaeologists will enjoy. This does not necessarily work but is a challenge that will persist for generations.

Questions for discussion:

What is pseudoarchaeology and how does it differ from scientific archaeology?

Why do people believe the fictional accounts and journeys that are characteristic of pseudoarchaeology?

Prehistory, Archaeology, and World Prehistory

Human beings have a skeleton adapted for standing and walking upright, which leaves our hands free for purposes other than moving around, while a powerful brain capable of abstract thought controls these physical traits. The same brain allows us to communicate symbolically and orally through language and to develop highly diverse cultures—learned ways of behaving and adapting to our natural environments. The special features that make us human have evolved over the past 7 million years.

The scientific study of the past is a search for answers to fundamental questions about human origins. When did the earliest humans appear? When, where, and how did they evolve? How can we account for the

Figure 1.2 The Pyramids of Giza, Egypt.
(krechet via iStock by Getty Images)

remarkable biological and cultural diversity of humankind? How did modern humans settle the world and develop so many different societies at such different levels of complexity? Why did some of us cultivate the soil and herd cattle while others remained hunters and gatherers? Why did some peoples (for example, the San foragers of southern Africa or the Shoshone of the Great Basin in North America) live in small family bands, while the ancient Egyptians and the Aztecs of Mexico built highly elaborate civilizations (Figure 1.2)? When did more complex human societies develop and why? The answers to these questions are the concern of scientists studying world prehistory.

Archaeologists define **prehistory** as that portion of the human past that starts around 3.3 Ma, with the appearance of the first human stone-tool technology (the Lomekwi 3 culture from Lake Turkana in Kenya), and finishes with the creation of written documents and archives (or history). **History** consists of the study of human experience through written documents and has a very much shorter time span. Thus the world's oldest written records come from Western Asia and date to before 5,000 years ago. Elsewhere, writing and written records came into use centuries, sometimes millennia, later. Indeed, some cultures still do not use writing, while in others, writing was adopted only during the past century when European powers annexed vast new territories and started to rule their new possessions. The study of prehistory (that is, the time before history, or written records) is a multidisciplinary enterprise that involves not only archaeologists but also scientists from many other disciplines, including biologists, botanists, geographers, geologists, and zoologists—to mention only a few. But archaeology is the primary source of information on human prehistory.

The archaeologist is a special type of anthropologist whose focus is on the "things" (or the "material culture") left by people in the past. Archaeology consists of a broad range of scientific methods and techniques for studying the past, used carefully and in a disciplined way. The archaeologist studies the human societies of the remote and recent past, using the surviving material remains of their cultures to do so. Archaeology is a highly effective way of studying human cultures in the past and the ways in which they have changed over long periods of time. It covers the entire time span of human existence right up to the study of nineteenth-century railroad stations and the garbage from modern industrial cities.

A century ago, most archaeologists worked in Europe and Western Asia. They thought of human prehistory in very provincial terms and were convinced that all significant developments, such as agriculture and civilization itself, had originated in the area between Mesopotamia and the Nile. Today, archaeologists are at work all over the globe—in Africa, Alaska, and Australia. Thanks to universal dating methods such as radiocarbon dating, we can date and compare prehistoric developments in widely separated parts of the world. We know, for example, that agriculture began in Syria in about 10,000 BC and in central Africa about 2,000 years ago. We can date the start of the modern human colonization of Europe to around 45,000, and that of North America to about 15,000 years before the present. This is the study of **world prehistory**, the prehistory of humankind evaluated not just from the perspective of a single region such as Western Asia, but from a global viewpoint.

World prehistory developed as a result of two major advances in archaeology. The first was the discovery of radiocarbon dating by University of Chicago chemists Willard Libby and J. R. Arnold in 1949. For the first time, archaeologists had at their disposal a dating method of potentially global application that enabled them not only to date sites in all corners of the world but also to compare the chronology of, say, the first agriculture in Southwest Asia with that in the Americas (see "Radiocarbon Dating" box in Chapter 4).

Until then, no one could make easy, direct chronological comparisons between widely separated regions, nor did they have a way of measuring the rate of cultural change through time. Within 15 years of Libby and Arnold's remarkable discovery, radiocarbon dates from hundreds of sites allowed the construction of the first reliable global chronologies, and a population explosion of professional archaeologists occurred worldwide.

Today, archaeological expeditions are at work in every corner of the world and in every environment imaginable: in the remote wilds of

Siberia, in tropical rain forests along the Amazon River in South America, on Rapa Nui (Easter Island) in the Pacific, in the middle of the arid Sahara Desert, and under the world's oceans.

The second major development came in 1961, when Cambridge University archaeologist Grahame Clark published his classic *World Prehistory* (third edition, 1977), the first synthesis of archaeology that took full account of radiocarbon chronology and global archaeological research. This groundbreaking volume helped turn archaeology intellectually from a somewhat provincial discipline into the global enterprise it is today.

Major Developments in Human Prehistory

World prehistory, as described in this book, is concerned with the broad sweep of the human past and more specifically with four major developments (Table 1.1):

- The origins of humankind some 3.3 Ma. We describe the ancestors of the first humans, the fossil evidence for our origins, and some of the behavioral changes and innovations that accompanied the appearance of our earliest forebears.

Table 1.1 Major Developments in Human History

AD/BC *Years* BP	
AD 1532	Spanish conquest of Peru
AD 600	Classic Maya civilization
AD 1	Roman Empire
3100 BC	Origins of civilization. Metallurgy
12,000 BP	Origins of food production
ca. 15,000 BP	First settlement of the Americas - Perhaps earlier
ca. 45,000 BP	First settlement of the Australia - Perhaps earlier
ca. 300,000 BP	Oldest known *Homo Sapiens* fossils, North Africa
1.8 Ma	*Homo erectus* in China, Java, Indonesia, Georgia
1.9–1.5 Ma	*Homo erectus* found in East and South Africa
2.4–1.6 Ma	*Homo habilis*, the first member of the genus *Homo*, found in East and South Africa
3.3 Ma	Oldest known stone tool industry: Lomekwi 3, Kenya
4.2–2.1 Ma	Various *australopithecine* hominins in Africa
4.5–4.3 Ma	*Ardipithecus ramidus*, the oldest certain hominin, found in Ethiopia
7–6 Ma	*Sahelanthropus tchadensis*, earliest known possible hominin, found in Chad
7.5 Ma	Hominin lineage likely diverges from that of Chimpanzees

- The evolution of archaic humans like *Homo erectus* and the origins of anatomically modern people—ourselves. These developments span a long period between about 2.5 million and 170,000 years before the present. We also describe the spread of fully modern humans through the Old World and into the Americas, a process that ended about 15,000 years ago.
- The origins of more complex forager societies and of agriculture and animal domestication, sometimes called **food production**, after about 12,000 years ago. We evaluate the different theories developed to explain greater cultural and social complexity and why humans took up farming and describe the early beginnings and spread of agriculture in Western Asia, Europe, Asia, and the Americas.
- The origins of urbanized, literate **civilizations** (state-organized societies) in about 3100 BC in Western Asia and the development of similarly complex societies in other parts of the world in later millennia.

These major developments provide us with a broad framework for telling the story of prehistory. Central to this framework are the notions of time and space—the context of biological and cultural developments in the past. (For a brief summary of how archaeological research proceeds, see Figure 1.5.)

Cyclical and Linear Time

All human societies have an interest in the past. It is always around them, haunting, mystifying, tantalizing, and sometimes offering potential lessons for the present and the future. The past is important because social life unfolds through time, embedded within a framework of cultural expectations and values. In the high Arctic, Inuit preserve their traditional attitudes, skills, and coping mechanisms in some of the harshest environments on earth. They do this by incorporating the lessons of the past into the present. In many societies, the ancestors are the guardians of the land, which symbolizes present, past, and future. Modern nation-states, such as our own, have a particularly intense interest in ancient times, born partly of curiosity, but also of a need for historical identity. But how true are the stories we tell ourselves? At times, they are total inventions, as when the Nazis claimed ancient Germanic (Aryan) rights over Europe. Today's archaeologists attempt to preserve an accurate scientific record of earlier times.

Archaeologists are deeply curious about the past, yet no one, least of all an archaeologist, should assume he or she is uniquely privileged in this interest. All human cultures share an interest in the past, but we think of it and use it in different ways, just as we have different perspectives on time. While it is true that archaeology is the only method modern science has of studying cultural change through time, that does not give archaeologists unique authority over the past. In many traditional societies, the past is a valued cultural commodity in ways that are fundamentally different from those of the archaeologist. The transmission of knowledge about ancient times lies in the hands of respected elders, who take pains to preserve the accuracy of oral traditions. Such traditions are of vital importance, and they are carefully controlled, for they define and preserve a group's identity from one generation to the next. The past is vested not in science, but in household, community, kin groups, and territory. Among the Yolngu Aborigines of Australia's Northern Territory, for example, only the oldest clan members serve as repositories for the most important historical knowledge. As both Australian Aborigines and Native Americans have pointed out, a fundamental incompatibility exists between Western science and its perspectives on the past and those of other societies. In part, this incompatibility revolves around the notion of linear time.

Westerners think of the passage of the human experience along a straight, if branching, highway of time. The great nineteenth-century German statesman Otto von Bismarck called this the "stream of time," upon which all human societies ride temporarily. We have a sense of linear, unraveling history that goes back through 5,000 years of recorded history to early Egypt and Mesopotamia. Ancient Egyptian civilization began in 3100 BC; Rome was founded in 753 BC; Christopher Columbus landed in the Bahamas on October 12, 1492; and the American Declaration of Independence dates to July 4, 1776. These are landmarks along the ladder of historical chronology, which continues to unfold inexorably every day, month, and year as we live our lives.

An unfolding, linear past is not the only way of conceptualizing ancient times. Many non-Western societies, ancient and modern, think of time as a cyclical phenomenon, or sometimes as a combination of the linear and the cyclical. The cyclical perspective stems from the passage of seasons and of heavenly bodies, from the close relationships between foragers and village farmers and their natural environments. It is also based on the eternal verities of human life: fertility and birth, life, growth, and death. The endlessly repeating seasons of planting and harvest, of game movements or salmon runs, and of ripening wild foods govern human existence in deeply significant ways. The ancient Maya developed an elaborate cyclical system of interlocking secular and religious calendars to measure the passage of the seasons and to regulate religious ceremonies (see Chapter 12).

However, we should not assume that societies with cyclical views of time did not have linear chronologies as well. The celebrated Maya "Long Count" was a linear chronology that formed an integral part of the close relationship between Maya rulers and the cosmos. The ancient Egyptians developed a linear chronology for administrative purposes. But, in general, societies develop linear chronologies only when they need them. For example, Western societies use linear time to regulate times of prayer, to control the workday, and to coordinate airline schedules. It is hard to generalize, but societies with centralized political systems tend to use the reigns of chiefs or kings as signposts along a linear time scale. For instance, the history of the rulers of the state of **Benin** in West Africa shows a significant shift in the interpretation of time. Before the fourteenth century AD, Benin history is essentially mythological, with inaccurate chronology and a variable number of kings. But with the founding of the Yoruba dynasty, the deeds and reigns of every *oba* (king) are remembered in detail with chronological accuracy right down to modern times (Figure 1.3).

Many non-Western societies do not perceive themselves as living in a changeless world. They make a fundamental distinction between the recent past, which lies within living memory, and the more remote past, which came before memory. For instance, the Australian Aborigine groups living in northeast Queensland distinguish between *kuma*, the span of events witnessed by living people, *anthantnama*, a long time ago, and *yilamu*, the period of the creation. Furthermore, many societies also

Figure 1.3 A bronze plaque from Benin City, Nigeria, West Africa, showing a seated *oba* (king) with two attendants. These artifacts served as important historical records of royal reigns and genealogy and were stored in the royal palace.
(Peter Horee/Alamy)

accept that cultural changes occurred in the past, among them Hindu traditions of history, which tell of early people who lived without domesticated animals and plants, and the Hadza hunter-gatherers of East Africa, who speak of their homeland's first inhabitants as being giants without fire or tools. These paradigms of the past take many forms, with mythic creators of culture—usually primordial ancestors, deities, or animals—establishing contemporary social customs and the familiar landscape, or a more remote, discontinuous heroic era like that of the Greeks, which allowed writers like the playwright Aeschylus to evaluate contemporary behavior.

Human thought is complex and varied, and once we zero in on a given culture, we can see yet more ways of doing things. For example, the aforementioned Greeks had two words for time. "Chronos" was their word for unfolding or sequential time—from which we get the words chronological and anachronism. While their second word, "kairos," had a qualitative and almost spiritual meaning, in which time was seen in terms of *right* or opportune moments. Ancient Indians had the same divided notions of time as chronological and kairotic. Kairos is perhaps a rather positive way of looking at time rather than our linear Bismarkian vision of a juggernaut that stops for no one (Figure 1.4).

Figure 1.4 A seated ancient Egyptian scribe from Saqqara, Old Kingdom. (Paris, Louvre/Alamy)

Written Records, Oral History, and Archaeology

Most human societies of the past were nonliterate, meaning that they transmitted knowledge and history orally, by word of mouth. Written records are the most comprehensive source of information about the past, but they usually follow a strictly linear chronology. They also served as educational tools. Apart from anything else, written documents were useful as cues for people to memorize standardized historical, ritual, or mythical information. In the early civilizations, such as those of Egypt, Mesopotamia, and the Maya, scribes enjoyed considerable prestige as the repositories of knowledge and information (Figure 1.5). They were considered so important that conquering Maya lords cut off the fingers of captured scribes to render them useless.

The Aztec oral histories, partially set down after the Spanish conquest of the fifteenth century AD, are an excellent example of history transmitted by word of mouth. They were recited according to a well-defined narrative plot, which focused on great men, key events (like the dedication of the sun god Huitzilopochtli's temple in the Aztec capital in 1487), and the histories of favored groups. In these, as in other oral histories, there were formulas and themes, which formed the central ingredients of a story that varied considerably from one speaker to the next, even if the essential content was the same. Many oral histories are mixtures of factual data and parables that communicate moral and political values. But to those who hear them, they are publicly sanctioned history, performed before a critical group and subject to the critical evaluation of an audience who may have heard the same stories before.

Both written records and oral histories are subject to all kinds of bias. Neither can claim total objectivity, any more than archaeology can. The problem for the archaeologist is to correlate data from excavations with that from oral traditions, to establish critically what is factual history and what is myth or moral exhortation. Oral traditions are hard to use since their antiquity is very difficult to establish. In some cases, in Australia, for example, oral histories and archaeology coincide in general terms. Australian Aboriginal traditions speak of the arrival of the first people from overseas, of the flooding of coastal areas, and of the hunting of giant marsupials (pouched animals like the kangaroo). So Australia's past can be said to come from two sources: archaeological data and oral traditions. At times, the archaeologists and indigenous people have shared interests and come together in identifying sacred and historic places, often to ensure they are preserved. Sometimes the two groups differ drastically on the significance of a particular location, where the archaeologist finds no buildings or artifacts, yet the local people consider it a sacred place.

But, all too often, the archaeologist and a local community have different interests in the past. To the archaeologist, the past is scientific data

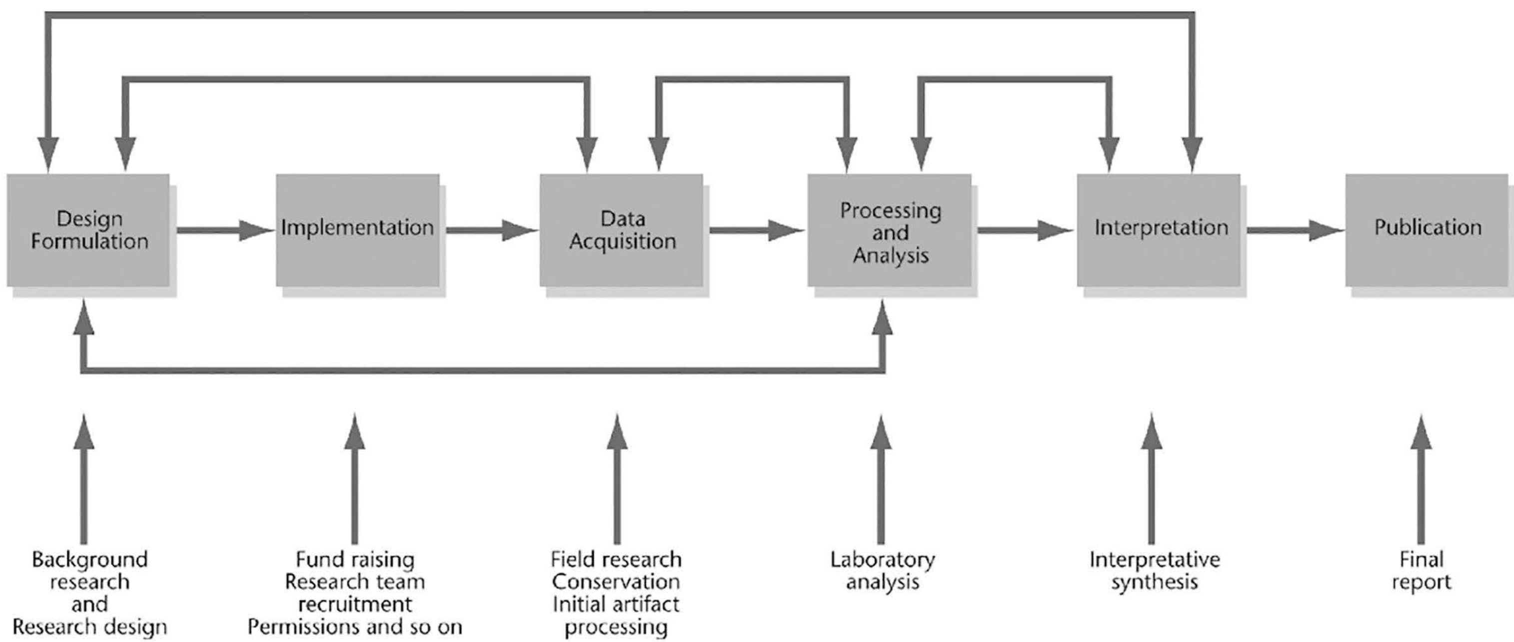


Figure 1.5 The process of archaeological research, which starts with the discovery of the site and proceeds through research design and field research to laboratory analysis, interpretation, and, finally, publication of the results.

to be studied with all the rigor of modern science. To local people, the past is often highly personalized and the property of the ancestors. Such histories are valid alternative versions of history that deserve respect and understanding because they play a vital role in the creation and reaffirmation of cultural identity.

Archaeologists are not alone in considering the past of value, nor are they immune to the politics that sometimes surround the interpretation of aspects of the past. Many Westerners may consider that archaeology—together with the scientific disciplines it draws upon—can provide the most reliable account of humanity's world prehistory. But, as archaeologists, we should never forget that alternative, and often compelling, accounts of ancient times exist, which play an important role in helping societies to maintain their traditional heritage as it existed before the arrival of the Westerner.

World Prehistory offers an account of over 3 million years of human history based on the latest scientific archaeological research, but it does so with a profound respect for the cultures and histories of others with different historical perspectives.

Studying World Prehistory

The study of human prehistory extends back from modern times deep into the remote past. It is as if we are looking back into prehistoric times through the wrong end of a telescope. We can discern relatively recent cultures like those of the Aztecs or the sixteenth-century Pueblo Indians of the Southwest with relative clarity, even if our knowledge is lamentably incomplete. Further back into the past the images become dimmer and more blurred, the scale smaller. We cannot use the lifeways of, say, modern arctic foragers or Maya farmers from Guatemala to interpret this remoter past. The first Native Americans of 15,000 years ago, or the late Ice Age foragers who flourished in Europe 25,000 years ago—these peoples lived in a world unimaginably remote from our own. And the world of the archaic humans of earlier prehistory, of a quarter of a million years ago or more, is so far distant that it is hard for us to comprehend in realistic terms. Such, then, is the objective of world prehistory—to understand prehistoric human behavior in a past separated from our own not only by thousands of years but also by environmental and social challenges very different from those we face today.

World prehistory can be likened to a vast, branching chronological tree, whose roots ultimately extend back to 6–7 Ma, to around the time of the last common ancestor of humans and the other apes. We may think of the human past as linear, but the tree analogy is an apt one, for even the earliest hominins and their cultures diversified rapidly after the first toolmaking humans appeared around 3.3 Ma. Studying the many branches of this hypothetical tree requires use of a fundamental theoretical conception, that of culture.

Culture

As anthropologists, archaeologists study human cultures and how they have changed through time. **Culture** is a concept that anthropologists developed to describe the distinctive adaptive system human beings use. Culture can be called a society's traditional systems of belief and behavior, as understood by individuals and the members of social groups, and manifest in individual or collective behavior. It is also part of our way of adapting to our environment. Our tools and dwellings are part of our culture. Humans are the only animals to manufacture tools for this purpose, although some other animals, among them chimpanzees, do fashion objects to use to achieve certain specific objectives.

Ordinarily, when animals die their experience perishes with them. However, human beings use the symbolic system of language to transmit their ideas and cultures, their feelings and experiences, from one generation to the next. This is why oral traditions are so important in many societies. We learn culture by intentional teaching as well as by trial and error and simple imitation. People can share ideas, which, in turn, can become behavior patterns repeated again and again—witness the long-lived stone hand ax, a multipurpose tool that remained in use for more than 1 million years of early prehistory (see Chapter 3). All archaeological research is based on the principle that culture is an ongoing phenomenon that changes gradually over time.

Unlike biological adaptation, culture is nongenetic and provides a much quicker way to share ideas that enable people to cope with their environment. It is the adaptiveness of culture that allows archaeologists to assume that artifacts found in archaeological sites are patterned adaptations to the environment.

A **cultural system** is a complex system comprising a set of interacting variables—tools, burial customs, ways of getting food, religious beliefs, social organization, and so on—that function to maintain a community in a state of equilibrium with its environment. When one element in the system changes, say hunting practices as a result of a prolonged drought, then reacting adjustments will occur in many other elements. It follows that no cultural system is ever static. It is always changing in big and small ways, some of which scholars can study at archaeological sites. A cultural system can be broken down into all manner of subsystems: religious and ritual subsystems, economic subsystems, and so on. Each of these is linked to the others. Changes in one system, such as a shift from cattle herding to wheat growing, will cause reactions in many others. Such relationships give the archaeologist a measure of the constant changes and variations in human culture that can accumulate over long periods as cultural systems respond to external and internal stimuli. Many of the interacting components are highly perishable. So far, no one has been able to dig up a religious philosophy or an unwritten language.

Archaeologists work with the tangible remains of human activity that survive in the ground such as clay potsherds and the foundations of dwellings. But these remains of human activity are radically affected by the intangible aspects of human culture. For instance, the **Moche** people of the Peruvian coast buried their great lords with elaborate gold and copper ornaments, with fine textiles and elaborate ceremonial regalia. Thanks to Walter Alva's excavations in the great mounds at Sipán, we know of one lord who was buried in about AD 250 with a golden rattle that showed a Moche warrior in full regalia beating a prisoner on the head with his war club (see Chapter 14). The artistic masterpieces buried with the lord of Sipán reflected a culture with an elaborate symbolism and complex religious beliefs that formed part of the intangible world of the Moche.

Culture History, Time and Space, and the Myth of the Ethnographic Present

The past extends back hundreds of thousands of years into remote prehistory, a featureless landscape that archaeologists people with cultures, each with its context in time and space. Culture history, the study of these many contexts, is a fundamental part of archaeology.

Culture history is the description of human cultures that reaches thousands of years into the past. Culture history is derived from the study of archaeological sites and the artifacts and structures in them, within the context of time and space. By investigating groups of sites and the artifacts found there, it is possible to construct local and regional sequences of human cultures that span centuries, even millennia. The study of culture history depends on another important principle, that of context.

Context

Archaeological **context** is the position of an archaeological find in time and space, established by excavation, recording, and survey. The dimension of time combines in archaeological context with that of space—not the limitless space of the heavens, but a precisely defined location for every find made during an archaeological survey and excavation. Every archaeological discovery, be it a tiny pin or a large palace, has an exact location in latitude, longitude, and depth, which together identify any point in space and time absolutely and uniquely. When carrying out surface surveys or excavations, archaeologists use special methods to record the precise positions of sites, artifacts, dwellings, and other finds. They locate the position of each site on an accurate survey map so that they can use the grid coordinates on the map to define the location in precise terms. When investigating a site, they lay out recording grids made up of equal squares over the entire site, using the grids to record the exact position of every object on the surface or in the trenches—a context in time and space determined by stratigraphic observation (Figure 1.6a), chrono-metric dating, and the law of association (Figure 1.6b).

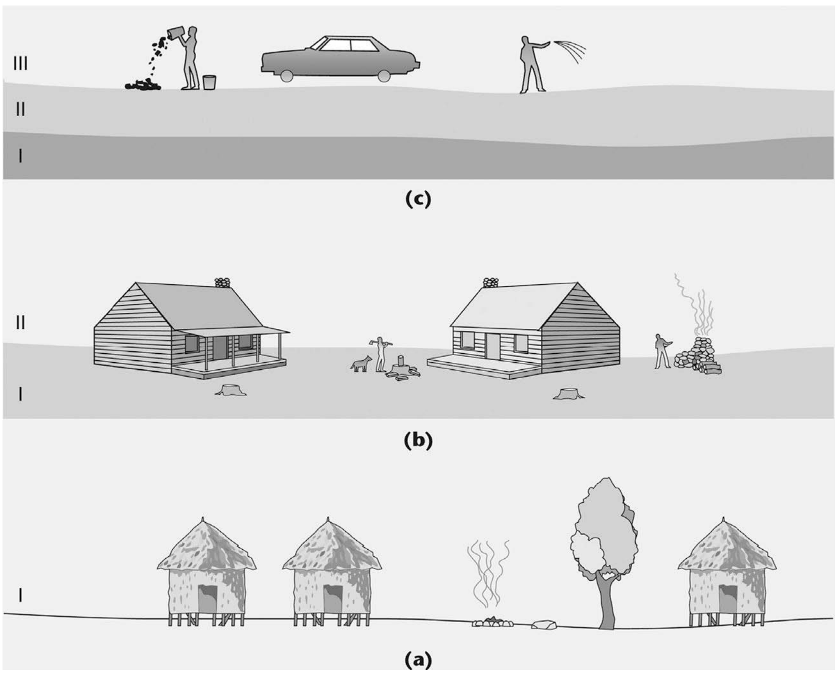


Figure 1.6a Stratigraphy and association, two fundamental principles of archaeology. (a) Superposition and stratigraphy: a farming village built on virgin subsoil. After a time, the village is abandoned and the huts fall into disrepair. Their ruins are covered by accumulating soil and vegetation. (b) After an interval, a second village is built on the same site with different architectural styles. This, in turn, is abandoned; the houses collapse into piles of rubble and are covered by accumulating soil. (c) Twentieth-century people park their cars on top of both village sites and drop litter and coins, which when uncovered reveal to the archaeologists that the top layer is modern. An archaeologist digging this site would find that the modern layer is underlain by two prehistoric occupation levels, that square huts were in use in the upper of the two, which is the later under the law of superposition. Round huts are stratigraphically earlier than square ones here. Therefore village I is earlier than village II, but the exact date of either, or how many years separate village I from village II, cannot be known without further data.

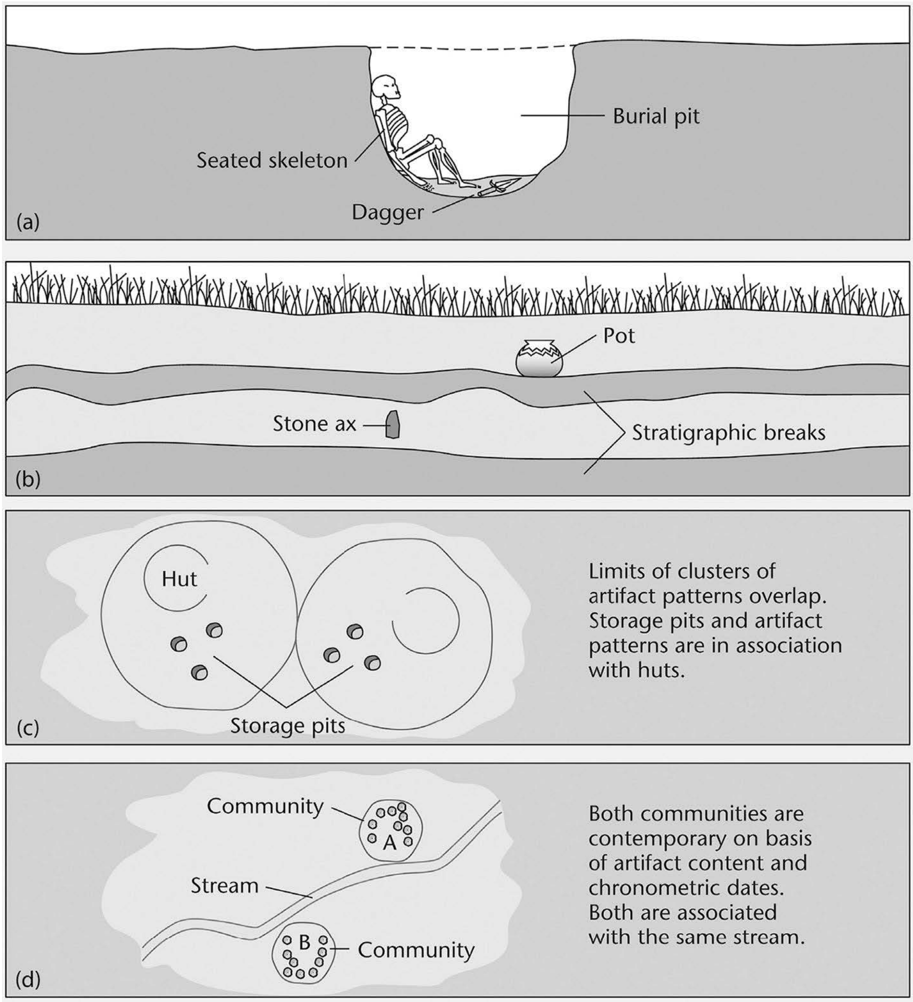


Figure 1.6b Some archaeological associations: (a) The burial pit, dug from the uppermost layer, contains not only a skeleton but also a dagger that lies close to its foot. The dagger is associated with the skeleton, and both finds are associated with the burial pit and the layer from which the grave pit was cut into the subsoil. (b) In contrast, a pot and a stone ax are found in two different layers, separated by a sterile zone, a zone with no finds. The two objects are not in association. (c) Two different household clusters with associated pits and scatters of artifacts. These are in association with one another. (d) An association of two contemporary communities.

Time

The time scale of the human past is hard to imagine. Fifteen thousand years separate us from the end of the Ice Age, when great ice sheets covered much of Europe and North America. At least 300,000 years have passed since the first *H. sapiens* appeared in Africa. At around that time, it is thought that fewer than a million humans (whether *H. sapiens*, Neanderthals, or other human forms) lived in Africa, Asia, and Europe, and the Americas

Table 1.2 Dating Methods and Human Prehistory

Date	*Method*	*Major developments*
Modern times (after AD 1)	Historical documents; dendrochronology; imported objects	Columbus in the New World; Roman Empire
3,100 BC		Origins of cities; origins of food production
15,000 BP		Colonization of New World
40,000 BP	Radiocarbon dating	
60,000 BP	(organic materials)	Colonization of Australia
75,000 BP	Uranium series dating	
100,000 BP	Potassium argon dating (volcanic materials)	
500,000 BP		
5 Ma		Early hominins and ancestors

were uninhabited. Winding back the clock yet further, at 2 Ma, all known humans dwelt in tropical Africa. Some idea of the scale of prehistoric time can be gained by thinking of a 24 hour day. If the first humans first appeared around midnight (put at a conservative 6 Ma), then the first of our species, *H. sapiens* (dated to around 300,000 years ago), would have turned up at around 10.48 pm, the first farmers (around 10,000 years ago) at 11.57 and 36 seconds, while historical records (at a mere 5,000 years ago) chime in just before the day is through, at 11.58 and 43 seconds.

Given that written records only emerge in the last minute and a bit of human existence, how, then, do archaeologists date the past? The chronology of world prehistory is based on observations of stratified occupation levels and on a variety of chronometric dating methods that take us far back into the past, long before the earliest historical records appear in Western Asia about 5,000 years ago (Table 1.2). Ninety-nine percent of all human existence lies in prehistoric times and can be measured only in millennia, and occasionally in centuries.

Dating the Past

Four major chronological methods date the 3.3 million years of the human past (see **Table 1.2**):

Historical Records (from Present Day to 3100 BC)

Historical records can be used to date the past only as far back as the beginnings of writing and written records, which first appeared in Western Asia in about 3100 BC, and much later in many other parts of the world.

Dendrochronology (Tree-Ring Dating) (from Present Day to 8000 BC)

The annual growth rings of long-lived trees such as sequoias, bristlecone pines, and European oaks, used for beams, posts, and other purposes by ancient peoples, can be used to date sites in areas such as the American Southwest, the Mediterranean, and Western Europe. Originally used on Southwestern pueblos, **dendrochronology** (tree-ring dating), using sequences of growth rings, is also used to calibrate radiocarbon dates (see "Dendrochronology (Tree-Ring Dating)" box in Chapter 7).

Radiocarbon Dating (from ca. AD 1500 to 40,000 Years Ago)

Radiocarbon dating is based on the measurement of the decay rates of C-14 atoms in organic samples like charcoal, shell, wood, hair, and other materials. When combined with accelerator mass spectrometry (AMS), it can produce dates from tiny samples, which are then calibrated, if possible, against tree-ring dates to provide a date in calendar years. Radiocarbon chronologies date most of prehistory after about 40,000 years ago, well after modern humans appeared in Africa for the first time (see "Radiocarbon Dating" box in Chapter 4).

Potassium Argon Dating (from 250,000 Years Ago to the Origins of Life)

Potassium argon dating is a chronological method used to date early prehistory that measures the decay rate of 40K atoms in volcanic rocks (see "Potassium Argon Dating" box in Chapter 2). It is an excellent way of dating East African hominin fossils, many of which are found in volcanic levels.

Other dating methods include obsidian hydration, paleomagnetic dating, thermoluminescence, and uranium thorium dating, but none of them can be universally applied.

Space

Spatial location is indispensable to archaeologists because it enables them to establish the distances between objects or dwellings, between entire settlements, or between settlements and key vegetational zones and landmarks. Such distances may amount to only a few centimeters, or they may be found to extend for hundreds of miles as a team of fieldworkers traces the distribution of traded luxury goods in dozens of settlements. Thus, archaeologists think of space on two general scales: the distribution of artifacts within a settlement (Figure 1.7) and the **settlement pattern**, the placement of the settlements themselves over the landscape.

Context in space is closely tied to people's behavior. Archaeologists examine both an artifact itself and its association with other artifacts to gain insight into human behavior.

For example, Belgian archaeologists investigated a 9,000-year-old hunting camp in a sandy clearing at **Meer** in northern Belgium. By plotting

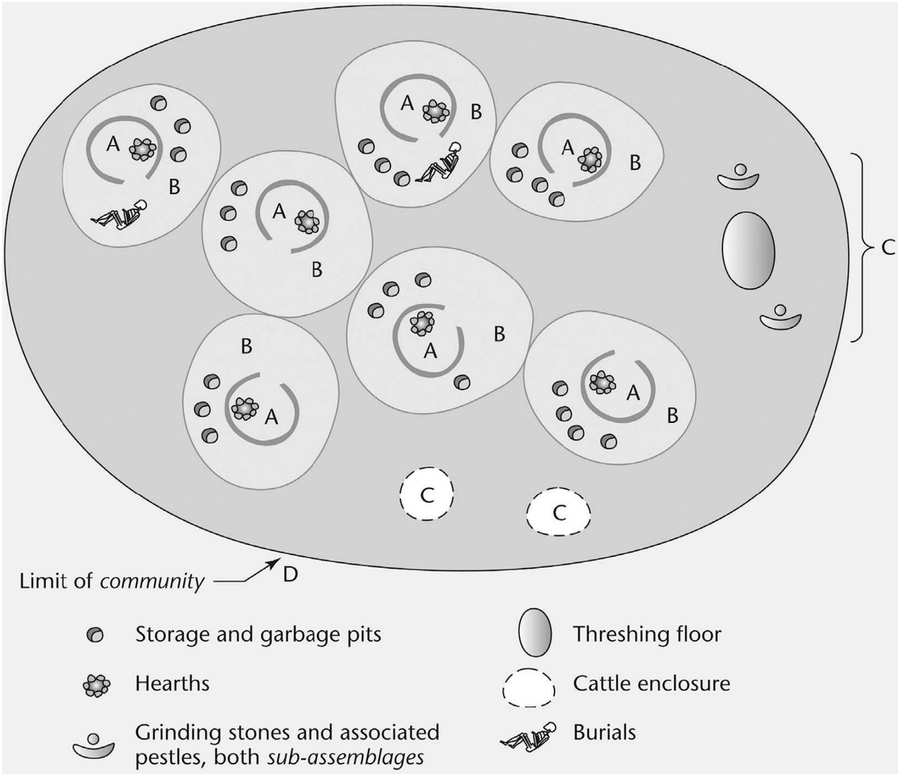


Figure 1.7 A hypothetical ancient farming village, showing (A) houses, (B) household areas, (C) activity areas, and (D) the community.

all of the stone fragments on the ancient ground surface, they managed to identify not only a camping area but also an outlying scatter of stone fragments where one or two people had sat down and fashioned several flint artifacts. The spatial relationships among the stone chips allowed them to reconstruct what had happened 9,000 years ago in astounding detail. By fitting together the stone flakes, they were able to replicate the stoneworking technique and even to show that one of the workers had been left-handed!

Analogy and the Ethnographic Present

The study of culture history depends heavily on **ethnographic analogy**—the comparison of the artifacts and cultures of living, modern-day societies with those of the past. Of course, numerous, and sometimes obvious, analogies can be made between ancient and modern hunting weapons or, for example, between grindstones (*metates*) used by modern Maya Indians and their remote ancestors. But to assume that prehistoric foragers thought the same way about the environment as modern San peoples from southern Africa do, or that late Ice Age hunters living in arctic environments led similar lives to those of Eskimos or Inuits, is nonsensical.

One approach is **ethnoarchaeology**, sometimes called "living archaeology," the study of living societies to aid in the understanding and interpretation of the archaeological record. For example, archaeologist John Yellen lived for many months among !Kung San foragers in the Kalahari Desert in southern Africa. He went back to their campsites and recorded the scatters of abandoned artifacts and the remains of brush shelters, hearths, and sleeping places. Yellen even excavated some of the sites, gathering a valuable body of information for studying ancient foragers. For instance, most artifact patternings at !Kung sites were the result of family activities, whereas communal events such as dancing and the first distribution of meat took place in open spaces and left no traces in the archaeological record. Archaeologists have carried out other such research works among the Hadza hunter-gatherers of Tanzania in East Africa (Figure 1.8).

Everywhere in the world, archaeologists work back from the known present into the remote past, from historic Pueblo settlements in the American Southwest, from modern African villages, and from contemporary Australian Aboriginal camps. These societies, be they Aztec, Inca, Pueblo, or Zulu, represent something often called the **ethnographic present**, traditional culture in its so-called pristine condition before the contaminating influence of Western civilization transformed it forever. The ethnographic present is, however, a myth, for all human societies are in a constant state

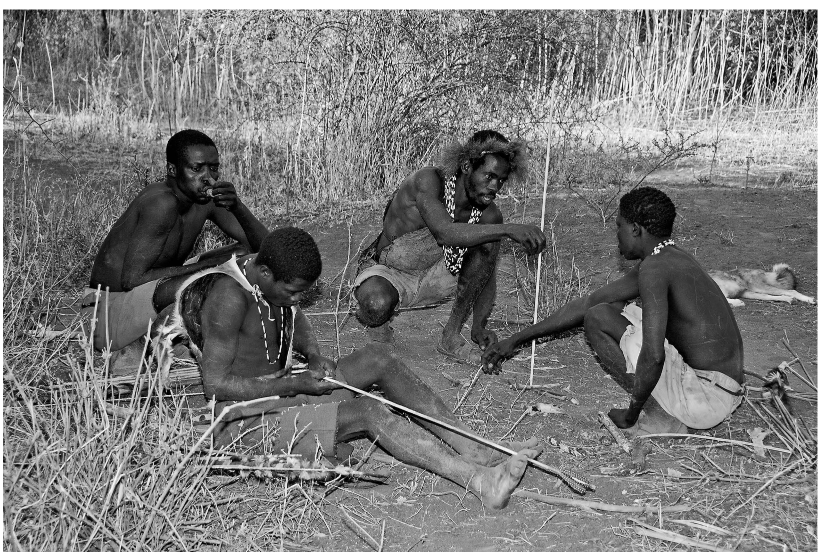


Figure 1.8 Ethnoarchaeology among the Hadza hunter-gatherers of Tanzania. Shown here is the recording of details of a hunter's kill.
(James O'Connell)

of change. There was never a moment, let alone one at European contact, when any ancient culture stood still—when it was pristine.

For example, throughout North America, Native Indian societies that Europeans encountered and described had already suffered the effects of widespread Western contact. Smallpox and other diseases spread far inland and decimated indigenous populations long before anyone physically encountered a foreigner. So even the first explorers of, say, the interior of the southeastern United States interacted with Indian societies that were often a shadow of their former selves. No one could describe their decimated societies as the "ethnographic present."

Cultural Process and Past Lifeways

Cultural process refers to the changes and interactions in cultural systems. The study of cultural process provokes intense theoretical debate among archaeologists, who assume that archaeology is far more than merely a descriptive activity and that it is possible to explain how cultural change occurred in the remote past.

Every cultural system is in a constant state of change. Its various political, social, and technological subsystems adjust to changing circumstances. We ourselves live in a time of rapid cultural change in which measurable differences exist between decades, let alone centuries. Consider the many small changes in automobile design that have occurred in the past few decades. In themselves, the changes often are not very significant, but the cumulative effect of several years of steady change toward safer cars is striking—air bags, energy-absorbing bumpers, padded steering wheels, antilock brakes, and so on. The automobile of today is very different from that of the 1960s, and many of the changes are due to stricter government safety regulations, which, in turn, result from greater safety consciousness on the part of consumers (Figure 1.9). Here we see a major cumulative change in part of our enormous technological subsystem.

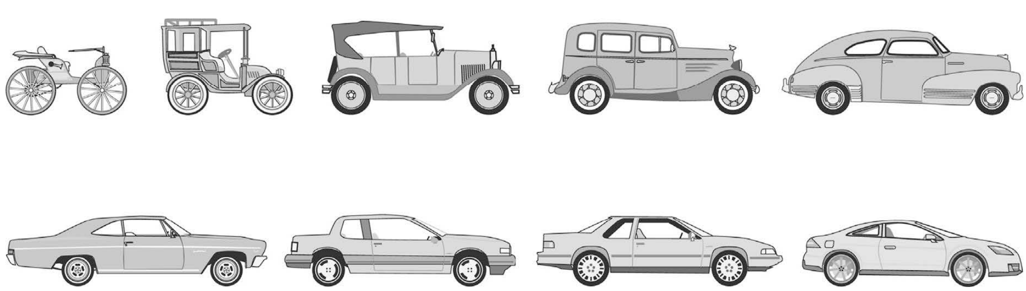


Figure 1.9 Changing automobile styles reflect design advances and safety considerations as well as shifting fashions.

By examining the relationships between these technological changes and the political and social subsystems, we can understand the processes through which culture has changed.

Most processes of culture change in human prehistory were cumulative, occurring slowly over a long time period. They were the result of adaptations to constantly changing external environments. Cultural systems were continually adjusting and evolving in response to internal and external feedback, including changes in the natural environment. The study of past lifeways—that is, how people survived or made their living in the past—involves the examination of prehistoric cultures within their environmental context. Environmental data come from many sources, including ancient plant remains, fossil pollen grains, and animal bones. Ancient subsistence patterns and even diet can be reconstructed from food residues such as animal bones, carbonized seeds, and fish remains. This is also descriptive archaeology, but it relates **archaeological cultures** to the complex and continually changing patterns of settlement, subsistence, and environmental influences.

The fundamental questions about prehistory revolve around culture change. How did AMHs, *H. sapiens*, evolve their more advanced cultures? What cultural processes came into play when people began to cultivate the soil or when complex and elaborate urban societies developed in Western Asia over 5,000 years ago? Clearly, no single element in a cultural system is the primary cause of cultural change, because a complex range of factors—rainfall, vegetation, technology, social restrictions, and population density, to mention only a few—interacts with one another and reacts to a change in any element in the system.

Mechanisms of Culture Change

Culture history is a sound way of describing the past, but it is of minimal use for studying variations in different prehistoric cultures or for answering fundamental questions about the nature of culture change in the past. But the archaeological record does not invariably reflect an orderly and smooth chronicle of culture change. A radically new artifact inventory may suddenly appear in contemporary occupation layers at several sites, while earlier tool kits suddenly vanish. A culture's economy may change rapidly within a century as the plow revolutionizes agricultural methods. How do such changes come about? What mechanisms of cultural change were at work to cause major and minor alterations in the archaeological record? Archaeologists use four descriptive models to characterize culture change: inevitable variation, invention, diffusion, and migration.

- **Inevitable variation**. As people learn the behavior patterns of their society, inevitably some differences in learned behavior will appear from generation to generation. These, although minor in themselves, accumulate over a long period of time, especially in isolated populations. The snowball effect of such inevitable variation among isolated, thinly scattered populations can be considerable. For example, projectile point forms varied considerably between different, isolated big game hunting groups on the North American Great Plains in 4000 BC, even though they all pursued the same animals with much the same techniques.

- **Invention**. Humans are inquisitive, constantly innovating and having ideas. Invention is the creation or evolution of a new idea. The term *invention* refers to new ideas that originate in a human culture, either by accident or by design. All innovations in human society have their origin in such actions or chance occurrences, but only a very few inventions are truly unique and not introduced from outside by some other culture. It is one thing to invent something, quite another to have it accepted by society as a whole. In general, technological innovations, such as the plow, are more readily accepted than social or religious innovations, for they are less likely to conflict with established value systems. The genius of humanity was that it recognized opportunities when they came along and adapted to new circumstances, often in similar ways in widely separated areas, resulting in independent invention of very similar ideas such as farming.
- **Diffusion**. The spread of ideas, over short or long distances, is termed *diffusion*. Neither the exchange of ideas nor of technological innovations necessarily involves actual movements of people. Diffusion can result from regular trade between neighboring communities. Commerce of any kind implies a two-sided relationship, in which both parties exchange goods, services, and, of course, ideas such as new religious beliefs. For instance, brightly painted Minoan pots from Crete carried olive oil and wine through the Aegean Islands and as far afield as Egypt (Figure 1.10).
- **Migration**. Migration involves movements of entire societies that deliberately decide to expand their spheres of influence. Spanish conquistadors occupied Mexico, and the Polynesians voyaged from island to island across the Pacific. In each case, new landmasses were found by purposeful exploration, then colonized. Smaller-scale migrations are more commonplace, such as when a group of merchants from lowland Veracruz, Mexico, moved into the highland city of Teotihuacán and settled in their own *barrio*, identified from their distinctive cream-colored pottery and dome-shaped thatched adobe houses (Figure 1.11). Other types of migrations take place, too, unorganized movements of slaves and artisans and of people fleeing religious persecution.

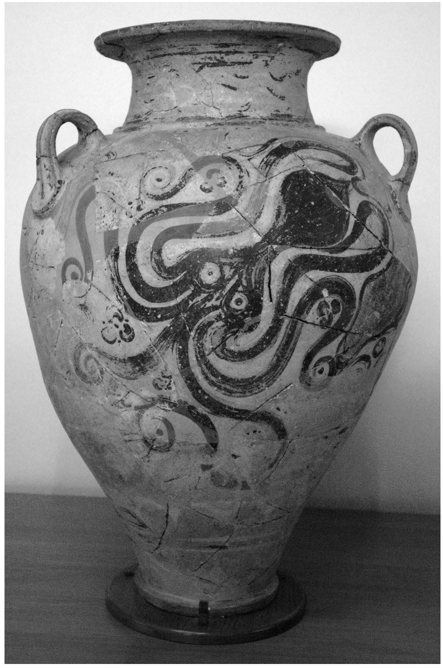


Figure 1.10 Minoan pot from Knossos, Crete.
(Craft Alan King/Alamy)

Figure 1.11 A reconstruction of the Veracruz enclave at Teotihuacán, Mexico.
(Chuck Carter/National Geographic Creative)

Invention, diffusion, and migration are far too general cultural mechanisms to explain the ever-changing relationships between human cultures and their environments. The identification of these mechanisms is largely a descriptive activity, based on artifacts and other material remains. The explanation of culture change requires more sophisticated research models that reflect the interaction of human societies with the natural environment.

Culture as Adaptation

In the 1950s, American anthropologists Julian Steward and Leslie White developed what they called **cultural ecology**, the study of the total way in which human populations adapt to and transform their environments. Archaeologists who study cultural ecology are concerned with how prehistoric cultures as systems interacted with other systems: with other human cultures, the biotic community (other living things around them), and their physical environment. This is often called the culture-as-adaptation approach to human prehistory.

Culture as adaptation—this phrase is behind most contemporary interpretations of world prehistory. Leslie White called culture "man's extrasomatic [outside the body] means of adaptation" (White, 1949, p. 14). Culture is the result of human beings' unique ability to create and infuse events and objects with meaning that can be appreciated, decoded, and understood with, among other things, ideology. Thus, human cultures differ greatly from place to place and from time to time, resulting in variations in prehistoric material culture—the data for studying prehistory.

Under the culture-as-adaptation rubric, human behavior is an adaptation not to a single site but to environmental regions. Thus, the archaeologist has to study not individual sites but entire regions. The archaeological record is not just a system of structured sites, but a continuous pattern of artifact distribution and density over the landscape. As individuals and groups hunt, forage, or farm their way across this landscape, they leave behind material remains of their presence, a record that reflects their continual behavior within the region.

Multilinear Cultural Evolution

The culture-as-adaptation approach attempts to interpret cultural variation and adaptation on a regional basis over long periods of time. This strategy means that the archaeologist must pay close attention to the relationships between ecological and social systems. Under this theory of **multilinear cultural evolution** (evolution along multiple tracks), each human society pursues its own evolutionary course, determined by the long-term success of an adaptation, via technology and social institutions, to its natural environment. Multilinear evolution is widely used as a general framework for interpreting world prehistory, which witnessed occasional dramatic incidents of cultural change.

Some societies achieve a broad measure of equilibrium with their environment, in which adaptive changes consist of little more than refinements in technology and the fine-tuning of organizational structures. Others become involved in cycles of change triggered by external environmental change or from within society. If these changes involve either greater food supplies or population growth, there can be accelerated change resulting from the need to feed more people or the deployment of an enlarged food surplus. Such was probably the case in parts of Southwestern Asia in 10,000 BC, when some communities living in favored regions began cultivating wild cereal grasses to expand their food supplies (see Chapter 6). Within generations of the first experiments with farming, many groups depended heavily on cereal crops. Major technological and social changes followed. People now settled in permanent villages under entirely different social conditions.

Every society has its growth limits imposed by the environment and available technology, and some environments, such as Egypt's Nile Valley, have more potential for growth. Certain types of sociopolitical organization, such as centralized control of specialized labor, are more efficient. Adaptive changes triggered technological innovations that led to increased food supplies and higher population densities. Multilinear evolution assumes human societies have developed along many tracks (see "Ancient War Casualties at Thebes" box).

The widespread use of multilinear evolution as an explanatory mechanism has led a number of archaeologists to talk of two broad stages of social development in prehistory: prestate and state-organized societies. These should not be thought of as universal stages through which all societies pass, as some Victorian anthropologists once argued, but as degrees of social development that many groups achieved quite independently in many environments (see "Ancient Social Organization" box).

Site

Ancient War Casualties at Thebes, Egypt

Archaeology studies not only great rulers but anonymous, ordinary people, too. Few tales of ordinary people are as vivid as the one unearthed in a remarkable discovery Egyptologist Herbert Winlock made in a sepulcher close to the tomb of the Middle Kingdom pharaoh Mentuhotep II (2061–2010 BC) at Thebes in 1911. Sixty soldiers killed in battle were stacked in the tomb dressed in linen shrouds. Their dried-out bodies were so well preserved that they began to decay when removed from the tomb. Winlock used biological and archaeological data to reconstruct their last battle. All the soldiers were young men in the prime of life, each with a thick mop of hair bobbed off square at the nape of the neck. All had perished in an attack on a fort, for their wounds came from arrows shot from above or from crushing blows from stones thrown down from a fortification.

Contemporary pictures show attackers sheltering under thin shields as they attempt to breach the defenses under a rain of missiles. In this case, the fire was too fierce, so the men had run out of range. A shower of arrows overtook some of them. At least one was hit in the back with an arrow that came out on the other side of his chest. He pitched forward. The slender reed shaft broke off as he fell and he bled to death. The defenders now sallied forth and mercilessly clubbed at least a dozen wounded men to death with heavy blows. Then, waiting vultures and ravens descended on the corpses and worried away the flesh with their beaks. A second attack was successful. The torn bodies were recovered and buried with honor in a special tomb next to their pharaoh. We do not know where the attack took place, but it was somewhere in Egypt, for the arrows that killed the attackers were of Egyptian design. Few discoveries make such a powerful statement about the lives of the anonymous players of the past as this one.

Multilinear cultural evolution combines systems approaches to human culture and cultural ecology into a closely knit, highly flexible way of studying and explaining cultural process. The culture-as-adaptation approach requires that one look at cultural change in the context of the interrelationships among many variables. Thus, there is no one prime agent of cultural evolution that caused, say, farming in ancient Syria or Maya civilization in **Mesoamerica** (the area of Central America where prehistoric states flourished). Rather, a series of important variables such as population growth, food shortages and a prolonged drought cycle, and intergroup competition acted together to trigger cultural change.

Theory

Ancient Social Organization

Prestate societies are small-scale societies based on the community, band, or village. They vary greatly in their degrees of political integration and are sometimes divided into three loosely defined categories:

1. **Bands** are associations of families that may not exceed 25 to 60 people. They are knit together by close social ties; they were the dominant form of social organization for most of prehistory, from the earliest times up to the origins of food production some 10,000 years ago.

2. **Tribes** are clusters of bands linked by **clans** (formal kin groups). A clan is not a tribe, which contains people from many kin groups, but a group of people linked by common ancestral ties that serve as connections between widely scattered communities. Clans are important because they are a form of social linkage that gives people a sense of common identity with a wider world than their own immediate family and relatives. Many early farming societies throughout the world can be classified as tribal societies.
3. **Chiefdoms** are a controversial category, for they display great differences in organization and social complexity, making them hard to define precisely. Fundamentally, they are societies headed by individuals with unusual ritual, political, or entrepreneurial skills and are often hard to distinguish from tribes. Society is still kin-based but is more hierarchical, with power concentrated in the hands of kin leaders responsible for acquiring and then redistributing food and other resources throughout the group. Chiefdoms tend to have higher population densities and vary greatly in their elaboration; they were politically very volatile, rising to power and collapsing with dramatic rapidity.

State-organized societies (preindustrial civilizations) operated on a large scale, with centralized political and social organization. Tiny elites ruled such societies. They held monopolies over strategic resources, including food surpluses, and used force to impose authority. Their social organization can be likened to a pyramid, with a single ruler at the apex and stratified classes of nobles, priests, bureaucrats, merchants, artisans, and commoners below. Most were based in large cities with populations that ranged upward from 5,000 people.

The state-organized society was based on intensive agricultural production, which often relied heavily on irrigation or swamp farming—carefully watered lands that yielded several bountiful crops a year. These painstakingly administered and controlled agricultural works were the means by which society supported thousands of non-farmers: artisans, officials, traders, and priests, as well as other city dwellers. State economies were based on the centralized accumulation of capital and social status through tribute and taxation. Long-distance trade, the division of labor, and craft specialization were often characteristic of early states, as were advances toward record keeping, science, mathematics, and usually some form of written script.

When we seek to explain the major and minor events of prehistory, we have to consider the ways in which change takes place, the processes and mechanisms of change, and the social and economic stresses (population pressure, game scarcity, and so on) that trigger these mechanisms. Such multicausal models are a far cry from speculative theories that speak of ancient Egyptian voyages across the Atlantic Ocean or brilliant, solitary inventors. They require rigorous methodologies for identifying the many factors involved, using data that consist, for the most part, of material remains such as potsherds and stone implements.

Cultural Traditions and Cultural Change

The culture-as-adaptation approach to the past is concerned primarily with identifying variations in ancient human cultures and with explaining cultural change over long periods of time. Archaeologists espousing this approach have focused on explanations for culture change and on relationships between people and their environments, to the point that many archaeologists have complained that this perspective is more concerned with the processes of culture change than with the people behind these changes. All human societies are made up of individuals—men and women, children and adults, families, entire communities, and their neighbors near and far. They spend their lives interacting with one another, agreeing, disagreeing, negotiating, quarreling, and living in peace. From these interactions stem cultural traditions that provide guidance for coping with the environment. The same traditions can be a powerful, conservative force—one that inhibits change—or can encourage innovation in times of stress.

Ecological and other external constraints can be culturally mediated, but they operate independently of human actions, which makes them susceptible to understanding in terms of evolutionary theory and other such generalizations. Cultural traditions are far more idiosyncratic and haphazard. This makes it difficult to impose evolutionary order on human history, for despite external constraints, much cultural change is contingent on ever-changing circumstances and cultural traditions. By studying individual cultural traditions, archaeologists try to explain the distinctive features of cultures in ways that evolutionists and cultural ecologists can never hope to. Increasingly, we seek to explain the past in terms of both external (environmental) and internal (social) constraints. Internal constraints include knowledge, beliefs, values, and other culturally conditioned habits, all of them different in every culture. Yet some of them are shared by cultures flourishing thousands of miles apart. For instance, two widely separated cultures may develop bronze metallurgy, which is based on a common body of technological know-how, but the cultural context of that knowledge is radically different, as it was, say, in the Shang civilization of China (Chapter 11) and the Moche culture in coastal Peru (Chapter 14). Some symbols, like the common practice of elevating chiefs or kings on a dais, or associations between rulers and the sun, have developed in many places. That does not mean, of course, that they are connected.

A new generation of archaeological research has moved beyond cultural process and ecology to take a first, cautious look at what was going on inside the early human mind. Sometimes called **cognitive archaeology**, the study of the archaeology of mind, this new approach to the past is both controversial and stimulating, since it draws on lines of evidence from many disciplines, including evolutionary psychology.

Intangibles: Ideology and Interaction

Archaeologists study the remote human past from rare fossil human remains and the surviving consequences of human behavior—artifacts, food remains, and so on. The human mind and our speech, thought processes, beliefs, and interpersonal dealings are intangibles, which do not survive in the archaeological record. Nevertheless, this same record provides dramatic evidence for evolving human behavior and greatly enhanced intellectual capabilities over 2.5 million years. The appearance of toolmaking in East Africa about 3.3 million years before the present was one "moment" when major change occurred. Perhaps it was no coincidence that human brain size increased dramatically over the next million years. Another major moment happened some 80,000 to 30,000 years ago when AMHs developed much more complex technology and made exquisite art.

Herein lie many fundamental questions about the past: Why did these developments take place? What happened to the human brain during these great spurts in human development? What was the nature of human intelligence before and after these cultural spurts? Our increased understanding of cultural forces and constraints, and of cognitive issues, has caused archaeologists to focus more attention on people and groups than on the processes of culture change. Much new research has tried to look beyond the material aspects of the archaeological record to search for the complex, intangible ideas behind ancient societies. This approach, which has generated an extraordinary outpouring of (often verbose and irrelevant) theoretical argument, is sometimes called **post-processual archaeology**. The theoretical debate continues, but has had the effect of highlighting two important topics: ancient ideologies and beliefs, and interactions between groups and individuals.

Ideology and Beliefs

The intangible ideologies and beliefs of ancient times are extremely difficult to reconstruct from material remains such as artifacts, art, and architecture. We can only guess at the beliefs and motivations behind late Ice Age cave art (Chapter 4) or the celebrated plastered human portraits from the early farming settlement at **Jericho**, Jordan (Figure 1.12). But the study of ancient ideology and beliefs offers great potential when written records such as Egyptian documents or Maya glyphs can be combined with excavations. One of the best examples of such research is Linda Schele and David Freidel's remarkable work on ancient Maya iconography in

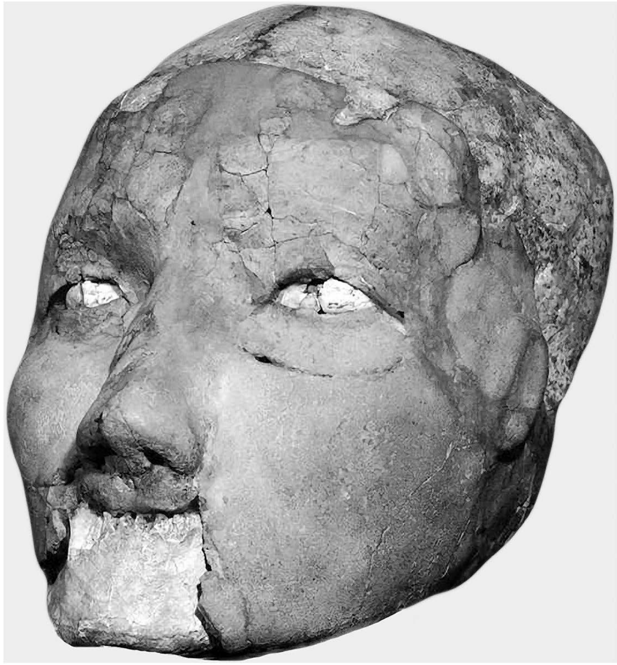


Figure 1.12 A plastered skull from Jericho, Jordan. (BibleLandPictures.com/Alamy)

Mesoamerica, based on a combination of deciphered glyphs and archaeological data (Chapter 12). Their work shows how ritual life, shrines, and temple structures helped shape past lives. "The Maya believed in a past which always returned … in endless cycles repeating, patterns already set into the fabric of time and space," they write in their book *A Forest of Kings.* "Our challenge … is to interpret this history, recorded in their words, images, and ruins, in a manner comprehensible to the modern mind, yet true to the Mayans' perception of themselves" (Schele and Freidel, 1990, p. 18).

Interactions

In the final analysis, it is people who share culture—groups and individuals—who make decisions about daily life. Men interact with women, children with adults; a kin group quarrels within itself, pitting small faction against small faction; ethnic groups compete for access to wealth or political power—such dealings between individuals, between individuals and groups, and between groups are the forces that constrain or encourage cultural change. By its very nature, the archaeological record tends to be impersonal, its artifacts and food remains chronicling the dealings of blurred groups rather than individuals or even categories of people, for instance, women, at a given moment in time.

Only rarely can the archaeologist go beyond artifacts and food remains to study the roles of groups or individuals, the work they undertook, and the subtle ways in which they influenced the course of events. For example, at the early farming village of **Abu Hureyra** in Syria, dating to 9700 BC, biological anthropologist Theya Molleson observed malformations of the toes, knees, and lower vertebrae in the skeletons of all the adult women, a condition due almost certainly to hours of grinding grain (see Figure 6.4). Male skeletons did not display the same impairments. This is some of the earliest evidence for division of labor between men and women in human history.

Studying ancient beliefs, the intangibles of the past, can be likened to studying a series of pictures without the captions. Indeed, this is one of the great frustrations of archaeology. We can admire a giant bull from the 15,000-year-old frieze Stone Age artists painted on the walls of a cave at **Lascaux** in southwestern France (Chapter 4), walk among the stone circles at **Stonehenge** in England (Figure 1.13), or trace the intricate engraving on a freshwater shell from the **Mississippian** culture of the southeastern United States (Chapter 7). But while we can admire the artistry behind the image, we can only rarely discern the complex beliefs and motives that resulted in these magnificent achievements. We cannot speak to the ancients; we can only seek to understand some of the brilliant, and often frustrating, complexity of their diverse societies.

Figure 1.13 Stonehenge in Southern England.
(Thyme/iStock by Getty Images)

British archaeologist Steven Mithen has likened the long millennia of our past to an archaeological play with several acts that reaches a climax with the appearance of farming a mere 12,000 years ago. In ten short millennia, humanity moves away from a simple village existence into a world of automobiles, aircraft, vast industrial cities, and an emerging global, computerized society. World prehistory performs most of this play, ending with the Spanish conquest of Mexico and Peru, with the climactic encounter between Westerners and the last of the preindustrial civilizations in the early sixteenth century AD.

Our play begins around 6 Ma.

Summary

- Archaeology is the study of the ancient human past using the material remains of past human behavior. These material remains make up the archaeological record, the archives of prehistoric times.
- While historians study written records, deal with an anonymous past. Archaeology is unique among the sciences in its ability to study culture change over long periods of time.
- Text-aided archaeology combines the evidence of archaeology with documentary sources, while prehistoric archaeology is the study of prehistory, the period of the human past before the advent of written records.
- The study of world prehistory, which developed in the 1950s, is the study of human prehistory from a global perspective using archaeological data and other sources.
- All human societies are interested in the past, but they think of it in different terms and use it for different purposes. Archaeologists, and Westerners more generally, conceive of time in a linear way, while many non-Western preindustrial groups measure time by the cycles of the seasons and the movements of heavenly bodies. They use linear time only when it is of use to them.
- Archaeology is not the only way of approaching history, for many societies have oral histories, alternative perspectives on the past that are of vital importance in preserving traditional culture and values.
- Theoretical approaches to human prehistory abound, but can be divided, in general terms, into processual and post-processual approaches. The processual (culture-as-adaptation) approach uses multilinear cultural evolution and cultural ecology to provide a viable general framework for studying world prehistory, based on the assumption that human societies evolved in many diverse ways. Archaeologists conventionally make a distinction between prestate and state-organized societies as part of this framework.
- Evolutionary ecology makes use of the mechanism of natural selection and optimal foraging strategy to interpret hunter-gatherer societies in terms of energy costs and risk management.

- In recent years, archaeologists have distinguished between external constraints on cultural change, such as environmental factors, and internal constraints, created by the actions of individuals and groups.
- A new generation of research is focusing on ideologies, human interactions, gender relations, and other topics, combining processual and post-processual approaches to study both types of constraints and their influences on the past.

Further Reading

Two major college textbooks offer more comprehensive summaries of world prehistory. Brian Fagan and Nadia Durrani's *People of the Earth*, 14th ed. (Abingdon: Routledge, 2019) is a much-expanded version of this book. T. Douglas Price and Gary Feinman, *Images of the Past*, 7th ed. (New York: McGraw Hill, 2012) is a world prehistory based on site case studies. Chris Scarre, ed., *The Human Past*, 4th ed. (London: Thames and Hudson, 2016) is a thorough, multi-authored account of prehistory for the more advanced reader. Brian Fagan and Nadia Durrani, *A Brief History of Archaeology* (Abingdon: Routledge, 2016) is a succinct account. For methods, our *Archaeology: A Brief Introduction*, 12th ed. (Abingdon: Routledge, 2016) is a good starting point. More comprehensive treatments include Brian Fagan and Nadia Durrani, *In the Beginning*, 15th ed. (Abingdon: Routledge, 2020) and Colin Renfrew and Paul Bahn, *Archaeology: Theories, Methods, and Practice*, 7th ed. (London: Thames and Hudson, 2016). The latter is an essential reference book for the serious student. Matthew Johnson, *Archaeological Theory: An Introduction*, 2nd ed. (New York: Wiley-Blackwell, 2010) covers theoretical issues. Brian Fagan and Nadia Durrani's, *Bigger than History: Why Archaeology Matters* (London: Thames and Hudson, 2020) is a hard hitting appraisal.

Part II

The World of the First Humans

Introduction: Beginnings

- An outline of human evolution over 6 million years,
- A focus on human movements out of Africa starting with *Homo erectus*,
- The appearance of *Homo sapiens*, and our relationship to other hominins.

Part II covers over 6 million years of human evolution, starting with our earliest known ancestors down to the appearance of us, *H. sapiens*. This is a vast time span, and sometimes the evidence is very thin on the ground: the end of a finger bone or a few teeth may be all the physical evidence we have to work with. Debates rage over our ancestry, and controversies are rife. Often a new discovery will upend everything we thought we knew—as with the 2015 publication of some exceedingly early stone tools found in Kenya, or with the 2017 reassessment of human fossils from Morocco that push back the appearance of *H. sapiens* by about 100,000 years. Add to the mix the massive advances being made into ancient genetic analysis, and this is an exciting time to work on human evolution. We hope the next two chapters will spark your fascination into the world of the first humans.

Chapter 2 begins at the beginning, as we meet the earliest known hominins (hominin simply means any species on the human evolutionary tree). Early scientists used to view human evolution as a sort of ladder-like progression from apes to us with a "missing link" in between. We now know things were very much more complex. Genetic analysis suggests that our human lineage probably split from that of the chimpanzees at around 7.5 million years ago (Ma). During this time span various different hominin species coexisted at any one time, with some going extinct before they gave rise to new forms. The evolutionary connections between the various hominins are often hard to determine, especially if the evidence is based on a few small fossil fragments. Nonetheless, scientists have established the presence of over 20 ancient hominins and the database is growing year on year.

So who were the first hominins, back in the mists of time? A key characteristic of the hominin family is bipedalism, or the ability to walk on two legs. The first possible member of our family (the evidence is contested) is the probably bipedal but still tree-loving *Sahelanthropus tchadensis*, who lived in today's Chad in Central Africa, between ca. 7 and 6 Ma. The title of earliest definite hominin currently goes to *Ardipithecus ramidus*, a fully bipedal person who lived in Ethiopia around 4.5 Ma. This species was soon followed by the australopithecines, Latin for "southern apes," of whom there were many types, both robust and gracile in form.

To date, all the known evidence for early hominins comes from tropical Africa, and it is in this region that we find evidence for the first possible member of our own genus, *Homo*, Latin for "man/human," at around 2.8 Ma (with the first definite evidence for *Homo* dating to 2.4 Ma). But what constitutes a member of our sub-family, *Homo*? Brains, brawn, superior bipedalism? As the evidence increases, some of the more traditional ideas have become untenable. For example, until very recently we used to think that stone toolmaking—with all its implications for intelligence, forward thinking, dexterous handicraft skills—was an exclusive hall mark of our genus.

The link seemed uncontroversial: stone tools were understood to have emerged with the appearance of the first *Homo*: *Homo habilis* (the handyman). Its tools were the crudely worked Oldowan implements—an industry that takes its name from the Olduvai Gorge in Tanzania, where a 1960s team found the first examples, which date to around 2.2 and 1.7 Ma. However, much older Oldowan tools, dating back to 2.6 Ma, have since been found in Ethiopia. This, and indeed other evidence, had been leading anthropologists to question whether hominins belonging to another genus (sub-family) might have made the first tools. The exclusive link between *Homo* and stone tools was finally smashed with the 2015 publication of the Lokemwi 3 stone tool industry from Kenya, which dates back to 3.3 Ma, greatly predating the genus *Homo*. The plot thickens yet further when we consider how researchers have also found butchery marks potentially dating to 3.4 Ma, and before, suggesting that stone tools were in use even before this time. But for now, the Lokemwi 3 tools mark the start of human material culture—as these are the first known human made objects. Yet they must have been made by a pre-*Homo* hominin, possibly an australopithecine.

Perhaps, argue some, the status of *H. habilis*, as a member of our sub-family, should be reconsidered—is this rather small brained creature really part of our genus? Indeed, early *Homo* and its contemporary hominins, such as the australopithecines, were physically and behaviorally still rather different from the humans that came after 1.9 Ma. At that point, we find evidence for *H. erectus*, or upright man, in Africa. This creature was the first of our ancestors to resemble modern humans. Its overall bodily proportions were relatively similar to our own, as were its development rates. This was the first of the more advanced hominins and is a clear member of our genus.

Chapter 3 opens with the emergence of *H. erectus*. We still know relatively little about the world of these early humans, beyond the fact that they were the first to exit Africa, radiating far beyond their tropical homeland. Their presence was still light on the ground, and as far as we know, they did not settle in extreme arctic areas, neither did they settle what is today the Americas, nor sail across to New Guinea or Australia. However, they were flexible hunter gatherers, able to adapt to many new places, and who probably had fairly high social intelligence, with an ability to plan, cooperate, and share food among relatively large groups. Around 1.65 Ma they were linked with a new and more sophisticated stone tool assemblage, known as the Acheulean industry. Maybe they were decent talkers, too, after all language and speech are perhaps the greatest tools in the human repertoire. We certainly know that we modern humans were not the only ones to speak. Our cousins, *Homo neanderthalensis* (with whom we share a common ancestor in Africa), had the same FOXP2 gene for speech that we do—though whether Neanderthal language (the mental process behind speech) was as complex as ours remains debated.

This brings us to one of the most exciting developments in the field of human evolution: ancient DNA analysis. The work is proving to be revolutionary, with new discoveries constantly being made. A major leap forward occurred in 2010 when Swedish geneticist Svante Pääbo announced that he and his team had managed to sequence the genome of the Neanderthal, that is, they had read all of its genes. Previously, geneticists had "only" managed to sequence the DNA inherited from the mother's side. This maternal DNA indicated that there was no interbreeding between *H. sapiens* and *H. neanderthalensis*. The results agreed with the "Out of Africa" archaeological model, which maintained that all *H. sapiens* come from a recent African ancestor and that we are not descended from different groups, e.g. the Neanderthals in Europe, or other ancient *H. erectus* migrations across the world.

Once Pääbo had read the entire Neanderthal genome, however, he and his team were in for a surprise. For their 2010 results showed that there was in fact some genetic intermingling between *H. sapiens* and the now-extinct Neanderthals—but probably around 50,000 years ago—that is, after we left our African homeland. In other words, while modern humans are not descended from the Neanderthals, and while all living humans constitute the same distinct species, some of our ancestors had sex with Neanderthals, and a tiny bit of their genetic material (between 1 percent and 4 percent) lives on in every single human population outside tropical Africa (the Neanderthals never lived in tropical Africa, as far as we know). But there was more: further 2010 research, by the same indefatigable team, identified a previously unknown human species, the Denisovans, with whom some of our ancestors also interbred. There are other twists to this genetic analysis, including evidence for genetic intermingling with other, now-extinct, hominins in Africa, but the bottom line is that this work highlights the true complexity of human evolution. There's no ladder here, more an intricate set of relationships.

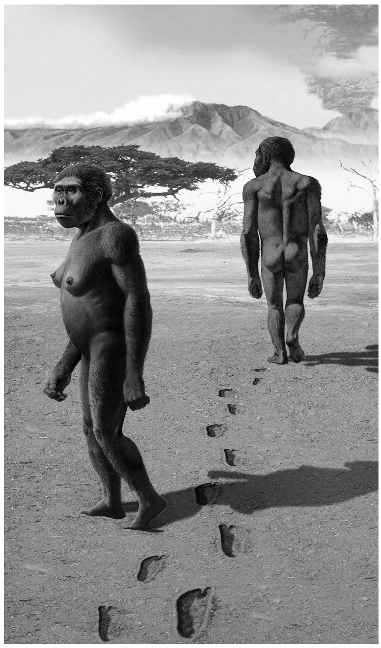
And so, after decades of arguments over whether anatomically modern humans spontaneously arose in different parts of the world, the presumed offspring of various ancient hominins, the genetic work demonstrates that all modern humans arose in Africa relatively recently, and that while there was some genetic intermixing with other hominins (Neanderthals, Denisovans, and others), our species split from a common ancestor with the Neanderthals by perhaps 400,000 years ago if not before.

This DNA derived date is interesting since it gels with the newly reassessed fossil record. To explain further, in 2017, specialists published their reanalysis of some "Neanderthal" fossils found at the site of Jebel Irhoud, in Morocco, North Africa. They found the fossils belonged not to Neanderthals, but very early *H. sapiens*, and that they date to around 300,000 years ago, give or take 34,000 years—making them roughly 100,000 years earlier than the (previously) oldest known *H. sapiens* fossils. Their location, in North Africa, far outside our assumed "tropical homeland" was a surprise, but then this field is full of surprises.

What happened next depends on weaving together an incomplete tapestry of archaeology, fossil analysis, and DNA research. The three strands do not always agree, but it seems we *H. sapiens* developed into fully anatomically modern humans—that is creatures indistinguishable from you or me—by about 120,000 years ago. We were an adaptive and intrepid species and it seems that we initiated various movements out of Africa, but that our major, lasting, exodus out began somewhere around or after 60,000 years ago. After this time, we began to inhabit every region of the world, including, by 15,000 years ago, the Americas. Populations began to increase and with that, so the evidence of our creativity begins to mushroom. We were artists, sailors, astronomers, and soon farmers and citizens. After more than 6 million years of human evolution, by 39,000–30,000 years ago, again the dates are controversial, we were the last and only hominin left standing. What we did next is the subject of the rest of this book.

Chapter 2

Human Origins



Laetoli hominins walk at Laetoli, East Africa, ca. 3.5 Ma.
(Raul Martin/MSF/Science Photo Library)

Chapter Outline

Prologue

It was a blazing hot day at **Olduvai Gorge**, East Africa, in 1959. Back in camp, Louis Leakey lay in his tent, suffering from a bout of influenza. Meanwhile, Mary Leakey, sheltered by a beach umbrella, was excavating the small scatter of broken bones and crude artifacts deep in the gorge. For hours she brushed and pried away dry soil. Suddenly, she unearthed part of an upper jaw with teeth so humanlike that she took a closer look. Moments later, she jumped into her Land Rover and sped up the track to camp. "Louis! Louis!" she cried, as she burst into the tent. "I've found Dear Boy at last." Louis leapt out of bed, his flu forgotten. Together, they excavated the fragmentary remains of a magnificent, robust hominin skull. The Leakeys named it *Zinjanthropus boisei* ("African human of Boise"), Mr Boise being one of their benefactors. With this dramatic discovery, they changed the study of human evolution from a part-time science into an international detective story.

Biologist Thomas Huxley called it "the question of questions": the nature of the exact relationship between humans and their closest living relatives such as the chimpanzee and the gorilla—the question of human origins. Ever since his day, scientists have been locked in controversy as they trace the complex evolutionary history of humanity back to its very beginnings. At first, they thought in terms of simple, ladder-like evolutionary schemes. These theories have now given way to highly tentative studies of early human evolution completed by reconstructing precise evolutionary relationships from fossil specimens, a process fraught with difficulty when bone fragments are the raw materials. It is a matter of fine and careful judgment, the comparing of anatomical details, the weighing of different characteristics, and the assessment of chronology and stratigraphy. An extremely thin fossil record between 5 and 1 Ma, representing fewer than 2,000 individuals, compounds the problem. Most of these are single teeth found in fossil-rich South African caves. Much rarer are skull fragments or jaws, the most valuable of all fossil finds. During this 4-million-year time period, our ancestors went through dramatic transformations, visible only through an incomplete paleontological lens. We know that many hominin forms flourished in tropical Africa during this period. Which of them, however, were direct human ancestors? We can achieve an understanding of human evolution only by getting to know as many species as we can, and this task has hardly begun. In this chapter, we examine some of the controversies that surround the biological and cultural evolution of humankind and describe what we know about the behavior and lifeways of our earliest ancestors.

The Great Ice Age (from 2.58 Million to 12,000 Years Ago)

The story of humanity begins deep in geological time, during the later part of the Cenozoic Era, the age of mammals. For most of geological time, the world's climate was warmer than it is today. During the Oligocene epoch, some 35 Ma, the first signs of glacial cooling appeared with the formation of a belt of pack ice around Antarctica. A major drop in world temperatures followed between 14 and 11 Ma. As temperatures fell, large ice sheets formed on high ground in high latitudes. About 3.2 Ma, large ice sheets expanded on the northern continents. Then, some 2.5 Ma, just after the first member of our genus, *Homo*, emerged in tropical Africa, glaciation intensified even more, and the earth entered its present period of constantly fluctuating climate. These changes culminated during the most recent interval of earth history, the Quaternary period (from roughly 2.58 Ma to present), and specifically within the Pleistocene epoch (from roughly 2.58 Ma to around 12,000 years ago). It was during the Pleistocene, colloquially known as the Great Ice Age, that humans first peopled most of the globe. The major climatic and environmental changes of the Ice Age form the backdrop for some of the most important stages of evolution (Table 2.1).

The words *Ice Age* conjure up a vision of ice-bound landscapes and frigid, subzero temperatures that gripped the earth in a prolonged deep freeze. In fact, the Pleistocene witnessed constant fluctuations between warm and intensely cold global climates. Deep-sea cores lifted from the depths of the world's oceans have produced a complex picture of Ice Age climate. These cores have shown that climatic fluctuations between warm and cold were relatively minor until about 800,000 years ago. Since then, periods of intense cold have recurred about every 90,000 years, with minor oscillations about 20,000 and 40,000 years apart. Many scientists believe these changes are triggered by long-term astronomical cycles, especially in the earth's orbit around the sun, which affect the seasonal and north–south variations in solar radiation received by the earth.

At least nine glacial periods mantled northern Europe and North America with great ice sheets, the last one retreating only some 15,000 years ago. Interglacial periods, with climates as warm or warmer than that of today, occurred infrequently, and the constant changes displaced plants and animals, including humans, from their original habitats. During colder cycles, plants and animals generally fared better at lower altitudes and in warmer latitudes. Populations of animals spread slowly toward more hospitable areas, mixing with populations who already lived there and creating new communities with new combinations of organisms. An estimated 113 of the mammalian species living in Europe and adjacent Asia evolved during the past 3 million years. This repeated mixing surely affected human evolution in many ways.

Table 2.1 Major Events of the Ice Age

Temperature ← Lower Higher →	Dates (BP)	Periods		Epochs	Glacials	Human Evolution	Prehistory
	10,000	Holocene		Holocene	Holocene Warm (Wisconsin in North America)		Cities, agriculture Settlement of New World
	118,000	Quaternary (2.58 Ma → present)	Pleistocene (2.58 Ma → 11,700 BP)	Brunhes			
	128,000				Saale		
	200,000				Many cold episodes		
	300,000					*Homo sapiens*	
	780,000						
Uncertain climatic detail before 130,000 years ago			Pliocene	Matuyama			
	1,600,000	Tertiary		Olduvai Event		Early hominins Genus *Homo* ca. 2.4 ma to today.	

Some of the earliest chapters of human evolution unfolded during a period of relatively minor climatic change, indeed before the Pleistocene truly began. Between 4 and 2 Ma, the world's climate was somewhat warmer and more stable than it was in later times. The African savanna, the probable cradle of humankind, contained many species of mammals large and small, including a great variety of the order of primates, of which we humans are a part.

Early Primate Evolution and Adaptation

The Order Primates

We humans are members of the biological order Primates, tree-loving mammals that first appeared after the age of the dinosaurs, just under 65 Ma. More specifically, we are **hominids**: members of the biological family Hominidae (or the great apes), which includes humans, chimpanzees, gorillas, orangutans, and their ancestors. Note that before the turn of the twenty-first century, the term *hominid* described only humans and our ancestors, but this new, broader classification has been adopted to reflect our close relationship with the other great apes. Now, when describing humans and our ancestors, we use the even more specific term **hominin**, which refers to any member of the biological tribe Hominini. While some scientists include chimpanzees within the hominin group, most use it to refer only to modern humans (us) and all our ancestors since the split from the last common ancestor of the chimpanzee, around 7.5 Ma (which is how we use the term *hominin* in this book).

But where does this date come from? Both anatomically and behaviorally, humans have much in common with other primates, especially with our closest living relative, the chimpanzee. According to molecular biology, genetic mutations occurred at similar rates along the different lineages, which means the accumulated change can be used to estimate the date of species divergence. However, this field is still in its infancy, and estimations vary on how fast this "molecular clock" might have ticked. This means the putative split with the chimpanzee lineage has been put at anything between 13 and 7 Ma, with most researchers favoring a date of around 7.5 Ma. The details of this split are still a complete mystery, largely because fossil beds dating to this critical period are very rare in Africa, the almost certain birthplace of humans, apes, and monkeys.

From 10 Ma to about 5 Ma we can largely only guess at the nature of the apelike animals that flourished in Africa during these millennia. As far as we know, most of these animals were mostly tree-living, with long arms and legs and a broad chest. They would have used all four limbs in the trees, occasionally scrambling on the ground and even standing on their rear limbs at times.

Though still fragmentary, between 5 and 2 Ma, we know a great deal more of the variety of hominins populated the East African savanna. Only some are our ancestors, and many became extinct without apparently giving rise to new species. The relationships between these hominins are complex and often unresolved, although meticulous scrutiny of their fossil remains has allowed paleoanthropologists to divide them into various genera (groups), including *Homo* to which our own species, *H. sapiens*, belongs (for a guide through the many taxonomic labels and a basic chronology of the hominins, see Figure 2.11).

Coming Down from the Trees

A fall in world temperatures after 20 Ma resulted in increasingly open environments in tropical latitudes. With this reduction in forested environments probably came a trend toward ground-adapted species. Many primates adapted to this kind of existence sometime after 10 Ma. In other words, they came down from the trees. About 5 Ma, the African savanna, with its patches of forest and extensive grassland plains, was densely populated by many mammalian species as well as by specialized tree dwellers and other primates. Some of these were flourishing in small bands, probably walking upright, and conceivably making tools out of stone and wood.

Coming down from the trees created three immediate problems. First was the difficulty of getting around in open country. To deal with this, hominins adopted a bipedal posture at least 4 Ma and possibly as early as 7 Ma. Our ancestors became **bipedal** (walking on two feet) over a long period of time, perhaps as a result of spending more and more time feeding on food resources on the ground. Human beings are large and have additional food requirements due to higher metabolic rates. This means that each hominin has to range efficiently over a larger area to obtain food. Larger mammals are more mobile than their smaller relatives. They cover more ground, which enables them to subsist off resources that are unevenly distributed, not only in space but also at different seasons. Mobility allows larger mammals like humans to incorporate unpredictable, often seasonal resources in their diets. They can tolerate extremes of heat and cold, a capacity that may have contributed to the spread of humans out of the tropics later in prehistory. Bipedal humans have sweat glands and depend heavily on water supplies. These glands are a direct adjunct to bipedalism, as they enhance endurance for long-distance foraging. Bipedalism displaces the body's center of gravity much less, and walking is more efficient than a quadrupedal gait. An upright posture and bipedal gait are the most characteristic hominin physical features.

Upright posture is vital because it frees the hands for other actions, like toolmaking. It contrasts with **knuckle walking**, which provides an excellent power thrust for jumping into a tree or a short sprint (think of a football lineman). It is a specialized way of moving around in which the backs of the fingers are placed on the ground and act as main weight-bearing surfaces. Knuckle walking was adaptive in the forest because long arms and hands as well as grasping feet were still vital for climbing (Figure 2.1). Human arms are too short for us to be comfortable with this posture. Bipedalism favors endurance and the covering of long distances, important considerations in open country. It was a critical antecedent of hunting, gathering, and toolmaking.

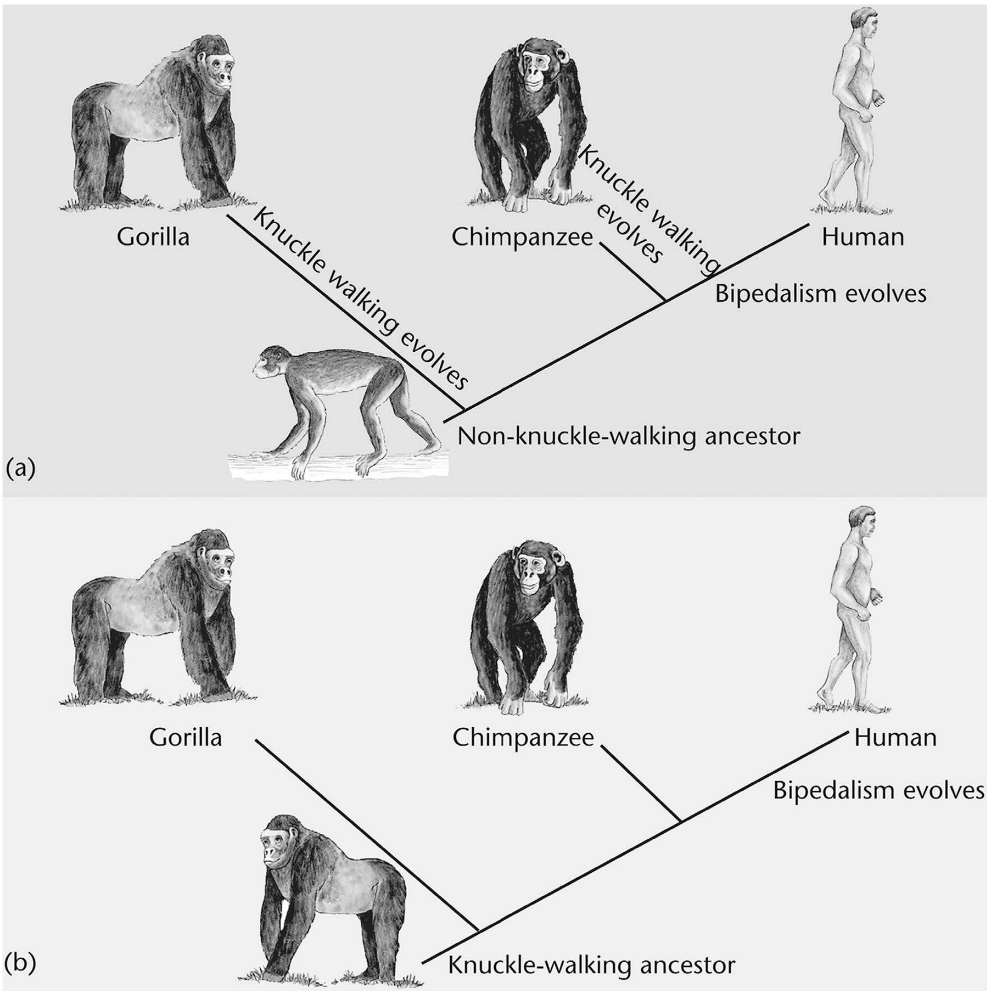


Figure 2.1 Knuckle walking and four-footed posture. Two major theories account for the evolution of bipedalism: (a) If the last common ancestor of chimpanzees, gorillas, and humans was not a knuckle walker (the body's center of gravity lies in the middle of the area bounded by legs and arms), then knuckle walking would have evolved independently in both chimpanzees and gorillas. Under this theory, the ancestral locomotion for humans was not knuckle walking. (b) If the last common ancestor for chimpanzees, gorillas, and humans was a knuckle walker, then the ancestral condition for humans is knuckle walking.

Second, the savanna abounded in predators, making it hard for primates to sleep safely. Large hominins made home bases, where they sheltered from the hot sun and slept in security, perhaps in trees above the ground. What form these home bases took is a matter of great debate. Last, high-quality plant foods, abundant in the forests, were widely dispersed over the savanna. It is striking that later foragers subsisted off a broad range of game and plant foods. As part of human evolution, our hominin ancestors expanded their food range to include more meat, perhaps during long periods of plant scarcity. Among mammals, these characteristics are associated with a trend toward larger brain size. And, as brain size increased, so, gradually, the lifeways of evolving hominins became less apelike and closer to that of human foragers, a process that took hundreds of thousands of years to unfold.

These and several other factors—such as increased longevity and brain enlargement—required much greater behavioral flexibility. This flexibility included enhanced intelligence and learning capacity, more parental care, and new levels of social interaction.

The Fossil Evidence for Human Evolution (from 7 to 1.5 Ma)

The Earliest Hominin?

The **Toro-Menalla** region of the Djurab Desert in Chad, Central Africa, is a brutal place for paleoanthropological research. In 2001, French scholars Michel Brunet, Patrick Vignaud, and their colleagues found a relatively complete chimpanzee-sized skull of a hominin exposed on the surface of the sand. Nicknamed Toumaï ("Hope of Life" in the language of Chad), the skull was dated—through comparison with animal fossils from other sites—to between 6 and 7 Ma.

Toumaï's head is confusing. The brain size (or cranial capacity) is small—around 365 cubic cm, toward the lower range seen in modern apes—but the facial structure and tooth composition are closer to those known from early humans than to apes. Moreover, the opening of the spinal cord points downward and is positioned toward the front of the skull, suggesting its head might have been balanced on an erect spine, a characteristic shared with later bipedal hominins, including modern humans, but not found in other apes (Figure 2.2).

Based on this collection of primitive and more evolved traits, Toumaï has since been attributed to the species *S. tchadensis* ("hominin of the Sahel, of Chad"). To date, fossils from a few such individuals have been found, represented by Toumaï's skull, four jawbone fragments, and a few teeth. However, no other body parts are known, making comparison with

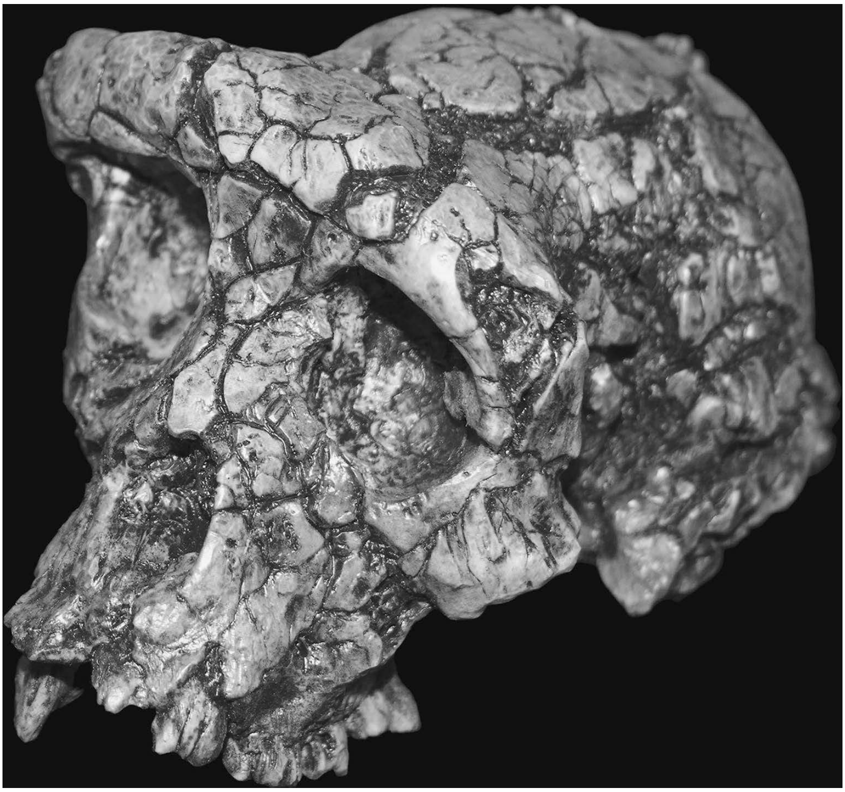


Figure 2.2 *Sahelanthropus tchadensis*.
(Sabena Jane Blackbird/Alamy)

other early hominin skeletons challenging. Moreover, Toumaï's finders readily admit that they still have not dated their find accurately—no absolute dates exist—so this remarkable discovery may prove of somewhat different antiquity in the future.

Whatever Toumaï's ultimate status, the find shows that very early human evolution took many branches and was not a matter of simple linear development. It is clear that hominin evolution is much more complicated than scholars suspected even a generation ago. In all probability, a wide variety of apes, some with larger brains, flourished in tropical Africa between 8 and 5 Ma, of which *S. tchadensis* is but one. Indeed, most paleoanthropologists believe East Africa was the main crucible of early human evolution, largely because this is the area that has yielded the greatest diversity of primordial hominins. Five to four million years ago, the now-desert regions of Ethiopia and northern Kenya were open savanna grassland teeming with herds of antelope and other mammals, hunted by both predators and our remote hominin ancestors. And it is here that the earliest known certain hominins have been found (Figure 2.3) (for dating, see box).

Figure 2.3 Map of archaeological sites described in the chapter.

Site

Potassium Argon Dating

The world's first archaeological sites are so ancient that they lie far beyond the chronological range of radiocarbon dating (Chapter 1). Potassium argon dating allows the dating of volcanic rocks between 2 billion and 100,000 years old. Many of the earliest hominin sites occur in volcanically active areas. Human tools are found in direct association with cooled lava fragments or ash from contemporary eruptions, allowing the dating of the **East Turkana** locations, Olduvai Gorge, and other famous early sites.

Potassium (K), an abundant element in the earth's crust, is present in nearly every mineral. Potassium in its natural form contains only a small proportion of radioactive 40K atoms. For every 100 40K atoms that decay, 11 percent become argon 40, an inert gas that can easily escape from its material by diffusion when lava and other igneous rocks form. As volcanic rock forms by crystallization, the argon 40 concentration drops to almost nothing, but the process of 40K decay continues, and 11 percent of every 100 40K atoms will become argon 40. Thus, it is possible, using a spectrometer, to measure the concentration of argon 40 that has accumulated since the volcanic rock formed. Recent advances in potassium argon dating involve computerized laser fusion, a variant of the method that uses a laser beam to analyze irradiated grains of volcanic ash, which give off a gas that is purified, and that measures its constituent argon atoms in a spectrometer. The new method draws on crystals of volcanic materials from layers associated with fossils to produce much more accurate dates for the earliest hominins.

Potassium argon dating has provided the first relatively reliable method establishing the chronology for the earliest stages of human evolution, and for the first human cultures on earth.

Walking on Two Feet?

Although Toumaï (see earlier in this chapter) may be the world's oldest known bipedal hominin, others show signs of early bipedalism. In 1974 paleoanthropologist Martin Pickford discovered an unusual fossilized molar tooth in the Tugen Hills region of Kenya. Almost 30 years later, in 2001, a team led by Brigitte Senut and colleagues discovered more fossils—teeth, a jawbone, plus arm, thigh, and finger bones of several individuals dated to between 6.2 and 5.6 Ma—that led her to establish a new genus and species: *Orrorin tugenensis* (Orrorin means "the original being" in the Tugen language of Kenya). The shape of the hominin's thigh bone, in particular, suggests that it might have walked on two legs. Thereafter, in Ethiopia, a 2004 team including Berkeley biological anthropologist Tim White found further evidence for a very early hominin species, which the team named *Ardipithecus kadabba*. Dating from 5.8 to 5.2 Ma, this creature may be related to the *australopithecines*, in which case it is feasible that it too was bipedal. However, the evidence is fragmentary and, until a more complete skeleton is found, few clear conclusions can be drawn.

This work built on Tim White's 1990s investigations, when he and his team found evidence for at least 17 early hominin individuals in a 4.4-million-year-old layer at **Aramis** in the arid Awash region of Ethiopia (Figure 2.4). These remains revealed evidence for a small creature that stood upright and had thin-enameled teeth, though its skull was closer in morphology to those of apes, suggesting close

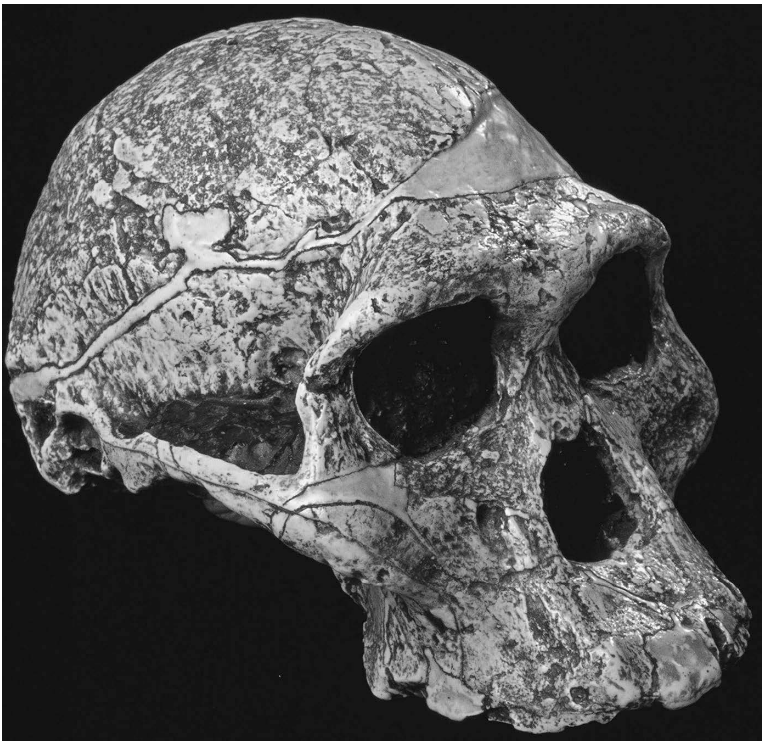


Figure 2.4 *Ardipithecus ramidus*.
(Adriane Van Zandbergen/Alamy)

links with ancestral chimpanzees. White and his colleagues initially thought they had found a new species of *australopithecine*, but in 1995 the species genus was changed to *A. ramidus* to distinguish it from later and different *australopithecines*. Today, the species is represented by parts of more than 30 individuals, often from contexts that can be confidently dated, indicating that this species probably lived between 4.5 and 4.3 Ma.

One *A. ramidus* individual, an adult female nicknamed "Ardi," has been particularly helpful to the story, since over 100 fossil fragments belonging to Ardi alone have been found, including an almost complete set of teeth and parts of her skull. Her reconstructed skeleton revealed some surprising features. The shape of her upper pelvis is much broader than those of living apes and would have prevented Ardi from lurching from side to side during upright walking. However, she was also well adapted to the trees, with a physiology that included strong leg muscles good for climbing, curving fingers that would have allowed her to grasp branches, and widely spread opposable big toes ideal for gripping branches—but less well adapted to upright walking. Scientists are still not entirely certain where Ardi and her friends fit into the hominin family tree, with some questioning whether *Ardipithecus* is even a hominin or whether it is more closely related to another extinct group of apes. Interestingly, at Aramis, this creature occurs in a layer stratified beneath two later horizons that have yielded later hominins: *Australopithecus anamensis* and *Australopithecus afarensis*.

What Is *Australopithecus*?

Australopithecus (Latin for "southern ape") was first identified by anatomist Raymond Dart at the Taung site in South Africa in 1925. He described a small, gracile primate that displayed both human and apelike features. Dart named his find *Australopithecus africanus*, a much lighter creature than another, more robust form of *australopithecine* that subsequently turned up at other South African sites and later in East Africa (Figures 2.5 and 2.6). The latter is known as *Australopithecus robustus*, a squat, massively built primate with a crested skull.

For years, paleoanthropologists thought that *A. africanus* was the direct ancestor of humankind and that human evolution had proceeded in a relatively linear way through time. More recent finds from East and South Africa have muddied the picture and revealed, as we have seen, far earlier primates on the human line.

Figure 2.5 *Australopithecus africanus*.
(Pascal Goetheluck/Science Photo Library)

Figure 2.6 *Paranthropus boisei*.
(Patrick Landman/Science Photo Library)

From *Ardipithecus* to *Australopithecus*

The earliest known *australopithecine*, *A. anamensis*, dates to about 4.2–3.9 Ma at Aramis and to about 4 Ma at **Allia Bay** and **Kanapoi** on the shores of Lake Turkana, northern Kenya. The fossil fragments, mostly found by Meave Leakey and Alan Walker and named *A. anamensis* (*anam* is "lake" in Turkana), come from a hominin with large teeth and a mosaic of what appear to be apelike and more evolved features. The hind limbs are thick enough to support the extra weight of walking on two feet, but *A. anamensis* was not such an efficient walker as modern humans, and the true extent of its bipedalism is hotly debated. Measurements of the hind limb suggest the hominin weighed between 47 and 55 kilograms (104 and 121 pounds). However, even this species is not without controversy, with some researchers believing the range of variation among the fossils suggests we are dealing with more than one species.

A. anamensis was followed by a much better known *australopithecine*, found at **Hadar**, about 72 kilometers (45 miles) south of Aramis, also on the Middle Awash River in northern Ethiopia. Here, Maurice Taieb and Donald Johanson discovered a remarkably complete skeleton of a small primate (the famous "Lucy"), together with fragments of at least 13 males,

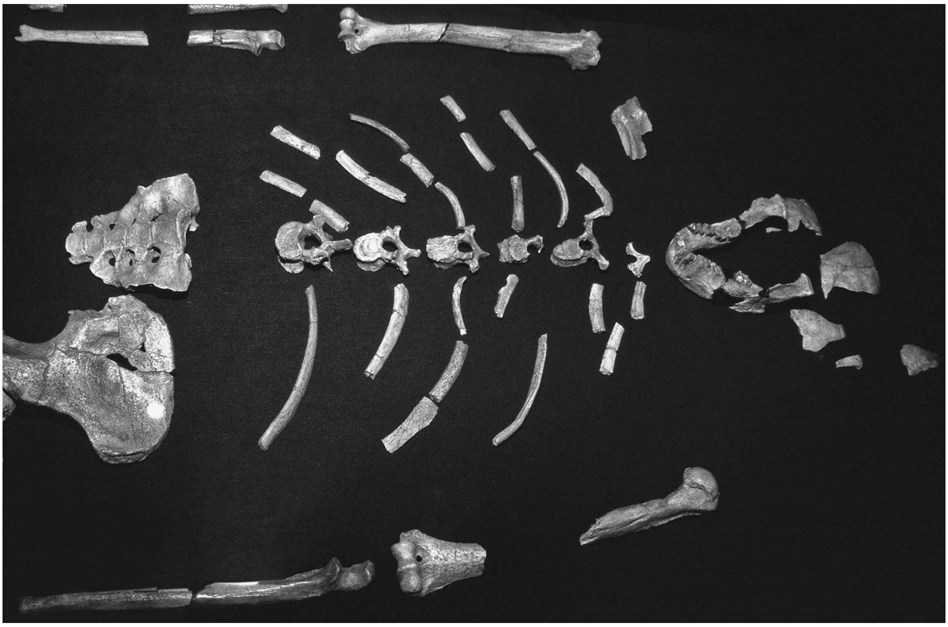


Figure 2.7 "Lucy," *Australopithecus afarensis*.
(Robert Preston Photography/Alamy)

females, and children. Lucy, who dates to about 3.2 Ma, stood just under 1.2 meters (4 feet) tall and was 19–21 years old (Figure 2.7). She (or possibly he, as some researchers now suggest) was a powerful, heavily muscled primate, fully bipedal, with arms slightly longer for their size than those of humans. Lucy and her contemporaries had humanlike hands and brains about the size of chimpanzees. Johanson and Tim White classified Lucy as *A. afarensis*, a direct ancestor of later *australopithecines*. Another recently discovered adult *A. afarensis* from the Afar dates to 3.6 Ma. Its shoulder blade and limbs suggest that *afarensis* was adept at walking and running.

The partial skeleton of a three-year-old *A. afarensis*, dated to 3.3 Ma, has come from the Dikika area of northeastern Ethiopia (found between 2000 and 2003). However, the long, curved fingers of the infant raise crucial questions about the continued importance of **arboreal** behavior in this species. From other Awash discoveries, we know that *afarensis* flourished as late as 3 Ma and displayed considerable size variation. Some individuals stood 1.5 meters (5 feet) tall and probably weighed approximately 68 kilograms (150 pounds), a far cry from the small, slender Lucy.

These early *australopithecines* were powerful, heavily muscled individuals, thought to be as strong as chimpanzees. Like its predecessors, *A. afarensis* was an anatomical mosaic, bipedal from the waist down, arboreal in the upper part of the body. All were fully bipedal, with the robust, curved arms associated with tree climbers. The arms were slightly longer for their size than the arms of modern humans.

Even more remarkable evidence of bipedalism comes from fossil-bearing beds at **Laetoli** in Tanzania, where Mary Leakey uncovered not only hominin fossils like those at Hadar but also the actual 3.6-million-year-old footprints of big game and some fairly large bipedal primates. The footsteps are those of an adult male and female, the latter carrying a child and making deeper imprints (Figure 2.8). "The tracks indicate a rolling and probably slow-moving gait, with the hips swiveling at each step, as opposed to the freestanding gait of modern man," Mary Leakey wrote (Leakey and Harris, 1990, p. 49). Some scientists believe the Laetoli prints are from *A. afarensis*, flourishing about 1,600 kilometers (1,000 miles) south of Hadar.

The Hadar and Laetoli finds confirm that the fundamental human adaptation of bipedalism predates the first evidence of toolmaking and the expansion of the brain beyond the level found in our nearest living relatives, the African apes. Bipedalism also implies that later hominins were preadapted (had evolved sufficiently) to utilize their hands for toolmaking.

Originally, experts thought *A. afarensis* was confined to East Africa. Then Michel Brunet discovered a 3- to 3.5-million-year-old fossilized *A. afarensis* jaw with seven teeth at **Koro Toro** in Chad, in the southern reaches of the Sahara Desert. The Chad hominin flourished in a savanna-woodland environment much wetter than the arid landscape of today. Koro Toro is the first *australopithecine* find west of East Africa's Rift Valley and debunks a long-held theory that the great valley formed a barrier separating ape populations and causing those in more open country to move from the trees onto the ground.

A. afarensis was a primitive form of the *australopithecines*, one that displayed considerable anatomical variation yet was hardy enough to adapt

Figure 2.8 Hominin footprints from Laetoli, Tanzania.
(John Reader/Science Photo Library)

to harsh, changing savanna environments and survive for nearly a million years. Without question, several as yet largely unknown hominin forms lived in eastern Africa before 3 Ma. At about 3 Ma, the descendants of *A. afarensis* split into different lines. At this point, the evolutionary plot thickens. One line comprises the more gracile *A. africanus*, first identified by Raymond Dart in 1925 and known entirely from South Africa. The second line held at least three species of robustly built *australopithecines*, somewhat later than *A. africanus*, which became extinct about 1 Ma. There are probably other still undescribed lines. With this diversification, we emerge into a more complex chapter in human evolution, marked by geographic and biological diversification and many competing theories.

All Kinds of *Australopithecines* (from 4.2 to 1.78 Ma)

Gracile *Australopithecines*: *A. africanus*

A. africanus was a gracile, highly mobile hominin, marked in fossil form by small, almost delicate skulls and prognathous (jutting-out) faces (see Figure 2.4). Found entirely in South Africa, and dated to 3.3–2.1 Ma, *A. africanus* is an evolutionary mystery, for no one has yet found this form in East Africa, where *A. afarensis* flourished, even if it ultimately evolved from this widely distributed ancestor. It could be an evolutionary experiment that went nowhere, or even have been among the first of a doomed line of robust hominins.

Robust *Australopithecines*: *Paranthropus aethiopicus, Paranthropus boisei*, and *Paranthropus robustus*

The robust *australopithecines*, known by several taxonomic labels, lived between 3 and 1 Ma. Found in both eastern and southern Africa, they are remarkable for their heavy build (see Figure 2.5). These hominins had large teeth and small brains and were specialized for the chewing of coarse, fibrous plant foods. As a group, these squat, heavily built hominins were very diverse.

Australopithecus garhi

Working the arid washes of Ethiopia's Awash desert, a team of 40 researchers from 13 countries has unearthed teeth and skull fragments from yet another hominin form, dating to about 2.5 Ma. The new hominin, named *Australopithecus garhi* (*garhi* means "surprise" in the local dialect), was of modest body size and its face had protruding features not unlike those of a chimpanzee (Figure 2.9). The lower molars are three times the size of those of modern humans, the canines almost as large. *A. garhi*'s brain was 450 cubic cm (at the upper end of the range of a modern chimpanzee). Some evidence

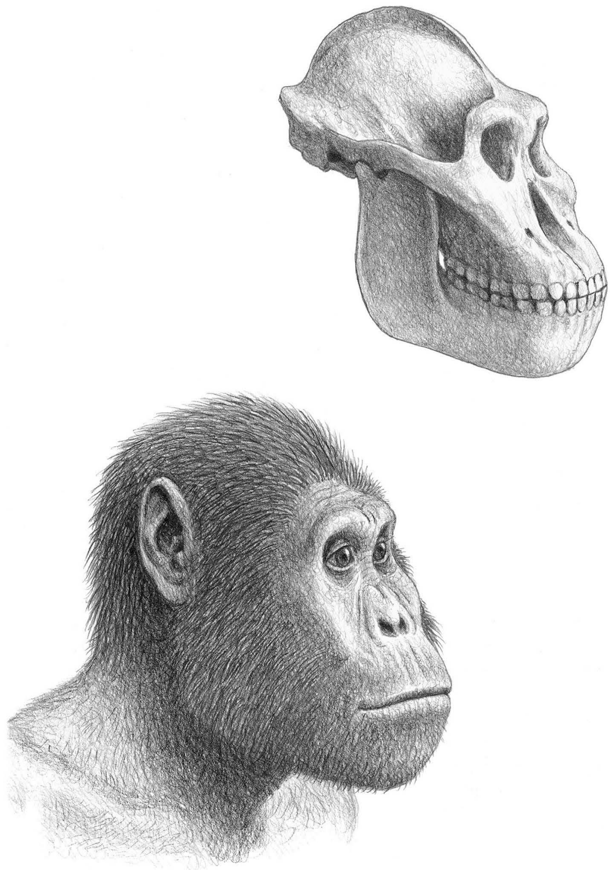


Figure 2.9 *Australopithecus garhi*.
(Mauricio Anton/Science Photo Library)

exists that its legs were longer than the legs of other *australopithecines*, perhaps suggesting a more *Homo*-like way of walking. The hominin was an efficient scavenger. Bones of antelope and other large animals found only a few feet away display cut marks from stone tools, the earliest known instance of hominin butchery of animals. Unfortunately, no stone tools were found close to the fossil remains, but surface finds of crude stone flakes and cobbles have come from a nearby lake bed level dating to about 2.5 Ma.

A. garhi has renewed debate over the identity of the very first human toolmaker. This large-toothed, small-brained hominin with an apelike face defies classification within either the gracile or robust *australopithecine* lines. That this hominin was eating meat suggests that a switch to a high-energy, high-fat meat diet was under way. This, in turn, may have led to an increase in brain size among some hominins. Indeed, the scientists who originally reported the finds though that *A. garhi* might represent an ancestor of our genus *Homo*. However, the picture is extremely complicated, with constant finds raising new questions.

Early *Homo* (from ca. 2.4 to 1.6 Ma)

Louis and Mary Leakey were the first to identify the first hominin classified as early *Homo* at Olduvai Gorge in Tanzania in 1960. They named their fragmentary discovery *H. habilis*, "handy man," a label that commemorated the assumed toolmaking abilities of these hominins. Then, in 1972, their son Richard was working beside Lake Turkana, Kenya, when he found the fragmented but complete skull KNM-ER 1470. It was relatively large brained (750–800 cc), flat-faced, but with a brow ridge that was less pronounced than in *H. habilis*. It was tentatively ascribed to the genus *Homo*, though Leakey was far from confident that it was *H. habilis.* In 1992, anatomist Bernard Wood suggested the skull be placed in a new taxon, *Homo rudolfensis.* In this model, there were two species of early *Homo* at 1.9 Ma—one small and more archaic bodied, and the other larger bodied and larger brained. No real consensus has been reached and the debate continues (Figure 2.10).

If you had encountered early *Homo* 2 Ma, you would have seen little to distinguish the new hominin from *Australopithecus*. Both were of similar height and weight, with early *Homo* averaging 1–1.35 meters (3 feet 3 inches–4 feet 5 inches) tall and around 32 kg (71 pounds). Both were bipedal, but early *Homo* would have looked less apelike around the face and skull. The head was higher and rounder, the face flatter, the jaw more

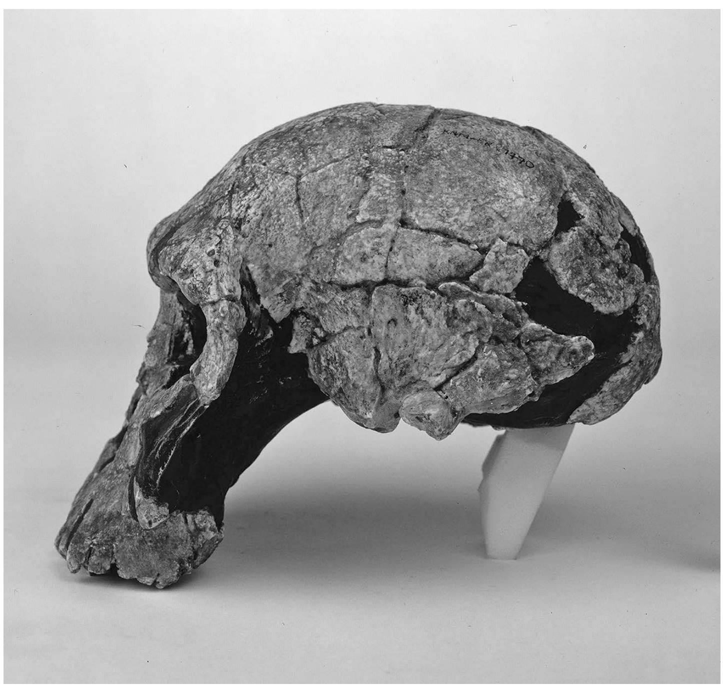


Figure 2.10 Skull 1470 from East Turkana, northern Kenya, a specimen of early *Homo*. (The Natural History Museum/Alamy Stock Photo)

slender. Some of the most significant anatomical differences involved the more even and less specialized teeth. The molars were narrower, the premolars smaller; the presence of front sheering teeth suggests that early *Homo* ate more meat than other primates, though microscopic wear studies of the teeth have shown that both *Australopithecus* and early *Homo* were still predominantly fruit eaters. Early *Homo* had a larger brain with a 30 percent larger cranial capacity, between 600 and more than 700 cubic cm, in contrast with those of *australopithecines*, which ranged between 400 and 500 cubic cm.

Thigh and limb bones from **Koobi Fora**, Kenya, and from Olduvai confirm that early *Homo* walked upright. The hand bones are somewhat more curved and robust than those of modern humans. This was a powerful grasping hand, more like those of chimpanzees and gorillas than of humans, a hand ideal for climbing trees. An opposable thumb allowed both powerful gripping and the precise manipulation of fine objects. With the latter capacity, early *Homo* could have made complex tools. Indeed, anthropologists traditionally assumed that *H. habilis* was the first hominin species to make stone tools, as represented by the long-lived **Oldowan** tool industry. The precursor of all later toolmaking traditions, this industry comprises some of the first clearly human made tools, largely wrought from rough stone cobbles such as basalt and quartz, which the hominins would strike with hammer stones to produce cores and sharp flakes for cutting.

Louis and Mary Leakey found the first examples of such tools during their work at Olduvai Gorge, which were dated to between 2.2 and 1.7 Ma. Researchers have since found even older Oldowan tools, dated to around 2.6 Ma, in Gona in Ethiopia. This raises an interesting question. The earliest clear skeletal evidence for *H. habilis* dates to 2.4 Ma, and few stone tool assemblages are directly associated with *Homo* fossils. So could another species have made these earlier tools, or should the dates for *H. habilis* be pushed back? To this end, witness the 2013 discovery, in Ethiopia, of a fossilized jawbone with five intact teeth (labeled LD 350) that has been dated to 2.8 Ma. This fossil exhibits a unique blend of primitive *Australopithecus* traits and more modern *H. habilis* features. Is this a transitional form, or should it in fact push back the date of the genus *Homo* by almost half a million years? Research is ongoing, but again and again we see how the picture of early human evolution is revised and debated as yet more evidence comes to the fore.

Early *Homo*'s skeletal anatomy gives a mosaic picture of both primitive and more advanced features, of a hominin that both walked bipedally and retained the generalized hominoid ability to climb trees. A telling clue comes from one of the Olduvai specimen's upper arm bones, which, like Lucy's, are within 95 percent of the length of the thigh bone. The chimpanzee has upper arm and upper leg bones of almost equal length, whereas modern human upper arms are only 70 percent of the length of the upper leg bones. Almost certainly early *Homo* spent a great deal of time climbing trees, an adaptation that would make them much less human in their behavior, and presumably in their social structure, than scholars assumed even a few years ago.

As we have seen, *H. habilis*, like many taxonomic labels, accommodates what may actually be two, or perhaps even more early human species. For clarity, we retain the generic term *early Homo* here but stress that it disguises considerable morphological variation, especially after 2 Ma, when we know of yet more new human forms evolving in Africa and perhaps in Asia, too. Two such forms, with small brain capacities, date to about 1.95 Ma and come from Malapa in northern South Africa. The finders have named the one *Australopithecus sediba*, for it shows both *Australopithecine* and human features. The other is a squat hominid, *Homo gautengensis*. The precise relationship of both forms to early *Homo* remains a mystery.

Our scientific predecessors thought of evolution as a gradual and progressive mechanism. The early East African fossils suggest a very different scenario, coinciding with that of the current view of evolution as punctuated equilibrium—long periods of relative stability punctuated with bursts of rapid change caused by new, selective pressures resulting from altered conditions, perhaps environmental change or alterations in the organism itself. For example, whoever was the first toolmaker, the development of stone tool technology gave its inventors a major advantage over other hominin species. Stone hammers and flakes let them exploit predator kills and shift to an energy-rich, high-fat diet, which could lead to all manner of evolutionary consequences. Major anatomical developments occurred during the millennia that separated early *Homo* from the next major human species, *H. erectus* (sometimes classified as *Homo ergaster*), who appeared in East Africa about 1.9 Ma.

Brain size increased to an average of around 600–910 cubic cm, though some of the African *H. erectus* crania indicate only modest brain size. Further modifications in hips and limbs occurred for bipedal locomotion and a reduction took place in sexual dimorphism (size difference due to sex). The primitive body form and sexual dimorphism characteristic of earlier hominins vanished only with the emergence of the much more advanced humans (see Chapter 3). But what caused this change of evolutionary pace remains a mystery, although climate change, especially cooler temperatures, played a role.

Who Was the First Human?

A couple of generations ago, human evolution was thought of as a ladder through time, with an apelike ancestor at the base and modern humans at the top. As for *Homo* (man), it was thought to have appeared at the moment when toolmaking began. This was the reasoning that caused the great controversies of the 1960s as to who was the earliest toolmaker. Was it *Australopithecus* or some related hominin form, like *H. habilis*? As the pace of discovery accelerated, it soon became apparent that several hominin forms lived at the time when toolmaking began, making identification of the first "human" an even more challenging task.

In recent years, anthropologists have generally used four criteria to assign a fossil to the genus *Homo*:

- An absolute brain size of 600 cubic cm,
- The possession of language, identified from casts of the brain patterns on the inside of the brain case,
- The possession of a modern, humanlike precision grip and an opposable thumb,
- The ability to manufacture stone tools.

All of these criteria present serious problems. Absolute brain capacity is of dubious biological importance. We now know that evidence of language cannot be inferred from a brain cast. Furthermore, we still do not know much about the range of precision grips found among early hominins. Stone tools, the ultimate "archaeological pointer," are also an inconclusive criterion to use, not least because the earliest known stone tools (at over 3.3 Ma) greatly predate the earliest known potential Homo remains (at 2.8 Ma). Recognizing who might be the first "humans," or what constitutes one, remains as problematic today as it was in the 1960s, when *H. habilis* was named as the first in our genus.

Added to which, hominin evolution involves a far greater level of species diversity than was previously thought. Human evolution can be seen as one or more **adaptive radiations** (a burst of evolution in which a single species diverges to fill a number of ecological niches, the result being a variety of new forms) rather than a simple, one-way evolution of successive species. This view stems from **cladistics** (noun: clade), an analytic system for reconstructing evolutionary relationships first proposed in the 1950s. Classical evolutionary analysis is based on morphological similarities between organisms. So is cladistics, but with a difference: cladistic analysis concentrates not only on features that identify common ancestry but also on those that are derived independently and are unique to specific lineages. Inevitably, cladistics tends to emphasize diversity over homogeneity.

A cladistic definition considers the human genus a group of species that are more closely related to one another than to species assigned to another genus. This interpretation insists that the human genus is **monophyletic**, that is, with all its members ultimately descended from a common ancestor. Wood and Collard define the human genus "as a species, or monophylum, whose members occupy a single adaptive zone" (1999, p. 66). Using this definition, they carried out a cladistic analysis of all the known fossil *Homo* species and devised a cladogram that separates all the *australopithecine* forms and early *Homo* into one genus, and later humans, starting with *H. erectus*, into another (see Figure 2.11). Their intricate

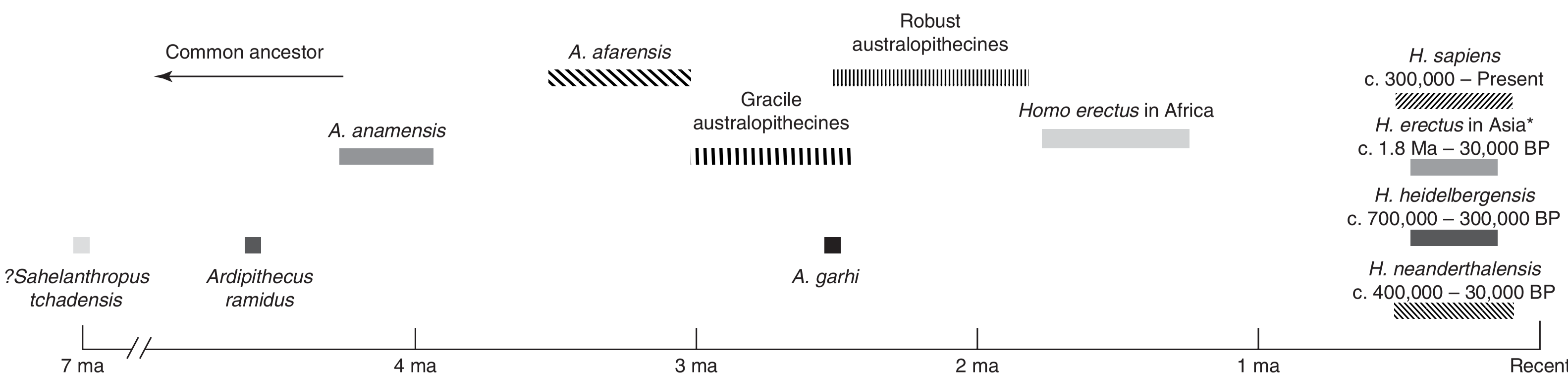


Figure 2.11 A highly simplified diagram showing the chronology and evolutionary status of early hominins and humans

statistical analyses suggest that enough is known of body size and shape, locomotion, development, and relative size of chewing apparatus to divide fossil hominin adaptive strategies into two broad groups:

Site

Olduvai Gorge, Tanzania

Olduvai Gorge is a vast gash in the game-rich Serengeti Plains of northern Tanzania, formed by an earthquake more than 100,000 years ago and called a miniature Grand Canyon by many visitors (Figure 2.12). The earth's movement exposed a long series of ancient lake beds, extending back as far as 2 Ma, stratified in the walls of the gorge. Geologists have identified four major series of lake beds, labeled from Bed I (at the base) to Bed IV, which formed in a semiarid environment much like that of today. Olduvai was discovered by German butterfly hunter Wilhelm Kattwinkel before World War I and was investigated by paleontologist Hans Reck in the 1920s. He found numerous fossil animal bones, including a long-extinct elephant, which he named after himself. Today, more than 150 species of extinct animals ranging in size from elephants to birds and rodents are known from Olduvai. But the gorge will always be associated with Louis and Mary Leakey, who realized the great potential of Olduvai for documenting early human evolution. Louis Leakey first found stone axes in the gorge in 1931. Between 1935 and 1959, the Leakeys surveyed and excavated numerous

Figure 2.12 Olduvai Gorge, Tanzania.
(Ulrich Doering/Alamy)

sites and published an important monograph on the Olduvai stone tools, in which they traced the evolution of stone artifacts from a simple technology based on lava lumps, which they named the Oldowan, to progressively more complex and better-made hand axes and flake tools (the Acheulean). Then, in 1959, they discovered *Zinjanthropus boisei* and changed the chronicle of human evolution forever. Subsequently, large-scale excavations by the Leakeys unearthed other hominin fossils, including *H. habilis*, whom they considered the first toolmaker. Don Johanson of Lucy fame has also worked in the gorge and recovered further early *Homo* fragments.

The most important Olduvai hominin fossils come from Beds I and II. Bed I lies on a volcanic bedrock, known as a tuff, which has been potassium argon dated to about 2 Ma, an excellent baseline for the lake bed sequence above. The beds themselves were close to the shore of an extensive, shallow lake, which expanded and contracted from one season to the next. The waters covered places where hominins had paused to process and eat animal parts they had scavenged from nearby predator kills, preserving stone tool fragments and broken animal bones, as well as the occasional hominin fossil in situ. Excavating these land surfaces requires great patience and skill. Once a location is identified, the investigators sift the ground surrounding the original find through fine screens, looking for significant fossils. Then they excavate into the lake bed to establish the stratigraphic relationship of the ancient land surface to the surrounding lake bed layers before exposing the scatter of artifacts and bones in the horizontal plane. This process is slow-moving and calls for meticulous excavation and recording, with each fragment, even those as small as snake fangs, being exposed in place and its precise location recorded before removal. The end product after months of work is a precise three-dimensional plan of the artifact and bone scatter, so that the relationships between stone fragments and other finds, including (hopefully) hominin fossils, are established with the greatest possible precision.

The pioneer excavation methods the Leakeys used at Olduvai have been adopted and refined in both the Lake Turkana and Hadar regions, where archaeologists work alongside human paleontologists, geologists, geomorphologists, and other specialists in a multidisciplinary investigation of the earliest human behavior.

- The *australopithecines* and early *Homo* belong in a group of hominins with a relatively low body mass, a body shape better suited to a relatively closed environment, and a postcranial skeleton that combined terrestrial bipedalism with expert climbing. The teeth and jaws of these hominins are well adapted to chewing and biting a varied and mechanically demanding diet. *Australopithecus* teeth and upper leg bone studies show that the rate of development (and dependence) of young hominins in this group was closer to that of modern African apes. The tooth development of *Homo* also appears to have been closer to that of African apes, as if its development period was also shorter than that of modern humans. Early *Homo* differed from the *australopithecines* in having larger brain sizes.

- Africa's *H. erectus* (sometimes known as *H. ergaster*) and later human forms (see Chapter 3) belong in a second group marked by a larger body mass, a modern, humanlike physique that was adaptive in more open terrain, and a postcranial skeleton consistent with terrestrial bipedalism. The ability to move around in trees was very limited, and teeth and jaws had similar mechanical properties to those of modern humans. Development rates were the same as our own.

This definition of *Homo* makes a clear distinction between the hominins of earlier than 1.9 Ma and their successors who evolved after that date. It implies that a behavioral and evolutionary chasm separates true humans from the many other hominins who flourished in Africa before 2 Ma. Quite what caused this adaptive shift in human evolution is unknown. Did it correspond with significant climatic and environmental change, with equivalent evolutionary changes in other large mammal groups, or with specific changes in hominin culture? The answers will have to come from a new generation of research.

Hominin evolution can be thought of as a series of adaptive radiations that unfolded over at least 6 million years. The first radiation was of bipedal apes, which lived for the most part in the drier parts of Africa. Two later radiations gave rise to what is still called early *Homo* and the robust *australopithecines*, each with its own adaptive theme. In the case of early *Homo*, expanded brain size played a key role, while the robust *australopithecines* developed specialized teeth. Although the latter varied greatly in morphological terms, later humans radiated not so much morphologically as ecologically, spreading from Africa and creating distinct geographic populations. This flowering of hominin types is exactly what evolution is about: "an endless production of novel ways of doing things, exploring alternatives, trying out new strategies as conditions themselves shift and change all driven by natural selection" (Foley, 1995, p. 103). Hominins were no different from other mammals, which began as a slim stem and radiated into distinct branches. We still do not know much about the relationships between such branches.

This same pattern of adaptive radiation may have continued much later in prehistory, during the long millennia when *Homo* had spread into Asia and Europe (see Chapter 3), with only a small part of this evolutionary process resulting in modern humans, *H. sapiens*, almost certainly in Africa.

The Earliest Human Toolmakers

"Humans the toolmakers …": This phrase has served to distinguish the earliest toolmaking humans from all other primates of the day. Their ability to manufacture tools was a clear indication of that uniquely human attribute, culture (see Chapter 1). Other animals like chimpanzees make tools to dig for grubs or other specific purposes, but only people manufacture artifacts regularly and habitually, as well as in a much more complex fashion. We have gone considerably further in the toolmaking direction than have other primates. One reason for this is that our brains allow us to plan our actions much further in advance.

The earliest human tools may well have been made of perishable wood, perhaps rudimentary clubs, digging sticks, or spears, but they have not survived. The simple Oldowan tool industry, which appeared in East Africa about 2.6 Ma, used to be the conventionally agreed-upon date for the origin of human culture. However, this date has now been pushed back—and by a long span.

In 2015, a team working at Lomekwi 3, near the west bank of Kenya's Lake Turkana, published its discovery of stone tools dating to around 3.3 Ma. Made from large pieces of volcanic rock, the Lokemwi 3 stone tool industry is a very crude yet technologically diverse culture that includes cores, flakes, and possible anvils. It remains unclear who made these items, but their appearance greatly predate *H. habilis* and suggest stone toolmaking arose with *Australopithecus* or *Kenyanthropu*s.

From around 2.6 Ma, we begin finding the Oldowan tools (after the Olduvai Gorge, see box) that have always been linked with early *Homo.* These stone artifacts have been found in large numbers throughout East and southern Africa and are associated with broken animal bones in the East Turkana region and at Olduvai Gorge. They were made from convenient pebbles, some perhaps converted into simple choppers by removing one or two flakes (Figure 2.13).

Stone tool expert Nicholas Toth has shown that the most important artifacts were not pebbles or even crude choppers, but the sharp-edged flakes removed from them. Angular flakes and lumps of lava made weapons, scrapers, and cutting tools used to cut meat, to butcher animals, and perhaps to shape wood. There are few formal tools, but Toth's controlled experiments show that the first toolmakers had a clear understanding of the potential of stone as the basis for a simple, highly effective technology that grew more complex over time. Eventually, the simple choppers evolved into crude, ax-like tools, flaked on both surfaces—the hand ax used widely more than a million years ago. This early human technology is called the Oldowan after Olduvai Gorge, where it was first described in detail.

Nicholas Toth has replicated thousands of Oldowan artifacts and shown by experiment that sharp-edged flakes are highly effective for slitting skin and butchering game animals. By studying the working edges of the tools under microscopes, he has detected wear from three possible uses: butchery and meat cutting, sawing and scraping wood, and cutting soft plant matter. Toth believes our early ancestors had a good sense of the mechanics of stone tool manufacture. They could find the correct acute angle for removing flakes by percussion. Not even modern

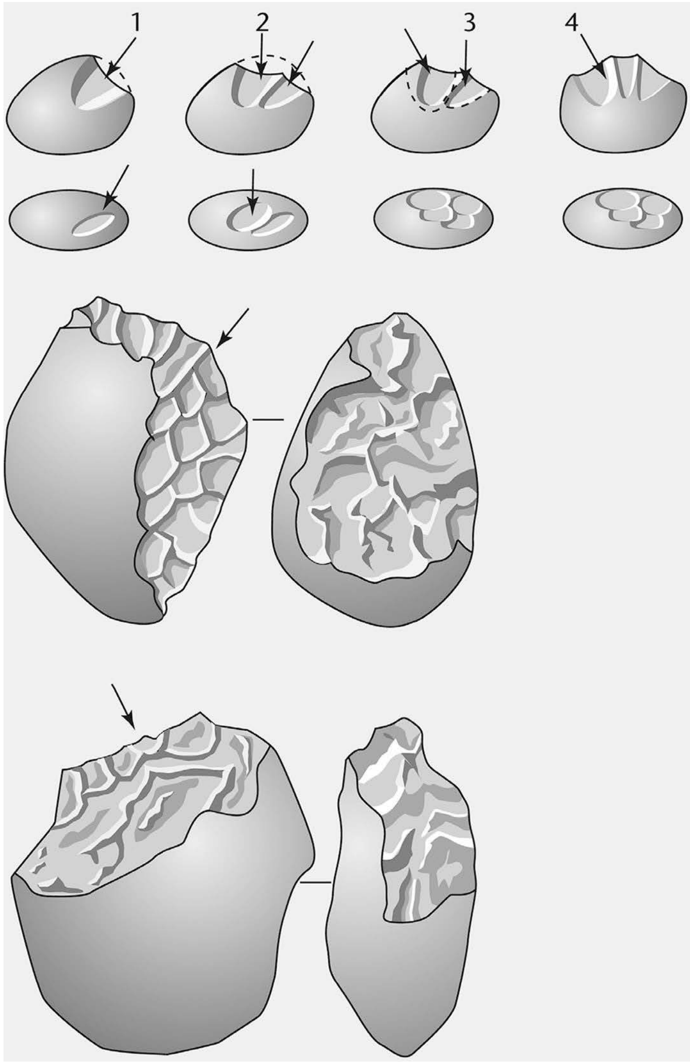


Figure 2.13 Many cobbles at Olduvai, and indeed Koobi Fora, were used as cores to produce sharp-edged flakes. First, sharp blows were struck near the natural edge of a pebble to remove flakes. The pebble was then turned over, and more blows struck on the ridges formed by the scars of the earlier flakes. A "core" with a jagged edge, perhaps used as a chopper, resulted. Many cores were "mined" for as many flakes as possible before being discarded. The figure shows Oldowan cores from Olduvai Gorge. Arrows show flake edges. Front and side views (two-fifths actual size).

beginners have this capacity; it takes hours of intensive practice to acquire the skill.

Unlike chimpanzees, who rarely tote the sticks and stones they use more than a few meters, early *Homo* carried flakes and pebbles over considerable distances, up to 14 kilometers (9 miles). This behavior represents a simple form of curation, retaining tools for future use rather than just utilizing convenient stones as chimpanzees do. Toth hypothesizes that the hominins tested materials in stream beds and other locations, transported the best pieces to activity areas, and sometimes dropped them there, carrying the rest off with them. He also points out that they must have relied heavily on other raw materials, like wood and bone, and that stone artifacts do not necessarily give an accurate picture of early hominin cognitive abilities.

What do the Oldowan tools and those of the even earlier Lokemwi 3 culture tell us about human behavior? Did these early toolmakers possess forms of protohuman cultures, with simple stone artifacts marking the initial steps on the long evolutionary trail to modern humanity? Or were the Oldowan and Lokemwi 3 hominins simply at an apelike grade of behavior? After all, the conceptual abilities and perceptions needed to manufacture these early and relatively crude tools also appear in ape-manufactured tools such as termite-fishing tools and sleeping platforms. Furthermore, not only hominins but also chimpanzees scavenged and hunted for game—chasing down small animals, carrying meat over considerable distances, and using convenient objects to break open animal bones and nuts.

Chimpanzees, like early hominins, use the same places again and again, pounding nuts at the same locations and carrying food to their favorite eating sites. Even if the specifics vary in some instances and the natural environments are different, the behavioral pattern of Oldowan and earlier hominins is generally similar to that of apes. There are, however, two behavioral differences between apes and early hominins. First, hominins were at an advantage in that they were bipedal, a posture that is far more efficient for carrying objects than is walking on four limbs. Second, the Oldowan and Lokemwi 3 manufacturers were adapted to savanna living, where they had to organize and cover far larger territories in open country than their primate relatives in the forest. In the long term, this may have resulted in new concepts of space and spatial organization, concepts definitely reflected in more complex stone tool forms after a million years ago.

Early hominins with their larger brains probably would not have behaved the same way as modern apes. We can be certain that significant differences existed between nonhuman primates and early humans, but these changes may not be reflected in stone artifacts. Without question, our ancestors became more and more dependent on technology. The opportunistic nature of primeval stone technology is in sharp contrast to the better designed, much more standardized stone artifacts of later humans.

Hunters or Scavengers?

Studying early hominin behavior is complicated both by poor preservation conditions and by the vast time chasm that separates us from our remotest ancestors. Two sources of information on very early human behavior survive in East Africa—the first is manufactured artifacts, and the second scatters of tools and food remains found at a few locations like Koobi Fora in East Turkana, northern Kenya, and Olduvai.

Concentrations of broken animal bones and stone tools in these regions and a few others have been excavated and studied with meticulous care. The concentrations are usually only some 6–9 meters (20–30 feet) across, places hominins visited and used either once or on several occasions. Later prehistoric foragers made habitual use of central places, places where they returned to sleep, cook food, and engage in a wide variety of social activities. Are we, then, to assume that the Koobi Fora and Olduvai concentrations are evidence that our earliest ancestors also used central places like their successors did? Did they hunt and kill big game animals, or did they merely scavenge flesh from abandoned predator kills?

At Koobi Fora, a group of hominins found the carcass of a hippopotamus in a stream bed about 1.8 Ma. They gathered around and removed bones and meat from the dead animal with small stone flakes. The sandy deposits in which the artifacts lay are so fine that we can be certain that every stone cobble was carried in to make tools at the carcass, some of them from as far as 14 kilometers (9 miles) away. The site contains abundant evidence of butchering and of tool manufacture, but we do not know if the hominins actually killed the animal.

Site FxJj50 at Koobi Fora is also in an ancient watercourse, a place where the hominins could find shade from the blazing sun, located close to water and abundant toolmaking stone. The site is a cluster of stone artifacts and fragments, including sharp flakes, choppers, and scraping tools. More than 2,000 bones from at least 17 mammalian species, mostly antelope, are associated with the tools, some of which have been chewed by hyenas and other carnivores. There are clear signs that hominins smashed and cut the bones, for reconstructed fragments show traces of hammer blows and fine linear grooves that could have resulted only from cutting bone with stone flakes. Many of the FxJj50 bones have their articular ends chewed off by carnivores, a characteristic of bone accumulations resulting from carnivore kills. Perhaps the hominins simply chased away lions and other predators and then moved in on a fresh kill; we cannot be sure.

At Olduvai Gorge, Mary Leakey plotted artifact and bone scatters in the lowest levels of the ancient lake bed. Many artifacts and bones were concentrated in areas about 4.6 meters (15 feet) across. At one site, a pile of shattered bones and rocks lay a short distance away, the bones perhaps piled in heaps as the marrow was extracted from them. Recent microscopic studies of the Olduvai scatters have shown that many of the bones were heavily weathered. They had lain on the surface for considerable periods of time, some for perhaps as long as a decade. The bones of many different animals come from the scatters, parts of carcasses from a very ecologically diverse set of animals. Limb bones predominate, as if these body parts were repeatedly carried to the sites.

At both Koobi Fora and Olduvai, meat- and marrow-rich bones occur concentrated in small areas with stone tools. The percentage of carnivore bones is somewhat higher than in the natural environment, as if intense competition took place between hominins and other carnivores. Perhaps the presence of such predators restricted the activities of hominins at Olduvai. They may have grabbed meat from fresh carnivore kills and then taken their booty to a place where they had a collection of stone tools near water or other predictable food supplies. There they would hastily cut off meat and extract the marrow before abandoning the fresh bones to the carnivores hovering nearby. Without fire or domesticated animals, scientists believe, early *Homo* probably had to rely on opportunistic foraging for game meat, it being unsafe for them to camp in open watercourses or on lake shores. It is worth noting that one hominin bone found at Olduvai Gorge had been gnawed by carnivores.

Most of the bones from the Olduvai accumulations are of smaller animals that could be run down and thrown to the ground with ease. This is more of an apelike form of behavior, although apes have been observed scavenging meat. Microscopic studies of the Olduvai bones show that the hominins rarely butchered and disarticulated large animals and carried their bones back to base. They seem to have obtained meat without cutting up too many carcasses, as if they scavenged it from already dismembered predator kills. In some cases, human cutting marks overlay predator tooth marks, as if the hominins had scavenged bones from carcasses other animals had already killed. In others, predators have chewed bones abandoned by *Homo*.

Archaeologist Robert Blumenschine spent several field seasons studying animal predators on the game-rich Serengeti Plains of northern Tanzania. Semiarid grassland crossed by occasional streams lined with trees—this was the kind of environment early hominins shared with other predators like lions and hyenas. Blumenschine observed dozens of predator kills, studying the abandoned, shattered bones and comparing them to the archaeological finds at Olduvai Gorge. As a result of these observations, he thinks the hominins could take unique advantage of two scavenging opportunities. The first was near streams, because lions kill close to water in the dry season. Sometimes more than a day would elapse before hyenas moved in, ample time, Blumenschine believes, for hominins to seize their share. It is here, too, that leopards hide small antelope kills in trees, high above the ground, but not out of reach of humans. Scavenging would have been most common in the dry months, when game (and its predators) stayed near to permanent water supplies and plant foods were in short supply. During the rains, both antelope and predators would range far over the plains, where it was easy for hyenas to find lion kills. But these were the months when hominins relied on plant foods and fruit in more wooded environments. Blumenschine argues that scavenging and plant gathering went hand in hand, each complementing the other at different times of year. Opportunism has been an important quality of humankind from the earliest times. Undoubtedly, however, plants and all kinds of vegetable foods were an important, if not the most important, part of very early human diet. (It is only fair to point out that the scavenging theory is the subject of vigorous debate surrounding the hunting abilities of the first humans.)

The Earliest Human Mind

Several species of *Homo* probably coexisted around 2 Ma. What, then, were the specialized mental processes found in these earliest humans as opposed to much earlier hominins?

Some clues lie in stone tool manufacture. Chimpanzees shape termite twigs with their teeth from convenient wood fragments, removing leaves so they can poke the "artifact" down a small hole. The making of stone tools, even those belonging to the very early, very crude, Lomekwi 3 culture (at 3.3 Ma), requires good hand–eye coordination, the ability to recognize acute angles in stone, and the mental processes necessary to shape one tool by using another. By the time the Oldowan industry emerged (ca. 2.6 Ma), its stoneworkers were carrying out simple tasks: shaping stones so they could hold them in one hand to crack bones and striking off sharp-edged flakes. Their artifacts defy precise classification in the way that one can subdivide later stone tools into forms such as choppers, scrapers, and knives, for example. Their lumps and flakes display continuous variability—an understanding of basic fracture mechanics, not the ability to impose standardized forms or to choose easily worked raw materials. Could chimpanzees have made such tools, as has been suggested? When Nicholas Toth originally tried to train a pygmy chimpanzee named Kanzi to make Oldowan tools, he found that Kanzi could make sharp flakes, but he never mastered the art of recognizing acute angles in stone, or other flaking. Archaeologist Steven Mithen argues for two possibilities: either a more general intelligence had evolved, or some mental processes for basic stoneworking had appeared—intuitive physics in the mind of early *Homo*. Oldowan stone tools were mainly used to process animal carcasses, for skinning, cutting joints and meat, and breaking open bones. But how did early *Homo* interact with the natural world?

One major change in behavior among early *Homo* appears in the archaeological record of 2 Ma: a potentially dramatic rise in meat consumption. In practice, early *Homo* was probably a behaviorally flexible, nonspecialized forager, whose lifeway was marked by diversity, by shifts between hunting and scavenging and between food sharing and feeding on the move. The larger brain of early *Homo* would have required the consumption of more energy and a higher quality of diet. The stable basal metabolic rate was maintained by a reduction in the size of the gut, which could only become reduced as a result of a higher-meat diet, since a high-fiber diet requires more intestinal action.

Steven Mithen believes that this need for more meat required another cognitive ability as opposed to that for toolmaking—that of being able to use one's knowledge of the environment to develop ideas about where to find predator kills and high densities of animals. He argues that the presence of toolmaking stone up to 10 kilometers (6 miles) from its source is a sign that early *Homo* was moving not only stone but also meat to different, ever-changing locations. Such ability suggests a relatively sophisticated interaction with the environment when compared with chimpanzees, who only transport "tools" to fixed locations.

Early *Homo* was so far confined to tropical Africa, and to a relatively narrow range of savanna and grassland environments, in contrast with later humans who adapted to every kind of climate imaginable. Many groups lived close to permanent water, tethered, as it were, to places like the shallow lake at Olduvai, where sites are stacked one above another over considerable periods of time. Many animal species appear in the Olduvai caches, as if our ancestors ranged widely over the surrounding landscape, but they may have transported much of their food to well-defined locations.

Early *Homo* shared the ability of its earlier ancestors to "map" resources over wide areas. But it may also have possessed additional cognitive abilities: to develop ideas about where to find food, and to use tell-tale signs such as animal droppings to find it, within a relatively narrow environmental setting. At the same time, its general intelligence was supplemented by some specialized abilities in artifact manufacture, which were to be an important foundation for environmental intelligence in later millennia.

Social intelligence may have evolved significantly. Anthropologist Robin Dunbar has studied living primates and discovered evidence for larger brain size in individuals living in larger groups, developing an equation for relating brain to group size. He then estimated the brain size of early *Homo* and applied his figures to the chimpanzee equation. Chimpanzees lived in predicted group sizes of about 60 individuals. In contrast, he predicted that *australopithecines* lived in groups with a mean size of about 67 individuals, whereas early *Homo* flourished in larger groups of about 81. Group living was essential for early *Homo*, which lived in an environment teeming with carnivores, often competing with them for meat with only the simplest of weapons for protection. Large groups have dramatic advantages for hominins living in environments where resources come in large "parcels" that are irregularly distributed across the landscape. Members of a group can search for food individually or in pairs, then share it with others, allowing the group as a whole to cover a much larger area. Mithen believes the larger brain of the first humans allowed for greater social intelligence for coping with the complexities of living in closer juxtaposition to others, where assuming that others know things is of vital importance.

The Development of Language

Cooperation, the ability to get together to solve problems of both subsistence and potential conflict, is a vital quality in human beings. We are unique in having a spoken, symbolic language that enables us to communicate our most intimate feelings to one another. But at what point did hominins acquire the ability to speak?

Our closest living relatives, the chimpanzees, communicate with gestures and many voice sounds in the wild, whereas other apes use sounds only to convey territorial information. However, chimpanzees cannot talk to us because they do not have the vocal apparatus to do so. Articulate speech was an important threshold in human evolution because it opened up whole new vistas of cooperative behavior and unlimited potential for the enrichment of life. When did hominins abandon grunts for speech? We cannot infer language from the simple artifacts made by early *Homo*, but there are two potential lines of research open.

Both comparative anatomy and actual fossils can be used to study differences between apes and humans. Biological anthropologist Jeffrey Laitman and others studied the position of the larynx in a wide variety of mammals, including humans. They found that all mammals except adult humans have a larynx high in the neck, a position that enables the larynx to lock into the air space at the back of the nasal cavity. Although this position allows animals like monkeys and cats to breathe and swallow at the same time, it limits the sounds they can produce. The pharynx—the air cavity part of the food pathway—can produce sounds, but animals use their mouths to modify sounds since they are anatomically incapable of producing the range of sounds needed for articulate speech.

Until they are about 18 months to 2 years old, human children's larynxes are also situated high in the neck. Then the larynx begins to descend, ending up between the fourth and seventh neck vertebrae. How and why are still a mystery, but the change completely alters the way the infant breathes, speaks, and swallows. Adult humans cannot separate breathing and swallowing, so they can suffocate when food lodges in an airway. However, an enlarged pharyngeal chamber above the vocal cords enables them to modify the sounds they emit in an infinite variety of ways, which is the key to human speech.

Using sophisticated statistical analyses, Laitman and his colleagues ran tests on as many complete fossil skulls as possible. They found that the *australopithecines* of 4 to 1 Ma had flat skull bases and high larynxes, whereas those of African *H. erectus/H. ergaster*, dating to about 1.9 Ma and later, showed somewhat more curvature, suggesting that the larynx was beginning to descend to its modern position. Only about 300,000 years ago did the skull base finally assume a modern curvature, which would allow for fully articulate speech to evolve. Early *Homo* probably had very limited speaking abilities. The real value of language, apart from the stimulation it gives brain development, is that with it we can convey feelings and nuances far beyond the power of gestures or grunts to communicate. We may assume that the first humans had more to communicate with than the gestures and grunts of nonhuman primates, but it appears that articulate speech was a more recent development.

The Earliest Social Organization

The few early sites that have been excavated show that the first phase of human evolution involved shifts in the basic patterns of subsistence and locomotion as well as new ingredients—food sharing and toolmaking. These led to enhanced communication, information exchange, and economic and social insight, as well as cunning and restraint. Human anatomy was augmented with tools. Culture became an inseparable part of humanity, and social life acquired a new and as yet little understood complexity.

What sort of social organization did early *Homo* enjoy? However much we look at contemporary nonhuman primates, we cannot be sure. Most primates are intensely social and live in groups in which the mother–infant relationship forms a central bond. The period of infants' dependency on mothers found in, say, chimpanzees was probably lengthened considerably with early *Homo*. The larger brain size would mean that infants were born with much smaller heads than adults, at an earlier stage of mental maturity. This biological reality would have had a major impact on social organization and daily habits.

Chimpanzees have flexible, matriarchal social groups. They occupy a relatively small territory, one with sufficient vegetable resources to support a considerable population density; this pattern contrasts sharply with the average hunter-gatherer band, typically a closely knit group of about 25 people of several families. The kind of systematic hunting such people engage in requires much larger territories and permits much lower densities per square kilometer or mile. The few sites that have been excavated suggest that early *Homo* tended to live in bands that were somewhat more akin to those of modern hunter-gatherers. But in all probability their social organization resembled more closely that of chimpanzees and baboons, which is very different from that of humans.

The world of early *Homo* was much less predictable and more demanding than that of even *Australopithecus*. What was it that was more complex? Why do we have to be so intelligent? Not for hunting animals or gathering food but for our interactions with other people. The increased complexity of our social interactions is likely to have been a powerful force in the evolution of the human brain. For early *Homo*, the adoption of a wider-based diet with a food-sharing social group would have placed much more acute demands on the ability to cope with the complex and unpredictable. And the brilliant technological, artistic, and expressive skills of humankind may well be a consequence of the fact that our early ancestors had to be more and more socially adept.

Summary

- The term *hominin* is used to describe living humans and all other species that belonged to the lineage that diverged from that of the chimpanzees, potentially about 7.5 Ma.
- The first hominins were tree-living, with long arms and legs and broad chests, but with apparent bipedal traits, walking on two limbs. They adapted to more open country in Africa, which resulted from global cooling more than 4 Ma, by broadening their diet to include more meat and by achieving great mobility and behavioral flexibility.
- The earliest known hominin fossil belongs to *S. tchadensis* from central Chad, dating to ca. 6 to 7 Ma, but its evolutionary status is uncertain. The earliest certain hominin is *A. ramidus* who flourished from 4.5 to 4.3 Ma in Ethiopia. It was followed by *A. anamensis* (4.2–3.9 Ma) and *A. afarensis* (3.7–3 Ma).
- By 3 Ma, the hominin line had radiated into many forms, among them robust and more gracile *australopithecines* and, by 2.4 Ma, the larger-brained early *Homo*.
- Early *Homo* (such as *H. habilis*, 2.4–1.6 Ma) was a forager who also scavenged game meat and perhaps hunted. These hominins used a simple stone technology, had some ability to communicate, and had a very rudimentary social organization.
- The relationships between the hominins are complex and unresolved, with many becoming extinct without giving rise to new species. For example, the more apelike *H. habilis* overlapped in time with the first of the more human-like species, beginning with *H. erectus/H. ergaster* (see Chapter 3) who appeared around 1.9 million years before present.

Further Reading

Louise Humphrey and Chris Stringer's *Our Human Story* (London, Natural History Museum, 2018) offers an excellent overview for the lay reader. Chris Stringer and Peter Andrews's *The Complete Book of Human Evolution* (London: Thames and Hudson, 2005) provides a lavishly illustrated survey. Richard Klein's *The Human Career*, 3rd ed. (Chicago: University of Chicago Press, 2009) is an advanced textbook. However, the field is moving so swiftly that we encourage you to keep abreast of findings, notably in the science journal *Nature*, and the peer-reviewed open access journal *PLOS One* (journals.plos.org).

Chapter 3

African Exodus

Homo erectus (or *Homo georgicus*) skull from Dmanisi, Georgia.
(Sabena Jane Blackbird/Alamy)

Chapter Outline

Prologue

Eugene Dubois was a Dutchman obsessed with the "Missing Link," the mythical human who was the evolutionary connection between apes and modern people. A surgeon by profession, in 1887, young Dubois even wangled a posting as an army physician to distant Sumatra in Southeast Asia, where, he was convinced, the Missing Link would be found. Incredible though it may seem, Dubois actually found what he claimed was such an ancestor on nearby Java in 1891. Digging into fossil-rich ash and river sediments at Trinil on the Solo River in northeastern Java, he found not only the bones of extinct animals but a human tooth, a thick-walled skull, and a human thigh bone.

Dubois named his fossil *Pithecanthropus erectus*, "ape-human which stood upright." This, he claimed, was the missing link between apes and humans, a very primitive human being. On his return to Europe in 1895, he was greeted with skepticism, then scorn. Dubois' reaction was to withdraw from the scientific arena. He is said to have kept his fossils under his bed. Modern science has vindicated Eugene Dubois, for he was the first to discover what is now known as *Homo erectus*, one of the most famous archaic humans.

Chapter 3 begins with the appearance of more advanced hominins, *H. erectus,* in tropical Africa about 1.9 Ma. We then describe how *H. erectus* moved to Southeast Asia by 1.8 Ma. Thereafter we describe their lifeways and expertise at big game hunting before discussing the appearance of other archaic humans. This leads us to fascinating questions: Who were the Neanderthals? How did they differ from modern humans? Finally, we try to answer one of the fundamental questions of prehistory: How, where, and when did fully modern *Homo sapiens* evolve? This question involves a jigsaw puzzle of genetics, archaeology, and environmental change.

Soon after 2 Ma, *Homo habilis* (2.4–1.6 Ma) and other forms of early hominins were joined by more advanced humans capable of far more complex and varied lifeways. These new human ancestors were among the first to tame fire and the first to settle outside the tropical savannas of Africa. They did so at the beginning of the last geological epoch, the Pleistocene, sometimes called the Ice Age. Chapter 3 describes the diverse archaic humans who moved out of Africa into Asia and Europe and their increasingly sophisticated adaptations to constant climatic change during the Ice Age.

Ice Age Background

The Pleistocene began about 2.5 Ma, after an intensification of glaciation worldwide. By this time great mountain chains had formed in the Alps, in the Himalayas, and elsewhere. Land masses had been uplifted; connection between these latitudes and southern areas was reduced, lessening their heat exchange and causing greater temperature differences between them. Northern latitudes became progressively cooler after 3 Ma, but climatic fluctuations between warmer and colder climatic regimens were still relatively minor during the first million years of the Ice Age. This was a critically important time, when a more advanced human form evolved in Africa and moved out of the tropics into Asia and Europe.

About 780,000 years ago, the earth's magnetic field changed abruptly from a reversed state it had adopted about 2.5 Ma to a normal one (see Table 2.1). This Matuyama/Brunhes boundary, named after the geologists who first discovered it, marks the beginning of constant climatic change for the remainder of the Ice Age. Deep sea cores give us a record of changing sea temperatures. They tell us that ice sheets formed gradually, but deglaciation and global warming trends took place with great rapidity. These corresponded with major sea level rises that flooded low-lying coastal areas. During glacial maxima, ice sheets covered up to a full third of the earth's surface, mantling Scandinavia and the Alps in Europe, as well as much of northern North America. Sea levels fell dramatically as a result, to hundreds of meters below modern levels. The glaciers were about as extensive as they are today during warmer periods, the so-called interglacials, when sea levels were close to present shorelines. Much less is known about changes in tropical regions, although it is thought that the southern fringes of Africa's Sahara Desert expanded dramatically during cold periods.

Early and modern humans evolved during a long period of constant climatic transition between warmer and colder regimens in northern latitudes. Experts believe that the world's climate has been in transition from one extreme to the other for more than 75 percent of the past 780,000 years, with a predominance of colder climate over the period (see Table 2.1). At least nine glacial episodes occurred, with a major one about 525,000 years ago, when there was ice as far south as Seattle, St. Louis, and New York in North America, and sea levels were as much as 197 meters (650 feet) below modern levels. In contrast, there were periods of more temperate conditions between 515,000 and 315,000 years ago. This was the period when human settlement outside Africa expanded, as small bands of foragers exploited the rich animal and plant resources of European and Asian river valleys and forests.

Another intensely cold cycle lasted from about 180,000 to 128,000 years ago, a cycle that coincided in general terms with the period when fully modern *H. sapiens* was evolving in Africa. Between 100,000 and 15,000 years ago, the last Ice Age glaciation saw the spread of *H. sapiens* throughout the Old World and into the Americas. These constant climatic changes played an important role in the spread of early human beings throughout temperate and tropical latitudes (see Figure 3.1).

Chronological Table A

Years Before Present	*Africa*		*Middle East*		*Europe*		*Asia*		*Ice Age Events*
50,000	Klasies River			*Homo sapiens* and Neanderthals	Mousterian	*Homo sapiens* and Neanderthals			Würm glaciation
100,000									
200,000 to present	Acheulian	*Homo sapiens*	Acheulian	?	Torralba Acheulian Homo *neanderthalensis*		Bamboo and simple chopper technology Zhoukoudian		At least nine cold periods
350,000–28,000		*Homo heidelber gensis*							
500,000					*Homo heidelbergensis*	H. heidelbergenis at 600,000 – 200,000 BP.		Homo erectus	
600,000–200,000									
1.2–500,000					*Homo antecessor (?heidelbergensis)*				
1.8–30,000				*? Homo erectus*					
1.9–1.5 million		*Homo ergaster* in East and Southern Africa		No human settlement	? First settlement No human settlement		Trinil		Matuyama/ Brunhes boundary
2.4–1.6 million	Oldowan olduvai Gorge Koobi Fora.	*Homo habilis* *Early Homo*			?H. erectus		No human settlement		Cooling trend
3.7–3 million		*Australopithecus afarensis*							
4.5–4.3 million		*Ardipithecus remindus*							

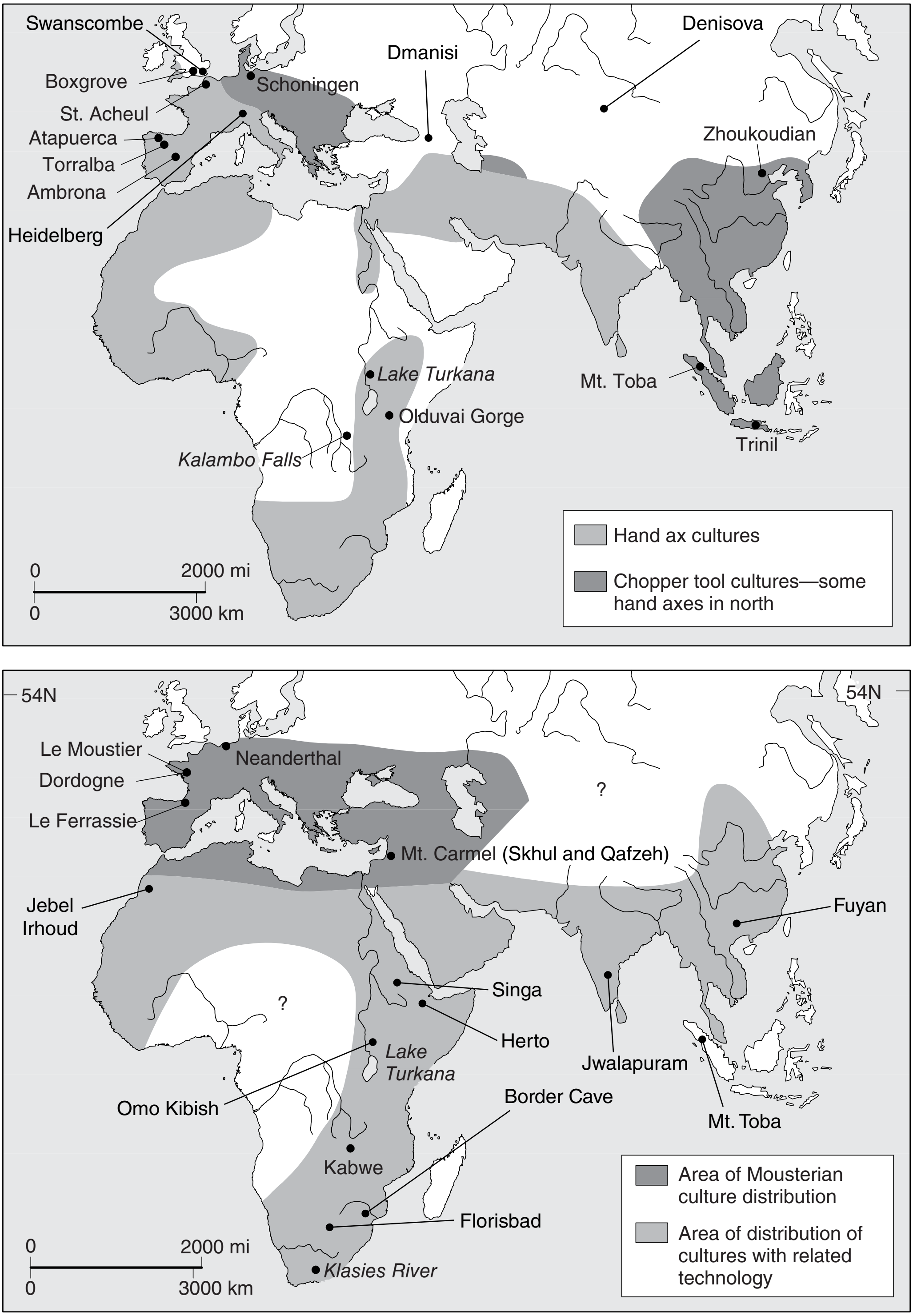


Figure 3.1 Maps of sites mentioned in the chapter. The upper map shows the distribution of hand-ax and chopper cultures, the lower the area of Mousterian and related cultures.

Homo erectus in Africa (from ca. 1.9 to ca. 1.5 Ma)

All paleoanthropologists agree that the successors to early *Homo* evolved in Africa. It is in this vast area of sub-Saharan Africa that we find a long, and highly complicated, record of early human evolution, ranging from Chad's *Sahelanthropus tchadensis*, to the australopithecines of eastern and southern Africa, to early *Homo*, and then later humans. As we shall see later in this chapter, the same continent was, according to all of the available evidence, also the cradle of us, *H. sapiens*.

The first hominin to possess overall body proportions relatively similar to ours was *H. erectus* (or "upright man"). Within Africa, this creature appeared around 1.9 Ma and thrived until about 1.5 Ma. Known from sites in the African Rift Valley (Kenya, Tanzania, and Ethiopia) as well as South Africa (Figures 3.2 and 3.3), it is associated with rich stone tool assemblages. But before we discuss this hominin further, a note on its status. Some researchers question whether the African *H. erectus* fossils should even be categorized as such. Instead, one taxonomic scheme proposes that the *H. erectus* specimens found in Africa are so distinct from the "classic" *H. erectus* fossils found in Asia that they should be given a different name, i.e. *Homo ergaster* (the workman). In this scheme, the European form of *H. erectus* is also given its own name: *Homo georgicus* (after the eastern European country of Georgia where it was first found, on which more later). There is simply no agreement, and the debates can be vicious. In this book, our compromise is to specify whether we are referring to African, Asian, or European examples of *H. erectus*.

As to the morphology of African *H. erectus*, its skulls and jawbones show a wide range of variation in shape and size, with some possessing only a modest brain size of 508–580 cubic cm, and others with a cranial capacity of 804–909 cubic cm. Those with smaller brains have vertical upper faces with large and projecting upper jaws, while those with the larger brains tend to possess stronger brow ridges, wide nasal openings, and projecting mid faces. Regardless of brain size and facial appearances, their bodies were typically slender and sometimes very tall (heights range from 1.45 to 1.85 meters), with shorter arms and longer legs than any previous hominin species. The change probably reflects the development of fully terrestrial bipedalism, and it is very likely that their mode of walking and running was very similar to our own.

That this new human evolved from early *Homo* seems unquestionable, but the details remain unclear. The fossil record for the African *H. erectus* includes a few complete skulls, such as skull KNM-ER 3773 from East Turkana (which dates to 1.6–1.5 Ma and has a much larger brain cavity than is found among the *australopithecines*), fragments of skull, jaw, pelvis, and limb bones, plus the remarkably complete skeleton of a child, known as "Turkana Boy." Discovered in 1984 by Kenyan archaeologist Kamoya Kimeu on the western shore of Lake Turkana, the eponymous boy was aged between 7 and 15 when he died around 1.5 Ma (Figure 3.3).

Figure 3.2 *Homo erectus* represented by skull KNM-ER 3733 from East Turkana, Kenya. This individual has a larger brain and more rounded skull than the *australopithecines.*
(The Natural History Museum/Alamy)

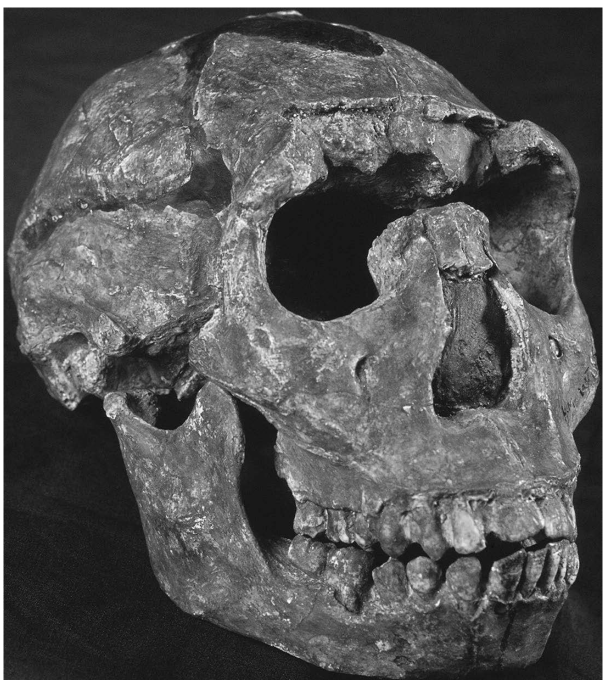


Figure 3.3 Lake Turkana, East Africa. A reconstruction of a young *Homo erectus* boy, who died in a small lagoon on the western shores of Lake Turkana about 1.5 Ma.
(Javier Trueba/Science Photo Library)

From the neck down, his bones are notably modern looking. Yet his skull and jawbone are more primitive, with brow ridges and a brain capacity perhaps as high as 700–800 cubic cm, about half the modern size. The boy stood at about 1.6 meters (5 feet 6 inches) tall, which is quite tall given that recent estimates suggest he may have been at the younger end of his proposed age range. Turkana Boy seems to confirm the theory that different parts of the human body evolved at different rates, the body achieving fully modern form long before the head.

The brain size of the African *H. erectus* (averaging around 600–910 cubic cm) was not always much bigger than *H. habilis*' range of 600–700 cubic cm, but in many respects, these new humans were radically different from the earlier *Homo*. They had more humanlike raised up noses, in contrast to the apelike noses of the *australopithecines*, and though still chinless they had smaller molars and premolars than those found in earlier hominins, perhaps suggesting a more mixed diet. Their bodies also looked more similar to modern humans with their relatively short arms and long legs, for these hominins lived entirely on the ground. They had barrel-like chests and narrower hips, which led to more efficient muscles for walking and running bipedally. Their more constricted pelvis would have reduced the amount of brain growth before birth and led to a longer dependence on the mother, like modern humans. The marked sexual dimorphism of the *australopithecines* and perhaps early *Homo* has now vanished, perhaps creating social environments where males no longer competed for females and male–female relationships lasted longer. In terms of their behavior, their spinal cord was narrower than in modern humans suggesting that the nervous system may not have been developed enough to control speech. However, from around 1.65 Ma, they were linked with a new and more sophisticated tool assemblage. Known as the Acheulean stone tool industry, it includes flakes and choppers, but also an innovative new form—the hand axe. Acheulean hand axes were created through "bifacial" (two-sided) knapping, in which flakes would be struck from both sides of the stone in order to create a fairly straight, sharp edge—a process requiring skill and forward planning.

The long, slim body of the African *H. erectus* was well adapted to living in hot, arid environments. These may have been the first nearly hairless, naked humans, for they could not have sweated efficiently if covered with apelike body hair. Environmental adaptation was nothing new among the hominins. Both *Australopithecus* and early *Homo* adjusted to plunging global temperatures during a glacial episode between about 2.7 and 2.5 Ma. The colder conditions turned much of Africa's moist woodlands into much drier, open savanna at a time of constant environmental change and phases of both arid and moister conditions. The hominins thrived in these conditions, as tree-dwelling primates yielded to bipedal forms better able to survive in the open. This adaptability let hominins move into new environments, where their mixed diet of meat and plant foods caused them to move over large home territories. *H. erectus* was just as adaptable and mobile, but was the first human to use fire, fashion more elaborate tools, and leave Africa.

Homo erectus in Southeast Asia (from ca. 1.8 Ma to possibly 30,000 Years Ago)

Soon after the appearance of *H. erectus* (1.9–1.5 Ma) in Africa, we find evidence for *H. erectus* throughout China, Java, and Indonesia (1.8 Ma to perhaps 30,000 years ago). However, some of the dates are open to debate, and there is much discussion over the classification, ancestry, and progeny of the Asian *H. erectus.* In terms of their appearance, the Southeast Asian fossil record of *H. erectus* is dominated by skulls, jaws, and teeth, with few or insecurely dated remains of other parts of the body. Nonetheless, scientists have adduced that they were large bodied, with fully modern bipedalism, a relatively large brain, strong brow ridges, and wide cheekbones. It is probable that their vision was excellent. Adult heights are thought to have averaged between 1.6 and 1.8 meters (5 feet 3 inches–6 feet).

The classic Asian *H. erectus* fossils come from the **Trinil** area of Java, where they date to between 1.8 million and 600,000 years ago, and from northern and southern China, dating to between 600,000 and 350,000 years ago, perhaps considerably earlier (Figure 3.4). (Note that many

Figure 3.4 *Homo erectus* from Zhoukoudian, China.
(Friedrich Saurer/Alamy)

of the dates for *H. erectus* have been gleaned through relative means, for example by matching fossils with absolutely dated sites in East Africa.) Their brain capacity varies massively, from between 775 and 1,300 cubic cm. Given their adaptation to a wide range of environments, from forested Javanese valleys to the harsh winters of northern China, the intrepid *H. erectus* was certainly capable of a far more complex and varied lifeway than previous hominins. With such a wide distribution, not only over space but also in time, it is hardly surprising that variations in population occur. For example, Chinese scholars claim that the *H. erectus* fossils from the famous **Zhoukoudian** cave near Beijing display a gradual increase in brain capacity from about 900 cubic cm 780,000 years ago to about 1,100 cubic cm in 200,000-year-old individuals.

Culturally, experts remain perplexed over why the stone tool kits of the Asian *H. erectus* do not include the large Acheulean hand axes, which first appear in Africa around 1.65 Ma, and are the work of African *H. erectus*. One explanation is that *H. erectus* left Africa for Asia before the hand axes were invented (and the evidence does not contradict this—the earliest Asian *H. erectus* evidence dated to 1.8 Ma, while the oldest known African Acheulean hand axes appear several thousands of years later). Alternatively, environmental or other reasons may have meant the Asian hominins rejected hand axes in favor of choppers, flakes, and tools made from or using materials such as wood, bone, bamboo, or antler.

Since all the data indicate that hominins originated in Africa, then why or when did they leave Africa? Unfortunately, the archaeological record is still tantalizingly incomplete. It may have been a slow process, with some researchers even suggesting it was first undertaken by *australopithecines*, or it is also possible to envisage a speedy scenario in which small bands covering large, open territories where food resources were scattered unevenly over the landscape; even an expansion of about 30–50 kilometers (20–30 miles) a year soon translates to hundreds, then thousands of kilometers within a few generations. Certainly, around 2 Ma, hominins were adjusting to cyclical alterations among savanna, forest, and desert as the Ice Age began. They did so by migrating with changing vegetational zones, as many mammals did, or by adapting to new environments, changing their dietary emphasis from meat to plant foods. Finally, they could move out of tropical latitudes altogether, into habitats human beings had never occupied before.

Very likely hominins adapted to changed circumstances in all these ways, with some radiating out of Africa by way of the Sahara when the desert could support human life. Geologist Neil Roberts has likened the Sahara to a pump, sucking in population during wetter savanna phases and forcing foragers out northward to the margins of the desert during drier cycles. In radiating out of Africa, hominins behaved just like other mammals in its ecological community.

The new humans were omnivores, eating both plants and animals, and thus linked ecologically with other predators. There was widespread interchange of mammals between Africa and more temperate latitudes during the Pliocene and Lower Pleistocene. For example, a major change in the mammalian populations of Europe took place about 700,000 years ago. Hippopotami, forest elephants, and other herbivores and carnivores like the lion, leopard, and spotted hyena seem to have migrated northward from Africa at this time. Migrations by the lion, leopard, and hyena—the animals with which hominins shared many ecological characteristics—were in the same direction as that humans had taken earlier. That the first successful human settlement of tropical Asia and temperate Europe coincided with radiations of mammalian communities out of Africa seems plausible.

Hominins in Eurasia and Europe

Around the same time as *H. erectus* appeared in Southwest Asia, hominins also appeared in Eurasia, though settling the more northerly latitudes of Europe and Eurasia may have presented a more formidable challenge, especially during glacial cycles. But who were these first Eurasian hominins? The earliest skeletal evidence dates to 1.8 Ma and comes from the cave site of **Dmanisi**, Georgia, explored between 1991 and 2005.

Dmanisi is the oldest well-dated hominin site anywhere outside Africa, and contains fossils belonging to males, females, and juveniles—including five skulls (see chapter opener). The Dmanisi hominins were smaller than most later hominins (averaging 1.5 meter tall), with a modest cranial capacity (610–775 cubic cm) that overlaps with *H. habilis* but would be well below that of the average *H. erectus*. They were bipedal, and probably highly efficient walkers, though with a gait that was slightly different to that of modern humans. Culturally, they seem to have lived in a supportive group: one of the best preserved skulls from Dmanisi belonged to an elderly person who lived long after losing every tooth and must have required compassionate care. Initially assumed to represent a European population of *H. erectus*, in 2002, the material was assigned the species *H. georgicus* ("Georgian Man"). Whether they represent a new species remains contested, and in 2006, a reassessment placed most of the material back into *H. erectus*.

The Lifeway of *Homo erectus*

We still know relatively little of the world of these archaic humans beyond a certainty that, between 1.8 million and half a million years ago, they had radiated far beyond their tropical homeland (see Figure 3.1). Nowhere were people abundant, and the global population of archaic humans was undoubtedly minuscule. As far as is known they did not settle in extreme arctic latitudes, in what is now northern Eurasia and Siberia, nor did Asian *H. erectus* groups cross into the Americas. Neither did they develop the watercraft needed to cross from the islands of Southeast Asia to New Guinea and Australia, land masses that remained isolated by the ocean until the late Ice Age.

Throughout an enormous area of the Old World, archaic humans developed a great variety of lifeways and local tool kits that reflected different needs. They were part of a vast animal community, and their long-term success resulted from their ability to adapt to the cyclical changes in the Ice Age environment, from temperate to much colder, then to full glacial conditions, and then, more rapidly, to warmer again. Many of these early human populations flourished in regions where dense, abundant, predictable resources were to be found isolated from other regions where similar conditions existed.

The climatic conditions of the Ice Age sometimes brought these isolated populations together and then separated them again, ensuring gene flow and genetic drift and continued biological and cultural evolution over the millennia. As it had been for early *Homo*, the key to adapting to temperate environments was mobility. Human bands could respond quickly to changes in resource distribution by moving into new areas. Theirs was a primarily opportunistic adaptation based on knowledge of where resources were to be found, rather than on deliberate planning, as was the case in much later times.

Separated as we are from these people by hundreds of thousands of years, it is difficult for us to obtain even a general impression of their simple but opportunistic lifeway. Almost invariably, the only signs of their existence are scatters of stone artifacts most frequently discovered near lakes and in river valleys, where the most plentiful food resources were to be found. These many finds have enabled us to divide the archaic human world into two broad and still ill-defined provinces: one comprising Africa, Europe, and some parts of Asia—more open country where hunting was important and multipurpose stone axes were commonly used—and the other a vast area of forested and wooded country in Asia where wood artifacts were all-important and stone technology tended to be more conservative. This is almost certainly a gross simplification of a very complex picture, but it provides us with a general portrait of an archaic lifeway far removed from that of more modern humans.

The simple Oldowan technology (appearing around 2.6 Ma) of early *Homo* remained in use for more than a million years before evolving slowly into a more diverse stone technology that itself remained in use for more than another million years. Yet neither early *Homo* nor its successors relied exclusively on stone. Our remote ancestors also made use of wood, one of the most versatile raw materials known to humanity, to make spears, throwing sticks, and other artifacts (see "Schoningen, Germany" box). However, most insights into the technology of early humans come from stone tools and the byproducts associated with them, because wood and other organic materials are rarely preserved.

In Africa and Europe archaic humans after around 1.6 Ma are associated with the aforementioned distinctive Acheulean tool kit. Of African origin, it includes not only a variety of flake tools and sometimes choppers, but also one of the most common exhibits in the world's museums—the hand ax (Figure 3.5). Unlike the crude flakes and choppers of the Oldowan, the **Acheulean** hand ax (named after the northern French town of Saint Acheul) was an artifact with converging edges that met at a point. The maker had to envision the shape of the artifact, which was to be produced from a mere lump of stone, then fashion it not with opportunistic blows but with carefully directed hammer strokes.

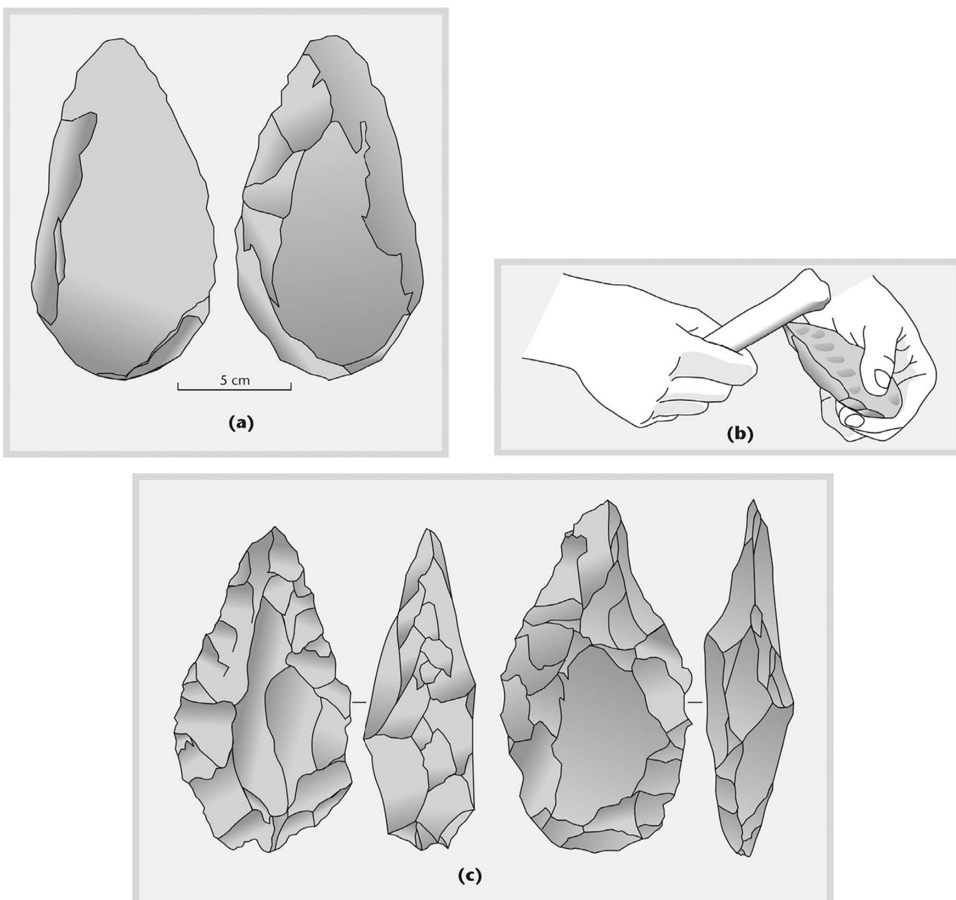


Figure 3.5 Acheulean technology. (a) Hand axes were multipurpose artifacts shaped symmetrically around a long axis. (b) A stoneworker thins the edge of a hand ax with a bone hammer. (c) Acheulean hand ax from **Swanscombe**, England, and cleaver from **Kalambo Falls**, Zambia.

Acheulean hand axes come in every size, from elegant oval types a few inches long to heavy axes more than 0.3 meter (1 foot) long and weighing 2.3 kilograms (5 pounds) or more. They were multipurpose tools used for woodworking, scraping skins, and especially skinning and butchering animals. The hand ax and its near relative the cleaver, with a straight end, were ideal for butchery because the artifact could be sharpened again and again. When it became a useless lump of stone, it could be recycled into flake tools. But one can achieve effective butchery with simple flakes as well. A number of researchers have wondered whether the hand ax was not used for other purposes such as throwing at game or digging for roots.

Hand axes and related artifacts occur over an enormous area of the Old World, and they underwent considerable refinement during the million years or so they were in use. But what do we know of the behavior of their makers? Without question, they would have hunted and foraged for food, probably in far more effective ways than early *Homo*. Time and time again, hand axes and other butchering artifacts have been found in association with the bones of large game animals. But did the hunters actually kill such formidable herbivores as the elephant and the rhinoceros? To do so would require social mechanisms to foster cooperation and communication abilities far beyond those of their predecessors.

Evidence for butchery and perhaps big game hunting also comes from three remarkable sites: **Boxgrove** in southern England, where hunters drove rhinoceroses, bison, horses, and other large animals over a cliff overlooking a small lake about 500,000 years ago. At **Ambrona** and **Torralba** in central Spain, people living in a deep, swampy valley either 200,000 or 400,000 years ago (the date is controversial) butchered elephants mired in muddy water. But the most vivid portrait of archaic hunting skill comes from a 400,000-year-old kill site at **Schoningen** in northern Germany (see "Schoningen, Germany" box).

Site

Schoningen, Germany

Since 1983, Hartmut Thieme has investigated an area of six square kilometers (2.31 square miles) within the region of an open cast coal mine at Schoningen, northern Germany, where mining operations cut deep into massive Pleistocene deposits. He has uncovered lakeshore sites, dated to between 400,000 and 380,000 years ago, once occupied by *Homo heidelbergensis*. One location was a campsite by a lake, where the inhabitants butchered elephants and other animals and also took birds and fish. Thieme recovered four worked branches from silver fir trees here, each with a diagonal groove cut into one end, perhaps to hold sharp stone flakes or flint tools to make a more efficient tool. The wood was carefully selected—the hard, intact roots of the boughs of rotten fir trunks.

Another location lay about 10 meters (33 feet) below the modern ground surface, where a hunt took place on the shores of a shallow, elongated lake. The area was dry and treeless, allowing the hunters to watch their prey. Here, a hunting band stalked, intercepted, killed, and butchered a complete herd of wild horses on the shore. Thieme and his colleagues have excavated more than 3,200 square meters (3,445 square feet) of organic mud where the artifacts lie. Plant pollens from the mud reveal a meadow and forest landscape that thrived in a cool, temperate climate. The inhabitants of the site hunted and butchered at least 20 wild horses, whose remains represent more than 90 percent of the 25,000 bone fragments at the site. They brought stone scrapers and points with them, manufacturing them elsewhere and only re-sharpening or reworking them onsite—there is no toolmaking debris, just refinishing flakes.

At least nine wooden spears have come from the site—currently the world's oldest surviving wooden artifacts. Most are made of spruce, between 1.82 and 2.5 meters (5.9 and 8.2 feet) long, each made from an individual tree that was felled, with the branches and bark stripped off, the tips being made from the hardest wood at the foot of the tree. The points are carefully shaped and symmetrical, the tails pointed and tapering toward the pointed, proximal end (see Figure 3.6). The hunters smoothed and shaped the surfaces of their weapons with great care, the maximum thickness and

Figure 3.6 One of the Schoningen spears exposed in the original excavations. (Dr. Hartmut Thieme, Institut für Denkmalpflege, Hannover, Germany)

weight lying a third of the way from the tip. Thieme remarks that they resemble modern hunting javelins. A replica spear tested under controlled conditions displayed excellent ballistic qualities with good penetrating power, ideal for hunting horses.

The first wooden tool from the site, found in 1994, was a spruce stick with carefully sharpened ends, 0.78 meters (2.6 feet) long, made from the stem of a small tree. Thieme believes this was a throwing stick, its shape and size like those Australian Aborigines used to hunt birds in flight. It would have been very effective against the geese that lived in the reeds around the lake and whose bones occur in the site.

Numerous other worked wood fragments came from this large hunting camp, among them a carefully shaped and charred stick that may have been used to cook meat over a fire. Hearths lie along the western edge of the main concentration of finds, each about a meter (3 feet) apart. The nearby finds include large bison bones, the flat surfaces of which bear traces of repeated cut marks, as if people were slicing up butchered meat into strips for drying. Thieme points out that the hearths lay on dry ground, which means they were probably used in late summer or fall, when water levels were low and rainfall sparse. Then, in late autumn, the first snow covered the bones and abandoned tools with a thick layer of decaying reeds before rising waters in spring preserved the site for posterity.

The eastern portions of the archaic human world lay in Asia, in an enormous region of woodland and forest with great environmental diversity. The tropical forests of East Asia are rich in animal and plant foods, but these food resources are widely dispersed over the landscape. Thus, *H. erectus* bands were constantly on the move, carrying tools with them, albeit not the famous Acheulean tool kit. This absence is puzzling. Scholars usually argue that African *H. erectus* was the first species to colonize the globe. As such, we would expect tools to appear around the world similar to those used by *H. erectus* in Africa.

As we mentioned earlier, the lack of the Acheulean tool kit in Asia may indicate that hominins had left Africa before the invention of this industry (an innovation dated to around 1.65 Ma). This does not contradict the dates for the first hominins in Asia (1.8 Ma) and indeed for the first hominins in Eurasia (note that the 1.8 Ma site at Dmanisi, Georgia, also lacks the Acheulean tool kit, instead possessing far cruder choppers than the fine African hand ax). Alternatively, it can be argued that it would have been more logical for Asia's *H. erectus* to make use of bamboo, wood, and other fibrous materials—the most convenient materials at hand. There was perhaps no need for the specialized, often complicated artifacts used in the open country of the West either for spear points or for the butchering tools used on large animals. As archaeologist Geoffrey Pope has

Figure 3.7 Bamboo scaffolding in use to build a modern high-rise. Asians have used this flexible and versatile material since the earliest times.
(Leungchopan/iStock by Getty Images)

pointed out, the distribution of the simple choppers and flakes that many eastern populations used coincides very closely with the natural distribution of bamboo, one of the most versatile materials known to humankind.

Bamboo was efficient, durable, and portable. It could be used to manufacture containers, sharp knives, spears, weapon tips, ropes, and dwellings. To this day, it is widely used in Asia as scaffolding for building skyscrapers (Figure 3.7). It is an ideal material for people subsisting not off large game but off smaller forest animals such as monkeys, rats, squirrels, lizards, and snakes, as well as plant foods. Simple stone flakes and jagged-edged choppers, the only artifacts to survive the millennia, would be ideal for working bamboo and may, indeed, have been used for this purpose for hundreds of thousands of years.

In trying to interpret the lifeways of these archaic people, the evidence indicates they were eclectic and flexible hunter-gatherers who relied on hunting, scavenging, and plant foods. They may have understood the telltale signs of the passage of seasons, the meanings of cloud formations, the timing of game and bird migrations, and the geography of their territories. They probably lived in relatively large groups at times, both to reduce the danger from carnivores and to improve the chance of finding food, especially from larger animals. Usually, band size was much smaller, especially when plant foods were more abundant and easily obtained by individuals. All of this argues for considerable social flexibility and intelligence, reflected in larger brain sizes. However, archaic humans may have been unable to integrate their social intelligence—their ability to share food and cooperate in the hunt—with other aspects of human intelligence.

A major question linked to human intelligence, broached in Chapter 2, concerns when people first used language (the mental process behind communication) and speech (the externalization of the former). *H. erectus*, for example, had a large brain with a well-developed Broca's area, the zone associated with speaking ability. Its vocal tracts were more modern, suggesting considerable potential for articulate speech. Recent genetic analysis shows that our Neanderthal cousins (see below) had the same FOXP2 gene for speech as we do, showing that they almost certainly had speech though whether their language was as complex as ours remains debated. Whatever the case, anthropologists Leslie Aiello and Robin Dunbar believe language and speech first evolved as a way to handle increasingly complex social information. As group sizes increased, so did a capacity for language, used primarily to talk about social relations. It was only later that humans developed the kind of general-purpose language we use today, which allows us to communicate freely, whatever the behavioral domain. So despite being like us in many ways, *H. erectus* lacked the cognitive flexibility characteristic of modern humans.

Thereafter, the next skeletal evidence for humans in Europe is represented by some fragmentary remains found in the Sima del Elefante site in the Atapuerca Mountains of northern Spain. Dated to 1.2 Ma, the fossils may belong to *H. erectus*. Interestingly, at the neighboring site of Gran Dolina remains of a potentially similar, but younger, hominin have been labeled *Homo antecessor* (or "Pioneer Man"). Dated to around 850,000 years ago, these creatures look quite similar to modern humans, though they were more lightly built and with smaller brains. These "pioneers" share many features with ***H. heidelbergensis***, who developed over 150,000 years thereafter (see below). Though there are taxonomic controversies with both *H. georgicus* and *H. antecessor*, we can be absolutely sure that at least a few bands of early Homo had moved into Europe before one million years ago.

One variable in the settlement equation may have been fire. We don't know exactly when and where humans domesticated fire. The earliest well-documented hearths come from a 780,000-year-old site in Israel, but fire could have been domesticated earlier in Africa. Early people would have been familiar with the great grass and brush fires that swept across the savanna during the dry months. Fire offered protection against predators and an easy way of hunting game, with even insects and rodents fleeing from a line of flames. Perhaps *H. erectus* developed the habit of conserving fire, taking advantage of long-smoldering tree stumps ignited by lightning strikes and other natural causes in order to kindle flames to light dry brush or simply to scare off predators. If so, it may be no coincidence that the first larger-scale settlement of temperate environments in Asia and Europe occurred after the taming of fire and during a period of accelerated climatic change. Perhaps most important of all, fire allowed humans to cook food, which resulted in softer foods that were easier to digest and with higher calorie contents. One theory argues that this new way of cooking produced more energy and larger brain size in humans.

Indeed, a larger brain size is apparent in *H. heidelbergensis* ("Heidelberg man," named after Germany's Heidelberg, the place of its discovery) who lived from around 700,000 to 300,000 years ago, and whose brains sized a hefty 1,100–1,400 cubic cm (just tipping *H. erectus*' 750–1,300 cubic cm). They lived over a very wide area and have been found in various sites in the East African Rift Valley, North and South Africa, and are known from several sites across Europe. With their large brains and strong, muscular bodies, they could hunt large animals with their relatively complex tool kits. In 2010 archaeologists found potential evidence that *H. heidelbergensis* cared for their sick with the discovery of "Elvis," a man who lived half a million years ago in the Atapuerca Mountains of northern Spain. The condition of his lower backbone suggested he suffered from debilitating lower back pain, that he was a hunchback who probably needed a cane to walk with, and that his survival must have depended on the support of his group. A year later, at the same site, the excavators reported the discovery of the malformed skull of a 12-year-old child, again pointing to compassionate care of the sick.

All in all, this hominin species seems rather "humane." Indeed, until recently, *H. heidelbergensis* was thought to have been the last common ancestor of the Neanderthals in Europe and *H. sapiens* in Africa. However, new fossil and genetic data could require a rethink of this notion. The latest deoxyribonucleic acid (DNA) analysis suggests that modern humans, Neanderthals (and Denisovans, of whom more later) split before 750,000 years ago, potentially making *H. heidelbergensis* too young to be our common ancestor. At present, therefore, it seems the somewhat earlier pioneer, *H. antecessor* (above), may be our shared ancestor.

The Neanderthals (from ca. 400,000 to possibly 30,000 Years Ago)

Homo neanderthalensis is perhaps the best known of all the archaic humans. It lived right across Europe and into Southwest Asia and is known from thousands of fossil specimens, from premature fetuses to the very elderly, and includes such evidence as the individuals found at **Atapuerca**, Spain, at least 300,000 years ago (Figure 3.8).

Figure 3.8 *Homo heidelbergensis* skull from the Pit of Bones, Atapuerca, Spain. (Javier Trueba/Science Photo Library)

The Neanderthals are still the subject of great controversy. In everyday speak, many people still use the word *Neanderthal* to describe dim-witted, ugly people who are like apes, an insult aimed at those they consider dumb. This stereotype and that of the shambling cave people so beloved by cartoonists come from mistaken studies of Neanderthal skeletons in the early twentieth century. In fact, the Neanderthals were strong, robustly built humans with some archaic features. Their skulls display retreating foreheads, projecting faces, and sometimes eyebrow ridges when compared with modern people. There is every reason to believe they were expert hunters and being capable of considerable intellectual reasoning.

There are, of course, striking anatomical differences between Neanderthals and modern humans, both in the robust postcranial skeleton of the Neanderthal and in its more bun-shaped skull, sometimes with heavy brow ridges and a forward projecting face (Figure 3.9).

In terms of our (modern human) relationship to the Neanderthals, ongoing DNA work is shedding much light on this question. In recent years, with improved technology, the cost of DNA analysis has reduced, and the rate of discovery has accelerated. At times, the results are game-changing, sometimes unexpected, but always fascinating. This is an evolving field and we can expect more big discoveries in the coming decade.

Figure 3.9 A classic Neanderthal skull, showing the prominent brow ridge and prognathous face. (ER Degginger/Science Photo Library)

The initial breakthrough occurred when researchers at the University of Munich, Germany, and at Pennsylvania State University were able to extract DNA from the first Neanderthal arm bone ever discovered (in the Neander Valley near Dusseldorf, Germany, in 1856). The scientists pulverized a small amount of the bone and extracted several small fragments of **mitochondrial DNA** (mtDNA) (see "DNA and Archaeology" box). By overlapping the small fragments of Neanderthal DNA and using a technique known as polymerase chain reaction (PCR) to make many copies of the molecules, the scientists managed to identify a sequence of 378 base pairs (chemicals that form the fundamental units of the genetic code) in a specific region of the Neanderthal DNA. This area, known as hypervariable region 1, is known to show changes over many generations. In general, the greater the dissimilarity in this region between two species, the more remote the relation is thought to be.

The researchers compared the Neanderthal DNA sequence to sequences in the same region of DNA for 994 modern human lineages, which included Africans, Asians, Australians, Europeans, Native Americans, and Pacific Islanders. The Neanderthal DNA sequence differed from all modern human DNA by either 27 or 28 base pairs. In contrast, modern human sequences in this region of DNA differ from each other on average by eight base pairs. The difference between modern human DNA and chimpanzee DNA in this region is much greater, at about 55 base pairs.

As a result, geneticists concluded that Neanderthals and modern humans are distant relations but that they did not evolve from one another. Likewise, Neanderthals were a distinct species, and not a subspecies of anatomically modern *H. sapiens*.

Then, in 2010, our knowledge advanced exponentially when Swedish geneticist Svante Pääbo announced that he and his team had sequenced the genome of the Neanderthals: that is, they had managed to read all of the genes of a Neanderthal. This was an incredible feat that even Pääbo had denounced as "impossible" a decade before. The results indicated something previously unexpected: that all living humans (*H. sapiens*) whose ancestral groups developed outside sub-Saharan Africa have a little Neanderthal in them—between one and four percent of their genome.

In other words, after our ancestors left Africa, some had sex with Neanderthals and produced hybrid offspring—that is, offspring from different species that are usually sterile, so preventing further gene flow between the two species. As a result, while no full Neanderthal person exists today, and while the Neanderthals remain a separate and evolutionary distinct species, a small amount of that prehistoric inter-species genetic mingling survives in the genome of all "non-Sub-Saharan-Africans" today. (Note that as far as we know, no Neanderthals lived in Africa, which is why none of our sub-Saharan ancestors interacted with them.)

In terms of when this Neanderthal interbreeding happened, geneticists put it at around 50,000 years ago. This reasoning rests on the fact that all non-Africans—whether French, Chinese, or Papua New Guinean—share the same amount of Neanderthal DNA. Since Neanderthals were, again as far as we know, never in China or New Guinea, the interbreeding must have happened before those populations split, with the Middle East as the likeliest location.

However, the story of our genetic interactions with the Neanderthals is devilishly complex and the earlier explanation probably barely scratches the surface. For example, in 2017, scientists found evidence for an even earlier interbreeding episode between Neanderthals and modern humans. Thus, they discovered *H. sapiens* DNA in a 124,000-year-old Neanderthal fossil found in Germany. This is rather stop-the-press interesting given that *H. sapiens* are not supposed to have reached Europe until 60,000 years ago. If nothing else, the genetic evidence hints at a far more complicated story of human movements and activities than traditionally assumed.

Indeed, in 2010, Pääbo's genetic work revealed surprise evidence for a previously unknown hominin species who once lived alongside Neanderthals and *H. sapiens*. The creature was identified after his team recovered a very distinctive mtDNA sequence from the portion of a finger bone excavated at Denisova Cave in the Altai region of Siberia. He and his team named this person a "Denisovan," and in the same year they went on to reconstruct its entire genome. The results suggested the

Denisovans were more closely related to the Neanderthals than us, with an estimated divergence date of about 400,000 years ago—but that we *H. sapiens* probably shared a common ancestor with both the Denisovans and the Neanderthals at over 750,000 years ago.

Further genetic sequences since recovered from various teeth found in the cave suggest the Denisovans probably lived at that site from about 200,000 to 50,000 years ago. The results also show signs of past interbreeding with Neanderthals and with another, more archaic, unknown creature. What is more, we clearly also interbred with them. Some modern humans today still carry Denisovan genes—particularly people from Papua New Guinea and other Melanesian people whose genomes average 4.8 percent Denisovan.

This led to a conundrum: given the only-known Denisovan remains come from this one cave in Siberia, how on earth did they get to Melanesia, thousands of kilometers away, and across open sea? Was it simply clever old us, the seafaring *H. sapiens,* who took their genes with us after interbreeding occurred? Or were the Denisovans formidable travelers and colonizers in their own right? Genetic experiments by David Reich currently suggest the latter: that the Denisovans physically moved to the islands. This must have required skill and forethought, but alas DNA analysis cannot currently tell us what the Denisovans were really like in terms of their behavior, nor anything of their intelligence. To find out more, someone needs to discover a Denisovan skull! Interestingly, some Chinese fossils—including various skull remains—dated from between 350,000 and 60,000 years ago may belong to Denisovans. Like a detective thriller, all we can say is watch this space in the next edition of this book.

All this begs the question: what happened to these other hominin species, and why is *H. sapiens* the only hominin left standing? Various researchers used to suggest that we used our intellectual superiority to "wipe them out." But if we look specifically at the *Neanderthals* (for whom we have far more evidence than the Denisovans), the genetic data point to something else. In terms of genetic diversity and numbers, it seems that from around 100,000 years ago the *Neanderthal* populations, particularly in the zone between Spain and Siberia, were already low in numbers and diversity, suggesting that they would have been especially vulnerable to the climatic fluctuations that punctuated the past. By 39,000 years ago, the genetic data indicate they went extinct (though some archaeologists prefer a date of some 10,000 years later for a few outlying populations).

Since their extinction overlaps with our movement out of Africa, did we have a hand in their demise? Perhaps we are asking the wrong questions. As we've seen earlier, the DNA indicates that these hominins did not experience a total replacement in all of the regions outside Africa: their genetic material lives on in many of us. Should we therefore regard Neanderthals (and indeed Denisovans) and *H. sapiens* as a single species? The answer is no. The overriding consensus is that *H. sapiens*, *H. neanderthalensis* (and the Denisovans) have clearly distinguishable evolutionary lineages that can be recognized for hundreds of millennia. The amount of hybridization between them should not override their classification as distinct species, and indeed hybridization was probably a feature of human evolution throughout most of the past 7 Ma.

Science

DNA and Archaeology

In recent years, genetic analysis has undergone nothing short of a revolution. The mapping of the genomes of our ancestors is helping scientists to unlock some of the mysteries of our evolution. This is an exciting area and the results are constantly being changed and updated as new discoveries are made.

DNA is a molecule composed of two chains that form the famous double helix. DNA lies at the center of the transmission of genetic information from parents to children. Genes are sets of codes that lie behind bodily traits such as blood groups or eye color. DNA also consists of a great deal of non-coding portions some of which play an important role in regulating the coding segments.

One interesting application of DNA analysis within archaeology is in dating past events. During reproduction, DNA is copied from one generation to another. The largest component of DNA is contained in chromosomes in the nucleus of body cells, usually called nuclear or autosomal DNA. We inherit autosomal DNA from our parents—50 percent from our mother (known as mitochondrial DNA, or mtDNA) and 50 percent from our father (Y-chromosome DNA). Random mutations always occur. If these mutations, or "errors," are not lethal, then they can, in turn, be copied onto succeeding generations. Since some parts of the genetic code mutate at reasonably predictable rates, it is possible to estimate the time taken to accumulate these changes. This is the concept of the "molecular clock." But the issue is knowing how fast the mutations arise, that is, how fast the clock ticks. The numbers rest on several big assumptions. Indeed, in 2012, a groundbreaking study investigated the genomes of 78 living children and discovered the number of mutations to be 36. This was half the number previously assumed, which means the molecular clock is far slower than previously thought. A similar study was done on chimps. The results led to the conclusion that the human lineage and that of the chimps may have split at least 7 million years ago, but possibly as far back as 13 Ma, though most researchers prefer a date of about 7.5 Ma. Likewise, we currently think that the last common ancestor shared between the Neanderthals, the Denisovians, and *H. sapiens* lived around 500,000–750,000 years ago.

The first ancient DNA sequences were reported by Svaante Pääbo, who extracted and characterized DNA from the skin of a predynastic Egyptian of about 4000 BC in 1985. In 1997, Pääbo and his team began to recover DNA from Neanderthal fossils. The initial results focused on just the mother's mtDNA, which found no evidence for any Neanderthal DNA in modern humans. As such, it was assumed that there was no interbreeding between our ancestors and the Neanderthals. This agreed with scientific consensus at the time, which held that there was total replacement of other human groups once modern humans left Africa, with perhaps only some minor mixing that would not show up in people today. But in 2010 Pääbo and his colleagues announced that they had managed to read the entire genome of the Neanderthal, and also of another—previously unknown hominin found in Siberia—which they named Denisovans.

The results paint a far more complicated picture of recent human evolution and reveal that there was in fact some interbreeding between fully modern *H. sapiens,* Neanderthals, and Denisovans—or at least in all modern humans whose populations arose outside sub-Saharan Africa (there were no Neanderthals or Denisovans in Africa, as far as we know). Thus, all modern humans outside Africa carry some genetic material from these now-extinct species, with most people's genomes consisting of two percent Neanderthal-derived DNA. This interbreeding probably happened sometime between 60,000 and 40,000 years ago, after we left Africa and before some of us moved onward into China and beyond.

However, the complexities don't stop there. Some populations in Oceania (especially Papua New Guinea and Australia) carry an even higher level of DNA in their genomes from ancient interbreeding with Denisovan-like populations. Moreover, there is some genetic evidence that present-day sub-Saharan African genomes carry signs of interbreeding from an archaic human species such as *H. heidelbergensis* or perhaps another recently discovered recent hominin, *H. Naledi*. While most of this outside (or introgressed) DNA in our genome seems to be non-functional, some elements could have provided both health benefits such as resistance to infectious diseases, while other elements have negative effects such as some autoimmune conditions.

These genetic data also provide insights into the spread of *H. sapiens* over the globe— particularly when combined with the fossil record and archaeological evidence. However the three strands do not always agree. For example, while some recent archaeological research suggests that *H. sapiens* arrived in Australia by 65,000 years ago, the genetic evidence points to a date of under 55,000 years ago. Likewise, archaeology indicates that humans first colonized the Americas around 15,000 years ago, whereas the genetic data hint at a peopling that might have begun as early as 23,000 years ago. The evidence is as intriguing as it is complex with new discoveries are emerging at a sometimes breakneck speed, and the use of DNA studies within archaeology is proving to be nothing short of revolutionary.

The Neanderthals flourished in Europe, Eurasia, and part of southwestern Asia from about 400,000 years ago until around 30,000 years ago. Neanderthal populations displayed great variation, but everywhere had the same posture and manual abilities as modern people—and clearly some of our ancestors thought them interesting enough to have sex with them. Yet they differed from us in having massive limb bones, often somewhat bowed in the thigh and forearm, features that reflect their greater muscular power (see Figure 3.10). For their height, the Neanderthals were bulky and heavily muscled, but their brain capacity (1,200–1,750 cubic cm) was similar to that of *H. sapiens* (1,000–2,000 cubic cm). Their heavy build and their ability to withstand extreme cold were a successful adaptation.

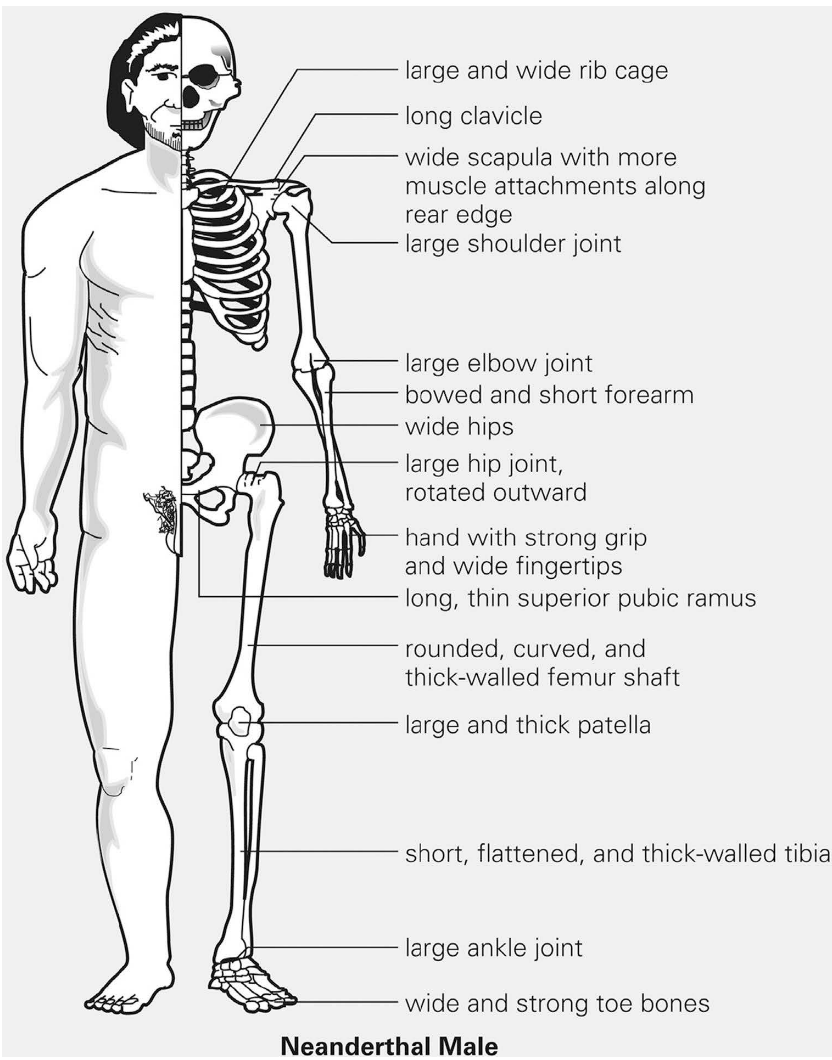


Figure 3.10 The skeleton of a male Neanderthal, showing major anatomical features.

Neanderthal culture and technology were more complex and sophisticated than those of their more archaic predecessors. Many of their artifacts were not multipurpose tools but were made for specific purposes such as stone spear points mounted on wooden spears or curved scrapers for treating pegged-out hides (Figure 3.11). Like their predecessors, they occupied large territories, which they probably exploited on a seasonal round, returning to the same locations year after year when game migrated or plant foods came into season.

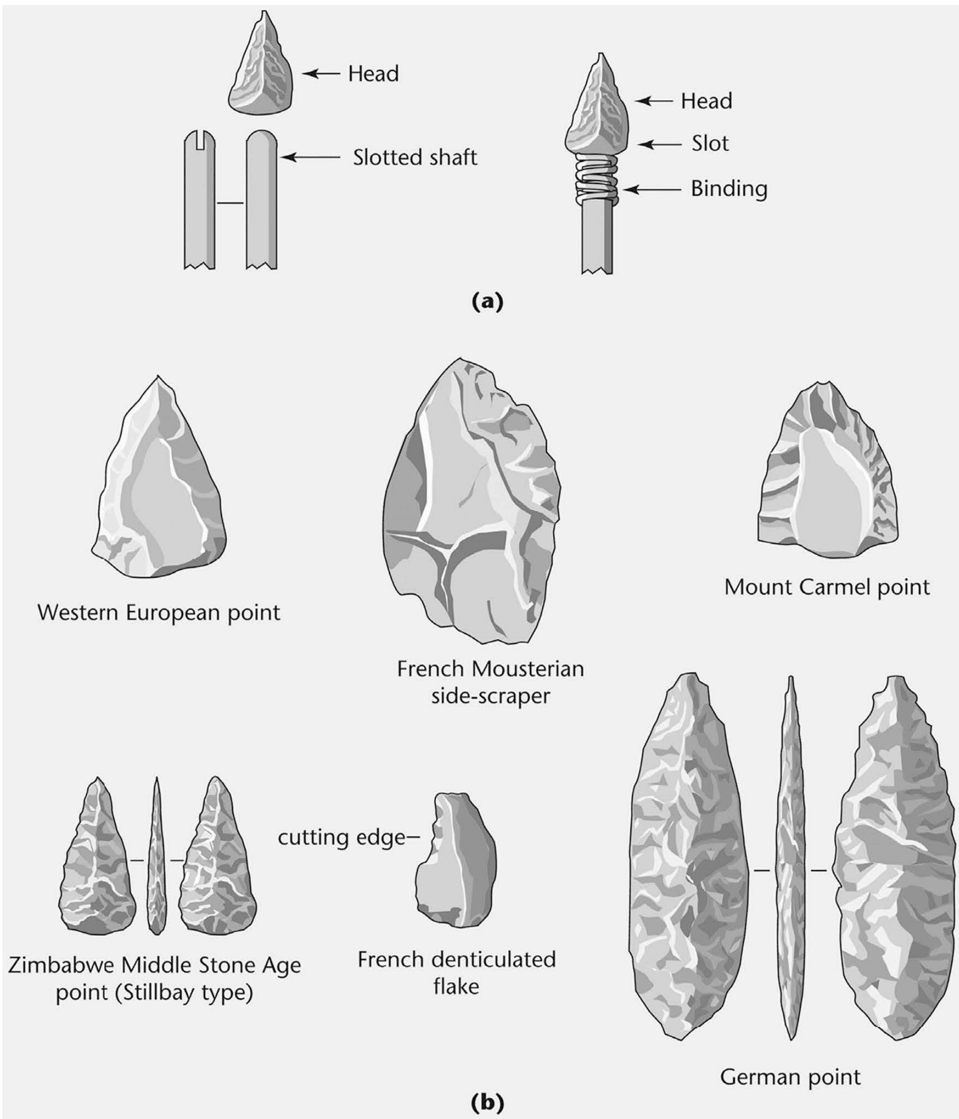


Figure 3.11 Composite spear points. Stone artifacts fabricated by archaic *Homo sapiens* included (a) composite tools that mounted stone points to the ends of wooden shafts and (b) a variety of spear points and also cutting and scraping tools.

The Neanderthals were skilled hunters, especially when one realizes that they had to attack game at close quarters with spears and clubs rather than with the bow and arrow (Figure 3.12, top). They were not afraid to tackle such formidable animals as mammoth, bison, or wild horses. Many Western European bands lived in caves and rock shelters during much of the year as a protection against arctic cold. During the brief summer months they may have fanned out over the open plains, living in temporary tented encampments, also exploiting plant foods (Figure 3.12). There can be little doubt the Neanderthals knew their local environments intimately and that they planned their lives around migration seasons and such factors as herd size and the predictability of animal movements. By this time, too, humans had learned how to store food for the lean months, maximizing the meat taken from seasonally migrating herds of reindeer and other animals.

The resulting cultural variability is reflected in the diverse **Mousterian** tool kits of Neanderthal groups (named after the site of Le Moustier in southwestern France). Unlike the hand ax makers, the Neanderthals made most of their artifacts of flakes, the most common being scraping tools and spear points. Some of their weapons were **composite tools**, artifacts made of more than one component—for example, a point, a shaft, and the binding that secured the head to the shaft, making a spear. Their technology was simple, highly variable, and a logical development of earlier technologies developed over hundreds of thousands of years (see Figure 3.11). Neanderthal sites in France have yielded a great diversity of tool kits. Some levels include hand axes, others notched flakes, perhaps used for stripping meat for drying or pressing fibrous plants. Such wide variation in Mousterian tool kits is found not only in France but also at other Neanderthal sites throughout Europe and southwestern Asia and in North Africa, where other archaic *H. sapiens* made similar tools. No one knows exactly what all these variations in tool kits mean, but they reflect the ability of the Neanderthals and *H. sapiens* to develop tools for different, highly specific activities, perhaps at a time of rising human populations and slightly enhanced social complexity.

The Neanderthals and their contemporaries elsewhere were foragers, and the world's population was still small, but life was gradually becoming more complex. We find the first signs of religious ideology, of a preoccupation with the life hereafter. Neanderthal burials have been recovered from caves and rock shelters and from open campsites. One rock shelter, **La Ferrassie** near Les Eyzies in France, yielded the remains of two adult Neanderthals and four children buried close together in a campsite. Group sepulchers occur at other sites, too, perhaps a sign that the Neanderthals, like most later foragers, believed in life after death.

We find in the Neanderthals and their increasingly sophisticated culture the first glimmers of our own complicated beliefs, societies, and religious sense. They also seemed to live in cooperative, compassionate

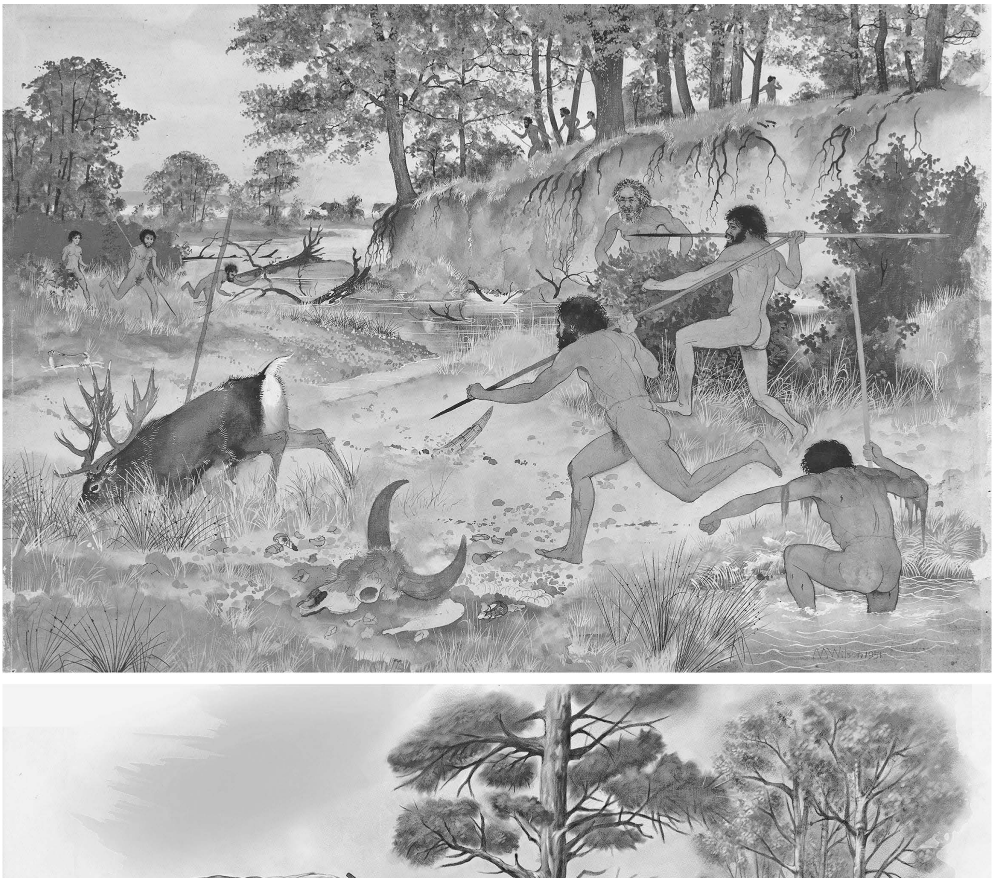


Figure 3.12 Reconstructions of Neanderthal lifeways: (top) hunters during the early last glaciation, (bottom) Neanderthal settlement with men and women at various tasks. (Jose Antonio Penas/Science Photo Library)

groups—as suggested by, for example, a skull of an elderly man from La Chapelle-aux-Saints who had lost many teeth, and who presumably would have needed caring support to survive. But the Neanderthals gave way to fully modern humans, who migrated out of Africa after 50,000 years ago, people whose awesome intellectual and physical powers created a late Ice Age world unimaginably different from that of earlier times.

Early *Homo* sapiens (from ca. 300,000 to 15,000 Years ago)

The modern human or *H. sapiens* is a very adaptable, successful primate, found on every continent, and the only surviving hominin on the evolutionary ride of the past 6 million-plus years. We call ourselves *H. sapiens* or "wise person." We are clever people, capable of subtlety, of manipulation, of self-understanding. What separates us from earlier humans, scientists wonder? The answers are complicated, since they do not always show themselves clearly in the archaeological record. First and foremost must be our ability to speak fluently and articulately. We communicate, we tell stories, we pass on knowledge and ideas, all through the medium of language. Consciousness, cognition, self-awareness, foresight, and the ability to express oneself and one's emotions are direct consequences of fluent speech. They can be linked with another attribute of the fully fledged human psyche: the capacity for symbolic and spiritual thought, concerned not only with subsistence and technology but also with the boundaries of existence and the relationships among the individual, the group, and the universe.

Fluent speech, the full flowering of human creativity expressed in art and religion, and expert toolmaking are some of the hallmarks of *H. sapiens*. With these abilities humankind eventually colonized not just temperate and tropical environments but the entire globe. With the appearance of modern humans we begin the study of people anatomically identical to ourselves, people with the same intellectual potential as our own. DNA analysis combined with archaeological work is shedding ever-greater light on where we came from, and how we are related; yet the controversies surrounding the origins of *H. sapiens* rank among the most vigorous in archaeology.

Continuity, Replacement or Something In-Between?

Before the turn of the current century, there were two major and diametrically opposed hypotheses to explain the origins of modern humans. One model, known as the regional continuity theory, hypothesized that *H. erectus* populations throughout the Old World evolved independently, first to archaic *H. sapiens*, then to fully modern humans. This continuity model argued for multiple origins of *H. sapiens* and no migrations later than those of *H. erectus*. In this scenario, modern humans in different parts of the world have much deeper roots, though continuous gene flow within the group meant that highly adaptive, novel anatomical features spread rapidly, thereby keeping all human populations on the same fundamental evolutionary path toward anatomically modern people, even if some evolved into fully modern humans before others.

On the opposite camp was the Out of Africa model. Proponents of this approach argued that *H. sapiens* evolved in one place, tropical Africa, and then spread to all other parts of the Old World. This model assumes population movement from a single point of origin and implies that modern geographic populations have shallow roots and derived from a single source in relatively recent times. Although this second hypothesis is now almost universally accepted, it has recently been modified as new and more refined genetic research works radically alter our knowledge of *H. sapiens* and its contemporaries. As such, it now appears that while modern humans are indeed of recent African origin (as per the Out of Africa model), once they left their homeland, they engaged in some interbreeding with now-extinct hominins outside Africa—including, but not necessarily restricted to, the Neanderthals and the Denisovans (see "DNA and Archaeology" box). As one can see, the evolutionary story is even more complex than previously expected.

Molecular Biology and Our Origins

Molecular biology has played a significant role in yielding clues to the origins of our species: from when our ancestors might have evolved to when some of us might have left Africa. Researchers first zeroed in on mtDNA, a useful tool for calibrating mutation rates because it accumulates mutations much faster than nuclear DNA. mtDNA is inherited only through the maternal line; it does not mix and become diluted with paternal DNA. Thus, it provides a potentially reliable link with ancestral populations. When genetic researchers analyzed the mtDNA of 147 women from Africa, Asia, Europe, Australia, and New Guinea, they found that the differences among them were very small. Therefore, they argued, the five populations were all of comparatively recent origin. We now know that three of the deepest branches of the mtDNA tree were exclusively African, the next deepest being a mixture of Africans and non-Africans. All non-African DNA branches are of a very similar depth. It is likely that the mtDNA lineage evolved for some time in Africa, followed by an out-migration by a small number of people. All later European and Asian *H. sapiens* lineages originated in this small African population. The latest chronology for the most common recent ancestor is about 171,500 years

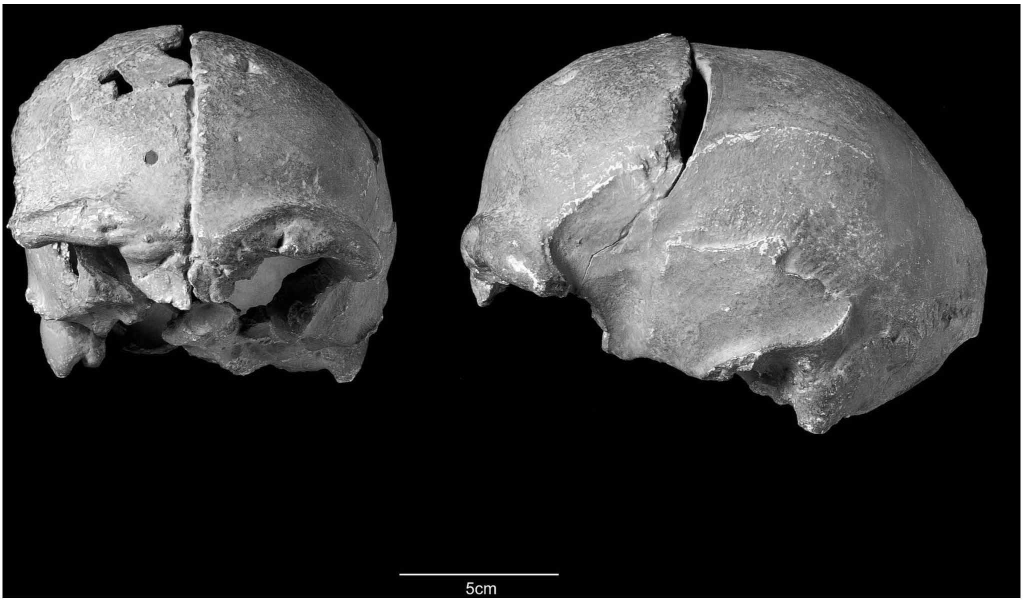


Figure 3.13 *Homo sapiens idaltu* from Herto, Ethiopia. (Age fotostock/Alamy)

ago (±50,000 years). The date of the earliest branch that includes both Africans and non-Africans is 52,000 years ago (±27,500 years). Biologists concluded that all modern humans derive from a 200,000-year-old African population, from which populations migrated to the rest of the Old World.

The case for African origins at around 200,000 to 150,000 years ago was supported by the fossil evidence. In 2003, researchers dated fossil remains of *H. sapiens* from Herto in Ethiopia to around 160,000 years ago (Figure 3.13). The skulls are clearly from anatomically modern people, although minor differences mark them as more primitive, sufficient for them to be labeled *H. sapiens idaltu* (after the local Afar name for "elder"). The adult male skull is long and rugged, with heavily worn upper teeth, and is also slightly larger than modern crania. Interestingly, signs indicate that the skulls were defleshed with stone tools after death, while the child's skull displays a polish resulting from repeated handling. Judging from modern-day practices in New Guinea and elsewhere, the people may have preserved heads as part of some ancestor cult—the earliest evidence of any form of death ritual from the past.

In 2005, another team found evidence from Omo Kibish, Ethiopia that pushed back this date yet further—to 195,000 years ago. However, some researchers expected that our origins go back even further given the presence of *H. sapiens*-like fossils from South Africa (including the Florisbad Skull) that might be as old as 260,000 years ago. Things took a radical turn in 2017 when a third team re-assessed some fossils from Jebel Irhoud in Morocco and discovered that our species goes back to 300,000 years, if not earlier.

To explain this bombshell discovery further, back in the early 1960s, excavators at Jebel Irhoud uncovered fossils representing at least five individuals. They originally thought the remains belonged to "African Neanderthals," around 40,000 years ago: for not only did the people look rather archaic, but they were found alongside tools described as "Mousterian" (the tradition associated with the Neanderthals). In 2004, fresh excavations resumed at the site, which led to the discovery of yet more stone tools and more human fossils, including a partial skull and a lower skull. In 2017, using improved dating techniques, particularly in thermoluminescence dating, the current team published its finding that all of the fossils come from a layer dating to about 315,000 ± 34,000 years—that is: 315,000 years ago, give or take another 34,000 years. But what species did these humans belong to? Recall the fact that no Neanderthals have otherwise been found in Africa, yet they seemed far too early to be *H. sapiens*.

The team used a shape-analysis technique to compare the Irhoud fossils with those of hominins from 1.8 Ma to 150,000 years ago (Figure 13.14). In all cases, they found that the Jebel Irhoud specimens were most similar to *H. sapiens*. Despite this, the skulls show a mosaic of both modern features (such as the shape of the lower jaw, which is like ours, if a little

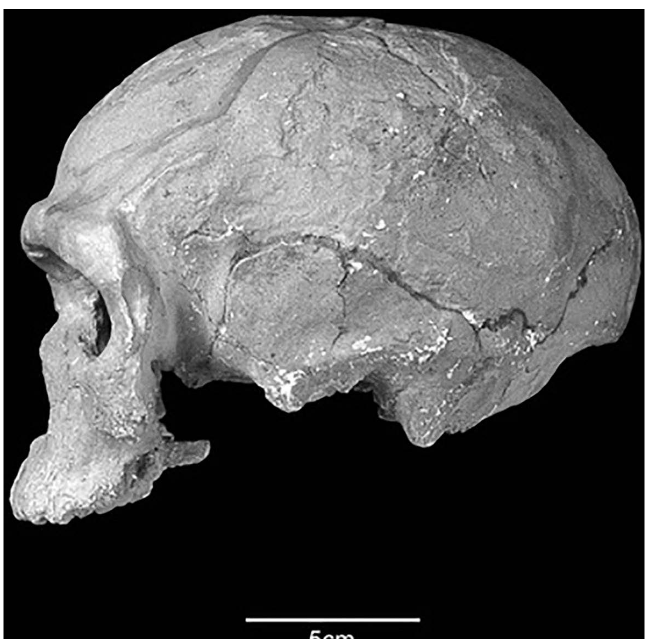


Figure 3.14 Skull of an early *H. sapiens* from Jebel Irhoud, Morocco. (The Natural History Museum/Alamy Stock Photo)

longer) and slightly archaic features (such as the elongated braincase which is unlike our modern globular form). As a result of their date and their form, the researchers conclude that these are very early, somewhat archaic, *H. sapiens*. Interestingly, this 2017 finding agrees with various genetic analyses that indicate our species had already diverged from a last common ancestor with the Neanderthals by 400,000 to 300,000 years ago. But the fact that our earliest known ancestors come from North Africa was a surprise. Until 2017, all other previously known early evidence comes from tropical Africa. Perhaps this work highlights just how understudied Africa is as a continent, and that archaeological bias may have been at work in terms of the locations explored.

Given that the Jebel Irhoud folk were still rather archaic in appearance, when did *H. sapiens* become fully anatomically modern—or physically just like you or me? The period before 100,000 years ago is critical to this question. Fossils found at Singa in Sudan (133,000 years ago), Laetoli in Tanzania (120,000 years ago), and Border Cave plus Klasies River Mouth in South Africa (120,000–90,000 years ago) all have clearly modern elements, but their morphology shows variation such as the robustness of the brow ridge or length of the braincase. However, at Skhul and Qafzeh in Israel (120,000–80,000 years ago) we have burial evidence for more than 20 individuals, who are all fully anatomically modern human (AMH)—with flat, short faces and high, round braincases. As such, a date of around 120,000 is currently given for the first AMHs: our oldest known modern ancestors.

Ecology and *Homo sapiens*

Ecological anthropologist Robert Foley points out that the savanna woodland of Africa before 100,000 years ago was an ideal environment for promoting the speciation of modern humans. He has studied monkey evolution in Africa and found that the widely dispersed populations had diverged. They did not continue on a single evolutionary course. Africa experienced considerable habitat fragmentation and reformation during the constant cold and warm cycles of the Ice Age, fluctuations that enhanced the prospects of speciation among the continent's animals and plants. For example, says Foley, one monkey genus alone radiated into 16 species at about the same time as modern humans may have evolved in Africa. Foley's monkey studies have convinced him that modern humans evolved in just such a fragmented mosaic of tropical environments, developing distinctive characteristics that separated them from their archaic predecessors. Food resources were predictable and of high quality in some areas. In response to such regions, some human populations may have developed wide-ranging behavior, lived in larger social groups with considerable kin-based substructure, and been highly selective in their diet.

As part of these responses, some groups may have developed exceptional hunting skills, using a technology so effective that they could prey on animals from a distance with projectiles. With more efficient weapons, more advance planning, and better organization of foraging, our ancestors could have reduced the unpredictability of the environment in dramatic ways. Few archaeologists would be so bold as to associate ancient technologies with specific fossil forms, but we do know that tens of thousands of years later, *H. sapiens* relied on much more sophisticated tool technology than that of their predecessors. The new tool kits were based on antler, bone, wood, and parallel-sided stone blade manufacture. This technology was much more advanced than anything their predecessors made, and it took many millennia to develop. There is no question but that this technology would have conferred a major advantage on its users, in terms of both hunting efficiency and energy expended in the chase (Figure 3.15).

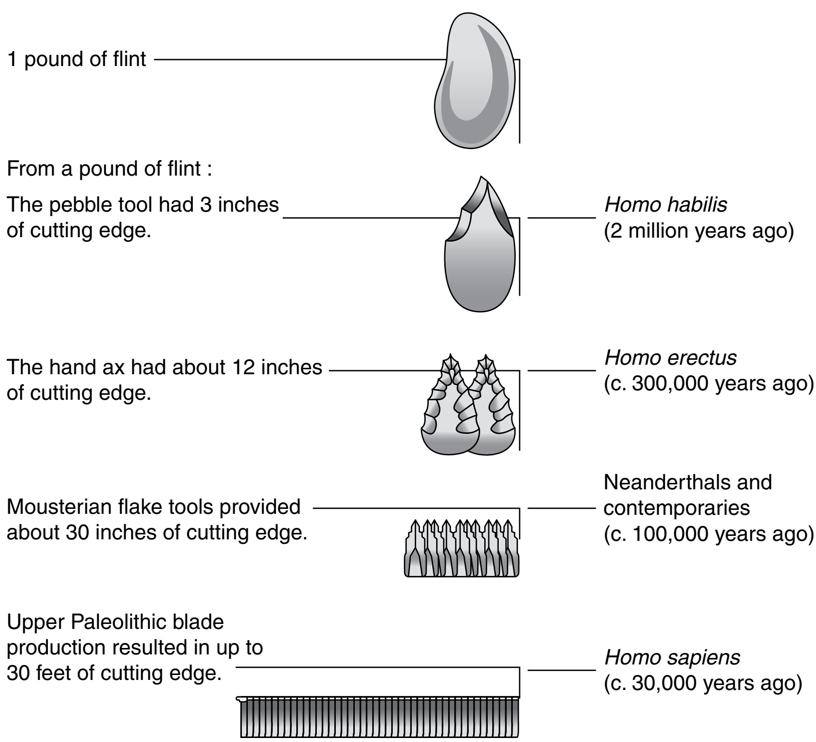


Figure 3.15 The growing efficiency of stone technology, shown by ancient stoneworkers' ability to produce ever-larger numbers of cutting edges from a unit of stone or other fine-grained rock. The Neanderthals were far more efficient stone artisans than their predecessors. By the same token, *Homo sapiens* used blade and other technologies that produced up to 4.5 meters (15 feet) per kilogram of rock (see Figure 3.5).

Interestingly enough, signs of technological change appeared throughout eastern and southern Africa between 200,000 and 100,000 years ago, as age-old hand-ax technology gave way to lighter tool kits that combined sharp stone flakes with wooden spear shafts, and to other more specialized artifacts used for woodworking and butchery. Such simple artifacts, made on medium-sized flakes, could have been the archaic prototypes of far more efficient tools and weapons that AMHs developed after 75,000 years ago (see Figure 3.14). But again, one must emphasize that the existence of such artifacts in Africa at the time when modern humans apparently first appeared there is not necessarily proof *H. sapiens* developed them. Nonetheless, all the material points to an African homeland for our species.

Out of Africa

If Africa was the cradle of modern humans, how, when, and why did *H. sapiens* spread into Europe and Asia? By 100,000 years ago, anatomically modern people were already living in the Middle East, as the aforementioned evidence from Qafzeh and Skhul (120,000–90,000 years ago) demonstrated, but elsewhere outside Africa little strong evidence survives for *H. sapiens* until around 60,000–40,000 years ago. The only major barrier to population movement between tropical Africa and the Mediterranean Basin is the Sahara Desert, today some of the driest territory on earth. Bitterly cold glacial conditions in the north brought a cooler and wetter climate to the desert from before 100,000 years ago until about 40,000 years ago. For long periods before then, the country between East Africa and the Mediterranean was passable, supporting scattered game herds and open grassland. The Nile Valley was always habitable, even during periods of great aridity in the desert. Thus, small groups of modern people could have hunted and foraged across the Sahara into the Nile Valley and Southwest Asia as early as 100,000 years ago. Some of these bands may have moved northward along long-dried-up water courses that led north from the heart of the desert to the Mediterranean. Still other groups may have moved eastward, across the Red Sea into what is now Yemen and Saudi Arabia and then onto South Asia, often using dried-up river valleys as migration routes. The debate over migration dates and routes is ongoing. For instance, the recent discovery of 47 modern human teeth from Fuyan Cave in southern China dating to between 120,000 and 80,000 years ago might indicate that modern humans settled at an early date in what is now southern China.

However, at this stage, as far as we can tell, there were still very few modern humans, and many argue that they lived in the same way as Neanderthals. Then, about 73,500 years ago, Mount Toba in distant Sumatra in Southeast Asia exploded in the greatest volcanic event of the past 23 million years. Twenty-eight hundred cubic kilometers

(670 cubic miles) of the mountain vanished into space. The lava flows from the eruption covered more than 20,000 square kilometers (7,700 square miles). Hundreds of square kilometers of solid rock fractured into vast clouds of volcanic ash that rose more than 32.5 kilometers (20 miles) into the atmosphere. Millions of tons of sulfur gas reached the stratosphere and lingered there for years. When the eruption subsided, only a huge crater remained, now the world's largest volcanic crater lake—100 kilometers (62 miles) long, 30 kilometers (18.6 miles) wide, and up to 505 meters (1,666 feet) deep.

The disaster is particularly significant because it happened at a crucial time in human prehistory: when Neanderthals and other hominins roamed much of Asia and Europe, and at the time when some *H. sapiens* were beginning to leave Africa. However, our ideas about the true impact of this eruption have changed a great deal since the year 2000.

Previous computer models had suggested that the event was a near doomsday event for all hominins. We know that ash from the explosion covered a huge swath of the tropical world, northwestward from Southeast Asia. Up to 9 feet (3 meters) of ash covered much of India and Pakistan. The sulfur gas from the eruption was thought to have caused a stratospheric haze that reflected sunlight and triggered severe global cooling that dropped temperatures over Greenland by as much as 6 degrees Celsius (11 degrees Fahrenheit). The effects were believed to have been especially severe in the African tropics, especially since the disaster coincided with a profound megadrought in East and southern Africa documented by cores in Lake Malawi, in the country of that name. The human cost was mooted to have been enormous, including almost certainly most, if not all, the *H. sapiens* population already in the Levant. Being of African origin and adapted to warmer temperatures, they were probably unable to cope with drastically lower temperatures.

Geneticists theorized that a severe population bottleneck ensued among humans over a wide area about 70,000 years ago, destroying much genetic diversity. They estimated that the African population declined to a total of between 4,000 and 10,000 females of reproductive age, with most of the survivors dwelling in unaffected areas in eastern and southern Africa—in complete isolation from the wider world and usually from neighboring groups. The bottleneck was understood to have lasted for another 20,000 years, ending at the very time that various researchers used to claim our ancestors acquired full cognitive powers—in other words this physical eruption lay behind an apparent cerebral eruption—possibly connected to the increased intelligence needed to deal with the ravages of drought and the need for cooperation and shared intelligence about food and water.

Certainly, the Mount Toba eruption may have dramatically altered the evolutionary path of our ancestors, particularly if it created a "genetic bottleneck" involving just a few resourceful folk. However, this theory has drawn criticism in recent years. Various scholars now argue that the climate change that followed the eruption has been dramatically overstated—with new estimates putting global cooling at around 2.5 degrees Celsius and lasting only a few years (with some areas, such as India, experiencing an even milder dip of just 1 degree Celsius).

It is true that hominins living at the time of the eruption must have faced some tough conditions, needing to adjust to colder temperatures, or faced with ash-contaminated water supplies. Yet various archaeological and geological researchers seem to support the revised view that the global environmental impact of the super-eruption was rather less than used to be thought. For example, excavations in India, such as those north of Jwalapuram in the Middle Son river valley, have shown how hominins persisted in the region without a break—as indicated by stone tools found below and immediately above the ash deposits. In 2013 research in East Africa explored a layer of glassy volcanic ash in the sediments of Lake Malawi that could be definitely linked with the Toba super-eruption. The team found no change in the fossil types close to the ash layer, which means no evidence for a severe volcanic winter. Likewise, a 2015 study on the climate of East Africa found no significant cooling linked with Mount Toba. Rather than the Mount Toba eruption causing a genetic bottleneck, such a bottleneck could, more parsimoniously, be explained with reference to Out of Africa movements. Indeed, the current estimate for the last significant genetic bottleneck is now 50,000 to 20,000 years ago and is more marked in all modern non-African populations who show much less genetic diversity than sub-Saharan populations. Could this be explained by a bottleneck experienced by a small group of people moving out of the continent? It is possible, and future genetic and archaeological work will no doubt clarify the situation yet further.

In terms of our movements out of Africa, it is clear that small numbers of fully modern humans moved out of Africa into the Middle East by 50,000 years ago. They left few physical traces of their journey, which is hardly surprising given their small numbers. These were people who were accustomed to maintaining connections with others over long distances, to whom ideas of reciprocity and exchanging information were routine. They would cooperate with others, had more efficient weaponry, and could tackle not only animals large and small but also consume all kinds of other foods, especially plants. Above all, they were planners and thinkers.

As the Middle East became increasingly dry and less productive after 50,000 years ago, small numbers of modern people may have responded to population pressure and food shortages by moving northward and northwestward into Europe and Eurasia, and also westward along Mediterranean coasts. As we shall see in Chapter 4, the past 50,000 plus years saw the greatest of all human diasporas take our ancestors to the islands of Southeast Asia, to New Guinea, Australia, Siberia, and, ultimately, the Americas.

Summary

- The climatic events of the Great Ice Age (the Pleistocene) between about 2.5 million and 15,000 years ago saw complex fluctuations between glacial maxima and much shorter interglacial periods that were the backdrop to the evolution not only of *H. erectus* but also of modern humans—*H. sapiens*.
- *H. erectus/H. ergaster* (1.9–1.5 Ma) evolved from earlier *Homo* in tropical Africa, and is associated with the Acheulean stone tool industry (1.65 Ma), used throughout Africa and Europe for the next one million years.
- By 1.8 Ma *H. erectus* appears in Asia where it may have lived until around 30,000 years ago. The Acheulean tool kit is not found in Southeast Asia, where *H. erectus* populations presumably relied heavily on bamboo and other forest products.
- The first evidence for hominins in Eurasia comes from the site of Dmanisi in Georgia (Eurasia) and is also dated to 1.8 Ma. They are currently classified as *H. erectus*.
- Small numbers of later humans (known as *H. antecessor*, but sometimes lumped with *H. heidelbergensis*) had settled in Western Europe by 1.2 Ma.
- At least as early as 780,000 years ago, humans domesticated fire, a valuable weapon against predators and a source of warmth and cooked food.
- Between around 400,000 and 30,000 years ago, the Neanderthals lived across Europe and in Southwest Asia. They developed more sophisticated toolmaking technology than had *H. erectus*, were more adept hunters and foragers, and were the first humans to bury some of their dead.
- *H. antecessor* may be the last common ancestor of the Neanderthals in Europe, and of modern humans in Africa.
- A reassessment of the Jebel Irhoud fossils, found in Morocco, has pushed back the emergence of *H. sapiens* to over 300,000 years ago (prior to 2017, a date of 200,000 years ago was given, based on the existing fossil record).
- Two competing theories account for the appearance of AMHs. The recent African origin hypothesis ("Out of Africa" hypothesis) argues that we evolved over the past couple of thousand years in Africa, spreading into other parts of the world from Southwest Asia, over the past 50,000 years or so (see Chapter 4). The regional continuity hypothesis holds that modern humans have much deeper roots (up to 1.8 Ma), and that modern people in various parts of the world today descend from earlier archaic populations that lived throughout the Old World.

- Drawing on the archaeology and the genetic data, most experts now follow the recent African origin theory albeit with some modifications: it is now apparent that there was some interbreeding among contemporary hominins once some of our forebears left Africa (with the mixing probably occurring at roughly 50,000 years ago).
- By 50,000 years ago, some modern human populations had resettled the Middle East. Within 5,000 years, some of them had moved north into Europe and Eurasia.
- With the appearance of modern humans, the long prehistory of the archaic world ends. After more than 7 million years of hominin evolution, *H. sapiens* is the only surviving member of the hominin family.

Further Reading

On ancient DNA, see David Reich *Who We Are and How We Got Here* (Oxford: OUP, 2018). Richard W. Wrangham, *Catching Fire: How Cooking Made Us Human* (New York: Basic Books, 2009) covers this important development. On the Neanderthals, see Dimitra Papaianni and Michael A. Morse, *The Neanderthals Rediscovered: How Modern Science Is Rewriting Their Story* (London: Thames and Hudson, 2013).

On modern human origins, see: Chris Stringer, *Lone Survivors: How We Came to Be the Only Humans on Earth* (New York: St. Martin's Griffin, 2013) and Chris Stringer and Robin McKie, *African Exodus: The Origins of Modern Humanity* (New York: Henry Holt, 2015). For a richly illustrated, picture-led, book profiling over 20 ancient hominin species, see Alice Roberts *Evolution* (London: DK Books, 2018).

Part III

The Birth of the Modern World

Introduction: Moderns, Migrations, and Farmers

- The spread of modern humans, often called the great diaspora,
- The beginnings of agriculture and animal domestication,
- The consequences of food production.

The next four chapters describe and analyze two momentous developments in prehistory—the dramatic spread of modern humans across the Old World and the Americas, and one of the most fundamental changes in our past, the changeover from hunting and gathering to farming and animal husbandry. These remarkable, indeed revolutionary, developments laid the foundations of the modern world. Part III begins about 50,000 years ago, in the late Ice Age world, and ends on the threshold of modern times.

In Part I, we described the controversies surrounding the origins of *Homo sapiens* and the powerful genetic and archaeological evidence that supports an African origin. The initial spread of moderns out of Africa, into East and Southeast Asia, also Europe and Eurasia, is still little known, for the archaeological record, even in well-explored regions like Europe, is very thin on the ground. We can only trace the general outlines of what happened, but the story that is emerging from archaeology and genetics is both provocative and fascinating.

We know that by at least 60,000 years before present (BP) modern humans were living in the Middle East, area already occupied by their Neanderthal cousins. From there, they spread north into continental Europe, perhaps by 45,000 years ago, and onto the vast Eurasian plains at about the same time. Far to the south, we know that moderns had probably settled in South Asia well before 50,000 years ago, in Southeast Asia at about the same time, and in Australia and New Guinea before 45,000. When *H. sapiens* settled in China is a matter of debate, but it was probably 50,000 BP.

The first settlement of the Americas is one of the great, and enduring, controversies of world prehistory. Most archeological and genetic experts agree that the first settlers crossed the land bridge, exposed by low sea levels, that linked Siberia and Alaska around 15,000 years ago. Their descendants spread rapidly into the heart of the continent and southward into Central and South America. Throughout the Americas, the early settlers adapted brilliantly to a wide range of environments, everything from tropical rain forest and arctic steppe to rich riverside, lake, and coastal environments. These societies flourished in complete isolation from their ancestors in the Old World, with remarkably complex hunter-gatherer societies developing in later times in favored areas like the coastal Northwest and Florida, as well as in rich Mississippi Valley environments, where fish, game, plant foods, and waterfowl abounded. Along the Peruvian coast, hunter-gatherers flourished for thousands of years off rich inshore fisheries, harvesting anchovies in enormous numbers.

For 99 percent of our time on earth, we humans survived by hunting and gathering food. The environmental backdrop after the end of the Ice Age was an irregularly warming world, part of the long-term cycle of glacials and interglacials that marked earlier times. But circumstances were different this time, for there were larger hunter-gatherer population densities, especially in favored areas like oak-forested regions of the Near East, where acorns and other nut harvests abounded. But warming brought aridity to many areas, especially during a thousand-year cold snap between 11,000 and 10,000 years ago, known to geologists as the Younger Dryas, named after an arctic flower. A severe drought cycle settled over much of the Near East and elsewhere, reducing nut harvests and game populations, as well as reliable water supplies. The hunter-gatherers had to adapt, so they settled in favored areas where water supplies were relatively predictable, and both game and plant foods were still available. These were people with an intimate knowledge of animals and plants, whose survival strategies included both the deliberate planting of wild grasses like emmer, einkorn, and rye, and the deliberate penning of herd animals like goats, pigs, and sheep, as well as, later, cattle. Taking up farming and animal husbandry was no big deal, for everyone was well aware that seeds germinated when planted and had intimate knowledge of their prey. The strategies were successful. With a very short time, cultivation became commonplace, spreading rapidly to areas with fertile soils and good water supplies. Climatic shifts like the Younger Dryas did not "cause" food production; they were among many complex, interacting factors that triggered a dramatic changeover in human subsistence, with momentous consequences.

The same changeover that took hold in the Near East also occurred in other regions, among them Egypt and South Asia, where food production may have begun before 8000 BC. Whether the changeover resulted from local adaptations to changed environmental circumstances is uncertain, but there are certainly grounds for believing that, for example, the domestication of cattle took hold independently in many locations. Cereal agriculture in northern China's Huang Ho River valley dates to as early as 8000 BC, if not earlier. Rice was domesticated along the Yangtze River in the south at about the same time—the evidence is uncertain.

The same changeover also occurred in the Americas, where Native American expertise with plant foods of all kinds was encyclopedic. Deliberate cultivation of native plants, whether grasses or roots, took place among hunter-gatherer societies that exploited a broad range of vegetable foods. Much experimentation was on a small, local scale, but the major change resulted from the domestication of teosinte, a grass native to Central America, which was the ancestor of maize, a staple of later Native American society. Maize spread southward into South America by at least 3000 BC and was cultivated in the North American Southwest a few centuries later. In the Andes foothills, native potatoes were raised by farmers as early as 7000 BC, as were quinoa and ullucu. In contrast to the Old World, where potentially domesticable animals such as cattle, goats, pigs, and sheep were hunted, there were no such beasts in the Americas, except the llama and the turkey, both of which were tamed.

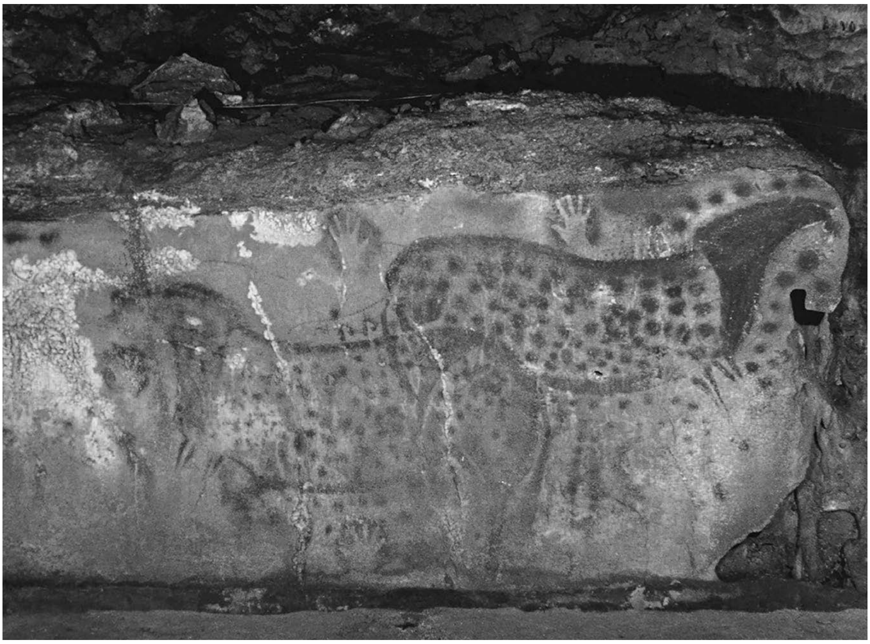
Food production spread rapidly throughout the Old World and the Americas. Within five thousand years, farming and herding societies flourished throughout much of the Near East and Europe, in the Nile Valley and South Asia, and in mainland Southeast Asia and China, as well as in the Americas. The consequences of this changeover were among the most fundamental shifts in human history. Unlike hunter-gatherers, who, for the most part, hunted and foraged through territories large and small (there were, of course, exceptions like the Pacific Northwest of North America), farmers with their crops and animals were anchored to their gardens, fields, and pastures. Most farming societies dwelt in settlements occupied for generations, communities where one lived cheek-by-jowl with other families and close kin. Such close-quarter living resulted in new social mechanisms, some of them concerned with avoiding conflict. Others involved relationships with other members of one's kin group living in one's own village or in communities at some distance. Such kin ties were the backbone for societies where sharing and reciprocal obligations provided food and other help in times of need. Kin were a powerful factor in ownership inheritance of herds and farming land. They also played an important role in the exchange networks that provided raw materials and other commodities obtained from elsewhere.

Population densities rose in villages large and small over the generations. New social mechanisms came into play, usually centered around clans and lineages, the kin-based institutions that governed social relationships of all kinds. Chapter 7 describes some of the increasingly elaborate societies that developed in the Pacific, where expert navigators colonized even the remotest islands of Polynesia after AD 1200. Powerful chiefs and lineage leaders played a vital role both in the Pacific and in the Southwest and eastern North America, culminating in the spectacular ceremonial center and population concentration at Cahokia in the American Bottom near the Mississippi River east of modern-day St. Louis some 800 years ago.

The growing complexity of human society after about 4000 BC assumed many forms. A broad array of chiefdoms and often-hereditary chiefs emerged throughout the world. Their power depended on their generosity, leadership skills, and ability to command the loyalty of their followers. This volatile mix of political and social realities endured in many places until modern times. In others, the trajectory of change led to the appearance of much more complex preindustrial states, described in Part IV.

Chapter 4

Diaspora



Imprints of Cro-Magnon hands from Pech Merle Cave, France.
(Prisma Archivo/Alamy)

Chapter Outline

Prologue

Spanish landowner Marcelino de Sautuola had a casual interest in archaeology. He had visited an exhibit in Paris of fine stone tools from French caves. In 1875, he decided to dig for artifacts of his own in the caverns of Altamira on his estate. Sautuola's young daughter, Maria, begged for the chance to dig with him, so he good-naturedly agreed. Maria soon tired of the muddy work and wandered off with a flickering lantern into a low side chamber of the cave. Suddenly, Sautuola heard cries of "Toros! Toros!" ("Bulls! Bulls!"). Maria pointed excitedly at brightly painted figures of bison and a charging boar on the low ceiling. Daughter and father marveled at the dynamic paintings, arranged so cleverly around bulges in the rock that they seemed to move in the flickering light.

Sautuola was convinced the paintings had been executed by the same people who had dropped stone tools in the cave. But the experts laughed at him and accused the marquis of smuggling an artist into Altamira to forge the bison. Not until 1904 was the long-dead Spaniard vindicated, when paintings with strong stylistic links to Altamira came to light in a French cave that had been sealed since the prehistoric artists had worked there. Clearly, whoever had painted on the cave walls at Altamira was a far cry from *Homo habilis*, the earliest known toolmaker.

After 120,000 years ago, with the emergence of people who were physically identical to ourselves (the anatomically modern humans, or AMHs), the pace of human life, of cultural evolution, began to accelerate, sometimes rapidly. The inevitably incomplete prehistoric archaeological record looks almost like series of "sparks," where rapid cultural change took place in one area but not in others. One such spark was the development of new stone technologies in sub-Saharan Africa by 75,000 years ago, another the first appearance of sophisticated art in Europe about 40,000 years ago, a third the first settlement of Australia by 50,000 BP. Only after about 30,000 years ago, during the late Ice Age, did rapid cultural change take hold in all parts of the world. This chapter describes the swiftly changing late Ice Age world of about 50,000 to 15,000 years ago. We show how humans first adapted to extreme arctic climates and developed highly specialized forager cultures that subsisted off cold-loving animals such as the mammoth and steppe bison. We discuss also the radiation of *H. sapiens* throughout the Old World, and then turn to one of the most controversial subjects in modern archaeology—the first settlement of the Americas (Figure 4.1).

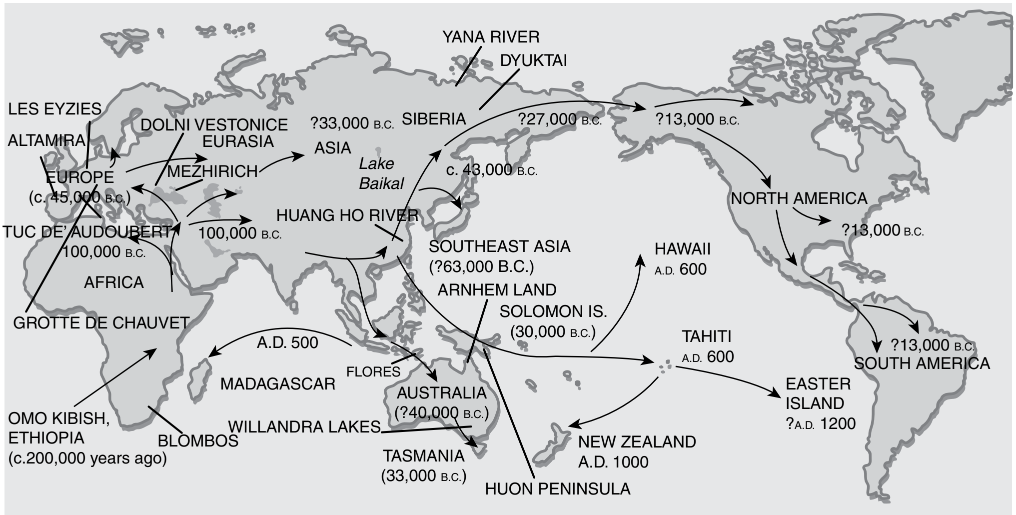


Figure 4.1 Map showing the settlement of the world by modern humans.

The Late Ice Age World (from 50,000 to 15,000 Years Ago)

From around 50,000 years ago, human culture began to change to such a degree that a generation ago, many researchers believed some sort of cognitive switch had flicked in the brains of *H. sapiens*. There is no biological evidence for any cerebral "big bang" at 50,000 years ago, however. What is clear is that *H. sapiens* possess a cognitive fluidity and an adaptability that has allowed us to dominate the world. As witnessed in the previous chapter, our DNA reveals that we met and interacted with other contemporary hominins. Yet for whatever reason, by around 39,000 years ago, or possibly somewhat later, we alone became the only human species left standing. After over 7 million years of hominin evolution, we *H. sapiens* are the sole result. The rest of this book concerns our endeavors.

For most of the past 45,000 years, the world was very different from that of today. At the height of the last Ice Age glaciation, some 18,000 years ago, vast ice sheets mantled Scandinavia and the Alps, leaving a corridor of open tundra between them. Sea levels were more than 90 meters (300 feet) lower than today. Britain was joined to the European continent, the North Sea was under ice, and the Baltic Sea did not exist. One could walk from Turkey to Bulgaria dry-shod (Figure 4.2). Vast, treeless plains stretched north and east from Central Europe to the frontiers of Siberia and beyond, a landscape of rolling scrub country dissected by occasional

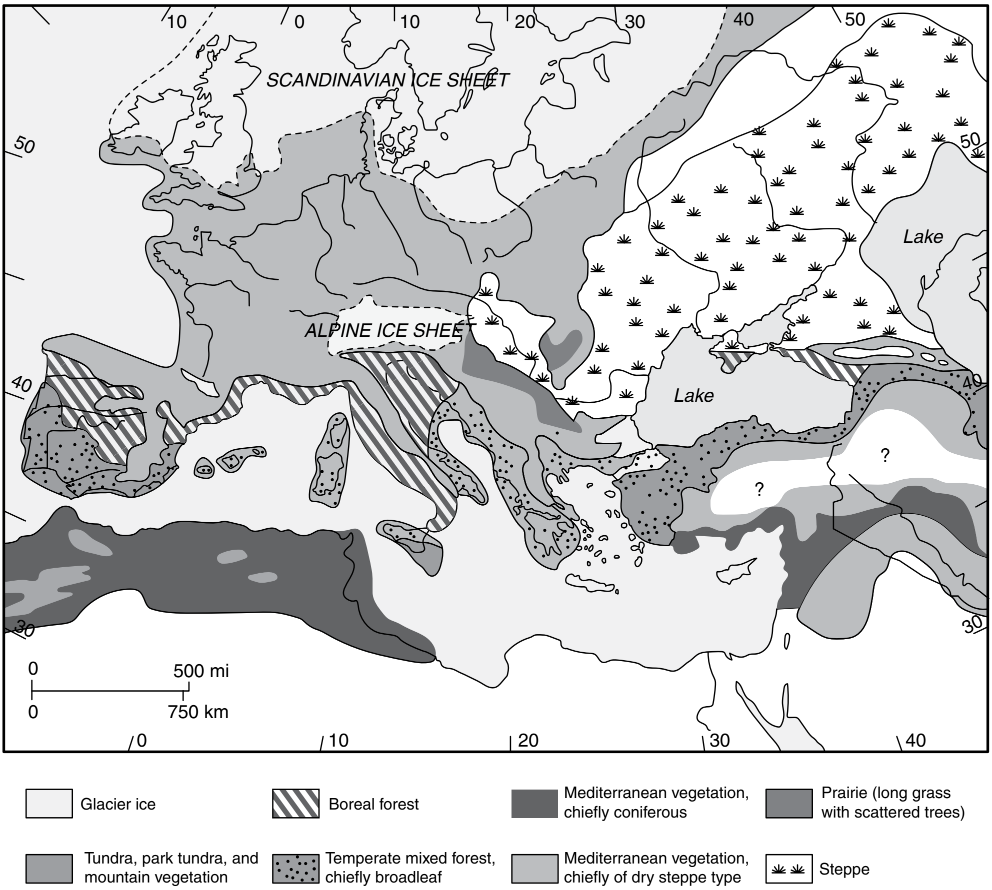


Figure 4.2 Generalized vegetation map of Europe during the late Ice Age.

broad river valleys. The only signs of life were occasional large herds of big game animals like the mammoth, bison, and reindeer, and they were often confined to river valleys. For humans to survive in these exposed landscapes required not only effective hunting methods and weaponry, but well-insulated winter dwellings and layered, tailored clothing that could keep people warm in subzero temperatures.

In more temperate and tropical latitudes, the effects of the last glaciation are harder to detect in geological strata. Tropical regions were often drier, many rain forests shrank, and there were more open grasslands and woodlands. In Africa, the Sahara Desert was as dry as, if not drier than, today, as cold polar air flowed south of the Mediterranean. Much lower sea levels exposed enormous areas of continental shelf in Southeast Asia. Many offshore islands became part of the Asian mainland. Great rivers meandered over what were then exposed coastal plains, across another sunken Ice Age continent known to scholars as **Sunda**. Offshore lay two large land masses—**Wallacea**, made up of the present islands of Sulawesi and Timor, and **Sahul**, a combination of New Guinea, Australia, and the

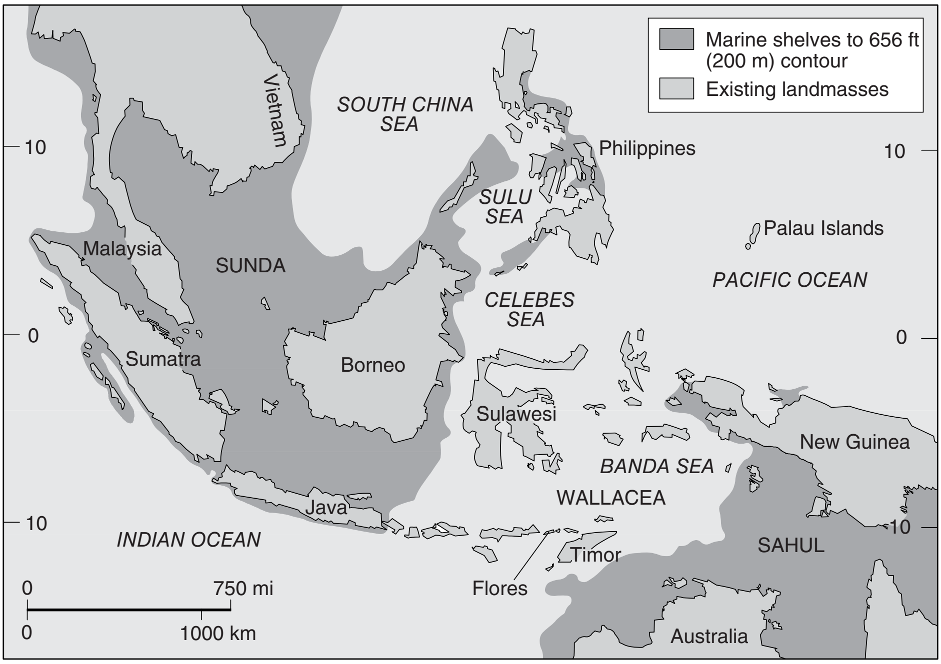


Figure 4.3 Sunda and Sahul during the late Ice Age.

low-lying and now flooded shelf between them (Figure 4.3). Let us now look at how late Ice Age humans peopled this diverse, often harsh, world.

The Peopling of Southeast Asia and Australia (from ca. 45,000 to 15,000 Years Ago)

H. sapiens had appeared in Southeast Asia, including Indonesia and the Philippines, by at least 45,000 years ago. At the time, sea levels were much lower than today, so human settlement on Sunda, the exposed continental shelf, may have been concentrated in river valleys, along lake shores, and on the coasts. If technological changes were indeed associated with *H. sapiens*, they probably involved more efficient ways of exploiting the rich and highly varied environments of the mainland and offshore islands. The coastlines that faced offshore were relatively benign waters that probably offered a bounty of fish and shellfish to supplement game and wild plant foods. Perhaps coastal peoples constructed simple rafts for fishing in shallows or used rudimentary dugout canoes for bottom fishing. At some point, some of these peoples crossed open water to Wallacea and Sahul. Sahul was a landscape of dramatic contrasts, of rugged mountain chains and highland valleys in the north, and rolling, semiarid lowlands over much of what is now Australia. Colonizing Sahul meant an open-water downwind passage of at least 98 kilometers (62 miles), an entirely feasible proposition in simple watercraft in warm tropical waters and smooth seas.

Site

Exotic Islanders: *Homo floresiensis*

Excavations in **Liang Bua**, or the "cold cave," on the remote island of Flores, Indonesia, have yielded remarkable evidence for a diminutive, previously unknown, hominin: one of the last non-modern hominin species to become extinct.

The evidence—comprising one nearly complete skeleton ("LB1," found in 2003), one partial skeleton, and parts of at least 11 other individuals—has been dated by various means including C-14, Uranium-series, and thermoluminescence, to between about 100,000 and 50,000 years ago. They were first thought simply to be a modern human with a physical disorder, but are now believed to be sufficiently morphologically different to constitute a distinct species, and have been named *Homo floresiensis* by Michael Morwood and his colleagues.

The islanders were only about a meter (3.2 feet) tall (Figure 4.4). Their brains are the same size as those of chimpanzees (ca. 380 cubic cm)—similar

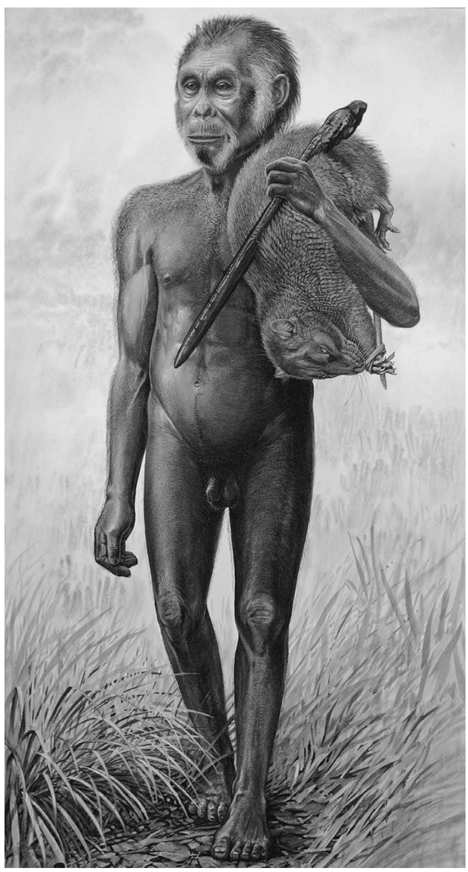


Figure 4.4 An artist's impression of *Homo floresiensis*. (Reuters/National Geographic Society)

to the smallest *australopithecine* brains. Their skulls display prominent brow ridges and a low brain case, while their faces are small with arched brow ridges, a slightly protruding upper tooth row with small canines, and a receding chin, but with a strong lower jaw. In 2009, a detailed digital study of the skull of the aforementioned LB1 suggested more similarities to the *Homo* species that lived around 1.5 million years ago (Ma) rather than to modern humans. Meanwhile, their bodies show a mix of primitive and modern traits. For example the upper arm has a modern shape, but its humerus (the funny bone) is wide, suggesting considerable upper body strength, more akin to early humans and apes than to *H. sapiens*.

However, its evolutionary status is a puzzle. Excavations elsewhere on Flores (at Mata Menge and Boa Lesa) have revealed stone tools—mostly small flakes of knapped cobbles that somewhat resemble the Oldowan tradition of Africa—in association with the bones of animals such as the Stegodon elephant. Scholars have dated them to around 800,000 years ago, and possibly as far back as 1 Ma. Even this long ago there was no land bridge connecting Flores, meaning that early hominins must surely have crossed dangerous seas to reach the island. Could these (as yet skeletally unknown) early hominins have given rise to *H. floresiensis*?

Unfortunately, it is hard to establish its closest relative since the morphology of *H. floresiensis* is incredibly distinctive. Indeed, its unique anatomical characteristics and small stature are thought to be the result of island isolation that led to, among other things, endemic dwarfing. To date, various ancestors have been mooted, including *Homo erectus*, *H. habilis*, and even *australopithecines*—or perhaps some as still unknown small-brained hominin. At this early stage in research, we do not know. However, of special note is the fact that the remains are associated with archaeology, including sophisticated stone tools, that suggests relatively complex behavior. This calls into question many of our assumptions about the relationship between brain size and intelligence.

Science

Radiocarbon Dating

Radiocarbon dating is the primary dating method used to date organic material from between about 40,000 years ago and the past 2,000 years. The method is based on the knowledge that living organisms build up their own organic matter by photosynthesis and by using atmospheric carbon dioxide. The percentage of radiocarbon in the organism is equal to that in the atmosphere. When the organism dies, the carbon 14 (C-14) atoms disintegrate at a known rate, with a half-life of 5,730 years. It is possible then to calculate the date of an organic object by measuring the amount of C-14 left in the sample. The initial quantity in the sample is low; therefore the limit of detectability is soon reached, so the oldest reliable radiocarbon dates are about 40,000 years old.

Radiocarbon dates can be obtained from many types of organic material, including charcoal, shell, wood, and hair. The beta particle decay rate is conventionally measured with a proportional counter, but the use of accelerator mass spectrometry (AMS) has refined the procedure dramatically. Every radiocarbon date arrives with a statistical error, a standard deviation. For example, a date of 2,200 ± 200 years means that the date has a probable range of 200 years, with a two-out-of-three chance that the date lies between the span of one standard deviation (2,400 and 2,000 years). Unfortunately, the concentration of radiocarbon in the atmosphere has varied considerably over time as a result of alterations in solar activity and changes in the strength of the earth's magnetic field. It is possible to correct dates by calibrating them against accurate dates from tree rings, by radiocarbon dating rings, and developing a master correction curve. Dates as far back as nearly 9000 BC can be calibrated with tree rings, and earlier dates with coral growth rings from tropical seas. (See also "Accelerator Mass Spectrometry (AMS) Radiocarbon Dating" box in Chapter 5.)

The earliest documented human settlement of New Guinea comes from the **Huon Peninsula** in the southeastern corner of the island, where some 40,000-year-old **ground stone** axes came to light. The Huon Peninsula faces New Britain Island, 48 kilometers (30 miles) offshore. Fishermen were living in caves on the island by at least 32,000 years ago. Some 4,000 years later, people had sailed southward between 130 and 180 kilometers (81 and 112 miles) to settle on Buka Island in the northern Solomons (see Figure 4.3). From Buka it would have been an easy matter to colonize the remainder of the Solomon chain, for the islands are only separated by short distances. All these data point to a rapid spread of late Ice Age foragers through Sahul by at least 40,000 years ago, using some form of quite effective watercraft.

Human occupation in what is now Australia is well documented after 45,000 years ago and possibly as early as 60,000 BP. The Malakunanja rock shelter in Arnhem Land has produced artifacts, such as stone tools, and evidence for pigment use, including grindstones and ochre. The oldest of these artifacts have been dated to 60,000 years ago, with similar dates gleaned for human occupation at the nearby rock shelter of Nauwalabila. Likewise, a date of around 65,000 years ago was recently given for the rock shelter of Madjedbebe. These dates are not without controversy, with some researchers noting that the genetic data suggest a maximum age estimate of no more than 50,000 years ago for human movement into Australia/New Guinea.

Thereafter, the **Willandra Lakes** Region has yielded shell middens and campsites dating from perhaps as early as 37,000 to about 26,000 years ago. They include the skulls and limb bones of robustly built, anatomically modern people, the earliest human remains found in Australia. Recently, more than 450 footprints of a group of 22,000-year-old hunters, some as

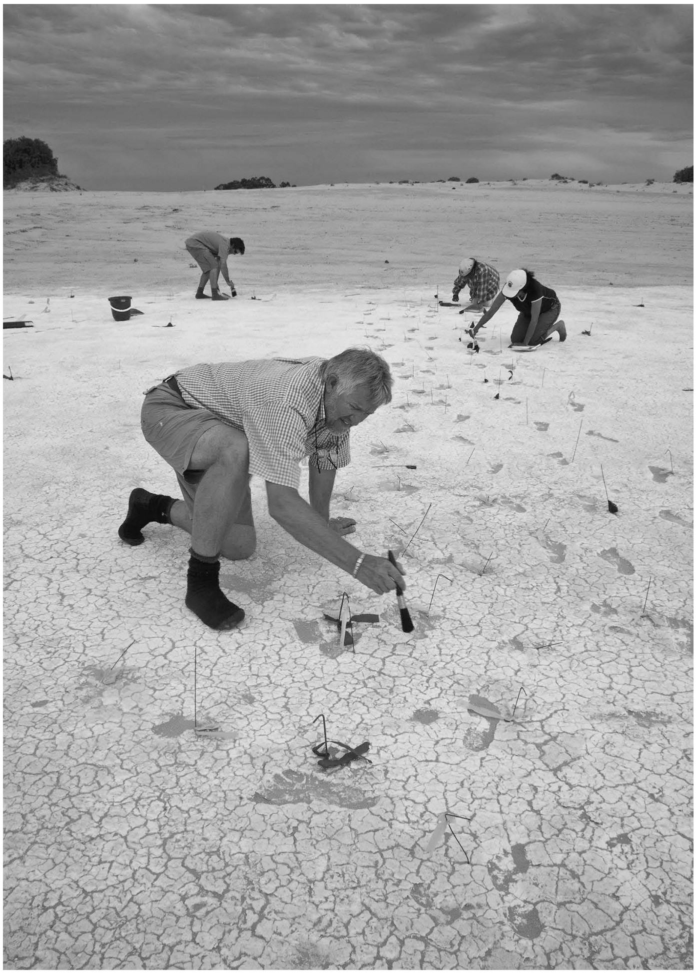


Figure 4.5 Excavating 22,000-year-old Aboriginal footprints at Willandra Lakes, Australia. (Michael Amendolia/Photoshelter.com)

tall as 1.98 meters (6 feet, 6 inches), have come to light in a dried mud level covered by sand dunes (Figure 4.5). By 33,000 years ago, human beings had crossed the low-lying strait that joined the island of Tasmania to the Australian mainland in the far south to colonize the most southerly region of the earth settled by Ice Age people. At the height of the glacial maximum, people lived in the rugged landscape of the Tasmanian interior, hunting red wallabies and ranging over a wide area for many centuries.

The ancient Australians adapted to a remarkable variety of late Ice Age environments, as did people living in northern China, in Japan, and on coastlines bordering chilly Ice Age seas. We do not have the space to cover all the diverse societies of the late Ice Age world, but, on the other side of the globe from Australia, the hunter-gatherer societies of Europe and Eurasia offer insights into the remarkable adaptive and opportunistic skills of the inhabitants of this long-vanished world.

Late Ice Age Europe: The Cro-Magnons (from ca. 44,000 to 15,000 Years Ago)

The first fully modern humans in Europe are often popularly called the **Cro-Magnons**, named after a rock shelter near the village of Les Eyzies in southwestern France. But don't let this nick-name confuse you, the Cro-Magnons are not a different species, but *H. sapiens*, indistinguishable from ourselves. These anatomically modern humans had settled in Southeast and Central Europe by at least 44,000 years ago, apparently near Neanderthal groups. Some of them had penetrated into the sheltered, deep river valleys of southwestern France by about 40,000 years ago (see Figure 4.2). By 30,000 years ago, if not already by 39,000 years ago (according to some of the genetic analysis), the Neanderthals had vanished and the density of Cro-Magnon settlement intensified considerably. The last surviving Neanderthal bands dwelt in relatively outlying areas, notably the Gibraltar area of southern Spain.

Subsistence

The Cro-Magnons entered Europe during a brief period of more temperate climate. Even then, climatic conditions and seasonal contrasts may have been such as to require new artifacts and much more sophisticated hunting and foraging skills. These adaptations developed rapidly, indeed spectacularly, after 39,000 years ago, following a large volcanic eruption in the Naples region of Italy that spewed ash over a wide area of Eastern Europe. It was during these millennia that *H. sapiens* finally mastered winter, for it was in northern latitudes that human ingenuity and endurance were tested to the fullest. The Cro-Magnons of Western and Central Europe developed elaborate and sophisticated hunting cultures during this period. Their cultures were marked not only by many technological innovations but also by a flowering of religious and social life, reflected in one of the earliest art traditions in the world.

The center of these activities was away from the open plains, in the river valleys of southwestern France and northern Spain and in parts of Central Europe like the Danube Basin. Here, deep valleys supported lush summer meadows and a mix of open steppe and forest where cold-tolerant animals ranging in size from the mammoth and bison to the wild horse and boar flourished. High cliffs often provided caves and rock shelters warmed by the winter sun. The area lay astride reindeer migration routes in spring and fall, while salmon ran up the fast-running rivers. The Cro-Magnons may have migrated to open country during the short summer months, concentrating in more sheltered river valleys from fall through spring. They hunted not only big game but also smaller animals such as arctic foxes, beavers, rabbits, wolves, and many birds; they also gathered plant foods. After about

16,000 years ago, they also fished for salmon, trout, perch, and eels from rivers and streams.

The Cro-Magnons survived in a harsh and unpredictable environment not only because they were expert hunters and foragers but also because they had effective ways of keeping warm outside in the depth of winter and the ability to store large amounts of meat and other foods to tide them over lean periods. Above all, anyone living in late Ice Age Europe had to be adaptable, capable of cooperating with others, and ready to grab opportunities to obtain food when they arose. Survival depended on diversification, on never concentrating on one or two animals to the exclusion of others.

For most of the year, the Cro-Magnons lived in small groups, subsisting off a wide range of game and stored foods. The times when they came together in larger groups may have been in spring, summer, and early fall, when reindeer, and, in later times, salmon, were abundant. This period of coming together was an important annual occasion, when social life was at its most intense. It was then that people arranged marriages, conducted initiation rites, and bartered raw materials, artifacts, and other commodities with one another. Then, as winter closed in, the groups would disperse through the sheltered river valleys, returning to their stored foods and the small herds of game animals that also took refuge from the bitter winds.

Reindeer were vital to survival. At the **Abri Pataud** rock shelter near Les Eyzies in France's Dordogne region, reindeer provided up to 30 percent of all prey for more than 10,000 years (Figure 4.6). The hunters located their

Figure 4.6 Female figure carved into limestone, Abri Pataud, Les Eyzies, France. (The Natural History Museum/Alamy Stock Photo)

camps close to shallow river crossings where they knew migrating reindeer were likely to pass. This complex rhythm of reindeer hunting was but a part of a constant pattern of group movements that persisted over many thousands of years. It survived from at least 32,000 years ago right up to the end of the Ice Age, when the glaciers finally melted and dense forest spread over the open plains and deep valleys of Central and Western Europe—not that life stayed exactly the same through these many millennia, for climatic conditions changed constantly. The Cro-Magnons had an efficient and highly versatile tool kit and a wide range of food resources to choose from, so they could readily adjust to changing circumstances.

Cro-Magnon Technology

Cro-Magnon technology was versatile yet fundamentally very simple. It depended on four interrelated foundations:

- Careful selection of fine-grained rock such as chert, flint, or obsidian for blade cores,
- The production of relatively standardized, parallel-sided artifact blanks from these cores that could be used to make more specialized cutting, piercing, and scraping tools,
- The refinement of the chisel or burin, an engraving tool, which enabled people to work antler and bone efficiently, and
- The use of the so-called **groove-and-splinter technique** for working antler and bone.

These technological innovations had a profound impact on the future course of human history, for they were the material means by which humans adapted to the climatic extremes of Eurasia and Siberia. Late Ice Age stoneworkers everywhere were highly selective in their use of flint and other fine-grained rock. The Cro-Magnons' primary objective was to produce blades, long, parallel-sided artifact blanks that could then be turned into a wide spectrum of specialized artifacts for hunting, for butchery and processing skins, for woodworking and clothing manufacture, and for the production of the raw materials needed to create antler and bone tools in treeless environments. So great was Cro-Magnon concern for good toolmaking stone that they bartered it with neighbors over considerable distances. Once procured, the precious raw materials were turned into carefully prepared blade cores that were carried around from one camp to the next. The cores were a kind of savings bank, an account of toolmaking stone used to produce tool blanks whenever they were needed. Thus, Cro-Magnon people were able to respond at a moment's notice to an opportunity to butcher an animal or to cut long slivers from fresh reindeer antlers.

The closest analogies in our own technology are the Leatherman tool and Swiss Army knife (or "snap-on" mechanics' tools) (Figure 4.7). Both

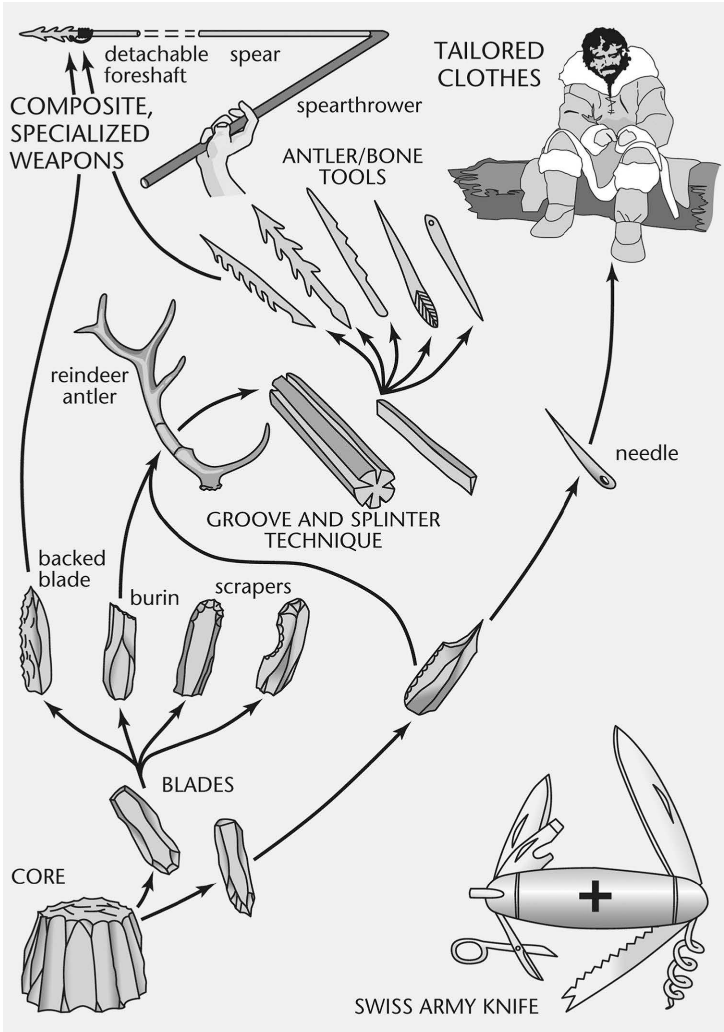


Figure 4.7 Blade core technology acts like a Swiss Army knife, producing blanks for making many specialized artifacts for working antler and bone.

are multipurpose artifacts built on a strong chassis with a special spring system that enables the user to call on a wide variety of different tools, from a pair of scissors to pliers. The late Ice Age equivalents were the cores and the blades that came from them.

One important Cro-Magnon artifact was the **burin**, a delicate chisel for carving fine lines. The burin was used for woodworking; for cutting grooves in animal hides; for engraving designs on antler, bone, and cave walls; and, above all, for cutting the long antler blanks for making artifacts of antler, bone, and ivory (see Figure 4.7). Many of these were specialized tools like barbed points mounted with foreshafts that snapped off when the spear entered its quarry. Some were important innovations, especially the eyed needle, essential for making tailored winter clothes, and the

spear-thrower, a hooked and sometimes weighted device that extended the range and accuracy of hunting weapons. It is said that a spear propelled by a spear-thrower can hit its target with greater velocity than a bow and arrow. The same technology of fine-barbed antler-head spears and stone-barbed weapons could be used for hunting big game, as well as for taking salmon in shallow water, for dispatching rabbits, and even for developing bows and arrows, which appeared some time during the late Ice Age.

The archaeological record reflects many refinements in Cro-Magnon technology over more than 15,000 years. In the early years of the twentieth century, French archaeologist Henri Breuil classified the late Ice Age cultures of southwestern France into four basic cultural traditions that culminated in the celebrated **Magdalenian culture** of about 18,000 to 12,000 years ago. The Magdalenian, named after **La Madeleine** rock shelter on the Vezère River, was not only a technologically sophisticated culture, but one with a concern for artistic expression and body ornamentation.

Cro-Magnon Art

The symbolic and ceremonial life of the Cro-Magnons was probably no more elaborate than that of their contemporaries known to have been painting in southern Africa and Australia. However, it is the best known and most thoroughly explored. Fortunately, much has survived, including evidence for music. Four bone and ivory flutes, between 35,000 and 40,000 years old, have come from southern German caves. For their art, Cro-Magnon artists used cave walls as their canvas and durable antler and ivory, not wood and skins, as palettes.

H. sapiens had long been interested in art. In South Africa's Blombos Cave there is evidence for engraved ochre dated to 100,000 years ago, while perforated shells, presumably used to decorate the body, are known from around 75,000 years ago. Perhaps such body ornamentation coincided with realizations that such adornments could define and communicate social roles—gender, group affiliation, and so on. By the Late Ice Age, people had undoubtedly mastered the ability to think in specific visual images, using them as well as chants, recitations, and songs to share and communicate images and ideas. This resulted in complex and diverse art traditions including the often-exquisite rock art of the Cro-Magnons.

The surviving Cro-Magnon art of Europe and Eurasia is but a minor proportion of their artistic output, for the artists almost certainly used many perishable materials—clay, wood, fiber, bark, hides, and bird feathers. Without question, they used red ocher and other pigments too as body paint for decoration. The surviving art occurs over a vast area from North Africa to Siberia, with major concentrations in northern Spain, southwestern France, and Central and Eastern Europe. On cave walls, the artists engraved and painted animals, occasional humans, and schematic patterns: lines, elaborate panels, and complex shapes. The same artists engraved antler, bone, and ivory with consummate skill. They created animals in the round, engraved bison with delicate strokes that etched in every detail of eyes, manes, and hair. Figurines survive of animals and humans in ivory, soft stone, and baked clay such as the celebrated Venus figurines that depict women of all ages (Figure 4.8). The significance of these female figures, with their usually voluptuous anatomy, eludes us. Numerous doodles of human figures occur in Cro-Magnon art, so the Venuses are not that unusual.

Cro-Magnon art is full of compelling images, many of them concentrated at major sites such as the **Grotte de Chauvet**, Lascaux, and **Trois Frères** in southwestern France, and **Altamira** in northern Spain (see Figure 4.8 and "Grotte de Chauvet. France" box). These may have been places of unusual religious and symbolic importance. They were ritual shrines, not only for local groups but also for people from far wider areas, too. Other locations were sacred places used occasionally for major

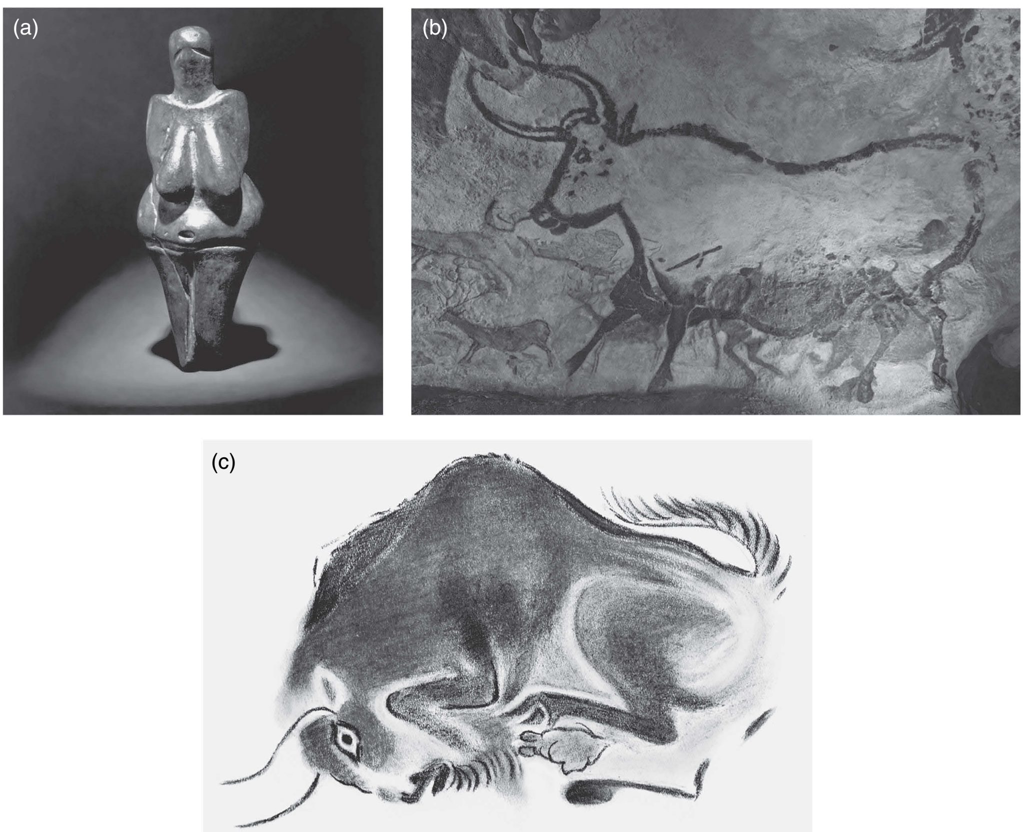


Figure 4.8 Cro-Magnon art. (a) Venus figurine from Dolni Vestonice, Moravia, Central Europe. (b) Wild bull from Lascaux, France. (c) Bison painted on a natural bulge of a chamber in an Altamira cave, northern Spain. All three works date to the period from 25,000 to 12,000 BC.

ceremonies. These are illustrated dramatically by **Le Tuc d'Audoubert** Cave in Ariège, France, where two carefully modeled clay bison lie in a remote, low-ceilinged chamber far from the entrance, placed against a rock (see Figure 1.1). The bison are about one-sixth the full size, shaped with a skilled artist's fingers and a spatula, the eyes, nostrils, and other features marked with a pointed object. Ancient human heel marks can be seen around the figures in this remote and dark chamber. In many other caves, paintings and engravings are far from daylight. There are several instances in which the footprints of both adults and children are preserved in damp clay, perhaps left by small parties of initiates who attended ceremonies in remote subterranean chambers. Some caves may also have been chosen for their echoes and other resonant effects.

Upper Paleolithic art defies easy interpretation, for the symbolic messages it communicates come from a world that is remote from our own. Yet the paintings and engravings still seem to come alive and appear larger than life when seen by modern candlelight flickering in the intense darkness. Did the artists paint art for art's sake, as some art historians and archaeologists believe? Or were they symbolically killing their prey before setting out on the chase? For others, such ideas seem too simplistic.

It is often argued that Cro-Magnon art was highly spiritual and linked with shamanistic practices. **Shamans**, priests or spirit mediums (the word comes from the Siberian Tungus word *saman*, meaning "priest"), are, according to some researchers, important members of many forager and subsistence farming societies. They are individuals perceived as having unusual spiritual powers, the ability to cross over into the world of the gods and ancestors. Through trance and chant, they would intercede with the ancestors and define the order of the world and the creation—the relationship between the living and the forces of the environment. Perhaps, argue some experts, much of the cave art was involved with shamanistic rituals, the animal figures being images of spirit creatures or the life force for the shamans. Hand impressions on cave walls may reflect a common practice—perhaps to obtain supernatural power from the supernatural forces that lurked behind the rock face.

Others, however, argue that the shamanistic interpretations of rock art lack support—with little evidence of such practices in recent time, let alone in the remote past. Instead such researchers prefer to observe how many modern hunter-gatherer groups use their art to communicate far more everyday aspects of daily life—from documenting social relationships to village planning. In this scenario, the prehistoric hand impressions, for example, might be seen as personal signatures of sorts, rather than ritual communication with the gods. Whatever the true interpretation, or interpretations, the Cro-Magnon rock art certainly has the potential to move and awe the modern viewer.

Site

Grotte de Chauvet, France

On December 18, 1994, three French cave explorers with an interest in archaeology crawled into a narrow opening in the Cirque de Estre gorge in the Ardèche region of southeastern France. They felt a draft flowing from a blocked duct, pulled out some boulders, and lowered themselves into a network of chambers adorned with exquisite calcite columns. To their astonishment, their lights shone on human hand imprints, then paintings of mammoths, cave lions, and other animals. The three explorers were "seized by a strange feeling. Everything was so beautiful, so fresh, almost too much so. Time was abolished, as if the tens of thousands of years that separated us from the producers of these paintings no longer existed" (Chauvet, Deschamps, and Hillaire, 1996, p. 42).

The Grotte de Chauvet is a series of painted and engraved chambers undisturbed since the late Ice Age. Hearths on the floor look as if they had been extinguished the day before. Flaming torches have been rubbed against the wall to remove the charcoal so they would flare anew. More

Figure 4.9 Wild horses, oxen, and rhinoceroses painted by late Ice Age Cro-Magnon people on the walls of the Grotte de Chauvet, southwestern France, from ca. 36,000 to 24,000 years ago.
(Arterra Picture Library/Alamy)

than 300 paintings adorn the walls (Figure 4.9). They include a frieze of black horses, wild oxen with twisted horns, and two rhinoceroses facing one another. The horses have half-open muzzles; the eyes are depicted in detail. There are lions, stags, and engravings of an owl, animals never before seen in painted caves, covering an area of more than 10 meters (30 feet). A little farther on in the chamber lies a slab that has fallen from the ceiling. A bear skull has been set atop it. The remains of a small fire lie behind it. More than 30 calcite-covered and intentionally placed bear skulls surround the slab. A 10-meter (30-foot) frieze of black figures dominated by lions or lionesses (without manes), rhinoceroses, bison, and mammoth lies in an end chamber, a human figure with a bison head standing to its right. The discoverers wrote that it "seemed to us a sorcerer supervising this immense frieze" (Chauvet, Deschamps, and Hillaire, 1996, p. 110). The artists were masters of perspective, overlapping the heads of animals to give the effect of movement and numbers. They even scraped some of the walls before painting them to make the figures stand out better. They would spread the paint with their hands over the rock, obtaining values that showed dimension and color tonality.

AMS radiocarbon dates (see "Accelerator Mass Spectrometry (AMS) Radiocarbon Dating" box in Chapter 5) from two rhinoceroses and a large bison point to a 1,300-year period around 34,000 BC, making these paintings the earliest securely dated art in the world. Two more dates from torch smears on the walls are around 24,500 BC, while two charcoal samples on the floor gave readings of about 22,500 BC, suggesting that humans visited Chauvet on several occasions over at least 10,000 years. Whether they painted over that long period is still unknown, but AMS dates will ultimately produce some answers.

Grotte de Chauvet was a bear cave, a place where these powerful animals hibernated. Interestingly, many of the animals on the cave walls represent dangerous members of the late Ice Age bestiary: the bear and the lion, the mammoth, rhinoceros, and bison, and even occasionally the nimble and ferocious aurochs. Perhaps human visitors to the cave, with its claw marks, hollows, prints, and scattered bones, came to the chambers to acquire the potency of the great beast, whose smell probably lingered in the darkness.

Some of the art may also have been associated with initiation rites, the journey through dark passages adding to the disorienting ordeal of initiation. Almost certainly, the art was a way of transmitting environmental and other knowledge from one generation to the next. Australian Aborigines, for example, commit to memory vast quantities of information about their territory that is closely tied to the mythical and symbolic world of their ancestors. Many of these data are vital to survival, constantly imparted to the young in ceremonies and rituals.

Hunter-Gatherers in Eurasia (from 45,000 to 15,000 Years Ago)

The open steppe-tundra plains that stretched from the Atlantic to Siberia were a far harsher environment than the sheltered valleys of southwestern Europe. To live there permanently, late Ice Age people had to find sheltered winter base camps and have both the technology to make tailored, layered clothing with needle and thongs and the ability to build substantial dwellings in a treeless environment. Small numbers of big game-hunting groups lived in the shallow valleys that dissected these plains before the glacial maximum 18,000 years ago, and as early as 45,000 BP. Thereafter, the human population rose comparatively rapidly, each group centered on a river valley where game was most plentiful and where plant foods and fish could be found during the short summers. It was here that the most elaborate winter base camps lay. One such base camp lay at **Mezhirich** on the Dnieper River, a complex of well-built, dome-shaped houses fashioned of intricate patterns of mammoth bones. The outer retaining walls were made of patterned mammoth skulls, jaws, and limb bones. The completed oval-shaped dwellings were about 4.8 meters (16 feet) across, roofed with hides and sod, and entered through subterranean tunnels. The use of mammoth bone for houses was a logical strategy in a largely treeless environment. One estimate has it that it would have taken some 15 workers about 10 days to build a Mezhirich dwelling, much more effort than would have gone into a simpler base camp or hunting settlement.

Olga Soffer believes that groups of about 30–60 people occupied these base camps for about six months of the year. Mezhirich was but one of several important base camp locations in the Ukraine, sites that contain the bones of a greater variety of game animals than smaller, more specialized settlements (see Figure 4.10). The mammoth bone dwellings also yielded many bones from fur-bearing animals like the beaver, and exotic materials and ornaments such as shiny amber from near Kiev and shells from the Black Sea, far to the south. The items from afar exchanged between neighboring communities were predominantly nonutilitarian, luxury goods that had social and political significance. Much of the trade may have been ceremonial, a means of validating important ideologies and of ensuring exchange of information and cooperation in daily life, just as it was elsewhere in the late Ice Age world at the time.

Late Ice Age groups settled much of the steppe-tundra as far east as Lake Baikal in Siberia, not through a deliberate process of migration, but as a result of the natural dynamics of forager life. The tundra hunters lived in small, highly flexible bands. As the generations passed, one band would coalesce into another, and sons and their families would move away into a neighboring and empty valley. In time, a sparse human population would occupy thousands of square kilometers of steppe-tundra,

Figure 4.10 Artist's reconstruction of two mammoth bone houses at Mezhirich, Ukraine. (Jack Unruh/National Geographic Creative)

concentrated for the most part in river valleys, at times venturing out onto the broad plains, and always on the move. It was through these natural dynamics of constant movement, extreme social flexibility, and opportunism that people first settled the outer reaches of Siberia and crossed into the Americas.

North and east of Lake Baikal, the steppe-tundra extends all the way to the Pacific, the home of more late Ice Age hunting groups known from a handful of settlements along lake shores and in river valleys. They are part of a widespread late Ice Age cultural tradition that reflects a varied adaptation by *H. sapiens* to an enormous area of central Asia and southern Siberia from well west of Lake Baikal to the Pacific coast. But where did these Siberian hunters come from? Did they originate in the west, or were their cultural roots in China to the south? These questions have a direct bearing on one of the most debated questions of world prehistory—the date of the first Americans.

East Asia (from 35,000 to 15,000 Years Ago)

We know enough about prehistoric Asia to realize that this was not a backward, peripheral region of the late Ice Age world. We cannot just argue that big game hunters from the Ukraine and the western steppe tundra migrated steadily northeastward into Siberia and then into the Americas. Rather, the spread of modern humans into central Asia, northern China, and the extreme northeast was a complex process that began at least 40,000 years ago.

Many biological anthropologists assume that *H. erectus*, originally a tropical and subtropical animal, settled in the warmer southern parts of China first, then radiated northward into more temperate environments. But how far north? Not until just before 35,000 years ago do a few signs of human settlement appear along the banks of the Huang Ho River in the arid grasslands of Mongolia. Open landscapes such as this and the neighboring steppe-tundra could support only the sparsest of forager populations, people who placed a high premium on mobility and portable tool kits. They were some of the first of the late Ice Age people to develop diminutive microliths.

The **microlith** (a term derived from the Greek *micros*: "small" and *lithos*: "stone") is a highly distinctive artifact, manufactured from carefully prepared wedge-shaped, conical, or cylindrical cores (Figure 4.11). By their very size, microliths were designed to be mounted in antler, bone, or wooden shafts to serve as spear barbs, arrow points, or small knives and scraper blades. Such diminutive artifacts came into use almost everywhere

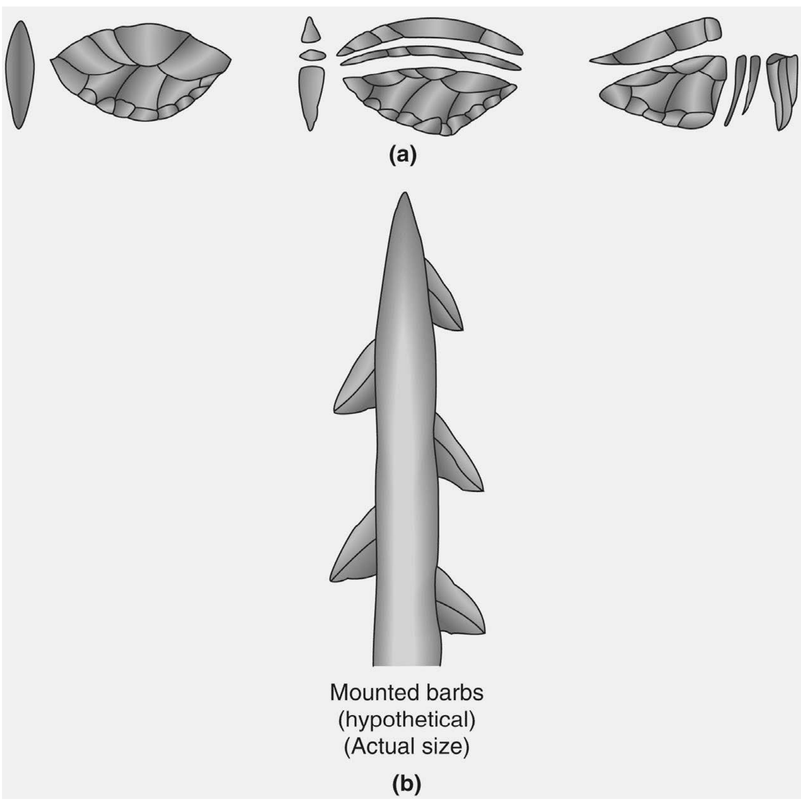


Figure 4.11 Microlith technology. (a) Siberian microblade artifacts were made by striking small blades of a wedge-shaped core, which produced fine, sharp artifacts that could be mounted on spears or in bone heads. (b) Later microliths used after the Ice Age were made by notching and snapping blades.

in the post-Ice Age world, for they were highly adaptive when used with slender wooden arrow shafts or with stout wooden handles. They first appear in a crude form in northern China at least 30,000 years ago, were in widespread use by 25,000 to 20,000 years ago, and soon became popular in the arid open country of the steppe-tundra, an area where high mobility and portable tool kits were at a premium. A somewhat similar microblade technology developed in Siberia late in the Ice Age.

We do not know, however, whether the first human inhabitants of Northeast Asia were people with such diminutive tool kits, or whether they used a heavier weaponry that included stone-tipped spears with sharp projectile points. Unfortunately, the archaeology of northern China, northeastern Siberia, and Alaska is little known because harsh environmental conditions make fieldwork possible for a mere two months or so a year in many places. We can only guess at a possible scenario for the first settlement of this vast area and of the Americas.

Sinodonty and Sundadonty

That the first Americans came from Siberia is unquestionable, but their ultimate ancestry is a matter of much debate. Christy Turner (2002) of Arizona State University studied the dental characteristics of Native American populations and compared them to other groups in the Old World. He showed that the crowns and roots of human teeth give clues to the degree of relationship between prehistoric populations. These tooth features are more stable than most evolutionary traits, with a high resistance to the effects of environmental differences, sexual distinctions, and age variations. In particular, he focused on a pattern of specialized tooth features he calls **Sinodonty**.

Sinodont hallmarks include incisor shoveling (the scooped-out shape on the inside of the tooth), double-shoveling (scooping out on both sides), single-rooted upper first premolars, and three-rooted lower first molars. Sinodonty is characteristic of all Native Americans. They share this feature with northern Asians, including northern Chinese. The morphological difference between Sinodonts and the other Mongoloid populations, whom Turner labeled **Sundadonts**, is so great that he believed Sinodont populations from northern Asia settled Siberia and the Americas. It was in China, he believed, that Sinodonty evolved, at least 40,000 years ago. The problem is to find the archaeological sites to confirm his theory.

Human Settlement of Northeast Siberia (before 25,000 to 15,000 Years Ago)

If the ancestry of the first Americans lies in Siberia, what, then, is the earliest evidence for human settlement in extreme Northeast Asia? The earliest known settlement is on the Yana River, only 140 kilometers (87 miles) from the Arctic Ocean. Here people hunted mammoth, wild horse, and other animals as early as 25,000 to 27,000 years ago, during a period of slightly warmer conditions than the last extreme cold snap of the late Ice Age, the Late Glacial Maximum (LGM), when far Northeast Asia was probably depopulated. Temperatures were about five degrees Celsius cooler than today, the aridity was extreme, and animal and plant productivities were too low to sustain human populations. Small numbers of hunter-gatherers seem to have reoccupied extreme Northeast Asia when conditions warmed after 18,000 years ago. Some of the earliest evidence of later human settlement comes from the **Dyuktai Cave** in the Middle Aldan Valley. There, Russian archaeologist Yuri Mochanov found 14,000- to 12,000-year-old mammoth and musk ox bones associated with flaked-stone spear points, burins, microblades, and other Upper Paleolithic tools. The best dated Dyuktai-like site is **Verkhne-Troitskaya**, also on the Aldan River, which has been radiocarbon dated to about 18,000 years ago. Subsequently, archaeologists have found microblades and characteristic wedge-shaped cores over a wide area of Northeast Asia, across the Bering Strait in Alaska, and as far south as British Columbia.

With its microblades and wedge-shaped cores, the Dyuktai culture has plausible links with widespread microblade cultures to the south, in China. A case can be made, then, for linking Dyuktai cultural traditions with northern China, where Sinodonts have been found, as well as with microblade finds in Alaska and British Columbia. Were the Dyuktai people thus the first Americans? Almost certainly not, for recent discoveries in Alaska have shown that foragers without microlithic tool kits flourished in the far north of North America just after the end of the Ice Age. How did they get there, given the savagely cold conditions in a region that geologists named Beringia, a vast landmass that extended from Siberia to Alaska across the low-lying Bering Land Bridge that linked the two continents?

For generations, scientists have assumed that the Bering Land Bridge was a steppe-tundra-covered, bitterly cold, dry, and windy landscape during the LGM. New research using deep sea cores and island-based drillings in the Bering Strait has painted a different picture. Thanks to the oceanic influence of the North Pacific circulation, somewhat warmer and moister conditions marked the heart of the Land Bridge. We know that humans lived in this refuge, not because of archaeological sites, but because of genetic data collected from modern northern populations. We know that the Native Americans are descended from groups that were isolated from their mainland Siberian ancestors during the LGM. As the climate warmed up after 16,000–17,000 years ago, animal and plant productivity throughout Beringia soared and people once again could expand into hitherto inhospitable areas. They followed the expanding scrub tundra east and west, not only back into Siberia but also into what is now Alaska. A few archaeological sites on higher ground on either side of the Bering Strait document a human presence around 14,000–15,000 years ago. On the American side, much population movement depended on the retreat of the gigantic LGM ice sheets that had mantled much of northern North America from the Atlantic to the Pacific. This scenario, which envisages a sparse human population, perhaps as many as 10,000 people, or many fewer, confined to the Land Bridge refugium, is known as the "Beringian Standstill Hypothesis." It is largely theoretical, but seems to dovetail with the existing facts.

The First Americans (before 15,000 Years Ago to 11,000 BC)

We know almost nothing about the very first Americans, but, judging from sparse archaeological finds on either side of the Bering Strait, they were what are often called broad-spectrum hunters, who subsisted off a very broad range of animal, maritime, and plant foods and exploited large hunting territories. They certainly moved over wide areas by land and perhaps also traveled using skin-clad watercraft. The weight of the available evidence and the Standstill Hypothesis both support a date for first settlement around 15,000 years ago, perhaps a little earlier, immediately after the LGM.

Under this scenario, small groups of hunter-gatherers moved into an ice-encircled Alaska just as temperatures were warming and the mantle of vast ice sheets that effectively blocked access to the heart of North America was beginning to retreat. The ice retreat accelerated. By 17,000 years ago, the Cordilleran ice sheet that mantled western North America had retreated from the Pacific coast, opening a coastal route to the south. By 14,000 BP, the Cordilleran and Laurentide ice sheet to the east had at least partially separated, opening a widening ice-free corridor south into the mid-continent. Which route, then, did the first settlers take? Were they maritime-adapted people, who came down exposed continental shelves along the Pacific coast in the west, or were they terrestrial hunter-gatherers, accustomed to subsisting in harsh, rugged terrain? At this stage in research, we simply do not know, in part because rising sea levels have covered any early settlements along the Pacific coast. The earliest sites there, from higher ground on Haida Gwaii (the Queen Charlotte Islands in British Columbia), date to around 13,000 years ago.

One thing is certain. Small human groups exploded into the areas south of the ice sheets with remarkable speed, exploiting what was to them a land flowing with milk and honey. A handful of sites document this rapid diaspora after about 15,000 years ago, among them **Meadowcroft Rock**

Shelter in Pennsylvania, **Fort Rock Cave**, Oregon, and **Arlington Springs** on Santa Rosa Island in Southern California. Some human feces from **Paisley 5 Mile Caves** in Washington State's Cascade Mountains date to about 12,300 years ago. There are scattered locations in Central and South America, among them **Valsequillo** in Mexico, **Taima-Taima** in Venezuela, and Huaca Prieta on the Peruvian coast. Further south, in northern Chile, Tom Dillehay has uncovered a remarkable settlement on the edge of a stream. **Monte Verde** was occupied by foragers living in simple wooden dwellings between 11,800 and 12,000 BC (see "Monte Verde, Chile" box).

After about 9200 BC the trickle of archaeological sites turns into a flood. There are now traces of **Paleo-Indian** (Greek *paleos*: "old") settlement between the southern margins of the ice sheets in the north and the Straits of Magellan in the far south. (The term *Paleo-Indian* is conventionally used to refer to the prehistoric inhabitants of the Americas from earliest settlement up to the beginning of the **Archaic** period in about 6000 BC).

Site

Monte Verde, Chile

Monte Verde lies in a small river valley in southern Chile, a streamside settlement covered by a peat bog, so that not only stone and bone but also wooden artifacts survive. Tom Dillehay has excavated the site very thoroughly, and it has been radiocarbon dated to as early as between 12,220 and 11,390 BC. Thus far, only a portion of the site has been excavated, revealing two parallel rows of what are said to be rectangular houses joined by connecting walls. The skin-covered houses were 3–4 meters (9–13 feet) square, with log and crude plank foundations and a wooden framework. Clay-lined hearths, wooden mortars, and large quantities of vegetable foods were found in the houses. A short distance away lay a wishbone-shaped structure associated with chewed bolo plant leaves (used today to make a form of medicinal tea), mastodon bones, and other work debris. This may have been a work area.

The Monte Verde people exploited a very wide range of vegetable foods, including wild potatoes; they also hunted small game and perhaps mammals such as extinct camels and mastodons (it is possible that they scavenged such meat, however). Apparently, they also chewed seaweed from the Pacific coast 34 miles (55 kilometers) to the west. Monte Verde was in a forest, with abundant vegetable foods year round. The site was almost certainly a long-term campsite. What is fascinating is that 90 percent of the stone artifacts are crude river cobbles. It is clear that wood was the most important raw material. It was certainly used for spears and digging sticks and for hafting stone scrapers, three of which have survived in their wooden handles. Sites yielding simple flaked-stone artifacts like those from Monte Verde have been found elsewhere in South America, as far south as Patagonia, but this is the first place that anyone has been able to make more complete discoveries.

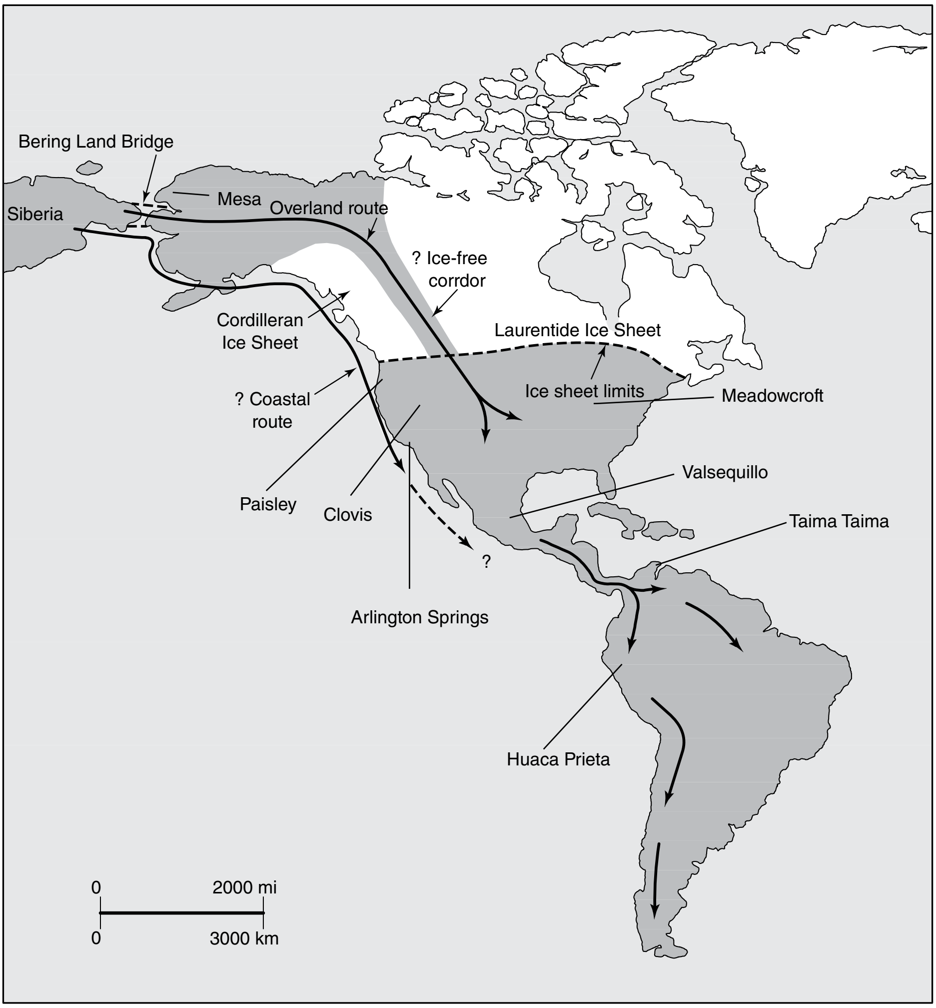


Figure 4.12 Hypothesized routes for the first settlement of the Americas. Coastal routes are now buried under the higher sea levels of modern times.

How, then, did Paleo-Indians travel southward from the arctic to the heart of North America (Figure 4.12)? Were they big game hunters who followed small herds of animals southward through a widening corridor between the two great North American ice sheets to the east of the Rockies as the ice sheets melted? Or were the first Americans expert sea mammal hunters and fisherfolk, who crossed from Siberia along low-lying coasts in canoes while fishing and sea mammal hunting? Did their successors then travel southward along the Pacific coast into more temperate waters? Again, fierce controversy surrounds what is virtually nonexistent archaeological evidence. Perhaps both coastal settlement and terrestrial occupation took hold in the rapidly changing world of the late Ice Age. We simply do not know, partly because the coastal sites of the day are buried many meters below modern sea levels.

At present, the consensus of archaeological opinion favors a relatively late human occupation of the Americas at the very end of the Ice Age, but it is entirely possible that this scenario will change dramatically as a result of future research—particularly since the current DNA evidence is suggesting a first settlement as early as 23,000 years ago. But why did first settlement take place? In all probability, the first Americans were behaving in the same way as other animal predators. They spent their days tracking the game herds, and perhaps sea mammals, that formed an important part of their subsistence, and when Siberian game herds moved onto the Bering Land Bridge during the coldest millennia of the last glaciation, their human predators followed. The higher ground to the east—Alaska—formed part of the same hunting grounds once temperatures warmed and they could move out of their refuge on the Bering Land Bridge.

The Clovis People (from ca. 11,200 to 11,000 BC)

The earliest well-documented Paleo-Indian settlement is associated with the distinctive **Clovis** fluted point (Figure 4.13). The Clovis tradition, named after a town in New Mexico, once flourished in various forms over

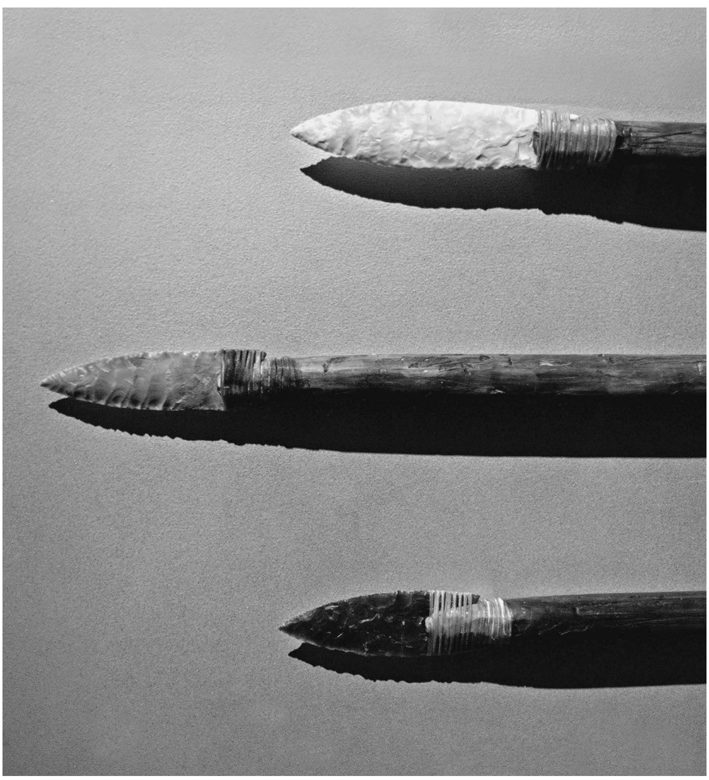


Figure 4.13 Mounted Clovis points, in modern spear shafts. (Robert McGouey/Alamy)

much of North and Central America from about 11,200 to 11,000 BC. Clovis may be an indigenous North American cultural tradition, but its roots lie in northern forager cultures such as those that flourished in Alaska at such locations as the **Hidden Mammoth** and **Mesa** sites as early as 11,800 BC, where foragers used simple bifacial spear points in the chase. These locations, little more than tiny scatters of bones, hearths, and stone artifacts, are the earliest evidence for human settlement in Alaska and have no direct equivalents in earlier traditions such as Dyuktai in Siberia.

Clovis is best, and misleadingly, known from occasional mammoth and bison kills on the North American plains. These plains expanded at the end of the Ice Age, their short grasses providing ample feed for all kinds of big game, including bison, mammoth, and other ruminants. Clovis bands on the plains preyed on these and many other game species, large and small. They were constantly on the move, often camping along rivers and streams and close to permanent water holes. Here they killed their prey, camping near where the carcass lay.

It would be a mistake, however, to think of the Clovis people as purely big game hunters. They settled not only on open grasslands but also in woodlands, tundra, deserts, and along sea coasts. In some areas, wild plant foods were probably as important as, if not more important than, game. Fish and sea mammal hunting may also have assumed great local importance, especially along rising coastlines. But wherever Clovis people and their contemporaries settled, large game was of some importance, simply because it was a relatively abundant meat source.

Nowhere were Clovis populations large. Their tool kit was highly portable, based on an expert stone-flaking technology that produced fine, **fluted** points. The hunters mounted these on long wooden shafts, sometimes attaching the head to a detachable foreshaft that acted as a hinge. When the spear penetrated an animal, the foreshaft would snap off, ensuring that the lethally sharp point stayed in the wound. Like other later Paleo-Indian groups, and like Ice Age hunters in the Old World, the Clovis people hunted their prey on foot, relying on their stalking skill and the accuracy of their throwing sticks (**atlatls**) to dispatch their quarry.

The origins of the Clovis people remain a complete mystery. However, most experts believe their ultimate beginnings were among late Ice Age forager populations in Alaska and Northeast Asia. If the first Americans crossed into the New World about 15,000 years ago, then the peopling of the uninhabited continent took place remarkably quickly. By 10,000 BC, Stone Age foragers occupied every corner of the Americas. The overall human population probably numbered no more than a few tens of thousands, but they had adapted to every form of local environment imaginable.

By this time, the last glaciation was long over and the great ice sheets of the north were in rapid retreat. Climatic conditions were warming up rapidly, and many species of Ice Age big game vanished. The descendants of the first Americans adapted to these new circumstances in very diverse ways, along trajectories of cultural change that led, ultimately, to the brilliant array of Native American societies that Europeans encountered in the late fifteenth century AD.

With the first settlement of the Americas, the great radiation of *H. sapiens*, the wise person, was nearly complete. This was the second great radiation of humanity, the climactic development of world prehistory. From it stemmed not only the great biological and cultural diversity of modern humankind but also food production, village life, urban civilization, and the settlement of the Pacific Islands—the very roots of our own diverse and complex world.

Summary

- This chapter documents the spread of *H. sapiens* into Europe and Eurasia from Africa and Southwest Asia after 45,000 years ago, during the late Ice Age.
- By this time, specialization and flexibility in human hunting and foraging were increasing, as anatomically modern humans replaced Neanderthal groups after 45,000 years ago.
- The sheer diversity of the late Ice Age environment gave the "Cro-Magnon" people of Western Europe great flexibility. These modern humans developed more complex societies and elaborate bone and antler technology, as well as an intricate symbolic life reflected in their artistic traditions.
- These traditions reached their apogee in the Magdalenian culture, which flourished after 18,000 years ago and for about 6,000 years.
- Late Ice Age hunter-gatherers also spread onto the Russian plains by 45,000 years ago, relying heavily on game of all kinds.
- Far to the northeast, Siberia was settled at least as early as 25,000 years ago, but the extreme northeast was probably abandoned during the last cold of the late Ice Age, then reoccupied around 15,000 years ago.
- The first humans to settle the Americas crossed from Northeast Asia, probably across, or along the coasts of, the Bering Land Bridge (central Beringia), but the date of their arrival is still uncertain.
- Most experts believe that first settlement occurred much later, perhaps at the very end of the Ice Age, as early as 15,000 years ago. Evidence exists for human occupation in Chile by 13,000 years ago, while the Clovis people of North America flourished between 11,200 and 10,900 BC.

Further Reading

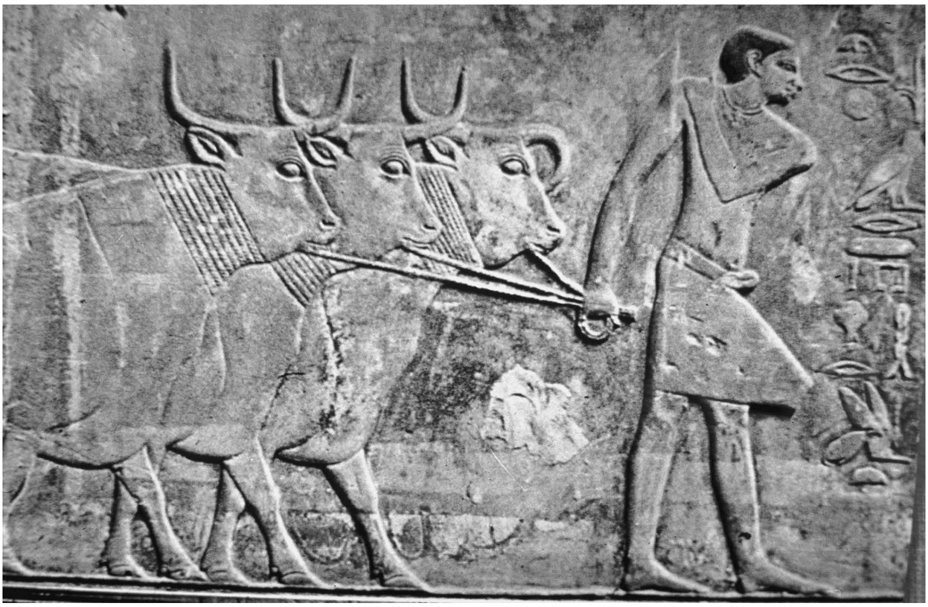
Chris Stringer, *Lone Survivors: How We Came to Be the Only Humans on Earth* (New York: St. Martin's Griffin, 2013) is a useful popular summary. For Australia and New Guinea, see Derek Mulvaney and John

Kamminga, *Prehistory of Australia* (Washington, DC: Smithsonian Institution Press, 1999). Brian Fagan, *Cro-Magnon* (New York: Bloomsbury Press, 2010) summarizes the first modern settlement of Europe. Paul Bahn and Jean Vertut, *Images of the Ice Age* (New York: Viking, 1988) is an invaluable analysis of Stone Age art.

Eurasia: John Hoffecker, *Desolate Landscapes* (New Brunswick, NJ: Rutgers University Press, 2001). The first Americans: David Meltzer, *First Peoples in a New World: Colonizing Ice Age America* (Berkeley: University of California Press, 2009).

Chapter 5

The Origins of Food Production



A herdsman leads cattle, depicted on the wall of the tomb of Ptahhotep, a vizier (first minister) of the V dynasty (ca. 2500 BC). The vizier was famous for his wisdom.
(The Print Collector/Alamy)

Chapter Outline

Prologue

The men climb high above the ground, lopping off small branches with their stone-bladed axes. The women and children gather up the foliage and pile it around the bare tree trunks. It is hard, backbreaking work that goes on for days on end, as the farmers watch the brazen sky for thunderclouds and signs of rain. A few spits of rain and building clouds bring hope of imminent showers. The people fire the tinder-dry brush, which burns fiercely. The sky fills with dense brown smoke as far as the eye can see, as the women turn over the fresh ash into the cleared soil and plant their precious seed. Then everyone waits for the life-giving rains to conjure bright green shoots from the soil.

It's hard for us to imagine, buying our food from supermarkets, that for more than 99 percent of our existence as humans we were hunters and gatherers, tied to the seasons of plant foods, the movements of game, and the ebb and flow of aquatic resources. Agriculture, the deliberate cultivation of cereal grasses and edible root plants, is a phenomenon of the past 12,000 years of human existence. Agriculture and animal domestication ("food production") were a major turning point in human history, the foundation for all early civilizations and, ultimately, for our own modern industrial world. Before describing the development and spread of farming, we must examine some of the major theories that explain this development and review some of its consequences. Also, we must describe the intensification of hunter-gatherer societies that came immediately after the Ice Age (Figure 5.1).

Serious discussion of the origins of food production began in the 1930s. Australian-born archaeologist Vere Gordon Childe was an eccentric genius who regarded artifacts and archaeological sites as the equivalent of historical documents and actual characters on the ancient world stage. Childe's main claims to fame were an encyclopedic knowledge of the clay and metal tools of Europe and southwestern Asia and a priceless ability to write popular accounts of the prehistoric past. To Childe, southwestern Asia, from Turkey to the Nile Valley and Mesopotamia, was the cradle of both farming and early civilization. In his famous syntheses of the origins of civilization, he wrote of two great revolutions in the early human past. The **Agricultural** (or **Neolithic** [New Stone Age]) **Revolution** resulted from the development of village farming, followed a few thousand years later by the **Urban Revolution** and the beginnings of cities, writing, metallurgy, and literate civilization.

The notion of agricultural and urban revolutions appealed to historians of his day like George Trevelyan and Will and Ariel Durant, who adopted V. Gordon Childe's revolutions for the early chapters of their widely read world histories. The revolutions were convenient labels,

Figure 5.1 Map showing archaeological sites and major centers of food production mentioned in this chapter and Chapters 6 and 7.

Chronological Table B

Years B.C. + B.P.	*Africa*	*Middle East Europe*	*South/Southeast Asia*	*China*	*Americas* *North*	*Americas* *Central/ South*	*Ice Age events*
3000 B.C.		First cities in Mesopotamia	Rice cultivation	Rice cultivation		Maize in Mexico	
4000 B.C.	Pre-dynastic Egypt	'Ubaid culture					Holocene
5000 B.C.					Archaic Foragers		
6000 B.C.	Cattle in the Sahara Desert	Farming in Europe Çatalhöyük Jarmo Jericho Abu Hureyra; Ali Kosh	Foragers	Foragers			
8000 B.C.	Foragers; Farming in Egypt				Clovis	Paleo-Indian cultures	
10,000 B.C.		Mesolithic cultures		Diuktai			
20,000 B.C.		Magdalenian Mezhirich; Cro-Magnons in Europe		Microblade cultures in China	? First settlement		Würm glaciation
30,000 B.C.			Offshore voyaging in Solomon Islands				
40,000 B.C.		Mousterian					
50,000 B.C.							

just like the Industrial and Information Revolutions we talk about today. To archaeologists, the term **Agricultural Revolution** is a simplistic designation, long outdated by a flood of new field data unavailable in Childe's day. However, the term does have merit in the sense that it draws attention to a catalytic development in the human past and, above all, to its consequences. Animal and plant domestication had important outcomes for humankind—new economies and great interdependence, permanent settlement, and more complex social organization, accelerating population growth, and increasing social inequality—to mention only a few.

Studying Ancient Climate Change

Climate change has affected human societies since the beginning. In Chapter 2 (see also Table 2.1), we described the constant fluctuations between arctic cold (glaciations) and warmer periods (interglacials). There is, as we said, evidence for at least nine glacial periods, identified from deep sea cores, ice cores, and other approaches. Our remote ancestors adapted successfully to long-term Ice Age climate change over tens of thousands of years when human population densities were much lower and people lived in relatively small bands. They adapted by moving, as part of lifeways that revolved around seasonal foods and constant movement over large territories.

By the end of the last glaciation, between 15,000 and 12,000 years ago, global populations were rising gradually, the world was becoming more crowded, and mobility, while still an option, became harder to achieve, especially in favored areas, where population densities were higher than usual. Ice sheets retreated and melted, while sea levels rose irregularly to near-modern levels, by 6000 BC. From the archaeologist's point of view, timescales are now much shorter. Studying often complex adaptations to short-term climate changes depends on very fine-grained climatic data, something that has only become available in recent years, thanks to a revolution in paleoclimatology, the study of ancient climate.

A variety of methods provide most of the detailed climatological data for the past 12,000 years. The main approaches are:

Ice cores from Greenland, the Andes, and elsewhere provide records of ancient temperatures and go back 800,000 years in Antarctica. They also yield information on carbon levels in the atmosphere.

Cave stalagmites throw light on rainfall fluctuations and droughts. They are being used in the American Southwest and northern China, among other places.

Coral rings are also a source of information on changing temperatures.

Lake cores bored into the deposits of freshwater lakes—the freshwater equivalent of deep-sea cores—can be a mine of information on drought cycles. They have been used to identify a series of 50-year drought periods that played a role in the collapse of much of ancient Maya civilization in lowland Mesoamerica during the tenth century AD.

Pollen analysis (Palynology) uses minute fossil plant pollens to study general vegetational changes like the spread of forests across Europe after the Ice Age, also minute shifts, documented in archaeological sites where they are preserved. They are also used to study the impact of cultivation on local environments through the presence of cultivation weeds.

Tree-rings (dendrochronology) chronicle changes in rainfall recorded in the annual growth rings of some tree species, notably sequoias and oaks. In Europe, tree-ring data extend back 8,000 years and are often precise to within a season. Tree-rings have provided invaluable data on the impacts of drought in the American Southwest. They have even been used to date the wood of a Stradivarius violin.

These are the major among a wide variety of approaches to ancient climate. Thanks to these research works, we now know that short-term climate change was a major player in what happened in human history. No one argues that climate "caused," say, the switchover to agriculture from hunting and gathering, or the collapse of Maya or other states. But there is no question that climate change had a major impact on how humans adapted to all kinds of environments. We describe some of these changes in later chapters.

The most important climatic events other than the changes in seasons are El Niños, the so-called "Christmas child," which result from warm water accumulating in the central Pacific that moves east. Weather patterns are reversed; heavy rain falls in the Peruvian desert and in Central America and California, while droughts plague other areas of the world, notably northeast Brazil and Africa. Intensive studies of El Niños have included excavations that have revealed the drastic effects on such coastal Andean states of the Moche of Peru's north coast. Their extensive irrigation works were inundated and destroyed, which had serious impacts on the state and its rulers. Again, we describe these events below.

As more and more data become available, we will learn much more about the local impacts of climate change in every part of the world. These researchers show us that many of the effects of warming and other climatic shifts are local, even if many of them, like widespread droughts and El Niños, have global consequences. In studying the impact of ancient climate, archaeologists rely heavily on multidisciplinary research, as they show that an understanding of ancient climate is important background for studying our own warming world.

The Holocene (after 10,000 BC)

Some 15,000 years ago, the great ice sheets began to retreat, at times very rapidly, ushering in postglacial times, often called the **Holocene** (Greek *Holos*: "recent").[1] At the same time, world sea levels rose dramatically, if irregularly, from their previous lows up to 90 meters (300 feet) below modern levels, leading to major changes in world geography.

The chilly waters of the Bering Sea flooded central Beringia and separated Siberia and Alaska by 11,000 BC. Sunda in Southeast Asia became an enormous archipelago. Britain became an island and the North Sea and Baltic assumed their modern configurations. The most striking climatic and vegetational transformations took place in northern latitudes, in areas like Western and Central Europe and in regions of North America contiguous to the great ice sheets. Only 9,000 years after the Scandinavian ice sheet began retreating, forests covered much of Europe. Major vegetational changes took place in warmer latitudes, too. Rainfall patterns changed at the end of the Ice Age, bringing large, shallow lakes and short grasslands to the Sahara. As late as 6000 BC, hunter-gatherer populations flourished in the desert, in areas that are now arid wilderness.

In southwestern Asia, warmer conditions saw the immigration of new plant species into highland areas such as the Zagros Mountains in Iran, among them wild cereal grasses. Their distribution expanded dramatically, to the point that wild wheat and barley became important staples for hunter-gatherer groups in the highlands and fertile river valleys like the Euphrates. Far away, in Mexico, rising temperatures brought a rich forest of cacti and legume trees to mountain valleys of the central highlands. This thorn-scrub-cactus forest included many wild ancestors of domesticated plants, among them maguey, squash, bean, plus teosinte, the annual grass that was probably the ancestor of maize, the crop that was to become one of the staples of Native American life.

Changes in Hunter-Gatherer Societies

These and other Holocene climatic changes had profound effects on hunter-gatherer societies throughout the world, especially on the intensity of the food quest and the complexity of their societies. So did natural population growth. By 15,000 years ago, the world's population was probably approaching about 10 million people. Except in the most favored areas, like southwestern France, the Nile Valley, and parts of the North American Midwest, late Ice Age environments were incapable of supporting anything but the sparsest of human population densities—well under one person per square kilometer. As a result, in early Holocene times, after 10,000 BC, still-rising human populations began to match the ability of the world's environment to support them as hunter-gatherers. It was no longer possible to solve a subsistence problem simply by moving elsewhere. People began to exploit a wider range of food resources with greater efficiency, both to avert starvation and to protect themselves from food shortages caused by short-term droughts and other unpredictable changes. In time, hunter-gatherer societies underwent profound adaptation and, in some areas, acquired greater complexity.

Nowhere can these changes be seen more clearly than in the Americas, settled by Stone Age hunter-gatherers either during or immediately after the Ice Age (see Chapter 4). By 11,000 BC, the big game that formed a staple part of their diet was extinct. The Paleo-Indians responded to changed circumstances by developing ever more intensive and specialized ways of exploiting local environments. The change is especially marked in areas of exceptional resource diversity like parts of the West Coast, the Peruvian coast, and the fertile river valleys of the southern Midwest and southeastern United States. In all these areas, hunter-gatherer populations became more sedentary; developed specialized technologies for hunting, foraging, and fishing; and in the process developed some form of social ranking.

The famous **Koster** site in the Illinois River valley provides a chronicle of this process of intensification taking place over many thousands of years, from about 7500 BC until AD 1200 (Figure 5.2). The first visitors were Paleo-Indian hunters who camped on the edge of the valley. About 6500 BC, later inhabitants founded a base camp that covered about 0.1 hectare (0.75 acre). An extended family group of about 25 people returned repeatedly to the same location, perhaps to exploit the rich fall hickory nut harvests in the area. Between 5600 and 5000 BC, substantial settlements of permanent mud and brush houses were occupied for most of the year, if not all of it. During spring and summer the inhabitants took thousands of fish, gathering mussels and hickory nuts in fall and migratory birds in spring. Even when hunting deer on the nearby uplands, the people could find most of their food resources within 5 kilometers (3 miles).

Figure 5.2 Excavations at Koster, Illinois.
(Photo by Arthur Greenberg, courtesy of the Environmental Protection Agency. US NARA record number 8464446)

After 2500 BC, Koster's population had risen to the point at which the people were exploiting a much wider range of food resources, including acorns, which require much more preparation than hickory nuts. Eventually, they experimented with the deliberate planting of wild native plants like goosefoot, simply to increase supplies of such wild foods. The Koster excavations document several long-term trends in many early Holocene hunter-gatherer societies, trends toward more sedentary settlement, intensive exploitation of locally abundant and predictable food resources such as salmon or nuts, and carefully organized mass processing and storage of staple foods.

Such intensive exploitation, processing, and storage were adaptive in environments where seasonal phenomena such as salmon runs, caribou migrations, or hickory nut harvests required not only efficient harvesting of quantities of food in a short time but also their processing and storage for later use. By using storage, and by careful seasonal exploitation of game, plant, and aquatic resources like fish and waterfowl, Holocene hunter-gatherers compensated for periodic food shortages caused by short-term climatic change and seasonal fluctuations. For example, Native American societies developed a remarkable expertise with wild plant foods. They also evolved an array of simple pestles, grinders, and other tools to process seeds and other wild plant foods. Later, it was an easy matter to adapt these tool kits to new, specialized tasks such as farming.

More restricted territories, less mobility, rising population densities, unpredictable environmental variations, and seasonal flood fluctuations were problems common to early Holocene hunter-gatherers throughout the world. A few of these societies, especially those in areas with rich and diverse food resources that included fish and sea mammals, achieved a greater complexity than any Ice Age society, with some signs of social ranking.

Social Complexity among Hunter-Gatherers

Complex hunter-gatherer societies did not appear everywhere, but they developed in a remarkable variety of environments, from fertile river valleys to coastal deserts. Everywhere, however, certain general conditions were necessary. First, population movements had to be limited by either geography or the presence of neighbors. Second, resources had to be abundant and predictable in their seasonal appearance. Such resources included fish, shellfish, nuts, and seeds, species that are plentiful and seldom exhausted. Third, population growth might have reached a point at which food shortages occurred and an imbalance existed between people and their food supply. Again, a solution was to intensify the food quest, an intensification that might have resulted in a more complex society or, as we shall see, in food production.

Social complexity was most common in areas where freshwater or marine fish, shellfish, or sea mammals were abundant. The full potential of marine and freshwater resources was realized only in a relatively few areas like northern Europe, Peru, and western North America. Here, higher than normal population densities were concentrated in restricted territories circumscribed by geography or neighbors. These populations acquired a more varied diet by using more specialized tool kits and sophisticated food storage systems and preservation techniques. These groups often lived in sedentary, large base camps ruled by important kin leaders who monopolized trade with neighboring groups. For example, the Chumash Indians of the Southern California coast were skilled navigators, fishers, and sea mammal hunters. Some Chumash communities numbered as many as 1,000 people living under hereditary chiefs (*wots*). A small elite developed of ceremonial officeholders, shamans, and such experts as canoe builders. Chumash culture was a maritime adaptation made possible by a specialized fishing technology that included planked canoes about 7.6 meters (25 feet) long (Figure 5.3). A canoe-borne trade

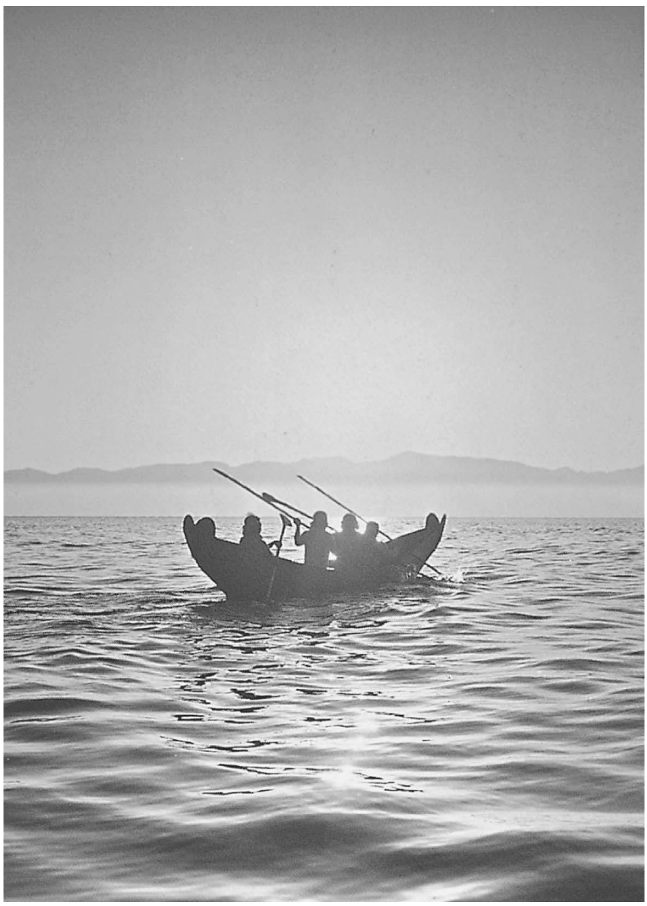


Figure 5.3 Reconstruction of a Chumash Indian *tomol* (canoe), used on the waters of the Santa Barbara Channel, California. The Chumash were among the most sophisticated hunter-gatherer societies on earth.
(Courtesy of the Santa Barbara Museum of Natural History)

in acorn meal and seashell beads flourished between the offshore islands and the mainland, controlled by powerful chiefs and canoe skippers. Each community maintained contacts with other coastal communities and with people living far in the interior.

Chumash culture achieved a degree of social elaboration that represents about the limit of such complexity possible without adopting agriculture. Why did such social complexity develop? Some scholars see the ocean as a kind of Garden of Eden, an environment sometimes so productive that hunter-gatherers could maintain permanent, sedentary settlements and high population densities. Perhaps people turned to fish, shellfish, and sea mammals in a period of rapid environmental change, like that at the end of the Ice Age. Unfortunately, however, we do not know how decisive marine or riverine resources were in allowing dense populations and sedentary living, both essential prerequisites for social complexity.

Away from coasts, rivers, and lake shores, and especially among groups living at the edges of several ecological zones, people living in more or less permanent settlements in rich inland environments turned to another strategy. They experimented with the planting of wild plant staples to supplement food resources in short supply. The cultural changes Holocene climate change and growing population densities forced on them made it easier for their descendants to adopt radically new economic strategies such as deliberate cultivation of the soil and animal domestication—food production.

Theories of Farming Origins

Victorian scientists believed agriculture was a brilliant invention, fostered by a rare genius. One day, went the scenario, a solitary forager was carrying home a bundle of edible grasses when she stumbled, spilling some of her load on damp ground. A few days later, she passed the same way and noticed small green shoots sprouting from the soil. With startling insight, the woman realized the potential of her new invention, planted more seeds near her hut, and fed her family off the bountiful harvest. Other families soon copied her example and agriculture was born.

Such captivating scenarios offer simple explanations but have no foundation in scientific fact. First, no one ever "invented" agriculture, because all hunter-gatherers knew that grasses germinated each year. You can propagate root crops like the African yam simply by cutting off the top and placing it in the soil. Hunter-gatherers living on the fringes of the African rainforest as early as 40,000 years ago may have planted yams in that way, but such practices are a far cry from the cultivation of cereal grasses, which began in the Old and New Worlds after the Ice Age. Reality was more complex than mere invention and is still little understood.

Nor did a single society "invent" agriculture, for farming appeared at widely different times in many parts of the world. Farmers in southeastern Turkey and in southwestern Asia's Euphrates and Jordan River valleys cultivated wheat and barley by about 10,000 BC. Central American cultivators grew domesticated squashes by about the same date. Chinese villagers harvested rice along the Lower Yangtze River by 6500 BC and perhaps much earlier. Most scientists believe that a set of complex cultural and environmental factors combined with population growth to cause societies in widely separated parts of the world to shift from foraging to food production, usually within a relatively short time, sometimes a few generations.

At the end of the Ice Age, hunter-gatherers in drought-prone subtropical zones such as southwestern Asia and highland Mesoamerica were exploiting potentially domesticable wild grasses and root plants with greater intensity. Dependence on such foods probably came earlier in these regions, where only a few forageable plant foods lived. Such dependence was essential to long-term survival and led almost inevitably to experimentation with deliberate planting of wild cereals and ultimately to cultivation. In contrast, populations in more humid, plant-rich tropical regions, like the African and Amazonian rainforests, probably did little more than plant a few wild species to minimize risk of starvation in lean years long after farming appeared in more temperate regions. Cereal agriculture came to sub-Saharan Africa only within the past 3,000 years, and it spread widely after the introduction of iron technology some centuries later.

During the 1920s, University of Chicago Egyptologist Henry Breasted popularized the term **Fertile Crescent** to describe the cradle of agriculture and civilization in southwestern Asia. The crescent has its arms in Mesopotamia and the Nile Valley, joined by a great arch across the Jordan Valley and Zagros Mountains of Iran. The label has fallen into disuse in recent years but is apt in the sense that it spans the vast arc of contrasting terrain where agriculture and urban civilization began. Most speculation about agricultural origins has surrounded the Fertile Crescent.

Early Theories: Oases and Hilly Flanks

Gordon Childe's Agricultural Revolution offers a good starting point, for it was the first modern attempt to explain agricultural origins. Drought conditions formed the core of his revolution thesis. He speculated that after the Ice Age the southwestern Asian climate became increasingly dry, forcing both animals and humans to concentrate in areas like the Jordan Valley, where permanent water supplies were available and plant foods perennially abundant. The arid conditions brought animals, humans, and plants into a close symbiosis (Greek: "life together"), creating favorable conditions for hunter-gatherers to experiment with cereal grasses and with herding wild goats and sheep. These experiments revolutionized human existence and spread rapidly throughout southwestern Asia and further afield.

Childe proposed the Agricultural Revolution long before pollen analysis, deep sea cores, and other highly sophisticated tools for climatic reconstruction were applied to Asian sites. The theory was simple but unproven. During the 1950s, University of Chicago archaeologist Robert Braidwood took a multidisciplinary team of botanists, geologists, and zoologists on a major field expedition to the Zagros Mountains, what he called the "hilly flanks" of southwestern Asia. He recovered the first climatic data for Holocene times and found evidence of increased forest cover and high rainfall after the Ice Age. He also excavated early farming settlements high above the fertile lowlands, which, at the time, were considered exceptionally early, as their radiocarbon dated to about 6000 BC.

Braidwood rejected Childe's oasis theory and argued that agriculture and animal domestication began in the mountainous terrain at the periphery of fertile lands. Higher rainfall meant more wild food supplies and denser game populations in the lowlands. Highland peoples were not so fortunate and adopted agriculture to increase food supplies in the face of rising populations. In other words, agriculture began on the flanks, not in the center.

The Recovery Revolution

Braidwood and Childe theorized at a time when multidisciplinary research was still in its infancy. Since the 1950s, archaeology has gone through what one may call a recovery revolution, a dramatic refinement of field and laboratory methods that has produced infinitely more fine-grained data. The recovery revolution has taken place alongside other important developments:

- Multidisciplinary studies of Holocene climatic change that combine pollen samples from lakes and marshes with deep sea and tree-ring data to produce a chronicle of large- and small-scale climatic change since 10,000 BC. These data allow archaeologists to place early farming sites within much more precise environmental contexts.
- New botanical data acquired through systematic use of **flotation** methods (see "Flotation and Botanical Remains" box) that allow the recovery of large samples of wild and domesticated seeds from occupation levels.
- Major advances in zooarchaeology, the study of animal bones, have provided a wealth of new information on the domestication of cattle, goats, pigs, sheep, and other animals.

Science

Flotation and Botanical Remains

Until the 1960s, archaeologists knew little of early domesticated plants. They lacked a recovery technology to excavate more than a few handfuls of carbonized seeds preserved in storage pits or hearths. Flotation methods, first developed in the North American Midwest, revolutionized our knowledge of ancient farming. By passing soil samples through water or chemicals, today's excavators can recover thousands of seeds, as they float to the surface while the heavier soil matrix sinks to the bottom of the screen. Elaborate flotation machines can process dozens of samples an hour. The sample is poured into a screened container and agitated by water pouring into the screen (Figure 5.4). The light plant materials float on the water and are carried out of the container by a sluiceway that leads to fine mesh screens, where the seeds are trapped and wrapped in fine cloth for further study.

Flotation is rewriting the early history of both foraging and farming. Botanist Gordon Hillman has reconstructed the foraging habits of 16,000-year-old hunter-gatherers living alongside the Nile River during the late Ice Age. His studies of the environment at Abu Hureyra, Syria, described in Chapter 6, document how tree cover receded from the site as drought became endemic. The inhabitants responded by gathering wild grasses, then cultivating them to amplify their food supply. Flotation has also been used extensively in eastern North America, the Southwest, and the **Andean** area, with similarly dramatic results.

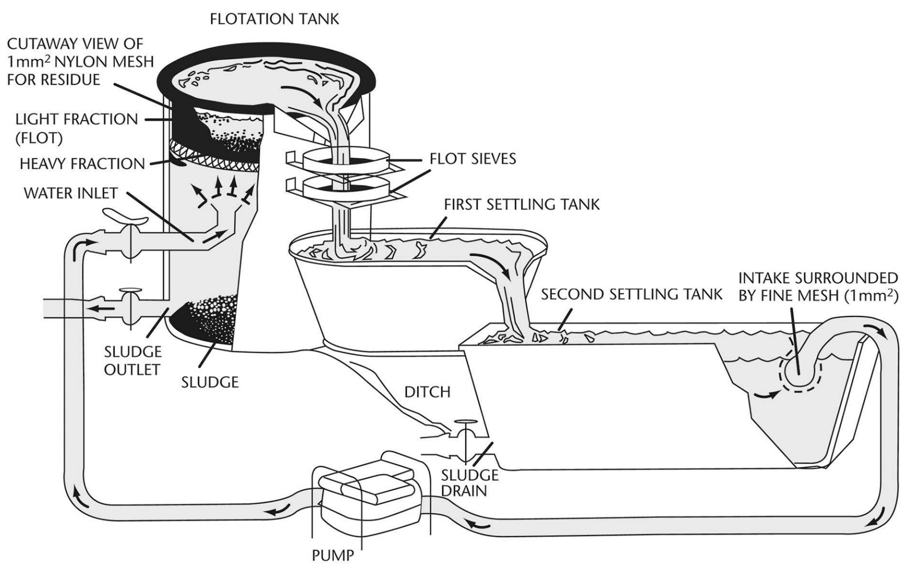


Figure 5.4 An elaborate flotation machine used to process large numbers of soil samples, developed for use at the early farming village of Abu Hureyra, Syria.

Science

Accelerator Mass Spectrometry (AMS) Radiocarbon Dating

Until about 20 years ago, dating the rate of decay (beta counts) from different radiocarbon samples had a calculated ratio that gave only approximations. Using carbon 14 (C-14) and carbon 12 (C-12), scientists could detect and count individual decay events with radiocarbon. They would observe the emission of beta particles to determine the rate of radioactive breakdown and so estimate the number of C-14 atoms remaining in the sample. Since only a small number of C-14 atoms breaks down over the many hours of the sample count, the samples had to be large enough to provide an adequate number of beta counts.

Back in the 1960s, archaeologists collected handfuls of charcoal from hearths in plastic bags, the rule being, the larger the sample, the better. Scientists could not date small objects like maize cobs or tiny wood fragments embedded in the sockets of prehistoric bronze spearheads. Furthermore, minute samples such as seeds can easily move upward or downward into other occupation layers, either through human agencies such as trampling or through natural phenomena such as burrowing animals. The development of a new radiocarbon dating method based on accelerator mass spectrometry (AMS) in 1983 revolutionized radiocarbon chronologies and the study of early food production.

An accelerator mass spectrometer can date the age of sample material by counting the number of C-14 atoms present. Rather than counting decay events (beta counts), researchers estimate the remaining C-14 by directly counting C-14 atoms. By doing this, they can date samples 1,000 times smaller than the handful of charcoal used a generation ago.

The development of small, high-energy mass spectrometers solved a major problem—that of background noise from ions or molecules of a similar mass to the C-14 masking their presence (Figure 5.5). The new instruments

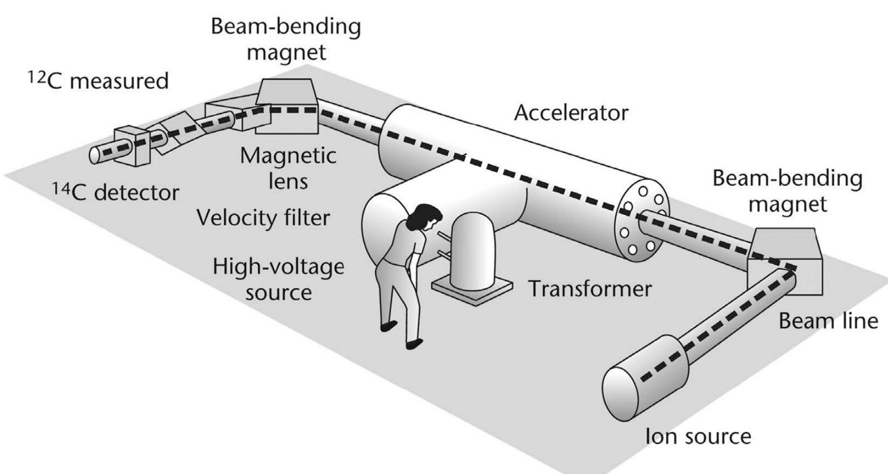


Figure 5.5 Accelerator mass spectrometry (AMS) radiocarbon dating.

filter out background, as a proportion of the sample's atoms is propelled through an accelerator toward a detector. Ionized carbon atoms from the sample are pulled in beam form toward the accelerator. A magnet bends the beam, so lighter atoms turn more sharply than heavier ones and move to the inside of the diverging beam. A filter blocks the passage of all charged particles except those of atomic mass 14. The accelerator pushes the stripped beam through a second beam-bending magnet, filtering out any last non C-14 particles. A magnetic lens focuses the beam as a C-14 detector counts the remaining ions, allowing the calculation of the sample age.

- AMS radiocarbon dating (see "Accelerator Mass Spectrometry (AMS) Radiocarbon Dating" box) permits the dating of individual seeds, root fragments, or maize cobs. For the first time, we can date early farming with high precision, as opposed to merely dating layers in which tiny seeds are found (and into which they may have fallen from higher levels).

The past 20 years have seen the development of more sophisticated ecological interpretations of the origins of food production, which result in large part from much larger databases of archaeological and environmental data.

Multicausal Theories

The recovery revolution has spawned complex multivariate models, which take into account the emerging realization that many early Holocene hunter-gatherer societies were complex and well preadapted to food production before anyone started planting wild cereal grasses or penning animals. For example, as recently as the eighteenth century AD, the Kumeyaay Indians of Southern California reduced the risk of starvation by "domesticating" their landscape. They lived in semiarid valleys, encouraging the growth of wild grasses by burning harvested stands, then broadcasting some of the seed over the burned ground. They created groves of oaks and pines by planting edible nuts at high elevations and planted agave and other desert plants in suitable habitats. In this way they flourished by means of a complex mosaic of manipulated wild plants.

Population and Resources Theories

All of us take risks in our lives and try to protect ourselves against the dangers of a sudden catastrophe. This is why wise investors diversify their holdings and why parents carry life insurance policies. This is known as risk management. In the case of prehistoric peoples, it meant minimizing anything that would threaten long-term survival. All environments, however favorable, involve some form of risk for foraging societies—drought cycles, long, cold winters, and unpredictable floods, to mention only a few. Often people respond to these risks by moving away or by developing new storage and food preservation technologies.

One logical and straightforward solution to rising populations, resulting food shortages, or risk factors may be to go one step further and to cultivate familiar plants and domesticate common prey so that people can draw on familiar stored food during scarce periods. In other words, food production arose as a result of risk management and as a way of increasing food supplies.

Ecological Theories

Proponents of ecological models talk of so-called opportunities for the introduction of food production, of people turning to superior local resources when the moment arrived. In this kind of scenario, some resources, say wild wheat or barley or wild oats, are seen as attractive. People use them more and more, to the extent that they eventually become domesticated. Ecological theories are founded on the assumption that human societies are cultural systems operating within much larger environmental systems.

The classic exposition of this point of view is that of University of Michigan archaeologist Kent Flannery, who worked in Mexico's southern highlands. He discovered that between 8000 and 4000 BC the local people relied on five basic food sources—deer, rabbits, maguey, legumes, and prickly pears—for their sustenance. By careful prediction of the seasons of each food, they could schedule their hunting and gathering at periods of abundance and before animals gained access to the ripe plants. Flannery assumed that the southern highlands and their inhabitants were part of a large, open environmental system consisting of many subsystems—economic, botanical, social, and so on—that interacted with one another. Then something happened to jolt the food procurement system toward the deliberate growing of wild grasses.

Flannery's excavations at dry caves dating to between 5000 and 2000 BC showed maize cobs slowly increasing in size, as well as other signs of genetic change. Therefore, he suggested that people began to experiment with the deliberate planting of maize and other crops, intentionally expanding the areas where they would grow. After a long period, these intentional deviations in the food procurement system caused the importance of wild grass collecting to increase at the expense of other collecting activities until it became the dominant one. Eventually, people created a self-perpetuating food procurement system, with its own vital scheduling demands of planting and harvesting that competed with earlier systems and won out because it was more durable. By 2000 BC, the highly nutritious bean and corn diet of the highland people was well established.

The crux of all these theoretical approaches is to identify the processes that caused people to shift to deliberate cultivation and domestication. For example, did new cost-benefit realities favor farming? What about such factors as the nutritive value and seasonal availability of different foods? Did genetic changes in plants and animals play a role? Unfortunately, it is difficult to link complex theoretical models with actual field data, largely because the factors involved in such profound cultural change (the reasons people make the changeover) do not lend themselves to easy documentation.

Many variables must be understood before we can reconstruct the conditions under which agriculture was first regarded as a profitable activity. We are searching for sets of conditions in which population pressure, the distribution of plants, the rate at which the environment was changing, and even the techniques of harvesting wild grasses all played their part in making agriculture work. Then there are variations among the potentially domesticable plants and animals, some of which resisted domestication because of their long life span or because parts of their lives took place outside human control. The seasonal distribution of wild vegetable foods or game may also have prevented experiments in domestication, when the seasons during which these wild foods were exploited coincided with the times of year when it was important that experimenting farmers stay near their growing crops. Under these circumstances, people would tend to pursue their traditional food procurement habits.

The Consequences of Food Production

Once successful, food production spread rapidly, partly because population growth after the fact prevented people from reverting to hunting and gathering. Food production spread to all corners of the world except where an environment with extreme aridity, heat, or cold rendered agriculture or herding impossible or where people chose to remain hunters and gatherers. In some places, food production was the economic base for urbanization and literate civilization, but most human societies did not go further than subsistence-level food production until the industrial power of nineteenth- and twentieth-century Europe led them into the machine age.

Differing Dates and Their Explanation

As we shall see in Chapter 6, food production began at very different times in various parts of the world, being well established in Southwest Asia by 10,000 BC, in China by at least 6000 BC and probably earlier, in

Mesoamerica by 5000 BC, but much later in tropical Africa—by about 1000 BC, and then only in some locations. What local variations accounted for this time lag? We know that hunter-gatherers in subtropical zones such as Southwest Asia and highland Mesoamerica were beginning to manipulate potential domesticates among wild grasses and root species at the end of the Ice Age, perhaps even earlier, judging from plant remains found at the Ohalo II site in Israel dating to about 20,000 years ago. Dependence on such foods probably came earlier in these regions, where only a few forageable species lived. Such dependence was essential to long-term survival. In contrast, populations in more humid tropical regions, like the African and Amazonian rain forests, probably did little more than manipulate a few wild species to minimize risk in lean years. Many African agricultural peoples still turn to hunting and gathering in lean years to this day. Agriculture was established considerably earlier in subtropical Southwest Asia, Middle and South America, Southeast Asia, and India than it was in humid, tropical zones, undoubtedly because these were rich in game and wild vegetable foods. Furthermore, domesticated crops and animals were more susceptible to irregular rainfall, locusts and other insect attacks, and endemic stock diseases. A strong and sustained incentive to obtain food must have been a prerequisite for a lasting shift from foraging to agriculture.

An interesting question remains: why did food production not take hold much earlier in prehistory? Surely, many previous occasions arose during the Ice Age when conditions were favorable for people to start cultivating plants. Here, population models for prehistory offer some clues. We know gradual population growth took place during the Stone Age. The constant, cyclic changes of the past 700,000 years must have led to conditions in some areas that presented human societies with the challenge of constant environmental change and population shifts. However, not until the end of the Ice Age did global populations rise sufficiently to limit mobility, and the easiest strategy for people faced with food shortages is to move away. There was initially a slow and then a rapidly accelerating intensification of hunter-gatherer lifeways during and after the last glacial maximum, especially during Holocene times. This intensification preadapted many societies to food production for the first time.

Changes in Human Life

Food production resulted, ultimately, in much higher population densities in many locations, for the domestication of plants and animals can lead to an economic strategy that increases and stabilizes available food supplies, although more energy is used to produce them (Figure 5.6). Farmers use concentrated tracts of territory for agriculture and for grazing cattle and small stock if they practice mixed farming. Their territory is much smaller than that of hunter-gatherers (although pastoralists need

Figure 5.6 Kamba women in Kenya, preparing a field for planting with hoes. (Images of Africa Photobank/Alamy Stock Photo)

huge areas of grazing land for seasonal pasture). Permanent villages replaced the temporary camps of earlier times. New social units came into being as more lasting home bases were developed; these social links reflected ownership and inheritance of land and led to much larger settlements that brought hitherto scattered populations into closer and more regular contact. Within a smaller area of farming land, property lines are carefully delineated as individual ownership and problems of inheritance arise. Shortages of land can lead to disputes and to the founding of new village settlements on previously uncultivated soil.

The technological consequences of food production were, in their way, as important as the new economies. A more settled way of life and some decline in hunting and gathering led to long-occupied villages, lasting agricultural styles, and more substantial housing. As they had done for millennia, people built their permanent homes with the raw materials most abundant in their environment. The early farmers of Southwest Asia worked dried mud into small houses with flat roofs; these were cool in summer and warm in winter. At night during the hot season, people may have slept on the flat roofs. Some less substantial houses had reed roofs. In the more temperate zones of Europe, with wetter climates, timber was used to build thatched-roof houses of various shapes and sizes. Early African farmers often built huts of grass, sticks, and anthill clay (Figure 5.7a). Nomadic pastoralists of the northern steppes had no concern with a permanent and durable home; yet they, too, took advantage of the

Figure 5.7a An aerial view of Mukuni village in southern Zambia, Central Africa. A farming village in Zambia, Central Africa, where forest and brush clearance and overgrazing have created conditions that encourage soil erosion. The mud and thatch dwellings in such settlements, often occupied for 15 years or more, are more lasting than the windbreak or other shelter of the hunter-gatherer.
(Sergi Reboredo/Alamy)

related benefits of having a domestic food supply: they used animal skins to make clothing, as well as tents to shelter them during the icy winters.

Agriculture is a seasonal activity, with long periods of the year in which the fields are lying fallow or are supporting growing crops. Any farmer is confronted with the problem of keeping food in ways the hunter-gatherer never has to ponder. Therefore, a new technology of storage came into being. Grain bins, jars, or clay-lined pits became an essential part of the agricultural economy for stockpiling food for the lean months and against periods of famine. The bins may have been made of wattle and daub, clay, or timber (Figure 5.7b). Basket and clay-lined silos protected valuable grain against rodents.

Hunter-gatherers use skins, wood containers, gut pouches, and sometimes baskets to carry vegetable foods back to base. Farmers face far more formidable transport problems: they must carry their harvest back to the village, keep ready-for-use supplies of foods in the house as opposed to storage bins, and store water. Early farmers began to use gourds as water carriers and to make clay vessels that were both waterproof and capable of carrying and cooking food (Figure 5.8). They made pots by coiling rolls

Figure 5.7b Grain bins at Oromo village, Lake Langano, Ethiopia. Storing food is a critical activity of many hunter-gatherers and farmers.
(John Elk III/Alamy Stock photo)

Figure 5.8 A Hopi potter from Moki Pueblo, perhaps the potter Nampeyo, "Harmless Snake," making a pot, using coils to make the sides. Photographed between 1875 and 1900, when this talented potter adopted ancestral styles from nearby archaeological sites.
(Manuel Cohen/Art Resource NY)

of clay or building up the walls of vessels from a lump and firing them in simple hearths. Clay vessels were much more durable than skin or leather receptacles. Some pots were used for several decades before being broken and abandoned.

For tens of thousands of years, people dug up wild edible roots with simple wooden sticks, sometimes made more effective with the aid of a stone weight. The first farmers continued to use the digging sticks to plant crops a few inches below the surface, probably in readily cultivable soils. They also used wooden or stone-bladed hoes (and much later, iron hoes) to break up the soft soil. These they fitted with short or long handles, depending on cultural preferences. European and Southwest Asian farmers made use of the ox-drawn plow in later millennia, at first with a blade tipped with wood, then with bronze, and later with iron. The plow was an important innovation, for it enabled people to turn the soil over to a much greater depth than ever before. Every farmer has to clear wild vegetation and weeds from the fields, and it is hardly surprising to find a new emphasis on the ax and the adze. In Southwest Asia, metal axes replaced the simpler stone tools of earlier farmers by 2500 BC. Present-day experiments in Denmark and New Guinea have shown that the ground and polished edges of stone axes are remarkably effective in clearing woodland and felling trees. In later millennia, the alloying of copper and bronze and, still later, the development of iron cutting edges made forest clearing even easier.

New tools meant new technologies to produce tougher working edges. At first, the farmers used ground and polished stone, placing a high premium on suitable rocks, which were traded from quarry sites over enormous distances. Perhaps the most famous ax quarries are in Western Europe, where ax blanks were traded the length of the British Isles, and Grand Pressigny flint from France was prized over thousands of square miles. In Southwest Asia and Mexico, one valuable toolmaking material, not for axes but for knives and sickles, was **obsidian**, a volcanic rock prized for its easy working properties, sharp edges, and ornamental appearance. Early obsidian trade routes carried tools and ornaments hundreds of miles from their places of origin. By using spectrographic techniques to identify distinctive trace elements in different obsidians, scientists have been able to match obsidian fragments in distant villages in the eastern Mediterranean to such places of origin as Lipari Island off Italy and Lake Van in Turkey.

All these technological developments made people more and more dependent on exotic raw materials, many of which were unobtainable in their own territory. We see the beginnings of widespread long-distance trading networks, which were to burgeon even more rapidly with the emergence of the first urban civilizations.

Food production led to changed attitudes toward the environment. Cereal crops were such that people could store their food for winter (see Figure 5.7b). The hunter-gatherers exploited game, fish, and vegetable foods, but the farmers did more: they altered the environment by the very nature of their exploitation. Expansion of agriculture meant felling trees and burning vegetation to clear the ground for planting. The same fields were then abandoned after a few years to lie fallow, and more woodland was cleared. The original vegetation began to regenerate, but it might have been cleared again before reaching its original state. This shifting pattern of farming is called slash-and-burn, or swidden, agriculture (see Figure 5.6). Voracious domesticated animals stripped pastures of their grass cover, then heavy rainfalls denuded the hills of valuable soil, and the pastures were never the same again. However elementary the agricultural technology, the farmer changed the environment, if only with fires lit to clear scrub from gardens and to fertilize the soil with wood ash. In a sense, shifting slash-and-burn agriculture is merely an extension of the age-old use of fire to encourage regeneration of vegetation.

Food production resulted in high population densities, but disease, available food supplies, water supplies, and particularly famine controlled population growth. Also, early agricultural methods depended heavily on careful selection of the soil. The technology of the first farmers was hardly effective enough for extensive clearing of the dense woodland under which many good soils lay, so potentially cultivable land could only be that which was accessible. Gardens probably were scattered over a much wider territory than is necessary today. One authority estimates that even with advanced shifting agriculture, only 40 percent of moderately fertile soil in Africa is available for such cultivation. This figure must have been lower in the early days of agriculture, with the simpler stone tools and fewer crops.

In regions of seasonal rainfall, such as southwestern Asia, sub-Saharan Africa, and parts of Asia, periods of prolonged drought are common. Famine was a real possibility as population densities rose. Many early agriculturalists must have worriedly watched the sky and had frequent crop failures in times of drought. Their small stores of grain from the previous season would not have carried them through another year, especially if they had been careless with their surplus. Farmers were forced to shift their economic strategy in such times.

We know that the earliest farmers availed themselves of game and wild vegetable foods to supplement their agriculture, just as today some farmers are obliged to rely heavily on them to survive in bad years. Many hunter-gatherer bands collect intensively just a few species of edible plants in their large territories. Aware of many other edible vegetables, they fall back on these only in times of stress; the less-favored foods can carry a comparatively small population through to the next rains. A larger agricultural population is not so flexible and quickly exhausts wild vegetables and game in the much smaller territory used for farming and grazing. If the drought lasts for years, famine, death, and reduced population can follow.

Nutrition and Early Food Production

Was food production a real improvement in human lifeways? For generations archaeologists thought that human health improved dramatically as a result of agriculture, because people worked less and lived on more reliable food supplies. But economist Ester Boserup and others have argued that in fact agriculture brought diminishing returns in relation to labor expended in the new systems that were adopted to feed many more people. Richard Lee's classic studies of the !Kung San of the Kalahari Desert of a half century ago tend to support her views. They show that these hunter-gatherers, and presumably others, had abundant leisure and worked less than farmers. Some nutritionists point out that hunter-gatherers may have had better-balanced diets than many farmers, who relied heavily on root or cereal crops. Further, farmers, with their sedentary settlements and higher population densities, were much more vulnerable to famine than their hunter-gatherer predecessors. They would also have been more vulnerable to gastrointestinal infections and epidemics because of crowded village populations.

Nutrition studies based on the skeletons of early farmers suggest some incidence of anemia and slow growth resulting from malnutrition. Regional studies of prehistoric populations have suggested a decline in mean age life expectancy in agricultural populations, which contradicts the commonly held perception. Taken as a whole, paleopathological studies hint at a general decline in the quality, and perhaps the length, of human life with the advent of food production. However, many unknowns are involved, among them changes in fertility and population growth rates, which caused the world's population to rise even if general health standards and life expectancy fell.

What impact these studies will have on population-pressure theories about the origins of agriculture is still uncertain. Certainly, any shift to food production caused by increasing population pressure could be reflected in a decline in the overall health and nutrition displayed by prehistoric skeletons.

In the final analysis, some people probably turned to food production only when other alternatives were no longer practicable. The classic example is the Aborigines of extreme northern Australia, who were well aware that their neighbors in New Guinea engaged in intensive agriculture. They, too, knew how to plant the top of the wild yam so that it regerminated, but they never adopted food production simply because they had no need to become dependent on a lifeway that would reduce their leisure time and produce more food than they required. We should never forget that humans have always been opportunistic, and the planting of food crops and the first taming of animals may have been the simple result of pure opportunism. Following these general remarks, Chapter 6 describes the beginnings of food production throughout the world.

Summary

- Many late Ice Age and early Holocene hunter-gatherer societies were preadapted to food production, as they were already exploiting some food resources intensively and living more sedentary lifeways. Most of these societies were in regions where food resources were diverse and seasonally predictable.
- In contrast to early theories that food production was a revolutionary development, modern hypotheses invoke social relations, population growth, and ecological factors as multivariate causes of food production. Its development was a gradual process, one that saw increasing reliance on food crops, especially in areas with constant and unpredictable environmental change.
- Food production resulted in more sedentary human settlement, more substantial housing, elaborate storage technologies, and special implements for agricultural tasks.
- All these technological developments led to greater interdependence and to more long-distance exchange of raw materials, as well as increasing human social complexity.

Note

1 Some experts are now talking about adding an era named the Anthropocene to the geological vocabulary. The debate continues. In the interests of clarity, we ignore it in these pages until the debate is finally settled.

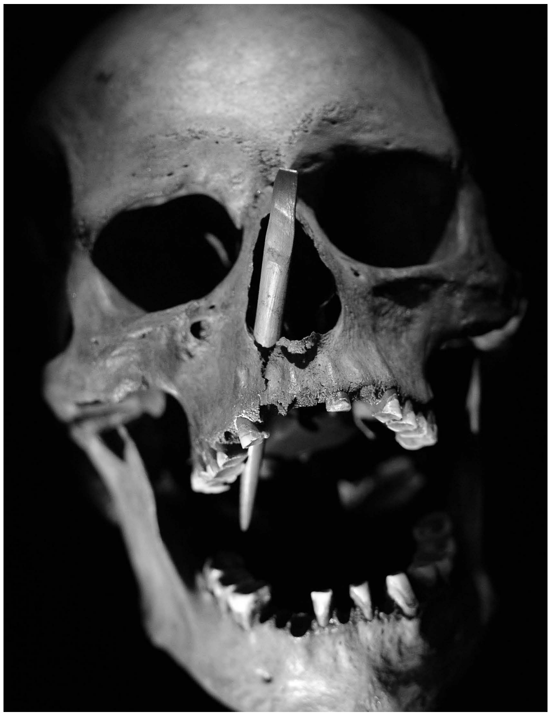
Further Reading

Steven Mithen, *After the Ice* (Cambridge, MA: Harvard University Press, 2006) is an excellent synthesis of late hunter-gather societies and early food production. The classic theories surrounding the origins of agriculture are gathered in Stuart Struever's anthology *Prehistoric Agriculture* (Garden City, NY: Natural History Press, 1971). Bruce D. Smith's *The Emergence of Agriculture* (New York: W. H. Freeman, 1999) summarizes what we know of early agriculture and animal domestication throughout the world, as well as the remarkable results being obtained from AMS radiocarbon dating of grain. Graeme Barker, *The Agricultural*

Revolution in Prehistory (Oxford, England: Oxford University Press, 2006) is an authoritative, global synthesis with excellent theoretical insights. Kent Flannery's *Guilá Naquitz* (Orlando, FL: Academic Press, 1986) is an exemplary monograph that is essential reading, if for nothing else, for its hypothetical dialogues, which contain a multitude of wisdoms about archaeology and archaeologists. A useful up-to-date summary: O. Bar-Yosef, "Multiple Origins of Agriculture in Eurasia and Africa." In Michel Tibayrenc and Francisco Ayala, eds. *On Human Nature*, pp. 297–331 (Boston, MA: Springer, 2017).

Chapter 6

The Earliest Farmers



A 35-year-old man from Porsmose, Denmark, who died from bone arrow wounds ca. 5000 BC. (Prisma Archivo/Alamy)

Chapter Outline

Prologue

It was the final day of the 1953 excavation season at Jericho. For weeks, the top of a human skull had projected from the side of the trench dug deep into one of the earliest farming communities in the world. Excavator Kathleen Kenyon had given strict instructions that it was not to be disturbed until the stratigraphic layers in the trench wall had been drawn and photographed. Then the excavators recovered a complete cranium, with facial features carefully modeled in clay, the eyes inset with shells (see Figure 1.12). Kenyon looked closely at the small hole in the wall. She could see two more plastered skulls within. They were removed. Three more now appeared behind them, then a final, seventh head. It took five days to extract the nest of skulls from the wall, for the crushed bones were packed tightly with stones and hard earth. They formed the earliest portrait gallery in the world, each head modeled with individual features—nose, mouth, ears, and eyebrows molded with delicacy. Kenyon believed she had found the heads of revered ancestors who were critical intermediaries between the living and the spiritual worlds, linking people closely to the land that brought forth their crops.

Whatever the complex factors that led to agriculture and animal domestication, the new food-producing economies proved dramatically successful. In 10,000 BC, virtually everybody in the world lived by hunting and gathering. By AD 1, the time of Christ, most people were farmers or herders, and only a minority were still hunter-gatherers, most of them living in environments where extreme cold or aridity prevented the growth of domesticated crops. The spread of food production throughout the world took only about 8,000 years.

As we saw in Chapter 5, hunter-gatherers everywhere had a profound knowledge of the food resources in their local environments. Nevertheless, many fewer animals and wild vegetable foods were domesticated than foraged over the millennia. In the Old World, early farmers tamed wheat, barley, and other cereals that grow wild over much of Asia and Europe. In the New World, Native Americans developed a remarkable expertise with plants of all kinds—indigenous cereal grasses, root species, and many varieties of nuts. From this proficiency came the staples of American farming: Indian corn (*Zea mays*, the only important wild grass to be domesticated), beans, squashes, and many minor crops. Root plants such as manioc, sweet potatoes, and various forms of potato, along with chili peppers and tobacco, were vital parts of Indian life.

Potentially tamable animal species like the wild ox, goat, pig, and sheep were widely distributed in the Old World during the late Ice Age. Native American farmers domesticated only animals such as the llama, the guinea pig, and the turkey, and then only under special conditions and within narrow geographic limits.

This chapter examines the archaeological evidence for the origins and initial spread of farming in the Old and New Worlds, a process that formed the foundation for subsequent, more complex human societies and the early civilizations.

Domesticating Animals

Having one's own herd of domesticated mammals ensured a regular meat supply. The advantages to having a major source of meat under one's control are obvious. Later, domesticated animals provided by-products such as milk, cheese, and butter, as well as skins for clothes, tent coverings, and leather shields and armor. In later millennia, people learned how to breed animals for specialized tasks such as plowing, transportation, and traction.

Domestication implies a genetic selection emphasizing special features of continuing use to the domesticator. Wild sheep have no wool, wild cows produce milk only for their offspring, and undomesticated chickens do not lay surplus eggs. Changes in wool bearing, lactation, or egg production could be achieved by isolating wild populations for selective breeding under human care. Isolating species from a larger gene pool produced domestic sheep with thick, woolly coats and domestic goats providing regular supplies of milk, which formed a staple in the diet of many human populations.

No one knows exactly how domestication of animals began. Three elements are vital to domestication: constraining the movement of the target populations, regulating their breeding, and controlling their feeding to shape future generations. At the end of the Ice Age, hunters in southwestern Asia were concentrating on gazelles (a small desert antelope) and other steppe animals. Wild sheep and goats were intensively hunted on the southern shores of the Caspian Sea. Gregarious, highly social animals like goats and sheep are the most easily domesticated beasts because they follow the lead of a dominant herd member or all move together; also, they tolerate feeding and breeding in a confined environment.

Hunters often fed off the same herd for a long time, sometimes deliberately sparing young females and immature beasts to keep the source of food alive. Young animals captured alive in the chase might be taken back to the camp to grow dependent on those who caged them, thus becoming partially tamed. A hunter could grasp the possibility of gaining control of the movements of a few key members of a herd, who would be followed by the others. Once the experience of keeping pets or of restricting game movements had suggested a new way of life, people might experiment with different species. As part of domestication, animals and humans increased their mutual interdependence.

Figure 6.1 A modern, back-bred version of the aurochs, *Bos primigenius*, which bears a fairly close resemblance to the original.
(Kletr/Shutterstock)

The process of animal domestication undoubtedly was prolonged, developing in several areas of southwestern Asia at approximately the same time. Although animal bones are scarce and often unsatisfactory as evidence of early domestication, most authorities now agree that the first species to be domesticated in southwestern Asia were goats, pigs, and sheep, by about 9500 BC. Goats and sheep are small animals that live in herds, whose carcasses yield much meat for their size. They can readily be penned and isolated to develop a symbiotic relationship with people.

Cattle are much more formidable to domesticate, for their prototype was *Bos primigenius*, the wild ox much hunted by Stone Age people (Figure 6.1). South African archaeologist Andrew Smith, an expert on herding, believes that the first domesticated animals came from better-disciplined wild herds in arid environments, where it was easier to control the movements of animals. Such conditions may have persisted over much of southwestern Asia and the Sahara Desert as the climate became drier after 7000 BC. DNA is now playing a part in the study of animal domestication. For instance, large numbers of mitochondrial DNA (mtDNA) samples from cattle bones show that they were domesticated around 8000 BC from, a small, local stock of females in the Near East and Southeast Anatolia, from where they spread to the rest of Anatolia and the Aegean about a thousand years later. Thereafter, they spread throughout Europe either by a route along the Danube River or a southern route via the shores of the Mediterranean.

The situation is more complicated with other animals such as pigs, horses, and dromedaries, the Eurasian camel. Genetic makeup among pigs has been complicated by interbreeding with wild boars in the case of Near Eastern beasts. These domesticated beasts spread throughout Europe, where they also interbred with local wild boars. Horses and dromedaries (Eurasian camels with two humps) traveled widely over many centuries, which caused their genetic makeup to become homogenized.

Some animals, such as sea mammals, resist domestication because much of their lives are spent out of the range of human influence. Most early successes with domestication took place with gregarious animals. They can be thought of as a food reserve, as "grain on the hoof."

Domesticating Wheat and Barley

The qualities of wild wheat, barley, and similar crops are quite different from those of their domestic equivalents. In the wild, these grains occur in dense stands. They can be harvested by tapping the stem with the hands and gathering the seeds in a basket as they fall off or by uprooting the plant. The tapping technique is effective because the wild grain is attached to the stem by a brittle joint, or **rachis**. When the grass is tapped, the weak rachis breaks and the seed falls into the basket.

The first cultivated wheat and barley crops were of the wild, brittle-rachised type, and the resulting crops would probably have been large enough to generate domestic-type mutants in the first two to five years. Selection for the semi-tough rachised forms was an unconscious process during the earliest stages of domestication, perhaps accelerated by the use of sickles or uprooting of individual plants to harvest ripe seeds rather than merely tapping them into waiting baskets (Figure 6.2). Computer simulations have shown that domestic, semi-tough rachised forms may have been rare at first, but they would have been fully domesticated within 20–30 generations—for these cereals, between 20 and 30 years. DNA fingerprinting studies on einkorn in southeastern Turkey confirm this brief time frame. There, alterations in just one or two genes transformed wild wheat into a useful crop with a tough rachis. The late archaeobotanist Gordon Hillman of London University believed that the farmers would have started conscious selection as soon as the domesticates became sufficiently common to be recognized, perhaps one to five percent of the crop. From then on, domestication would have been completed in three or four years.

Although the broad outlines of the process of domestication can be reconstructed through controlled experimentation and computer simulation, it is most unlikely that anyone will ever find "transitional" grains in southwestern Asian sites that will document the actual process under way. The changeover from wild to domesticated strains was so rapid that we are more likely to find wild seeds in one level and domesticated ones in the

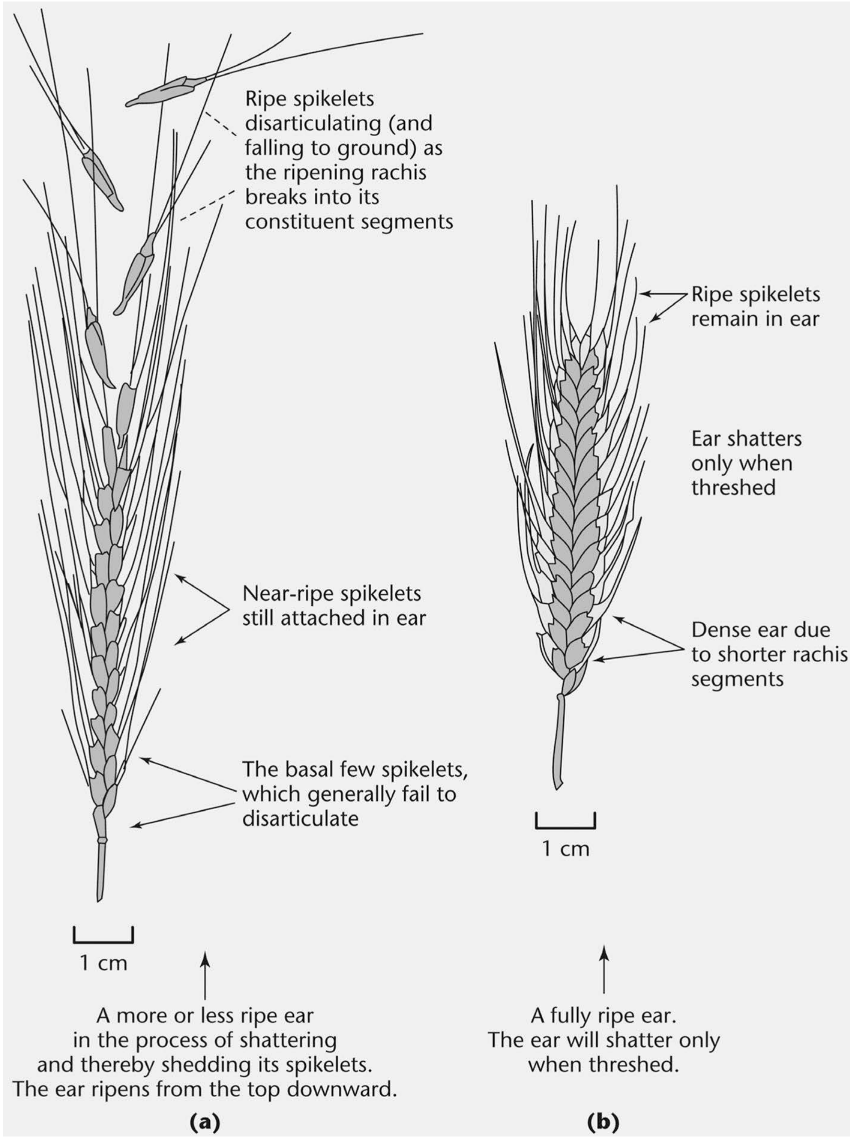


Figure 6.2 Wild and domesticated einkorn, showing brittle and tough rachis. (a) Wild einkorn showing its brittle-rachised ear and arrow-shaped spikelets adapted for penetrating surface litter and cracks on the ground. (b) Domestic einkorn, showing its semi-tough-rachised ear and its plumper spikelets, which have lost some key features necessary for self-implantation.

next. DNA research works pinpoint a core area for domestication centered on the Karacadag Mountains in southeastern Turkey as the most likely place for the earliest cereal domestication. Currently, the best archaeological evidence comes from sites such as Abu Hureyra in Syria, where farming appears about 10,000 BC (see the discussion that follows). We know, however, that figs were cultivated in the Jordan Valley as early as 9400 BC.

Southwest Asian Farmers (from ca. 10,000 to 5000 BC)

The universal global warming at the end of the Ice Age had dramatic effects on temperate regions of Asia, Europe, and North America. Ice sheets retreated and sea levels rose. The climatic changes in southwestern Asia were more subtle, in that they involved shifts in mountain snow lines, rainfall patterns, and vegetation cover. However, these same cycles of change had momentous impacts on the sparse human populations of the region. At the end of the Ice Age, no more than a few thousand foragers lived along the eastern Mediterranean coast, in the Jordan and Euphrates Valleys. Within 2,000 years, the human population of the region numbered in the tens of thousands, all as a result of village life and farming. Thanks to new environmental and archaeological discoveries, we now know something about this remarkable change in local life.

Pollen samples from freshwater lakes in Syria and elsewhere tell us forest cover expanded rapidly at the end of the Ice Age, for the southwestern Asian climate was still cooler and considerably wetter than today. Many areas were richer in animal and plant species than they are now, making them highly favorable for human occupation. About 10,000 BC, most human settlements lay in the Levant (the area along the Mediterranean coast) and in the Zagros Mountains of Iran and their foothills (see Figure 5.1). Some local areas like the Jordan River Valley, the Middle Euphrates Valley, and some Zagros valleys were more densely populated than elsewhere. Here more sedentary and more complex societies flourished. These people exploited the landscape intensively, foraging on hill slopes for wild cereal grasses and nuts while hunting gazelle and other game on grassy lowlands and in river valleys. Their settlements contain exotic objects such as seashells, stone bowls, and artifacts made of obsidian (volcanic glass), all traded from afar. This considerable volume of intercommunity exchange brought a degree of social complexity in its wake. A recently discovered burial of a 45-year-old female shaman, buried 12,000 years ago with a foot from a much larger man and the bones of several animals, testifies to enhanced ritual activity.

Thanks to extremely fine-grained excavation and extensive use of flotation methods, we know a great deal about the foraging practices of the inhabitants of Abu Hureyra in Syria's Euphrates Valley (Figure 6.3). Abu Hureyra was founded about 11,500 BC, a small village settlement of cramped pit dwellings (houses dug partially in the soil) with reed roofs supported by wooden uprights. For the next 1,500 years, its inhabitants enjoyed a somewhat warmer and damper climate than today, living in a well-wooded steppe area where wild cereal grasses were abundant. They subsisted off spring migrations of Persian gazelles from the south. With such a favorable location, about 300 to 400 people lived in a sizable, permanent settlement. They were no longer a series of small bands but lived in a large community with more elaborate social

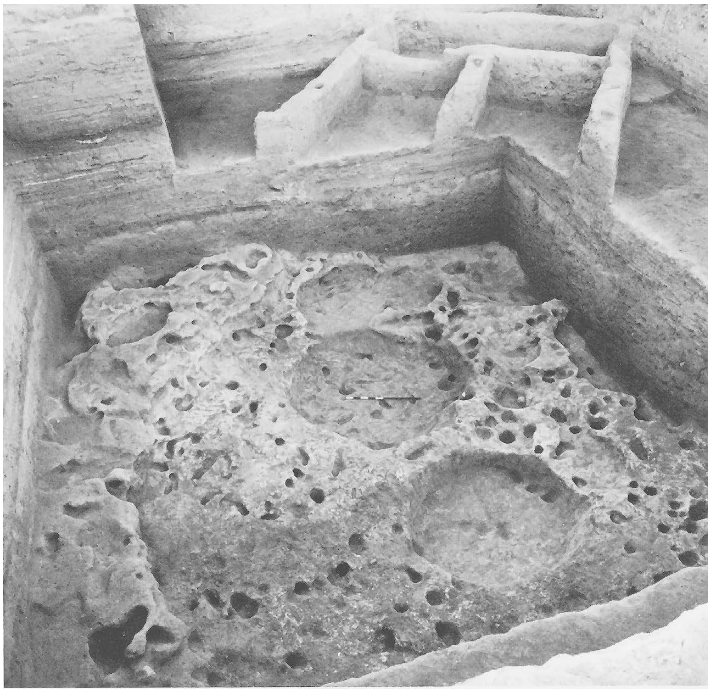


Figure 6.3 Abu Hureyra, Syria: Excavations in the earlier settlement show interconnecting pits roofed with poles, branches, and reeds to form small huts. Part of a later rectangular house can be seen at a higher level (top right).
(Dr. Andrew Moore)

organization, probably grouped into clans of people of common descent. The flotation samples from the excavations allowed archaeobotanist Gordon Hillman to study changing plant-collecting habits, as if he were looking through a telescope at a changing landscape. Hundreds of tiny plant remains show how the inhabitants exploited nut harvests in nearby pistachio and oak forests. Then a savage drought caused by the cold Younger Dryas event that returned much of Europe to near-arctic conditions descended on the Near East. As the climate dried up, the forests retreated from the vicinity of the settlement. The inhabitants turned to wild cereal grasses, collecting them by the thousands, while percentages of nuts fell. By 10,200 BC, drought conditions were so severe that the people abandoned their long-established settlement, perhaps dispersing into smaller camps. There are signs that they experimented with growing rye, but not permanently. Other communities were already growing figs.

Five centuries later, about 9700 BC, a new village rose on the mound. At first, the inhabitants still hunted gazelle intensively. Then, about 9000 BC, within the space of a few generations, they switched abruptly to herding domesticated goats and sheep and to growing einkorn, pulses, and other cereal grasses. Abu Hureyra grew rapidly until it covered nearly

12 hectares (30 acres). It was a close-knit community of rectangular, one-story, mud-brick houses, joined by narrow lanes and courtyards and finally abandoned about 6000 BC (see "Men's and Women's Work at Abu Hureyra, Syria" box).

Many complex factors led to the adoption of the new economies, not only at Abu Hureyra, but at many other locations such as **'Ain Ghazal**, also in Syria, where goat toe bones showing the telltale marks of abrasion caused by foot tethering (hobbling) testify to early herding of domestic stock. Most settlements lay on low ground near well-watered, easily cultivable land; some lay in arid valleys, which were better watered at the time. Their inhabitants usually lived in small, densely clustered villages of circular or oval one-room houses. Some settlements also contained communal structures adorned with engravings of animals and geometric shapes. The most famous of these many communities is at the base of the biblical city of Jericho, famous for the siege in which Joshua collapsed the city walls with the blast of trumpets.

Site

Men's and Women's Work at Abu Hureyra, Syria

In earlier times, many people spent most of their lives working at specific tasks, labor that left telltale signs on their bones. For instance, people who squat habitually develop specific anatomical conditions of their hips, knees, and ankles.

Biological anthropologist Theya Molleson of London's Natural History Museum examined the fragmentary skeletons of about 162 people from the early farming village at Abu Hureyra in Syria. She found ample evidence of repetitive tasks. Some people's neck bones displayed enlarged upper vertebrae, the result of carrying heavy loads on their heads. Others displayed the characteristic facets at the forward side of the ankles that are found in people who squat habitually from an early age. This condition occurred in men, women, and children.

Many Abu Hureyra skeletons from people in otherwise good health displayed collapsed lower vertebrae, grossly arthritic big toes, and muscular arms and legs (as revealed by prominent muscle attachments).

The toe bones were very revealing: older individuals displayed a degenerative condition of the metatarsals, and even younger people showed changes in the big toe and second toe joints that had resulted from kneeling with the toes tucked under the foot. This position was used by people who spent long periods of time laboring at household tasks such as grinding grain. When Molleson examined pictures from ancient Egyptian and Assyrian tombs, she found just such a position being used by grain grinders, metalworkers, and other artisans.

At Abu Hureyra, a community without metal, the inhabitants must have been grinding grain on shallow querns. The weight of the body was used to

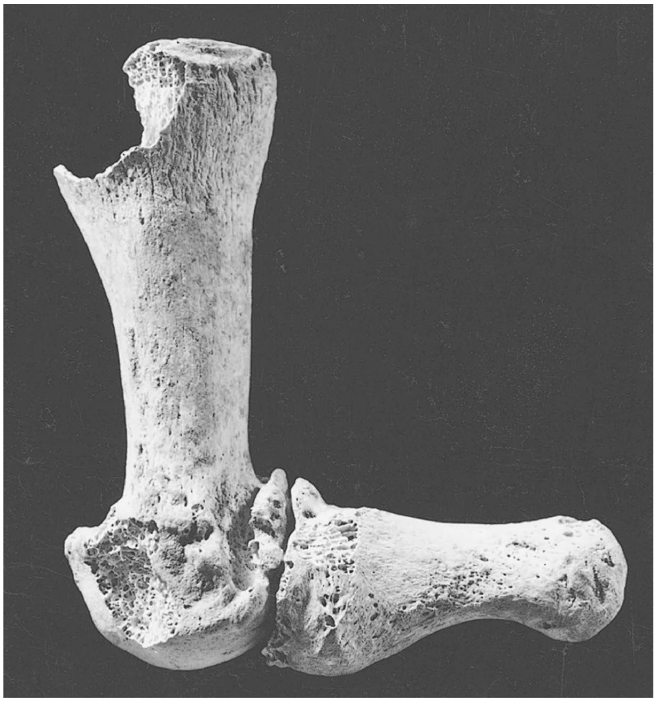


Figure 6.4 Deformed toe bones of an Abu Hureyra woman, Syria, ca. 9000 BC. (The Trustees of the Natural History Museum, London)

grind the grain; the toes were used as a base for applying force to the grinding motion. This was a very painful and tiring activity indeed, hard on the arms as well as the big toe (Figure 6.4). The Abu Hureyra skeletons displayed well-marked attachments for the deltoid muscles on the upper arms, which probably resulted from the movement at the end of the pushing stroke during grinding. Theya Molleson measured the first metatarsal bone of the feet in her sample. She found the larger ones belonged to males, the smaller to females. On the latter, the arthritic condition associated with grinding was found. The constant, daily use of saddle querns (saddle-shaped grinding stones) caused this condition to develop in the knees and the lower back of many Abu Hureyra individuals. Grinding with such a quern is very laborious; it involves pushing a rubbing stone over a slightly tilted quern set as close to the knees as possible. Many passes are needed to produce flour for baking, a grinding method placing severe stress on knees, wrists, and lower back, reflected in the bones of those who carried out this constant, daily work—the women of the community.

The Abu Hureyra people had heavily abraded teeth, resulting from eating coarse grain. But they may have sifted grain through fiber baskets: some of the teeth display the characteristic grooving resulting from chewing basket fiber to soften it.

A small camp flourished at the bubbling Jericho spring by at least 10,500 BC, but a more permanent farming settlement quickly followed. Soon the inhabitants built massive stone walls complete with towers and a rock-cut ditch more than 2.7 meters (9 feet) deep and 3 meters (10 feet) wide around their settlement. Their beehive-shaped huts clustered inside the walls. The communal labor of wall and ditch building required both political and economic resources on a scale unheard of a few thousand years earlier. Why the inhabitants needed the walls remains a mystery, but they may have been flood works or for defense against conflict resulting from competition from neighboring groups for scarce food resources. Jericho also yielded compelling evidence of ancestor worship in the form of human skulls with plastered faces, a clear sign that people enjoyed a close link with the supernatural and the land, guarded traditionally by the dead (see Figure 1.12).

The population of the Levant increased considerably between 8000 and 6000 BC, scattered in permanent villages as far east as the more arid Syrian plateau. Emmer wheat, barley, lentils, and peas were grown in small fields, and crops were rotated with pulses to sustain soil fertility. Some communities like Jericho became important trading centers. The farmers were using obsidian from Turkey, turquoise from Sinai, and seashell ornaments from the Mediterranean and the Red Sea. The volume of trade was such that many villages used small clay spheres, cones, and disks to keep track of commodities traded. These tokens may represent a simple recording system that later evolved into written script (see Chapter 8).

What is now southeastern Turkey was a diverse, favorable highland and lowland environment for human settlement from early in the Holocene. Food production probably began in this region at about the same time as it did in the Euphrates Valley.

The upper reaches of the Euphrates and Tigris Rivers drain the tableland of the Urfa region of southeastern Turkey. This is a place of arid limestone hills, where the summers are hot and dry and the winters wet, with diverse soils that supported natural stands of wild cereals and eventually became ideal for farming. DNA research work has pinpointed the Karacadag Mountains in this area as the original homeland of domesticated einkorn. Was the Urfa, then, the area where farming began, as opposed to the Euphrates and Jordan Valleys to the south? The answer must be that we do not yet know, but fascinating archaeological sites chronicle sophisticated ritual observances that coincide, in general terms, with the changeover from hunting and gathering to food production. For the first time, we find evidence for communal structures, for public areas where more elaborate structures served as a focus for the settlement (see "Ritual Buildings in Southeastern Turkey" box).

Site

Ritual Buildings in Southeastern Turkey

Communal buildings, open spaces, monoliths, and sometimes human remains—convincing evidence for ritual comes from several early villages in southeastern Turkey. At **Çayönü Tepesi** in southeastern Turkey, occupied from about 8600 to 7000 BC, the settlement lay on a terrace above a small river, the rectangular houses standing at right angles to the river. They form an arc with a large open space at the center. Three quite distinct buildings once stood in this plaza. One of them was continually rebuilt, with three stone-built cells crammed with human bones under one end of the structure. One contained a pile of more than 40 human skulls. This "House of the Dead" also yielded a flat stone slab bearing traces of animal and human blood, as if some of the dead were sacrificial victims. Were the dead part of ancestor rituals, or were they war captives sacrificed after their capture? We don't know. The remains of at least 400 people lay in the cells. Another of the public buildings was virtually square, with a floor made of small stones pressed into plaster and tall, stone monoliths set into the floor.

Nearby **Göbekli Tepe** lies on the summit of a hill with a fine view over the surrounding landscape. In about 9600 BC, at least four circular structures were cut partially into the limestone bedrock, so they are semisubterranean, almost cryptlike. Two huge stone pillars stood in the center of each crypt, with as many as eight others around the edges of each (Figure 6.5a). Rectangular,

Figure 6.5a A large subterranean building at Göbekli Tepe, Turkey, showing the tops of two central T-shaped monoliths and others embedded in the dry stone walls at the edge of the building, where a bench is emerging from the excavation. (National Geographic Image Collection/Alamy)

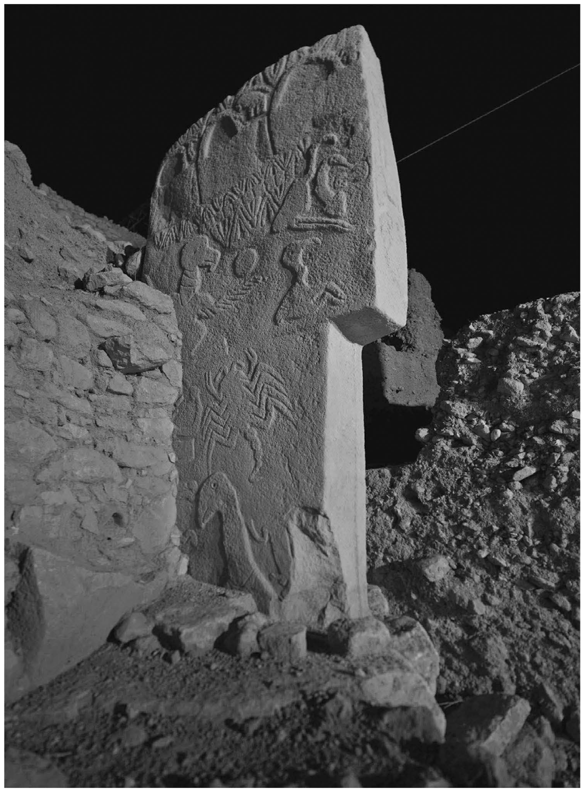


Figure 6.5b A T-shaped monolith from the site, with low-relief sculpture. (National Geographic Image Collection/Alamy)

with flat cross-sections, they were up to 2.4 meters (8 feet) high and weighed as much as 7 tons. Stone-cut benches lay between the pillars. The pillars bore carvings of game animals like wild boar, gazelle, and aurochs, and also snakes and birds (Figure 6.5b). One pillar held a human arm, as if the columns were partially anthropomorphic. Headless figures are also known. The pillars came from a quarry 91 meters (300 feet) away, where at least one still in place would have been 6 meters (20 feet) long and weighed 50 tons.

Contemporary with Göbekli Tepe, nearby **Nevali Çori** yielded 29 limestone and mud houses, some of them cult buildings set slightly into a slope so that the visitor stepped down into the interior, which was surrounded by a stone bench. Monolithic stone pillars interrupted the bench, as did a niche, out of sight of the entrance. Some of the pillars were carved; the same religious beliefs persisted over several rebuildings. Sculptures interred in a later cult building include an intriguing figure with a human head and the body of a bird. In others, a bird perches on the head of a human; symmetrical human figures stand back to back. Perhaps the connections between bird and human heads reflect the soul of a person or a connection with the other world.

What are we to make of these extraordinary sites, which apparently straddle the changeover from hunting and gathering to food production? They hint that elaborate rituals and more complex social organization predated agriculture in this region. Steven Mithen, a specialist on human cognition, believes that the religious beliefs behind these early carvings not only predated farming but also may have led to it. The elaborate construction and ritual activities at these sites would have required dozens, if not hundreds, of people. Feeding them would have required large quantities of wild grain, some of which would have fallen on the ground, germinated, and been gathered again—a form of domestication. In time, some of this quality Karacadag grain would have been carried back home and traded, like obsidian and seashells, to communities many kilometers away, perhaps even as far as Jericho. This theory offers a speculative alternative to the common view that persistent drought was a major contributor to the changeover—the unresolved debate continues. But whatever the cause of early food production in this region, we can be sure that it resulted in major adjustments not only to society but also to its complex relationship to the cosmos and the environment.

In the Zagros highlands of Iran, the herding of goats and sheep probably began somewhat earlier than in the lowlands. Here, open steppe was ideal country both for intensive hunting of wild goats and sheep and, after about 10,000 BC, for herding them as well. At the village of **Ganj Dareh** near Kermanshah in Iran, foragers occupied a seasonal hunting camp in about 10,500 BC. About 1,500 years later, a small farming village of rectangular mud-brick houses stood on the same spot, a settlement based on goat and sheep herding and cereal horticulture. One of the best-known prehistoric farming villages in the Zagros is **Jarmo** in northern Iraq, little more than a cluster of 25 mud houses forming an irregular huddle separated by small alleyways and courtyards. Jarmo was in its heyday in about 6000 BC, by which time more than 80 percent of the villagers' food came from their fields and herds.

Below, on the lowlands, farming began along the eastern edge of the flat Mesopotamian plain as early as it did in the Levant. The village of **Ali Kosh** on the plains of Khuzistan, north of where the Tigris and Euphrates become one river, started off as a small settlement of rectangular mud-brick houses as early as 9000 BC. As time went on, the houses became larger, separated by lanes or courtyards. The people drove their herds of goats and sheep to the highlands during the hot summer months, bringing them back to lush lowland pastures in fall. These same seasonal herding practices continue to this day. Ali Kosh documents more than 2,000 years of farming and herding on the lowlands, a period that saw the development of improved cereal strains and the development of irrigation as a means of intensifying agricultural production. Only 5,000 years after food production appeared, people in the Levant and Mesopotamia were living in cities with thousands of inhabitants.

Early Egyptian and African Farmers (Earlier than 7000 to 1000 BC)

The same dynamics of growing populations crowded into restricted territories developed in the Nile Valley as a result of Holocene climatic change. During the late Ice Age, the valley was a rich, diverse habitat, abounding in game, fish, and wild plant foods. Wild cereal grasses were important in the human diet from at least 15,000 years ago.

The Nile Valley is unusual in that its water supplies depend not on local rains but on floods from rainfall gathered far upstream in Ethiopia. The fluctuations in these yearly inundations had a profound effect on the pattern of human settlement downstream. The irregular cycles of higher and lower rainfall may have caused people to manage wild food resources very carefully. Like their Southwest Asian counterparts, they turned to the deliberate cultivation of wild barley and wheat, probably well before 7000 BC.

By 5000 BC, dozens of farming villages flourished in the Nile Valley, settlements now buried beneath deep layers of sand and gravel laid down by thousands of years of river floods. Only 1,500 years later, the inhabitants of the valley were subsisting almost entirely off agriculture, living in small villages like **Merimde Beni Salama** near the Nile Valley. Merimde was a cluster of oval houses and shelters, built half underground and roofed with mud and sticks. The farmers planted barley and wheat as the annual floods receded, while their animals grazed in flat river grasslands. Population densities were still low, so the average Nile flood allowed early Egyptian farmers to harvest grain over perhaps two-thirds of the river floodplain (Figure 6.6). Thus there was no need for irrigation works, which appear in about 3000 BC, when Egypt became a unified state (see Chapter 10).

After 6000 BC, cattle herders ranged widely over the semiarid grasslands of what is now the Sahara Desert. These nomads left superb wall paintings of their beasts in the caves and rock shelters of the Saharan highlands, grazing their herds along the shores of shallow lakes like a much larger Lake Chad on the southern edge of the desert. The Sahara dried up rapidly after 6000 BC, forcing its cattle-herding population into permanent oases or to the fringes of the desert. But not until much later, around 1000 BC, did herders move into sub-Saharan East Africa and West Africans domesticate such to grow tropical cereals like domesticated sorghum and millet (millet had been domesticated in Africa and indeed Asia by at least 5000 BC, while sorghum was domesticated at around 4000–3000 BC in Ethiopia, and the surrounding regions).

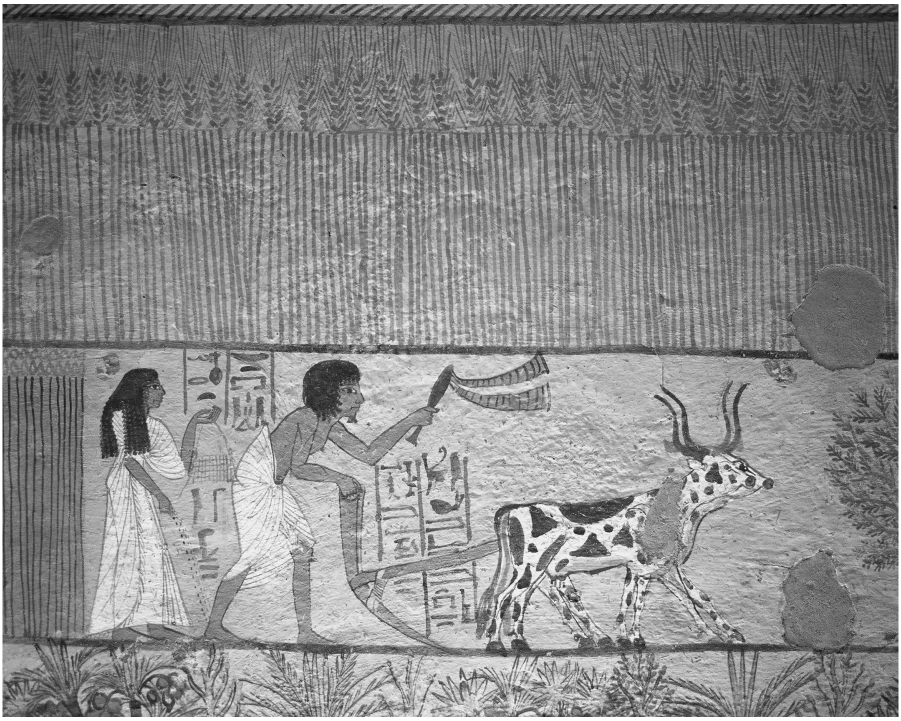


Figure 6.6 The Egyptian artisan Sennedjem and his wife plowing in a field, as depicted in his tomb. He decorated tombs in the time of Ramesses II, ca. 1220 BC. The roots of ancient Egyptian agriculture date back to at least 7000 BC.
(Stock Connection Blue/Alamy)

European Farmers (from ca. 6500 to 3000 BC)

The new economies were so successful that they spread rapidly from southwestern Asia into contiguous areas, especially as forager populations rose and natural food supplies were no longer sufficient to support increasingly sedentary forager groups. Many of them turned to food production to supplement their age-old game, plant, and fish diet. By using a mosaic of key sites and radiocarbon dates, we can trace the spread of farming over wide areas of Europe and southern Asia.

Agriculture and animal domestication spread rapidly through Turkey after 10,000 BC, and from there into Greece, the Balkans, and temperate Europe. Between 9500 and 6000 BC, long-distance exchange, especially of obsidian for ornaments and toolmaking, became a major factor in daily life. From Turkey's Lake Van trade traveled to the Levant and as far afield as the Persian Gulf. A few settlements like **Çatalhöyük** prospered by controlling the trade. In about 7000 BC, Çatalhöyük covered 13 hectares (32 acres), a settlement of numerous small mud-brick houses backed onto one another, the outside walls serving as a convenient defense wall. But the large village never became a full-fledged city. No powerful leaders monopolized trade and production. It was a community of individual households and families that lacked the elaborate, centralized organization of a city that thrived until a climatic shift threatened sustainability (see Box "Sustainability: Adapting to Climate Change at Çatalhöyük") (Figure 6.7).

Figure 6.7 Schematic reconstruction of a cluster of flat-roofed, mud-brick houses from Level VI at Çatalhöyük, Turkey. The inhabitants entered through the roof, the outside walls forming natural protection against intruders.
(De Agostini Picture Library/Getty Images)

Science

Sustainability: Adapting to Climate Change at Çatalhöyük

Subsistence farmers have always been challenged by sustainability, especially when climate change is involved. Çatalhöyük prospered off a trade in shiny obsidian (volcanic glass) for toolmaking that was exchanged over an enormous area of the Near East. The community supported itself by cereal agriculture and herding cattle, goats, and sheep in significant numbers. Everything went well until a 160-year-long cold and dry cycle descended on a wide area of Europe and the Near East, caused by a sudden drainage of glacial freshwater into the North Atlantic. Several lakes in Turkey have yielded cores that record the sudden climatic crisis. Cooler and drier conditions affected early farming and herding societies across the region, so much so that they may have caused early farmers to move out of Turkey into new pastures in northern Greece and Bulgaria. The climatic evidence comes mainly from lake cores. At Çatalhöyük, temperatures may have cooled somewhat, but the main impact was a decrease in summer rainfall which must have affected both crops and animals. A ten-member research team headed by Mélanie Roffet-Salque studied the hydrogen isotopic composition of these fatty acids with dramatic results. They identified what they call "precipitation signals" from lipids (fatty acids) in food remains preserved in clay vessels. It is as if we are by the side of the people as they responded to the abrupt climate change between about 6325 and 5815 BC. When the cold snap came, they reduced their cattle herd sizes and switched to goats and sheep, while also increasing the efficiency of butchery, known from telltale evidence of bones broken into tiny fragments, and making greater use of bones that yielded grease and marrow, both signs of food scarcity and diet stress. The impact of the climatic shift must have been quite severe. There are telltale signs of malnutrition in the cattle bones, perhaps as a result of difficulties with winter fodder during cold months.

There were changes in the settlement, too. For centuries, Çatalhöyük's families lived in large, multiroom dwellings with internal structures and the dead buried in the houses. The cooler and drier conditions brought profound economic and social changes after 6300 BC. The people now lived in smaller, more independent, and self-sufficient households. Almost simultaneously, the villagers now built lighter shelters with central "living rooms" surrounded by storage and working areas. But to no avail. Ultimately, Çatalhöyük proved unsustainable and was abandoned by 7800 BC.

At the time Çatalhöyük was a bustling village, farming had begun on the Aegean Islands, in Greece, and in parts of southeastern Europe. Since the end of the Ice Age, Europe had been the home of numerous scattered forager groups who lived off forest game, plant foods, and sea and freshwater fish and mollusks. As in Asia, these populations were preadapted to cultivation and animal domestication, especially in areas where short-term population shifts and local environmental change may have required new subsistence strategies.

Domesticated animals and grains were probably introduced into Southeast Europe from Asia by local bartering. The plants were cereals like emmer and bread wheat, which were demanding crops that extracted large quantities of nutrients from the soil. The farmers had to husband their land carefully, rotating cereals with nitrogen-fixing legumes and revitalizing their fields with animal manure. Thus was born the European farming system that carefully integrated cultivation and animal rearing into a close-knit subsistence strategy based on individual households supplying their own food needs. Temperate Europe has year-round rainfall and marked contrasts between summer and winter seasons. With plentiful wood and cooler temperatures, timber and thatch replaced the mud-brick architecture of southwestern Asia.

The expansion of farming society into Central and Western Europe coincided with a cycle of higher rainfall and warmer winters around 5500 BC, at a time when the rising Mediterranean Sea breached a natural earthen berm and flooded into the vast Euxine Lake, turning it within a few weeks into the Black Sea. This event probably caused many farming communities along the lake to move inland, up river valleys and into the Danube Basin.

Within 1,000 years, farming based on cattle herding combined with spring-sown crops developed over an enormous area of continental Europe. As farming groups spread across lighter soils, clearing forest for fields and grazing their animals in once-forested lands, many indigenous forager bands adopted the new economies. The best-known early European farming culture is named the **Bandkeramik complex** after its distinctive line-decorated pottery. It appeared in the Middle Danube Valley in about 5300 BC, then spread rapidly along sheltered river valleys far west to southern Holland and east into parts of the Ukraine. Bandkeramik (Danubian) communities were well spaced, each with territories of some 202 hectares (500 acres). The people lived in long, rectangular timber-and-thatch houses, from 5.4 to 14 meters (from 18 to 46 feet) long, presumably sheltering families, their grain, and their animals (Figure 6.8). Between 40 and 60 people lived in Bandkeramik villages.

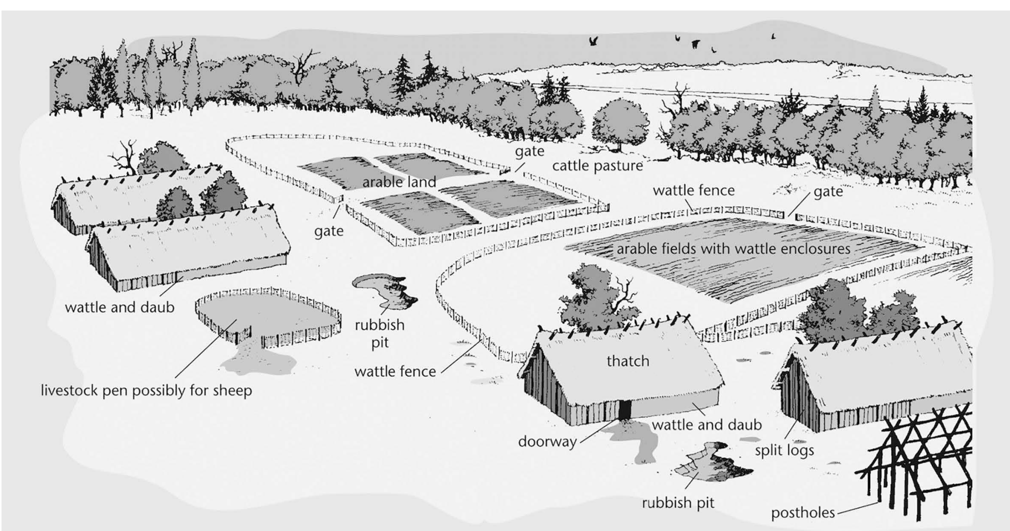


Figure 6.8 Reconstruction of a European Bandkeramik settlement.

Figure 6.9 Avebury, Wiltshire, England. A celebrated Stone Age shrine built ca. 2500 BC. (Robert Harding Picture Library/Alamy)

As the centuries passed, the population rose rapidly and the gaps between individual settlements filled in. In time, village territories became more circumscribed, their settlements protected by earthen enclosures. This was a time when communal tombs came into fashion, among them the celebrated **megaliths** (Greek *mega-lithos*: "big stone") of Western Europe. These were sepulchers fashioned from large boulders and buried under earthen mounds (Figure 6.9). Such corporate burial places may have been locations where revered kin leaders were buried; people with genealogical ties with the ancestors were of paramount importance to a group of farming communities with strong attachments to their fertile lands. Judging from modern analogies, the ancestors were seen as the guardians of the land, the links between the living and the forces of the spiritual world that control human destiny.

Somewhat later, between about 2800 and 2300 BC, individual graves as well as communal sepulchers appeared. These may have been the burial sites of individual leaders, prominent men who were laid to rest with their elaborate regalia of rank. They may have been the sole male ancestor of the group, the source of authority over landownership. Chieftainship, with inheritance of land and wealth, was now legitimized as the character of European agriculture changed rapidly, partly as a result of the introduction of the plow by about 2800 BC.

Site

Easton Down and the Avebury Landscape, England

The great earthworks and megalithic monuments of Western Europe did not stand alone. For example, the famous sacred circles at **Avebury** and Stonehenge in southern England (Figure 6.10) lay at the center of vast, long-vanished sacred landscapes, which were marked by burial mounds, enclosures, charnel houses, and other sites for commemorating the ancestors. Avebury, north of Stonehenge and less well known, was built in about 2550 BC in a natural amphitheater ideal for a large stone circle. In its final form, its earthwork and ditch dug into the underlying white chalk encompassed 11.5 hectares (28.5 acres) and measured about 350 meters (1,150 feet) across. Four causewayed entrances divide the monument into four unequal arcs. Ninety-eight standing stones set up inside the ditch once adorned the interior, some of them up to 14 meters (46 feet) high. Two inner circles stood within the outer circle. This staggering construction was built by farming communities with no wheeled carts, only the simplest levers and rollers, and stone, antler, and wooden tools. When new, the white earthworks with their exposed subsurface chalk must have stood out for kilometers.

Figure 6.10 West Kennet Long Barrow, Wiltshire, England. A megalithic tomb buried under an earthen mound, the side chambers filled with burials. (Skycam Photo Library/Alamy)

Generations of archaeologists have excavated Avebury, but only recently have they paid close attention to its now-invisible landscape, very different from the rolling farmland of today. Obtaining evidence of ancient landscapes requires careful excavation and sample collection, most often of the original land surfaces under burial mounds and earthworks. When archaeologist Alasdair Whittle excavated some test trenches into a long burial mound at Easton Down in southern England, he exposed the original land surface and also the core of stacked turves, chalk, and topsoil under the mound, which gave him an unusual opportunity to obtain a portrait of the local vegetation in about 3200 BC.

First, he turned to pollen analysis. Small amounts of pollen grains from the land surface were predominantly from grasses, showing that no woodland grew close to the tumulus when it was built. A well-sealed section of the premound soil yielded 11 mollusk samples, which chronicled a dramatic change from woodland to open grassland forms over a short period of time. Whittle located an ancient tree hollow under the mound, which, hardly surprising, contained woodland mollusks. A sudden increase in open-country mollusks followed, a change so rapid that human clearance of the land seems the only logical explanation. Interesting, soil scientists found signs of lateral movement of the soil below the mound, which can have resulted only from cultivation before the mound was built.

Excavations such as Easton Down can give us only snapshots of the complex mosaic of cleared and uncleared land that characterizes any agricultural landscape. For example, mollusks and soil samples under nearby Avebury itself tell us that the great temple of 2550 BC rose on long-established but little-grazed natural grassland close to a forest that had generated after being cleared for farming.

This kind of environmental archaeology is now so precise that we can fix the exact seasons when monuments were built or buildings erected. For example, soil samples from carefully cut sod laid under the original ground surface of 40-meter (130-foot) Silbury Hill, built in about 2200 BC, also close to Easton Down, show that the builders started work in the late summer, most likely after the harvest when people had time for construction work. We know this because the well-preserved sods contain ants and anthills. The ants were beginning to grow wings and fly away from their anthills, as they do in late summer.

As environmental and landscape studies continue, we will learn a surprising amount about the setting and perhaps the meaning of major religious sites like Avebury and Stonehenge.

Early Agriculture in Asia (before 7000 to 3000 BC)

A second major center of plant domestication developed in eastern Asia, where food production began almost as early as it did in southwestern Asia.

Rice Cultivation in Southern China

Rice was the staple of ancient agriculture over an enormous area of southern and southeastern Asia and in southern China. Today, rice accounts for half the food eaten by 3 billion people and 21 percent of the total calories consumed by humankind. Intensive research in the broad lowlands flanking the Yangtze River in southern China has now traced and dated the progressive domestication of this vital species that was to fuel the many civilizations of East and Southeast Asia. Flotation of archaeological deposits has shown that it took thousands of years for rice to be fully domesticated, for people cultivated it long before its morphological changes turned it into a domesticated plant. It took thousands of years for the domestic variety to dominate the subsistence of the Yangtze communities that are so clearly seen at the remarkable site of Tianluoshan. However, by 3000 BC rice was the dominant crop of the precocious Liangzhu state, and rice farmers had begun to expand into Southeast Asia, to interact with the indigenous hunter-gatherers.

Rice was one of the earliest plants to be domesticated in the northern parts of Southeast Asia and southern China. Botanists believe that the rice and Asian millets ancestral to the present domesticated species radiated from perennial ancestors around the eastern borders of the Himalaya Mountains at the end of the Ice Age. The initial cultivation of wild rice is thought to have taken place in an alluvial swamp area, where there was plenty of water to stimulate cereal growth. The first form to be domesticated may have flourished in shallow water, where seasonal flooding dispersed the seed on the border zone between permanently dry and permanently inundated lands. Perhaps this cultivation occurred under conditions in which seasonal flooding made field preparation a far from burdensome task. Such conditions could have been found on the Ganges Plain in India and along the rich coastal habitats of Southeast Asia and southern China with their dense mangrove swamps.

Perhaps the first efforts to cultivate rice resulted from deliberate attempts to expand seasonally inundated habitats by constructing encircling dams to trap runoff. The dams could then be breached, flooding dry land that could be used for rice planting, thereby creating additional stands of wild rice. From there, it was a short step to sowing and harvesting in wet fields (paddies). Most likely, a sedentary lifeway based on the gathering of wild rice developed in low-lying, seasonally flooded areas at the beginning of the Holocene. Systematic cultivation resulted from a response to population growth, climatic change, or some other stress.

After about 8000 BC, warmer conditions may have allowed wild rice from the south to colonize the lakes and marshes of the middle and lower Yangtze Valley of southern China, when hunter-gatherer societies throughout China were exploiting a broad spectrum of animal and plant resources. Two caves document the increasing use of rice and more sedentary lifeways thereafter. In **Diaotonghuan** cave, occupied by hunter-gatherer as early as 23,000 years ago, a long period of warming between 8000 and 6000 BC witnessed the exploitation both of wild rice, and of domesticated forms, known from **phytoliths** (minute particles of silica from plant cells). A similar changeover occurred at nearby **Xianrendong** cave. At both sites, pottery appears and evidence of more and more use of cultivated rice and more sedentary living.

By 3000 BC, much more sophisticated agricultural societies flourished along the Yangtze River and farther afield. The archaeology of these traditions is known primarily from cemetery excavations that show slow changes in grave goods. The earliest graves indicate few social differentiations, but later sepulchers show not only a much wider variety of artifacts—pottery, bone and stone tools, jade objects, and other ornaments—but also an increase in the number of elaborately adorned burials. China specialist Richard Pearson, who has analyzed several cemeteries, argues that they demonstrate an increase in the concentration of wealth, a trend toward ranked societies, and a shift in the relative importance of males at the expense of females; the last trend may be associated with the development of more intensive agriculture, an activity in which males are valued for their major roles in cultivation.

First Farmers in Northern China

A second great center of early Chinese agriculture lies nearly 650 kilometers (400 miles) north of the Yangtze, where the Huang Ho River flows out of mountainous terrain into the low-lying plains of northern China. Northern Chinese agriculture was based on millet, whereas the southern staple was rice. The first northern agricultural communities were situated in the lower regions of the Huang Ho River Valley, where the collecting of wild millet had been commonplace for a long time. The area is a small basin, forming a border between the wooded western highlands and the swampy lowlands to the east. As in the south, the early Holocene saw a warming trend followed by a cooler interval, then a more prolonged period of climatic amelioration. The domestication of millet occurred between 9000 and 7500 BC. It was during the colder period, dating to after 6500 BC, that the first sedentary farming villages appear in the lower Huang Ho Valley. Between 7000 and 5500 BC, the inhabitants of the Jiahu village, by a large lake south of the great river, relied heavily on hunting fishing and plant foraging during a warming period, but also cultivated some millet. About 260 people are thought to have dwelt in the village, which enjoyed extensive contacts with other communities as much as 100 kilometers (60 miles) away before being destroyed by a flood. The Cishan site, north of the river, of about 6000 BC was a ceremonial center, where millet was stored in deep pits. Millet agriculture spread outward from the Huang Ho River, southward into areas where rice was also grown.

The fine, soft-textured earth of the Huang Ho Valley was both homogeneous and porous and could be tilled by simple digging sticks. Because of the concentrated summer rainfall, cereal crops, the key to agriculture in this region, could be grown successfully. The plants available for domestication included the wild ancestors of foxtail millet, broom-corn millet, sorghum, hemp, and mulberry. Many villages lay near small streams on lower river terraces, along foothills and plains. Ancient Chinese farmers developed their own cultivation techniques, which persisted for thousands of years. By far the best known of China's early farming cultures is the **Yangshao**, which flourished over much of the Huang Ho River Basin, an area as large as the early centers of agriculture in Egypt or Mesopotamia, from before 4800 BC to about 3200 BC.

Each Yangshao village was a self-contained community, usually built on a terrace overlooking fertile river valleys, situated to avoid flooding or to allow maximal use of floodplain soils (Figure 6.11). Using hoes and digging sticks, the farmers cultivated foxtail millet as a staple, mainly in riverside gardens that flooded every spring. By 3000 BC, Yangshao was

Figure 6.11 Excavations at Banpo farming village, China. (Rebecca Rose Flores/Alamy Stock Photo)

a characteristic and thoroughly Chinese culture, with its own naturalistic art style and expert potters who made cooking pots for steaming food, the technique that forms the basis of much Chinese cuisine to this day. The Chinese language may have its roots in Yangshao as well. Many regional variations of peasant farming culture developed throughout China. Agriculture developed over wide areas at about the same time, with people adapting their crops and farming techniques to local conditions. In time, the success of the new economies led to local population increases, more complex cultures, and the concentration of wealth in privileged hands.

Early American Agriculture (8000 BC onward)

Food production also developed independently in the Americas. For thousands of years after first settlement, the Native Americans subsisted off hunting and gathering, developing an increasing expertise with wild plant foods of all kinds. In some regions, they exploited such resources intensively, especially in the Midwest and Southeast, where some groups managed to occupy more or less permanent settlements for many generations. In time, however, they also started planting wild grasses as a means of supplementing wild plant resources. In time, too, this led to agriculture, especially in areas where wild grasses were plentiful.

By the time of Columbus, the ancient Americans had developed a truly remarkable expertise with all kinds of native plants, using them not only for food but also for medicinal and many other purposes. The most important staple crop was maize, the only significant wild grass in the New World to be fully domesticated. It remains the most important food crop in the Americas, used in more than 150 varieties as both food and cattle fodder. Root crops formed another substantial food source, especially in South America, and included manioc, sweet potatoes, and many varieties of the potato. Chili peppers were grown as hot seasoning. Amaranth, sunflowers, cacao, peanuts, and several types of beans were also significant crops. In contrast to Old World farmers, the Andean Indians had few domesticated animals. Among them were the llama of the Andes and alpacas, which provided wool. The dog, the guinea pig, the raucous turkey, and the muscovy duck were also tamed.

Most archaeologists now agree that at least three major centers of native plant domestication sprang up in the Americas: highland and lowland Central America for maize, beans, squash, and sweet potatoes; the highlands of the central Andes for root crops like potatoes and manioc; and the southeastern United States for pepo squash, sunflowers, and other local plants. There were also four areas of later cultivation activity: tropical (northern) South America, the Andean area, Mesoamerica, and southwestern and eastern North America.

Mesoamerica: Guilá Naquitz and Early Cultivation

The process of plant domestication is still little understood. Archaeologist Kent Flannery bases his arguments on ecological considerations (see Chapter 5). He believes plant cultivation began as a result of strategies designed to cope with continuous short-term climatic fluctuations and constant population shifts. Flannery bases his arguments on his own excavations at the **Guilá Naquitz** rock shelter in the Valley of Oaxaca. Guilá Naquitz was occupied about six times over a 2,000-year period between 8750 and 6670 BC. The tiny forager groups who visited the cave faced unpredictable climatic fluctuations due to periodic droughts in an area that could support very few people per square mile.

The Guilá Naquitz people foraged 11 different edible plant species over the years. In wet years, they experimented with deliberate planting of beans. Bean cultivation near the cave allowed people to collect more food and travel less. At first the experiments were confined to wet years, but as time went on and the people gained more confidence, plant yields rose and they relied more heavily on their own cultivation as opposed to foraging. In time, the Guilá Naquitz people simply added squashes, beans, and a simple form of maize to a much earlier foraging adaptation. Recent accelerator mass spectrometry (AMS) radiocarbon dating of samples dates squash cultivation at the cave to about 8000 BC, as early as cereal agriculture in southwestern Asia. Flannery believes that this kind of changeover occurred in many areas of Mesoamerica.

Maize

The wild ancestor of maize (*Zea mays*) was a grass named teosinte (or *Zea mays* ssp. parviglumis), which still grows in Central America today. The process of domestication may have started as an unintentional by-product of gathering wild teosinte. What may have happened was that the foragers favored the most harvestable of teosinte grasses, those whose seeds scattered less easily when ripe. In time, this favored type of teosinte would become established near campsites and in abandoned rubbish dumps. In time, too, people would remove weeds from these teosinte stands, then start deliberately planting the more useful types. Eventually, the grass became dependent on human intervention. A genetic revolution followed, which led to maize (Figure 6.12).

Most experts believe maize was first domesticated in Mesoamerica, the earliest known samples coming from the Río Balsas region of southwestern Mexico, where it dates to perhaps as early as 6700 BC and was well established by 4000 BC. Maize from Guilá Naquitz in the Valley of Oaxaca dates to about 3400 BC. *Zea mays* may have been domesticated in Panama as early as 5000 BC, but the evidence does not include actual maize cobs.

Figure 6.12 Teosinte.
(The Bookworm Collection/Alamy)

The most complete archaeological evidence for early maize cultivation comes from the dry caves and open sites of the dry, highland **Tehuacán Valley** in southern Mexico. Archaeologist Richard MacNeish found that the earliest Tehuacán people lived mainly by hunting deer and other mammals and also by collecting wild vegetable foods. MacNeish estimated that in 10,000 BC 50 to 60 percent of the people's food came from game. After 8000 BC the game population declined, and the people turned more and more to wild plant foods. By at least 4500 BC, about 90 percent of the Tehuacano diet consisted of tropical grasses and plants such as cacti and maguey. So much grain was necessary that some form of cultivation or domestication of native plants may have been essential by this time. AMS radiocarbon dates on early maize cobs from **San Marcos Cave** date this staple to at least 3600 BC.

More than 24,000 maize specimens have come from the caves of the Tehuacán Valley. They document a long sequence of maize evolution, beginning with 71 small cobs from the lowest levels of San Marcos Cave and from deep in **Coxcatlán Cave**. The cobs are less than 20 millimeters (2 inches) long and lack the ability to disperse their kernels naturally, a clear sign of full domestication. We do not know how many centuries earlier teosinte was transformed into maize, but archaeologist Bruce Smith believes that one place where the process unfolded lay more than 250 kilometers (150 miles) west of Tehuacán, in river valleys that flow from the highlands into the Pacific—areas where the wild teosinte that is most biochemically similar to maize still grows today.

Maize was domesticated in Mesoamerica long before the Pyramids of Giza were built along the Nile River (see Chapter 10). Corn was probably also domesticated in the tropical lowlands, perhaps even earlier than in the highlands, but the evidence is still sketchy.

The primitive form of domesticated eight-rowed maize (*Maiz de ocho*) represented at Tehuacán was the common ancestral corn that spread thousands of miles from its original homeland. Subsequent derivatives of this basic maize developed elsewhere throughout the Americas. If Kent Flannery's hypothesis is correct, plant domestication in Mesoamerica was not so much an invention in one small area as a shift in ecological adaptation deliberately chosen by peoples living where economic strategies necessitated intensive exploitation of plant foods. It appears that the evidence from both Tehuacán and Guilá Naquitz bears out this hypothesis.

Andean Farmers

The story of plant domestication in Mexico shows how it was a deliberate shift in ecological adaptation. The same shift occurred in two areas of the Andean region: in the mountain highlands and along the low-lying, arid Pacific coast.

The great eighteenth-century German naturalist Alexander von Humboldt was the first European scientist to explore the high Andes. He marveled at the great variety of wild plants and animals that thrived in the harsh and varied landscape of high peaks and mountain valleys. Farmers living in the foothills of the great mountains had tamed only a handful of these many species. Squash was domesticated in the highlands by almost 8000 BC. Five important Andean species were of vital importance to highland economies: the llama, alpaca, and guinea pig, the potato, and a grain crop, quinoa. Llamas were perhaps domesticated alongside quinoa, perhaps as early as 2500 BC (Figure 6.13). Llama herding was widespread throughout the highlands and along the north coast of Peru by 900 BC. Guinea pigs, an important wild food for many thousands of years, may have been domesticated in high mountain valleys at about the same time.

At the time of European contact in the fifteenth century AD, Andean farmers used hundreds of potato varieties. Four major strains were domesticated in the highlands, of which one, *Solanum tuberosum*, is now grown all over the world. Wild potatoes were an important food for highland Andean foragers from the time of earliest settlement. Well-documented potato tubers come from midden sites dating to about 2000 BC

Figure 6.13 Panalauca Cave near Lake Junin, Peru. Excavations here have yielded evidence of early quinoa cultivation and llama domestication by 2500 BC.
(Professor John Rick, Stanford University)

at the mouth of the Casma Valley on the Peruvian coast, but earlier specimens will undoubtedly come to light in the south central highlands, where other animal and plant species, including lima beans, were domesticated between 3000 and 2000 BC.

The Peruvian coast forms a narrow shelf at the foot of the Andes, an arid desert strip dissected by river valleys with deep, rich soils and plentiful water for part of the year. For thousands of years, coastal communities lived off the incredible bounty of the Pacific and gathered wild plants in summer. Fishing may have assumed greater importance after 5000 BC, when the climate was warmer and drier than today. By this time the people were also cultivating some plant species like cotton, squash, peppers, and tuberous begonias. Maize was spreading southward into South America by at least 3000 BC.

At large, more or less permanent coastal settlements like **Chilca** and **Paloma**, fish and mollusks were staples, but the inhabitants also ground up wild grass seeds into flour and grew squashes. By 3800 BC, the Chilca people were growing several types of beans, including the ubiquitous lima, and squashes. They lived in circular matting and reed huts erected on frameworks of canes or occasionally whale bones. The succeeding millennia saw many permanent settlements established near the Pacific, the people combining agriculture with fishing and mollusk gathering. But fish and sea mammals were so abundant that agriculture remained a secondary activity much later than it did in Mesoamerica.

Within a remarkably short time, more complex farming societies developed out of the simple village communities of earlier centuries. In some regions, these developments led rapidly to the emergence of state-organized societies, the world's first civilizations. In others, egalitarian farming cultures became elaborate chiefdoms, in remarkably effective adaptations to challenging environments. Chapter 7 examines some of these remarkable societies and the issue of greater cultural complexity in farming societies.

Summary

- Southwest Asia was cool and dry immediately after the Ice Age, with dry steppe over much of the interior. Farming began in eastern Turkey and at Abu Hureyra on the Euphrates River in about 10,000 BC, and sheep and goats replaced gazelle hunting abruptly at the same site and other settlements after 9000 BC.
- Herding was well established somewhat earlier in the Zagros highlands, while farming communities linked by long-distance exchange routes inhabited Anatolia by at least 9500 BC.
- Agriculture and animal husbandry developed in southeastern Europe because of a local shift to the more intensive exploitation of cereals and wild sheep, and also because of a "drift" of domestic animals and cereals across from Southwest Asia. The flooding of Euxine Lake may also have contributed to the spread.
- The widely distributed Bandkeramik complex documents the first settlement of southeastern European farmers in the Middle Danube Valley and on the light **loess** soils of central Europe around 5500 BC.
- During the next millennium, food production spread widely throughout Europe, largely at the hands of indigenous foragers, who adopted sheep, pottery, and cereals, which they considered of immediate advantage to them.
- Food production was probably introduced into Egypt's Nile Valley at a time of drought, by 7000 BC. As the Sahara Desert dried up after 3000 BC, pastoralists with cereal crops moved south of the desert, introducing cattle herding as far south as the East African highlands.
- In southern China, rice was apparently cultivated as early as 9500 BC. Widespread rice agriculture was well established by 6500 BC.
- The staple in the Huang Ho Valley of northern China was millet, cultivated at least as early as 6500 BC and perhaps much earlier.
- At least three centers of early cultivation developed in the Americas: the Andes, Central America, and southeastern North America.

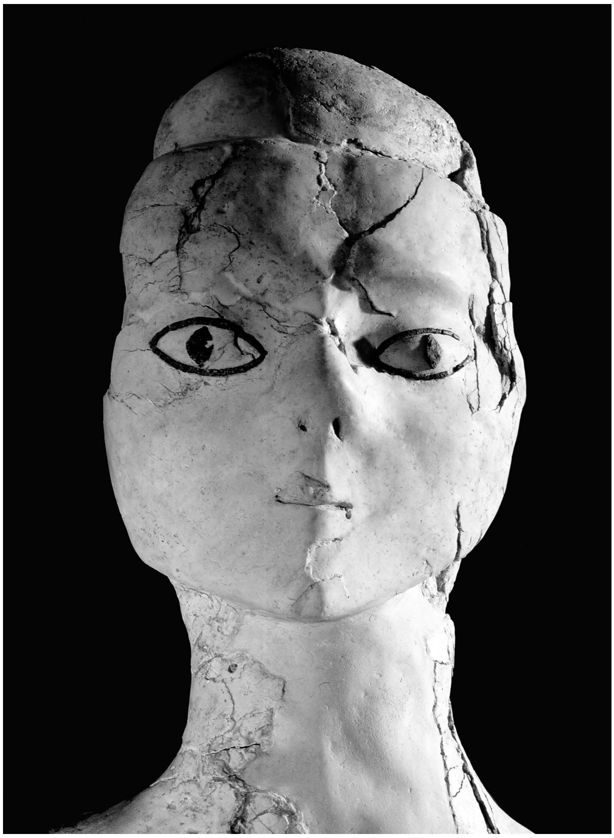
- Maize was the most important cereal, domesticated from a Central American native grass named teosinte as early as 4000 BC. Maize agriculture spread from southern Mexico and Guatemala thousands of miles to the north and south.
- Farmers lived in the highland Andes and in coastal Peru by 3000 BC, but maize did not become a vital cultivated staple until about 1,000 years later.

Further Reading

Andrew Moore's *Village on the Euphrates* (New York: Oxford University Press, 2000) describes the Abu Hureyra excavations and is the finest and most comprehensive monograph on an ancient farming settlement ever written. Ian Hodder, *The Leopard's Tale* (London and New York: Thames and Hudson, 2006) is a fascinating analysis of the beliefs behind the early farming settlement at Çatalhöyük, Turkey. For Europe, see I. J. Thorpe, *The Origins of Agriculture in Europe* (London: Routledge, 1996) and Barry Cunliffe, ed., *The Oxford Illustrated Prehistory of Europe* (Oxford, England: Oxford University Press, 1996). For early farming in Asia, see Li Liu, *The Chinese Neolithic* (Cambridge, England: Cambridge University Press, 2004). Li Liu and X. Chen, *The Archaeology of China: From the Late Palaeolithic to the Early Bronze* Age (Cambridge: Cambridge University Press, 2012) is also valuable. Charles Higham's *The Archaeology of Mainland Southeast Asia* (Cambridge, England: Cambridge University Press, 1989) is comprehensive and authoritative, while his article coauthored with Tracey L. D. Lu, "The Origins and Dispersal of Rice Cultivation," *Antiquity* 72 (1998): 867–877, is a good source for early rice agriculture. For the Americas, see Bruce Smith, *The Emergence of Agriculture*, already cited.

Chapter 7

Chiefs and Chiefdoms



Human, probably ancestral, figurines from 'Ain Ghazal, Jordan, ca. 9000 BC.
(Heritage Image Partnership/Alamy)

Chapter Outline

Prologue

In 1879, Frank Cushing, a young anthropologist from the Smithsonian Institution, arrived at a Zuñi pueblo on a mule. A pall of wood smoke covered the town as the sun set behind the settlement. The mud-brick walls melted into the landscape. He wrote: "It seemed still a little island of mesas, one upon the other, reared from a sea of sand, in mock rivalry of the surrounding grander mesas of Nature's rearing." A pioneer of the anthropological method known as participant observation, Cushing lived among the Zuñi for four and a half years, learning their language and recording their traditional life in great detail.

After three years, the Zuñi initiated him into the secret Priesthood of the Bow. Cushing now dressed in Indian clothing. He spent many hours sitting in kivas watching "the blazes of the splinter-lit fire on the stone altar, sometimes licking the very ladder-poles in their flight upward toward the skyhole, which served at once as doorway, chimney, and window." He listened to "the shrill calls of the rapidly coming and departing dancers, their wild songs, and the din of the great drum, which fairly jarred the ancient, smoke-blackened rafters" (quotations from Cushing, 1979, pp. 48 and 112).

Frank Cushing enjoyed the confidence of the Zuñi, but unfortunately he died before he could set down his account of their culture. Cushing's observations have been of priceless value to archaeologists, as they work back from the present into the remote past in the American Southwest. Food production was the foundation of the world's earliest civilizations, but agriculture did not lead, invariably, to state-organized societies or cities. As we saw in Chapter 1, the archaeologists of a century ago often thought in linear, evolutionary terms of an inevitable ladder of human progress from simple hunting and gathering to civilization. This linear approach, with its overtones of cultural superiority and racism, was intellectually bankrupt by 1910. Multilinear evolution, developed a half century later and a common model for studying the past, likens human cultural evolution to a complex tree with many branches leading cultures in many different environments in bewilderingly diverse ways. The branching model argues that no single society, however simple or complex, is superior to another. In other words, civilization, for all its variety as well as social and technological complexity, is only one way of adapting to the world's many environments.

A generation ago, anthropologist Elman Service made a fundamental distinction between prestate and state-organized societies, dividing the former into bands, tribes, and chiefdoms (see "Ancient Social Organization" box in Chapter 1). Ferocious academic debates about the nature of tribes and chiefdoms have erupted in recent years, many of them revolving around the relative complexity of chiefdoms in both the ancient and modern worlds. At issue here is not so much stages of social complexity, but the whole issue of complexity itself. This chapter describes several examples of emerging social complexity in the ancient world that did not result in literate civilizations. The chiefdoms surveyed here, from the Pacific Islands and the American Southwest and Southeast, represent a wide range of complexity, which resulted from diverse environmental and cultural circumstances.

Inevitably, multilinear cultural evolution has acquired a somewhat step-like association. Some scholars choose to consider "evolution" a racist and pejorative creation of Western science, ignoring in the process the branchlike model, which allows for many forms of equally successful human society without recourse to ethnocentric or racist assumptions.

Reciprocity and "Big Men"

As we saw in Chapter 1, precise definitions of chiefdoms, or of cultural complexity, are virtually impossible to formulate. There is no question, however, that all more complex human societies depend heavily on ties of kin and reciprocity for their long-term viability. And all the world's more intricate ancient societies, whether foragers or farmers, were based on permanent, or at least semipermanent, settlements.

While a considerable degree of cultural complexity arose in some hunter-gatherer societies, like, for example, those of the Chumash of Southern California or the Pacific Northwest, the most profound changes in human society arose after the advent of farming. Perhaps the greatest changes in the new farming societies were social and political rather than economic. They stemmed in large part from the necessity for farmers to live in compact, permanent settlements, to adopt sedentary lifeways, and to maintain very close ties to their lands.

Early agricultural villages like Abu Hureyra or Merimda in western Asia, or permanent farming settlements in Mexico's Tehuacán Valley, brought households into much closer juxtaposition than ever before. The members of a small forager band could always move away when factional disputes threatened to disrupt the band. Farmers, anchored to their land, did not have such a luxury. As a result, kinship ties, not only of immediate family but also of more distant kin, assumed much greater importance in daily life. Subsistence farming households produce their own food needs, but their survival depends both on cultivating a diversity of soil types and on reciprocal obligations with fellow kin. Reciprocity was vital to survival, for it created networks of obligation between near and more distant kin. These allowed people to ask for help when their crops failed, knowing that one day their kin would need help in turn and assistance would be given without question.

The ties of kinship and of membership in hereditary clans and lineages, with all their reciprocal obligations, provided not only institutions that allowed for the settlement of domestic disputes but also mechanisms for the ownership and inheritance of farming and grazing land.

The ownership of land was vested not in individual hands, but in a clan or lineage founded by a powerful ancestor. Thus, the relationship between people and their land was closely related to their links to their ancestors, who were the guardians of the soil. It is probably for this reason that early farmers in the Levant and Turkey maintained figurines or the plastered skulls of their forebears (see chapter opener photo and Figure 1.12).

Trade and exchange played an important role in the development of more complex societies. Everywhere the new farming economies developed, farmers relied increasingly on their neighbors. While late Ice Age hunter-gatherers traded fine-grained rock and exotic objects over long distances, the more sedentary agriculturalist was forced to obtain many more commodities from elsewhere. These included foodstuffs, game meat and hides, hut poles, obsidian, and other vital materials, to say nothing of ornaments and other rare objects from afar. Complicated exchange networks linked village with village and household with household, and narrow trails that carried visitors from one community to the next brought objects bartered from hand to hand over enormous distances. It was such networks that brought Gulf Coast seashells deep into the North American Midwest and obsidian from Turkey to the distant Jordan Valley. The individuals who controlled such exchange networks, or the supplies of key commodities and exotic luxuries, became natural leaders of newly complex village societies.

The earliest farming villages were egalitarian communities, for signs of social ranking do not appear in burials until long after food production took hold. In time, however, this egalitarian form of village life often gave way to new, more complex agricultural societies headed by powerful kin leaders. These were individuals, often shamans or people with extraordinary supernatural powers, linked to their followers by close kin ties and by their ability to reward loyalty with gifts of food and exotic commodities and goods obtained from afar. Anthropologist Marshall Sahlins, who studied modern-day Pacific Island societies, called such people "Big Men." They were clever entrepreneurs, whose power was based strictly on their above-average abilities and the loyalty they commanded from their followers. This loyalty was but transitory, for it did not pass from one generation to the next. This made for volatile, ever-changing political, economic, and social orders. In time, some Big Men acquired such power that they could create hereditary dynasties, which passed chiefly authority from one generation to the next.

Prestate societies of this greater complexity developed in almost every part of the ancient world, in late prehistoric Europe, sub-Saharan Africa, Polynesia, and parts of North America. Everywhere chieftainships of this type evolved, they were exceptionally volatile, as the reins of political and economic power passed from one chiefly family to another, and from one center to the next. None of these elaborate prestate societies managed to maintain tight political, economic, and social control over little more than a local area. State-organized societies achieved such larger-scale integration, which often transcended local ecological zones. Some complex prestate societies, notably those in Western Europe, eventually came under the sway of expanding civilizations like that of Rome. Others, like those of Africa, Polynesia, and North America, survived into historic times, until the arrival of European explorers during the Age of Discovery, which began in the fifteenth century AD. We cannot hope to describe all the more complex prestate farming societies that developed throughout the world, so we shall confine our discussion to the first settlement of the Pacific and to the emergence of chiefdoms in North America.

Chiefs and Navigators in the Pacific (from 2000 BC to Modern Times)

By the end of the Ice Age some 15,000 years ago, *Homo sapiens* had settled in most areas of the Old and New Worlds. Only two areas remained uncolonized by human beings. One was Antarctica, not even visited until the eighteenth century AD; the other the remote islands of Melanesia and Polynesia in the Pacific (Figure 7.1). In Chapter 4, we saw how late

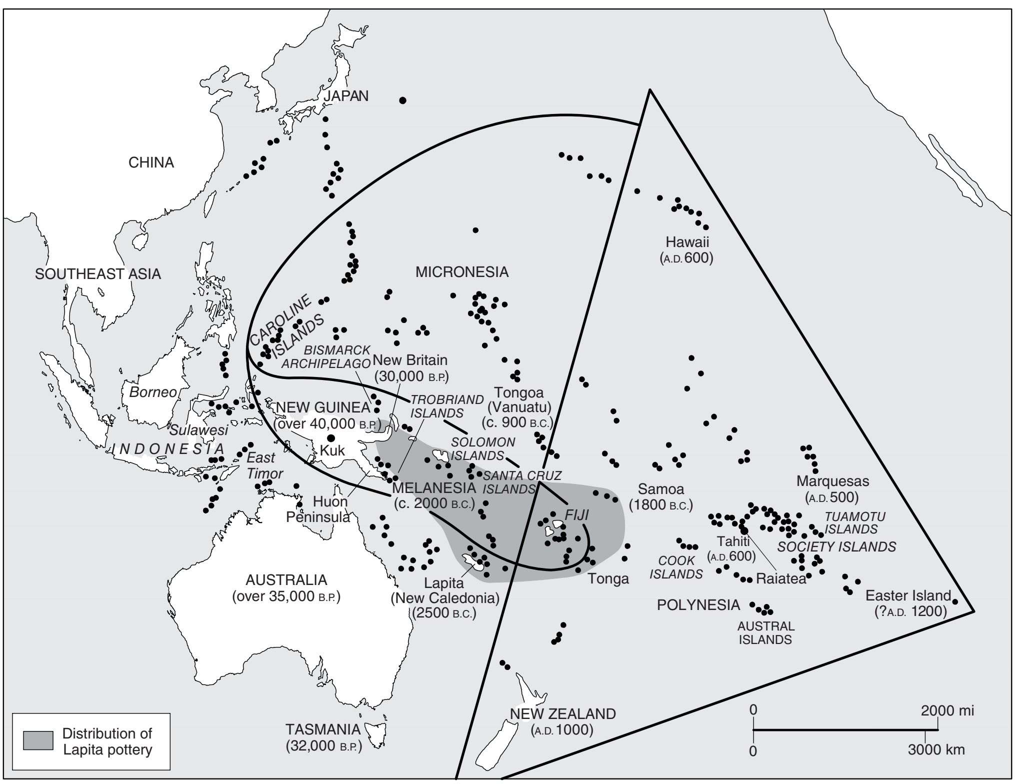


Figure 7.1 Human settlement of the Pacific Islands.

Ice Age foragers voyaged across open straits to colonize Sahul and the Solomon Islands. Small groups of them had settled on the islands close to New Guinea, in the Bismarck Archipelago of the southwestern Pacific, by at least 32,000 years ago. Here colonization paused for many thousands of years. The successful settlement of islands even further offshore depended on the development of large offshore sailing craft and the ability to navigate far out of sight of land. It also hinged on the successful cultivation of root crops like taro and yam, and also on small, portable animals like chickens and pigs that could be penned and transported in canoes. These conditions were met by 2000 BC.

The first settlement of offshore Melanesia and Polynesia was closely connected to the cultivation of yams and taro, which enabled people to live on islands far from the mainland, land masses too isolated for animals or plants to migrate to. The maritime expansion to the more distant Melanesian islands took place after 2000 BC and covered 5,000 kilometers (3,100 miles) of island chains and open ocean during a period of six centuries. The voyages took place in ocean-going, double-hulled canoes capable of carrying heavy loads (Figure 7.2). They are associated with the so-called **Lapita culture**, named after a site on New Caledonia Island in the southwestern Pacific. The Lapita people originated in the Bismarck Archipelago region of western Melanesia some millennia earlier. Their canoes carried obsidian, foodstuffs, and other commodities from island to island over long distances. Lapita trade networks were part of a chain

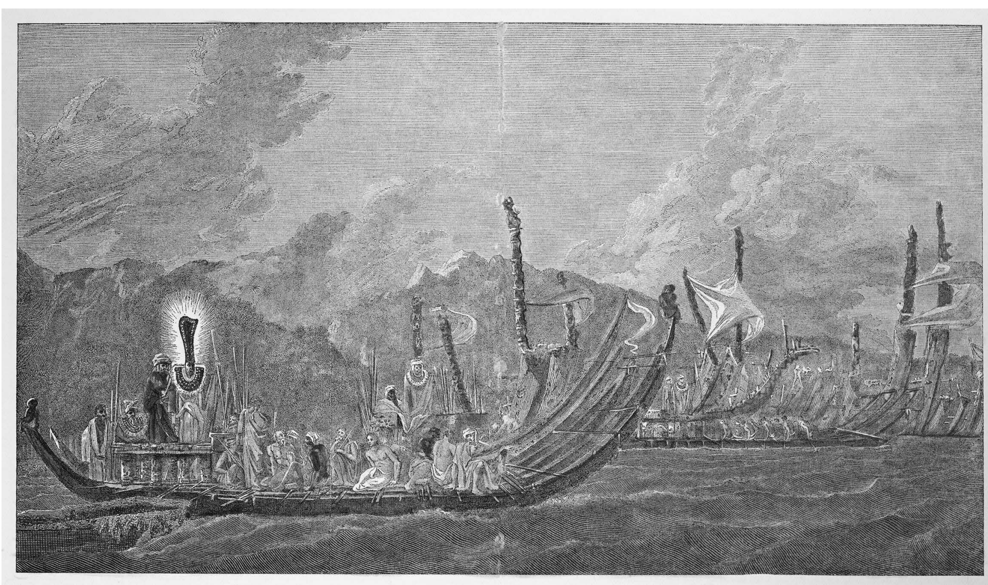


Figure 7.2 Tahitian war canoes pass in review before Captain Cook off Tahiti in 1773. Artist unknown.
(INTERFOTO/Alamy)

of such contacts that extended from Malaysia in the east to coastal New Guinea and offshore.

The rapid expansion to more remote islands occurred among people who lived in an island environment where short interisland passages were an integral part of daily life. But the journeys to outlying islands like Fiji and Tonga involved much longer passages, some as long as about 1,000 kilometers (600 miles). Here, one-way journeys may have been rare and trade was at best sporadic. Navigation out of sight of land required expert skills. Canoe navigators became a respected and close-knit group, who passed their knowledge down from generation to generation by word of mouth. Young apprentices acquired their skills over many years of sailing under expert supervision. They learned the angles of rising and setting stars, the trends of ocean swells, and the telltale and often inconspicuous phenomena that indicate the general direction and distance of islands.

From Melanesia, canoes voyaged from island to island through western Polynesia, taking the plants and domesticated animals of their homelands with them. Melanesians voyaged to Micronesia and Polynesia about 2,000 years ago. After a lengthy period of adaptation in western Polynesia, small groups began to settle the more remote islands. The Marquesas were colonized by 200 BC and the Society Islands and Tahiti by AD 600. The first canoes arrived in Hawaii some 1,350 years ago and on Rapa Nui (Easter Island) by AD 1200. New Zealand, the largest and among the most remote of all Pacific islands, has a temperate climate, not the tropical warmth of Polynesia. Despite this ecological difference, New Zealand was first settled by Polynesian ancestors of the Maori people, who voyaged southward, perhaps as early as AD 1000, probably slightly later. New Zealand's temperate North Island made the cultivation of yams and other tropical island crops difficult, so the early settlers relied heavily on hunting, fishing, and foraging.

Technologically, Micronesia and Polynesia had no metals and relied heavily on stone axes and an elaborate array of bone and shellfish hooks. The crops people planted varied from island to island, but breadfruit, taro, coconut, yams, and bananas were the staples. By combining fish with simple agriculture, the islanders were able to accumulate significant food surpluses that were the basis of powerful chiefdoms. In Polynesia, as elsewhere in the world, agricultural surpluses generated on the larger islands were used as a form of wealth. This wealth, in turn, concentrated political power in the hands of a relatively few people. When European explorers visited Tahiti in the mid-eighteenth century, they chanced on a center of a vigorous eastern Polynesian society (Figure 7.3). The islands were ruled by a powerful hierarchy of warlike chiefs and nobles, descendants of the canoe crews who had first settled the archipelago. The chiefs acquired prestige by controlling and redistributing wealth and food supplies just as they did in Europe, North America, and elsewhere

Figure 7.3 The *marae* at Taputapuatea, Rai'atea, Society Islands, Polynesia. (Veronique Durruty/Getty Images)

in the prehistoric world. Their formidable religious and social powers led, inevitably, to intense competition, to warfare, and to ever more ambitious agricultural projects.

Factionalism and vicious infighting riddled Tahitian society, as in the chiefdoms that developed far to the north, in the Hawaiian Islands, at about the same time. Polynesian chiefdoms were highly volatile and politically unstable. This volatility is well documented in New Zealand, where the introduction of the sweet potato in about AD 1400 made a dramatic difference to local life. The population of North Island grew rapidly as agricultural surpluses created new wealth and greater social complexity. Soon, overcrowding on the best sweet potato lands led to intense competition between neighboring chieftains. When Europeans arrived in 1769, they found the Maori people living in fortified villages and engaged in constant warfare (Figure 7.4). Their military campaigns on land and sea were short and violent, often launched from elaborately carved war canoes up to 24.3 meters (80 feet) in length. By this time, warfare was a key element in Maori society, to the extent that it was institutionalized and an important factor in maintaining cohesion and leadership.

The chiefdoms of Polynesia were fully as elaborate and hierarchical as those elsewhere in the ancient world. They were based on kin ties and on communal ownership of land. These were societies in which leadership, even when inherited, depended heavily on the personal qualities of

Figure 7.4 Maori *pa*, a fortified village, built around a volcanic crater, Mt. Eden, Auckland, New Zealand.
(David Wall/Alamy)

leaders and on their ability to retain the loyalty of their followers. Their chieftains were not despotic monarchs, exercising supreme political, religious, and economic authority, but people who ruled because of their inborn abilities and because of their close ties to their people. As we shall see in the case of North America, some of these prestate societies achieved remarkable levels of elaboration, but they were very different from the tightly controlled, socially stratified states of western Asia, China, or the Americas, described in Chapters 9–14.

The transformation in Maori society that resulted from the introduction of the sweet potato can be mirrored by the history of maize in North America. Both in the Southwest and in the South and Southeast, the arrival of corn led to major changes in indigenous society, but these changes varied greatly from one region to the next. In each area, highly variable ecological factors and social realities led to the development of complex farming societies.

The American Southwest (from 300 BC to Modern Times)

Chapter 6 describes how maize was domesticated from an indigenous grass called teosinte in southern Mexico before 6000 BC and was in common use a millennium later. The new staple did not, however, spread northward across the Rio Grande into the North American Southwest until some centuries later.

Human occupation of the Southwest dates back to before 9000 BC. For thousands of years, the descendants of these early Southwesterners gathered many plant foods, including yucca seeds, cacti, and sunflower seeds, adapting skillfully to the harsh realities of desert living. They developed a remarkable expertise with all kinds of plant foods, which preadapted them for maize agriculture. Maize, beans, and squash agriculture came to the Southwest from northern Mexico, after generations of sporadic contacts between desert foragers and settled farmers. Knowledge of domesticated plants, even gifts of seeds or seedlings, passed from south to north.

Climatic data from tree rings tell us that between about 2500 and 100 BC the southwestern climate was relatively stable, perhaps somewhat wetter than today (see "Dendrochronology (Tree-Ring Dating)" box). However, it was a semiarid environment where hunting and gathering were high-risk occupations, mainly because rainfall was always unpredictable.

Domesticated plants like maize and beans might have low yields in these dry environments, but they had one major advantage: they were predictable food sources. Cultivators of the new crops could control their location and their availability at different seasons by storing them carefully. The people living in the southern deserts of the Southwest may have adopted maize and beans as supplementary foods, not because they wanted to become farmers, but so they could become more effective foragers and maximize the potential of their environment.

Maize first entered the Southwest during a period of higher rainfall between 2000 and 1500 BC. The new crop spread rapidly through the region, especially when combined with beans after 500 BC. Beans helped return vital nitrogen to the soil, maintaining fertility for longer periods of time. Maize farming in the dry Southwest was never easy, for the farmers were working close to the limits of corn's range. They selected moisture-retaining soils very carefully, used north- and east-facing slopes that received little direct sun, planted near canyon mouths, and diverted water from streams and springs. They did everything they could to minimize risk, dispersing their gardens to reduce the danger of local drought or flood. The appearance of maize did not trigger a dramatic revolution in southwestern life. The earlier corns were not very productive, but more bountiful local forms soon became a vital staple for many southwestern groups who were now living in permanent hamlets and much smaller territories. They also led to more complex southwestern societies that adjusted to changing climatic conditions with remarkable flexibility.

Science

Dendrochronology (Tree-Ring Dating)

Everyone is familiar with tree rings—concentric circles, each circle representing annual growth—visible on the cross-section of a felled tree's trunk. These rings are formed by all trees, but especially where seasonal changes in weather are marked, with either a wet and dry season or a definite alternation of summer and winter temperatures. As a rule, trees produce growth rings each year, formed by the cambium, or growth layer, lying between the wood and the bark. When the growing season starts, large cells are added to the wood. These cells develop thicker walls and become smaller as the growing season progresses; by the end of the growth season, cell production has ceased altogether. This process occurs every growing year, and a distinct line is formed between the wood of the previous season, with its small cells, and the wood of the next, with its new, large cells. The thickness of each ring may vary according to the tree's age and annual climatic variations; thick rings are characteristic of good growth years.

Weather variations within a circumscribed area tend to run in cycles. A decade of wet years may be followed by five dry decades. One season may break a 40-year rainfall record. These cycles of climate are reflected in patterns of thicker or thinner tree rings, which are repeated from tree to tree within a limited area. Dendrochronologists have invented sophisticated methods of correlating rings from different trees so they can build up long master sequences of rings from a number of trunks that may extend over many centuries.

Samples are normally collected by cutting a full cross-section from an old beam no longer in a structure, by using a special core borer to obtain samples from beams still in a building, or by V-cutting exceptionally large logs. Once in the laboratory, the surface of the sample is leveled to a precise plane. Analyzing tree rings consists of recording individual ring series and then comparing them against other series. Comparisons can be made by eye or by plotting the rings on a uniform scale so that one series can be compared with another. The series so plotted can then be computer-matched with the master tree-ring chronology for the region (Figure 7.5).

Extremely accurate chronologies for southwestern sites come from correlating a master tree-ring sequence from felled trees and dated structures with beams from Indian pueblos. The beams in many such structures have been used again and again, and thus some are very much older than the houses in which they were most recently used for support. The earliest tree rings obtained from such settlements date to the first century BC, but most timbers were in use between AD 1000 and historic times.

Dendrochronology was once confined to the American Southwest but is now widely used in many other parts of the world, including Alaska, Canada, parts of the eastern United States, England, Ireland, and continental Europe, and also the Aegean Islands and Eastern Mediterranean. The Europeans have worked with oak trees with ages of 150 years or more to

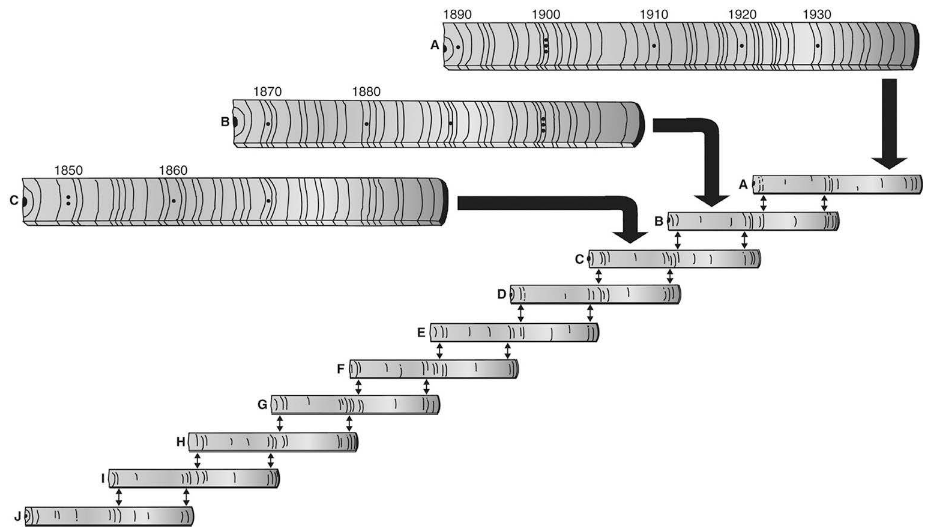


Figure 7.5 Dendrochronology. Building a tree-ring chronology: (A) a boring taken from a living tree after the 1939 growing season; (B–J) specimens taken from old houses and progressively older ruins. The ring patterns match and overlap back into prehistoric times.

develop master chronologies for recent times. Using visual and statistical comparisons, they have managed to link living trees to dead specimens serving as church and farmhouse beams and others found well preserved in bogs and waterlogged peats or prehistoric sites. The resulting tree-ring sequences go back at least 10,021 years in Germany and 7,289 years in Ireland. The Aegean Dendrochronology Project has developed a tree-ring sequence covering 6,000 of the past 8,500 years, which is leading to much more precise dates for the Minoan and Mycenaean civilizations than those cross-dating or radiocarbon readings suggest. So precise are the master sequences in many areas that an expert can date even short ring cycles to within a handful of years.

Tree-ring chronologies provide records of short-term climatic change in areas such as the American Southwest, where cycles of wetter and drier weather can cause radical changes in settlement patterns. Southwestern chronologies are accurate to within a year, a level of accuracy rarely achieved with archaeological chronologies anywhere. In recent years, the Laboratory of Tree Ring Research at the University of Arizona has undertaken a massive dendroclimatic study that has yielded a reconstruction of relative climatic variability in the Southwest from AD 680 to 1970. This enables the Laboratory's scholars to study such phenomena as the "Great Drought" of AD 1276 to 1299, which caused many ancestral pueblo peoples to abandon their large pueblos. In 1276, the beginnings of the drought appeared in tree rings in the Northwest. During the next ten years, very dry conditions expanded over the entire Southwest before improved rainfall arrived after 1299.

Hohokam, Mogollon, and Ancestral Pueblo

By 300 BC, many centuries of experimentation had produced much more productive domestic crops and a greater dependence on farming. The cultural changes of these centuries culminated in the great southwestern ancestral cultural traditions: Hohokam, Mogollon, and Ancestral Pueblo.

Hohokam people occupied much of what is now lower Arizona. They were desert farmers, who grew not only maize and beans but also cotton, which flourishes in hot environments. Where they could, they practiced irrigation from flowing streams; otherwise they cultivated floodplains and caught runoff from local storms with dams, terraces, and other devices. For centuries, much Hohokam life and trading activity centered around **Snaketown**, a large settlement and ceremonial center near the Gila River (Figure 7.6). The inhabitants had trading relationships not only with other parts of the Southwest and with the Pacific coast to the west but also with Mexico. The Hohokam obtained tropical bird feathers,

Figure 7.6 The Hohokam settlement at Snaketown, Arizona, during 1965 excavations, showing circular dwellings.
(Arizona State Museum, University of Arizona, photo by Emil Haury)

copper artifacts, and other exotic objects from the south, but scholars are sharply divided on the amount of Mexican influence on Hohokam culture and religious beliefs. The Hohokam vanished after AD 1500, their cultural heirs the O'odham people of today.

Mogollon was a more highland cultural tradition, which flourished mainly in what is now New Mexico from about 300 BC to between AD 850 and 1150. Mogollon farmers relied on direct rainfall and used little irrigation, living in small villages of pit dwellings with timber frames and mat or brush roofs. In only a few areas did more elaborate settlements develop, but by this time Mogollon was becoming part of the western pueblo **Ancestral Pueblo** tradition. Ancestral Pueblo (formerly called **Anasazi**) society developed out of indigenous forager roots and was centered on the Four Corners area, where Utah, Arizona, Colorado, and New Mexico meet. Ancestral Pueblo people made heavy use of wild plant foods, even after they took up serious maize farming after AD 400. Most of their farming depended on seasonal rainfall, although they used irrigation where practicable.

At first the Ancestral Pueblo lived in small pit-house villages, but after AD 900 much of the population congregated in aboveground settlements of adjoining rooms. These became the famous pueblos, often clustered in small arcs to make them equidistant from the subterranean ceremonial rooms, the **kivas**, in the middle of the settlement (Figure 7.7). The largest

Figure 7.7 Casa Rinconada in Chaco Canyon, one of the largest kivas known. The roof is, of course, missing.
(Scott Warren/Alamy Stock Photo)

and most spectacular pueblos were located in densely populated areas like Chaco Canyon in New Mexico and **Mesa Verde** in Arizona. It was in areas like these that Ancestral Pueblo society sometimes achieved a higher degree of complexity, with larger, densely populated towns that controlled large exchange networks.

Chaco Canyon, with its dramatic cliffs, was the center of a remarkable flowering of Ancestral Pueblo culture that lasted for two centuries after AD 900. During this time, the **Chaco phenomenon**, as it is sometimes called, expanded from its canyon homeland to encompass an area of 64,750 square kilometers (25,000 square miles) of the San Juan Basin and adjacent uplands. The people constructed large, well-planned towns, extensive road and water-control systems, and outlying sites linked to the canyon at least symbolically by ceremonial roadways and visual communication systems. The "Great Houses," large pueblos of Chaco Canyon such as **Pueblo Bonito**, contained luxury items, including turquoise from near Santa Fe, seashells, copper bells, and even the skeletons of macaws, colorful birds from the lowland rainforests of Mesoamerica much prized for their bright feathers (Figure 7.8).

When Chaco was in its heyday between AD 1075 and 1115, the canyon was an important ceremonial center for dozens of outlying settlements. Chaco flourished during a period of uncertain rainfall, and the local farming land could never have supported more than about 2,000

Figure 7.8 Pueblo Bonito, a Chaco Canyon "Great House," dated to between AD 850 and 1130. The round structures are kivas.
(DeAgostini/Getty Images)

people, although population estimates for the pueblos rise as high as 5,600. Thus, archaeologists argue, Chaco may have had a relatively small permanent population and been a place where much food was stored and where large crowds of Ancestral Pueblo congregated for major ceremonial observances.

What, then, was Chaco? Was it a highly centralized chieftainship, controlled by a small but powerful elite of chiefs and nobles who had a monopoly over trade and important spiritual powers? Or was it what archaeologist Gwinn Vivian calls an egalitarian enterprise, a cooperative mechanism developed by dozens of communities living in a harsh and unpredictable environment? We do not know, but early archaeologists discovered elaborately decorated burials at Pueblo Bonito. The Ancestral Pueblo lived in a society where kin ties were all-important, where everyone had complex obligations to fulfill both to his or her own community and to the clan. Without such obligations, it would have been impossible to carry large quantities of food to Chaco's storerooms, or to transport the more than 200,000 wooden beams needed to build its large pueblos and kivas. Perhaps the Chaco phenomenon was an adaptive mechanism whereby local kin leaders regulated and maintained long-distance exchange networks and ceremonial life as a means of supporting far more people than the environment would normally carry. They used economic, social, and ritual ties among a scattered rural population to encourage cooperation between isolated communities in times of need.

The Chaco phenomenon reached its peak between AD 1100 and 1130, when a prolonged drought and environmental degradation caused the system to collapse. The Ancestral Pueblo moved away into more dispersed settlements, maintained alliances with one another, or flourished in scattered, independent pueblos. Perhaps the most famous of all Ancestral Pueblo cultural developments is that centered on the Mesa Verde canyon system in the northern San Juan Basin. By AD 1100, as many as 30,000 people lived in the nearby Montezuma Valley, mainly concentrated in villages of 1,000 people or more. Only about 2,500 of them lived in Mesa Verde. Between AD 1200 and 1300, people moved from open locations into crowded pueblos. **Cliff Palace**, which was the largest settlement, had 220 rooms and 23 kivas (Figure 7.9).

Both in Mesa Verde itself and in the surrounding countryside, large villages, almost towns, were homes for between 1,000 and 2,500 people, living in room clusters associated with kivas and other ceremonial buildings. Everywhere in Mesa Verde, the emphasis was on individual communities. Judging from the numerous kivas, considerable cooperative and ritual activity took place, and on numerous occasions inhabitants of different communities organized large labor parties to carry out sophisticated water-control works and other communal projects. This Ancestral Pueblo tradition was quite similar to Chaco Canyon, with

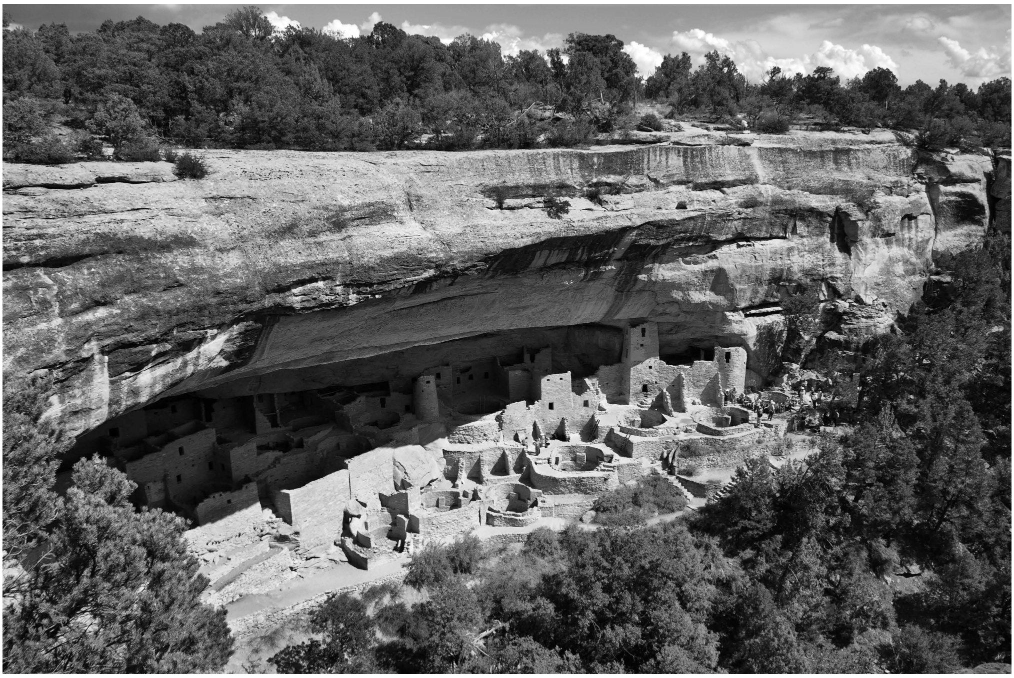


Figure 7.9 Cliff Palace, Mesa Verde, Colorado.
(Robert Alexander/Getty Images)

its intricate mechanisms for integrating dispersed communities, or the chiefdoms of the South and Southeast with their large centers and satellite villages.

The twelfth and thirteenth centuries saw the culmination of four centuries of rapid social and political development in the Mesa Verde region. About AD 1300, however, the entire San Juan drainage, including Mesa Verde, was abandoned by Pueblan peoples. They moved in scattered groups south- and southeastward into the lands of the historic Hopi, Zuñi, and Rio Grande pueblos, where their ultimate descendants live to this day. Following the abandonment of large areas of the Southwest in the late thirteenth and early fourteenth centuries, large settlements formed in previously sparsely inhabited areas. Some of these pueblos are recognized as those of direct ancestors of modern communities.

Southwestern pueblo society never achieved the cultural complexity found in eastern North America or among the Hawaiians or Tahitians, but it achieved the limits of regional integration possible for a region where rainfall was irregular and the climate harsh. Perhaps the best way to describe much southwestern organization is as a theocracy, a government that regulated religious and secular affairs through both individuals, like chiefs, and kin groups or associations (societies) that cut across kin lines. The basic social and economic unit was the extended family, but for hundreds of years southwestern peoples fostered a sense of community and undertook communal labors like irrigation works using wider social institutions that worked for the common good.

Moundbuilders in Eastern North America (from 2000 BC to AD 1650)

No one knows exactly when maize spread across the southern plains into the eastern woodlands of North America, but at least sporadic corn cultivation may have diffused to the Mississippi River and beyond in the early first millennium AD. Like all ancient Native Americans, eastern groups had developed a great expertise with native plants of every kind soon after first settlement before 3000 BC. The densest populations gathered by lakes and estuaries and in the fertile river valleys of the Midwest and Southeast. By 2000 BC, local river valley populations in some areas had increased to the point that group mobility was restricted and periodic food shortages occurred. Under these circumstances, it was almost inevitable that some groups turned to the deliberate cultivation of native food plants like goosefoot and marsh elder to supplement wild cereal grass yields. At the same time, the first signs of social ranking appear in local burials. We find, also, an increasing preoccupation with burial and life after death. For the first time, individual communities and groups used cemeteries on the edges of their territories, which may have served to validate territorial boundaries. As the centuries passed, the funeral rites associated with death and the passage from the world of the living to that of the ancestors became ever more elaborate and important. This elaboration was associated not only with increasing social complexity and an explosion in long-distance exchange but also with the building of ceremonial earthworks.

Adena and Hopewell

Thousands of years of long-distance exchange between neighboring communities had given certain raw materials and exotic artifacts high prestige value in eastern North American society. Scarce and hard to come by, such imports were important gifts exchanged between kin leaders and chiefs. They assumed great social value and significance in societies that placed a high premium on prestige. Hammered copper artifacts, conch shells from the Atlantic and Gulf coasts, certain types of stone axes became status symbols, buried with their powerful owners. By 500 BC, the individuals who controlled these exchange networks were influential not only in life but also in death, for they were buried under large burial mounds.

The **Adena culture**, which flourished in the Ohio Valley between 500 BC and about AD 400, was one of the first to build extensive earthworks. Adena earthworks follow the contours of flat-topped hills and form circles, squares, and other shapes, enclosing areas as much as 107 meters (350 feet) across. These were ceremonial enclosures rather than defensive works, sometimes built to surround burial mounds, other times standing alone. The most important people were buried in log-lined tombs under burial mounds, their corpses smeared with red ocher or graphite. Nearby lie soapstone pipes and tablets engraved with curving designs or birds of prey. Some prestigious kin leaders were buried inside enclosures or death huts that were burned down as part of the funeral ceremony. Occasionally the burial chamber was left open so that other bodies could be added later.

The building of these mounds was invariably a communal effort, probably involving fellow kin from several settlements who piled up basketfuls of earth. The earthworks grew slowly as generations of new bodies were added. Apparently, only the most important people were interred in the mounds. Most Adena folk were cremated and their ashes placed in the communal burial place.

Between 200 BC and AD 400, the **Hopewell tradition**, an elaboration of Adena with a distinctive religious ideology, appeared in Ohio. Hopewell burial practices were such a success that they spread rapidly from their heartland as far afield as upper Wisconsin and Louisiana and deep into Illinois and New York State. The Midwest experienced a dramatic flowering of artistic traditions and of long-distance trade that brought copper from the Great Lakes region, obsidian from Yellowstone, and mica from southern Appalachia. The Hopewell people themselves dwelt in relatively small settlements and used only the simplest of artifacts in daily life. They wore leather and woven clothes of pliable fabrics. All the wealth and creative skill of society was lavished on relatively few individuals and their life after death.

At first glance, Hopewell exotic artifacts and ritual traditions seem completely alien to the simple indigenous culture of the area, but they are deeply rooted in local life. The cult objects buried with the dead tell us something of the social interactions of communities and kin groups. Some of the exotic grave goods, such as pipe bowls or ceremonial axes, were buried as gifts from living clan members to a dead leader. Others were personal possessions, cherished weapons, or sometimes symbols of status or wealth. Hopewell graves contain soapstone pipe bowls in the form of beavers, frogs, birds, bears, and even humans. Skilled artisans fashioned thin copper and mica sheets into head and breast ornaments that bear elaborate animal and human motifs (Figure 7.10). There were copper axes and arrowheads, and trinkets and beads fashioned from native copper nuggets, not smelted.

A few specialists manufactured most of these artifacts, perhaps in workshops within large earthwork complexes, themselves close to major sources of raw materials. Ceremonial objects of all kinds were traded from hand to hand throughout Hopewell territory along the same trade routes that carried foodstuffs and everyday objects from hamlet to hamlet.

Figure 7.10 Hopewell sheet-mica ornament in the form of a human hand.
(Heritage Image Partnership Ltd/Alamy)

However, the prized manufactures may have passed from one person to another in a vast network of gift-giving transactions that linked different kin leaders with lasting, important obligations to one another. The closest, but very far-fetched, modern analogy to such an arrangement is the famous *kula* ring exchange system of the Trobriand Islands of the southwestern Pacific. There, distinctive types of shell ornaments pass in perennial circles among individuals, linking them in lasting ritual and trading partnerships, in ties of reciprocal obligation. This kind of environment encourages individual initiative and competition, as kin leaders and their followers vie with one another for prestige and social status that is as transitory as life itself. Perhaps somewhat similar practices were commonplace in Hopewell times. Once dead and buried with their prized possessions, the deceased were no longer political players, for their mantles did not necessarily pass to their children or relatives.

Figure 7.11 Circular Hopewell mounds at the Mound City national monument, Ohio. Each covers a charnel house where the cremated dead were deposited.
(Zack Frank/Shutterstock)

Hopewell burial mounds are much more elaborate than those of their Adena forebears (Figure 7.11). Some Hopewell mounds rise 12 meters (40 feet) high and are more than 30 meters (100 feet) across. Often, the builders would deposit a large number of bodies on an earthen platform, burying them over a period of years before erecting a large mound over the dead. Hopewell burial complexes reached imposing sizes. The 24 burial mounds at **Mound City**, Ohio, lie inside an earthen enclosure covering 5.26 hectares (13 acres).

The Mississippian Tradition

The center of religious and political power shifted southward after AD 400 as the Hopewell tradition declined. It was then that the people of the densely populated and lush Mississippi floodplain may have realized the great potential of maize as a high-yielding food staple. Much of the local diet always came from game, fish, nuts, and wild or cultivated native plants, but maize added a new and valuable supplement to the diet. It was demanding to grow, but eventually maize became a vital staple, especially when combined with beans in the late first millennium AD. Beans had the advantage of a high protein value but also the asset of compensating for the nutritional deficiencies of corn. The new crops assumed greater importance as rising populations and, perhaps, the insatiable demands of a small but powerful elite were causing considerable economic and social stress.

Maize and beans may have been planted initially as supplementary foods, but they differ from native plants such as goosefoot in that they demand more start-up labor to clear land. Within a short time, the river valley landscape was transformed in such a way that hunting and fishing provided less food for the energy expended than farming. Major social and political changes and an entirely new economic pattern followed, changing eastern North American society beyond recognition. Thus was born the **Mississippian tradition**, the most elaborate prehistoric cultural tradition to flourish in North America.

Regional Mississippian societies developed in river valleys over much of the Midwest and Southeast and interacted with one another for centuries. Many Mississippian populations lived in fertile river valleys with lakes and swamps. They lived by hunting, fishing, and exploiting migrating waterfowl. Every family harvested nuts and grew maize, beans, squashes, and other crops. The cultivation of native plants like goosefoot and marsh elder, as well as sunflowers—to mention only a few species—was of vital importance. Theirs was a complex adaptation to highly varied local environments. Some groups flourished in small, dispersed homesteads, while others lived in compact villages, some so large they might be called small towns; thousands of people lived near locations like Cahokia, on the banks of the Mississippi opposite the modern city of St. Louis.

Cahokia flourished on the so-called American Bottom, an extremely bountiful floodplain area with a great diversity of food resources and fertile soils. The greatest of all Mississippian centers, Cahokia presided over a population of several thousand people in its heyday after AD 1000. The great mounds and plazas of its ceremonial precincts dominated the countryside for miles. Monk's Mound at the center of Cahokia rises 31 meters (102 feet) above the Mississippi floodplain and covers 6.5 hectares (16 acres) (Figure 7.12). On the summit stood a thatched temple at the east end of an enormous plaza. Around the plaza rose other mounds, temples, warehouses, administrative buildings, and the homes of the elite. The entire ceremonial complex of mounds and plazas covered more than 80 hectares (200 acres) and depicted the ancient cosmos of the eastern woodlands, divided into four opposing segments and oriented toward the cardinal points.

Why did Cahokia achieve such political and religious importance? The great center lay at a strategic point close to the Mississippi River and near its confluence with the Missouri, in a region where northern and southern trade routes met. The ruling families of Cahokia achieved enormous political and spiritual power within a few generations, perhaps by virtue of their supernatural abilities as mediators between the spiritual and living worlds, between those on earth and the ancestors. At the same time, they must have been adept traders, with economic and political

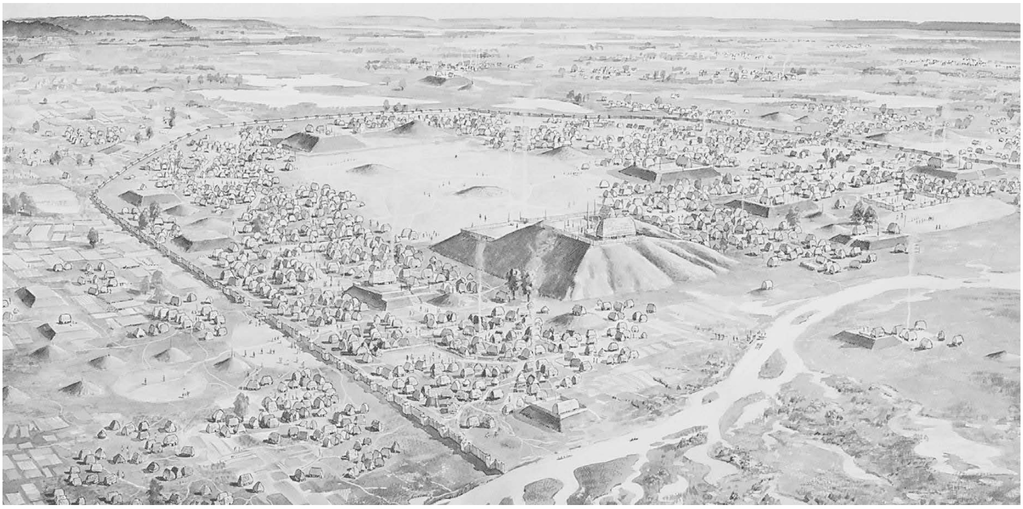


Figure 7.12 An artist's reconstruction of the central precincts of Cahokia in its heyday, ca. AD 1100. Painting by Lloyd K. Townsend.
(Courtesy Cahokia Mounds State Historic Site)

connections over a wide area. Their political power was sufficient to command the loyalty and labor of satellite settlements and religious centers throughout the American Bottom, to the point that elite families may have lived in subordinate centers, where they presided over critical rituals such as the annual Green Corn festival, which celebrated the new harvest. Sacred figurines and distinctive clay vessels bear motifs that are familiar in later Native American religious belief and have deep roots in more ancient cultures.

Although Cahokia was the most elaborate of all Mississippian chiefdoms, its core territory was minuscule by, say, ancient Egyptian standards. Politically volatile and based on ancient religious beliefs, its power and prosperity depended heavily on the authority, charisma, and ability of a handful of rulers. The great center was a magnet for immigrants over a wide area, identified from isotopic analysis of teeth in burials, so it was a very diverse, community. This diversity may have caused serious political and social tensions, between native-born Cahokians and immigrants. Cahokia collapsed in about AD 1,300, as a result of floods and catastrophic drought cycles, as well as social disorder perhaps involving immigrants, also warfare. Other polities to the south and east rose to prominence, but never rivaled that of the Mississippians' greatest chiefdom.

Cahokia was in the north of the Mississippian lands. A major center developed to the south, at **Moundville** in Alabama (see "Moundville, Alabama" box). Dozens of small centers and towns sprang up between the two. More than just sacred places for annual planting and harvest ceremonies, all Mississippian centers were markets and focal points of powerful chiefdoms. For example, Cahokia owed some of its importance to the manufacture and trading of local salt and chert, a fine-grained rock used to make hoes and other tools.

We know little about how Mississippian society functioned, but each major population center was probably ruled as a series of powerful chiefdoms by an elite group of priests and rulers who lived somewhat separated from the rest of the population. Unlike their recent predecessors, these individuals may have inherited political and economic power and also social position as the offices of the elite were passed from one generation to the next. The chieftains controlled long-distance trade and were the intermediaries between the living, the ancestors, and the gods.

As in the Hopewell culture, high-ranking individuals went to the next world in richly decorated graves, with clusters of ritual objects of different styles that symbolized various clans and tribes. Excavations at Cahokia's burial mound 72 revealed at least six different burial events that involved 261 people, including four mutilated men and 118 women, who were probably retainers sacrificed to accompany a chief in the afterlife. One such chief lay on a layer of thousands of shell beads, accompanied by grave offerings from as far afield as Wisconsin and Tennessee. Cahokia and most other larger Mississippian communities had more or less standardized layouts. The inhabitants built platform-like mounds and capped them with temples and the houses of important individuals. These mounds were grouped around an open plaza, while most people lived in thatched dwellings clustered nearby. As we shall see in Chapter 12, somewhat similar architectural groupings are typical of Mesoamerican ceremonial centers and cities, tempting many earlier scholars to argue that Mississippian chiefs were under strong cultural influence from Mexico, claims now discounted.

Mississippian graves and mound centers contain finely made pottery and other artifacts that bear elaborate designs and distinctive artistic motifs. These artifacts include stone axes with handle and head carved from a single piece of stone, copper pendants adorned with circles and weeping eyes, shell disks carved with woodpeckers and rattlesnakes, elaborately decorated clay pots, and engraved shell cups adorned with male figures in ceremonial dress (Figure 7.13). The themes and motifs on these objects have many common features throughout the South and Southeast and as far afield as the borders of the Ohio Valley. At first, experts thought that these ceremonial artifacts represented a **Southern Cult**, and that its ideology and motifs, such as a weeping eye, had arrived in North America in the hands of Mexican artisans and priests. But a closer look at indigenous art traditions shows that many North American groups used such motifs. Many Mississippian ceremonial artifacts served as badges of rank and status and as clan symbols. They were traded from hand to hand over long distances as symbolic gifts between widely separated chieftains who shared many common religious beliefs.

Figure 7.13 A Mississippian shaman cavorts on a shell gorget (neck ornament). He carries a death's head in one hand and a ceremonial mace in the other. Diameter: 10 centimeters (4 inches). (Heritage Image Partnership Ltd/Alamy)

Site

Moundville, Alabama

Moundville lies by the Black Warrior River in west-central Alabama and flourished between AD 1250 and 1500. The site, with its 29 or more earthen mounds, covers more than 75 hectares (185 acres). The larger mounds delineate a quadrilateral plaza of about 32 hectares (79 acres), some supporting public buildings or residences for important individuals. A few are associated with skull caches, while a sweat house and charnel structure for exposing the dead lie just outside the southern side of the plaza, which is oriented on the cardinal directions. The three sides of the site away from the river were protected by a bastioned and much rebuilt palisade during some of Moundville's history. As at Cahokia, hundreds of people lived within the general site area, perhaps as many as 1,000 individuals. More than 3,000 burials have been excavated at Moundville, with the highest-status interments lying in the mounds.

In AD 900, a relatively small number of Woodland people lived in the Moundville area at a time of considerable political and economic unrest and increasingly circumscribed territory. The local people relied on nut harvests and other wild foods, until maize production intensified between AD 950 and 1000. They dwelt in relatively small settlements, which seem to have grown in size as a response to higher agricultural production, increased production of freshwater shell beads, and warfare.

Between AD 1050 and 1250, the first platform mounds appear at Moundville. This was a time when maize and bean agriculture assumed increasing importance, providing as much as 40 percent of the diet. The Black Warrior valley became an important maize farming area as the population dispersed into smaller agricultural communities—some little more than farmsteads, some probably much larger. The Moundville site became an important ceremonial center, the only one in the valley.

In about AD 1250, the site changed completely in character from a dispersed settlement to a compact, highly formalized, and fortified town (Figure 7.14). The inhabitants laid out a quadrilateral plaza with accompanying earthworks arranged in their proper order. They imposed a symbolic landscape on the natural one. Moundville now had an east-west symmetry, a pairing of residential mounds with mortuary temple mounds, and a well-defined ranking of social spaces within the site. By now, Moundville resembled a compact, fortified town inhabited by about 1,000 people living in small groupings of square pole-and-mud houses. Moundville had expanded from an important ceremonial center to the capital of a single kingdom ruled by a paramount chief, supported by tribute and engaged in long-distance exchange. The formal layout of public architecture in the heart of the site probably reflected the status relationships of different kin groups set in the context of a sacred landscape. The paramount chief derived his power both from his supernatural authority and the power conferred on him by the sacred landscape. For a century and a half after

Figure 7.14 Moundville, Alabama.
(Rosa Betancourt/Alamy)

AD 1300, Moundville was ruled by a firmly entrenched chiefly dynasty, reflected in a series of lavishly adorned burials in its burial mounds. The dynasty's increasing power isolated its members both symbolically and practically from their subjects, as the population moved out of the hitherto compact town into the surrounding countryside. Only the elite and their retainers seem to have remained at the now unprotected site. No one knows why the people dispersed. It may have been a result of an administrative decision, an adjustment to soil exhaustion, or simply lessened danger of attack. Whatever the cause, Moundville now became a sparsely inhabited ceremonial center and a necropolis, with cemeteries occupying former residential areas. Many of the burials within them came from outlying communities. At the same time, the wide distribution of distinctive cult motifs on clay vessels seems to suggest that more people had access to the religious symbolism of chieftainship than ever before.

Moundville went into decline after AD 1450, a century before Spanish contact. Elite burial ceased, although a nominal chief may have presided over the site. Perhaps chronic factionalism and resistance to authority among lesser leaders led to the collapse of the once rigid Mississippian hierarchical system, resulting in a patchwork of local chiefdoms, whose leaders may have shown allegiance to a hereditary chief still living among the mounds of his ancestors. Some people continued to live at Moundville when Spanish conquistador Hernando de Soto passed through the area in AD 1540, but we do not know whether a shadowy chiefdom still existed.

The Mississippian was an entirely indigenous cultural tradition, the climax of millennia of steady cultural evolution in eastern North America with some significant Mesoamerican influences. Cahokia, Moundville, and other great Mississippian centers were past the height of their powers by the time European explorers reached the Mississippi Valley in the sixteenth century, but numerous chiefdoms still flourished in the mid-South and Southeast right up to the time of European contact and beyond. It is interesting to speculate what trajectory the successors of Mississippian society would have taken if Europeans had not arrived. Would they have evolved into a full-fledged, state-organized society to rival that of the Maya and Aztec to the south? Experts believe they would not have, simply because the growing seasons for maize and beans in North America are too short and the climate too harsh to support either intensive agriculture or high urban population densities under preindustrial conditions. It would have been difficult for any chieftain to accumulate the food surpluses necessary to maintain authority over more than a relatively limited area. In sum, the most important cultural consequences of food production were a long-term trend toward greater political elaboration, a degree of social ranking, and greater interdependency in a wide range of village farming societies.

The trends toward complexity that developed in eastern North America and the Pacific also unfolded in temperate Europe and in sub-Saharan Africa (see Chapter 10). In Europe, the most able of village kin leaders eventually became warrior chieftains and even hereditary leaders ruling from small towns. One catalyst for such development was an explosion in long-distance exchange that coincided with the widespread use of bronze, and later iron—metallurgy that linked even isolated communities together in larger economic and later political units. Roman general Julius Caesar's legions found the Iron Age people of Western Europe a tough enemy to conquer. Centuries later, the descendants of these people were to shatter Rome's reputation as an invincible power. However, the most momentous consequences of food production were those that led to the emergence of the state-organized society, the urban civilizations that developed in many parts of the world after 3000 BC, described in Part 4.

Summary

- Chiefdoms are hard to define, but were based on ties of kin and reciprocal obligations. The relationships between people and their land were closely linked to kin groups and kin ancestors.
- In time the egalitarian form of village life gave way to new, more complex agricultural societies headed by powerful kin leaders with charisma or extraordinary supernatural powers. Some of these "Big Men" managed to acquire such power that their chiefdoms became hereditary. Others were based on individual ability and personal loyalties, which perished with their owners' deaths. Chiefdoms of varying complexity developed in many parts of the ancient world.
- Both simple and complex chiefdoms developed on the Pacific islands. Simple root horticulture had been established in highland New Guinea by 6000 BC. The people of the Lapita cultural complex traded widely throughout the southwestern Pacific after 1600 BC, but not until the past 2,000 years did offshore outrigger canoes settle Micronesia and Polynesia, and New Zealand was colonized between AD 1000 and 1200. Thereafter, increasingly complex chiefdoms developed in island groups like Hawaii and the Society Islands of Polynesia.
- More complex societies also developed in the North American Southwest and the eastern woodlands. Maize agriculture reached the Southwest by about 1500–2000 BC. By 300 BC, sedentary villages and a much greater dependence on farming were characteristic of the Southwest, leading to the emergence of the Hohokam, Mogollon, and Ancestral Pueblo cultural traditions, among which the ultimate ancestry of modern pueblo peoples lies.

- Many groups in eastern North America turned to the deliberate planting of native plants as food supplements after 2000 BC, but maize and bean agriculture did not arrive from the Southwest until the first millennium BC. After 1000 BC, a series of powerful chiefdoms arose in the Southeast and the Midwest, peoples among whom elaborate burial customs and the building of burial mounds and earthworks were commonplace.
- The Adena tradition appeared in about 700 BC and was overlapped by the Hopewell tradition in approximately AD 100. About AD 800, the focus of economic, religious, and political power shifted to the Mississippi Valley and the Southeast with the rise of the Mississippian tradition. This tradition, with its powerful religious and secular leaders, survived in a much modified form until European contact in the sixteenth century AD.

Further Reading

Patrick Kirch, *On the Road of the Winds: An Archaeological History of the Pacific Islands before European Contact* (Berkeley: University of California Press, 2002) summarizes the first colonization of the Pacific Islands. Kirch's *The Evolution of the Polynesian Chiefdoms* (New York: Cambridge University Press, 1989) describes complex societies in the Pacific. For New Zealand archaeology, see Janet Davidson, *The Prehistory of New Zealand* (Auckland: Longman Paul, 1984). Southwestern archaeology is well analyzed by Linda Cordell, and Maxine McBrinn, *The Prehistory of the Southwest*, 3rd ed. (Orlando, FL: Academic Press, 2012). For the eastern woodlands, see George R. Milner, *The Moundbuilders* (London: Thames and Hudson, 2004), and also Timothy R. Pauketat and Susan M. Alt, eds. *Medieval Mississippians: The Cahokian World* (Santa Fe, NM: School for Advanced Research, 2015). Susan Keech McIntosh, ed., *Beyond Chiefdoms: Pathways to Complexity in Africa* (New York: Cambridge University Press, 1999) contains a collection of essays essential to anyone interested in the archaeology of chiefdoms.

Part IV

Early Civilizations

Introduction: Old World Civilizations

- The origins of state-organized societies, aka preindustrial civilizations,
- The basic features of the earliest states and political and social complexity,
- Divine rulers, pharaohs, and war lords: the earliest civilizations.

We devote four chapters to the origins of states and the earliest Old World civilizations. Necessarily, our coverage is brief and to the point, but libraries of books and papers are devoted to preindustrial states if you want more detail. Chapter 8, "State-Organized Societies," applies to both Old World civilizations and to the Americas. We strongly advise you to read this before embarking on descriptions of different states on either side of the Atlantic. Once that chapter is behind you, individual chapters in Part IV are devoted to Mesopotamia and the eastern Mediterranean world, Egypt and Africa, and South, Southeast, and East Asia. In case you want to study a specific civilization in more detail, we provide you with recommended readings.

The origins of states have been the subject of major controversy for over a century. How did preindustrial civilizations come into being? What major factors led to the rapid development of more politically and socially complex societies? The earliest theories assumed that the first civilization had developed along the Nile River, but such theories soon widened to incorporate much of the Near East. One of the most enduring theories came at the hands of prehistorian Vere Gordon Childe during the 1930s, when he argued for an Urban Revolution. The revolution included the development of metallurgy, the appearance of specialist artisans, and a rapid extension of long-distance trade. Irrigation improved agricultural productivity; centralized political and economic control and new-class-stratified societies came into being, in which writing played an important part.

Today's scholars agree that three elements of Childe's revolution were of central importance: large food surpluses, diversified framing economies, and irrigation agriculture. Otherwise, everyone now considers the revolution hypothesis too simplistic, given the great variety of preindustrial states that have flourished over the past 5,000 years. Most archaeologists use the term "civilization" as shorthand for urbanized, state-level societies. All of them are focused on compact or more spread out cities, had centralized capital accumulation, controlled long-distance trade, and food surpluses that supported many non-farmers. Society was pyramid-like, with an all-embracing state religion and complex social stratification.

The development of states everywhere was a complex process that involved major social and economic change, certainly some ecological factors, all of which resulted in complex cultural systems. Individuals and groups played an important part in many pathways that led to the preindustrial state. Religious ideology, ways of acquiring power and loyal subjects, and conquest played important roles, as did individuals of exceptional ability and leadership skills. Preindustrial civilizations, which depended on human labor, were volatile entities, which rose and fell with often bewildering rapidly, witness the rise and fall of the Sumerians of Mesopotamia, of ancient Maya kingdoms, and the Moche state of Peru.

Chapter 9 focuses on Mesopotamia and the eastern Mediterranean world. The Sumerians of Mesopotamia (from ca. 3100 to 2334 BC) with their bustling city-states ruled by *lugals*, secular and war chiefs, flourished in a volatile political world, where long-distance trade and written script were of vital importance. Their city-states collapsed as the Akkadians and Babylonians (from 2334 to 1650 BC) patched together much larger, volatile domains based on conquest and long-distance trade. The wider eastern Mediterranean became a center of maritime trade and competing civilizations after 2000 BC, among them the Minoans of Crete (from 1900 to 1200 BC) and the Mycenaeans of the Greek mainland (from 1600 to 1200 BC). By this time, the civilizations of the eastern Mediterranean were ever more closely linked to one another, dominated, in turn, by the Hittites and Phoenicians (from 1650 to 800 BC) at a time of extreme political volatility, triggered in part by severe drought.

The Egyptian pharaohs presided over a linear civilization along the Nile that was unified from earlier kingdoms around 3100 BC. They were considered divine rulers, whose power rested in a long-lasting religious ideology centered around the sun god Amun. Between 3000 and 2575 BC, Old Kingdom Egypt became a powerful state, presided over by authoritarian pharaohs, who were buried under pyramids. The state fell apart during catastrophic droughts in about 2100 BC but was reunified by rulers from Waset (now Luxor) in Upper Egypt in 2040 BC. These Middle Kingdom pharaohs were successful administrators and generals, but their New Kingdom successors (from 1530 to 1075 BC) turned Egypt into a powerful imperial civilization that dominated much of the eastern Mediterranean until 1075 BC. Egypt's success was due in considerable part to the predictable, but irregular, Nile floods and fertile soils in the floodplain, which, together with efficient administration, allowed Ancient Egypt to flourish until the Roman conquest of 30 BC, when it became a province of their empire. Upstream, the African kingdoms of Kush and Meroe in modern-day Sudan and Aksum on the Ethiopian highlands became formidable competitors to the pharaohs, for whom they provided important commodities such as elephant ivory.

The Indus civilization developed out of indigenous roots in South Asia after 2700 BC and flourished for a millennium. Its anonymous people, headquartered in great cities like Harappa and Mohenjo-daro, traded with the Sumerians. This civilization was a dispersed entity of cities and outlying villages, with none of the grandiloquent flamboyance of Egypt and Mesopotamia. No one has yet cracked the Indus Valley code, so we lack firsthand written information about how the people thought or the names of any leaders, nor do we have records of the remarkable Khmer state that rose in Southeast Asia, in present-day Cambodia, in the late first millennium AD. The inspiration for the Khmer state came both from South Asia and from the north, at its peak marked by the enormous, elaborate ceremonial centers of Angkor Thom and Angkor Wat. Expert water management supported rice agriculture and fishing, but intense droughts during the twelfth century seem to have undermined Khmer civilization, and it collapsed under pressure from neighbors.

Chinese civilization emerged in a complication process before 2700 BC, both in the north, centered on the Huang Ho River, and on the Yangtze River, in the much warmer south. By 3000 BC, a patchwork of kingdoms flourished in the north and south, supported by either millet or rice cultivation. Dynasties of local rulers lived in walled towns tied loosely to their competitors by intricate allegiances and kin ties. Each local dynasty assumed power in turn, but a loosely unified confederacy of small kingdoms developed into the Shang civilization. Shang rulers presided over a much more complex society than that in earlier centuries. They dwelt in at least seven capitals and dominated the north from 1766 to 1122 BC. Shang civilization is famous for its skilled bronze work that became an important symbol of power and prestige. A similar trend toward greater complexity developed in the south and east, especially in the lower and middle reaches of the Yangtze River, but little is known of these kingdoms.

A pattern of intense rivalry and constant small-scale warfare marked Chinese civilization, much of it at the hands of the Zhou, warring rulers who moved the center of gravity of civilization south and west. They divided their domains into a series of provinces, which fought one another for centuries. Finally, a ruler of the Qin kingdom, Zheng, the "Tiger of Qin," unified China by force in 221 BC and became the first Emperor of China, Shihuangdi. Work on his massive tomb began as early as 246 BC. He was buried under a great burial mound that rose 43 meters (140 feet) above the surrounding landscape. Inside, the burial chamber (still unexcavated) is said to include a model of China with the rivers delineated in mercury. Nearby, an entire regiment of life-sized terracotta soldiers, complete with cavalry and officers, guarded the royal sepulcher. The molded figures were modeled with individual hairstyles and regalia and were fully armed. Half-scale bronze carts and other horses lay nearby. Shihuangdi's regiment has become one of the major tourist attractions in China. Both excavation and conservation continue, for much of the regiment is still unexcavated. Just reconstructing the fragmented soldiers will take decades.

For all their diversity, the Old World's preindustrial civilizations share a common framework, being stratified societies that functioned for the benefit of the few and were almost invariably governed by a combination of religious ideology, careful management of food surpluses, and force. The legacy of their cultural heritage is enormous.

Chapter 8

State-Organized Societies

Assyrian ivory carving of a woman peering from a window, Nimrud, Iraq.
(Heritage Image Partnership Ltd/Alamy)

Chapter Outline

Prologue

Paul-Émile Botta was appointed the French consul in Mosul in northern Iraq in 1840, with one official objective: to dig the nearby mounds of biblical Nineveh. Botta had no archaeological qualifications whatsoever, except that he was an experienced traveler who spoke several western Asian languages. At first, he dug fruitlessly into Nineveh, finding nothing but inscribed bricks. Then, one of his workers told him of similar bricks that formed the chimney of his house at a village named Khorsabad, 23 kilometers (14 miles) away. To get rid of the man, Botta sent two of his laborers to investigate. A week later, they returned with stories of richly carved walls adorned with strange animals. Botta leaped on his horse and rode to Khorsabad, where he gasped at the curious bas-reliefs in the walls of the small pit—of bearded men in long gowns, winged animals, and wild beasts. He moved his excavations to Khorsabad. Within a few weeks, he had uncovered room after room of sculpted limestone slabs, the wall decorations of a magnificent, exotic royal palace. "I believe myself to be the first who had discovered sculptures which with some reason can be referred to the period when Nineveh was flourishing," he wrote excitedly of the palace (Fagan, 2007, p. 102).

We know now that Botta had uncovered not Nineveh but Assyrian King Sargon's palace, constructed at great expense in the eighth century BC. Even so, Botta's remarkable discoveries ushered in a classical era of nineteenth-century archaeology—which revealed to an astonished world not only the Assyrians but, in addition, the Sumerians, the Maya, the Minoans, the Mycenaeans, and other hitherto unknown civilizations.

Today, there are no more unknown civilizations to unearth, but archaeologists are still striving to understand the origins and workings of the world's earliest states. We know that in about 3100 BC, the first **state-organized societies** appeared in Egypt and Mesopotamia, ushering in a new chapter in human history (Figure 8.1). The development of the world's first states was a complex process that took many centuries. This chapter defines a state-organized society and discusses some of the factors that contributed to the development of early civilizations. We also examine some of the theories surrounding their origins.

What Is a State-Organized Society?

Everyone who has studied the prehistory of human society agrees that the emergence of civilization in different parts of the world was a major event in human adaptation. The word *civilization* has a ready, everyday meaning. It implies "civility," a measure of decency in the behavior of the individual in a civilization. Such definitions inevitably reflect ethnocentrism or value judgments because what is "civilized" behavior in one

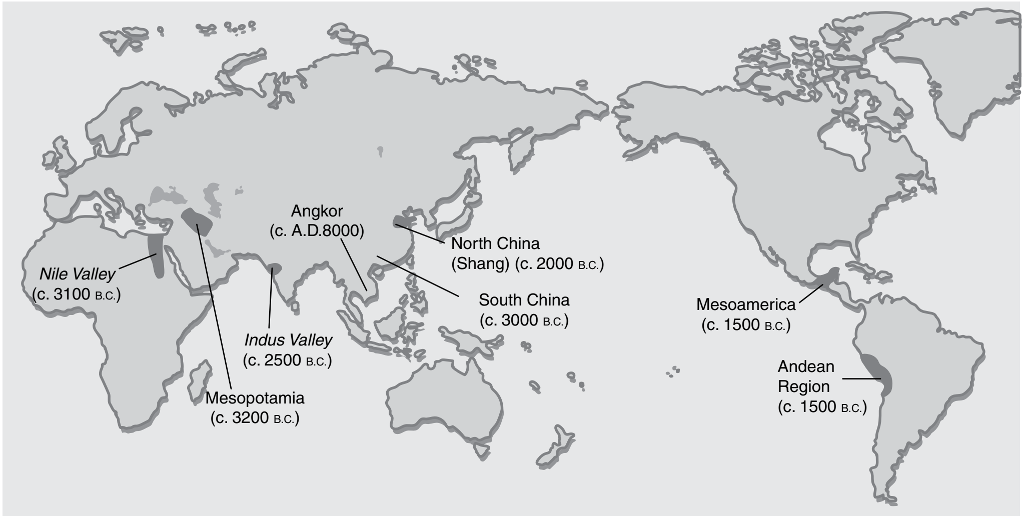


Figure 8.1 Areas of early state formation.

civilization might be antisocial or baffling in another. These simplistic understandings are of no use to students of early civilizations seeking basic definitions and cultural processes.

Today, archaeologists use the term *civilization* as a shorthand for urbanized, state-level societies. Those described in these pages are sometimes called "preindustrial civilizations" because they relied on manual labor rather than on fossil fuels such as coal. Many variations exist among the preindustrial civilizations, but the following features are characteristic of all of them:

- Societies based on cities, with large, very complex social organizations. The preindustrial civilization was invariably based on a larger territory, such as the Nile Valley, as opposed to smaller areas owned by individual kin groups.
- Economies based on the centralized accumulation of capital and social status through tribute and taxation. For instance, Sumerian kings in Mesopotamia monopolized trading activity in the name of the state. This type of economy allows the support of hundreds, often thousands, of non-food producers such as smiths and priests. Long-distance trade and the division of labor, as well as craft specialization, are often characteristic of early civilizations.
- Advances toward formal record keeping, science, mathematics, and some form of written script. This took many forms, from Egyptian hieroglyphs to the knotted strings used by the Inca of the Andes.
- Impressive public buildings and monumental architecture, like Egyptian temples and Maya ceremonial centers.

Chronological Table C

Years A.D./B.C.	Africa	Near East: Mesopotamia	Near East: Levant	Europe		Asia: South Southeast	Asia: China	Americas: North	Americas: Central	Americas: South
A.D.1532	Songhay								Aztec	Inca
	Mali Zimbabwe Ghana			Age of discovery				Mississippian	Toltec	Chimu
A.D.1000						Khmer civilization		Ancestral Pueblo		Tiwanaku Huari
	Indian Ocean trade			Medieval times			Historic times	Hohokam Mogollon		Teotihuacán
		Islamic Rule				Colonization of Polynesia			Maya	Moche
	Meroe Bantu expansion					Funan		Hopewell Adena		
A.D.				Roman Empire	Iron	Indian trade expands	Unification of China			
	Cattle herders in East Africa	Persian Empire	Phoenicians	Classical Greece						Chavín de Huantar
		Assyrians	Sea peoples		Age	Rice-farming cultures				
1000 B.C.							Xhou	MAIZE IN SOUTHWEST	Olmec	
	Ancient Egypt: New Kingdom		Hittites	Mycenaeans						
		Babylonians		Minoans	Bronze		Shang civilization			Irrigation Agriculture
							? Xia	Hunter-gatherers	Village farmers	El Paraiso
2000 B.C.	Middle Kingdom					Lapita culture (pacific)	Farming cultures			
	Old Kingdom	Sumerians		stone Age farmers	Age					Foragers and local farming
3000 B.C.										

- Some form of all-embracing state religion, in which the ruler plays a leading role. For example, the Egyptian pharaoh was considered a living god on earth.

We should emphasize, however, that to think of the development of pre-industrial civilizations like a step on a ladder of cultural evolution is both misleading and far too simplistic a way of looking at the past. What applies to ladder-like models of human evolution applies just as forcibly with the appearance of state-organized societies. They are far too simple. Just for a start, the idea that, say, Ancient Egypt emerged independently and without contact with Mesopotamia, when many links between them came through trade and other contacts, is nonsense. Justin Jennings, for example, argues that civilizations resulted from "sporadic, often unintended by-products of rapid settlement aggregation" (Jennings, 2016: 273). Under this scenario, the only way in which people were crowded into ever-larger settlements was by making fundamental changes in their lives. The earliest cities, much smaller than today's, came into being without the benefit of earlier experience, many of the forces that caused them resulting from ever more intensive webs of relationships that connected people with one another. Creating the first cities and state-organized societies was a very complex and still little understood process.

Cities

Archaeological research into early civilization concentrates on the origin and development of the city. Today the city is the primary human settlement type throughout the world, and it has become so since the Industrial Revolution altered the economic face of the globe. The earliest cities assumed many forms, from the compact, walled settlement of Mesopotamia to the Mesoamerican ceremonial center, with a core population in its precincts and a scattered rural population in villages arranged over the surrounding landscape. The palaces of the Minoans and Mycenaeans of Crete and mainland Greece functioned as secular economic and trading centers for scattered village populations nearby. Angkor Wat in Cambodia and other great Khmer centers in Southeast Asia were dispersed cities with extensive hinterlands.

A city can be defined by its population, which is generally larger and denser than that of a town or village. A generally used rule of thumb is a lower limit of 5,000 people for a city. However, numbers are not a sufficient definition. Economic and organizational complexity as well as population size and density distinguish the city from other settlement types:

- A city is a large and relatively dense settlement, with a population numbered in at least the thousands. Small cities of the ancient world had 2,000 or 3,000 inhabitants; the largest, such as Rome or Changan in China, may have had more than a million.

- Cities are characterized by specialization and interdependence between the city and its rural hinterland, and between specialist craftspeople and other groups within the city. The city is a central place in its region, providing services for the villages of the surrounding area, at the same time depending on those villages for food. Most cities, for example, had a marketplace where agricultural produce could be exchanged.
- Cities also have a degree of organizational complexity well beyond that of small farming communities. Centralized institutions regulate internal affairs and ensure security. These usually find expression in monumental architecture such as temples or palaces, or sometimes a city wall. Here we must recognize an overlap between the concept of the city and the concept of the state. States, too, are characterized by centralized institutions. It may be possible to have states without cities, but it is hard to envisage a city that is not embedded within a state.

An ancient city site will usually be obvious to archaeologists, from both its size and the scale of its remains. The state is more difficult to define. It is a political unit governed by a central authority whose power crosscuts bonds of kinship. Kin groups do not disappear, of course, but their power is reduced, and a new axis of control emerges based on allegiance to a ruling elite.

Theories of the Origins of States

Few developments in world prehistory have generated as much theoretical debate as the origins of states. Modern hypotheses build on theories developed as early as the 1930s.

The "Urban Revolution"

The Victorians, like the Greeks and Romans before them, assumed that civilization had originated along the Nile, in the "Land of the Pharaohs." Eventually, early theorizing used a broader canvas, embracing all of the Fertile Crescent.

The first relatively sophisticated theories about the origins of civilization were formulated by Vere Gordon Childe of "**Neolithic Revolution**" fame. He wrote of a later "Urban Revolution," which saw the development of metallurgy and the appearance of a new social class of full-time artisans and specialists, who lived in much larger settlements: cities. However, the artisans' products had to be distributed, and raw materials obtained, often from long distances away. Both needs reduced the self-sufficiency of peasant communities, Childe argued. Agricultural techniques became more sophisticated as a higher yield of food per capita was needed to support a growing nonagricultural population. Irrigation increased productivity, leading to centralization of food supplies, production, and distribution. Taxation and tribute led to the accumulation of capital. Ultimately, said Childe, a new class-stratified society came into being, based on economic classes rather than traditional ties of kin. Writing was essential for keeping records and for developing exact and predictive sciences. Transportation by land and water was part of the new order. A unifying religious force dominated urban life as priest-kings and despots rose to power. Monumental architecture testified to their activities. Gordon Childe considered technology and the development of craft specialization in the hands of full-time artisans a cornerstone of the Urban Revolution.

Early Ecological Models

With much more data, modern scholars now agree that three elements of Gordon Childe's Urban Revolution were of great importance in the development of all the world's early civilizations: large food surpluses, diversified farming economies, and irrigation agriculture.

The Fertile Crescent model assumed that the exceptional fertility of the Mesopotamian floodplain and the Nile Valley was the primary cause for the appearance of cities and states in these regions. Larger grain surpluses resulted from increased agricultural efficiency, as well as social and cultural changes. Some scholars, among them economist Ester Boserup, took the opposite tack. They believed that population growth, not food surplus, was the incentive for intensified agriculture and eventually more complex societies. But, though important, dense populations did not characterize all state-organized societies, as the Mycenaean or Inca civilizations show.

The same theorists pointed out how the ecological diversity of local environments varied greatly from one area to another. Diversified agricultural economies tended to focus on fewer, more productive crops, but the ultimate subsistence base remained wide. For instance, the Egyptians farmed wheat and barley on a large scale, but also raised large herds of cattle and goats. The highland Andean states relied heavily on their lowland neighbors for fish meal, cotton, and other resources. The resulting diversity of food resources protected the people against famine and stimulated trade and exchange for food and other products, as well as the growth of distributive organizations that encouraged centralized authority.

The adoption of irrigation agriculture was also considered a major factor in the rise of civilization since it supported far higher population densities. Early ecological theories were closely tied to early states' apparent widespread use of irrigation agriculture to enhance agricultural output. Anthropologist Julian Steward and historian Karl Wittfogel argued during the 1950s that irrigation lay behind the development of socially stratified societies in Egypt, Mesopotamia, and elsewhere, which

Wittfogel famously called "hydraulic civilizations." In areas where irrigation was practiced, both scholars argued, the relationship between the environment, food production, and social institutions was identical. Wittfogel was a China specialist who believed that early Asian civilizations became "mighty hydraulic bureaucracies" that owed their despotic control over densely populated areas like China, Egypt, and India to the technological and environmental demands required by large-scale water-control projects in areas of scant rainfall. Thus, the social requirements of irrigation led to the development of states and urban societies in several parts of the Old World, and the same requirements led to remarkable similarities in their economic and social structures.

A mass of new data, including large-scale landscape surveys, has sharpened our perceptions of early irrigation. For example, archaeologist Robert Adams carried out major field surveys of ancient irrigation works in Mesopotamia in the 1960s. Adams found that early Mesopotamian irrigation consisted of cleaning natural river channels and building just a few smaller feeder canals. Most settlements lay near major rivers and made the most of the natural hydrology of the waterways. Each community controlled its own small-scale irrigation works. Only centuries later did a highly centralized state government organize irrigation schemes on a massive scale. The same was true of Egypt, where the greatest irrigation works were undertaken during the New Kingdom, using thousands of laborers fulfilling tax obligations to the state. In contrast, early Egyptian agriculture relied on natural basins to hold back Nile water: a village-level, small-scale operation requiring no official supervision.

While some form of irrigation was a necessary precondition for the settlement of the southern Mesopotamian plains, where the world's first cities arose, large-scale irrigation does not everywhere appear to have been a factor in the rise of early civilizations. By the same token, modern researchers have shown that ecology was only one component in a mosaic of many changes that led to state-organized societies.

Technology and Trade

The origins and evolution of complex societies have long been linked to technological innovation and to growing trade in raw materials like obsidian, copper, and luxuries of all kinds. Gordon Childe considered metallurgy an important component in the Urban Revolution, but, in fact, copper and other exotic materials were at first used in Southwest Asia for small-scale production of cult objects and jewelry. In many cases the technological innovations that did appear, like the wheel in Mesopotamia and the sailing ship in Egypt, were of more benefit in transportation than production. Not until several centuries after civilization started were copper and bronze more abundant, as demands for transportation and military needs burgeoned. Technology did evolve, but only in response to developing markets, new demands, and the expanded needs of a tiny segment of the population—the elite.

Any form of trade involves two elements, both the goods and commodities being exchanged and the people doing the exchanging. People make trade connections when they need to acquire goods and services that are not available to them within their local area. This trade (more conventionally called "exchange") can be gift-giving, the exchange of gifts that reinforce a social relationship between both individuals and groups as a whole. The gifts serve as gestures that place obligations on both parties and are often a preliminary to bartering for all manner of commodities. This kind of preliminary gift exchange is commonplace in New Guinea and the Pacific and was widespread in Africa during the past 2,000 years. Bartering, the exchange of commodities or goods, was another basic trading mechanism for many thousands of years, often sporadic and usually based on notions of reciprocity, the mutual exchange of commodities or objects between individuals or groups. Redistribution of these goods through society lay in the hands of chiefs, religious leaders, or kin groups. As we have seen, such redistribution was a basic element in chiefdoms. The change from redistribution to impersonal market economy trade, often based on regulated commerce involving, perhaps, fixed prices or even currency, was a change closely tied to growing political and social complexity and hence to the development of the state.

Science

Obsidian Sourcing

Scientists studied the sources of toolmaking stone long before the advent of spectrographic analysis, relying both on petrology and on distinctive rocks, like the butter-colored and easily recognized Grand Pressigny flint, widely used in France by Stone Age farmers. High-tech analytical methods have used spectrographic analysis to identify no fewer than 12 early farming villages that had obtained obsidian (volcanic glass) from the Ciftlik area of central Turkey (Figure 8.2).

This pioneer study showed that 80 percent of the chipped stone in villages within 300 kilometers (186 miles) of Ciftlik was obsidian. Outside this "supply zone," the percentages of obsidian dropped sharply with distance, to 5 percent in a Syrian village and 0.1 percent in the Jordan Valley (Figure 8.2). If these calculations are correct, each village was passing about half its imported obsidian further down the line. Renfrew and his colleagues identified no fewer than nine obsidian "interaction zones" between Sardinia and Mesopotamia, each of them linked to well-defined sources of supply, and each yielding obsidian with its own distinctive trace elements identifiable spectrographically.

Obsidian sourcing is now a commonplace method of tracing ancient exchange, and it has been applied successfully in many parts of the world, among them California and Mesoamerica (Figure 8.3).

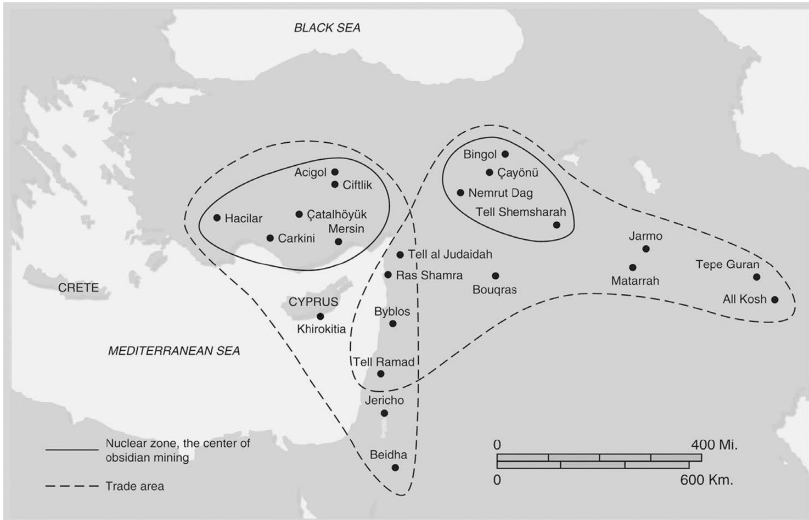


Figure 8.2 Obsidian trade in the Mediterranean region. Sourcing studies reveal that early farming communities in Cyprus, Anatolia (Turkey), and the Levant obtained their obsidian from two sources in central Anatolia. Meanwhile, villages such as Jarmo in the Zagros Mountains and Ali Kosh far to the southeast relied on sources in Armenia. Settlements such as Çatalhöyük in Anatolia were so close to obsidian sources that they probably collected their own supplies. More than 80 percent of their stone artifacts are made of the material. Obsidian tools are much rarer down the line the further one travels from the source.

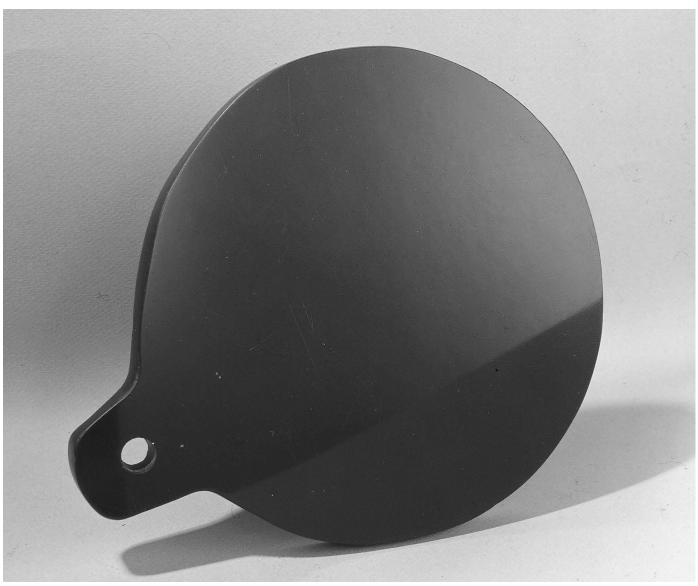


Figure 8.3 Obsidian mirror from Mesoamerica.
(Heritage Image Partnership Ltd/Alamy)

In the 1970s, a number of archaeologists gave trade a primary role in the rise of states. In the Aegean area, British archaeologist Colin Renfrew attributed the dramatic flowering of Minoan civilization on Crete and through the Aegean to intensified trading contacts and to the impact of olive and vine cultivation on local communities. As agricultural economies became more diversified and food supplies could be purchased both locally and over longer distances, a far-reaching economic interdependence resulted. Eventually, this led to redistribution systems for luxuries and basic commodities, systems that were organized and controlled by Minoan palaces and elsewhere in the Aegean where there were major centers of olive production.

Now that we know much more about ancient exchange and commerce, we know that trade can never be looked upon as a unifying factor or as a primary cause of ancient civilization, simply because no one aspect of it was an overriding cause of cultural change or evolution in trading practices. Extensive long-distance trade, like large-scale irrigation, was a consequence rather than a cause of civilization.

Warfare

In the 1970s, anthropologist Robert Carneiro used the archaeology of coastal valleys in Peru to argue that warfare played a key role in state formation. His "coercive theory" of state origins argued that the amount of agricultural land in these valleys was limited and surrounded by desert. So a series of predictable events led to the development of states. At first, autonomous farming villages flourished in the valley landscape. But as the population grew and more land was taken up, the communities started fighting over land and raided each other's fields as they competed for limited acreage. Some of the village leaders emerged as successful warlords, became chieftains, and presided over large tribal polities. The valley population continued to grow, and warfare intensified until the entire region fell under the sway of a single successful warrior, who lorded over a single state centered on the valley. Then this ambitious ruler and his successors began raiding neighboring valleys. Eventually a multi-valley state developed, creating a much larger civilization.

Carneiro's theory is hard to test in the field, but an attempt to do so in Peru's Santa Valley showed no sign of autonomous villages. Rather, it depicted a much more complex, evolving settlement pattern over many centuries. Archaeologist David Wilson points out that the only "coercive" processes came about around AD 400, when the Moche people carved out a multi-valley state by military conquest of neighboring valleys (Chapter 14). The conquest took place long after complex irrigation-based societies flourished in the Santa Valley. As with irrigation hypotheses, reality is more complicated than the straightforward Carneiro scenario.

Warfare also can be rejected as a primary cause of civilization on other grounds. In earlier times, the diffuse social organization of village communities had not yet led to the institutional warfare that resulted from the concentration of wealth and power in a few hands. Kingdoms engaged in raiding and violent conflict almost everywhere before state formation, which may have had a profound effect on peoples' lives, but other powerful factors were simultaneously at play. Only when absolute and despotic monarchs came into power did warfare become endemic, with standing armies to control important resources, solve political questions, and ensure social inequality. This type of warfare presupposes authority and is a consequence of civilization.

Cultural Systems and Civilization

Most archaeologists agree that urban life and preindustrial civilization came into existence gradually, during a period of major social and economic change. Everyone agrees, also, that linear explanations invoking irrigation, trade, or warfare are inadequate. Recent theories of the rise of states invoke multiple and often intricate causes and are frequently based on systems models.

In the 1960s, Robert Adams, an expert on ancient Mesopotamia, introduced a new generation of complex theories when he argued that irrigation agriculture, increased warfare, and local resource variability were three factors vital in newly appearing urban civilizations. Each affected society and the other factors with positive feedback, helping to reinforce each other. The creation of food surpluses and the emergence of a stratified society were critical developments. Irrigation agriculture could feed a bigger population. Larger populations, an increase in permanent settlement, and trade with regular centers for redistributing goods were all pressures for greater production and increased surpluses, actively fostered by dominant groups in society. The greatly enlarged surpluses enabled those who controlled them to employ larger numbers of artisans and other specialists who did not themselves grow crops.

Adams argued that some societies were better able to transform themselves into states because of the favorable variety of resources on which they could draw. Higher populations led to monopolies over strategic resources. These communities eventually were more powerful than their neighbors, expanding their territories by military campaigns and efficiently exploiting their advantages over other peoples. Such cities became early centers of major religious activities, of technological and artistic innovations, and of writing. Literacy, a skill confined to a few people, became an important source of power.

Archaeologists like Kent Flannery, who works in Mesoamerica, now saw the state as a very complicated "living" system, the complexity of which could be measured by the internal differentiation and intricacy of its subsystems, such as those for agriculture, technology, or religious beliefs. The way these subsystems were linked and the controls society imposed on the system were vital. This model seemed to work well with Mesoamerican states, where pervasive religious beliefs formed close links between public architecture, the economy, and other subsystems of civilization.

The management of a state is a far more elaborate and central undertaking than that of a small-scale society. Indeed, the most striking difference between states and less complicated societies is the degree of complexity in civilizations' ways of reaching decisions and in their hierarchic organization, not necessarily in their subsistence activities. Systems models of early states are bound to be complex, for they have to distinguish between mechanisms and processes of cultural change, and the socioenvironmental pressures by which we have sought to explain the origins of civilization. Religion and control of information now appear to be key elements in the regulation of environmental and economic variables in early civilizations and, indeed, in any human society.

Environmental Change

Ecologically based theories, which also rely heavily on systems approaches, have enjoyed a relatively long life compared with many other hypotheses. For example, in a classic study of the Valley of Mexico, William Sanders and a group of archaeologists showed how the Aztec state created and organized huge agricultural systems that spread over the shallow waters of the lakes that once filled the valley. The variability of the local environment meant the Aztecs had to exploit every environmental opportunity afforded them. Thus, Sanders argues, the state organized large-scale agriculture to support a population of up to 250,000 in and close to the Aztec capital, Tenochtitlán. Environmental factors were decisive in each area where civilization began, he believes. Another important factor was centralized leadership.

The ecological approach has serious problems. How, for example, does one tell which environments would foster state formation? Fertile floodplains like those in Mesopotamia and Egypt? Coastal river valleys like those in Peru? Highland plateaus like those in Mesoamerica? Or areas where land is in short supply (also coastal Peru)? States have arisen in regions with few geographical constraints, like the Maya lowlands of Mesoamerica. Further, preindustrial civilizations have developed without any sign of rapid population growth in Iran and other parts of Southwest Asia. But environmental factors undoubtedly were major players in a very complex process of cultural change and response.

Social Approaches: Power in Three Domains

In recent years, archaeology has shifted away from systems-ecological approaches toward a greater concern with individuals and groups. The former theories have often been somewhat impersonal, treating states as rather mechanical entities that operated according to complex processes of cultural change. A new generation of researchers is carrying social approaches and the study of power in new directions, arguing that all human societies consist, ultimately, of individuals and groups interacting with one another, each pursuing its own agendas.

Archaeologically, one can look at power in three domains: economic power, social and ideological power, and political power. The combination of economic productivity, control over sources and distribution of food and wealth, the development and maintenance of the stratified social system and its ideology, and the ability to maintain control by force were the vital ingredients of early states. Each of these domains was closely linked to the others, but they can be studied separately in the archaeological record.

Economic power depends on the ability to organize more specialized production and the diverse tasks of food storage and food distribution. In time, stored wealth in food and goods develops into relationships of dependency between those who produce or acquire the wealth and those who control and distribute it. A state comprises elites (the noble class), officials (the managers), and dependents (the commoners). The landowning class and the estate—whether owned by a temple, the ruler, or a private individual—provided security for the estate's dependents. All early states developed from foundations where agricultural production became more intensified and diverse. At the same time, early states moved away from purely kin-based organization into centralized structures that crosscut or overrode kinship ties.

Economic power also rested in trade and long-distance exchange networks, which provided access to commodities that were not available locally. Sumer obtained its metal from Anatolia, Iran, and the Persian Gulf. Egypt acquired gold and ivory from Nubia (the modern-day Sudan). Highland Andean civilizations imported fish meal from the Pacific coast. The acquisition of exotic commodities or goods on any scale required organization, record keeping, and supervision. The archaeological record shows that the extent of state supervision of trade and traders varied considerably from civilization to civilization.

Social power means ideological power and comes from the creation or modification of certain symbols of cultural and political commonality. Such common ideology, expressed in public and private ceremonies, in art, architecture, and literature, served to link individuals and communities with common ties that transcend those of kin. Those who create and perpetuate these ideologies are held in high honor and enjoy considerable prestige, for they are often perceived as interceding with the spiritual world and the deities, and sometimes even seen as flesh and blood divinities themselves. The guardians of ideology are privileged individuals, for their spiritual powers give them special social status and allow them to perpetuate social inequality.

So important was ideology that one can speak of the Mesopotamian or Maya areas not in a political sense, for they were made up of patchworks of city-states, but in an ideological one. Many great cities of the past, like the Maya city at Tikal in Guatemala, were a combination of the spiritual and the secular. They all boasted powerful priesthoods and religious institutions, which owed their wealth to their ability to manage the spiritual affairs of the state and to legitimize rulers as upholders of the cosmic order. The temples and public buildings they erected formed imposing settings for elaborate public ceremonies that ensured the continuity of human life and the universe (Figure 8.4).

Political power rested in the rulers' ability to impose authority throughout society by both administrative and military means. Those who held positions of authority within either the bureaucracy or the army did not come from within the kin system, but were recruited outside it. This political power lay in foreign relations and in defense and making war. It also operated at a statewide level, dealing with the resolution of major disputes between different factions. But a great deal of power lay outside

Figure 8.4 Uxmal, Mexico, once a symbolic depiction of the Maya spiritual world. (ImageBROKER/Alamy)

the political estate, in the hands of community and kin leaders who handled many legal matters revolving around such issues as landownership and family law.

Archaeologist Norman Yoffee believes that the interplay between these three sources of power led to the development of new society-wide institutions—to supreme rulers and the state. There was, he says, no one moment when civilization came into being, for social evolution did not end with the rise of the state. Preindustrial states functioned in an atmosphere of continual change and constant disputation. Some collapsed; others survived for many centuries.

This approach to the origin of states argues for many trajectories for the development of social complexity. Many societies operated under significant constraints; they may have lacked, say, dependable crops or domesticated animals or the ability to store large amounts of food. Constraints like these took human societies along very different evolutionary paths than those of the state. That some societies did not become civilizations does not mean that they were stuck in a "backward stage," but simply that constraints on growth prevented the interplay of the major factors that led to state formation elsewhere. Thus, the chiefdom is an alternative trajectory to the state. In the chiefdom, social inequality came from within the kin system; in the state, inequality was based on access to resources and the power this control provided.

Factionalism and Ideology

Every early civilization had a pervasive set of religious beliefs and philosophies that reached out to every corner of society. Such ideologies shaped society and ensured the conformity of its members, but to study such intangibles is a formidable task. Ideologies come down to us in distinctive art styles, like those of the Egyptians or the Moche of the Andes (Figure 8.5). Such styles are visual reminders of a state's ideology, reinforcing the power of supreme rulers and their special relationships to the gods and the spiritual world. In societies where only a minority—those with power—are literate (or have scribes in their employ), art and public architecture have powerful roles to play in shaping society and reinforcing ideology.

The Maya elite lived in cities like Copán and Tikal, which were depictions in stone, wood, and stucco of a symbolic landscape of sacred hills, caves, and forests. Here, great lords appeared before the people atop high pyramids in elaborate public ceremonies (see Figure 8.4). Through ritual bloodletting and shamanistic trance, they entered the realm of the Otherworld, the world of the deities and ancestors. These sacred rituals validated the world of the Maya and linked noble and commoner, ruler and humble village farmer, in a complex social contract. The leaders

Figure 8.5 Artifacts as ideological statements. A Moche ceramic vessel from coastal Peru, ca. AD 400, depicts a man paddling atop a fish.
(Agefotostock/Alamy)

were the intermediaries, the people who interceded with the gods to guarantee plentiful crops and ensure the continued existence of human life. The ceremonial centers, with their pyramids, plazas, and temples, were reassuring settings where the drama of life and death, of planting and harvest, were played out against a backdrop of ever-changing seasons. These ceremonies justified social inequality, the great distinctions between the ruler and the ruled.

Ancient ideologies were as complex as our own, and they defy ready archaeological analysis by their very complexity and nonmaterial nature (Figure 8.5). The recent decipherment of Maya script has shown just how important and pervasive ideologies were in ancient civilizations. Until decipherment, most authorities assumed Maya rulers were peaceful priest-kings who used their power as astronomers to preside over small city-states. But Maya glyphs reveal an intricate and complex pantheon of deities and religious beliefs that often defy modern analysis. Each day in the Maya calendar possessed a combination of qualities; every compass direction had colors and characteristics; each deity had many roles and moods. Nothing in Maya society occurred without acquiring symbolic and often ideological meaning. In Egypt, too, the ancient precedents of the pharaohs' rule and the teachings of the gods permeated all society and governed even the collection of taxes and the distribution of rations.

With ideology comes factionalism. As we have seen, ancient societies were as diverse as modern ones, especially when their rulers traded with neighbors near and far. The state functioned for the benefit of a minority—privileged rulers and nobles to whom all wealth and power flowed. A ruler governed his domains by deputing governance to relatives and loyal followers, who became provincial governors. But, inevitably, some individuals were more ambitious than others, rebelling against authority and plotting to gain supreme power. Competing factions within local groups and in different regions triggered further social inequality, changing patterns of leadership, increased specialization, and helped lead to the development of states. And once civilizations came into being, they would challenge royal successions or even trigger civil war when a ruler was perceived as weak or indecisive. Competition and emerging factionalism were powerful catalysts in the development of many early states. One can imagine the maneuvering and plotting at an Egyptian pharaoh's court, at a time when life expectancies were short and sudden death possible at any time. Everyone wanted to be in a favorable position when a successor came to the throne.

In an era when archaeological research has become increasingly specialized, it is probably futile to search for a theory of state formation that can be applied to all civilizations. Common questions, however, revolve around the implications of ecological variables in societies about to become states: how is ecological opportunity or necessity translated into political change? What were the larger goals of the political actors who were pursuing their individual goals while states were coming into being? Which ecological variables were obstacles? Which were opportunities? The answers to these questions will come from sophisticated research works that combine systems-ecological approaches with careful research into what British archaeologist Colin Renfrew has called "the archaeology of mind," the elusive intangibles behind the material record of the past.

People as Agents of Change

For all our talk of "cultural processes," we must never forget that it is people—individuals and groups—who are the agents of political and other cultural change. History is made by individuals of exceptional ability and leadership qualities. No question, such people also came to positions of great power in the early civilizations, but many of them remain anonymous because written records are very incomplete. In some cases, for example in Egypt, we know the names of seminal rulers like the early pharaoh Narmer, but they are little more than shadowy personages on the stage of history. More modern examples include the Zulu King Shaka, who set up the Zulu state in South Africa in the early nineteenth century, King Kamehameha of Hawaii, and others. All of them, whether ancient or more modern, were individuals who were products of their times, whose personal abilities made the most of unusual circumstances, accidental situations, and other moments when they could further their political and military goals (Figure 8.6). The result was, invariably, a process of historical change.

Distinctive qualities marked Shaka and other modern agents of change, and the chiefs of unusual ability who created the first civilizations shared these traits. They were members of an elite—people with aggressive and

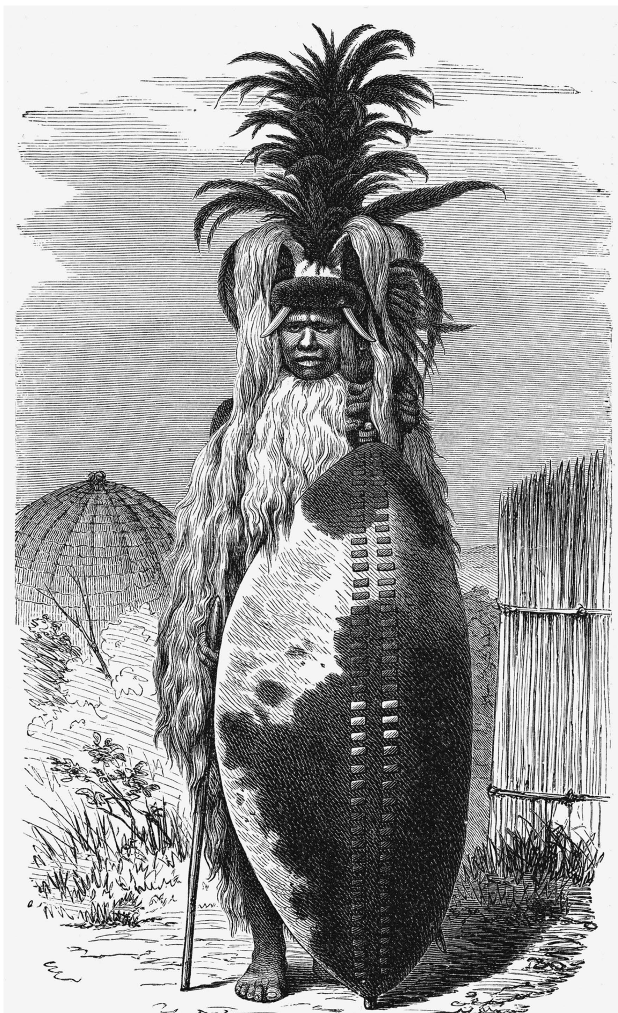


Figure 8.6 One of the Zulu ruler Shaka's warriors.
(Heritage Image Partnership Ltd/Getty Images)

authoritarian personalities, with outstanding military abilities that gave them upward social mobility. They usurped the position of chief by fair means or foul, then conquered their immediate neighbors, while seeking a competitive advantage over more distant rivals (this could be technological, a matter of military strategy, or another advantage). They used this advantage to expand into more distant lands, while using forced labor to intensify agricultural production as a means of keeping their subjects content and of provisioning armies. If they could not intensify their food production, they acquired additional resources by raiding. Finally, they solidified their position by power-sharing, even if it was nothing more than a nominal gesture. This was definitely not democracy, for the earliest states were ruled by strong, able rulers who governed autocratically, even if they had nominal councils of advisers.

Much depends on ideology, too, for invariably the preindustrial states were held together by a powerful and distinctive ideology. The famous *Epic of Gilgamesh* gives us a flavor of Mesopotamian ideology. The pharaohs ruled as the living personification of the sun god. Maya lords were shamans and intermediaries between the people and the ancestors. These ideologies were reflected in sacred places, where lavish ceremonies and public appearances by the ruler were important symbols of continuity and stability, where the ruler's subjects directed their loyalty to the central figure at the pinnacle of the state. Ideology never caused states to come into being, but was an invariable and important part of their fabric once they were established.

Both processes and individual agents played vital roles in the formation of states. Aggressive individuals of great ambition have been members of human societies since the beginning, but until about 6,000 years ago, they never lived at a time when conditions of social inequality and chiefly competition were endemic in areas like Mesopotamia and the Nile Valley, or later in Mesoamerica and the Andes. Then, competitive advantage, military prowess, and other circumstances turned a very few of them from powerful chiefs into authoritarian kings, soon supported by compelling new ideologies developed from earlier and less complex world views.

Justin Jennings, whom we quoted earlier, believes that state-organized societies came into being when families and neighborhoods that lived in centralized, kin-based relationships developed to deal with people near and far tried to simplify these ever more complicated webs that linked them to the wider world. Such efforts resulted in states and other forms of regional societies. He believes that states and other regionally organized political entities were the outcome of generations of temporary, often self-interested decisions that were made during the formative years of the earliest cities. In other words, purely local social interactions could morph into self-managed cities under the right circumstances. There was no blueprint for developing a city. Rather, each early city developed as a result of shifting realities. Early states and civilizations did not come into being fully formed and unchanging. Their emergence was often complex, sometimes volatile happenings over many generations.

The Collapse of Civilizations

Many historians have written about cycles of history—the rise of civilizations, their brilliant apogees, and their sudden declines. Eventually one civilization falls and another rises to take its place, which, in turn, goes through the same cycle of rise and fall. The record of early civilizations could easily be written in cyclical terms, for states have risen and then collapsed with bewildering rapidity in all parts of the world within the past 5,000 years. In the Mexican highlands, for example, the great city of Teotihuacán flourished between about 200 BC and AD 700. In AD 600, it had a population of more than 125,000 people. For 600 years, more than 85 percent of the population of the Valley of Mexico lived in or close to Teotihuacán (Figure 8.7). Then the city collapsed in the eighth century AD. Within half a century, the population shrank to a quarter of its former size.

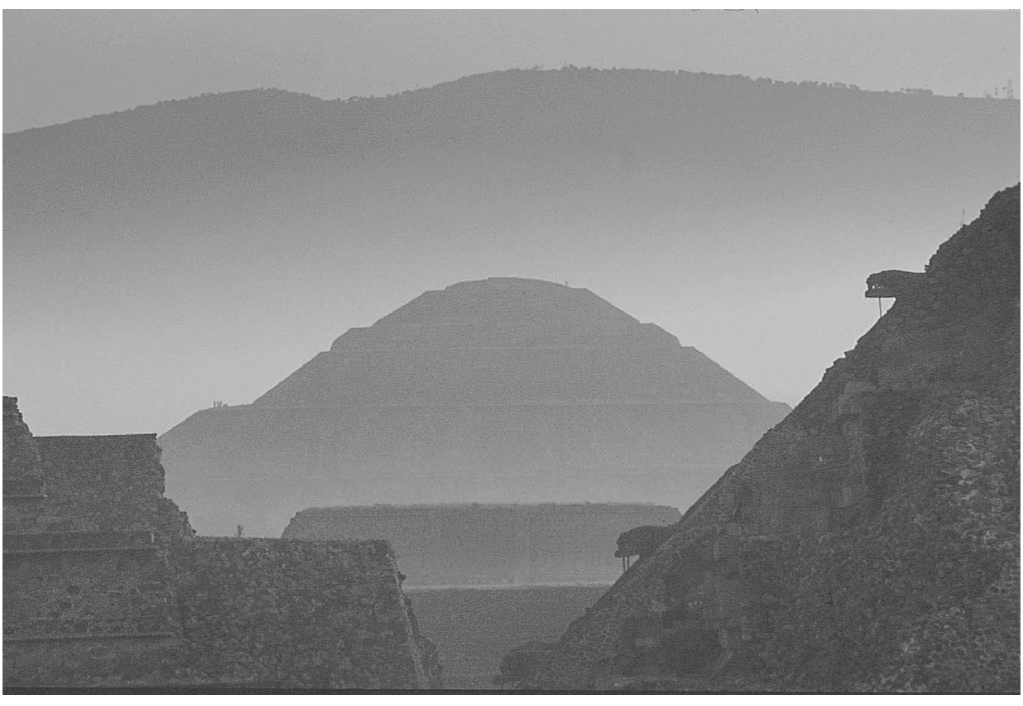


Figure 8.7 The Pyramid of the Sun at Teotihuacán, Mexico, a vast edifice erected as a sacred mountain to mirror the peak behind it, which was still a sacred place 800 years after the city collapsed, ca. AD 750.
(Kenneth Garrett/National Geographic Image Collection)

When a complex society collapses, it suddenly becomes smaller, simpler, and much more egalitarian. Population densities fall; trade and economic activity dries up; information flow declines; and the known world shrinks for the survivors. Joseph Tainter, one of the few archaeologists to have made a comparative study of collapse, points out that an initial investment by a society in growing complexity is a rational way of trying to solve the needs of the moment. At first the strategy works. Agricultural production increases through more intensive farming methods; an emerging bureaucracy works well; expanding trade networks bring wealth to a new elite, who use their authority and economic clout to undertake great public works, such as pyramids and temples, which validate their spiritual authority and divine associations.

As the least costly solutions to society's needs are exhausted, so does it become imperative that new organizational and economic answers be found, which may have much lower yields and cost a great deal more. As these stresses develop, argues Tainter, a complex society such as that of the Maya is increasingly vulnerable to collapse. There are few reserves to carry society through droughts, famines, floods, or other natural disasters. Eventually, collapse ensues, especially when important segments of society perceive that centralization and social complexity simply do not work anymore and that they are better off on their own. The trend toward decentralization, toward collapse, becomes compelling. Collapse is not a catastrophe but a rational process that occurs when increasing stress requires some organizational change. The population decline and other catastrophic effects that just preceded, accompanied, or followed collapse may have been traumatic at the time, but they can be looked at as part of what one might call an economizing process.

There is, of course, more to collapse than merely an economizing process. Complete collapse can occur only under circumstances in which a power vacuum exists. In many cases, a powerful neighbor may be waiting in the wings. In early times, numerous city-states traded and competed with one another within a small area. Sumerian cities, Minoan and Mycenaean palace-kingdoms in Greece and the Aegean, the Maya in Mesoamerica all lived in close interdependence within their culture areas, in a state of constant "peer–polity interaction." They traded, fought, and engaged in constant diplomacy. Under these circumstances, to collapse is an invitation to be dominated by one's competitors. There is only loss of complexity when every polity in the interacting cluster collapses at the same time. The collapse of early civilizations may, then, be closely connected to declining returns from social complexity and to the normal political processes of factionalism, social unrest, succession disputes, and even civil war.

Summary

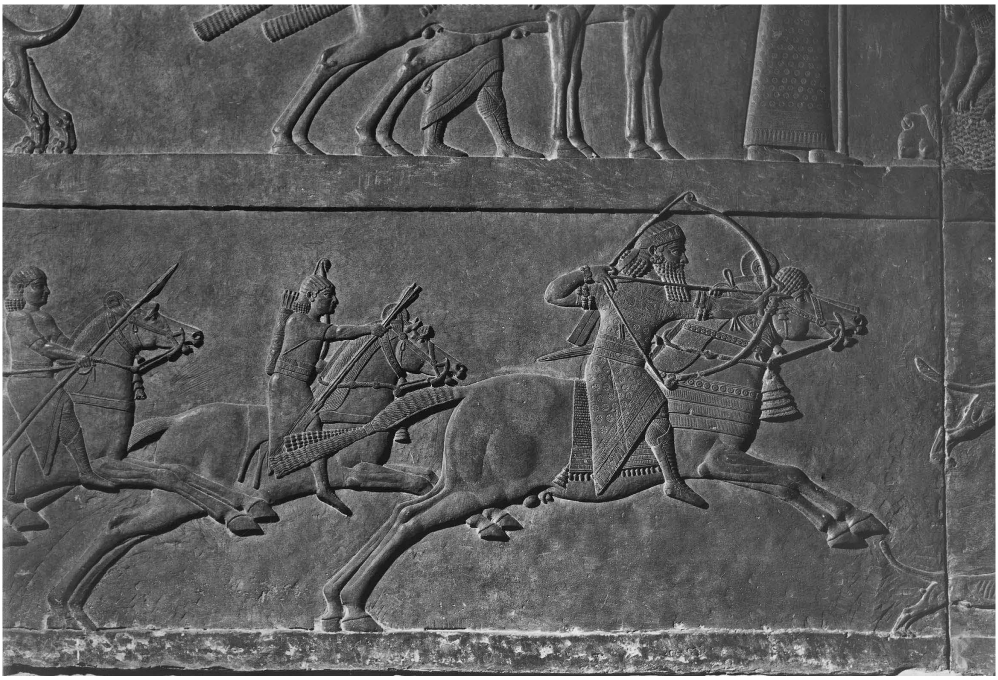
- This chapter contrasts the historical and anthropological approaches to the origins of states and summarizes the main theories archaeologists have developed.
- Gordon Childe's "Urban Revolution" theory centered on the development of the city.
- Another group of theories involved the intensification of agriculture and irrigation. Exchange networks and warfare have also been espoused as potential causes of civilization.
- Many modern theories revolve around systems-evolutionary hypotheses and explanations involving environmental change.
- A new generation of social approaches, on the other hand, argues that religious and informational factors, epitomized by centralized authority, have been key elements in the regulation of environmental and economic variables in early civilization.
- Such theories also stress that the social structure of a society ultimately determined its transformation, so the search for the causes of civilization focuses on ecological variables and the opportunities they present to individuals pursuing political goals in different societies—individual agents of change. In other words, how is ecological opportunity or necessity translated into political change?
- Recent research works are now focusing on factionalism, ideology, and gender as promising areas of inquiry.

Further Reading

Charles Redman, *The Rise of Civilization: From Early Farmers to Urban Society in the Ancient Near East* (San Francisco, CA: W.H. Freeman, 1978), critiques theories up to the late 1970s. Chris Scarre and Brian Fagan, *Ancient Civilizations*, 4th ed. (Abingdon: Routledge, 2016) summarizes the world's earliest states for beginning readers and includes some discussion of theories of the origins of states. A recent survey: Jeremy A. Sabloff and S. Paula W. Sabloff, eds. *The Emergence of Pre-Modern States: New Perspectives on the Development of Complex Societies.* Santa Fe, NM: Santa Fe Institute, 2018. Bruce Trigger, *Understanding Early Civilizations: A Comparative Study* (Cambridge: Cambridge University Press, 2003) is a definitive work for scholars. Important, more recent discussions of the origins of states: Richard Blanton with Lane F. Fargher, *How Humans Cooperate: Confronting the Challenges of Collective* Action (Boulder: University Press of Colorado, 2016), Justin Jennings, *Killing Civilization: A Reassessment of Early Urbanism and Its Consequences* (Albuquerque: University of New Mexico Press, 2016), and Norman Yoffee, *Myths of the Archaic State: Evolution of the Earliest Cities, States,* *and Civilizations* (Cambridge: Cambridge University Press, 2005). On writing, Andrew Robinson's *The Story of Writing*, Rev ed. (London: Thames and Hudson, 2009) is a lavishly illustrated essay for beginners. Collapse of civilizations: The best place to start is Joseph Tainter, *The Collapse of Complex Societies*, Rev. ed. (Cambridge: Cambridge University Press, 1990) is somewhat dated, but is an excellent introduction before consulting more recent specialized sources. See also excellent essays in Ronald K. Faulseit, ed. *Beyond Collapse* (Carbondale, IL: Center for Archaeological Investigations, Southern Illinois University Press, 2016).

Chapter 9

Mesopotamia and the Eastern Mediterranean World



Assyrian King Assurbanipal rides out on a lion hunt. Ninth century BC.
(Heritage Image Partnership/Alamy)

Chapter Outline

Prologue

In 1872, George Smith, an earnest banknote-engraver-turned-clay-tablet-expert, was sorting through the dusty fragments of Assyrian king Assurbanipal's royal library in the British Museum. Suddenly, he came across a tablet bearing a reference to a large ship grounded on a mountain. Immediately, he realized he had found an account of a flood that bore a remarkable resemblance to the biblical story of the flood in Genesis. A prophet named Hasisadra is warned of the gods' intention to destroy all of sinful humankind. He builds a large ship, loads it with his family and "the beast of the field, the animal of the field." The flood destroys "all [other] life from the face of the earth" (Fagan, 2007, p. 192). The ship goes aground on a mountain. Hasisadra sends out a dove, which returns. Eventually, a raven is dispatched and never returns. Hasisadra releases the animals, becomes a god, and lives happily ever after.

George Smith's discovery caused a public sensation at a time when people believed in the literal historical truth of the Judeo-Christian scriptures. Seventeen lines of the story were missing, so the London *Daily Telegraph* paid Smith's way to Nineveh to find the missing fragments. Incredible though it may seem, Smith found them within five days. The tablets can be seen on display in the British Museum, duly labeled "DT" for *Daily Telegraph*.

The Victorians thought of Mesopotamia (Greek for "land between the rivers"), now southern Iraq, as the location of the biblical Garden of Eden. Today, it is a far from paradisiacal place, for the delta regions and floodplain between the Tigris and Euphrates Rivers form a hot, low-lying environment, much of it inhospitable sand, swamp, and dry mud flats. Yet this now-inhospitable region was the cradle of the world's earliest urban civilization. From north to south, Mesopotamia is approximately 965 kilometers (600 miles) long and 400 kilometers (250 miles) wide, extending from the uplands of Iran to the east to the Arabian and Syrian deserts in the west. The plains are subject to long, intensely hot summers and harsh, cold winters and would be desert but for the Euphrates and Tigris Rivers. There are few permanent water supplies away from these great rivers and their tributaries. Rainfall is slight and not dependable and is insufficient for growing crops. However, with irrigation, the alluvial soils of the lower plain can be farmed and their natural fertility unlocked. Farmers can achieve high crop yields from relatively limited areas of land, sufficient to feed relatively dense populations. By 6000 BC and perhaps earlier, village farmers were diverting the waters of the rivers. Within 3,000 years the urban civilization of the Sumerians was flourishing in Mesopotamia. This chapter describes this, the earliest of the world's civilizations, and the complex western Asian societies that developed out of the first Mesopotamian states (Figure 9.1).

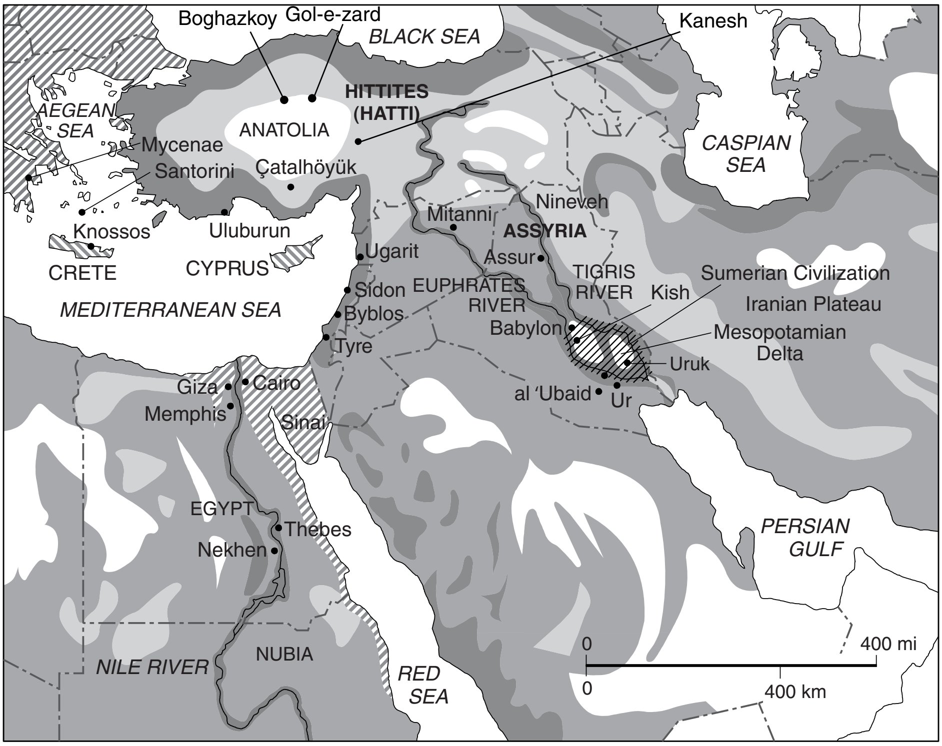


Figure 9.1 Map showing archaeological sites in this chapter and the next chapter.

Origins (from 5500 to 3000 BC)

Controversy surrounds the first settlement of the land between the rivers. Intensely hot in summer, bitterly cold in winter, the plains were far from a hospitable environment for village farmers. We know that by 6500 BC hundreds of small farming villages dotted the rolling plains of northern Mesopotamia upstream—settlements connected by long-distance trade routes that carried obsidian, finely painted pottery, and other goods over hundreds of kilometers, from Turkey as far as southern Iraq. By this time, much of the trade, especially in pottery, was concentrated in the hands of a small elite living in key centers along water routes. However, we do not know whether the uninhabited plains were settled by village farmers from the north around 6000 BC, as many scholars believe, or whether much earlier indigenous hunter-gatherers adopted farming along the shores of the Persian Gulf at this time or even earlier.

No one knows when hunter-gatherers first settled on the shores of the Persian Gulf, which, during the late Ice Age, was a large river estuary. One school of thought believes that, as sea levels rose after 15,000 years ago, the gulf spread far up into what is now southern Iraq, perhaps creating coastal and riverside marshlands rich in fish and plant foods. The ancient coastlines of the early and middle Holocene now lie below many feet of river alluvium and sand, as does the archaeological record of potential early occupation. As the climate dried up during the Holocene, goes this argument, forager populations tended to concentrate in more resource-rich areas. As elsewhere in western Asia, it may have been in such locations that people first experimented with growing cereal grains. Within a few thousand years, farming villages clustered along river banks and better-watered areas of the desert.

Whatever their origins, the earliest farmers developed methods of cultivation using canals and natural waterways, which allowed higher crop yields. The first known farming communities date to around 6000 BC, small communities located in clusters along the Euphrates river channels. As early as 5500 BC, a few farming communities were diverting flood waters from the Euphrates and Tigris onto their fields, then draining them away to prevent salt buildup in the soil. The largest of these clusters consisted of small rural communities located around a larger town that covered about 11.3 hectares (28 acres) and housed between 2,500 and 4,000 people. Some of their small irrigation canals extended out about 5 kilometers (3 miles) from the river. From the very beginning some of these **'Ubaid** culture settlements (named after a village near ancient Ur) boasted substantial buildings, alleyways, and courtyards. Others consisted of little more than humble mud-brick and reed huts. Each cluster was a group of villages linked by kin ties, with a clan leader living in one larger settlement overseeing village affairs and, probably, the irrigation schemes that connected them.

We do not know anything about how the first inhabitants of the Mesopotamian floodplain acquired or developed the skills needed to survive in their harsh environment. Interdependence among members of the community was essential because raw materials suitable for building houses had to be improvised from the plentiful sand, clay, palm trees, and reeds between the rivers. Digging even the smallest canal required at least a little political and social leadership. The annual back-breaking task of clearing silt from clogged river courses and canals could only have been achieved by communal efforts. Distinctive social changes came from the more efficient systems for producing food that were essential in the delta. As food surpluses grew and the specialized agricultural economies of these 'Ubaid villages became successful, the trend toward sedentary settlement and higher population densities increased. Expanded trade networks and the redistribution of surpluses and trade goods also affected society, with dominant groups of 'Ubaid people becoming more active in producing surpluses, which eventually supported more and more people who were not farmers. The Tell Zeidan site in Syria was a small 'Ubaid town and an important junction for trade routes, evidence that the social and economic changes of the day developed over a large area.

Site

The Temple at Eridu, Iraq

Sumerian legends called Eridu the earliest city of all, the dwelling place of Enki, God of the Abyss, the fountain of human wisdom. "All lands were the sea, then Eridu was made," proclaims a much later Mesopotamian creation myth. Sumerians considered Enki's word to have created order from the chaos of the primordial waters. Eridu itself once lay in the heart of a fertile riverside landscape. Today, harsh desert surrounds the ancient city. Its ruined temple platform stands at one end of the great city mounds, a low, flat mass of clay and sand with a dune forming downwind of the crumbling mound. For generations, the desolate site defied some of the best archaeologists in the world, who lacked the expertise to distinguish sun-dried mud brick from the surrounding soil. British archaeologist Richard Campbell-Thompson dug into Eridu in 1918 and complained that he found nothing but loose sand. Thirty years later, Iraqi archaeologist Fuad Safar and his British colleague Seton Lloyd returned to the city with a large labor force and a small mining railroad, which enabled them to move enormous amounts of sand. They also had an expertise with mud-brick structures, using methods German archaeologists had developed at the great city of Babylon just before World War I, which used picks to "feel" different soil textures. To this simple technique, they added brushes and compressed air, which proved an excellent way to clear mud brick. The two excavators removed enough sand to expose a small complex of mud-brick public buildings still standing about 2.4 meters (8 feet) high. Then they embarked on a long-term project to decipher the history of the great shrine that had once stood at the heart of the city.

Safar and Lloyd soon found a solid brickwork platform extending from the base of the much later ruined *ziggurat* (temple). They spent two weeks piecing together scattered brick and reconstructed the foundations of a small, rectangular building surrounded by concentric brickwork triangles. After days of puzzlement, they realized they were looking at a temple platform that had been extended again and again by the simple expedient of building another layer of brickwork around the shrine to build ever-larger, brilliantly decorated shrines, culminating in the great ziggurat that adorned the city before it was abandoned (Figure 9.2). At least five temples had stood atop the one that Safar and Lloyd had exposed. They dismantled the rectangular structure and penetrated deep toward bedrock, uncovering no fewer than ten earlier shrines, each built atop its predecessors. Temple XVI, dated to ca. 4500 BC, lay on clean sand, a small mud-brick shrine 14 meters (45 feet) square, with one entrance, an altar, and an offering table. Hundreds of fish bones, including the complete skeleton of a sea perch, still lay on the offering table. Sea perch live in brackish water, like the shallow estuaries that were once close to Eridu.

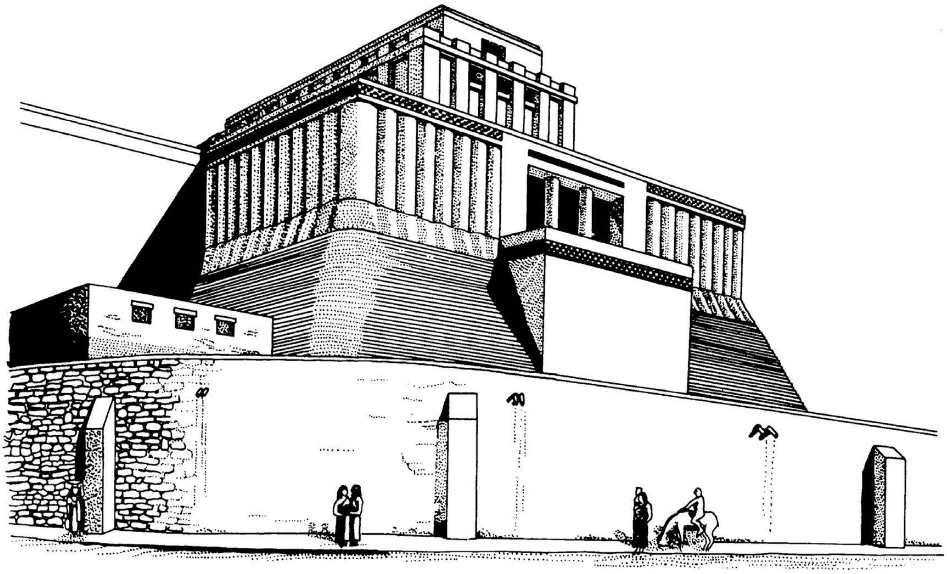


Figure 9.2 Artist's reconstruction of the final stage of the ziggurat at Eridu, Iraq, one of the earliest temples in the region.

Five hundred years later, Eridu's temple platform lay inside a sacred enclosure at least 180 meters (200 yards) square. A magnificent stepped ziggurat now rose in the center of the city, its façade adorned with brightly colored fired bricks. Residential quarters and markets crowded on the sacred enclosure, while the ziggurat was visible for kilometers around. Thanks to months of sophisticated and painstaking mud-brick excavation, we know that this imposing shrine was the descendant of much humbler temples that had commemorated the same sacred place.

As Mesopotamian society grew rapidly in complexity in the centuries that followed, so did the need for social, political, and religious institutions that would provide some form of centralized authority. In time, the small village ceremonial centers grew. **Eridu**, a rapidly growing town, consisted of a mud-brick temple with fairly substantial mud-brick houses around it, often with a rectangular floor plan (see "The Temple at Eridu, Iraq" box). The craftsworkers lived a short distance from the elite clustered around the temple, and still farther away were the dwellings of the farmers who grew the crops that supported everyone. By 4500 BC, the Eridu temple had grown large, containing altars, offering places, and a central room bounded by rows of smaller compartments. The population of Eridu was as high as 5,000 at this time, but exact computations are impossible. Places like Eridu assumed great importance after 4500 BC, among them Uruk, the world's first city.

The First Cities: Uruk

Uruk began life as a small town and soon became a growing city, quickly absorbing the populations of nearby villages. During the fourth millennium BC, Uruk grew to cover an estimated 250 hectares (617 acres). Satellite villages extended out at least 10 kilometers (6 miles), each with its own irrigation systems. All provided grain, fish, or meat for the growing urban population. The city itself was a densely packed agglomeration of houses, narrow alleyways, and courtyards, probably divided into distinct quarters where different kin groups or artisans such as potters, sculptors, and painters lived. Everything was overshadowed by the stepped temple pyramid, the ziggurat that towered over the lowlands for miles around. The ziggurat complex and its satellite temples were the center of Uruk life. Not only were these temple complexes places of worship, but also storehouses, workshops, and centers of government (see Figure 9.2).

The ruler of Uruk and the keeper of the temple was both a secular and spiritual ruler. His wishes were carried out by his priests and by a complex hierarchy of minor officials, wealthy landowners, and merchants. Tradespeople and artisans were a more lowly segment of society. Under them were thousands of fisherfolk, farmers, sailors, and slaves who formed the bulk of Uruk and other cities' burgeoning populations. By 3500 BC, the Mesopotamian city had developed an elaborate system of management. This system organized and regulated society, meted out rewards and punishments, and made policy decisions for the thousands of people who lived under it.

Writing and Metallurgy

Two innovations appeared as Uruk and other cities grew rapidly. The first was writing, the second metallurgy. The origins of written records go back thousands of years before the Sumerians, to a time soon after the adoption of food production when the volume of inter-village trade demanded some means of tracking shipments. Its beginnings are still little understood. One popular theory has villagers using carefully shaped clay tokens as records, which they carried around on strings as early as 8000 BC. By 5000 BC, commercial transactions of all kinds were so complex that there were endless possibilities for thievery and accounting errors. Some clever officials made small clay tablets and scratched them with incised signs that depicted familiar objects such as pots or animals. From there it was a short step to simplified, more conventionalized **cuneiform** signs (Figure 9.3).

At first, specially trained scribes dealt almost entirely with administrative matters, compiling lists and inventories. Eventually, the more creative among them explored the limitless opportunities afforded by the ability to express themselves in writing. Kings used tablets to trumpet

Figure 9.3 Cuneiform tablet from the diplomatic archives at El-Amarna, Egypt, ca. 1350 BC. This tablet records the export of raw glass to Egypt, ca. 1350 BC.
(World History Archive/Alamy Stock Photo)

their victories. Fathers chided their errant sons, and lawyers recorded complicated transactions. Sumerian literature includes great epics, love stories, hymns to the gods, and tragic laments.

The Sumerians' homeland had no metals, so they imported copper, gold, and other ores from the Iranian highlands and elsewhere as early as 3500 BC. At first these shiny metals had high prestige value, but the advent of lead and tin alloying after 2000 BC led to widespread use of bronze artifacts for farming tools and weapons of war. Bronze technology produced tougher-edged, more durable artifacts that could be used for more arduous day-to-day tasks. One resulting innovation was the metal- and wood-tipped plow, an implement dragged by oxen that was capable of digging a far deeper furrow than the simple hoes and digging sticks of earlier times. The plow, which incidentally was never invented in the Americas, was developed as irrigation agriculture assumed greater importance in Sumer, and the combined innovations increased agricultural yields dramatically. These yields not only supported larger urban and rural populations but also provided a means for the rulers of city-states both in Sumer and farther afield to exercise more control over food surpluses and over the wealth obtained by long-distance exchange.

The adoption of bronze-edged weapons had momentous consequences for Sumerian life, for their appearance in local armies can be linked directly to a rising penchant for using war as a means of attaining political ends. Cities like Eridu and Uruk were not isolated from other centers. Indeed, they were only too aware of their neighbors. For example, the city-states of Lagash and Umma were uneasy neighbors and engaged in a tendentious border dispute that dragged on for three or four centuries. Cities soon had walls, a sure sign that they needed protection against marauders. Sumerian seals bear scenes with prisoners of war. By this time, too, there were southern Mesopotamian colonies in what is now northern Iraq, at Susa across the Tigris, in the Zagros, and elsewhere on the northern and northeastern peripheries of the lowlands. Some of these colonies were entire transplanted communities; others are represented by characteristic Uruk-style artifacts far from their homelands. Artifacts and artistic styles characteristic of Uruk have come from the Nile Valley during centuries when long-distance caravan trade was expanding rapidly in Egypt and across the Sinai. It's important to realize that the trend toward more complex societies and toward states and cities took hold over an enormous area, not just in southern Mesopotamia. Urbanization did not develop in one place. It was a consequence of the outgrowth of many groups who came in contact with one another.

Sumerian Civilization (from ca. 3100 to 2334 BC)

With the emergence of the Sumerian civilization in about 3100 BC, a new era in human experience begins, one during which the economic, political, and social mechanisms created by humans begin to affect the lives of cities, towns, and villages located hundreds, if not thousands of miles apart (see "Voices: The Sumerians" box). No human society has ever flourished in complete isolation, but the real launching point in long-distance exchange and organized trade took place during the fourth millennium BC, the first millennium when the history of an individual society can be understood only against a background of much broader regional developments. In a real sense, a rapidly evolving economic system linked hundreds of Southwest Asian societies all the way from eastern Iran and the Indus Valley in Pakistan to Mesopotamia, the eastern Mediterranean, Anatolia, and the Nile Valley with ever-changing cultural tentacles. By the third millennium BC this system not only embraced Southwest Asia but also extended to Cyprus, the Aegean, and mainland Greece.

This nascent economic system developed as a result of insatiable demands for nonlocal raw materials in different ecological regions where societies were developing along very similar general evolutionary tracks toward greater complexity. The broad and apparently linear cultural sequence in southern Mesopotamia just described can be matched by equivalent developments in northern Mesopotamia and east of the Tigris. In each area, these developments and many technological innovations were triggered not only by basic economic needs but also by the competitive instincts of newly urbanized elites, who used lavish display and exotic luxuries to reaffirm their social prestige and authority. Sumerian civilization is a mirror of this developing regional interdependence.

Voices

The Sumerians

When Enlil, like a big bull, set his foot on the earth,
To make the good day thrive in abundance,
To make the fair night flourish in luxuriance,
To make grow tall the plants, to spread wide the grains…

Sumerian literature is the earliest in the world, rich in poetry and prose, and also comprised of more prosaic documents. "Why do you idle about? Go to school, stand before your 'school-father,' recite your assignment, open your schoolbag, write your tablet…" The voices of the ancient Sumerians speak to us over the millennia. The delinquent student, the love song, the agricultural directory, and the stirring epic—Sumerian literature vibrates with energy and perception. A bride sings to her royal bridegroom, Shu-Sin:

Bridegroom, dear to my heart,
Goodly is your beauty, sweetheart,
Lion, dear to my heart,
Goodly is your beauty, honeysweet.

A farming handbook giving pragmatic advice from a father to his son fills 180 lines of tightly packed cuneiform. The author guides his heir through the yearly agricultural cycle, starting with the inundation of the fields by the great rivers in May and June. "Plow eight furrows to each strip of land about 6 meters (20 feet) wide." "Keep an eye on the man who puts in the barley seed that he make the seed fall two fingers uniformly." "On the day when the seed breaks through the ground," one should say a prayer to Ninkilim, goddess of field mice and vermin, so they do not harm the growing crop. The handbook contains precise instructions on watering, adjuring the young farmer to "let your tools hum with activity."

The Epic of Gilgamesh, still performed on the stage to this day, is the most famous of all Sumerian literary works, the story of a man who loves and hates, weeps and rejoices, hopes and despairs. Gilgamesh is king of Uruk, a restless hero famous for his tyrannical arrogance. His subjects complain to the gods, who send Enkidu, who has lived among the beasts, to tame Gilgamesh. The two heroes fight, then become fast friends and kill the formidable Bull of Heaven. Enkidu is sentenced to an early death by the gods. The grieving Gilgamesh now seeks immortality. Eventually, he fails in his quest and returns weary and disappointed to Uruk to live out his days. The epic as we know it is a mixture of literary borrowings, but it is a masterpiece. Witness:

Gilgamesh says to Enkidu:

If now you will descend to the netherworld,
A word I will speak to you, take my word,
Instruction I offer you, take my instruction.
Do not put on clean clothes,
Lest like an enemy [the netherworld] stewards will come forth.
Do not anoint yourself with the good oil of the bur-vessel,
Lest at its smell they will crowd about you…

But the most vivid Sumerian voices are those of common folk, expressed in proverbs of the day: "We are doomed to die, let us spend; We will live long, let us save," "Friendship lasts a day, kinship endures forever," or "You can have a lord, you can have a king, but the man to fear is the tax collector" (quotes from Kramer, 1981, pp. 304, 15, 246, 67–68, 196–197, 118, 121, 123).

Sumerian civilization came into being as a result of a combination of environmental and social factors. The Sumerians lived in a treeless lowland environment with fertile soils but no metal, little timber, and no semiprecious stones. They obtained these commodities by trading with areas where such items were in abundance. Sumerian rulers controlled not only large grain surpluses that could be moved in rivercraft but also a flourishing industry in textiles and other luxuries. The trade moved up and down the great rivers, especially the placid Euphrates. Ancient overland trade routes linked the Tigris and Euphrates with the distant Levant cities and ports. Even as early as Sumerian times, caravans of pack animals joined Anatolia to the Euphrates, the Levant to Mesopotamia, and Mesopotamia to isolated towns in the distant Iranian highlands to the east.

By 3250 BC, expanding trade networks linked dozens of cities and towns from the Mediterranean to the Persian Gulf and from Turkey to the Nile Valley. By this time, states small and large flourished not only in Egypt and Mesopotamia but also in the coastal Levant and in highland Iran. Each of them depended on the others for critical raw materials such as metal ore or soapstone vessels, for timber or even grain. In northern Mesopotamia, east of the Tigris, and in the Levant, expanding trade and a host of important technological innovations resulted not only from basic economic needs but also from the competitive instincts of a new elite. All, however bitter their enmity, depended on their neighbors and more distant trading partners.

An intricate and ever-changing system of political alliances and individual obligations of friendship linked community with community and city-state with city-state. In time, financial and logistical checks and balances were maintained by an administrative system based in the temples to bring order to what had begun as informal bartering. Specialized merchants began to handle such commodities as copper and lapis lazuli. There was wholesaling and contracting, loans were floated, and individual profit was a prime motivation. Increasingly, every city-state, and indeed entire civilizations, came to depend on what we have called a nascent world system, not so much for political stability but for survival. Reliable, long-term interdependency became a vital factor in the history of Southwest Asian states by 3000 BC.

By 2800 BC, Mesopotamia was home to several important city-states, states that were in contact with the Levant and the Iranian plateau and even, sporadically, with the pharaohs of Egypt. As the Mesopotamian delta became an environment increasingly controlled by human activities and the volume of long-distance trade increased dramatically, so competition over resources intensified. Both clay tablets and archaeological finds tell of warfare and constant bickering between neighbors. Each state raised an army to defend its water rights, trade routes, and city walls. The onerous tasks of defense and military organization passed to despotic kings supposedly appointed by the gods. City-states such as **Uruk, Kish**, and **Ur** had periods of political strength and prosperity when they dominated their neighbors (Figure 9.4). Then, just as swiftly, the tide of their

Figure 9.4 The reconstructed ziggurat at Ur, Iraq, originally built in about 2300 BC. (Robert Harding Picture Library Ltd/Alamy Stock Photo)

fortunes would change and they would sink into obscurity. There was a constant threat from nomadic peoples of the surrounding mountains and deserts, who encroached on settled Sumerian lands. At times, they disrupted city life so completely that any form of travel became an impossibility. In a real sense, city-states were the settings for economic and social strife in early Mesopotamia.

Some Sumerian cities nurtured powerful and wealthy leaders. When British archaeologist Sir Leonard Woolley excavated a royal cemetery at Ur, he found the remains of a series of kings and queens who had been buried in huge graves with their entire retinue of courtiers. One tomb contained the remains of 59 people. Each wore his or her official dress and regalia and had laid down to die in the correct order of precedence, after taking a fatal dose of poison (Figure 9.5). More recent research suggests they were killed with blows on the head instead.

Inevitably, the ambitions of some of these proud Sumerian leaders led them to entertain bolder visions than merely the control of a few city-states in the lowlands. They were well aware that control of lucrative sources of raw materials and trade routes was the secret of vast political power. In about 2400 BC, a monarch named Lugalzagesi boasted of overseeing the entire area from the Persian Gulf to the Mediterranean.

Figure 9.5 Reconstruction of a royal funeral at Sumerian Ur, as recorded by Sir Leonard Woolley. His imaginative account of the funeral may be inaccurate. Unfortunately, his field notes are lost. (The Trustees of the British Museum/Art Resource NY)

This boast was probably false. It is likely that Sumerian cities dominated the overland routes that linked Mesopotamia, Turkey, and the Levant, but their influence was never permanent and their control probably illusory.

Lugalzagesi and others were characteristic of a tradition of Mesopotamian civilization: the combination of trade, conquest, ruthless administration, and tribute to create large, poorly integrated, and highly volatile empires. Each sought to control an enormous territory between the Mediterranean and the Persian Gulf.

The tenuous and sometimes more regular contacts Mesopotamia maintained with dozens of city-states in Anatolia and along the eastern Mediterranean coast foreshadow the constant political and economic rivalry that was to dominate Southwest Asian history during the second millennium BC—rivalry over control of Mediterranean coastal ports. Here two oceans and three continents meet. The eastern Mediterranean coast had no natural harbors, so the control of its overland routes was the key to dominating a vast area of the known world, resource-rich Anatolia and grain-rich Egypt. The history of this region was bound inextricably to the fortunes of the larger powers that surrounded it.

Akkadians and Babylonians (from 2334 to 1650 BC)

While Sumerian civilization prospered, urban centers waxed and waned in neighboring areas. In these regions, too, lived rulers with wider ambitions, who had a vision of a larger role. By 2500 BC, Akkadian cities to the north of Sumer were competing with lowland cities for trade and prestige. In approximately 2334 BC, a Semitic-speaking leader, Sargon, founded a ruling dynasty at the town of Agade, south of **Babylon**. By skillful commercial ventures and judicious military campaigns, his northern dynasty soon established its rule over a much larger kingdom that included both Sumer and northern Mesopotamia. After a short period of economic prosperity, when Akkad became heavily dependent on grain from fertile lands to the north, its empire suddenly imploded in the face of catastrophic drought. We know this from a stalagmite from Gol-e-Zard cave in northern Iran, which has yielded a record of dust activity between about 3200 and 1700 BC. Gol-e-Zard lies hundreds of kilometers east of the former Akkadian Empire, but the dust blown into the cave comes from the Syrian and Iraqi deserts. This dust has a high magnesium content, unlike the local limestone, which means that the amount of magnesium in the growing stalagmites in the cave changed through time. A higher concentration of magnesium means a higher dust level and drier conditions. Using uranium-thorium, the researchers were able to identify two major droughts which started about 2510 BC and lasted 100 years and in 2260 BC, enduring for 290 years. The later date coincides almost precisely with the collapse of the Akkadian Empire. Starving farmers thronged to the rich southern cities. A 180-kilometer (112-mile) wall known as the Repeller of the Amorites was built between the Tigris and Euphrates Rivers to control immigration. It failed, as such wall-building strategies do to this day. After bitter conflict, Akkad collapsed.

Fifty years of political instability ensued before King Ur-Nammu of Ur took control of Sumer and Akkad in 2112 BC and created an empire that extended far to the north. Sargon had forged an empire by military conquest but had never followed up his victories with proper administrative governance. Tablets from royal archives tell us that Ur-Nammu and his successors of Ur's Third Dynasty were a new breed of ruler, who placed great emphasis on consolidating their new empire into a powerful and well-organized bureaucracy.

Ur in turn gave way to Babylon and its Semitic rulers by 1990 BC. Babylon's early greatness culminated in the reign of the great king Hammurabi in 1792 BC, famous for his law code. He integrated the smaller kingdoms of Mesopotamia for a short period, but his empire declined after his death as Babylonian trade to the Persian Gulf collapsed and trade ties to Assur in the north and for Mediterranean copper in the west were strengthened.

Hittites and Sea Traders (from 1650 to 1200 BC)

All these developments came from ever-closer economic ties between different regions of Southwest Asia. These ties were a sign of an economic interdependency that persisted regardless of political change or war. The desert caravans of pack animals and the ships that plied Mediterranean waters resulted from a more durable world system that transcended the boundaries of local societies and even entire civilizations. At the center of this world system lay the strategic eastern Mediterranean coast.

During the second millennium BC a network of small and prosperous states controlled the eastern Mediterranean coastlands. They lived in the shadow of the great kingdoms that lay inland: Egypt to the south (see Chapter 10), **Mitanni** to the east of the Euphrates, and **Hatti** (the kingdom of the **Hittites**) in Anatolia. Each of these three kingdoms controlled a large area of territory surrounded by a hinterland that lay more or less under its influence (see Figure 9.1). The three states competed directly in the coastal zone, and they had complex dealings on all frontiers. Mitanni, for example, tried to prevent the city-state of Assur in northern Mesopotamia from going its own way, and the famous Amarna tablets, an archive of Egyptian diplomatic correspondence, tell of shifting allegiances among the city-states of the coast. By this time, the eastern Mediterranean shore was a land of many cities, a regular military and diplomatic battlefield for its powerful neighbors.

The Hittites

The Hittites were the newest and perhaps the most able diplomatic players. Originally the rulers of **Kanesh**, they expanded their domains and seized control of the rest of Anatolia just before 1650 BC. Hittite kings exercised enormous political influence in Southwest Asia from their capital at **Boghazkoy**, with its 6.4 kilometers (4 miles) of city walls (Figure 9.6). In the fifteenth century BC, Syria had been a province of the Egyptian Empire. The Hittites pressed hard on the Egyptians on both diplomatic and military fronts, until the Great King of Hatti, Suppiluliumas I (1375–1335 BC), could claim Lebanon as his frontier. Diplomatic archives in Akkadian cuneiform contain records of a peace treaty of about 1269 BC between the Hittite and Egyptian kings, which confined Egyptian interests to southern Palestine. The grandiloquent public architecture of the period commonly depicted Egyptians and Hittites locked in battle with state-of-the-art weaponry. This included light, two-wheeled chariots manned by archers and new siege machinery for use against the many walled cities in the disputed areas.

By 1200 BC, Hatti was in trouble. The Hittites had prospered by virtue of their well-organized, professional army, long a stabilizing influence in the eastern Mediterranean. They were expert diplomats who controlled what is now northern Syria through their rule over two great cities—Carchemish on the Euphrates and Alalakh of Mukish in the west. There were also

Figure 9.6 The Royal Gate, flanked by lions, at Boghazkoy (Hattusas), the Hittite royal capital. (Chris Hellier/Alamy Stock Photo)

treaty relationships with other powerful neighbors, including **Ugarit** (Ras Shamra) on the northern Levant coast. Ugarit was a cosmopolitan city ruled by a monarch who was almost like a merchant-prince. He controlled vast supplies of gold and a fleet of more than 150 ships, some of considerable size. These ventured as far afield as Cyprus and the Nile, the former a center of exchange with the Aegean. Ugarit was vital to the Hittites, who had never become a maritime power, for they depended on its ships.

Both the lack of maritime power and a rigid feudal system contributed to Hatti's undoing. About 1200 BC, repeated migrations of foreigners flowed into Anatolia from the northwest, at a time when severe drought was impacting much of the eastern Mediterranean world from the Aegean to the Nile, including Hatti. The central Hittite government collapsed, partly because of attacks from outside but also because powerful vassals threw off their allegiance to the king. Anatolia dissolved into the homeland of dozens of small city-states, each striving to maintain its independence.

Uluburun and Maritime Trade

All this diplomatic and military activity on the part of the great kingdoms was aimed at control of the lucrative gold, copper, and pottery trade of the eastern Mediterranean. This trade, in the hands of eastern Mediterranean and Mycenaean traders, is vividly illustrated by the investigations of a Bronze Age shipwreck off the southern Turkish coast.

The advantage of shipwrecks from the archaeological point of view is that they provide sealed capsules of maritime trade frozen at a moment in time. The famous **Uluburun** ship, excavated by Çemal Pulak from the waters near Kas off southern Turkey, was shipwrecked in about 1310 BC. The ship carried more than 350 copper ingots, each weighing about 27 kilograms (60 pounds)—a load of ten tons, enough to equip a small army with weapons and armor (Figure 9.7). A ton of resin traveled in two-handled jars made by people living in the Syria region; it was used, so Egyptian records tell us, as incense for Egyptian rituals. Dozens of blue glass disks and ingots were being sent to Egypt from Tyre. The cargo also included hardwood, Baltic amber, tortoise shells, elephant tusks, hippopotamus teeth, ostrich eggs, jars of olives, and even large jars holding stacked Canaanite and Mycenaean pottery.

The Uluburun ship's cargo contains items from Africa, Egypt, the eastern Mediterranean coast, the Greek mainland and the Aegean, Cyprus, and even copper from Sardinia. It is a dramatic reflection of the truly international nature of eastern Mediterranean trade in the second millennium BC, when the Hittites were at the height of their power. It is hardly surprising that the great powers of the day competed savagely for control of the eastern Mediterranean shore, for it lay at the very center of an interlocking maze of trade routes that spanned the entire civilized world.

Figure 9.7 A diver above a replica of the Uluburun ship, Turkey. (ImageBROKER/Alamy)

Iron Technology

Maritime trade played a major role in the diffusion of iron tools and weapons over the eastern Mediterranean. Iron is thought to have been first smelted in the middle of the second millennium BC, perhaps in the highlands immediately south of the Black Sea. The new metal had many advantages, for its tough, sharp edges were invaluable for military tasks and for farming and carpentry. Iron was plentiful, unlike the tin used to alloy bronze. Iron tools soon became commonplace over a wide area of Europe and Southwest Asia, although it was some time before domestic artifacts such as axes and hoes were invariably made with the new technology.

Minoans and Mycenaeans (from 1900 to 1200 BC)

Eastern Mediterranean trade extended far west of Greece, to Sardinia, North Africa, and Spain. But the main western frontier lay in the Aegean Islands and on the Greek islands, where the Minoan and Mycenaean civilizations flourished during the second millennium BC.

The Aegean abounds in sheltered bays and many straits, allowing even primitive, heavily laden seagoing vessels to take shelter and sail from island to island. The interisland trade expanded rapidly, not only in metal objects but in olive oil and wine carried in fine pots and also in marble vessels and figurines. A constant current of new products and ideas flowed across the region. By 2500 BC, numerous small towns housed farmers, traders, and skilled artisans on the mainland and the islands. The beginnings of town life fostered considerable cultural diversity in the Aegean, a diversity nurtured by constant trading connections and increasingly complex political and social organization.

Minoan Civilization (from 1900 to 1400 BC)

Minoan civilization developed out of earlier indigenous farming cultures by 1900 BC. It is best documented at the famous Palace of Minos at **Knossos**, near Heraklion on the north coast, a site first settled as early as 6000 BC at about the same time that Çatalhöyük flourished in Anatolia. Parts of the Greek mainland and Aegean Islands were settled by farming peoples as early as 6500 BC, but not until considerably later did village communities spring up throughout the region. This development coincided with the cultivation not only of cereals, but also of olives and vines. By 3500 BC, the inhabitants of the Aegean and Greece were exploiting local ores to make fine metal tools and precious ornaments. The Knossos farmers lived in sun-dried mud-and-brick huts of a rectangular ground plan that provided for storage bins and sleeping platforms. By 3730 BC, signs of long-distance trading increased in the form of exotic imports such as stone bowls. The first palace at Knossos was built by about 1930 BC; it was a large building with many rooms grouped around a rectangular central court.

In about 1700 BC, an earthquake destroyed the first royal residence on the site, just as Minoan civilization reached the height of its powers. The palace that rose in its place was an imposing structure that rambled around a central courtyard (Figure 9.8). Some buildings had two stories; the plastered walls and floors were painted with brightly colored geometric designs, with landscapes, dolphins, and other sea creatures (Figure 9.9). The most remarkable art depicted dances and religious ceremonies, including acrobats leaping vigorously along the backs of prancing bulls. Part shrine, part royal residence, part storehouse, and part workshop, the Palace of Minos at Knossos was the hub of a predominantly rural civilization centered on large country houses and chieftains' residences.

The dramatic flowering of Minoan civilization resulted from intensified trading contacts throughout the Aegean and as far afield as Egypt and the Levant. The Minoans were expert seafarers and middlemen in international trade. Their ships handled all manner of cargos. But this time, olive and vine cultivation had added welcome diversity to local village farming economies, as well as providing valuable export commodities. This led to the development of distribution systems organized and controlled by important leaders, who coordinated ships, shipping

Figure 9.8 The North Entrance of the Palace of Minos at Knossos, with a reconstructed bull frieze. (Constantinos Iliopoulos/Alamy Stock Photo)

Figure 9.9 The throne room at Knossos, with stone throne and frieze depicting mythical birds. This chamber was used for formal appearances of priests or priestesses costumed as deities. (YAY Media AS/Alamy)

lanes, and marketplaces, and lived in palaces large and small. Minoan society developed from entirely local roots, which was an adaptation to a mountainous environment where population densities were never high and much wealth came from the export trade.

A massive volcanic explosion devastated the island of **Santorini**, a Minoan outpost 113 kilometers (70 miles) north of Crete, in about 1650 BC. (The date is much disputed and may be as much as a century and three-quarters later.) This cataclysmic eruption caused massive tidal waves and ash falls that mantled many Minoan fields, but Knossos continued to flourish long afterward. In about 1400 BC, earthquake and fire destroyed the great palace. By this time, the center of the Aegean world had shifted west to the Greek mainland, where Mycenae reached the height of its power.

Mycenaean Civilization (from 1600 to 1200 BC)

Mycenaean civilization, centered on the fertile plain of Argos in southern Greece, developed in about 1600 BC. The chieftains who ruled over the walled fortress of **Mycenae** gained their wealth and economic power not only from their warrior skills but also from wide trading contacts in the Aegean and further afield (Figure 9.10). Mycenaean kings were expert charioteers and horsemen, whose material culture and lifeways are

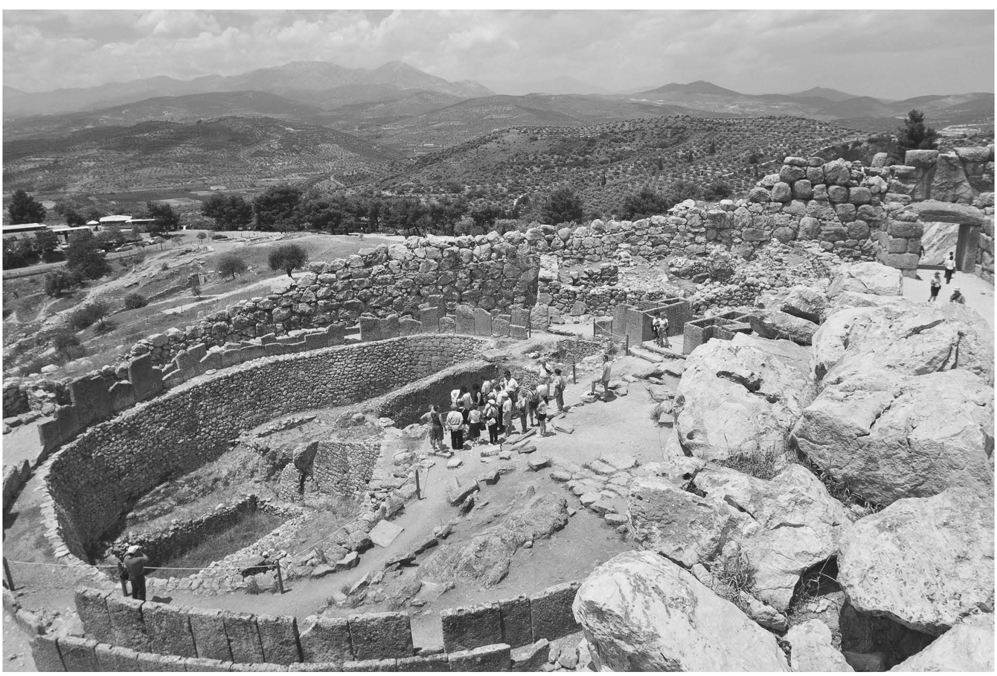


Figure 9.10 The shaft grave area at Mycenae, where richly adorned leaders were buried. (ImageBROKER/Alamy)

immortalized in Homer's poems, the *Iliad* and the *Odyssey*. These epics were written many centuries after the Mycenaeans themselves had become folk memories. However, they give a splendid impression of the wealth and glitter of Bronze Age Greek life. So do Mycenaean graves. Mycenae's rulers and their relatives took their wealth with them to the next world. They were buried in spectacular shaft graves wearing fine gold face masks modeled in the likeness of their owners and weapons adorned with copper, gold, and silver (Figure 9.11).

Mycenaean commerce took over where Minoan trade left off. Much of the rulers' prestige was based on their contacts in the metal trade. Minerals, especially tin for alloying bronze, were in constant demand in eastern Mediterranean markets. Both copper and tin were abundant in Turkey and central Cyprus, so Mycenaean traders became middlemen, developing the necessary contacts in both areas and in the Aegean to obtain regular supplies. So complex did their trading relationships become that the Mycenaeans found it necessary to establish their own writing system. They refined a simple pictographic script known to archaeologists as Linear A, which the Minoans had used, and wrote it in the Greek language, creating what scholars call Linear B. Large numbers of clay

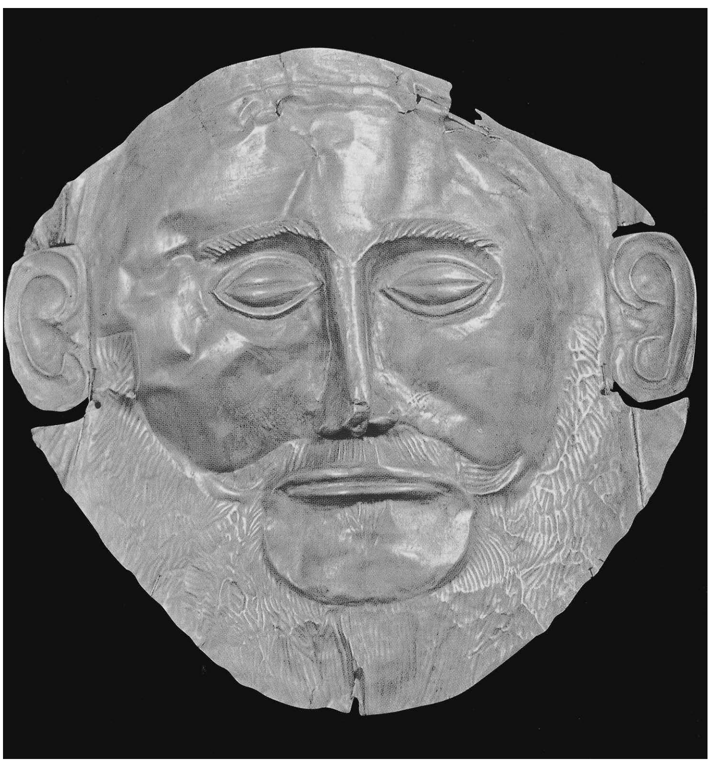


Figure 9.11 Golden funerary mask of a Mycenaean lord from a shaft grave at Mycenae, Greece. (MARKA/Alamy)

tablets from a Mycenaean palace at **Pylos** in western Greece show that the script was used for inventories and records of commercial transactions, ration issues, and so on, for the daily affairs of estate administration.

Like Minoan civilization, Mycenaean society was based on small towns and palaces where the elite lived and where trade, centralized food storage, and major religious ceremonies took place. Mycenae itself was a formidable citadel ringed with a defense wall of large boulders. The main entrance passed under a portico carved with two seated lions and led up the hill to the stone palace with its magnificent views of the plain of Argos. Everything was set up for storage and defense. There was a water cistern within the defense walls, rows of clay storage jars held large quantities of olive oil, and storerooms contained many foodstuffs and the wealth of the palace. The rulers and their immediate relatives were buried in a circular enclosure to the west of the gate, but the Mycenaeans also used beehive-like communal burial chambers outside the citadel for many of their dead.

Mycenae continued to dominate seaborne eastern Mediterranean trade routes until about 1200 BC, when its power was destroyed, perhaps as a result of serious droughts and incursions from the north. In the same century, other northern barbarian raids impacted the Hittite kingdom in Turkey. These incursions, the result of unsettled political conditions and overpopulation in Europe, together with repeated crop failures from drought, threw the eastern Mediterranean world into confusion.

Sea Peoples and Phoenicians (from 1200 to 800 BC)

The Hittite civilization collapsed during a period of political upheaval, persistent drought, and, apparently, frequent earthquakes, but the trade routes that joined states large and small continued to link every corner of the Mediterranean world. The imperial powers and petty kingships that had made up much of the economic world of 1200 BC were governed by highly centralized palace bureaucracies. These bureaucracies controlled specialized activities such as trade in glass ingots and ivory ornaments, which allowed significant economies of operation and dense population concentrations.

When the Hittite and Mycenaean civilizations came apart in an almost domino-like effect and Egypt declined at the same time, centralized bureaucracies lost their power over economic activities. The infrastructure for controlled, specialized trade came apart and the power of urban elites declined. For 300 years, there was a political vacuum, a period of widespread suffering and piracy, much of it at the hands of warlike bands known to archaeologists as the **Sea Peoples**. In the Levant, many rural groups moved to the highlands, loosening their dependence on trading cities like Ugarit, and became herders and farmers. Some of them formed loose federations of towns, villages, and nomadic bands to preserve their sovereignty in the face of new and aggressive outside powers like the Assyrians of northern Mesopotamia. One such federation became the state of Israel, which acquired its own monarchy after 1000 BC and protected itself with a network of walled cities. By this time, eastern Mediterranean trade was recovering and the hillside federation expanded into the lowlands, hemmed in by the sea and the desert and by still-powerful Egyptian and Mesopotamian civilizations on either side.

A slow economic recovery during the first millennium BC came at the hands of the **Phoenicians**. At first, they acted as middlemen in the Cyprus and Aegean trade. Their ships were soon carrying Lebanese cedarwood to Cyprus and the Nile, and copper and iron to the Aegean. Powerful cities like Byblos, Sidon, and Tyre extended their trading as far as the copper and tin mines of Spain. Phoenician merchants made enormous profits from purple dye extracted from seashells and much used for expensive fabrics. By 800 BC, Phoenician merchants were everywhere in the Mediterranean as Assyria became the dominant power in the Levant. Their need for a highly accurate record-keeping system played a significant part in the development of the Western alphabet.

Assyrians and Babylonians (from 1200 to 800 BC)

The city of **Assur** on the Tigris River in northern Mesopotamia had been a major force in the eastern Mediterranean world since Sumerian times. The merchants of Assur controlled strategic desert and river trade routes and commerce downstream to Babylon and beyond. The Assyrian Empire expanded dramatically in the ninth century BC, when a series of despotic, grandiose kings expanded their domains with relentless annual campaigns. These were absolute monarchs who boasted of their conquests on their palace walls and lived in magnificent splendor, well aware of the value of conspicuous display (see chapter opener). When King Assurnasirpal completed his palace at Nimrud on the Tigris he threw a party for the 16,000 inhabitants of the city, 1,500 royal officials, "47,074 men and women from the length of my country," and 5,000 foreign envoys. The king fed this throng of more than 69,000 people for ten days, during which time his guests ate 14,000 sheep and consumed more than 10,000 skins of wine.

The last of the great Assyrian kings was Assurbanipal, who died in approximately 630 BC. Eventually, the Assyrian capital, **Nineveh**, fell to Persian and Babylonian warriors. For 43 years, the mighty King Nebuchadnezzar of Babylon ruled over Mesopotamia and turned his capital into one of the showplaces of the ancient world. His double-walled city was adorned by mud-brick palaces with elaborate hanging gardens, a great processional way, and a huge ziggurat. It was to Babylon that a large contingent of Jews was taken as captives after Nebuchadnezzar's armies sacked Jerusalem. This event is immortalized in Psalm 137:1: "By the waters of Babylon we sat down and wept."

The Babylonian Empire did not long survive the death of Nebuchadnezzar in 556 BC. The armies of Cyrus of Persia took Babylon in 539 BC. The eastern Mediterranean world came under the sway of empires much larger than ever before. These were the centuries of classical Greece, when Rome began to emerge as a major power, and when the basic foundations of Western civilization were laid. They came from a Mediterranean world that had been evolving economically, politically, and socially for thousands of years. What had begun as an adaptation to the realities of living in arid but fertile floodplain environments had developed into a web of economic and political interdependency that was far larger than anything the world had seen before—the remote forerunner of the vast global economic system of today. As we shall see in Chapter 10, by the time the Roman Empire dominated the Mediterranean 2,000 years ago, new trade routes and markets as far east as India and China were linked to the western Asian world.

Summary

- The Mesopotamian lowlands may have supported farmers before 6500 BC, but their first traces appear in the 'Ubaid culture of the sixth millennium. This culture practiced small-scale irrigation and lived in groups of communities linked by trade networks.
- In time, some settlements, like Eridu, became ceremonial centers and towns. A rapid evolution to urban life ensued, marked by fast population growth, the congregation of people in small cities, and the development of long-distance trade. This new urban society was organized in distinctive stratified social classes. Copper metallurgy developed at about the same time in the highlands and soon came into widespread use.
- By 2900 BC, Sumerian civilization was in full swing and was part of a growing economic system, which linked kingdoms as far afield as the Iranian plateau and the Indus in the east and the Mediterranean and the Nile Valley in the west.
- Mesopotamia never achieved political unification under the Sumerians. Rather, dozens of city-states vied for political and economic supremacy and competed with other societies in northern Mesopotamia and close to the Zagros Mountains.
- Sumerian civilization flourished until about 2000 BC, when it was eclipsed by Akkadian and then Babylonian power.
- To the north and west the Minoans, and then the Mycenaeans, dominated the Aegean Sea and its lucrative wine and olive oil trade, while the Hittites rose to power in what is now Turkey. The centuries-old political order was disrupted by the Sea Peoples after 1200 BC.

- In the late second millennium BC, the city of Assur in the north nurtured the Assyrian Empire, which was extended by vigorous and despotic kings during the first half of the succeeding millennium. At one time, the Assyrian Empire stretched from the Mediterranean to the Persian Gulf.
- The Assyrian Empire fell in 612 BC, and the Babylonians filled the power vacuum under the rule of Nebuchadnezzar. Babylon fell to Cyrus the Great of Persia in 539 BC, and Mesopotamia became part of the Persian Empire.

Further Reading

Two books summarize the Sumerians admirably. Samuel Kramer's *The Sumerians* (Chicago: University of Chicago Press, 1963) is a readable classic well deserving of its popularity. Harriett Crawford's *Sumer and the Sumerians*, 2nd ed. (Cambridge, England: Cambridge University Press, 2004) and the same author's *The Sumerian World* (Abingdon: Routledge, 2016) are up-to-date accounts. Nicholas Postgate's *Early Mesopotamia: Economy and Society at the Dawn of History* (London: Kegan Paul, 1992) is also definitive. For the Hittites, see J. G. MacQueen, *The Hittites*, 3rd ed. (New York: Thames and Hudson, 1996) and Trevor Bryce, *The Kingdom of the Hittites* (Oxford, England: Oxford University Press, 1998). For later events, see Manuel Robbins, *Collapse of the Bronze Age: The Story of Greece, Troy, Israel, Egypt, and the Peoples of the Sea* (New York: Author's Choice Press, 2001) and Robert Drew, *The End of the Bronze Age* (Princeton, NJ: Princeton University Press, 1995). For the Minoans and Mycenaeans, see Oliver Dickinson, *The Aegean Bronze Age* (Cambridge, England: Cambridge University Press, 1994); J. Lesley Fitton, *Minoans (Peoples of the Past)* (London: British Museum Press, 2002); and Robert Castleden, *Mycenaeans: Life in Bronze Age Greece* (London: Other, 2005).

Chapter 10

Egypt and Africa

Portrait of a pharaoh. The mummy of Ramesses II (1224 BC).
(Heritage Image Partnership/Alamy)

Chapter Outline

Prologue

"Nearly overcome, I… contrived to sit; but when my weight bore on the body of an Egyptian, it crushed it like a band-box.… I sank altogether among the broken mummies, with a crash of bones, rags, and wooden cases, which raised such a dust as kept me motionless for a quarter of an hour, waiting till it subsided again." Thus did the notorious Giovanni Belzoni, Italian circus performer turned tomb robber, explore ancient Egypt in 1817. Belzoni became a tomb robber by chance when a scheme to mechanize Egyptian agriculture collapsed. He contracted to move a large statue of the pharaoh Ramesses II from Thebes to Alexandria. The tall Italian discovered he had a talent for bold discovery. In the course of three hectic years, he opened the great temple at Abu Simbel in Nubia, penetrated the inner chambers of the Pyramid of Kephren at Giza, and discovered the tomb of the pharaoh Seti I in the Valley of Kings. Belzoni and his ilk thought nothing of using gunpowder or even of going after rivals with a gun, for everyone was out for spectacular finds and all the loot he could gather. Eventually, he fled Egypt in danger of losing his life, exhibited his finds in London, then perished trying to find the source of the Niger River in West Africa.

Thanks to the adventures of Belzoni and his lik, and magnificent discoveries like Tutankhamun's tomb, ancient Egypt casts a magical spell over many people. All the ingredients of adventure and romance lie along the Nile: golden pharaohs' tombs, high pyramids, and spectacular temples. Of all ancient civilizations, Egypt is the best known and perhaps the most misunderstood. Many people assume that Egyptian civilization developed and flourished in isolation in the Nile Valley, cut off from the rest of the ancient world. In fact, Egyptian civilization owed much to both Asia and tropical Africa and was a major political player in the eastern Mediterranean world of the second millennium BC. This chapter describes the origins and development of this most remarkable of ancient civilizations and its relationships with the wider ancient world.

Predynastic Egypt: Ancient Monopoly (from 5000 to 3100 BC)

By 5000 BC, a patchwork of simple village farming communities lay along both banks of the Nile River, from the delta of Lower Egypt to the First Cataract at Aswan and even further upstream. The river itself formed a natural highway between settlements near and far, the prevailing north winds allowing even sailing boats to stem the current. The villages soon became a patchwork of small kingdoms, each clustered under the rule of local leaders. Within 2,000 years, these small polities had become a unified state, at the time the largest literate civilization in the world.

Most explanations for the origin of the state focus on population growth and competition for land and natural resources. In Egypt's case, state formation took place where population densities were still relatively low and there was plenty of vacant land, so neither of these factors played a significant role.

Egyptologist Barry Kemp believes that the village farmers of 4000 BC had strong ties to their ancestral lands, expressed in deeply symbolic terms. At first, dozens of small communities, each with its own patchwork of farming land, competed and traded with their neighbors. Kemp likens the behavior and long-term effects to that of a game of Monopoly. In Monopoly, each player maximizes the opportunities thrown out by the dice. In Egypt, both individuals and entire villages took full advantage of favorable locations, of their access to desirable resources like potting clay, and of chance breaks that came their way. At first the communities, like Monopoly players, were basically equal, but eventually someone, or some hamlet, gained an unforeseen advantage, perhaps from trading expertise or unusually high crop yields. Equilibrium gave way to a seemingly inevitable momentum, where some communities acquired more wealth and more power than their neighbors—the prehistoric equivalent of building Monopoly hotels on Park Place. Inevitably victorious, they established a monopoly over local trade, food surpluses, and so on, which overrode any threat other political or economic players posed.

In predynastic times, dozens of such "games" were likely in progress. As time went on, the number of players grew fewer, but the stakes were higher as increasingly large chiefdoms vied for economic power and political dominance. Just like Monopoly, players changed over time, some acquiring great power and then losing it as charismatic individuals died or trading opportunities changed. Kemp points out that Egypt had more than enough fertile land and resources to enable such games to play out over many generations. Surplus resources like grain or toolmaking stone were the foundation of power. But he believes the Egyptians also had a genius for weaving a distinctive ideology that imbued leadership and authority with elaborate symbols and rituals. These ideologies became a powerful factor in promoting unification.

Science

Ancient Wine at Abydos

In 1988, German Egyptologist Günter Dreyer excavated the tomb of one of Egypt's first leaders at Abydos on the Middle Nile. Scorpion I lived in about 3150 BC. His elaborate tomb contained four rooms stocked with at least 700 jars, which held a total of about 4,550 liters (1,200 gallons) of wine. Forty-seven of the jars contained wine pips, together with remains of sliced figs that were once suspended on strings in the wine, probably to sweeten it. The crusty residues adhering to the insides of the pots were analyzed with an infrared spectrometer and liquid chromatography, which revealed the remains of tartaric acids (found naturally in grapes), and also of terebinth resin, which ancient vintners used to prevent wine from turning into vinegar. Neutron activation analysis of the jar clay yielded trace element clusters that were compared to a large database of samples from Egypt and the eastern Mediterranean. The database pointed to the southern hill country of Israel and Transjordan as the source of the vessels, an area where vine growing was well established in 3100 BC. The wine probably traveled the Nile across an ancient trade route, "the Way of Horus," that linked southern Israel with Egypt via the Sinai Desert. By 3000 BC, vine growing was well established in the Nile Delta in northern Egypt, the source of the pharaoh Tutankhamun's wines 1,500 years later.

New Kingdom tomb paintings show laborers picking bunches of grapes from laden vines supported with forked sticks or on trellises. They empty heavy baskets into clay crushing vats. Teams of five or six men stomp the bunches by foot, hanging onto ropes to keep their balance. Tutankhamun enjoyed wines stored in short-handled red clay amphorae, mainly from vineyards in the western delta far downstream. At least ten vintners produced the mainly dry wines the pharaoh drank. One Syrian wine maker named Khay made no fewer than six jars of fine wine for the king. A pharaoh enjoyed the pick of the vintages. At least 160 wine labels have come from the heretic king Akhenaten's palace at el-Amarna, some labeled "good," or "very good." Others, presumably inferior, were merely labeled "for merrymaking" or "for taxes."

Archaeological excavations and surveys hint at a rapid but complex consolidation of political power in fewer and fewer hands. By 3500 BC, three predynastic kingdoms dominated the Nile: Nagada, Nekhen, and This near Abydos in Upper Egypt. These little-known kingdoms were the nucleus of a unified Egypt (Figure 10.1).[1]

Archaeology and myth combine for a hypothetical scenario for unification: By 3500 BC, the kingdoms of Upper Egypt may have had direct contact with southern Arabia and Southwest Asia, bypassing Lower Egypt. Mesopotamian cylinder seals have come from Upper Egyptian sites, and gold was obtained from mines in the eastern desert. Conflict ensued, with the politically most-developed center, Nekhen, emerging victorious. The rulers of Nekhen, then This, finally embarked on a campaign of military conquest, which eventually engulfed all of Egypt between the Mediterranean and Aswan.

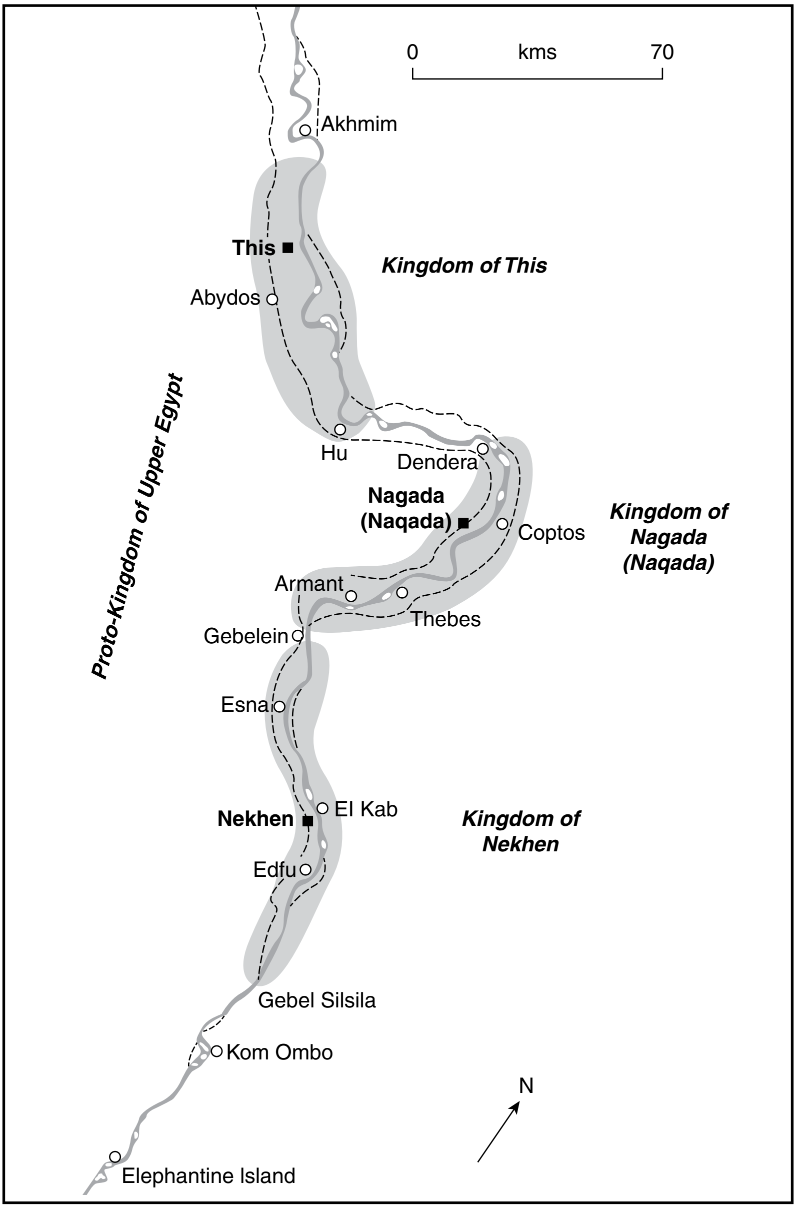


Figure 10.1 Map showing predynastic kingdoms in Upper Egypt in about 3300 BC. This is a gross simplification of a complex, ever-changing political situation.

By 3100 BC, a semblance of political unity joined Upper and Lower Egypt in the symbolic linking of the gods Horus and Seth depicted in later Egyptian art. As these events unfolded, a new state came into being, founded not only on physical but also on a symbolic geography, a harmony achieved by balanced opposites, of which Horus and Seth are but one manifestation. For thousands of years, the Egyptians were concerned with the potential of a world torn between potential chaos and order. They believed that disorder and disequilibrium could be contained by the rule of kings and by the benign force of the power of the sun. Thus, the Egyptians' intellectual view of the universe coincided with the structure of political power. Unification was the culmination of local social and political developments that resulted from centuries of gradual change in economic and social life.

Predynastic villages were autonomous units, each with its local deities. During the fourth millennium BC, the larger villages became the focal points of different territories, which in dynastic times became the nomes, or provinces, through which the pharaohs administered Egypt. The nomarchs (provincial leaders) were responsible for the gradual coalescence of Egypt into larger political and social units. Their deeds are recorded on ceremonial palettes used for moistening eye powder. Some of these palettes show alliances of local leaders dismantling conquered villages. Others commemorate the administrative skills of leaders who brought their villages through drought years by skillful management. The unification of Egypt was a gradual process of both voluntary and involuntary amalgamation. Voluntary unification resulted from common needs and economic advantage. Perhaps it was only in the final stages of unification that military force came into play to bring larger and larger political units under single rulers.

However the process of unification unfolded, there can be no question that unification was the pivotal and fundamental concept upon which the institutions of ancient Egyptian civilization rested. Unification brought order from political chaos, and serenity and rightness to a confused world. The king's task as shepherd of the people was to preserve *ma'at*, "rightness," derived in considerable part from unification, to maintain order in the face of a chaotic outside world.

The Egyptians themselves identified the first king as Narmer. (The universally used word pharaoh, from "great house": *par-aa*, came into use during the second millennium BC.) In fact, a series of still-unknown rulers, Narmer among them, may have completed the process of unification. The famous Narmer Palette (see Figure 10.2) depicts the semblance of political unity this king and his successors achieved, as a new state came into being based on the symbolic balance of the forces of good and evil, unification and fragmentation. The Egyptians believed that only the rule of kings and the benign force of the sun could contain disorder. In reality, unification took several centuries to achieve through a process of deft political alliance and continual warfare.

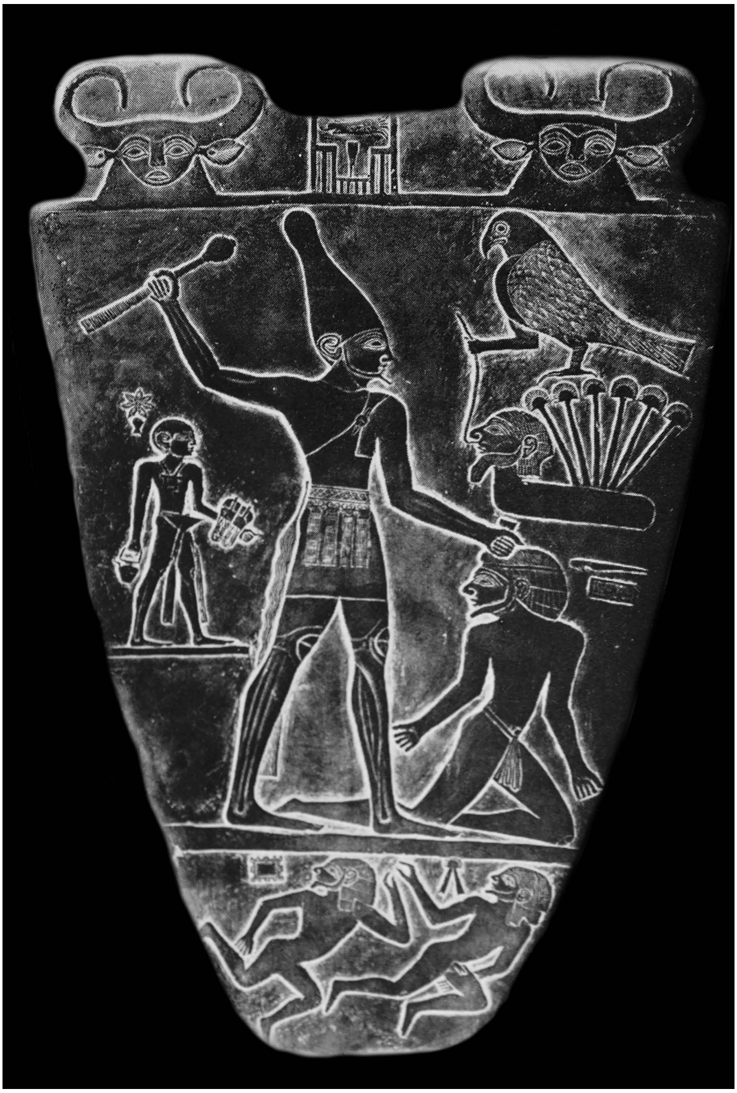


Figure 10.2 The Narmer Palette, a slab carved on both sides with scenes commemorating King Narmer (Menes), whom legend credits with unifying Upper and Lower Egypt. He appears on the palette wearing the white and red crowns of these two regions, presiding over the conquest of the Delta.
(World History Archive/Alamy Stock Photo)

Dynastic Egyptian Civilization (from ca. 3000 to 30 BC)

Egyptologists conventionally divide ancient Egyptian civilization into four broad periods: the Archaic Period and the Old Kingdom, the Middle Kingdom, the New Kingdom, and the Late Period. The first three were separated by two intermediate periods, interludes of political change and instability (Table 10.1).

Table 10.1 Ancient Egyptian Civilization

Years BC	*Period*	*Characteristics*
30 BC	Roman occupation	Egypt an imperial province of Rome
332 to 30 BC	Ptolemaic Period	The Ptolemies bring Greek influence to Egypt, beginning with conquest of Egypt by Alexander the Great in 332 BC
1070 to 332 BC	Late Period	Gradual decline in pharaonic authority, culminating in Persian rule (525–404 and 343–332 BC)
1530 to 1070 BC	New Kingdom	Great imperial period of Egyptian history, with pharaohs buried in Valley of Kings; pharaohs include Ramesses II, Seti I, and Tutankhamun, as well as Akhenaten, the heretic ruler
1640 to 1530 BC	Second Intermediate Period	Hyksos rulers in the delta
2134 to 2040 BC	Middle Kingdom	Thebes achieves prominence, also the priesthood of Amun
2040 to 1640 BC	First Intermediate Period	Political chaos and disunity
2575 to 2134 BC	Old Kingdom	Despotic pharaohs build the pyramids and favor conspicuous funerary monuments, institutions, economic strategies, and artistic traditions of ancient Egypt established
2920 to 2575 BC	Archaic Period	Consolidation of state
3100 BC	Unification of Egypt under Narmer-Menes and Scorpion	

Archaic Egypt and the "Great Culture" (from 3000 to 2575 BC)

The first ruler of a truly unified Egypt was King Horus Aha, who reigned in about 3100 BC. The next four and a half centuries were a long period of consolidation, the Archaic Period, when the pharaohs assumed the role of divine kings. They and their high officials invented Egypt's royal tradition, converting it into powerful architectural statements and artistic styles that endured for centuries. Just like Mesoamerican lords (Chapters 12 and 13), the pharaohs made a great play of their rare public appearances, developing spectacular settings for major ritual events and festivals. They also created a centralized bureaucracy that directed labor, administered food storage, and collected taxes. At the center of the state lay the concept of a great ruler on earth who symbolized the triumph of order over chaos. In Egypt, the terms father, king, and god were metaphors for one another and for a form of political power based on social inequality that was considered part of the natural order the gods had established at the creation.

The Archaic Period saw the birth of Egypt's "Great Culture," a distinctive ideology that systematized Egyptian civilization over wide areas at the expense of local religious cults. Such an ideology was essential in a society where only a minority could read and write. Scribes held enormous power in all early civilizations, and Egypt was no exception. "Be a scribe.… You will go forth in white clothes, honored, with courtiers saluting you," a young man is advised. Writing was power, the key to controlling the labor of thousands of people.

Old Kingdom (from ca. 2575 to 2134 BC)

The Old Kingdom saw society shaped in an image in which the well-being of the people depended on the ruler supported by their labors. The new image of kingship developed after the death in 2649 BC of the pharaoh Djoser, whose architect Imhotep built the first pyramid as a royal burial place—the celebrated Step Pyramid at Saqqara. The king was now absorbed into the mythic symbol of the sun. The sun god became a heavenly monarch, the pharaoh the deity's representative on earth. On his death, an Old Kingdom pharaoh "went to his double," joining the sun god in heaven. Thus it was that Djoser and his successors lavished enormous expenditure on their sepulchers—at first earthen mounds, then pyramids that became symbolic ladders to heaven, their sloping sides the rays of the sun widening after bursting through a gap in the clouds (see "The Step Pyramid at Saqqara" box).

Site

The Step Pyramid at Saqqara

Like other early Old Kingdom kings, Third Dynasty pharaoh Djoser (2668–2649 BC) grappled with internal political problems. He managed to extend his rule as far upstream as Aswan and laid great emphasis on his role as king and supreme territorial claimant, a role he celebrated within a large enclosure dominated by a unique structure: the Step Pyramid at Saqqara opposite the royal capital at Memphis.

Djoser's vizier Imhotep devised the architecture of the Step Pyramid (Figure 10.3). The great architect drew his inspiration from earlier royal tombs, rectangular structures like those at Abydos, which were eternal mansions for dead monarchs. Such tumuli (mounds) had associations with the primor-dial earthen mound that formed an integral part of the Egyptian legend of the creation. Imhotep erected a stepped pyramid instead of a mound as an area for the king's spirit. It rose in six diminishing steps to more than 60 meters (372 feet) above the desert, the faces oriented to the cardinal points. Each step formed a bench or mastaba resembling earlier royal tombs, here built into a stepped pyramid. The effect is like a giant double staircase rising toward heaven.

Figure 10.3 The Step Pyramid at Saqqara, Egypt. (Medioimages/Photodisc/Thinkstock)

A thick stone wall with a palace-like façade more than 1.6 kilometers (1 mile) in perimeter surrounded the entire mortuary complex, forming a huge courtyard, 108 by 187 meters (354 by 613 feet), with a main gateway at the southeastern corner. An entrance hall decorated with columns opened into a vestibule. The king's internal organs were buried in the so-called south tomb facing the main pyramid on the south side of the enclosure. Thus, there were two sepulchers, for the two lands of Upper and Lower Egypt.

The substructure of the Step Pyramid is a honeycomb of shafts and tunnels, many dug by tomb robbers, others containing large numbers of often exquisite stone vases. Some of them bear the names of earlier kings, as if Djoser incorporated them into his pyramid as an act of piety to his predecessors. Only a mummified left foot remains of the king himself. Other members of the royal family were buried in some of the shafts and tunnels. As the pyramid grew these burial chambers were sealed off. Finally, the builders dug a new entrance for Djoser's burial chamber on the north side. They sealed it with a three-ton granite plug.

The Step Pyramid was an elaborate formal setting for the display of kingship—and of the ruler himself—either to his courtiers or the populace at large. The court before the pyramid was a setting for royal appearances, complete with ceremonial territorial markers, a throne platform, and a token palace. On occasion, the pharaoh laid claim to his kingdom by striding around the limits of the court and its markers. The entire complex was an arena for the eternal pageantry of kingship on earth. The "appearance of the king" was an important occasion throughout Egyptian history.

The court cemeteries and pyramid complexes of the Old Kingdom pharaohs extend over a 35-kilometer (22-mile) stretch of the western desert edge, most of them slightly north of Memphis.

The pharaohs lavished enormous resources on their pyramids, culminating in the reigns of Khufu and Khafre, who built the pyramid tombs of Giza (see Figure 1.2). In about 2528 BC, Khufu built the Great Pyramid of Giza, one of the spectacular wonders of ancient Africa and one of the Seven Wonders of the Ancient World. It covers 5.3 hectares (13.1 acres) and is 146 meters (481 feet) high. Well over 2 million limestone blocks, some weighing 15 tons apiece, went into its construction. A long causeway linked each pyramid in the Giza complex to a royal mortuary temple. These austere buildings housed statues of the king. The nearby sepulchers vested these temples with great authority, for they associated the ruler with what was, in effect, a powerful ancestor cult that linked them to their predecessors and to the gods (see Figure 10.4).

We do not know why the pharaohs suddenly embarked on this orgy of pyramid construction, with all the accompanying demands that it made on the fledgling state. Their construction, like other major Egyptian public works, was a triumph of bureaucratic organization, of organizing and transporting food and building materials. Then officials marshaled

Figure 10.4 The Sphinx at Giza built by the Old Kingdom pharaoh Khafre in about 2500 BC. Human-headed lions (sphinxes) were important symbols of royal power. (Donyanedomam/Thinkstock)

skilled artisans and village laborers to quarry, dig, and drag stone into place, housing them nearby in a special pyramid town, where rations were prepared. What is staggering is the efficient management overview, achieved without computers, deploying and supporting thousands of villagers for short periods of time as they fulfilled their annual tax-by-labor obligations to the state.

Perhaps, as Kurt Mendelssohn has argued, the pyramids were built as a means of linking the people to their guardian, the king, and to the sun god, the source of human life and of bountiful harvests. The relationship between the king and his subjects was both reciprocal and spiritual. The pharaoh was a divine king whose person was served by annual labor. In short, pyramid building created public works that helped define the authority of the ruler and make his subjects dependent on him. Every flood season, when agriculture was at a standstill, the pharaohs organized thousands of peasants into construction teams, fed by a nearby pyramid workers' community. The permanent (year-round) labor force comprised relatively few people, mainly skilled artisans, the fruit of whose work was placed in position on the main structure once a year. As far as is known, the peasants worked off tax obligations. Their loyalty to the divine pharaoh provided the motivation for the work.

The construction of the pyramids helped institutionalize the state by trading redistributed food for labor. As construction proceeded from one generation to the next, the villagers became dependent on the central administration for food for three months a year, food obtained from surpluses the villages themselves contributed in the form of taxation. After a while the pyramids fulfilled their purpose, and the state-directed labor forces could be diverted to other, less conspicuous state works. A new form of state organization had been created, one that both fostered and exploited the interdependence of Egyptian villages.

Old Kingdom Egypt was the first state of its size in history. The pharaohs ruled by their own word, following no written laws, unlike the legislators of Mesopotamian city-states. The pharaoh had power over the Nile flood, rainfall, and all people, including foreigners. He was a god, respected by all people as a tangible divinity whose being was the personification of *ma'at*, or "rightness" (Figure 10.4). *Ma'at* was far more than just rightness; it was a "right order" and stood for order and justice. *Ma'at* was pharaonic status and eternity itself—the very embodiment of the Egyptian state. As the embodiment of *ma'at*, the pharaoh pronounced the law, regulated by a massive background of precedent set by earlier pharaohs. A hereditary bureaucracy effectively ruled the kingdom, with rows of officials forming veritable dynasties. Their records tell us that much official energy was devoted to tax collection, harvest yields, and administration of irrigation.

Science

Mummies and Mummification

The Ancient Egyptians believed in an afterlife and eternal survival. One's corpse was one's link with earth; the offerings in the tomb and the spells on the walls the pathway to Ameniti, the other world. Thus, the preservation of one's body from decay was essential, whence embalming and mummification. Mummies, both of pharaohs and lesser folk, have become a symbol of Ancient Egypt. Egyptian funerals were elaborate, culminating in a procession, accompanied by professional mourners, that culminated in a "opening of the mouth" ceremony. The opening carried out by priests "reanimated" the mummy, so it could eat and drink, thereby sustaining itself. The funeral culminated in a feast, in which the mummy participated before its final burial.

Mummies have long fascinated visitors to Egypt, to the point that powdered up mummy became a widely recommended medicine, preferably from one with an inoffensive smell. "Pharaoh is used for balsam," remarked Sir Thomas Browne, one of the few people who advocated preserving the hundreds of burials unearthed at Saqqara near Cairo and elsewhere. Hardly surprisingly, fake powder made from modern corpses entered the marketplace. Mummy was prescribed for all kinds of ailment and only fell into disuse during the eighteenth century.

The idea of mummification goes back to predynastic times, when the dead were buried in shallow, sandy pits, where their bodies were preserved by the dry environment. Some of the dead were wrapped in linen bandages before 3000 BC. At first, bodies were dried in the sun, then bandaged, resin being applied to the body and bandages. By 2500 BC, the internal organs were usually removed and stored separately, presumably to slow decay. Bodies were treated with natron, a form of salt that has desiccating qualities, found in a natural state in Egypt. Thereafter, mummification became increasingly sophisticated. Many details escape us, despite extensive research, but the Greek geographer Herodotus wrote in the fifth century BC of the embalmers moving the brain through the nose with an iron hook. They opened the flank of the corpse with a flint knife, removed the stomach contents, and cleaned the cavity with palm wine and ground spices. They filled it with aromatic substances such as myrrh, sewed up the cuts, then submerged the body in natron for 70 days, which dried it out. The corpse was washed, then bandaged with linen strips coasted with gum on the underside before being laid in a case shaped like a human figure. There were, of course, numerous variations on the process, depending on the budget.

Early efforts at unwrapping mummies were crude at best, and it is only in the past century or so that we have learned more about the dead, especially their chronic medical conditions. For example, tooth abscesses were a major health problem, which caused acute pain. Ramesses II suffered from chronic arthritis; pharaoh Tuthmosis IV (ca. 1399 BC) died fairly young, was balding, had pierced ears, and was emaciated, perhaps from an unidentified wasting disease.

The later pharaohs and other prominent people were buried on the west bank of the Nile in Upper Egypt, the former in the Valley of the Kings. Many Egyptian mummies come from the vast necropolis (cemetery) at Saqqara near Cairo, which has yielded a vast number of tombs, many of them of prominent officials. They went to eternity in lavishly decorated tombs, their carefully mummified bodies surrounded with rich grave furniture. The Pyramids of Giza are part of the necropolis. In 2018, a mummification workshop and a shaft used as a communal burial place, originally investigated in 1900, were reexamined. The workshop dates to about 664 to 404 BC, later than the classic period of Ancient Egyptian civilization. Meticulous excavations unearthed an embalmer's tools, including a large collection of clay vessels, bowls, and measuring cups. These vessels contain residues that will yield priceless information on the oils used in the embalming process. Fragments of mummy cases, cylindrical ritual jars, and ceremonial vessels come from the shaft and nearby passages, a communal burial place. The excavators also found a gilded mummy mask, found in the hall of a burial chamber, one of many dug into the sides of hallways. The gilded silver mask adorned the mummy of a priest of Mut, the consort of the sun god Amun, and a mother goddess, closely associated with the power of a pharaoh.

Mummies and tombs continue to come to light, but the chances of finding another undisturbed sepulcher like Tutankhamun's are remote.

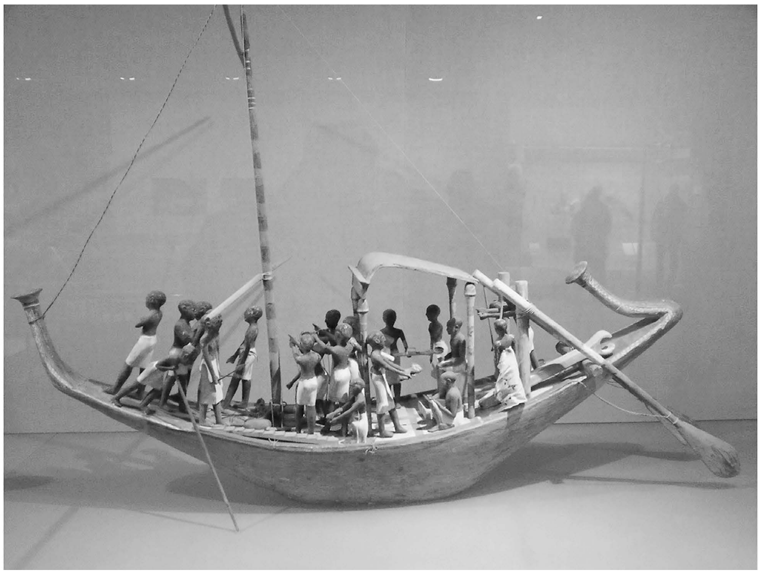
Old Kingdom Egypt was a time of powerful, confident rulers, of a virile state governed by a privileged class of royal relatives and high officials. Their talents created a civilization that was for the benefit of a tiny minority. It was for this privileged elite, headed by a divine king, that Egyptian merchants traded for the famed cedars of Lebanon, mined turquoise and copper in Sinai, and sought ivory, semiprecious stones, and mercenaries for Egypt's armies from Nubia, in present-day Sudan.

A prolonged drought cycle after 2180 BC caused by monsoon failures in the Indian Ocean undermined the Old Kingdom rulers' absolute powers. Three hundred years of repeated famines led to anarchy and a diminution of pharaonic authority (see Table 10.1). Egypt splintered into competing provinces ruled by ambitious lords.

Middle Kingdom (from 2040 to 1640 BC)

In about 2134 BC, the city of Thebes in Upper Egypt achieved supremacy and reunited Egypt under a series of energetic pharaohs. Middle Kingdom rulers were less despotic, more approachable, and less likely to see themselves as gods. They had learned lessons from the past and relied heavily on an efficient bureaucracy to stockpile food supplies and increase agricultural production (Figure 10.5a,b). For more than three centuries, Egypt enjoyed great prosperity and political stability under a series of able pharaohs. Their decisive leadership expanded overseas trade, while they secured Egypt's frontiers with vigorous military

(a)



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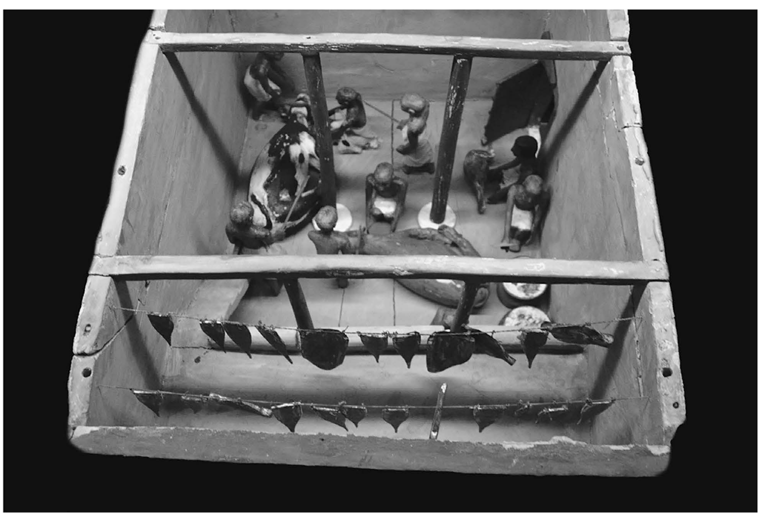


Figure 10.5 Models of a boat and an estate granary belonging to a Middle Kingdom courtier named Meketre. (a) He rides in his boat sitting under a canopy. (b) On his estate, laborers fill bins with wheat as scribes in a neighboring office record the amounts being stored.
(World History Archive/Alamy)

campaigns. The most capable kings worked hard to create a highly centralized, controlled state both by effective leadership and by bureaucratic supervision. At the same time, they strove to increase agricultural production as protection against drought by developing larger-scale agriculture, especially on the shores of the fertile Fayum Depression west of the Nile.

Everything depended on charismatic leadership and a strong king. During the seventeenth century BC, succession disputes engulfed the Theban court at a time when thousands of Asians were moving into the Delta region. Egypt soon fragmented into two kingdoms centered on Lower and Upper Egypt. Lower Egypt came under the control of Hyksos kings, nomadic rulers from Asia. This Second Intermediate Period was a turning point in Egyptian history, for the Hyksos brought new ideas to a civilization that was slowly stagnating in its isolated homeland. They introduced more sophisticated bronze technology, the horse-drawn chariot, and new weapons of war. All these innovations kept Egypt up to date and ensured that subsequent pharaohs would play a leading role in the wider eastern Mediterranean world.

New Kingdom (from 1530 to 1075 BC)

The New Kingdom began when a series of Theban rulers fought and finally conquered the Hyksos, thereby reunifying the kingdom (see "Voices: The Warrior Ahmose, Son of Abana" box). An able pharaoh named Ahmose the Liberator turned Egypt into an efficiently run military state, tolerating no rivals and rewarding his soldiers with gifts of land, while retaining economic power and wealth in his own hands. Ahmose set the tone for the greatest era in Egyptian history. Now the king became a national hero, a military leader who sat on a throne midway between the Asiatic world in the north and the black Nubian kingdoms of the south. He was an imperial ruler, a skilled general, the leader of a great power. As we saw in Chapter 9, Egypt now became a major player in the shifting sands of eastern Mediterranean politics, competing with the Hittites and Mitanni for control of lucrative trade routes and seaports. New Kingdom pharaohs financed their kingdom with Nubian gold, turning the lands beyond the First Cataract into a lucrative colony.

Thebes (known to the Egyptians as *Waset*) was now capital of Egypt, the "Estate of Amun," the sun god. The temple of Amun at Karnak, built mostly between the sixteenth and fourteenth centuries BC, was the heart of the sacred capital (Figure 10.6). Amun was the "king of the gods," a solar deity who conceived the pharaohs, then protected them in life and death. The "Estate of Amun" extended to the western bank of the Nile opposite Thebes, where the pharaohs erected an elaborate city of the dead.

Figure 10.6 The temple of the sun god Amun at Karnak.
(National Geographic Image Collection/Alamy)

They themselves were buried in secret, rock-cut tombs in the arid Valley of Kings. Their sepulchers became models of the caverns of the underworld traversed by the night sun.

The New Kingdom witnessed a brief period of religious unorthodoxy in 1353 BC, when a heretic pharaoh, Akhenaten, turned away from Amun to a purer form of sun worship based on the solar disk Aten. Akhenaten went so far as to found a new royal capital at El-Amarna downstream of Thebes, on land associated with no established deity. The capital was abandoned after his death, leaving a priceless archaeological legacy—a unique archive of New Kingdom society that archaeologists have excavated at intervals for more than a century. In 1333 BC, eight-year-old Tutankhamun succeeded to the throne. He presided over a troubled kingdom, so his advisers took the only course open to them. They restored the old spiritual order, reverting to the dynastic traditions of the early pharaohs. Tutankhamun himself ruled for a mere ten years, but achieved in death an immortality that transcends that of all other pharaohs, simply because Howard Carter and Lord Carnarvon found his intact tomb in the Valley of Kings (Figure 10.7).

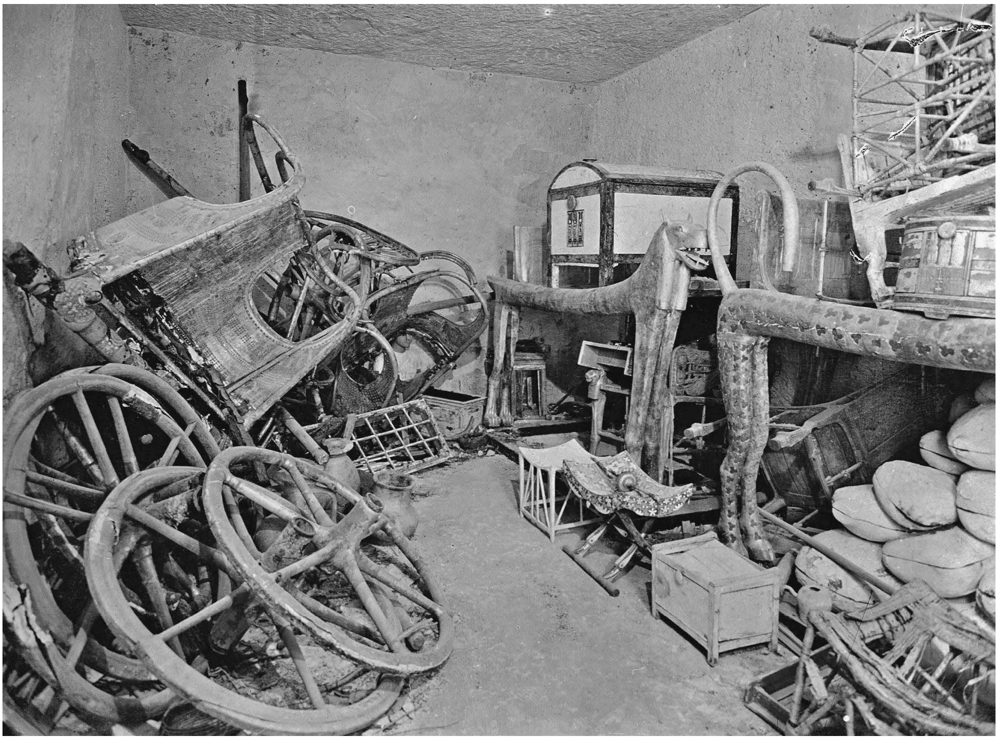


Figure 10.7 The antechamber of Tutankhamun's tomb, with his royal chariots in the foreground (left) and funerary beds to the right.
(David Cole/Alamy)

Voices

The Warrior Ahmose, Son of Abana

The ancient Egyptians boasted loudly on their tomb walls, to the point that one does not know what to believe. Their stories of unrelenting success are much too good to be true, but, occasionally, we come across a truly remarkable individual. A doughty warrior named Ahmose, son of Abana, is a case in point. The old soldier must have been walking history. Ahmose was a soldier's son and followed in his footsteps, at first as a foot soldier, following the king as "he rode about on his chariot." His bravery was noted and "the gold of valor was given" to him. This was the beginning of an illustrious military career. Ahmose served five pharaohs, witnessed the expulsion of the Asian Hyksos kings from Egypt, was present at the ravaging of their capital Avaris in the delta and at the siege of Sharuhen in Asia, and fought in several bloody Nubian campaigns. When the pharaoh Ahmose (no relative) laid siege to Avaris and fought three battles there, Ahmose (the soldier) noted: "took captive there one man and three women, total four heads, and His Majesty gave them to me for slaves." After bitter fighting and the complete destruction of Avaris, Ahmose's armies chased the Hyksos into Palestine and laid siege to the town of Sharuhen, their stronghold in southern Palestine.

Fresh from the slaughter at Sharuhen, the victorious Theban king turned his attention to Nubia, Ahmose, son of Abana, at his side. "Now when his majesty had slain the nomads of Asia, he sailed south... to destroy the Nubian Bowmen. His majesty made great slaughter among them, and I brought spoil from there: two living men and three hands. Then I was rewarded with gold once again, and two female slaves were given to me. His majesty journeyed north, his heart rejoicing in valor and victory. He had conquered southerners and northerners." Ahmose served in several later Nubian campaigns, ending up as a crew commander on a warship, promoted for his skill in organizing the towing of his ship through a turbulent cataract. "I brought a chariot, its horse, and him who was on it as a living captive. When they were presented to his majesty, I was rewarded with gold."

After Nubia, the battle-scarred veteran relaxed in retirement, lavished with honors and land. "The crew commander Ahmose, son of Abana, the justified.... I let you know what favors came to me. I have been rewarded with gold seven times in the sight of the whole land, with many male and female slaves as well."

Just imagine how wonderful it would be if one could sit down for a long talk with Ahmose, son of Abana, in his old age. He died honored and respected, his deeds remembered on the walls of his sepulcher: "The name of the brave man is in that which he has done; it will not perish in the land forever" (quotes from Lichtheim, 1976, pp. 12–14).

The Ramesside pharaohs of 1307 to 1196 BC labored hard to elevate Egypt to its former imperial glory. Ramesses II (from 1290 to 1224 BC) campaigned far into Syria, financing his military campaigns and an orgy of temple building with Nubian gold (see chapter opener). He met his match at the Battle of Kadesh in Syria, where the Hittites fought his army to a standstill. From that moment on, Egypt lost political influence in southwestern Asia and began a slow, at first barely perceptible decline.

Late Period (from 1070 to 30 BC)

With the death of Ramesses III in 1070 BC, Egypt entered a period of political weakness, during which local rulers exercised varying control over the Nile. The pharaohs were threatened by Nubian rulers from the south, who controlled Egypt for a time in the eighth century BC. Assyrians, Persians, and Greeks all ruled over the Nile for varying periods of time until Rome incorporated the world's longest-lived civilization into its empire in 30 BC. The Greeks brought much Egyptian lore and learning into the mainstream of emerging Greek civilization, ensuring that ancient Egypt contributed to the roots of Western civilization.

Egypt and Afrocentrism

The ancient Greeks and Romans believed that Egypt was the fountain of all civilization. While archaeological discoveries have shown that urban civilization developed in both Egypt and Mesopotamia at the same time, most scholars believe that civilization developed in isolation along the Nile, in a fertile if unpredictable river valley that was a world unto its own.

Some African American historians of the so-called Afrocentrism school disagree, for they believe that the institutions of Western civilization were born in tropical Africa and that ancient Egypt was a black African civilization. These arguments, which first surfaced in the 1950s, reached a high level of sophistication in linguist Martin Bernal's celebrated "Black Athena" theory (first published in 1987). Bernal presented archaeological, historical, and linguistic evidence to place ancient Egypt at the core of Western civilization. Egyptologists are almost unanimous in demolishing his arguments on the grounds that they do not stand in the face of scientific data. For example, Afrocentrists claim that the ancient Egyptians were black-skinned tropical Africans. In fact, both tomb paintings and biological data point to a generally eastern Mediterranean population, but one that became increasingly cosmopolitan in later centuries as Egypt enjoyed closer contacts with other lands, including tropical Africa. It is also worth mentioning that the ancient Egyptian social world thought of skin colors and races in distinctive ways quite different from our own—a point worth making about every human society.

Nubia: The Land of Kush (from 3000 to 633 BC)

If ancient Egypt was indeed a civilization unto itself, what connections did it enjoy with the people of the Nile Valley living south of the First Cataract at Aswan? The arid country that lay upstream was Nubia, the Land of Kush, famous to the ancient Egyptians for its gold, ivory, and slaves. Nubia straddled the Middle Nile, a narrow strip of fertile land that extended far upstream into modern-day Sudan as far as the borders of highland Ethiopia. The most fertile valley lands lie along the Dongola Reach between the Third and Fourth Cataracts. It was here that some of the earliest complex Nubian societies developed among groups who had been herders and farmers since before 4000 BC.

Old Kingdom pharaohs sent their armies to subdue Nubia and boasted of lucrative cattle raids. Egyptian prospectors journeyed far into the desert in search of fine rocks and semiprecious stones. The Middle Kingdom kings were more ambitious, for they discovered Nubian gold. In 1900 BC pharaoh Amenemhet fortified strategic reaches with ten strongholds, most of them at points where trade routes intersected with the river. This trade lay in the hands of the Nubian chieftains of Kerma in the heart of the Dongola Reach, a small town with palaces and temples and fortified with elaborate defenses and four gates. Kerma's rulers enjoyed great wealth while alive and upon their death were buried under large burial mounds surrounded with as many as 400 sacrificial victims (Figure 10.8). All this wealth came from trade connections with people living in the desert and farther upstream, as well as with the Egyptians far downstream. But the New Kingdom pharaohs, who wanted this wealth for themselves, marched on Kush in 1500 BC and made it a colony. Nubia now changed from a country of village farmers and chiefdoms into something resembling a vast plantation state, worked for the benefit of absentee landlords to provide commodities of all types at the cheapest possible cost.

The economic and political shock waves that rolled over the eastern Mediterranean after 1200 BC not only overthrew the Hittites and weakened Egypt (see Chapter 9) but also loosened the pharaohs' hold on Nubia. After four centuries of confusion, Nubian civilization achieved new heights. The rulers of the new Kush espoused ancient Egyptian religious beliefs and assumed the powers and ideology of the pharaohs.

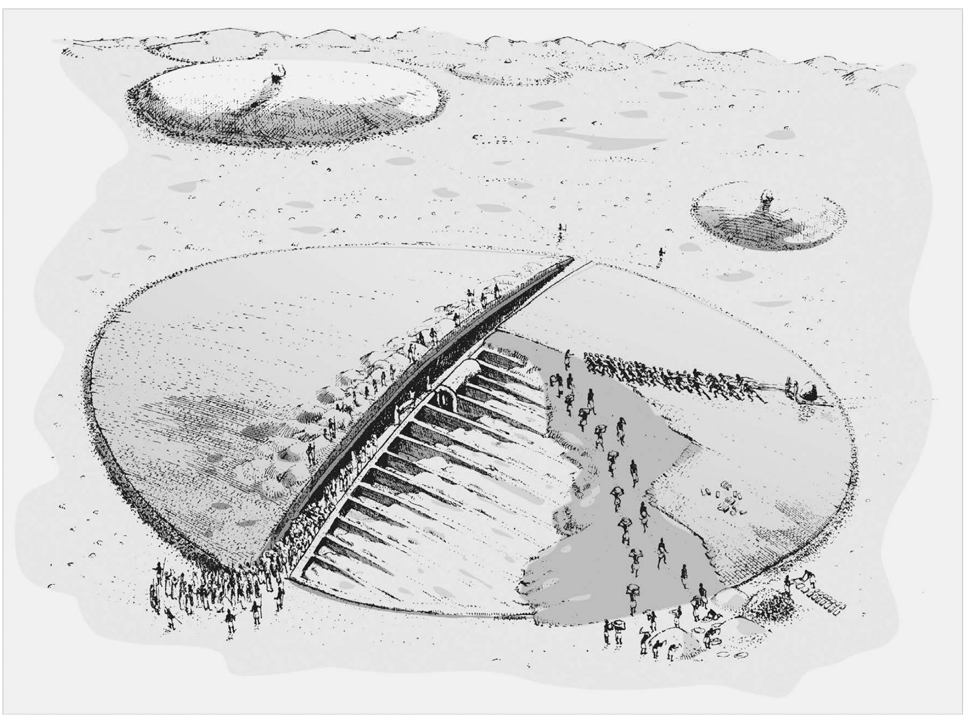


Figure 10.8 A royal tomb at Kerma. People rush to complete the mound as the burial takes place.

Their wealth came from the Egyptian export trade, from gold, ivory, and many other commodities.

Between 730 and 663 BC Nubian monarchs not only ruled over Kush, they presided over Egypt itself. King Piye marched north in 730, honored the sun god Amun at Thebes, then subdued rebellious rulers in the delta far downstream. Piye was content to rule Egypt from Kush, but his successors transferred their court to Thebes, as the servant became the master, the conquered the conquerors. The Nubian pharaohs did much to restore art and religion, but they were inexperienced in foreign affairs, which led to their downfall. In 663 BC, King Assurbanipal of Assyria sacked Thebes and the ruler of the day fled to the safety of Kush. In 591 BC, an Egyptian army marched upstream and "waded in Kushite blood." King Aspelta fled to Meroe, some 500 kilometers (300 miles) upstream, where Nubian monarchs ruled in peace for more than 800 years.

Meroe and Aksum

The move to Meroe came when the focus of Nubian trade was shifting away from the eastern Mediterranean to the Red Sea and Indian Ocean. This new commercial world linked the Red Sea, the Persian Gulf states, India, and ultimately Southeast Asia and China into a vast web.

The island of Socotra off the south coast of Yemen, northeast Africa, and the mysterious Land of Punt, perhaps located in today's Ethiopia or Eritrea, were spice-rich lands where Africans rubbed shoulders with Arabians, Indians with Egyptians. Well-traveled trade routes linked Red Sea coasts with the Nile and the eastern Mediterranean coastline, traversed by laden asses and, increasingly, by camels, aptly named the "ship of the desert" by the Arabians who first domesticated them as early as 2500 BC. By the third century BC, camel breeders dominated the overland caravan trade and brought prosperity to Meroe.

Meroe (from 593 BC to AD 330)

Meroe lies on the east bank of the Nile, some 200 kilometers (124 miles) north of the modern city of Khartoum. Its rulers administered a string of villages and towns along the river from Lower Nubia to Sennar on the Blue Nile, controlling the gold, ivory, and slave trades with Egypt. The city also lay astride bustling caravan routes that linked the river with the Red Sea and extended far to the west, along the southern margins of the Sahara (see Figure 10.9).

Some 24 kings and queens ruled over Meroe between 593 and 220 BC. These black-skinned rulers were the descendants of the great pharaoh Piye and his successors. They preserved many of the conservative standards of ancient Egyptian civilization, while expressing distinctive African cultural traits. For centuries, they administered a complex, exploitative

Figure 10.9 General view of Meroe, showing pyramids and iron slag heaps. Two thousand years ago Meroe lay amid fertile grasslands; it is now desert, partly as a result of overgrazing and excessive tree cutting for charcoal burning by the city's inhabitants. (Martchan/Shutterstock)

economic enterprise for their own benefit, controlling trade through a network of carefully policed trade routes and by force.

Ironworking was big business at Meroe, for iron ore was plentiful nearby. Huge slag heaps overlooked the temples and palaces of the city, accumulated over centuries of manufacture that began as early as the seventh century BC. Iron-tipped tools and weapons gave Meroitic armies strategic advantages over their desert neighbors.

Meroe reached the height of its prosperity during the first century AD, when it maintained regular trading contacts with the Roman Empire. A century later, the city was in decline, finally overthrown by the armies of King Ezana of the Kingdom of Aksum in the nearby Ethiopian highlands between AD 325 and 350.

Aksum (from AD 100 to 1000)

Aksum, which had prospered from the Red Sea trade, was an African kingdom whose earliest rulers appear to have adopted various ideas from southern Arabia in the eight centuries before Christ (Figure 10.10). Its highland homeland was a fertile if unpredictable environment where irrigated cereal crops, among them a native grass called teff, flourished,

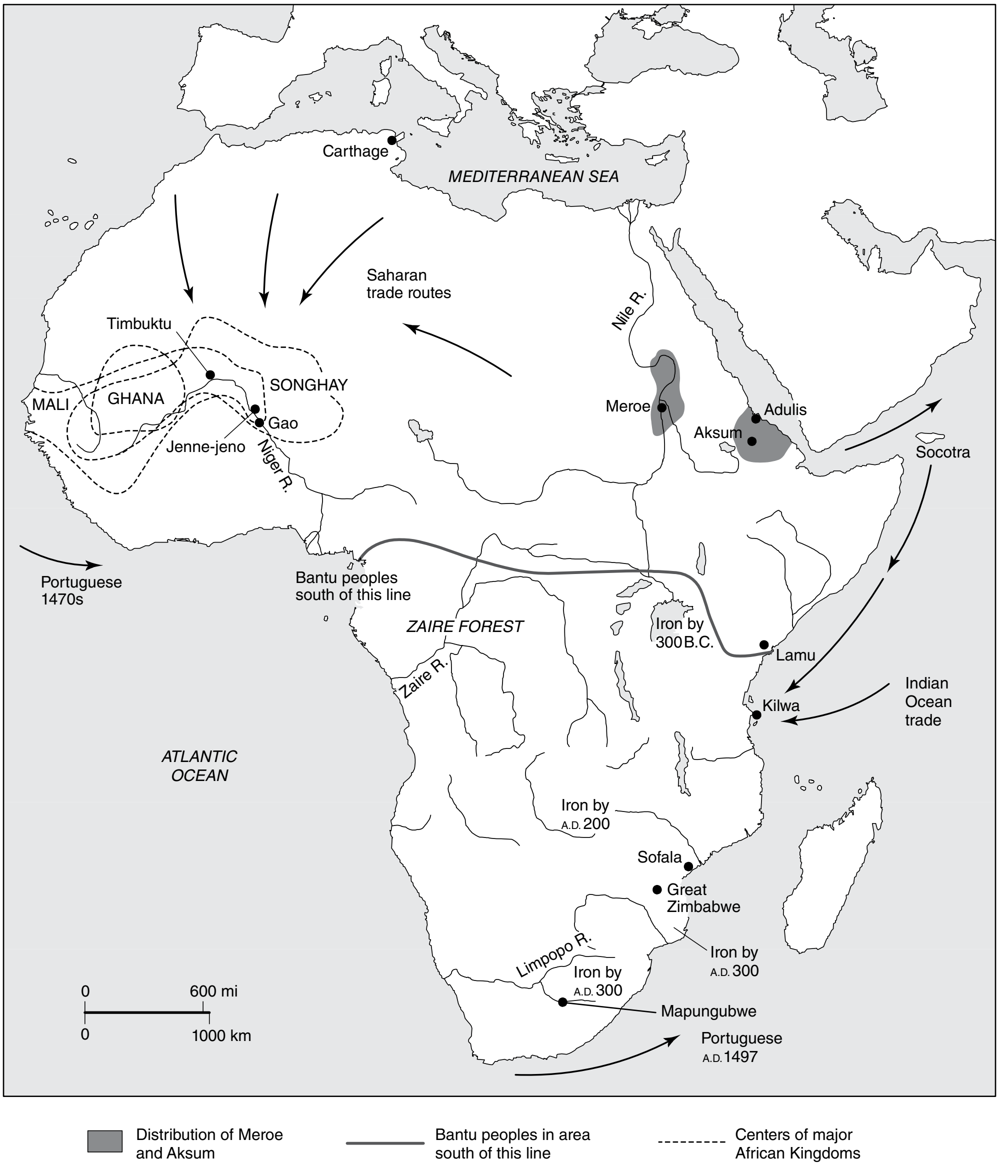


Figure 10.10 African states and kingdoms mentioned in the chapter.

providing large food surpluses in good years. By the first century AD, Aksum was a powerful kingdom, in regular contact with Rome and handling all manner of luxuries and commodities through its port at Adulis on the Red Sea. Adulis became so important that Aksum soon overshadowed Meroe, while the Nile trade declined.

The archaeology of Aksum is still relatively little known, but in the third century AD, the Persian philosopher Mani described it as one of the four greatest kingdoms in the world, along with Rome, China, and Persia. It was a thriving, wealthy society ruled by an elite. We know that its rulers lived in imposing multistory palaces and were buried under columns up to 33 meters (108 feet) high, carved to represent such buildings (Figure 10.11). At about the time he overthrew Meroe, King Ezana abandoned the religion of his forefathers and adopted Christianity, which had reached his domains through Aksum's widespread trading connections, making Aksum one of the oldest Christian kingdoms in the world.

Christianity flourishes in Ethiopia to this day, but Aksum faltered as Islam acquired increasing influence over the Red Sea trade in the seventh century AD. At the height of its powers, Aksum was a potent symbol of a new, much more international world, which sprang from the ruins of the Roman Empire and linked Asia and Africa with lasting ties.

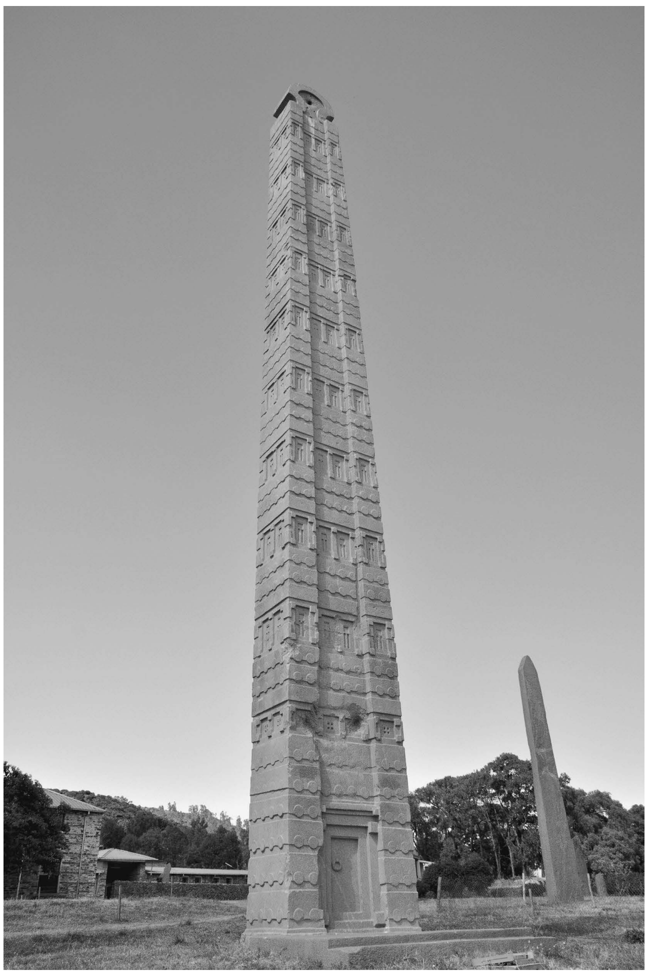


Figure 10.11 Royal stelae at Aksum, Ethiopia.
(heckepics/Thinkstock)

Sub-Saharan Africa (from ca. 500 BC to ca. AD 1500)

For thousands of years after the Ice Age, sub-Saharan African societies were largely isolated from other continents, other cultures. The isolation broke down gradually, partly as a result of Ancient Egyptian trading with Nubia. As early as the fifth century BC, iron metallurgy spread south of the Sahara for the first time, perhaps from Meroe and from the north. The new technology was more a utilitarian than a decorative metal, and ideal for tropical forest clearance and agriculture. How quite agriculture and herding spread south into the tropics for the first time is a matter for controversy, largely because the archaeological clues are thin on the ground. We know that farmers and herders had settled in the East African lakes region by the last few centuries BC and on the banks of the Zambezi and Limpopo Rivers in southern Africa soon after 2,000 years ago. The newcomers absorbed, eliminated, or pushed out the indigenous hunter-gatherers. Today, hunter-gatherer populations survive only in areas that are too arid for farming such as the Kalahari Desert in southern Africa.

By 500 BC, sub-Saharan Africa was thinly populated by a wide variety of subsistence farmers, most of them speaking Bantu languages ancestral to today's dialects. Within a few centuries, the continent in all its environmental diversity was home to prosperous and powerful states, and, contrary to popular belief, was connected to a much wider outside world long before Europeans arrived. The changes began slowly, about 2,000 years ago, during the early Christian era, when the insatiable demands of societies north of the Sahara in the Mediterranean world and on the far shores of the Indian Ocean for copper, gold, ivory, and slaves brought Africans in touch with extensive and rapidly expanding trading systems in the outside world.

The seven centuries between the appearance of the first kingdoms south of the Sahara in the ninth century AD and the arrival of the first European explorers are known to us almost entirely from archaeology, for both historical records and oral traditions are extremely sparse. French archaeologist and historian François-Xavier Fauvelle calls these centuries a "golden age" of African history and he is probably correct. Africa was home to powerful and prosperous states, witnessed the development of cities ruled by able rulers where foreign traders resided. These volatile kingdoms of great sophistication became part of the increasingly strong currents of global exchange, not only of commodities but also of people and religious ideas.

The changes resulted from two developments that stimulated long-distance trade with sub-Saharan Africa. The camel revolutionized desert travel and allowed travelers and merchants to venture deep into the Sahara and into the arid Sahel region immediately south of the desert. Camel caravans became big business. After about 2,000 years ago, camels replaced wheeled carts as the primary vehicles for caravan travel across the eastern Mediterranean.

This travel revolution—it was nothing less—coincided with increasingly common use of the monsoon winds of the Indian Ocean. No one knows when mariners discovered the monsoon cycle in these waters. The northeast monsoon brings sailors to Africa in winter. Then, in summer, the northwest monsoon returns them to their destination. These cycles are so regular that a sailing vessel can travel from India to Arabia or East Africa and back within 12 months. Around 120 BC, a Greek navigator named Eudoxus sailed from Egypt down the Red Sea and direct to India. Another Greek pilot, Hippalus, popularized the deep water route. The monsoon traded expanded rapidly in square-sailed vessels that voyaged before the monsoon winds. The commodities of the Indian Ocean trade rarely changed. From Africa came copper, gold, iron, and ivory, also wooden poles (for treeless Arabia), and slaves. Both in the Sahara and monsoon worlds, raw materials forged interconnections between African kingdoms close to coasts and in the far interior.

West African Kingdoms (from ca. AD 800 to 1550)

No one knows when trade routes between North Africa and the Sahel, the southern frontier of the Sahara, came into regular use. Desert Berber nomads adopted Islam and played a key role, as did the camel. A two-month journey took the traveler to Sudan, “the land of the blacks,” where slaves were to be obtained. The new trade opened up great opportunities for ambitious West African chiefs. A site named **Jenne-jeno** in Mali’s inland Niger River Delta was a small farming village in the third century BC. Copper from the Sahara and gold from the south brought prosperity. Ten centuries later, Jenne-jeno was a major trading center, protected by a mud-brick wall 2 kilometers (1.2 miles) in circumference. Its rulers presided over a territory that extended at least 100 kilometers (60 miles) downstream of the town. This was a stable base for a trade in gold, iron, and agricultural produce with the north (Figure 10.12).

The demand for gold proved insatiable, as was that for Saharan salt, craved by farmers to the south. Jenne-jeno and other West African kingdoms formed an increasing complex network of traders and Saharan trading towns that bought great wealth and power to West Africa. Islamic conquerors took control of the Saharan trade at the end of the first millennium AD, a development that brought literate and much-traveled Arab geographers to the lands south of the Sahara. There, geographer al-Bakri described the Kingdom of Ghana as so rich in gold that “it is said that the king owns a nugget as large as a big stone.”

Figure 10.12 The mosque at Jenne, Mali, the modern town, on the southern fringes of the Sahara Desert. Islam was a strong influence on West African kingdoms.
(Paul Kingsley/Alamy)

Ghana (?AD 700 to ca. 1230)

Ghana is, of course, a modern West African nation, which assumed its current name at independence from the British. It was once the name of a loosely structured domain that straddled the northern borders of the gold-bearing river valleys of the Upper Niger and modern-day Senegal. No one knows when it first came into being, but Arab writers described the kingdom during the eighth century. The Islamic geographer al-Idrisi (1099–1165) wrote a description of Ghana in about 1154, using accounts by Arab merchants. He described Ghana's ruler as dwelling in a fortified palace adorned with glass windows. The king wore silk and marched behind elephants, giraffes, and other wild animals. He was a Muslim, the royal dynasty having converted within the previous century. The capital was said to comprise two cities, one the royal precincts, the other the commercial city, situated on the banks of a river. Quite where this imposing capital was located remains a mystery, for nothing convincing survives archeologically.

The leaders of kingdoms along the Sahel converted to Islam out of genuine faith, but also because it had major political advantages. Islam gave foreign merchants a sense of solidarity, who exported gold, ivory, and salt, also kola nuts, used as a stimulant. They offered cloth, leather goods, glass beads, and weapons in exchange. How centralized and powerful Ghana was is unknown. Most likely, the ruler probably presided over a loosely knit alliance of minor chiefs and small towns and had little power except for his wealth. In the end, the kingdom dissolved into its constituent chiefdoms during the eleventh century. Ghana became a province of the ambitious Kingdom of Mali.

Mali (from ca. 1230 to 1440)

Two centuries of constant squabbling ensued, until an exceptionally able ruler named Sundiata assumed power in about 1230. He founded his new capital at Mali on the Niger River. A century later, Mali extended over much of sub-Saharan West Africa. The Catalan Atlas, a spectacular cartographic work of the European Middle Ages, compiled in about 1375, displays West Africa, presided over by a black king with loose golden clothing, holding a golden orb and scepter (Figure 10.13). Small wonder he was depicted as a golden monarch, for most of Western Europe's gold now came from West Africa, which remained the principal source until the importation of American metal after 1492. According to Arab

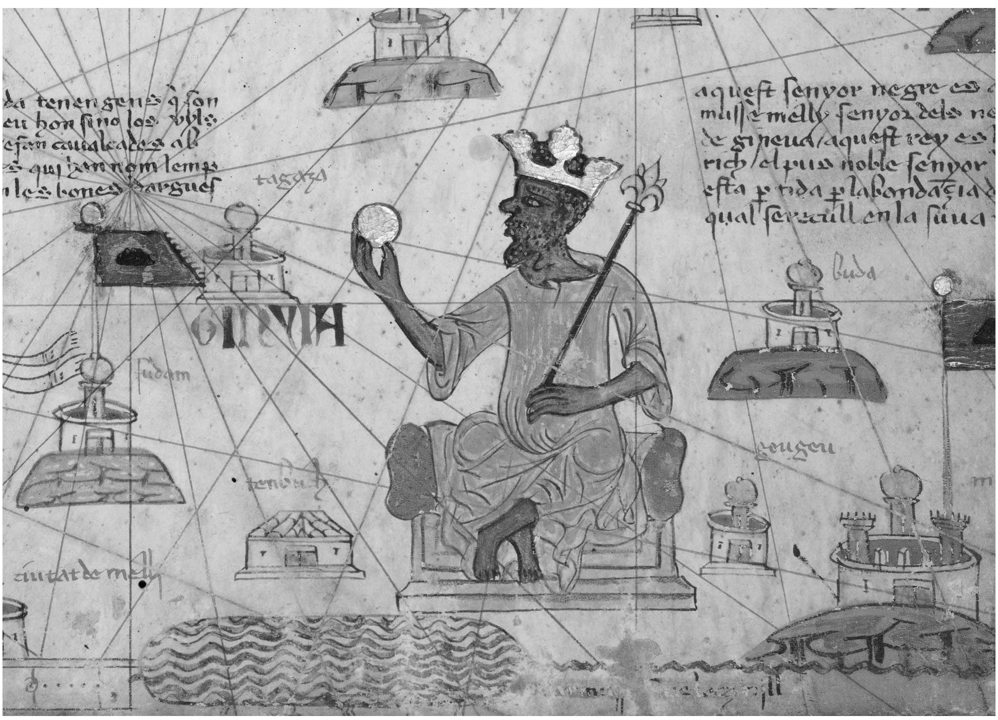


Figure 10.13 The ruler of Mali, said to be Musa Mansa, as depicted in the Catalan Atlas. He holds a golden orb and scepter, symbol of Mali's huge wealth.
(Niday Picture Library/Alamy Stock Photo)

sources, King Musa ruled from an elaborate mud-brick palace with a domed room in the center, where the ruler held audience. Elaborate, heavily guarded processions marked his public appearances when he worshipped at the mosque. One has the impression that Malian rulers governed with piety, wisdom, and wealth. Unfortunately, no one has yet located the remains of the palace, so we are unable to verify the Arab accounts.

Mali's Islamic rulers governed with supreme powers granted by Allah and ruled their conquered provinces with carefully selected religious appointees, or even through clever slaves, chosen for their loyalty and political acumen. Islam provided a reservoir of thoroughly trained, literate administrators who believed that political stability resulted from efficient government and sound trading practices. When the celebrated Malian king Musa Mansa left his kingdom and crossed the Sahara on a long pilgrimage to Mecca in 1324, the wealth that accompanied him caused a sensation. So much gold circulated through Cairo that the value of gold dropped by more than 10 percent for years.

The fame of the Mali kings spread all over the Islamic world (Figure 10.12). The city of Timbuktu on the fringes of the Western Sahara became not only a famous caravan center but a celebrated place of Islamic scholarship. All this prosperity was based on the gold and ivory trades. Malian gold underpinned not only much of the Islamic world, but the treasuries of European kings, too. Before Columbus sailed to the New World, Mali and its lesser neighbors provided no less than two-thirds of Europe's gold.

Musa Mansa's reign saw Mali at the peak of its fame and prosperity. Mansa, the tenth monarch, died in 1337. His successors were less able. One of them was Mari Djata II, who squandered the royal treasury on "loose living." After his death in 1373, the rulers of Gao, another major trading center on the Niger River that had been conquered by Musa Mansa, threw off its joke and founded a rival kingdom, Songhay.

Songhay (from ca. AD 1464 to 1550)

The new state prospered as a series of able rulers expanded their domains. Most famous among them was Sonni Ali, who extended Songhay's frontiers far into the Sahara and deep into Mali country between 1464 and 1494. By 1460, Mali's power had weakened completely. Sonni Ali, monopolized much of the gold and ivory trade at the same time, relying on large armies to maintain law and order and control the volume of trade that passed through his domains. His competent successors further expanded the kingdom. Songhay was at the height of its powers when Columbus landed in the Bahamas in 1492. When Europe explored the Americas, its nations acquired new sources for precious metals that trebled the amount of gold and silver circulating in Europe in half a century. The annual output from America was ten times that of the rest of the world. The Saharan gold trade declined sharply. Cities like Gao and Timbuktu, as well as the Kingdom of Songhay, crumbled into relative obscurity. By 1550, Songhay had collapsed, and the center of political power moved south into the tropical forests and coastal regions that are now Ghana, Nigeria, and the Ivory Coast, where European ships traded for gold, ivory, and slaves.

The East African Coast: Stone Towns and Islam (from First Century AD to 1498)

Mesopotamia and the Nile, as well as the Indus Valley (see Chapter 11), lay close to, or within the world of the monsoon winds. The decoding of the winds of the Indian Ocean began long before the Christian era. Three thousand years ago, sailing down the Red Sea and then coasting along to the Persian Gulf were commonplace. But the offshore route direct from the Red Sea was faster, when ships left the Red Sea in July and arrived off India in September. These direct voyages were apparently a Greek innovation, possible because of the rigid hulls of their ocean-going vessels, far more seaworthy than sewn, planked Arab vessels.

Once the direct passage became known, open-water voyaging took off. Roman coins became common in India. On the island of Socotra off the south coast of Yemen and northeast Africa was a major center for the spice trade, where Africans rubbed shoulders with Arabians, Indians with Egyptians. During the first century AD, an anonymous seafarer, probably an Egyptian Greek, compiled *The Periplus of the Erythraean Sea,* a seaman's guide to the coasts of the Indian Ocean. Clearly based on first-hand knowledge, the author described anchorages and ports of call along the East African coast, which he called Azania "in which there is ivory in great quantity and tortoise shell."

The East African coast is a slow-moving place, caressed for much of the year by gentle northeasterly winds. Long before the first outsiders sailed to East African shores, a scatter of fishing villages and hunters lived inside coral reefs between Somalia as far south as Zanzibar in Tanzania, and beyond. Quite when the first sailors from the north arrived is unknown, but it could have been as early as the first millennium BC. There was sporadic monsoon trade as early as the first century BC, but there were much more intensive contacts between the coast and interior sources for materials such as elephant ivory long before Islam arrived on East African shores in the late eighth century AD. Small settlements of Islamic communities settled along what is now the Kenya coast as early as AD 750, as demand for gold and ivory skyrocketed in the Mediterranean world and elsewhere. The African coastal trade expanded rapidly and foreign merchants developed lasting relationships with local rulers and prominent trading families.

By 1100, a string of small Islamic towns flourished along the coast from Somalia in the north to **Kilwa** in southern Tanzania in the south. They formed a distinctive coastal civilization that was based entirely on the Indian Ocean trade. From places like the islands of Kilwa and Zanzibar, small caravans set off for the interior, carrying bundles of cotton, glass beads, and thousands of seashells from Indian Ocean beaches from one strategic intermediary inland to the next. These latter were prized as ornaments in the far interior. This trade was very one-sided in strict monetary terms, for the glass beads, cheap cloth, and other luxuries perceived as prestigious in the African interior were worth a fraction of the gold dust, copper ingots, ivory, and slaves that fueled the maritime trade of an entire ocean.

The Swahili of the coast were Africans with long experience of the remote interior, and carefully maintained links with long-distance trade networks that extended far inland. They controlled the sources of cowries and other seashells that were highly valued inland, also made cake salt from seawater, much-prized by subsistence farmers. Swahili ironworkers fabricated finished artifacts that passed hand-to-hand inland. The coastal merchants exchanged Indian cloth and glass beads for gold and ivory. The ivory was easily obtained and highly valued in distant India, as it was much easier to carve into ornaments than brittle Indian tusks. Gold was far harder to obtain, as the sources were far to the south, with dust and nuggets coming from the interior between the Limpopo and Zambezi Rivers. Gold workings in what is now Zimbabwe are estimated to have produced about 710 kilograms (10,000 ounces) of gold annually over a period of eight centuries. The first flowering of medieval culture in Europe owed much to the gold and ivory that flowed northward from West Africa and the East African coast.

Life along the coast centered around "stone towns," compact trading settlements, each with their own mosques, almost all of them close to the shore, reflecting their dependence on the coast. The towns were compact, the buildings fabricated of coral masonry, each dominated by prominent urban merchants. The stability of Islam and the predictable winds gave the coastal towns a basic permanence. But this was, above all, an African society, fortunate to lie at a great crossroads of vast global networks that relied on the monsoon winds and encompassed a good quarter of the earth. The culture was shared from one town to the next, but each was independent, this being a linear coastline plagued by constant water shortages. This distinctive African coastal thrived in all its diversity until the arrival of the Portuguese explorer Vasco da Gama in 1498, and beyond.

Gold and Ivory: Mapungubwe and Great Zimbabwe (from Late First Millennium AD until the Fifteenth Century)

The most prized sources of gold and ivory, also other raw materials, also slaves need to carry them, lay in the little-known interior of South Central Africa between the Zambezi and Limpopo Rivers. Hot, low-lying river valleys and hundreds of narrow bush paths connected village to village and chief to chief on the ivory and gold rich plateau far inland. The highland environment was savanna woodland with moderately fertile soils, with grassland that could support large cattle herds. Farmers had first settled on the highlands around the time of Christ. Cattle herding became a way of measuring both wealth and political power on the hoof. Both agriculture and herding were high risk activities in an environment where rainfall was unpredictable and seasonal. The Shona peoples who called the highlands home were quick to realize the potential of long-distance trade with traders from the distant Indian Ocean coast. By AD 1200, Shona society had acquired some complexity, as local chiefs traded gold and ivory for exotic commodities like cloth and glass beads, which they then used to cement their political power, also to acquire more grain and cattle. A mosaic of small and large chiefdoms developed, each with enough territory to graze their cattle through the wet season and the dry months.

At first, the coastal trade was at best sporadic, but, after the tenth century, trade and exchange expanded dramatically, as demand for gold and ivory mushroomed and the coastal towns achieved great prosperity. Inevitably, some chiefdoms achieved dominance as they managed to control trade routes and exact tribute from surrounding chiefs. Two powerful kingdoms flourished on the trade, **Mapungubwe** in the Limpopo River valley, now the border between South Africa and Zimbabwe, and **Great Zimbabwe** to the north.

Mapungubwe (from AD 1230 to 1600)

Mapungubwe lies in an extensive valley system, where the Shashe and Limpopo Rivers become one. This is a low-lying environment, where present-day rainfall is inadequate for the cultivation of sorghum and millet. However, between about 1000 and 1300, the Medieval Warm Period with its higher rainfall caused regular flooding and allowed subsistence agriculture. The landscape also abounded in elephants, which, like cattle, thrived on good grazing grass. These circumstances led to increased social complexity and the development of rank-based societies where cattle were important as a source of wealth, bridewealth, and social ranking. The ancestors of the chiefs who founded Mapungubwe dwelt in sometimes large villages, one of which lay in the shadow of the hill overlooking the valley where chiefly power was centered. In this society, political status depended on one's kin relationship to the reigning chief. We know little about how social complexity developed, or of the changes that resulted, but by 1220, a small group had moved atop Mapungubwe Hill, which overlooks the valley. Long a center of rainmaking activity, it became a secluded place where sacred leaders lived in isolation in a changing world where long-distance trade was widening chiefly horizons. The more abundant rainfall of the time seems to given validity to Mapungubwe's leaders.

By this time, Mapungubwe society was divided into a hierarchy of commoners, district chiefs, and the elite. At least 24 burials have been excavated on the hill, but only 11 survived for analysis. One gold-laden burial, thought to be a major chief, was adorned with a wooden bowl covered with gold foil, a golden scepter, and a rhinoceros (Figure 10.14). The wealth of the elite and of their domains was based on cattle, but, above all, on the trade in gold and ivory. But Mapungubwe lay in a harsh, unpredictable environment. When the rains faltered after 1220, the kingdom competed with Great Zimbabwe to the north. Imported glass beads tell us that it survived until at least the fifteenth century.

Figure 10.14 The rhinoceros figure from Mapungubwe, covered with gold sheet. (Heritage Image Partnership/Alamy Stock Photo)

Great Zimbabwe (before AD 1250 to ca. 1450)

Great Zimbabwe is one of sub-Saharan Africa's iconic sites, a valley of stone built enclosures and other structures dominated by the towering, free-standing walls of the Great Enclosure. A large hill, known as the Acropolis or Hill Ruin, overlooks the lower ruins. The hill lies at the head of a valley that brings mist and dew in from the distant Indian Ocean, making this a long-established place for rainmaking ceremonies, which may have begun as early as the sixth century AD. They persisted into the thirteenth century, which was also a time of drought at Mapungubwe.

Radiocarbon dates from the Acropolis show that Great Zimbabwe and Mapungubwe flourished at the same time and must have competed with one another. A strong Mapungubwe influence appears in Zimbabwe's pottery at about 1250. Archaeologist Thomas Huffman believes that a relative of the Mapungubwe ruler may have moved northward and married into the traditional leadership at Zimbabwe, but this is a controversial theory. Such an alliance would have strengthened the ties between the two kingdoms, just as the coastal trade reached new heights. Swahili traders on the coast expanded southward to a major center at Kilwa, now in southern Tanzania, where they had access to gold and ivory, the demand for which was increasing, as far away as China. Great Zimbabwe was closer to the coast, and served as capital for a large kingdom for 150 years, competing with Mapungubwe, especially in the elephant ivory trade. Its leaders glorified revered ancestors as a basis for their rule, their wealth coming from the gold ivory, also from large cattle herds, a traditional measure of wealth. Their hereditary dynasty acquired power, also from its prowess at rainmaking.

The rulers may have lived in isolation from commoners atop the Acropolis, but the high walls of the Great Enclosure reinforce the great distance between the elite and other people, who presided over a kingdom that grew to be several times larger than that in the Limpopo Valley. The wealth generated by the trade was enormous, far great than that from cattle. Chinese porcelain, Indian cloth, and glass beads were among the imports found in the deposits inside the Great Enclosure. Iron gongs survive as traditional symbols of African chieftainship, but, tragically, frenzied excavations during the early twentieth century in search of gold and other treasure destroyed much of the evidence that would have told their story. There is, however, no evidence that the Zimbabwe chiefs embraced Islam. Their powerful kingdom was the center of a truly indigenous African kingdom.

The heyday of Zimbabwe was between 1350 and 1450, just before Europeans arrived on the coast. The site was abandoned sometime after 1450, when the local grazing grass and farming land became depleted and persistent droughts caused the population to scatter into small villages away from a place that may have attracted as many as 20,000 people (the estimate is, at best, approximate).

All these indigenous African kingdoms developed in response to economic and political opportunities from outside. But their political, social, and economic institutions were always adapted to local conditions and were logical developments of earlier farming cultures.

After the fifteenth century AD, Africa was exploited by Europeans and others not only for its raw materials but also for its slaves. The tentacles of the international slave trade touched not only African coasts but also reached into the deepest strongholds of the interior. Not until the nineteenth century did Victorian explorers, in pursuit of elusive geographical prizes like the source of the Nile, reveal to a horrified world the full extent of the slave trade and its catastrophic effect on African society.

Summary

- Ancient Egyptian civilization arose out of complex processes of forced and voluntary integration along the Nile Valley. These processes were accelerated by increasing trade contacts with Southwest Asia, culminating in the emergence of the ancient Egyptian state somewhere around 3100 BC.
- Egyptologists conventionally subdivide ancient Egyptian civilization into four main periods: the Archaic Period and Old Kingdom, the Middle Kingdom, the New Kingdom, and the Late Period, the first three of which were separated by brief intermediate periods of political chaos.
- The Old Kingdom was notable for its despotic pharaohs and its frenzy of pyramid construction, an activity that may be connected with pragmatic notions of fostering national unity.
- The Middle Kingdom saw a shift of political and religious power to Thebes and Upper Egypt.
- New Kingdom pharaohs made Egypt an imperial power with strong interests in Asia and Nubia. Ancient Egyptian civilization began to decline after 1000 BC, and Egypt fell under Roman rule in 30 BC.
- Nubia, upstream of the First Cataract, was exploited by the Egyptians for centuries, but it came into its own as the pharaohs' power declined. Nubian kings from Kush actually ruled over Egypt in the eighth century BC, but they were forced to retreat to Meroe, far upstream, two centuries later.
- Meroe became a center for the Red Sea and Indian Ocean trade, ruled by kings and queens who preserved Egyptian customs. It prospered from trade and its iron mines until the fourth century AD, when it was conquered and finally eclipsed by the Kingdom of Aksum in the Ethiopian highlands.
- The camel opened up the Sahara to regular gold and salt trade, thus fostering the development of powerful West African states such as Ghana, Mali, and Songhay between about AD 800 and 1500.

- At the same time, the expanding Indian Ocean trade in gold, ivory, and other commodities nurtured a network of African trading towns on the East African coast after the tenth century AD.
- The main sources of gold and ivory were far to the south between the Limpopo and Zambezi Rivers. Mapungubwe on the Limpopo River prospered off the ivory trade from about 1380 to 1220. Thereafter, the center of the gold and ivory trade shifted north to the cattle kingdom based on Great Zimbabwe during the fourteenth and fifteenth centuries AD. Control of the coastal trade passed into European hands during the sixteenth century.

Note

1 Lower Egypt comprises the Nile Delta bordering the Mediterranean Sea and the valley to just upstream of the modern city of Cairo. Upper Egypt extends from there upstream to the First Cataract at Aswan. The ancient Egyptians themselves recognized this subdivision.

Further Reading

Two volumes provide good general summaries. Alan B. Lloyd, *Ancient Egypt: State and Society* (Oxford: Oxford University Press, 2014), while Barry Kemp's *Ancient Egypt: The Anatomy of a Civilization*, 2nd ed. (London: Routledge, 2006) is an in-depth treatment. Nicholas Reeves's *The Complete Tutankhamun* (New York: Thames and Hudson, 1990) is a magnificent tour of the golden pharaoh's sepulcher. Nubia is little known to anyone but specialists, but David O'Connor's *Ancient Nubia: Egypt's Rival in Africa* (Philadelphia: University of Pennsylvania Museum, 1993) offers an update. For Meroe and Kush, see Derek Aelsby, *The Kingdom of Kush: The Napatan and Meroitic Empires* (London: Marcus Weiner, 1999). For Aksum, see David Phillipson, *Ancient Ethiopia: Aksum, Its Antecedents and Successors* (London: British Museum Press, 1998). Graham Connah's *African Civilizations*, 3rd ed. (Cambridge, England: Cambridge University Press, 2015) is a superb account of early African kingdoms, including Nubia, Meroe, and Aksum. Nehemiah Levetzion's *Ancient Ghana and Mali* (London: Methuen, 1971) and Innocent Pirirayi, *The Zimbabwe Culture: Origins and Decline of Southern Zambezian States* (Walnut Creek, CA: Altamira Press, 2001) provide beginning descriptions. François-Xavier Fauvelle, *The Golden Rhinoceros.* Trans. Troy Tice (Princeton, NJ: Princeton University Press, 2018) is a beautifully written account of societies that were in what he calls "The African Middle Ages."

Chapter 11

South, Southeast, and East Asia

A terra-cotta warrior, part of a regiment guarding the tomb of Chinese emperor Shihuangdi, ca. 221 BC.
(Iannomadav/Thinkstock)

Chapter Outline

Prologue

In 1950, Sir Mortimer Wheeler, the famed British excavator, assembled a team of young archaeologists, students, and local laborers to work on a confusion of mud bricks that projected out of a weathered citadel mound at Mohenjo-daro on the banks of the Indus River in Pakistan. The laborers removed meter after meter of sand and the few bricks grew into many, "until the stark walls of a huge platform began to emerge from the hillside. The aspect was of a fortress, towering grim and forbidding above the plain" (Wheeler, 1968, p. 317).

Wheeler puzzled over the mass of brickwork. He recorded a grid of narrow passages, signs of a timber superstructure, and a carefully designed platform with an approach way. The enormous structure looked less and less like a fortress, but what was it? Suddenly a light went on in his brain. The narrow passages were ducts for air to dry the floor of the timber barn that once housed the city's grain, accessible only from the site, away from the teeming streets. The "fortress" was the municipal granary.

More recent excavations have thrown Wheeler's bold interpretation into doubt, but many details of the Indus civilization of South Asia, one of the world's least known, came from his classic investigations of over half a century ago. The world's earliest civilizations developed in the Nile Valley and western Asia. Within 15 centuries, Egypt, the eastern Mediterranean, Mesopotamia, and the Iranian highlands were linked in a loosely structured and ever-changing economic system. States rose and fell, rulers achieved supreme power only to see their domains collapse like a house of cards, and armies battled over strategic ports and control of vital materials, but the web of interconnectedness adjusted and remained intact. Soon the tentacles of these economic contacts extended far to the east, into southern Asia and far beyond.

In Chapter 10, we saw how the emphasis of long-distance trade shifted southward into the Red Sea and Indian Ocean regions after the decline of ancient Egypt in about 1000 BC. This chapter retraces chronological steps and describes how state-organized societies developed in South and Southeast Asia and China (Figure 11.1).

Figure 11.1 Map of Asian sites and societies in the chapter.

South Asia: The Indus Civilization (from ca. 2700 to 1700 BC)

The Indus River, on the banks of which South Asian civilization began, rises in the snow-clad Himalayas of southern Tibet and descends 1,600 kilometers (1,000 miles) through Kashmir before debouching onto the Pakistani plains. Here, as in Mesopotamia and the Nile Valley, fertile floodplain soils played an important role in the development of state-organized society. Between June and September each year, the spring runoff from the distant mountains reaches the flat lands, inundating thousands of acres of good farming land and depositing rich flood-borne silts as a natural fertilizer on soil soft enough to be cultivated without the aid of metal artifacts.

Hundreds of village settlements flourished across the Indus valley plains by 3000 BC. Many of them were small, fortified towns with carefully laid out streets, built above the highest flood level but as close to the river as possible. The next 500 years saw irrigation canals and flood

Science

DNA and South Asian Civilization

The origins of the Indus civilization and of later South Asian society have remained a controversial mystery for generations. Recent genetic research involving a large scale study of ancient and modern Indians shows that there were two major migrations into India over the past 10,000 years. The first was a population movement from the Zagros region of southwestern Iran, a major center of early food production, that brought agriculture and herders to South Asia, estimated to have been between 7000 and 3000 BC. These newcomers mingled with the earlier inhabitants, who had arrived as part of the great spread of modern humans about 65,000 years ago. The immigrants and indigenous peoples created the Indus civilization from well-established farming and herding traditions.

In the centuries after 2000 BC, a second wave of immigrants known as the Aryans, arrived from the Eurasian steppe, probably from the region that is now Kazakhstan. Horse riders and cattle herders, also renowned warriors, they brought with them an early version of Sanskrit, an old Indo-Aryan language. This so-called Vedic Sanskrit became the classical Sanskrit of ancient India that is the major ritual language of Hinduism, and also important in Buddhism and Jainism. The mingling continued. Genetics show that between 50 and 60 percent of the genetic ancestry of most people in South Asia comes from the original inhabitants.

These findings are highly controversial for Hindu nationalists, who denounce any theory that Aryans and their culture were not the founders of Indus civilization, and that today's India resulted from a mingling of early immigrants. They are trying to rewrite school textbooks, when the new research shows that long-lasting, diverse South Asian civilization developed from varieties of heredities and histories. The genius of this civilization is that it was inclusive, not exclusive.

embankments transform the Indus valley environment into an artificial landscape. The obvious leaders for these new communities were the chieftains, traders, priests, and kin leaders, who acted as intermediaries between the people and their gods. Theirs was a philosophy that humans were part of an ordered cosmos that could be maintained by unremitting toil and a subordination of individual ambition to the common good. No one knows when this primordial philosophy developed, but it is probably as old as farming itself, always a risky undertaking in subtropical lands. By 2700 BC, the most successful leaders of larger settlements presided over hierarchies of cities, towns, and villages.

The early stages of the **Indus civilization** date to between 3200 and 2600 BC. The people lived in small villages covering only a few acres, and archaeologists have found no signs of social ranking. Their environment was like that of Mesopotamia: low-lying, hot, and with fertile soils but no metals. Thus, its inhabitants could not flourish in isolation. Long before the rise of Indus civilization in the valley, the peoples of the lowlands interacted constantly with their neighbors to the north and west, especially in the highlands of southern Baluchistan in western Pakistan. Metals, semiprecious stones, and timber came from the highlands, where people depended for their subsistence on dry agriculture and sheep herding. Over the millennia, the relationship between lowlands and highlands was fostered not only by regular exchange of foods and other commodities but also by seasonal population movements that brought enormous herds of goats and sheep down from mountain summer pastures in Baluchistan to the lowlands during the harsh winters in the west. This interaction between Baluchistan and the Indus may have been a major catalyst in the rise of complex societies in both areas, an interaction that was vital not only in the Indus Valley but in distant Mesopotamia as well.

Early Indus society was in sharp contrast to the complex, sometimes urban society that developed in the lowlands after about 2600 BC. The transition from egalitarian to ranked society was an indigenous one, with a short period of explosive growth over one or two centuries ending about 2500 BC. This contrasts dramatically with the long phase of increasing social, political, and economic complexity in Egypt and Mesopotamia.

This growth may have coincided with a major shift in Sumerian trade patterns. After 2600 BC, Mesopotamian city-states reorganized their trade in luxuries and raw materials and obtained many of their needs by sea from three foreign states—**Dilmun**, on the island of Bahrain in the Persian Gulf; **Magan**, a port farther east; and **Meluhha**, even farther away, where traders could obtain ivory, oils, furniture, gold, silver, and carnelian, among other commodities. The Sumerians exchanged these goods for wool, cloth, leather, oil, cereals, and cedarwood. Meluhha was probably the Indus valley region. In about 2350 BC, King Sargon of Agade in Mesopotamia boasted that ships from all these locations were moored at his city. There are even records of villages of Meluhhans near **Lagash** and elsewhere in Mesopotamia. This was a highly organized mercantile trade conducted by specialized merchants, a trade quite different from that of the exchange networks on the highlands far inland.

The sea trade increased the volume of Sumerian imports and exports dramatically. One shipment of 5,900 kilograms (13,000 pounds) of copper is recorded. The entire enterprise was very different from the basically noncommercial exchange systems of the Iranian plateau. The trade was under Mesopotamian control, much of it conducted through Dilmun and had a major impact on the growth of Indus civilization. Interesting, its beginnings coincide with the growth of urban centers in both Mesopotamia and the Indus Valley. However, many scholars believe overseas trade was less important than sometimes claimed and that Indus civilization was an entirely indigenous development.

Mature Indus Civilization

Mature Indus civilization developed and flourished over a vast area of just under 1.3 million square kilometers (0.5 million square miles), a region considerably larger than modern Pakistan. The Indus and Saraswati Valleys were the cultural focus of the Indus civilization, but they were only one part of a much larger, very varied civilization, whose influences and ties extended over the lowlands of Punjab and Sind, from the highlands of Baluchistan to the deserts of Rajasthan, and from the Himalayan foothills to near Bombay. The age-old relationship between highland Baluchistan and the Indus plains placed the Indus civilization within a larger cultural system, as did its maritime links with the Persian Gulf.

The Indus civilization was different from that of the predominantly urban Sumerians in Mesopotamia, covering a core area of more than 777,000 square kilometers (3,000,000 square miles). One can make an analogy with Egypt, where the Upper and Lower Nile were part of the same civilization, but administrative, cultural, and social differences always existed between the two regions. These were major regional subdivisions of the Indus civilization, linked by common symbolism and religious beliefs—the foundations of a cultural tradition that endured, albeit in modified form, for many centuries. Like the Sumerians, the Indus people adopted the city as a means of organizing and controlling their civilization. We know of at least five major Indus cities. The best known are **Harappa** and **Mohenjo-daro**. Harappa and Mohenjo-daro were built on artificial mounds above the floods at the cost of herculean efforts. Mohenjo-daro is by far the largest of the Indus cities, six times the area of Harappa, and was rebuilt at least nine times, sometimes because of disastrous inundations (Figure 11.2). Widely

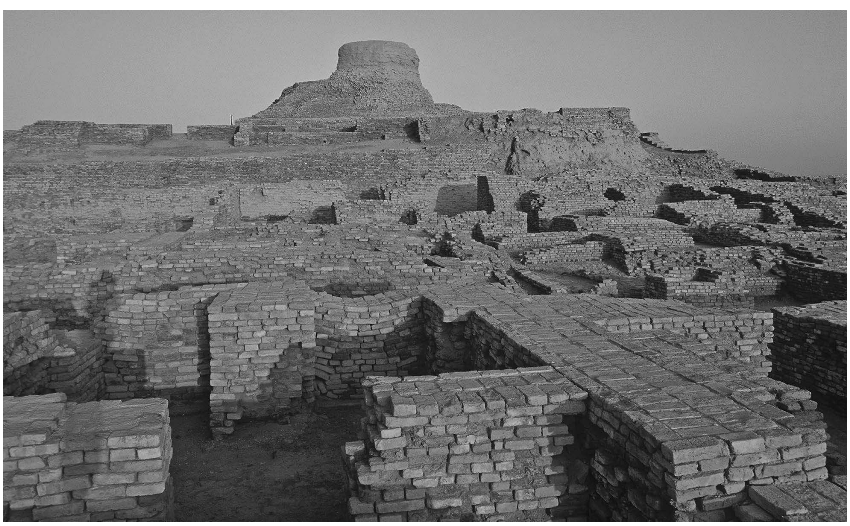


Figure 11.2 The citadel at Mohenjo-daro, with residential precincts in the foreground. (Globuss Images/Alamy)

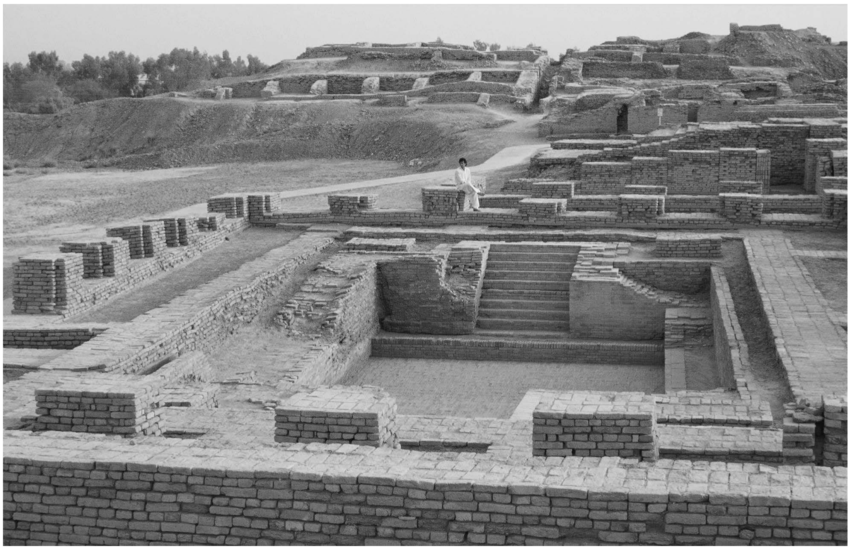


Figure 11.3 The great citadel at Harappa, Pakistan.
(Mike Goldwater/Alamy)

accepted population estimates, based on densities of modern, somewhat similar settlements, place some 35,000 to 40,000 people at Mohenjo-daro and 23,500 at Harappa. The two cities are so similar that the same architect might have designed them. A high citadel lies at the west end of each city, dominating the streets below. Here lived the rulers, protected by great fortifications and flood works (Figure 11.3). Mohenjo-daro's towering citadel rises 12 meters (40 feet) above the plain and is protected by massive flood embankments and a vast perimeter wall with towers. The public buildings on the summit include a pillared hall almost 27 meters (90 feet) square, perhaps the precinct where the rulers gave audience to petitioners and visiting officials. There are no spectacular temples or richly adorned shrines.

The rulers of each city looked down on a complex network of at least partially planned streets (Figure 11.4). The more spacious dwellings, perhaps those of the nobility and merchants, were laid out around a central courtyard where guests may have been received, where food was prepared, and where servants probably worked. Staircases and thick ground walls indicate that some houses had two or even three stories. There were also groups of single-rowed tenements or workshops at both Harappa and Mohenjo-daro where the poorest people lived, many of them presumably laborers. Some areas of Harappa and Mohenjo-daro served as bazaars, complete with shops.

We do not know the names of the rulers who controlled the major cities like Harappa and Mohenjo-daro. The anonymity of the Indus leaders extends even to their appearance (Figure 11.5). These were no bombastic rulers, boasting of their achievements on grandiose palace walls. Thus far, the evidence of archaeology reveals leadership by rulers, perhaps

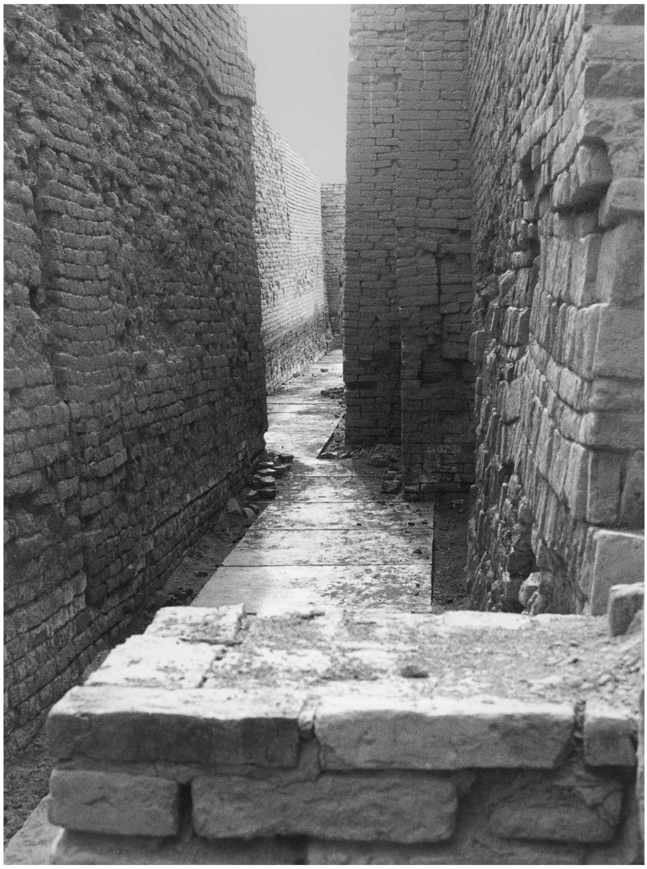


Figure 11.4 A street at Mohenjo-daro, Pakistan.
(Heritage Image Partnership/Alamy)

merchants, ritual specialists, or people who controlled key resources or large areas of land. They seem not to have led ostentatious lives; there was a complete lack of priestly pomp or lavish public display. There is nothing of the ardent militarism of the Assyrian kings or of the slavish glorification of the pharaohs.

One reason we know so little about Indus leaders is that their script still has not been deciphered. Almost 400 different pictographic symbols have been identified from their seals. Linguists do not even agree on the language in the script, but they know it is a mixture of sounds and concepts, just like Egyptian hieroglyphs. Indus seals depict gods, like a three-headed figure who sits in the yogic posture and wears a horned headdress. He is surrounded by a tiger, elephant, rhinoceros, water buffalo, and deer. Some Indus experts think the deity was a forerunner of the great god Shiva in his role of Lord of the Beasts. Many Indus seals depict cattle, which may be symbols of Shiva, who was worshiped in several forms. To judge from later beliefs, he may have had a dual role, serving as a fertility god as well as a tamer or destroyer of wild beasts. In part he

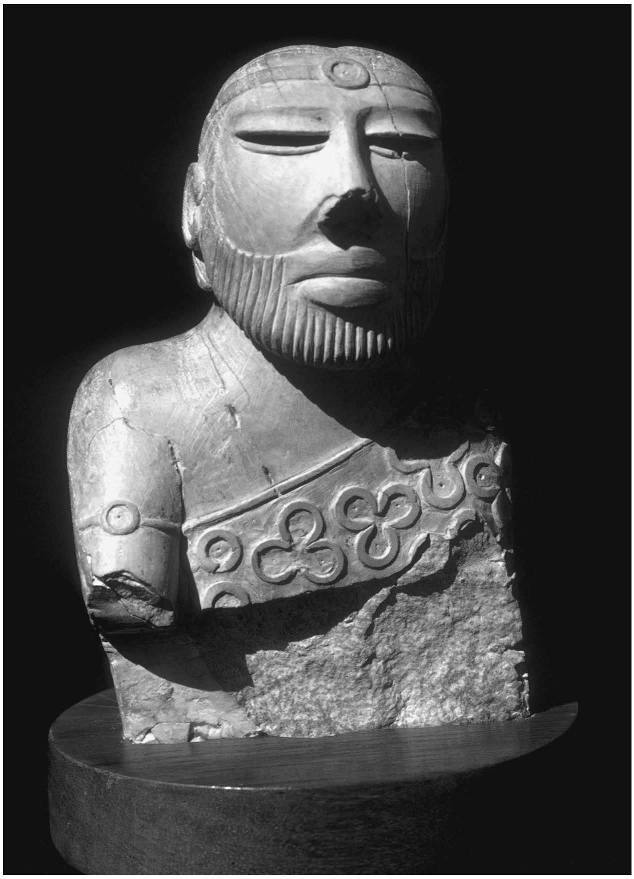


Figure 11.5 A bearded man from Mohenjo-daro.
(Robert Harding Picture Library Ltd/Alamy)

may symbolize the unpredictable dangers of flood and famine that could threaten a village or a city. If the evidence of figurines and seals is to be believed, the symbolism of early Indus religion bears remarkable similarities to that of modern Hinduism.

South Asia after the Indus Civilization (from 1700 to 180 BC)

The Indus civilization reached its peak in about 2000 BC. Three centuries later, Harappa and Mohenjo-daro were in decline and soon abandoned. Their populations dispersed into smaller settlements over an enormous area. The reasons for this change are still little understood, but may be due to a variety of factors, among them flooding along the Indus, shifts in patterns of Mesopotamian trade, and changes in subsistence farming. One fundamental cause may have been major geological disturbances near the source of the all-important Saraswati River, which caused it to dry up and some tributaries to divert to new courses, thereby catastrophically disrupting farming life along its banks. Chronic deforestation and soil erosion may also have contributed to the demise of the Indus cities.

Other changes followed soon afterward. By 1500 BC, rice cultivation had taken hold in the Ganges Basin to the east, opening up a new environment for farming where conditions were unsuitable for wheat and barley cultivation. By 800 BC, an indigenous iron technology was in full use throughout the subcontinent. Iron tools accelerated rice cultivation on the Ganges Plain. Two centuries later, 16 major kingdoms were concentrated around urban centers in the Ganges Plain.

City life in the Ganges Valley marked the beginning of the classic period of South Asian civilization. The new cities became economic power-houses and centers of great intellectual and religious ferment. Brahmanism was the dominant religion during the early first millennium, a form of Hinduism that placed great emphasis on ritual and sacrifice. But philosophers of the sixth century BC, like Buddha and Makkhali Gosala, challenged Brahmanism with revolutionary doctrines that militated against sacrifice. Buddhism, with its teachings of personal spiritual development, spread rapidly, becoming the dominant religion in the north within five centuries.

Meanwhile, outside powers eyed the fabled riches of the subcontinent. King Darius of Persia invaded the northwest in 516 BC and incorporated the Indus Valley into the Persian Empire. Two centuries later, Alexander the Great ventured to the Indus River and brought Greek culture to the area. The great ruler Chandragupta Maurya of Magadha benefited from the power vacuum following Alexander the Great's conquests and carved out the **Mauryan Empire**, which extended from Nepal and the northwest deep into the Deccan (see Figure 11.1). His grandson Asoka presided over the empire at its height between 269 and 232 BC, seeking to unify its diverse peoples by a well-defined moral and ethical code based on Buddhist principles. As the Mauryan Empire came to an end in 185 BC, South Asia had become part of a vast trading network that linked the Mediterranean world to all parts of the Indian Ocean and, indirectly, to new sources of raw materials many sea miles to the east.

The Origins of Chinese Civilization (from 2600 to 1100 BC)

In Chapter 6 we described the origins of Chinese agriculture and the gradual elaboration of local society that resulted from cereal and rice cultivation. The beginnings of Chinese civilization are still little known. Numerous small kingdoms seem to have competed for supremacy, starting as early as 4000 BC. By 3000 BC, China was a patchwork of kingdoms large and small, ruled by chieftains buried in considerable splendor. The origins of Chinese civilization in its traditional northern homeland are known only from legend. Such legends tell us that the celebrated ruler Huang Di founded civilization in the north in about 2698 BC. This legendary warlord set the tone for centuries of the repressive, harsh government that was the hallmark of early Chinese civilization. About 2200 BC, a **Xia** ruler named Yu the Great gained power through his military prowess and his knowledge of flood control, by which he could protect the valley people from catastrophic inundations. Like his successors, Yu appears to have used divination with the aid of ox shoulder blades as a way of making decisions (Figure 11.6).

What exactly do these legends mean? Who were the Xia and their successors, the Shang? In all probability they were dynasties of local rulers who achieved lasting prominence among their many neighbors after generations of bitter strife. Every chieftain lived in a walled town and enjoyed much the same level of material prosperity, but each ruler came from a different lineage and was related to his competitors by intricate and closely woven allegiances and kin ties. Each dynasty assumed political dominance in the north in turn, but for all these political changes, **Shang civilization** itself continued more or less untouched, a loosely unified confederacy of competing small kingdoms that quarreled and warred incessantly.

Figure 11.6 A Shang oracle bone used for divination by early Chinese rulers. A heated point was applied to the ox shoulder blade, which cracked. The priest then "read" the cracks and recorded the findings.
(DEA Picture Library/Getty Images)

Royal Capitals

Shang settlements are stratified on top of less complex settlements at many places in northern China, and they represent a dramatic increase in the complexity of material culture and social organization. The same trends toward increasing complexity are thought to have occurred elsewhere in China at approximately the same time, for literate states may have emerged in the south and east as well. In form they probably resembled the Shang closely, but few details of the others are known. It seems likely that the Shang Dynasty dominated from approximately 1766 to 1122 BC but that other states continued to grow at the same time. The larger area of Chinese civilization ultimately extended from the north into the middle and lower courses of the Huang Ho and Yangtze Rivers. In this account, we concentrate on northern Chinese civilization simply because more is known about the archaeology of the Shang than about any other early Chinese state.

Shang rulers lived in at least seven capitals, situated near the middle reaches of the Huang Ho River in the modern provinces of Henan, Shandong, and Anhui (see Figure 11.1). The sites of all these towns are still uncertain, but in approximately 1557 BC the Shang kings moved their capital to a place named **Ao**, which archaeologists have found under the modern industrial city of Zhengzhou, some 150 kilometers (95 miles) south of **Anyang**, close to the Huang Ho River. The diggers have found traces of a vast precinct surrounded by an earthen wall more than 9.9 meters (33 feet) high, enclosing an area of 5 square kilometers (2 square miles). It would have taken 10,000 workers laboring 330 days a year for no fewer than 18 years to erect the fortifications alone. This walled compound housed the rulers, the temples, and the nobles. The residential quarters and craft workshops lay outside the Shang walls. These include two bronze factories, one of them covering nearly a hectare.

The capital moved to the Anyang area in approximately 1400 BC, where it remained until the fall of the Shang more than 250 years later. This new royal domain was known as Yin and may have encompassed a network of compounds, palaces, villages, and cemeteries extending over an area of some 310 square kilometers (120 square miles) on the northern bank of the Huang Ho River. The core of this "capital" was near the hamlet of **Xiao-tun**, 2.4 kilometers (1.5 miles) northwest of the modern city of Anyang. Years of excavations at Xiao-tun have revealed 53 rectangular foundations of stamped earth up to 36 meters (120 feet) long, 19.5 meters (65 feet) wide, and as much as 1.5 meters (5 feet) high, many of them associated with sacrificial burials of both animals and humans. One group of 15 foundations on the north side of the excavated area supported timber houses with mud and stick walls, devoid of sacrificial victims. These are believed to be the royal residences that housed extended families of nobles living in large halls and smaller rooms closed off with doors.

Royal Burials

The Shang rulers at first buried their dead in a cemetery just more than 1.6 kilometers (1 mile) northeast of Anyang. Eleven royal graves from this cemetery were excavated during the 1930s. They were furnished on a lavish scale and date to between 1500 and 1200 BC. The best-known grave is in the shape of a cross-like pit approximately 9.9 meters (33 feet) deep with slightly sloping walls. Four ramps lead from the surface to each side of the pit. The coffin of the ruler, which was placed inside a wooden chamber erected in the burial pit, was accompanied by superb bronze vessels and shell, bone, and stone ornaments. One ceremonial halberd has an engraved jade blade set in a bronze shaft adorned with dragons and inlaid with malachite. Sacrificial victims and slaves accompanied the dead ruler, buried both in the chamber itself and on the approach ramps. Many were decapitated, so their bodies were found in one place and their heads in another.

The Shang kings surrounded their sepulchers with hundreds of lesser burials. No fewer than 1,221 small graves have been dug up nearby, many of them burials of between 2 and 11 people in a single tomb. In 1976 archaeologists uncovered nearly 200 of these graves. Most of them contained decapitated, dismembered, or mutilated bodies. Some of the victims had been bound before death. These can only have been sacrificial offerings consecrated when the kings and their relatives died.

Bronzeworking

The Shang people are justly famous for their bronzework, best known to us from ceremonial artifacts found in royal tombs. The prestigious metal was not gold, which was in short supply, but bronze. Most Shang bronzeworks are food or drinking vessels, some are weapons, a few are musical instruments, and many are chariot and horse fittings. Bronzeworking was the guarded monopoly of the rulers, a complex art the Chinese developed quite independently from the West before 2000 BC. Their smiths produced some of the most sophisticated and elegant bronze objects ever crafted (Figure 11.7). Their elaborate display pieces were copies of clay prototypes carefully sculpted around a baked clay core and encased in a segmented mold. Once the clay version was completed, the baked outer mold was removed, the model broken away from the core, and the two parts reassembled to receive the molten bronze. This complex technique remained in use for at least five centuries.

Figure 11.7 Shang ceremonial bronze.
(World History Archive/Alamy)

Shang Warriors

Every early Chinese ruler stayed in power by virtue of a strong army. Shang society was organized on what might be called military lines, so that the royal standing army could be supplemented with thousands of conscripts on very short notice. The kings frequently were at war, protecting their frontiers, suppressing rebellious rivals, or raiding for sacrificial victims. In a sense, every early Chinese state was an armed garrison that could call on armies of more than 10,000 men. The secret was a sophisticated, permanent military establishment and a kin organization through which people were obligated to serve the king when called on. The same basic organization persisted long after the fall of the Shang Dynasty in 1100 BC.

Most surviving Shang weapons come from sacrificial chariot burials such as the one excavated near Anyang in 1973. The archaeologists did not uncover the wooden chariot itself but a cast of the wooden parts preserved in the soil (Figure 11.8). They brushed away the surrounding soil with great care until they reached the hardened particles of fine sand that had replaced the wooden structure of the buried chariot. They managed to photograph not only the "ghost" of the chariot but also the skeletons of the two horses. The charioteer had been killed at the funeral and his body placed behind the vehicle. The charioteer rode on a wicker and leather car measuring between 0.9 and 1.2 meters (3 and 4 feet) across and borne on a stout axle and two

Figure 11.8 Chariot burial from the Shang royal cemetery near Anyang. The wooden parts of the chariot were excavated by following discolorations in the soil left by rotting wood. (Dorling Kindersley/Alamy)

spoked wheels with large hubs adorned with bronze caps. In all probability, the nail-free chariot was held together with sinew lashings, decorated with bronze and turquoise ornaments, and perhaps painted in bright colors.

The War Lords (from 1100 to 221 BC)

The Shang Dynasty fell in about 1100 BC at the hands of the neighboring **Zhou**. The conquerors did not create a new civilization; rather, they took over the existing network of towns and officials and incorporated them into their own state organization, thus shifting the focus of political and economic power to the south and west, away from Anyang into the fertile Wei Valley near the modern city of Xi'an. By this time, the influence of what may loosely be called Shang civilization extended far beyond the north, into the rice-growing areas of the south and along the eastern coasts. The Zhou divided their domains into various almost independent provinces, which warred with one another for centuries. Not until 221 BC did the great emperor Shihuangdi unify China into a single empire (Figure 11.9; see chapter opener; also see "The Burial Complex of Emperor Shihuangdi" box). His Han Dynasty successors traded with the Western world through the celebrated Great Silk Road across central Asia, and also with newly powerful states in Southeast Asia.

Figure 11.9 A cart, its horses, and driver fabricated in cast-bronze with silver inlay, at one-third life size. From the precincts of the tomb of emperor Shihuangdi, first emperor of China. (Huing Chung Chih/Shutterstock)

Site

The Burial Complex of Emperor Shihuangdi

King Zheng, the "Tiger of Qin," was the first sovereign emperor (Shihuangdi) of China. He became ruler of Qin at the age of 13 in 246 BC, unifying China after a series of ruthless military campaigns in 221 BC. Work may have begun on the emperor's tomb as early as 246 BC, but it intensified with unification. The emperor considered himself unique, so his sepulcher was to be the largest ever built. Later court histories write of more than 700,000 conscripts, many of them convicts, who worked on the tomb, the capital, and the royal palace.

The great burial mound measures more than 335 meters (1,100 feet) on each side and rises 43 meters (140 feet) above the surrounding countryside, 40 kilometers (25 miles) east of Xianyang on the banks of the Wei River. Inside lies what is said to be a replica of the royal domains, with China's great rivers recreated in mercury flowing, by some mechanical device, into the ocean. The constellations of the heavens appear on the ceiling of the burial chamber, the earth's geography beneath. Scale models of palaces and pavilions contain the emperor's personal possessions, while models of courtiers attend him in death. Many concubines, who were also laborers on the tomb, were sacrificed and buried inside the tumulus. While Han Dynasty historians state that the mound was looted after the fall of the Qin line, Chinese archaeologists have detected unusually high concentrations of mercury in the soil chemistry of the mound and suspect Shihuangdi's grave goods may be intact. Chinese archaeologists decline to excavate the tomb, as they say they lack the resources and skills to dig it properly and conserve the contents. The mound once lay in the middle of a large funerary park surrounded by a 6.4-kilometer (4-mile) outer wall.

In the 1970s, Chinese archaeologists excavated a regiment of terra-cotta soldiers to the side of the funerary mound—armed cavalrymen, kneeling archers, and their officers, perhaps a ceremonial guard assigned to protect the eastern side of the tomb (see chapter opener). The molded figures were finished with individual hairstyles, mustaches, and other features and were fully armed. Other finds near the tumulus include two half-scale bronze chariots and their horses, as well as underground stables, some with mangers containing horses buried alive (see Figure 11.9).

Southeast Asian Civilization (from AD 1 to 1500)

After 500 BC there are signs of major cultural and social change throughout Southeast Asia, which coincide with the introduction of iron technology between about 600 and 400 BC. The new metallurgy was grafted onto existing bronze technology. Knowledge of iron forging almost certainly came as a seaborne trade network, known as the Maritime Silk Road, linked Southeast Asia with India, China, and the Mediterranean world. Larger communities developed, usually centers for craft production. The appearance of larger settlements coincided with a sharp decline in the strength of the summer monsoon that brought much drier conditions that threatened rice production. As a reaction, Iron Age communities constructed reservoirs round their settlements and by means of irrigation and plowing, greatly magnified food production and produced much larger crop surpluses. Meanwhile, along the coast, new urban centers sprang up, where emerging leaders prospered by controlling trade, and encouraged Indian craft workers, merchants, and missionaries to settle.

Toward the end of the first millennium BC, some Southeast Asian societies were showing signs of developing into highly ranked, centralized kingdoms presided over by an aristocratic class to whom formal display, feasting, and ritual were of paramount importance. They ruled by virtue of their close relationships with their ancestors. The growing complexity of such societies came in part from the ability of their overlords to attract loyal followers, control trade, increase production, and organize labor. In time, many such rulers aspired to even greater status, presiding over far larger kingdoms carved out by force, charisma, or the creation of magnificent palaces and temples, which served as the focus for elaborate public ceremonials and prestigious displays.

These Southeast Asian kingdoms were in a constant state of political flux and without fixed boundaries. Alliances developed between neighboring rulers. Everything revolved around the principal overlord, whose ability to cement alliances and deal with potential enemies dictated his relationships with his rivals. Some experts use the Sanskrit word **mandala**, an Indian political doctrine, to describe the relationships between these rulers, whose territories are thought of as circles. It is as if they were concertinas that expanded and contracted as different kingdoms interacted with one another. Each society focused on its own center and on its own religious ruler and his retinue. The personal and spiritual qualities of each leader were important variables in a complex, ever-changing political equation.

Divine kingship revolutionized social and political organization in Southeast Asia. Kingdoms flourished in riverine and lowland areas, along the lower Mekong, and in the middle Mekong Valley, including the celebrated Tonle Sap plains, the homeland of Khmer-speaking peoples.

The Chinese called the lower Mekong region **Funan**, which meant "the port of a thousand rivers," but the term has little real historical meaning. According to Chinese records, the ports of the delta handled bronze, silver, gold, spices, and even horses brought by sea from central Asia. Chinese accounts of Funan extol its rich trade. They tell of a drainage and transport system that rapidly transformed much of the delta from barren swamps into rich agricultural land. The development of these fields took the communal efforts of hundreds of people living off the fish that teemed in the bayous of the delta. Most Funanese lived in large lake cities fortified with great earthworks and moats swarming with crocodiles. One of them, Oc Eo, was a major port city, connected to the ocean and its capital, known as Angor Borei, by a complex canal network.

The coastal region prospered greatly from the third to the sixth century AD, thanks to its long traditions of indigenous metallurgy and other crafts and trading expertise. But by the sixth century AD, the center of economic and political gravity had shifted inland to the middle Mekong and the fertile Tonle Sap, an area the Chinese called Zhenla. Competing Zhenla rulers acquired sufficient food surpluses to embark on ambitious conquests and, eventually, to develop a new political concept of divine kingship that united their far-flung domains in a common purpose: the glorification of the god-king on earth. Devotion to the Hindu creator, Siva, became a mechanism that provided divine justification for kingship, as well as a focus for the loyalty and devotion of a ruler's retinue, who would endow temples in return for royal favors. Ambitious men would try and try again to raise themselves above others and their kingdoms to supreme rule. Throughout the centuries, these were never states in the Western sense of the word. Rather, the concertina effect of kingdom politics was constantly at work, with competing polities asserting independence at times and becoming tribute givers and vassals at others.

The Angkor State (from AD 802 to 1430)

The many Zhenla overlords shared one ambition: to establish authority over as large an area as possible. The earlier kings were unable to unite Zhenla into a single kingdom or hold the kingdom together until a dynamic Khmer monarch named Jayavarman II came to power in AD 802. From his base near the Mekong River, he conquered his competitors and set up his new territories as tribute kingdoms, giving his loyal generals land grants.

Jayavarman II is said to have merged the cult of the ancestors with that of Siva in the form of a linga to consolidate his new kingdom. His subjects were taught to worship him as a god. All resources of an increasingly centralized government were devoted to the preservation of the cult of the god-king. Everyone, whether noble, high priest, or commoner, was expected to subordinate his or her ambitions to the need to perpetuate the existence of the king on earth and his identity with the god in this life and the next. This remarkable leader reigned for 45 years, the first of at least three dynasties of Khmer rulers, who often came to power after vicious fighting and presided over an ever-changing state that reached the height of its prosperity between AD 900 and 1200.

Previous monarchs had encouraged the worship of Siva in the form of the phallic image, but now Jayavarman II presented himself as the reincarnation of Siva on earth. He was the *varman*, the protector, and his priests were the instruments of practical political power. The high priests were invariably energetic, imposing nobles who presided over a highly disciplined hierarchy of religious functionaries. The ruler himself headed a bureaucracy of high-status families, which included generals and administrators who settled land disputes. The bureaucracy supervised every aspect of Khmer life, from agriculture to warfare, tax collection, and the rituals of the state religion. As always with preindustrial civilizations, a close link evolved between food surpluses and the control of the enormous labor forces needed to construct temples, reservoirs, and other public works.

The custom of building a new majestic and holy temple to house the royal linga of each king, and destined as a mausoleum when the king entered the domain of the gods, was the most important of all the religious rituals. As a result, many of the 30 monarchs who followed Jayavarman II left massive religious edifices to commemorate their reigns. These they built on artificial mounds in the center of their capitals, the hub of the Khmer universe, an area known today as Angkor. The Khmers' unique form of kingship produced, instead of an austere civilization like that of the Indus, a society that carried the cult of wealth, luxury, and divine monarchy to amazing lengths. This cult reached its apogee in the reign of Suryavarman II, who built the temple of **Angkor Wat** in the twelfth century (see "Angkor Wat, Cambodia" box).

Site

Angkor Wat, Cambodia

Four years after his succession in AD 1113, King Suryavarman II commenced building his masterpiece, an extraordinary shrine that is a spectacle of beauty, wonder, and magnificence and the largest religious building in the world. Angkor Wat (Figure 11.10) is 1,500 meters (5,000 feet) by 1,200 meters (4,000 feet) across. The central block measures 215 by 186 meters (717 by 620 feet) and rises more than 60 meters (200 feet) above the forest. It dwarfs even the largest Sumerian ziggurat and makes Mohenjo-daro's citadel look like a village shrine.

Figure 11.10 Angkor Wat, Cambodia. (f9photos/Thinkstock)

Every detail of this extraordinary building reproduces part of the heavenly world in a terrestrial mode. The Khmer believed that the world consisted of a central continent known as Jambudvipa, with the cosmic mountain, Meru, rising from its center. The gods lived at the summit of Meru, represented at Angkor Wat by the highest tower. The remaining four towers depict Meru's lesser peaks; the enclosure wall depicts the mountain at the edge of the world, and the surrounding moat depicts the ocean beyond. Angkor Wat was the culminating attempt of the Khmer to reproduce a monument to the Hindu god Vishnu, the preserver of the universe.

Angkor Wat's bas-reliefs show Suryavarman seated on a wooden throne wearing an elaborate crown and pectoral. He receives his high officials as they declare their loyalty. Next, the king progresses down a hillside on an elephant accompanied by the high priest and his generals. The court rides with him through a forest, with noble ladies in litters, everyone protected by heavily armed soldiers. Scattered throughout Angkor Wat are scenes of battles and bas-reliefs of celestial maidens. Naked to the waist, slender, and sensuous, the dancers wear skirts of rich fabric. Their flowered background, the subtle rhythm of their gestures, and their jeweled necklaces and diadems bring to light the delights of paradise promised to the king after his death. Inscriptions also spell out the terrible punishments that awaited ill-doers.

Angkor Wat was constructed using a measurement of 0.435 meters (1.43 feet), a Khmer unit of measurement known as a *hat*. The length and breadth of the central structure of the temple corresponded to 365.37 *hat*, while the axial distances of the great causeway corresponded with the four great eras of Hindu time. Someone standing in front of the western entrance on the spring equinox could see the sun rising directly over the central lotus tower. During his lifetime, Suryavarman used Angkor Wat as the place where he, as a divine monarch, communicated with the gods. When he died, his remains were placed in the central tower, so that his soul entered his divine image and made contact with the royal ancestors. Here the immortal ruler became as one with Vishnu, master of the universe.

Angkor Wat taxed the resources of the kingdom severely at a time of increased strife with neighboring powers. In 1181, another ruler, Jayavarman VII, who was a Buddhist, started building a huge new capital at **Angkor Thom** nearby. A dark and forbidding 12.8-kilometer (8-mile) wall surrounded the capital. When visitors walked inside, they entered a symbolic Hindu world with the king's funerary temple at the center. The Grand Plaza of Angkor Thom was the scene of ceremonies and contests, of vast military reviews and massed bands.

It is said that a million people once lived in or near Angkor Thom. One temple dedicated to the king's father contained no fewer than 430 images, with more than 20,000 in gold, silver, bronze, and stone in the wider precincts. An inscription in the Ta Prohm temple nearby, dedicated to the king's mother in the image of the Buddha's mother, records that 306,372 people from 13,500 villages worked for the shrine, consuming 38,000 tons of rice a year. An inscription in the nearby temple of Ta Prohm inventories a staff of 18 senior priests, 2,740 minor functionaries, 615 female dancers, and a total of 66,625 "men and women who perform the service of the gods." All this royal construction was designed to earn merit for the king and his followers. He also built fully staffed hospitals and pilgrims' shelters to gain further credit. The result of Jayavarman's building projects was a totally centripetal religious utopia in which every product, every person's labor, and every thought were directed to embellishing the hub of the universe and the kings who enjoyed it (Figure 11.11).

Figure 11.11 Ta Prohm in its current ruined state, where tree roots are uprooting the walls and exquisite sculptures.
(Mel Birch/Alamy)

The impression of prosperity and stability was illusory in a society where the ruler's power depended on the granting of favors and on his successful patronizing of the major aristocratic families. The king mediated with the gods for rain, settled disputes, and used the rich resources of the land to redistribute wealth among his subjects. He sat at the center of the circle represented by the mandala, its boundaries defined only by the loyalties of the aristocrats who ruled the outlying provinces. A Khmer king's hold on the reins of power depended on the control of the center, the Angkor, and the vital surpluses of rice to feed his followers. Thus, when the central administration was weak, the kingdom tended to break up into regional units. By the fifteenth century, Angkor was weakened by climatic conditions that involved serious droughts and occasional catastrophic monsoon rains. The collapse of the agricultural base took place as Thai military expansion in about 1430–1431 threatened security. The Khmer rulers abandoned Angkor and moved strategically east, to the banks of the Mekong. Thus, when the central administration was weak, the kingdom tended to break up into regional units. By the fifteenth century, Angkor was weakened by serious droughts and the state eventually collapsed in the face of Thai threats in about 1430–1431 (see "Climate Fluctuations and the End of Angkor" box)

Science

Climate Fluctuations and the End of Angkor

The Khmer civilization based on Angkor can be described as a "hydraulic civilization." The very existence of the great cities and the elaborate state depended on water management, management that was so elaborate that it had no rival in the ancient world. Water was far more than something that had to be controlled and managed for agriculture; it lay at the core of the ruler's power.

The Khmer water management system came into being during the twelfth century, just as Angkor Wat was constructed. An elaborate network of channels, canals, and reservoirs collected and stored water that flowed down onto the plains of Angkor from surrounding higher ground. Surplus water flowed through overflows and bypasses into the Tonle Sap Lake to the south. As the state reached the height of its powers, most water management revolved around channels that carried water to the lake. Tree-ring data from neighboring Thailand and Vietnam tell the story. During the mid to late 1300s, Angkor suffered from persistent droughts, which were followed by several years of exceptionally heavy monsoon rains. The resulting flooding was so severe that the infrastructure was overwhelmed. Computer models have shown how the flooding diverted most of the flow into large channels that were eroded rapidly. At the same time, other parts of the elaborate system received less flow and silted up. The widespread erosion and silting seriously disrupted the water management system; vital canals south of the city were choked with debris. The flooding worsened. Ultimately, efforts to control the floodwaters were unsuccessful and Angkor collapsed. Khmer engineers tried diverting water from existing river systems that created new catchments, with unforeseen environmental consequences. For generations, they had managed a system that was predictable. But the vagaries of El Niño events originating in the southwestern Pacific destabilized an overextended state and Angkor collapsed in the face of climatic stress and foreign invaders.

Late in the thirteenth century, the strategic trade routes through the Malay Straits came under Islamic control in a new chapter of international trade. Melaka became an important port and stronghold on the northern shore of the straits. The rest of the kingdoms and ports of the islands soon adopted the new religion, which preached a message of religious egalitarianism in the face of centuries of Indian statecraft based on notions of divine kingship. Within three centuries, the rulers of inland Java had adopted Islam, perhaps to maintain control over their subjects, who were welcoming the new beliefs with open arms. Islam and trade went hand in hand in island Southeast Asia until the arrival of Portuguese gun-bearing sailing ships at Melaka in 1519.

The Khmer state is a classic example of how a combination of cultural processes and able individuals can lead to the appearance of powerful yet volatile states. Yet these same states face constantly the problem of controlling not only the center but also the periphery, especially in times of weak rule and menacing competition from outside.

Summary

- State-organized societies on the Indian subcontinent developed from indigenous roots before 2700 BC.
- The Indus civilization of the lowland Indus Valley developed as the result of a major shift in Sumerian long-distance trade patterns and long-term interactions between the Indus culture of the lowlands and the Baluchistan highlands.
- Indus civilization flourished along the Indus for about 1,000 years. It was an urban society with many smaller satellite settlements, carefully planned and ruled by priest-kings who controlled both religious and economic life.
- After 1700 BC, the major cities went into decline, but Indus civilization flourished in rural settings for a considerable time. The center of economic and political gravity moved eastward to the Ganges River valley, culminating in the Mauryan Empire of the first millennium BC.
- Early Chinese civilization emerged independently of state-organized societies in the west. The Shang civilization of the Huang Ho Valley is the best-known early Chinese state, flourishing from 1766 to 1122 BC. It was probably the dominant state among several throughout northern China.
- Shang society was organized along class lines, with the rulers and nobles living in segregated precincts, whereas the mass of the people was scattered in townships and villages in the surrounding countryside.
- Shang civilization ended with the overthrow of the Shang Dynasty by Zhou rulers, who reigned over a wide area of northern China from 1122 to 221 BC. China was unified under emperor Shihuangdi in that year.
- The process of forming Southeast Asian states began around the same time, but the first historical records of complex states date to the third century AD.
- Many such states developed in and around the central Mekong Valley and later the central Cambodian basin. There, after AD 802, flourished the flamboyant Khmer civilization, a society based on divine kingship and strong notions of conformity.
- After six centuries of spectacular development, the Khmer civilization came in contact with expanding Islamic trade networks and new religious doctrines at a time of drought and political unrest.

Further Reading

Andrew Robinson, *The Indus: Lost Civilizations* (London: Reaktion Books, 2015) is an admirable summary of the Indus civilization and its mysterious script. See also Rita Wright, *The Ancient Indus* (Cambridge: Cambridge University Press, 2009). Raymond Allchin's *The Archaeology of Historic South Asia* (Cambridge, England: Cambridge University Press, 1995) covers the Mauryan and later societies. Li Liu and Xingcan Chen, *The Archaeology of China* (Cambridge: Cambridge University Press, 2012) is an up-to-date, comprehensive synthesis. See also Li Liu, *State Formation in Early China* (London: Duckworth, 2003). For Southeast Asia generally, see Charles Higham, *Early Cultures of Mainland Southeast Asia* (London and New York: Thames and Hudson, 2002); also see Charles Higham and Rachanie Thosarat's *Prehistoric Thailand* (Bangkok: River Books, 1998), which describes recent excavations. Charles Higham, *The Civilization of Angkor* (Berkeley: University of California Press, 2000) is an excellent summary of this important state.

Part V

Preindustrial States in the Americas

Introduction: Mesoamerican and Andean States

- The development of preindustrial states in the Americas,
- Ancient Mesoamerican civilizations,
- Complex societies in the Andes.

The last three chapters of *World Prehistory* are devoted to the complex and volatile civilizations, which developed in Mesoamerica (that part of Central America where civilizations developed) and the Andes region of South America. We begin in Mesoamerica, starting in the hot and humid lowlands encompassing the Gulf Coast and Yucatán. Every community depended on others for foods and raw materials. Large and small chiefdoms developed over a wide area between about 2000 and 1000 BC. The Olmec was one such cultural tradition along the Gulf Coast and further afield in fertile tropical environments. Elite families assumed power, based on centers like La Venta and San Lorenzo. New ideas of kingship, involving shaman-like rulers, came into being. Some of these chiefly dynasties survived for more than a thousand years.

Ancient Maya civilization had deep roots in earlier farming societies that were flourishing before 1000 BC. Over the next 700 years, some early (Preclassic) Maya centers such as El Mirador in Guatemala rose to prominence ruled by lords who acted out roles as living gods. Water supplies and uncertain rainfall were among the factors that led to a volatile political landscape that pitted lord against lord in a complex jigsaw of competing city-states. Classic Maya civilization flourished between AD 300 and 900, with its elaborate written script and brilliant water management and ingenious farming methods that resulted in a highly productive civilization made up of smaller city-states, a reflection of the fragile environment. Population densities skyrocketed. Perhaps 8 to 10 million people lived in the lowlands after AD 600. At the end of the eighth century, the great centers like Tikal, Uaxactun, and Copán in the southern lowlands were abandoned in an event known as the Classic Maya collapse, due to a complex mix of ecological, political, and social factors. Nevertheless, Maya civilization continued to flourish in the northern Yucatan until the Spanish arrival in the early sixteenth century.

The foundations of highland Mesoamerican civilization developed in the Valleys of Oaxaca and the Valley of Mexico. In both locations, rural communities surrounded at least four centers ruled by an elite by 400 BC. The people thought of their leaders as intermediaries between the living and the ancestors, between the living and spiritual worlds. An elaborate calendar and soon writing regulated ceremonial and daily life. The same pattern of civilization flourished in highland Mesoamerica for 2,000 years. Between 300 and 100 BC, Zapotec rulers laid out an imposing center atop a flattened hilltop at Monte Albán. The city with its great plaza reached the height of its power after 200 BC, coexisting peacefully with the expanding state centered on Teotihuacán in the Valley of Mexico to the north.

Teotihuacán developed out of earlier chiefdoms around 200 BC and grew rapidly as village communities resettled in the growing city. At least 80,000 people lived there in AD 100, rising eventually to about 150,000 in AD 750. Teotihuacán was a vast city laid out on a grid pattern, dominated by the Pyramid of the Sun and Moon and anchored by the wide Street of the Dead. A huge, square enclosure known as the Ciudadela and anchored by the temple of the Feathered Serpent god Quetzalcoatl lay at the city center. Teotihuacán was an intensely sacred place, thought to be the center of the world where the gods created civilization. At its peak, the city covered at least 21 square kilometers (8 square miles), its power derived from trade, conquest, and a powerful religious ideology. The city collapsed suddenly in about AD 750, for reasons which remain a mystery.

The ensuing political vacuum was filled by the rulers of other highland cities, with the Toltec achieving some dominance between 650 and 1200. By AD 900, the capital, Tula was a city of about 40,000 inhabitants, the state becoming very militaristic, its domains, which covered much of Central Mexico. The Toltec state fell apart in about 1200 for unknown reasons, perhaps connected with persistent drought. Into the vacuum stepped an obscure group, the Aztecs, who were fierce and ruthless warriors. They founded their capital, Tenochtitlán in about 1325 and forged a vast empire that ruled some 5 million people through conquest and tribute payments. Tenochtitlán became a spectacular metropolis with an imposing central precinct dominated by temples of the sun god Huitzilopochtli and the rain god Tlaloc. Several Aztec rulers were astute politicians and great conquerors. They presided over a centralized state stratified into the elite, commoners, and slaves, maintained standing armies, and conducted elaborate public ceremonies that included human sacrifice.

Tenochtitlán was the symbolic center of the Aztec universe, its empire a mosaic of ever-changing alliances. The Aztec Empire was at its height when Hernán Cortés and his conquistadors landed on the Gulf Coast and captured the great city after a bloody siege. Aztec warriors with their simple weapons and crude tactics were no match for firearms, war dogs, horses, and iron weapons. Tens of thousands of people perished during the ten-year conquest of what became known as New Spain, both from warfare and also from smallpox and other exotic diseases brought by the conquerors.

Two centers of Andean civilization developed far to the south, one along the Peruvian coast, the other in the south-central Andes around Lake Titicaca. In these contrasting environments, a remarkable diversity of states developed, in part because of enduring religious beliefs, and also from constant interactions between coast and highlands. Everything culminated in the vast Inca Empire, known as Tawantinsuyu, "the Land of the Four Quarters" that linked the arid coastal deserts with the high Andes.

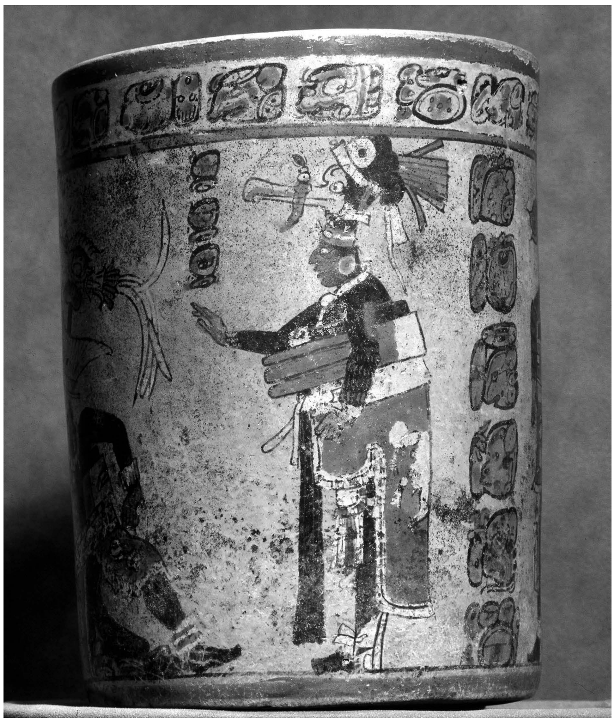
Peru's North Coast is among the driest environments on earth, with most water coming from mountain runoff down the rivers that bisect the desert. Initial settlement lay along the Pacific, for rich anchovy fisheries flourished close inshore. By 2600 BC, a large kingdom ruled by a center named Caral in the Supe Valley combined anchovy fishing with local crops including beans and peppers and trading cotton grown in the river valleys. Over the centuries, other kingdoms developed, among them centers with U-shaped layouts. This change may have coincided with the development of irrigation agriculture and maize farming. In the Andes foothills, a major ceremonial center at Chavín de Huantár brought religious ideas from both the coast and Amazon forests into flamboyant religious beliefs that spread over a wide area after AD 900.

On the coast itself, a series of kingdoms developed in coastal river valleys and traded with one another, also with the highlands, where fish meal was much in demand. People moved inland, as irrigation agriculture produced bountiful crops of maize, cotton, and many lesser crops such as beans. The Moche state emerged in by AD 100 and flourished for 700 years, ruled by powerful warrior priests, known from spectacular graves from the Sipán Valley dating to about AD 400. Moche artisans were expert metalworkers and potters, famous for their portraits of prominent individuals. Great centers and temples rose in the valleys, but Moche civilization was plagued not only by drought but also by major El Niños, which brought heavy rains that destroyed irrigation works and temporarily decimated the anchovy fisheries. These events, and a major earthquake, may have played a role in the collapse of the Moche state by about AD 700.

Moche was followed by Sicán and Chimu, the latter a powerful state that developed sophisticated water management systems. But the center of political power moved to the highlands over the centuries, where the wealthiest districts lay in the flat lands surrounding Lake Titicaca. From these roots emerged Tiwanaku, an economic and religious center that flourished between AD 450 and 1200, when it inexplicably collapsed. Into the ensuing political vacuum stepped an obscure group, the Inca, who were subsistence farmers around Cuzco in the Central Andes. Their leaders became expert conquerors and politicians, among a brilliant leader, Pachakuti, who became their ruler in 1438. He and his henchmen forged Tawantinsuyu, a vast empire that extended from highlands to lowlands, as far north as Ecuador. His successors presided over their domains a combination of close administration and force. Inevitably beset by political unrest and civil war, Tawantinsuyu collapsed in the face of Spanish conquistador Francisco Pizarro and his rapacious followers, who landed in Peru in 1532.

Chapter 12

Lowland Mesoamerica



A Maya ballplayer with his headdress, black body paint and elaborate padding, ready for competition.
(Heritage Image Partnership Ltd/Alamy)

Chapter Outline

Prologue

By any standards, John Lloyd Stephens, New York-lawyer-turned-traveler, was a remarkable man. In 1839, he and Scottish artist Frederick Catherwood journeyed deep into the Mesoamerican rain forest, following rumors of vanished civilizations and great ruins masked by primordial jungle. They came first to the tiny modern village of Copán, where "around them lay the dark outlines of ruins shrouded by the brooding forest. The only sound that disturbed the quiet of this buried city was the noise of monkeys moving around among the tops of the trees" (Stephens, 1841, p. 48). While Catherwood drew the intricate hieroglyphs he had found on the Maya stelae, Stephens tried to buy the ancient city of Copán for fifty dollars so that he could transport it block by block to New York. The deal fell through when he found he could not float the antiquities downstream. Stephens and Catherwood visited Palenque, Uxmal, Chichén Itzá, and other sites. They were the first to recognize the Maya as the builders of these great sites: "These cities… are not the works of people who have passed away… but of the same great race… which still clings around their ruins," Stephens wrote (1841, p. 222). All subsequent research into the Maya and into ancient Mesoamerican civilization has been based on his work.

Intricate calendars, great ceremonial centers and superb architecture, mysterious glyphs and spectacular shamanistic rituals—the colorful **Maya civilization** fascinates archaeologist and layperson alike. Exotic and, until recently, little understood, the Maya epitomize the ancient traditions of civilization in Central America. A search for their origins takes us back nearly four millennia to the village farming communities that flourished in Mesoamerica when Egyptian civilization was at its height and the Shang state dominated northern China. This chapter describes the origins and growth of Maya and other lowland civilizations in Central America. Chapter 13 surveys the peoples of the highlands, who interacted constantly with their lowland neighbors.

Beginnings: Preclassic Peoples in the Lowlands (2000 BC to AD 300)

Two great mountain chains form the backbones of highland Mesoamerica, running down the coastlines until they reach the east-west volcanic chain that forms the Mesa Central, the central plateau (Figure 12.1). The inland basin of the Valley of Mexico with its five lakes forms the heart of the plateau, for thousands of years the center of political and economic life in highland Mesoamerica. The highland regions of southern Mesoamerica are mountainous, with the highland plateau of Oaxaca offering some of the rare flat terrain in the region. Even further south, great mountain

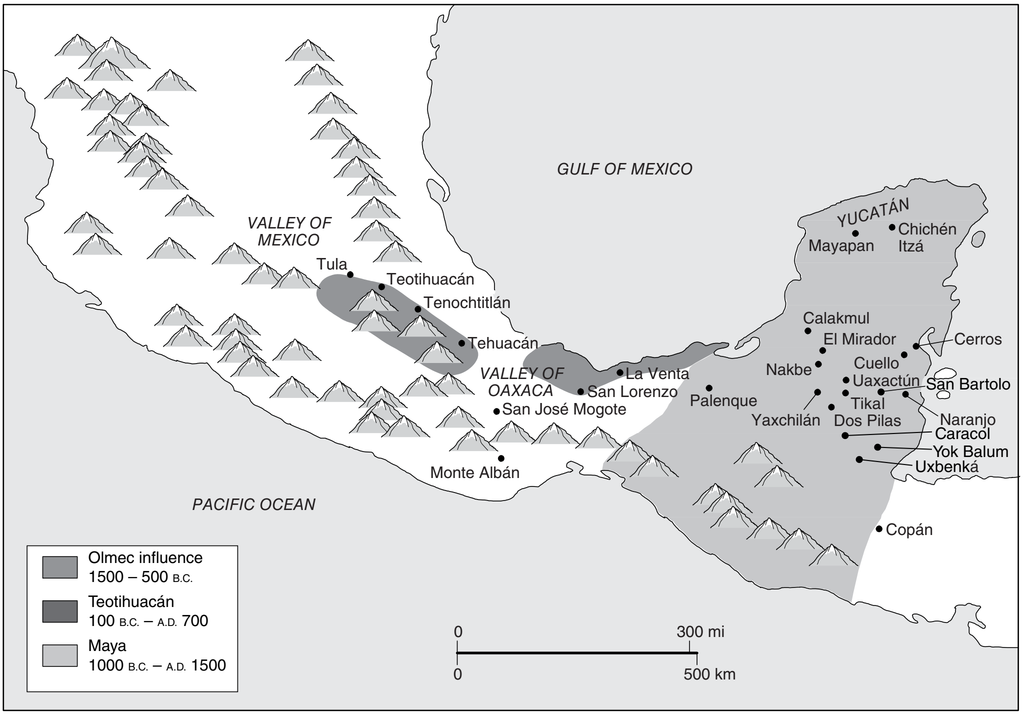


Figure 12.1 Map showing sites in this chapter and the next chapter.

ranges enclose the highland plateau where modern Guatemala City lies. The peoples of the Basin of Mexico and the southern highlands enjoyed a cool climate with most rainfall falling between June and November, sufficient to allow a single crop a year. The more southerly plateaus were still fertile, but warmer.

To the east and north, the serried mountains of the highlands give way to the low-lying limestone peninsula of the Yucatán, the so-called Maya lowlands. Highland climatic conditions contrast dramatically with those in the lowlands, where conditions are hot and humid throughout the year. The southern two-thirds of the Yucatán make up the Petén, hilly limestone formations covered with dense tropical forest intersected with lakes and swamps. The limestone plains of the northern Yucatán are much drier, with a drainage pattern based on underground water channels. The shores of the Gulf of Mexico are low-lying and hot: the low coastal plains of Veracruz and Tabasco, the Yucatán Peninsula, and the heavily forested coastal strip along the Gulf of Honduras.

By 2000 BC, sedentary villages were common throughout Mesoamerica, dispersed in small communities across highly diverse agricultural environments in both lowlands and highlands. The variations in the Mesoamerican environment with its widely distributed food resources and raw materials made everyone dependent on their neighbors, on communities living in very different surroundings. From the earliest times, barter networks linked village to village and lowland groups to people living on the semi-arid highlands or in the Basin of Mexico. The same exchange networks also spread compelling ideologies, which were to form the symbolic foundation of ancient Mesoamerican civilization. Therein lies a crux of Mesoamerican civilization: the constant interactions and exchanges of both commodities and ideas between people living in dramatically contrasting environments, often within only a few hundred kilometers of one another.

The first signs of political and social complexity appear in many parts of highland and lowland Mesoamerica between about 2000 and 1000 BC, during the so-called **Preclassic**, or Formative, Era. In many regions, small but often powerful chiefdoms headed by a chief and a small nobility appeared. A similar pattern of greater social and political complexity appeared in Mesopotamia, Egypt, China, and other areas where early state-organized societies evolved. In Mesoamerica, as elsewhere, the new social complexity can be identified by differences in house designs, by the appearance of small shrines, and through prestigious trade goods such as fish spines and seashells from the Gulf Coast used in bloodletting and other religious ceremonies. Here, as in other areas, control of trade in exotic, prestigious objects and knowledge of distant lands were vital to the ideology of chiefdoms. Such objects, and the ideology associated with them, symbolized and legitimized the authority of leaders to control both human and natural resources.

There was no one region where this emerging sociopolitical complexity occurred first. Rather, it was a development that took hold more or less simultaneously in many regions of Mesoamerica, not in isolation, but with each region interacting with others. The most famous of these early societies was the Olmec.

The Olmec (from 1500 to 500 BC)

The **Olmec** occupied a revered place in the legend and lore of later Mesoamerican civilizations. Maya priests recognized the great cultural legacy they owed to these little-known ancestral Mesoamericans. Earlier scholars thought in terms of a "mother civilization," of an Olmec state that was the ancestor of all later Mesoamerican civilizations. Today, we know that Olmec was a series of chiefdoms along the Gulf Coast of Veracruz and Tabasco, which may have exercised some influence over adjacent areas of Chiapas and central Mexico in early Preclassic times. Olmec society flourished during a period when art motifs, religious symbols, and ritual beliefs were shared between developing chiefdoms in many regions as a result of regular contacts between the leaders of widely separated communities and through day-to-day trade. Olmec art and artifacts have been found over an area 20 times that of the Gulf Coast heartland. Olmec-like artifacts have come from Cuello in the Maya lowlands, and with pre-Maya burials under the city of Copán. Archaeologist Arthur Demarest has called this phenomenon a "lattice of interaction" over many centuries that produced the complex and sophisticated traditions of Mesoamerican civilization that developed in later centuries.

Olmec peoples lived along the Mexican southern Gulf Coast from about 1500 to 500 BC. Their homeland was low-lying, tropical, and humid, with fertile soils. The swamps, lakes, and rivers were rich in fish, birds, and other animals, creatures that formed an important part of a new and remarkably sophisticated art style that was to leave a permanent imprint on Mesoamerican life. The origins of the Olmec are a complete mystery, but their culture undoubtedly had strong local roots.

Some of the earliest Olmec settlement comes from a platform at **San Lorenzo**, in the midst of frequently inundated woodland plains. The first village occupation shows few distinctive Olmec traits, but by 1250 BC the people of San Lorenzo were farming both dry gardens and fields located on river levees, which produced exceptional crop yields. Soon, San Lorenzo's leaders were erecting ridges and earthen mounds around their platforms, on which they built pyramids and possibly ball courts. A century later, magnificent monumental carvings adorned San Lorenzo, apparently portraits of rulers that the Olmec themselves often mutilated, perhaps when the rulers died (Figure 12.2). The people of San Lorenzo traded obsidian and semiprecious stones with many parts of Mesoamerica until their center fell into decline after 900 BC and was superseded by La Venta, the most famous Olmec site, nearer the Gulf of Mexico.

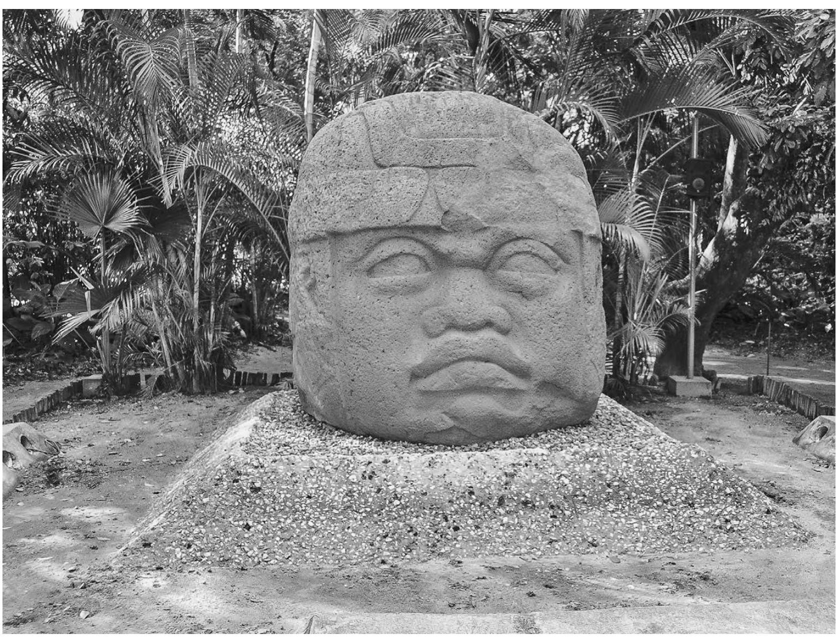


Figure 12.2 Colossal Olmec head from San Lorenzo.
(Jejim/Thinkstock)

Was Olmec society a large, homogeneous state or a series of smaller kingdoms linked together by king, religion, and trading connections? Current opinion favors the second alternative, where large kin groups originally owned village land. Over many generations, certain families probably acquired control of the most fertile lands and prime fishing and waterfowl hunting preserves. They became the dominant elite in Olmec society. To give symbolic and ritual expression to their newfound power, the new elite built awe-inspiring artificial mountains and strategically placed open spaces designed to give an impression of overwhelming power. It was here that the rulers performed carefully staged public rituals and displays designed to confirm supreme authority. Those who ruled over these settings adorned their precincts with colossal statues of themselves.

Nowhere are these buildings and sculptures more spectacular than at **La Venta**, built on a small island in the middle of a swamp. A rectangular earthen mound 120 meters long by 70 meters wide and 32 meters high (393 by 229 by 105 feet) dominates the island. Long, low mounds surround a rectangular plaza in front of the large mound, faced by walls and terraced mounds at the other end of the plaza. Vast monumental stone sculptures litter the site, including Olmec heads bearing expressions of contempt and savagery (see Figure 12.2), perhaps portraits of actual rulers.

Throne-like blocks depict a seated figure, perhaps a ruler, emerging from a deep niche carved into stone (Figure 12.3). The sides bear stylized depictions of jaguars, perhaps symbolizing the mythic origins of the rulers among such animals. For about 400 years, La Venta people traded ceremonial jade and serpentine from as far away as Costa Rica, during a time when Olmec ideas of kingship and religious ideology spread far across the lowlands and highlands. Then, sometime around 400 BC, La Venta was destroyed, its finest monuments intentionally defaced.

One of the most important institutions to come into being in Olmec society was kingship, known to us only from distinctive art styles centered on a mysterious half-jaguar, half-human figure. Olmec lords may have grafted the ancient ideology of the jaguar onto an emerging institution of kingship, where the ruler was a shaman-king with awesome supernatural powers. The Olmec rain god may have been a half-human, half-animal figure with snarling jaguar teeth, but it was only one of many combinations of mythical beasts that came from the hallucinogenic mind as opposed to the forest itself. Olmec artists grafted eagles' feathers and claws onto serpents and other beasts to form mythical creatures, perhaps one of them the feathered serpent Quetzalcoatl, the most enduring of all Mesoamerican deities and central to highland civilization for many centuries. By the time the classic Mesoamerican civilizations of highlands and lowlands arose, dynasties of lords had been ruling Mesoamerica along well-established lines for nearly 1,000 years.

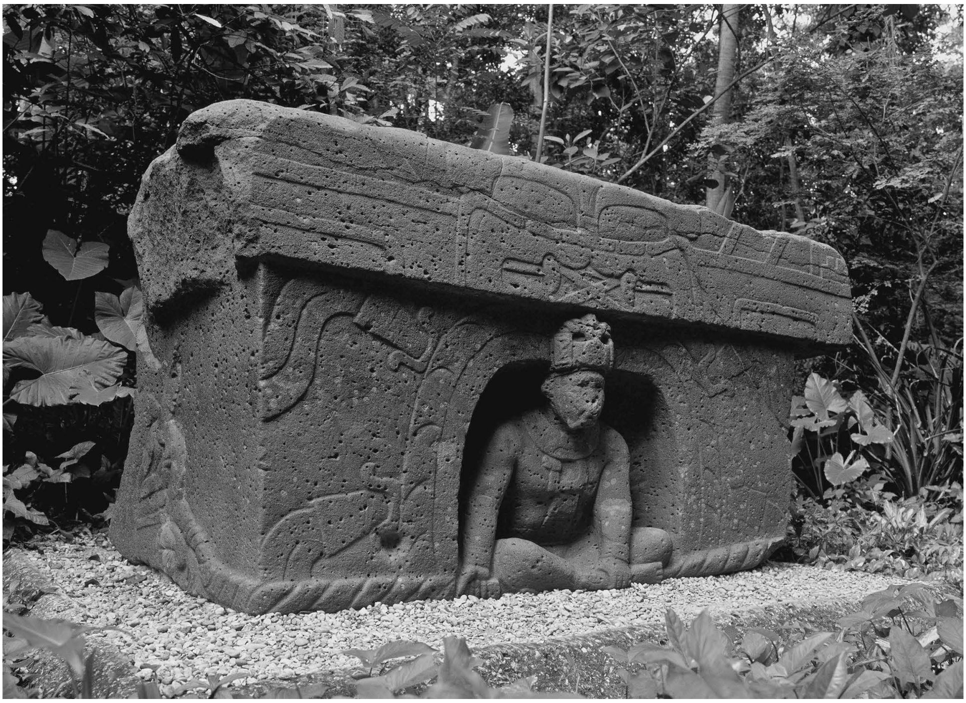


Figure 12.3 An Olmec altar at La Venta depicts a lord sitting below a schematic jaguar pelt. He emerges from a niche or cave holding a rope that binds prisoners carved on either side of the throne.
(JTB MEDIA CREATION LTD/Alamy)

The Origins of Maya Civilization (before 1000 BC to AD 300)

The roots of ancient Maya civilization lie in much earlier cultural traditions in the Mesoamerican lowlands. Archaeologist Norman Hammond was able to trace the roots of Maya culture back to the second millennium BC, at the Cuello site in northern Belize. **Cuello** is a small Maya ceremonial center, today comprising an acre-square, 3.6-meter (12-foot)-high platform with a low pyramid. Hammond excavated layer after layer of occupation, until he excavated a pole-framed, palm-thatched house set on a lime-plaster platform dating to about 1000 BC. The Cuello people maintained the same basic plaza layout for many centuries, making it larger and larger until about 400 BC. At this point, the villagers converted their ceremonial precinct with its wood and thatch temples into a large public arena. They filled the square with rubble to create a raised platform covering more than a hectare. Hammond unearthed the fragmentary skeletons of more than 30 sacrificial victims in the rubble, some with hacked-off skulls and limbs, others sitting in a circle around two young men. Recent research has shown that some of the captives were foreigners. Six carved bone tubes buried with the victims bore the interlacing woven-mat motif symbolic of later Maya kingship. Such mats were royal thrones. The appearance of the motif here may document the appearance of a Maya elite by 400 BC.

San Bartolo, Nakbé, and El Mirador (ca. 1000 to 300 BC)

Preclassic life was much more complex than originally thought, as witnessed by a series of remarkable discoveries of important Maya centers dating to before the emergence of Classic Maya civilization about 2,000 years ago.

The **San Bartolo** site in Guatemala was occupied between 400 and 200 BC, a little-known location marked by a small pyramid where wall paintings unexpectedly came to light on rooms inside it. Mayanists William Saturno and Boris Beltrán tunneled into the pyramid in 2005 and found a room richly decorated with polychrome murals (see "Maya Paintings at San Bartolo, Guatemala" box). Although epigraphers cannot yet read the hieroglyphs in the room, they are certainly evidence that Maya society was literate 2,500 years ago, long before once believed.

Some Preclassic sites in Guatemala's Petén achieved considerable size and importance. **Nakbé** lies about 350 kilometers (215 miles) from Guatemala City, and 13.6 kilometers (8.5 miles) from the early Maya city at **El Mirador**, which covers 15.5 square kilometers (6 square miles). The two settlements were once linked by a causeway, but smaller Nakbé was occupied much earlier, by about 1000 BC. Between 650 and 450 BC, Nakbé's leaders built huge platforms over their earlier ceremonial structures, raising pyramids with blank façades atop them. The pyramids themselves were crowned with three small temples clustered at the top of a steep stairway bounded with panels and masks. Nakbé's temple façades reflect the emerging notion of *Ch'ul Ahau*, divine kingship, in Maya society. In lavish public ceremonies, important lords donned the masks of gods, symbolizing their role as living gods. Nakbé reached the height of its powers around 300 BC, but subsided into complete political and economic obscurity within a few generations as its neighbor, El Mirador, rose to prominence during a period of ample rainfall (for climate change, see the box "Climate Change and Maya Civilization").

Site

Maya Paintings at San Bartolo, Guatemala

William Saturno was thirsty and tired. He crawled into a shady looter's trench at San Bartolo, a small and remote Preclassic Maya center in Guatemala's Petén. The vandals had exposed part of a room covered by later construction. The one visible wall bore a colored mural, preserved because it was covered with mud and the room sealed off.

Figure 12.4 The maize god appears in a Preclassic mural at San Bartolo, Guatemala. (Kenneth Garrett/National Geographic Creative)

Careful recording uncovered nine mythological figures, the principal among them the bejeweled maize god, whose head replicates the foliation of the corn plant (Figure 12.4). His arms are outstretched as he turns his head and looks at the woman kneeling behind him, who also has her hands upraised. Another female figure with black hair seems to float above her. A kneeling man is in front of the maize god, while other figures seem to form a procession. This narrative of the Maya creation legend is the earliest known, although familiar from the mythological art of much later centuries. Accelerator mass spectrometry (AMS) radiocarbon dates for the paintings give readings between 400 and 200 BC, making the San Bartolo paintings the earliest Maya wall art known. A line of ten hieroglyphs painted in black forms part of the mural. So far, the experts have been unable to read them, even with their knowledge of later Maya writing, but at least one of the glyphs is thought to be a symbol of kingship.

San Bartolo is a Sistine Chapel of early Maya art, which extends back the origins of a civilization with an elaborate art tradition, writing, and religious beliefs. The distinctive cultural traditions of the Maya were developing rapidly as early as 400 BC, much earlier than once believed.

Between 150 and 50 BC, El Mirador grew to cover 15.5 square kilometers (6 square miles) of low, undulating terrain, part of which flooded during the wet season. El Mirador was a maze of pyramids and plazas, with more than 200 imposing structures including causeways, temples,

Figure 12.5 The challenges of Maya archaeology. An aerial view of the overgrown Danta pyramid at El Mirador, Guatemala.
(Al Argueta/Alamy)

and lords' dwellings. The city lies in a depressed zone, where water could be trapped for later use during the dry season. By this time, the Maya were also building large reservoirs for water storage. This careful management reflected a society that was well aware of the need to plan for drought years. The strategy seems to have worked, for Maya civilization developed rapidly into a complex mosaic of city-states.

Brigham Young University archaeologists have uncovered at least 200 buildings at El Mirador, including a great complex of pyramids, temples, and plazas. The Danta pyramid at the eastern end of the site rises from a natural hill more than 70 meters (210 feet) high. A little more than 2 kilometers (1 mile) west rises the Tigre complex, a pyramid 55 meters (182 feet) high surrounded by a plaza and smaller buildings (Figure 12.5). El Mirador is yielding some of the earliest examples of Maya writing, inscribed on potsherds and occasionally on stucco sculpture. A raised road connected El Mirador with another important Preclassic center, **Calakmul**, 38 kilometers (24 miles) to the northeast. This stupendous and still little-known city collapsed suddenly in the early Christian era. The dynamics of its collapse are little understood, but are mirrored at other Preclassic Maya communities where the institution of kingship rose and was then abandoned.

Kingship and Glyphs

Kingship was at the heart of lowland Maya civilization. Maya rulers linked their actions to those of the gods and ancestors, sometimes legitimizing

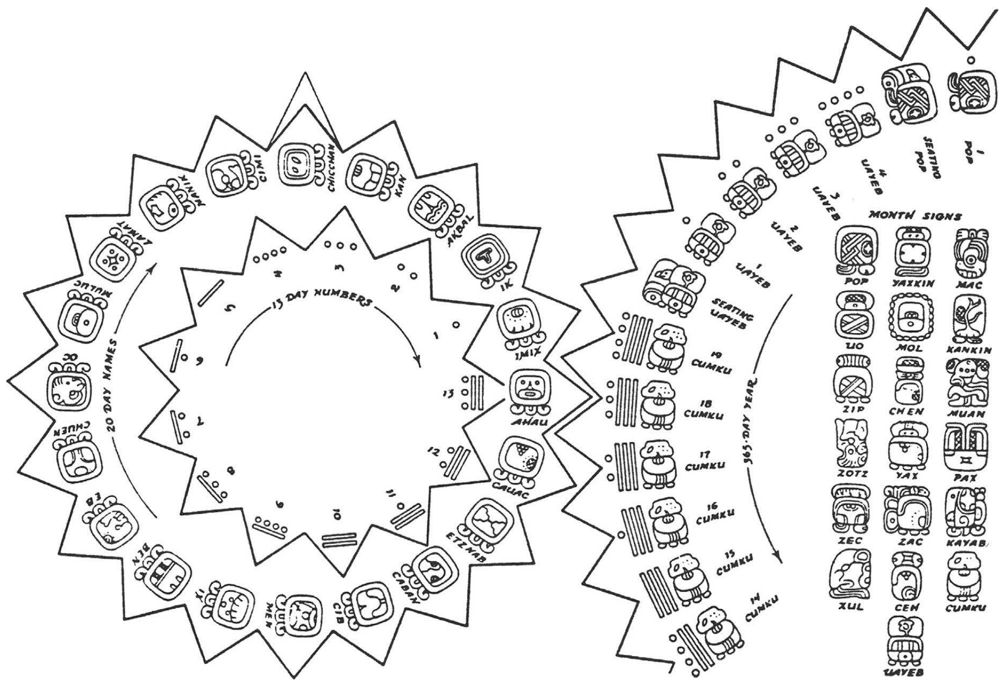


Figure 12.6 The Maya calendar, showing the two interlocking cycles. The left-hand wheel is the 260-day *tzolkin*, the sacred calendar with 13 numbers (inner wheel) and 20 day names (outer wheel). The right-hand wheel is the *haab*, the secular cycle, with 18 months of 20 days each.

their descent by claiming it reenacted mythical events. In a real sense, Maya history was linked to the present, to the Otherworld, and to the legendary Olmec of the remote past. Society was embedded in a matrix of sacred space and time.

Maya kingship unfolded within an intensely sacred setting, artificial landscapes where complex ceremonies took place throughout the year and on longer cycles of time. Thus, the calendar was vital to Maya life, for the complicated geography of sacred time was just as important as that of space for determining political strategies and social moves (Figure 12.6). At the heart of Maya life lay both the calendar and the elaborate hieroglyphic script used, among other things, to calculate the passage of time and regular religious observances.

Maya Script

The Maya inherited a long tradition of hieroglyphic writing from earlier times. Some Mesoamerican societies like the Olmec developed written scripts as early as 900 BC, but we know little of them.

The decipherment of Maya script ranks among the greatest scientific achievements of the twentieth century. For generations, most Mayanists assumed that the intricate glyphs were used to record the calendar and that the ancient Maya lords were peaceful astronomer-priests. But in 1952, Russian epigrapher Yuri Knosorov demonstrated that Maya script was a phonetic and syllabic hieroglyphic script, just like Egyptian writing. Twenty years later, a group of scholars succeeded in assembling the dynastic histories of Maya lords at several important centers like **Palenque** and **Tikal**. More than 20 years of rapid-fire, intensive teamwork have since resulted in the decipherment of much Classic Maya script, although many difficulties await resolution.

Unlike Egyptian or Sumerian script, the Maya archive is limited in scope and confined to inscriptions on clay pots, monumental inscriptions on buildings and stelae, and only four codices (deer-skin documents) that survived the Spanish conquest. These are public statements of royal accessions, triumphant military campaigns, and important ceremonies. They are the political propaganda of Maya lords, the "politically correct" literature of a nobility intent on justifying their deeds and their ancestry. Of the everyday literature of the Maya we know nothing. But the surviving texts tell us Maya rulers were not peaceful astronomers, but bloodthirsty lords presiding over a patchwork of competing city-states. Decipherment has revealed Maya civilization as a constantly shifting quicksand of diplomatic marriages, political alliances, and brutal conquests. The account of Maya civilization that follows is based on both archaeology and deciphered glyphs.

Political Cycles

Archaeologist Joyce Marcus has observed a remarkable similarity in the ways in which Mesoamerican states rose, reached their peak, then collapsed. She notes a consistent scenario in both the lowlands and highlands, not only in Maya civilization, but with the great city of Teotihuacán and also Toltec and Aztec civilizations in the highlands (see Chapter 13).

This scenario unfolds as follows: first, a new city-state, say Maya Tikal or Teotihuacán, expands its territory through diplomacy, political marriages, and military conquest. The new state would reach its maximum territorial limits early in its history. Then, once some provinces reached a significant level of cultural complexity and development, they would break away from their nominal master and become an independent polity. Far from being weakened, the core state still prospered, investing its energy and resources in its own local area rather than in expansion. But sometimes the old provinces, now independent states, would ally themselves against their old overlord and conquer it, so the old state became a second center. This cycle of rise, expansion on the margins, fission, then decline at the expense of others repeated itself again and again, to the point that it can be considered a consistent pattern of Mesoamerican civilization. Marcus's scenario is well documented in Maya political history.

Classic Maya Civilization (from AD 300 to 900)

Even as El Mirador collapsed, perhaps because its water supplies or trading connections faltered, two other centers, Tikal and **Uaxactún**, stepped into the resulting political and economic vacuum. The two centers were less than 20 kilometers (12 miles) apart, too close for bitter rivals to coexist. But their rivalry coincided with the blossoming of Classic Maya civilization.

The Classic period of Maya civilization saw new adaptations to the challenging lowland environment. Many communities now lay at the summits of hillocks and ridges, so that the quarries at their base used to build pyramids, temples, and other structures became large reservoirs surrounded by artificial hills and plazas that were catchment pavements to funnel water into them. With brilliant ingenuity, the Maya architects built gravity canals that released water from the elevated central reservoir system into tanks and surrounding irrigation systems.

These elaborate water management systems developed over many centuries out of a need to store water in a land without seasonal river floods—or even major rivers—like those that watered the irrigation schemes of the Egyptians or Sumerians. The Maya developed what archaeologist Vernon Scarborough calls "microwatersheds" to make up for deficiencies in rainfall. But such systems have severe constraints. Inevitably, they can service only a limited area. Rainfall filled the reservoirs and tanks, but the rainfall fluctuated greatly from year to year, making the carefully controlled releases of floodwater typical of Mesopotamian irrigation impossible. Water management and irrigation in the lowlands required the right topography, highly flexible labor management, and a great deal of trial and error.

Over centuries, Maya agriculture slowly created a highly engineered infrastructure that became increasingly productive over time. Everything was slow and deliberate, set in a social and political context that accommodated the realities of a fragile tropical environment. The Maya were successful because they spent many centuries learning how to farm this environment. They worked within environmental limitations they learned the hard way, kept their villages dispersed, and developed a level of interdependency that reflected the uneven distribution of soils and food resources across the landscape. As long as this system worked well, they were relatively immune to climatic stress. It was no coincidence that Maya civilization developed as a mosaic of much smaller city-states, each centered on microwatersheds, which gave it a flexibility and resilience to short-term climatic events that endured for many centuries.

As populations rose, especially on the outskirts of cities, the Maya expanded the scope of their agriculture. As early as the first century AD, they began draining and canalizing swamps, turning hitherto unfarmable lands into grids of raised field systems elevated above low-lying, seasonally inundated land that bordered rivers. These plots resembled the well-known swamp gardens the Aztecs of highland Mexico used centuries later to feed their great capital, Tenochtitlán. As populations climbed even further, the Maya began terracing steep hillsides to trap silt that cascaded downslope during heavy rainstorms. By AD 800, immediately before the collapse, perhaps 8 to 10 million Maya lived in the lowlands, a staggeringly high density for a tropical environment with low natural carrying capacity.

A recent Lidar survey of 2144 square kilometers (828 square miles) in northern Guatemala's central lowlands provides dramatic new evidence of intense occupation. Between AD 560 and 850, an average population density of as many as 80 to 120 people per square kilometer lived in a landscape that was heavily modified by intense agriculture, essential to maintain such a dense population. The scale of wetland exploitation was such that some form of centralized planning was used, whereas the terraces used on higher ground were probably administered by the people who used them. Extensive causeways linked different communities large and small; extensive defensive works hint at large-scale warfare. As many as 7 to 11 million people may have lived across the 95,000 square kilometers (36,600 square miles), although, of course, the population density and distribution varied with the terrain.

Site

A Tragedy at Cerén, El Salvador

We would know little of the lives of commoners but for an ancient natural disaster. One August evening in the sixth century AD, a sudden rumble shook the quiet Maya village at *Cerén* in El Salvador. An underground fissure less than a mile away erupted without warning. A fast-moving cloud of ash darkened the twilight sky. The villagers fled for their lives, leaving everything behind. Minutes later, their houses lay under a thick layer of volcanic debris. Fifteen hundred years later, archaeologist Payson Sheets used subsurface radar to locate several buried houses deep under the ash. He then excavated the dwellings. Plotting every artifact, even individual wall fragments, seeds, and pieces of thatch, he discovered households where the people fled cascading ash at the end of their evening meal.

One household lived in a complex of four buildings: a kitchen, a workshop, a storehouse, and a residence where the residents socialized, ate, and slept. The residence had a front porch open on three sides. The main room covered 4 square meters (43 square feet), with storage pots against the back wall. One pot contained a spindle whorl for making cotton thread. A large adobe bench on the east side of the room served as a sleeping place. During the day, people rolled up their mats and stored them among the rafters. Even the sharp-edged obsidian knife blades, stored high in the roof for safety, still lay among the thatch. A walkway linked the dwelling to a nearby storehouse, passing by a food-grinding area where a *metate* (grinding stone) still stood on forked sticks about 50 cm (20 inches) above the ground. The household owned a well-tended garden along the side of the storehouse, with carefully spaced rows of three species of medicinal herbs standing about a meter (3 feet) apart, each plant standing in a small mound of soil. Just to the south, an ash-covered field contained ridges of young maize plants about 20 to 40 cm (8 to 15 inches) high, typical corn growth for August in this environment. Some of the maize plants were doubled over, the ears still attached to the stalk, a "storage" technique still used in parts of Central America today.

The Rise of Tikal and Uaxactún

Tikal had expanded greatly during the first century BC as large public buildings rose on the foundations of earlier, more humble structures. Clearly, the intent was to rival, and even outdo, El Mirador's splendor. During this century an elite emerged at Tikal, people represented by the burial of a noble-woman under a shrine and by tomb paintings of richly decorated nobles. Uaxactún just to the north underwent a similar transition during the same century. Here, Preclassic temples bear stucco masks and façades that depict the Maya world and the king who built the structures. The two centers were political and economic equals during this century (Figure 12.7).

Figure 12.7 Tikal's central precincts.
(Zai Aragon/Shutterstock)

Tikal's inscriptions are the chronicle of a remarkable dynasty that ruled one of the four Maya capitals from the early Classic period until the ninth century AD. The earliest recorded monarch is Yax-Moch-Xok ("First Scaffold Shark"), who is thought to have ruled around AD 200, although the city had a long and much earlier history. During his reign, strong influences from Teotihuacán in the highlands appear, shown by pottery styles and green obsidian from the city's closely controlled sources. This impact on political, military, and religious affairs at Tikal continued until AD 550.

Yax-Moch-Xok was not the earliest king but was the one who served as founding ancestor for the great royal clan of Tikal that ruled in coming centuries. Tikal's hieroglyphic texts identify 31 rulers (18 known by name) after the founder, the earliest dating to AD 292, the last known one to AD 869, making for 577 years of recorded history. Uaxactún also fostered a powerful royal dynasty, whose monuments, like those of the Tikal kings, soon depicted rulers with sacrificial victims cowering at their feet, noble victims taken in hand-to-hand combat for later sacrifice in public rituals. These portraits signal a crucial development in Maya history: the increasing role of warfare and campaigns of deliberate conquest.

Between AD 320 and 378, Great Jaguar Paw, the ninth successor of Yax-Moch-Xok, sat on the throne of Tikal at a time when rivalries with nearby Uaxactún came to a head. He died in 378 at a moment when a warrior named Fire-Born arrived, a warrior from the "west," perhaps the city of Teotihuacán in the highlands (see Chapter 13). The connection between Great Jaguar Paw's death and Fire-Born's arrival is unclear, but it was the latter who defeated the armies of Uaxactún on January 16, AD 378. His army ignored long-established rules of combat and sacked Uaxactún, setting up Fire-Born as the founder of a new dynasty. Tikal's military expansion took place with assistance from Teotihuacán during a period of regular trading contacts between the great highland city and multiple Maya centers, marked by many finds of the distinctive green obsidian mined by the great city. The same contacts may have brought new philosophies of war and conquest and the rituals associated with them. These rituals were to become part of the Mesoamerican religious tradition for many centuries.

Tikal's royal dynasty prospered in the coming centuries. It eventually headed a multicenter polity, extending its influence by conquest and long-distance trade and by judicious political marriages that gave neighboring rulers maternal kin ties to the center. At the height of its powers, Tikal's territory may have supported an estimated population of as many as 300,000 people, the city and its immediate hinterland 62,000; these are perhaps high estimates, however. In about AD 557, Tikal went into decline after its defeat by the lord of a new rising state, Caracol, then prospered anew during the late Classic period.

Caracol and Calakmul

Caracol lay in south-central Belize, 70 kilometers (43 miles) southeast of Tikal, controlled important crystalline rock supplies, and was an important rival. Its imposing ceremonial core covered at least 2.25 square kilometers (0.9 square mile) during the seventh century, when between 30,000 and 50,000 people lived there, and as many as 100,000 lived in the surrounding countryside. Caracol commenced hostilities against Tikal in AD 557, soon after Tikal had captured and executed a prominent lord. The Caracol ruler Lord Water defeated Tikal, apparently capturing the city's then-ruler, Double Bird. Tikal now became a tribute dependency of Caracol, which grew in size and prestige as its vassal declined. Lord Water's successors dominated Tikal for at least 150 years and embarked on ambitious conquests against neighboring Calakmul and Naranjo. But eventually Caracol paid the price for its military adventures, only to rise again during the late Classic period.

The ever-shifting diplomatic and military landscape in the lowlands involved dozens of city-states and cities, large and small, whose relationships with the major centers and lesser kingdoms are a tangle of claims, counterclaims, and archaeological data. In addition to Caracol, both Tikal and Calakmul, also in the southern lowlands, were rival regional capitals during the early Classic period. At its height, Calakmul had a ceremonial precinct covering about 2 square kilometers (0.7 square mile) and a surrounding residential area more than 20 square kilometers (7.7 square miles) in extent (Figure 12.8). More than 50,000 people lived in the urban core of

Figure 12.8 Calakmul.
(alksenodsen/Shutterstock)

a great city and important rival of Tikal between at least AD 514 and 814. Like Tikal, Calakmul sat astride an important overland trade route. The rivalry between the two cities may have been both a power play and a struggle for dominance of long-distance exchange. There may have been family ties between the two cities. The rivalry was intense, culminating in warfare and constant shifts in allegiance between Tikal, Calakmul, and Caracol. Tikal had few allies in its immediate vicinity, but maintained friendlier relations with two more distant city-states—Palenque and Copán.

Palenque and Copán

The city of Palenque, another Maya capital, but in the western lowlands, is remarkable not only for its fine buildings but also for its rulers' obsession with their ancestry (Figure 12.9). Two Palenque rulers, Pacal the Great ("Shield") and his oldest son, Chan-Bahlum ("Snake-Jaguar"), who ruled in the seventh century AD, stand out for their vision and wisdom. Palenque's dynastic history began on March 11, AD 431, when Bahlum-Ku'k ("Jaguar-Quetzal") became ruler and lasted until sometime after AD 799. Toward the end of his long reign, which lasted 67 years, Pacal built the Temple of the Inscriptions, a masterpiece of Maya architecture under which his tomb lies. His sarcophagus lid bears his royal genealogy. Palenque dominated the southwestern lowlands between AD 603 and 702.

Figure 12.9 Temple of the Inscriptions, Palenque.
(DeAgostini/Gettyimages)

Copán in Honduras is adorned with pyramids and plazas covering 12 hectares (30 acres), rising from the vast open spaces of the Great and Middle Plazas to an elaborate complex of raised enclosed courtyards, pyramids, and temples known to archaeologists as the Acropolis (Figure 12.10). Here successive rulers built their architectural statements atop those of their predecessors in an archaeological jigsaw puzzle of the first magnitude.

The earliest inscription at the site dates to December 11, AD 435, and was the work of ruler Yax-Ku'k-Mo' ("Blue Quetzal Macaw"), although there may have been earlier rulers. For four centuries, Blue Quetzal Macaw's successors formed a powerful dynasty at Copán and became a major force in the Maya world. At one point, Copán ruled over neighboring **Quirigua**. More than 10,000 people lived in the surrounding valley. On May 3, 738, the subordinate ruler of Quirigua turned on his master and captured and sacrificed him, but Copán seems to have maintained a measure of independence and survived. In 749, a new ruler, Smoke Shell, ascended to the throne of the once-great city. He embarked on an ambitious campaign of rehabilitation, even marrying a princess from distant Palenque. He also embarked on a building frenzy that culminated in the Temple of the Hieroglyphic Stairway, built in 755. Smoke Shell's son from his Palenque marriage, Yax-Pac ("First Dawn"), ruled during troubled times, with internal factionalism on the rise. By this time, the city was top-heavy with privilege-hungry nobles and rife with political intrigue. Collapse was imminent.

Figure 12.10 Artist Tatiana Proskouriakoff's reconstruction of Copán.
(Gift of the Carnegie Institution of Washington. © President and Fellows of Harvard College, Peabody Museum, Harvard University. PM# 50-63-20/18487 (digital file #60742852))

Today's Maya archaeologist works closely with epigraphers, using carefully deciphered glyphs and inscriptions to reconstruct complex architectural events, as well as the ritual or political motives behind them. Archaeologists William and Barbara Fash combined both lines of evidence to reconstruct Smoke Shell's Hieroglyphic Stairway at Copán, erected by the ruler on one of the city's most sacred precincts. In the 1930s, archaeologists of the Carnegie Institution restored much of the ruined stairway, replacing the glyph blocks in approximate order. They were unable to read the inscriptions, which made the task difficult. In 1986, a team of archaeologists and epigraphers headed by the Fashes set out to restore and conserve the building, while establishing the true meaning of the stairway. Using meticulous excavation, the archaeologists recovered thousands of tenoned mosaic fragments, which were drawn and photographed, then pieced together in a precise reconstruction of the building. They recovered a powerful political statement (Figure 12.11).

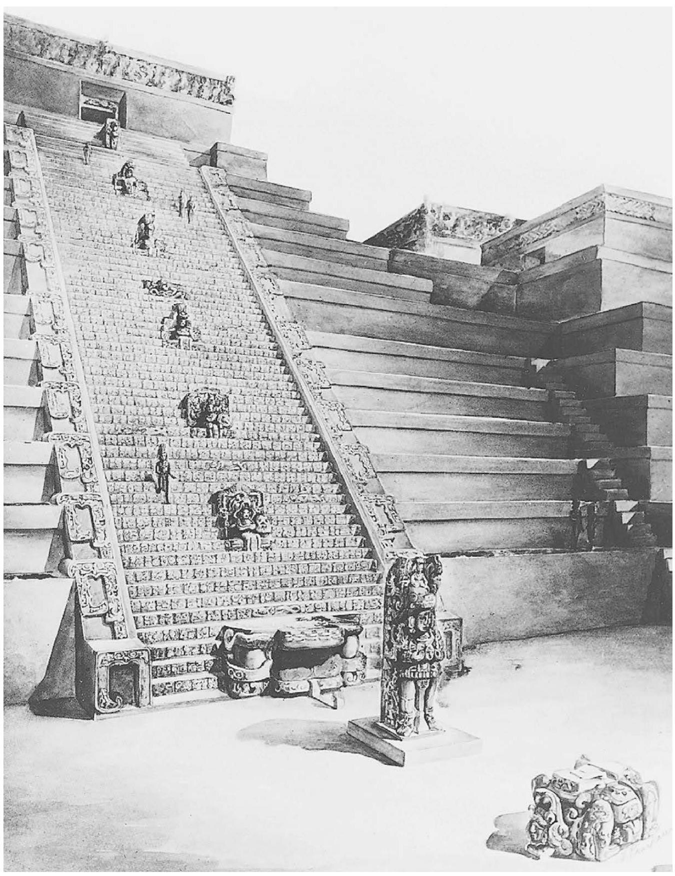


Figure 12.11 Tatiana Proskouriakoff's rendering of the Hieroglyphic Stairway at Copán. (Gift of the Carnegie Institution of Washington. © President and Fellows of Harvard College, Peabody Museum, Harvard University. PM# 50-63-20/18489 (digital file #60741055))

More than 2,200 glyphs ascend the sides of the stairway and provide an elegant statement of the Maya kings' supernatural path. William Fash believes the building was an attempt by Smoke Shell to re-legitimize the conquered dynasty of earlier times. Portraits on the stairs depict Copán's lords as warriors carrying shields, with inscriptions recounting their deeds. A figure, perhaps Smoke Shell himself, stands where an altar forms the base of the stairway, in the form of an inverted head of the rain god Tlaloc. Tlaloc seems to be belching forth the inscriptions, his lower jaw forming the top of the stairs. Inside his head lies an offering of decorated flints in the form of portraits and artifacts Smoke Shell himself perhaps used in the sacrificial and bloodletting ceremonies that dedicated the stairway. Unfortunately, the stairway was shoddily and hastily built. It soon collapsed, at a time when Copán was rapidly losing its political authority (Figure 12.11).

The diplomatic and military landscape was constantly changing as alliances were formed and just as rapidly collapsed again. During the very late Classic era, after AD 771, a new political pattern emerged indicative of changed conditions and stressful times. Carved inscriptions began to appear in the houses of local nobles at Copán and other sites, as if the rulers were now granting the privilege of using inscriptions to important individuals, perhaps as a way of gaining their continued support in times of trouble. This proliferation of inscriptions in the southern lowlands and elsewhere may also reflect minor nobles' taking advantage of confused times and a disintegrating political authority to claim their own brief independence. The confusion accelerated. By AD 800, Maya populations were declining sharply, and both monument carving and major construction soon came to an end.

The central institution of Maya civilization was kingship, for it was the concept that unified society as a whole. Maya kings lived and carried out their deeds in the context of a history they recorded in building projects at Copán, Palenque, Tikal, and elsewhere. Maya elites lived out their lives in the context of the kings who ruled them, and, in turn, thousands of commoners lived their lives with respect to the nobility. We are only beginning to understand the tapestry of their history.

The Classic Maya Collapse

Maya civilization reached its peak after AD 600. Then, at the end of the eighth century, the great ceremonial centers of the Petén and the southern lowlands were abandoned, the long count calendar was discontinued, and the structure of religious life and the state decayed. Within a century, huge sections of the southern lowlands were abandoned, never to be reoccupied. At Tikal, perhaps the greatest Maya center, the elite vanished and the population declined to a third of its earlier level. The non-elite survivors clustered in the remains of great masonry structures and tried to retain a semblance of their earlier life. Within a century, even they were gone. All this is not to say that Maya civilization vanished completely, for new centers may have emerged in neighboring areas, taking in some of the displaced population. Maya civilization continued to flourish in the northern Yucatán.

Everyone studying this ninth-century collapse agrees that a multiplicity of factors—some ecological, some political and social—led to catastrophe in the southern lowlands. The theories of the 1970s argued that the collapse of Teotihuacán gave the Maya a chance to enlarge their managerial functions in Mesoamerican trade. According to these theories, the elite became increasingly involved in warfare and competition between regions. The late Classic era saw a frenzy of public building and increased pressure on the people, the source of both food and labor for prestige projects. Agricultural productivity fell, disease may have reached epidemic proportions, and population densities plummeted so that recovery was impossible. There is some evidence of disease, stature decline, and malnutrition, but the evidence is incomplete.

More recently, endemic warfare has been invoked as a powerful factor in the collapse. At **Dos Pilas** in northern Guatemala, 105 kilometers (65 miles) from Tikal and founded by a renegade noble from Tikal in AD 645, Arthur Demarest uncovered evidence of civil war and prolonged conflict. Dos Pilas's later rulers embarked on campaigns of expansion, which had enlarged their territory to more than 3,884 square kilometers (1,500 square miles) by the mid-eighth century. Dos Pilas now controlled major jade and obsidian routes. Its lords lavished wealth on ornate palaces and a pyramid topped by three temples. Demarest and Juan Antonio Valdés dug deep under a small temple behind a stela that commemorated "Ruler 2," who reigned between AD 698 and 726, and uncovered the ruler's burial chamber. He wore a shell mosaic headdress adorned with monster faces, a heavy jade necklace, and jade bracelets. Hieroglyphs associated with the grave tell of the lord's carefully contrived diplomatic marriages with neighbors and of his military campaigns.

Dos Pilas flourished until AD 761. By then, its rulers had overextended themselves, despite frantic efforts to maintain their domains. In that year, nearby **Tamrindo** attacked its former sovereign and killed "Ruler 4," despite the Dos Pilas inhabitants' desperate resistance. The invaders tore down the royal palace and robbed temple façades to build rough defensive walls with wooden palisades to surround the central precinct. Here, the people clustered in a small village of crude huts while the nobles fled and built a new center at **Aguateca**. The new center lay atop a steep cliff above a deep chasm, protected on three sides by natural features, as well as by massive defense walls. The Aguatecans held out for another half century, despite repeated attacks. In the early ninth century AD, Demarest believes, intensive warfare drove these survivors of Dos Pilas into fortified towns and villages, where they erected defensive walls even around large tracts of agricultural land. Local conditions may have become so insecure that farmers were limited to defended acreage, so that crop yields may have been affected dramatically. In a last desperate stand, the remaining Aguatecans dug three moats, one 140.2 meters (460 feet) long, across a peninsula in Lake Petexbatun, creating an island fortress. The bedrock from the canals became defensive walls and a walled wharf for a canoe landing. The outpost did not last long, for the inhabitants abandoned it in the 800s.

The various collapse theories have been subjected to exhaustive analysis by research works that involve both simulation studies and examinations of trading patterns and demographic and ecological stresses that could have affected population densities. Patrick Culbert examined population densities and the potential for agricultural production in the southern lowlands. He has shown that population densities rose to as many as 200 persons per square kilometer (518 per square mile) during the late Classic period over an area so large that it was impossible for people to adapt to bad times by moving to new land or emigrating. He believes that the magnitude of the population loss during the two centuries after AD 800 was such that social malfunction alone cannot account for it. Failure of the agricultural base must have been an important component in the collapse equation at the local level.

Maya agriculture became increasingly intense as populations rose, and both terrace and raised-field systems covered large areas in many parts of the lowlands. At some of the larger sites like Tikal, the people may have been transporting great quantities of foodstuffs from distances of between 50 and 100 kilometers (31 and 62 miles) away. In the short term, the intensification strategies worked, but they carried the seeds of collapse. The risks of climatic change, plant disease, erosion, and long-term declines in soil fertility are always present in such enterprises. To continue functioning efficiently, the newly intensified systems would have had to have been managed constantly. Just the repair of field systems after floods and rains would have required watchful effort on a large scale. There are no signs that the Maya made any social changes that enabled them to achieve such a level of management, especially when so many people engaged in public construction projects and apparently in military activity (perhaps the Maya were under pressure from the north).

Culbert believed that long-term environmental degradation was an important element in the scenario, where catastrophic declines followed short-term gains in productivity. For example, as populations rose, fallow cycles may have been shortened, so that increased competition took place between crop plants and weeds; this is a problem that only constant weeding, a very labor-intensive activity, can solve. Shortened fallow cycles also lead to lower levels of plant nutrients and declining crop yields, and we do not know whether the Maya tried to counteract these trends by systematic mulching or by planting soil-restoring crops. The problem of erosion may have been even more acute. There are signs that the people lost much soil to runoff in the lowlands, for they did not build the terraces needed in time to retain the soil. Some of this erosion may have resulted from extensive deforestation.

There remains the issue of drought and climate change. What role did climate change have in the rise and partial disintegration of Maya civilization? We are lucky in that the decipherment of Maya glyphs has provided researchers with a quite well documented history of Classic Maya civilization from about 300 BC until its widespread collapse during the tenth century AD. Mayanists have long considered cycles of drought and rainfall as major players in Maya civilization, especially in the collapse, associated with drought cycles lasting for decades. Climate change has been a controversial issue, largely because, until now, the available climatic records, mainly from fresh water and deep sea cores, have been somewhat inaccurate. Lake sediment cores provided the first evidence of major droughts, but they have been of limited use in areas close to major centers like Tikal because of disturbance caused by intensive agriculture. In recent years, much more accurate records have come from cave deposits in the Maya lowlands, obtained from cave stalagmites like those in China and the Near East. These can be dated precisely using uranium thorium dates of the growth layers in them. Yok Balum cave in Belize lies close to four important Maya centers, among them the Classic Maya site of Uxbenká. This has provided an opportunity to examine rainfall fluctuations throughout the Classic period, of great value because major centers like Tikal and Calakmul are influenced by the same climatic systems (see Box "Climate Change and Maya Civilization").

Science

Climate Change and Maya Civilization

A 56-centimeter (22-inch) stalagmite inside Yok Balum shows that the upper portions grew between 40 BC and AD 2006. Combining uranium thorium dates and oxygen isotope measurements taken in tiny increments, a team of researchers was able to study climate changes on the surface, for the oxygen isotope values reflect changing rainfall conditions. The ancient Maya farmed a landscape with unpredictable rainfall, well documented in the stalagmite samples. There were droughts lasting for decades from AD 200 to 300, 820 to 870, 1020 to 1100, and 1530 to 1580. These fluctuations were driven by El Niños and north- and south-movements of the Intertropical Convergence Zone near the Equator, where trade wind belts meet, and winds tend to be calm—the so-called doldrums.

The researchers argued, on the basis of historical records of recent droughts, notably between 1535 and 1575, that changes in agricultural productivity in the Maya lowlands led to poor crops, famine and disease, and population movements. For instance, ample rainfall between 200 and 300 BC led to population growth and expanded agricultural production, including the exploitation of seasonal wetlands. This was when the great center at El Mirador flourished, only to decline, with accompanying political adjustments, when a century-long drought came between AD 200 and 300. When rainfall increased once more, Tikal, Calakmul, and other major sites located near extensive seasonal wetlands became major, powerful kingdoms, relying also on carefully maintained reservoirs and storage tanks. Between 440 and 660, agricultural productivity and population soared during the Classic period, a time of unusually high rainfall.

But high-density populations in a region of unpredictable rainfall were in trouble when sporadic drying resumed after 660. During drier periods, kingdoms tended to fragment, and warfare became commonplace, as political competition intensified. Between 760 and 800, population densities of 145 people per square kilometer were not unusual, so drought brought economic and political stress. Between 780 and 900, the institution of divine kingship collapsed, and political power became decentralized. Depopulation followed over the next centuries, reflected in migration and reorganization. The major political centers were now in the northern Yucatán, but another intense drought cycle between 1000 and 1100 that affected Chichen Itzá in the north (see p. **397**) seems to have ensured that the Classic Maya's glory days never returned.

The Yok Balum stalagmite sample provides a remarkable chronicle of the climate changes that challenged the Maya. Stalagmite research has barely begun, but, as more columns become available, it will provide a highly detailed portrait of the relationships between divine Maya lords, their subjects, and the unpredictable environment that supported them.

By the time the tenth-century droughts settled over the lowlands, essentially all the arable land was under cultivation, and Maya agriculture was very close to the critical threshold where even a slight drop in agricultural productivity would mean serious trouble. For nearly three centuries, intense drought cycles lowered the water table, produced inadequate rains, and ravaged an agricultural economy that already had trouble satisfying the accelerating demands of the nobility.

A fundamental cause of the Maya collapse, then, was at least four major droughts that brought hunger and catastrophic social change. In city after city, the great lords were powerless to bring rain; perhaps unrest erupted. Archaeology shows us that these cities' populations either perished or dispersed into small hamlets. Having overreached themselves, the unfortunate Maya saw their civilization come down around their ears. Surveys of Copán and its hinterland have shown how dramatic the settlement shifts were (see "Studying the Maya Collapse at Copán" box).

Science

Studying the Maya Collapse at Copán

How and why did Copán collapse? Archaeologists David Webster, William Sanders, and many colleagues working on a long-term exploration of the city decided to investigate the collapse by studying changing settlement patterns and shifting population densities around the abandoned city. They developed a large-scale settlement survey modeled after the famous Basin of Mexico survey of some years earlier to examine more than 135 square kilometers (52 square miles) around the urban core. Using aerial photographs and systematic field surveys, the research team recorded more than 1,425 archaeological sites containing more than 4,500 structures. Team members mapped and surface-collected each location. Two hundred fifty-two sites were test-pitted to obtain artifacts and dating samples so they could be placed within the general chronological framework for the valley.

As the data flowed into the laboratory, the researchers developed a classification of site types using size and other criteria, classifying them in a hierarchy from simple to complex as a way of developing a portrait of shifting landscape use over many centuries. At the same time, they obtained 2,300 dates, using volcanic glass fragments that could be dated using the obsidian hydration method. The survey yielded a bird's-eye view of dramatic population changes as human settlement expanded and contracted over the valley landscape.

The earlier sites found in the survey documented rapid population growth, especially in the city itself and nearby. There was only a small, scattered rural population. Between 700 and 850, the Copán Valley reached its greatest sociopolitical complexity, with a rapid population increase to between 20,000 and 25,000 people. These figures, calculated from site size, suggest the local population was doubling every 80 to 100 years, with about 80 percent of the people living within the urban core and immediate periphery. Rural settlement expanded outward along the valley floor, but was still relatively scattered. Now people were farming foothill areas, as the population density of the urban core reached more than 8,000 people per square kilometer (0.3 square mile), with the periphery housing about 500 people per square kilometer (0.3 square mile). Some 82 percent of the population lived in relatively humble dwellings, an indication of the pyramid-like nature of Copán society.

After AD 850, the survey showed dramatic shifts. The urban core and periphery zones lost about half their population, while the rural population increased by almost 20 percent. Small regional settlements replaced the scattered villages of earlier times, a response to cumulative deforestation, overexploitation of even marginal agricultural land, and uncontrolled soil erosion near the capital. By 1150, the Copán Valley population had fallen to between 2,000 and 5,000 people.

The Copán research does not explain why the city collapsed, but it chronicles the dramatic impact of rapidly growing populations on ecologically fragile landscapes. The evidence hints that environmental degradation was a major factor in the Maya collapse. Maya writings tell us that Maya lords considered themselves the intermediaries between the living and supernatural worlds. However, when the inexorable forces of environmental decline took hold, their authority evaporated and a centuries-old spiritual relationship between farmers and an elaborate cosmic world vanished into near oblivion.

Ecological factors lay at the center of the collapse. The expanding Maya population depended on an agricultural system that made no allowance for long-term problems. Eventually, the system could produce no further riches, could not expand, and could only decline—with catastrophic results. But it would be a mistake to think of the Maya "collapse" as a universal phenomenon. Rather, the collapse in the ninth century was a marked episode in a long series of periodic flowerings and collapses characteristic of Maya civilization—indeed, of Mesoamerican civilization generally.

Postclassic Maya Civilization (from AD 900 to 1517)

Despite the collapse in the southern lowlands, Maya religious and social orders endured in the more open country of the northern Yucatán. Just as Tikal and other famous cities collapsed, northern centers like **Chichén Itzá** in the northeast came into prominence during the Postclassic period. Chichén Itzá itself has never been fully mapped, so its area and exact population remain a mystery. The city's central core is well known, its central plaza dominated by the Castillo, the temple of Kukulcán (Quetzalcoatl), a square, stepped pyramid about 23 meters (75 feet) tall, crowned with a temple, with stairways on all four sides (Figure 12.12). The Temple of the Warriors lies west of the Castillo, an inner temple with sculpted pillars masked by a later, more elaborate structure. The mosaics, carved façades, and sculpted serpents and warriors on the later temple show Toltec influence from the highlands. During its heyday, this great city maintained contacts with the Maya of the Gulf Coast lowlands, and through them probably with the Valley of Oaxaca and the highlands (Figure 12.13).

Postclassic Maya civilization was marked by as much volatility as that of earlier years. Political infighting and ecological problems may have been part of the cause. As Chichén Itzá collapsed in the thirteenth century, the city of **Mayapan** moved into the economic and political vacuum and dominated the northern Maya world. Mayapan lies in the center of the northern Yucatán, a densely populated, walled city with about 12,000 inhabitants, built near a series of natural wells. It was a trading center, dependent on an expanding waterborne trade in bulk goods like cacao, salt, and obsidian.

Figure 12.12 The Castillo at Chichén Itzá.
(frans lemmons/Alamy)

Figure 12.13 The ball court at Chichén Itzá.
(Yvonne Boyd/Alamy)

Mayapan's confederacy fell apart in the mid-fifteenth century. Three quarters of a century later, in 1519, Spaniard Hernán Cortés and his conquistadors landed on the gulf lowlands, to change the face of Mesoamerica forever. His objective was not the lowland Maya but the gold-rich kingdom of the Mexica, or Azteca, in the distant highlands, described in Chapter 13.

Summary

- The Preclassic period of Mesoamerican prehistory lasted from approximately 2000 BC to AD 250, a period of major cultural change in both lowlands and highlands. Sedentary villages traded with each other in raw materials and exotic objects. These exchange networks became increasingly complex and eventually came under the monopolistic control of larger villages.
- Increasing social complexity went hand in hand with the appearance of the first public buildings and the evidence of social stratification. These developments are well chronicled in the Olmec culture of the lowlands, which flourished from approximately 1500 to 500 BC. Olmec art styles and religious beliefs were among those that spread widely over lowlands and highlands during the late Preclassic period.
- Religious ideologies, ritual organization, and extensive trading networks were key factors in the development of Maya society in the lowlands after 1000 BC.
- Classic Maya civilization flourished from AD 250 to 900 and consisted of an ever-changing patchwork of competing states. Maya glyphs show that Maya civilization was far from uniform. Religious beliefs rather than political or economic interests unified Maya society.
- Until about AD 600, the largest states were in Guatemala's northeast Petén, with a multicenter polity headed by the "Sky" rulers of Tikal. Maya civilization reached its height in the southern lowlands after the seventh century, collapsing suddenly in the Yucatán after AD 900.
- The reasons for the collapse remain uncertain, but environmental degradation, pressure on the labor force, and food shortages were doubtless among them.
- After the collapse, the focus of Maya civilization moved to the northern Yucatán, where Maya civilization flourished at Chichén Itzá and other centers right up to the Spanish conquest of the sixteenth century. Many Maya communities still flourish in the lowlands today.

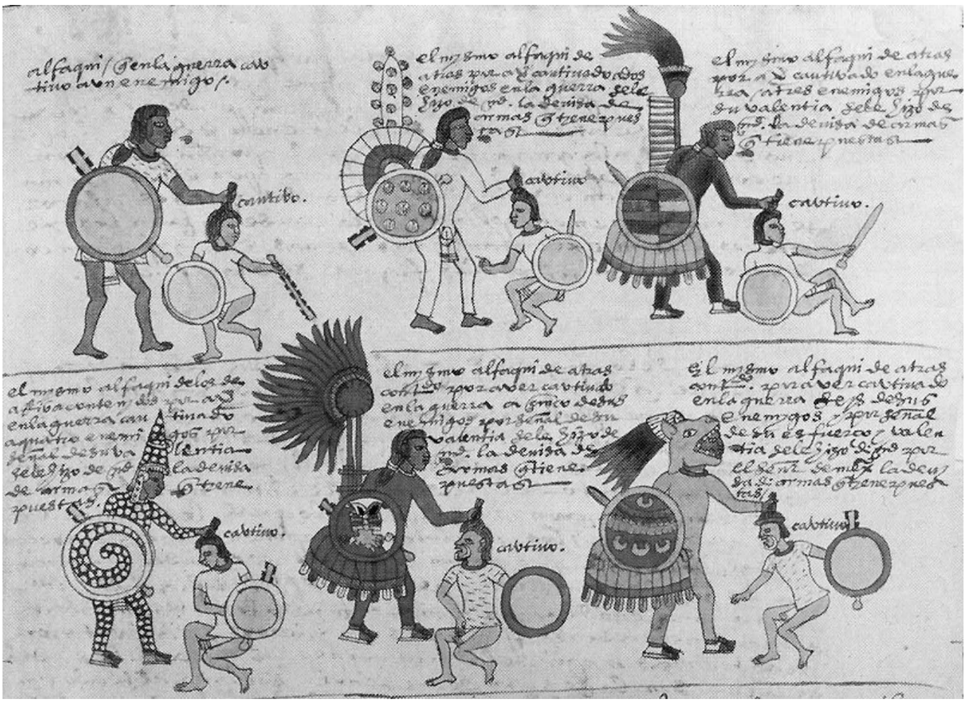
Further Reading

The definitive summary is Susan Toby Evans, *Ancient Mexico and Central America* (London and New York: Thames and Hudson, 2004). For the Olmec, see Richard Diehl, *The Olmecs: America's First Civilization*

(London and New York: Thames and Hudson, 2004). Michael D. Coe and Stephen Houston, *The Maya*, 9th ed. (London: Thames and Hudson, 2015) is the classic description of this flamboyant civilization. For Maya script, see Michael Coe, *Breaking the Maya Code*, 3rd ed. (London: Thames and Hudson, 2012). Linda Schele and David Freidel's *A Forest of Kings* (New York: Morrow, 1990) is a popular synthesis of Maya history based on both archaeology and glyphs, which is seminal, if controversial in places. Their *Maya Cosmos* (New York: Morrow, 1993) discusses Maya astronomy and world views. Jeremy A. Sabloff's *The Cities of Ancient Mexico* (New York: Thames and Hudson, 1989) provides a guide to major Mesoamerican sites. David Webster, *The Fall of the Ancient Maya* (London and New York: Thames and Hudson, 2002) is an excellent account of the collapse.

Chapter 13

Highland Mesoamerica



Aztec warriors. From the *Codex Mendoza*.
(World History Archive/Alamy)

Chapter Outline

Prologue

"And when we saw all those cities and villages built in the water, and other great towns on dry land, and that straight and level causeway leading to Mexico, we were astounded. These great towns and pyramids and buildings rising from the water, all made of stone, seemed like an enchanted vision.... Indeed some of our soldiers asked whether it was not all a dream." Spanish conquistador Bernal Diaz was one of the 600 soldiers and adventurers who accompanied Hernán Cortés on his hazardous march from the Gulf Coast to the heart of the Aztec Empire. He was an impressionable youth when he gazed out over the Valley of Mexico in 1519 and saw the Aztec capital, Tenochtitlán, stretched out before him. Half a century later he wrote: "I stood looking at it, and thought that no land like it would ever be discovered in the whole world, because at that time Peru was neither known nor thought of." Then he added: "All that I then saw has been destroyed."

Cortés reduced Tenochtitlán to rubble in a brutal siege in 1521, founding Mexico City on its ruins. Aztec civilization collapsed. Thousands of Indians perished from smallpox and other exotic diseases the conquistadors introduced. But Diaz knew he had witnessed a unique moment in history, a sight of a well-ordered, preindustrial city at the height of its powers. His memories of his first sighting of the Aztec capital were as fresh in his seventies as they were when he glimpsed the Valley of Mexico for the first time (Cohen, 1963, pp. 214–215).

The origins of Aztec civilization went back at least 1,500 years and sprang from both indigenous and lowland roots. Throughout the long history of Mesoamerican civilization, lowlands and highlands were linked inextricably to one another. This chapter describes the highland Mesoamerican civilizations, which culminated in the complex, rapidly changing world of the Aztecs, disrupted catastrophically by the Spanish conquest of AD 1519 (see Figure 12.1).

The Rise of Highland Civilization: The Valley of Oaxaca (from 2000 to 500 BC)

Many of the foundations of highland Mesoamerican civilization were laid in two areas: the Valley of Oaxaca and the Valley of Mexico. The warm, semiarid Valley of Oaxaca is the homeland of the modern-day Zapotec people. By 2000 BC, maize and bean agriculture supported dozens of small villages and hamlets of 50–75 people. In time, some of these settlements grew to considerable size, with as many as 500 inhabitants, some of them nonfarming artisans and priests. The earliest farming villages lay on the valley floors, where water supplies were more plentiful.

As local population densities rose, the Oaxacans expanded onto slopes and into more arid lands. Eventually, argues Kent Flannery, the economic power these rising farming populations generated gave highland areas like this an edge over their neighbors.

The evolution of larger settlements in Oaxaca and elsewhere was closely connected with the development of long-distance trade. Simple barter networks of earlier times evolved into sophisticated regional trading organizations in which Oaxacan and other village leaders controlled monopolies over sources of obsidian and its distribution. Soon magnetite mirrors (important in Olmec ritual), tropical feathers, and ceramics were traded widely between highlands and lowlands. The influence of the lowlands was felt most strongly in Oaxaca, where Olmec pottery and other ritual objects appear between 1150 and 650 BC. Many of them bear the distinctive human-jaguar motif of the lowlands, which had an important place in Olmec ideology (see Chapter 12).

In 1300 BC, the largest settlement in the Valley of Oaxaca was **San José Mogote**, which lay at the junction of three side valleys, a village of thatched houses with about 150 inhabitants sharing one lime-plastered public building. During the next century, San José Mogote grew rapidly into a community of 400 to 600 people living in rectangular houses with clay floors, plastered and whitewashed walls, and thatched roofs over an area of about 20 hectares (50 acres). Public buildings then appeared in larger Oaxacan settlements, built on adobe and earth platforms. Fragments of conch shell trumpets and turtle shell drums come from these structures. Clay figurines of masked, costumed dancers lie in San José Mogote's ceremonial buildings (Figure 13.1). There are marine fish spines, too, almost certainly used in personal bloodletting ceremonies performed before the gods. By 400 BC, at least seven small chiefdoms ruled in the Valley of Oaxaca.

The basic Mesoamerican pattern of civilization came into being over more than 1,000 years in the highlands. In the Valley of Mexico, in Oaxaca, and elsewhere, a larger center was ruled by an elite and served by a rural population living in lesser villages scattered throughout the surrounding countryside. By 50 BC, at least some of the centers, like Monte Albán in the Valley of Oaxaca, achieved considerable size and complexity. The new highland elites presided over hierarchies of priests and officials and had the ability to command the labor of hundreds, if not thousands, of farmers to build and maintain temples, pyramids, and palaces. They controlled large food surpluses, which supported a growing population of non-farmers, merchants, and artisans. Their political power rested on their ability to coerce others, on well-established notions of social inequality, and above all on a complex and often publicly reenacted social contract between rulers and their subjects. The people saw their leaders as intermediaries between the living and the ancestors, between their plane of existence and the spiritual world. An elaborate calendar and soon

Figure 13.1 The four figurines formed a ritual scene buried beneath the floor of a house at San José Mogote, Oaxaca, Mexico.
(Joyce Marcus and Kent Flannery, University of Michigan)

writing regulated every aspect of ceremonial and daily life and helped generations of rulers presiding over many kingdoms to legitimize their dynastic origins and their relationship to the gods. Highland civilization, with its carefully regulated agriculture, marketplaces, and lucrative trade monopolies, was to flourish for 2,000 years.

Monte Albán (from 500 BC to AD 750)

Two major city-states dominated the Mesoamerican highlands in the early first millennium AD, at the time when Classic Maya civilization flourished in the lowlands: Monte Albán in the Valley of Oaxaca, and Teotihuacán in the Valley of Mexico.

Monte Albán was founded in about 900 BC on a hill overlooking three arms of the Valley of Oaxaca 400 meters (1,300 feet) below (see Figure 13.2).

Figure 13.2 Monte Albán, Valley of Oaxaca.
(f9photos/Shutterstock)

The new settlement grew rapidly, soon boasting more than 5,000 inhabitants. The chosen hill commanded a spectacular view and a unique setting, but it did not make economic sense as a site for a major ceremonial center, lying as it did far from fertile agricultural lands in the valley below. Perhaps nearby San José Mogote's leaders simply chose an imposing site overlooking their domains as a symbol of their power and political domination. In any event, Monte Albán soon assumed great importance, becoming a major state by 150 BC. Between 200 and 350 BC, more than 16,000 people lived in the city, the population rising to a peak of 30,000 during the late Classic period, between AD 500 and 700. Here, again, the Marcus model of rapid expansion, then growth in the center before decline (see Chapter 12), may hold true.

Between 300 and 100 BC, Zapotec rulers laid out the Main Plaza atop the artificially flattened hilltop. Monte Albán became an elaborate complex of palaces, temples, and plazas, some of which served as ritual settings, others as markets. The city straddled three hills, with at least 15 residential subdivisions, each with its own plazas. Most inhabitants lived in small houses erected on stone-faced terraces built against the steep terrain. Years of archaeological excavation and survey have mapped more than 2,000 houses and an enormous ceremonial precinct centered around the paved Main Plaza. This ritual ward evolved over more than 1,000 years of continuous rebuilding and modification, which had the effect of progressively isolating the plaza and those who lived around it from the rest of the city. The late Classic plaza of AD 500 to 720 was 300 meters long and 150 meters wide (975 by 480 feet), bounded on its north and south sides by 12-meter- (37-foot)-high platform mounds with staircases leading to buildings atop them (Figure 13.2). The rulers and their families lived in a complex of buildings on the north platform, which also served as the formal settings for meetings with high officials and with emissaries from other states such as Teotihuacán.

Monte Albán reached the height of its power after 200 BC, when it rivaled another expanding state, Teotihuacán, to the north. The two great cities coexisted peacefully and traded with one another for centuries. Parts of Monte Albán were occupied until the Spanish conquest.

Valley of Mexico: Teotihuacán (from ca. 200 BC to AD 750)

As early as 600 BC, a series of chiefdoms ruled over the Valley of Mexico. Five centuries later, two of them, Cuicuilco in the west and Teotihuacán to the east, were vying for leadership of the valley. At that moment, nature intervened with a major volcanic eruption that buried and destroyed Cuicuilco completely, leaving Teotihuacán the master of the Valley of Mexico and adjacent parts of the central highlands.

Teotihuacán grew rapidly during the ensuing centuries as thousands of people moved from outlying communities into the metropolis. Whether they moved voluntarily or as a result of conquest and compulsory resettlement is unknown. At least 80,000 people lived in the city by AD 100. Like Monte Albán, Teotihuacán may have grown from constant military conquest, in another example of the Marcus model of initial rapid expansion. Between AD 200 and 750, Teotihuacán's population grew to more than 150,000 people, making it similar in size to all but the very largest cities of contemporary western Asia and China.

Archaeologist René Millon's map of the city reveals an enormous community that grew over many generations according to a long-term master plan. Over more than eight centuries, the Teotihuacános built 600 pyramids, 500 workshop areas, a great marketplace, 2,000 apartment complexes, and precinct plazas, all laid out on a grid plan anchored by the 5-kilometer- (3-mile)-long Street of the Dead, which bisects the city on a north-south axis, oriented exactly 15.5 degrees east of north, an orientation established by astronomical observation (Figure 13.3).

The Teotihuacán map suggests that the city was grouped into wards based on both kin ties and commercial considerations. Most people lived in standardized, walled residential compounds up to 60 meters (200 feet) on each side, connected by narrow alleyways and compounds (see "Life in Teotihuacán's Barrios" box). Some of these neighborhoods (*barrios*)

Figure 13.3 Teotihuacán, showing the Pyramid of the Sun (back left) and the Avenue of the Dead, with the Pyramid of the Moon in the foreground.
(Jiri Vatka/Thinkstock)

housed craftspeople like obsidian workers or potters. There were also military quarters. Foreigners from the Valley of Oaxaca, and also lowland Veracruz, lived in their own neighborhoods. More important priests and artisans lived in dwellings built around small courtyards. Prominent nobles occupied elaborate palaces with central, sunken courts.

At the very core of Teotihuacán's being was the Sacred Cave under the 64-meter- (210-foot)-high Pyramid of the Sun, an entryway to the underworld. The cave was the focus of the powerful creation myth perpetuated by the city's leaders. A sight line from the mouth of the cavern to the western horizon may have associated such astronomical phenomena as the setting sun to specific dates in the local calendar. Teotihuacán's first, and very able, leaders used this cave and the creation myth associated with it as the catalyst for putting their city on the political and religious map. They laid out their entire city as a symbolic landscape commemorating the creation and their principal gods. Their architects laid out the Street of the Dead perpendicular to the Sacred Cave and built a small pyramid dedicated to what scholars call "the Great Goddess," associated with the sun, on the site of the present Pyramid of the Moon, framing it with a sacred mountain on the horizon. They then constructed the Pyramid of the Sun on the site of the Sacred Cave, dedicated to the Great Goddess and to a deity of fire, rain, and wind.

The broad avenue extends southward for 3.2 kilometers (2 miles), where it intersects an east-west avenue, thereby dividing the city into four quadrants. The huge, square enclosure known as the Ciudadela, with sides more than 400 meters (1,300 feet) long, lies at the intersection. Here lies the Temple of Quetzalcoatl, the feathered serpent, a six-level pyramid adorned with tiers of inset rectangular panels placed over a sloping wall (Figure 13.4). The architects took Teotihuacán's centuries-old symbolism of the Sacred Cave as a passageway and built it into the Temple of the Feathered Serpent. The façade is thought to depict the moment of creation, when opposed serpents, one representing lush greenness and peace, the other desert, fire, and war, cavort in the primordial ocean, painted blue in the background. The Temple of Quetzalcoatl was built to the accompaniment of at least 200 human sacrifices, young warriors with their hands tied behind their backs sacrificed in groups of 18 individuals, the number of 20-day months in the year.

Figure 13.4 The façade of the Temple of Quetzalcoatl, Teotihuacán. (Bildarchiv Monheim GmbH/Alamy)

Site

Life in Teotihuacán's Barrios

Teeming neighborhoods of single-story, flat-roofed, rectangular apartment compounds complete with courtyards and passageways lay beyond Teotihuacán's ceremonial precincts. Narrow alleyways and streets about 3.6 meters (12 feet) wide separated each compound from its neighbors. Each housed between 20 and 100 people, perhaps members of the same kin group. Judging from artifact patternings, some sheltered skilled artisans, families of obsidian and shell ornament makers, weavers, and potters.

What was life like inside Teotihuacán's anonymous apartment compounds (*barrios*)? Mexican archaeologist Linda Manzanilla has investigated one such complex close to the northwest edge of Teotihuacán, searching for traces of different activities within the complex. The stucco floors in the apartments and courtyards had been swept clean, so Manzanilla and her colleagues used chemical analyses of the floor deposits to search for human activities. She developed a mosaic of different chemical readings, such as high phosphate readings, where garbage had rotted, and dense concentrations of carbonate from lime (used in the preparation of both tortillas and stucco) that indicated cooking or building activity. Manzanilla's chemical plans of the compound are accurate enough to pinpoint the locations of cooking fires and eating places where the inhabitants consumed such animals as deer, rabbits, and turkeys. She managed to identify three nuclear families of about 30 people who lived in three separate apartments within this community inside a much larger community. Each apartment had specific areas for sleeping, eating, religious activities, and funeral rites.

Teotihuacán's barrios have revealed intense interactions between people who knew one another well, and between these tight-knit communities and the wider universe of the city itself. Walking along one of the cleared streets, you can imagine passing down the same alley 1,500 years earlier, each side bounded by a bare, stuccoed compound wall. Occasionally, a door opens onto the street, offering a view of a shady courtyard, of pots and textiles drying in the sun. The street would have been a cacophony of smells and sounds—wood smoke, dogs barking, the monotonous scratch of maize grinders, the soft voices of women weaving, the passing scent of incense.

Teotihuacán was a vast urban community made up of hundreds of smaller communities, with a market that sold commodities and exotic luxuries from all over the Mesoamerican highlands and lowlands. The Teotihuacános valued their foreign trade so highly that they allowed foreigners to settle among them in special barrios occupied over many centuries. Immigrants from the Veracruz region of the lowlands lived in a neighborhood on the city's eastern side, identified from the remains of distinctive circular adobe houses with thatched roofs identical to those of the inhabitants' Gulf Coast homeland (see Figure 1.11). These people, easily identified by their orange-, brown-, and cream-painted pots, probably traded in exotic tropical luxuries such as brightly colored bird feathers. Another neighborhood on the western side housed Zapotec traders from the Valley of Oaxaca, 400 kilometers (250 miles) south of Teotihuacán. Potsherds from their segregated compounds allow us to identify their presence in the crowded city.

A powerful cult of sacred war and human sacrifice, sometimes called "Star Wars" by modern scholars, became associated with the feathered serpent, the storm god, and the cyclical movements of the planet Venus. The beliefs associated with this "Star Wars" cult spread widely in Mesoamerica and had a profound effect on Maya civilization (see Chapter 12).

The Ciudadela lay at the very center of Teotihuacán, at the crossroads of the city and the symbolic center of the cosmos, the axis around which the universe revolved.

Teotihuacán was a unique city, covering at least 21 square kilometers (8 square miles), and it was a major place of pilgrimage, a sacred city of the greatest symbolic importance. Its prosperity came from trade, especially in the green obsidian found nearby, which Teotihuacán's merchants exchanged for all manner of tropical products, including bird feathers, shells, and fish spines from the lowlands. Food supplies came from the intensive cultivation of valley soils and from acres of swamp gardens built up in the shallow waters of the nearby lakes. This was a brightly colored city, a landscape painted in every hue, the houses adorned with polished whitewash, which still sticks to wall fragments. But above all, the great city spoke a powerful symbolic language, which comes down to us in architecture, art, and ceramics. Its leaders perpetuated an origin myth that had their great city as the place where the cosmos and the present cycle of time began. Every ritual within Teotihuacán's precincts fostered the belief that its people were honored and responsible for maintaining the cosmos. A cult of war and sacrifice governed by an eight-year cycle ensured the well-being of the cosmos, the city, and its inhabitants. Teotihuacán's armies were formidable in battle, their victories the source of the prisoners sacrificed to the gods.

To be a Teotihuacáno was to be honored, for one dwelt at the very center of the world. But this honor carried important obligations to the city, the lords, and the gods. Every citizen served the state, through artisanship, through laboring on public works, and through serving in Teotihuacán's armies. These obligations were fulfilled through the ties of kinship that underlay every household, every apartment compound, and every royal palace, linking everyone in the great city in the common enterprise of maintaining the cosmos. On occasion, the government attempted planned resettlement of city dwellers on adjacent, underutilized lands, where agricultural production could be maximized, especially on irrigable lands near the lakes. But most people still lived in the city, the heart of a large, loosely knit state about the size of the island of Sicily in the Mediterranean, some 26,000 square kilometers (10,000 square miles).

Teotihuacán's rulers controlled the destinies of about half a million people, but its main impact on lowland and highland Mesoamerica was economic, ideological, and cultural rather than political. Its power came from conquest and trade, and above all from a carefully nurtured ideology that made the great city the place of creation, the very cradle of civilization. So successful was this religious propaganda that the Aztecs and other highland peoples still deeply revered a ruined Teotihuacán at the time of the Spanish conquest seven centuries later.

After about AD 650, Teotihuacán's ideology became increasingly militaristic, at a time when the state may have become more oppressive. The city's enormous population combined with uneven exploitation of the Valley of Mexico's resources may have created serious economic problems that threatened to undermine the state. Quite why the great city collapsed is a matter of controversy. Most likely, a combination of factors contributed to its fall. They included serious drought conditions, perhaps triggered by El Niño events, economic competition from other cities that undermined its dominant economic position, and social unrest among commoners. The end, when it came, was cataclysmic. The Ciudadela's temples and palaces were burned and razed in about AD 750. The destruction was part of a systematic desanctification of Teotihuacán both politically and ritually, to prevent new rulers from taking power. Teotihuacán and its state vanished from history, only to be remembered in legend as the place where the Toltec and Aztec world of later times began.

The Toltecs (from AD 650 to 1200)

Teotihuacán had acted as a magnet to the rural populations of the highlands for many centuries. When the great city collapsed, its inhabitants moved outward as other central Mexican cities expanded into the political vacuum its conquerors had left. Political authority passed rapidly from one growing city to the next. Eventually, one group achieved a semblance of dominance: the Toltecs.

Early Toltec history is confusing at best, but, like other highland peoples, they were composed of various tribal groups, among them the Nahua-speaking Tolteca-Chichimeca, apparently semi-civilized people from the fringes of Mesoamerica. (Nahuatl was the common language of the Aztec Empire at the Spanish conquest.) A ruler named Topiltzin Quetzalcoatl, born in the year AD 935 or 947, moved the Toltec capital to Tollan, "the Place of Reeds" (the archaeologists' **Tula**), in its heyday a city of some 30,000 to 60,000 people, far smaller than Teotihuacán. Here bitter strife broke out between the followers of the peace-loving Topiltzin Quetzalcoatl and those of his warlike rival, Tezcatlipoca, "Smoking Mirror," god of warriors and of life itself. The Tezcatlipoca faction prevailed by trickery and humiliation. Topiltzin and his followers fled Tula and eventually arrived on the shores of the Gulf of Mexico. There, according to one account, the ruler set himself on fire decked out in his ceremonial regalia. As his ashes rose to heaven, he turned into the morning star. The Spanish conquistadors learned another version of the legend in which Topiltzin Quetzalcoatl fashioned a raft of serpents and sailed over the eastern horizon, vowing to return in the year 1 Reed, of which you will read more (on page 422).

In the years following Topiltzin Quetzalcoatl's departure, the Toltec state reached its greatest extent, controlling much of central Mexico from coast to coast. By AD 900, Tula was a prosperous town of artisans that soon grew into a city of as many as 40,000 people covering 16 square kilometers (5.4 square miles). By AD 1000, the Toltec lords had laid out their capital on a grid pattern with a wide central plaza and ceremonial center bordered by imposing pyramids and at least two ball courts. Four colossal warriors carrying spear-throwers and incense bags supported the roof of a temple atop a pyramid (Figure 13.5). A grim "Serpent Wall," 40 meters (131 feet) long, runs along the north side of the pyramid, bearing friezes of serpents consuming skeletal humans. Everything points to a now militaristic society obsessed with human sacrifice. Tula's temples, pyramids, and ball courts were torn to the ground in about 1200, when the Toltec Empire fell apart, perhaps in part because of long drought cycles.

Figure 13.5 Colossal warrior figures atop Pyramid B at Tula, the Toltec capital. (World Pictures/Alamy)

Aztec Civilization (from AD 1200 to 1521)

During the next century, a political vacuum existed in the Valley of Mexico, where a series of moderate-sized city-states prospered and competed. Into this settled and competitive world stepped a small and obscure group, the Azteca, or Mexica. Within a mere two centuries, these insignificant players on the highland stage presided over the mightiest pre-Columbian empire in the Americas.

The Aztecs' history, as they told it, reads like a rags-to-riches novel. They claimed they came from Aztlan, an island on a lake west or northwest of Mexico, migrating into the valley under the guidance of their tribal god Huitzilopochtli, "Hummingbird on the Left," who was soon reborn as the sun god himself. This was the version perpetuated by official Aztec historians and recorded by the Spaniards. Such migration legends were common in ancient Mesoamerica and should not be taken at face value. The Aztecs had certainly settled in the valley by the thirteenth century, but they were unwelcome arrivals in the densely settled valley. Eventually they settled on some swampy islands in the marshes of the largest lake in the valley, where they founded twin capitals, Tenochtitlán and Tlatelolco, sometime after 1325. Fierce and ruthless warriors, the Aztecs became mercenaries for the lord Tezozomoc of the expanding Tepanec kingdom in 1367. The Aztecs shared in the spoils of his expanding domains, soon adopting the institutions and empire-building strategies of their employer.

After Tezozomoc's death in 1426, an Aztec ruler named Itzcoatl and his exceptionally able adviser Tlacaelel attacked the Tepanecs and crushed them in one of the great battles of Aztec history. The Aztecs became the masters of the Valley of Mexico and set out to rewrite society and history itself. The great Tlacaelel ordered all the historical codices of the Aztecs' rivals burned, creating a mythic, visionary history of the Mexica in their place. The Aztecs were now the chosen of the sun god Huitzilopochtli, the true heirs of the ancient Toltecs, great warriors destined to take prisoners in battle to nourish the sun in its daily journey across the heavens. A series of brilliant and ruthless leaders embarked on aggressive campaigns of conquest to fulfill Aztec destiny. The greatest Aztec ruler was Ahuitzotl (1486–1502), the sixth *tlatoani*, or "speaker." His armies marched far beyond the valley to the borders of Guatemala. Just like Teotihuacán and Tikal, the initial conquests rapidly delineated the broad outlines of their domains.

The Aztec Empire covered both highlands and lowlands and affected the lives of more than 5 million people. A brilliant strategist and able administrator, Ahuitzotl was a single-minded militarist who believed fervently in his divine mission to nourish the sun god. Twenty thousand prisoners reportedly perished in 1487 when he inaugurated a rebuilt Great Temple of Huitzilopochtli and the rain god Tlaloc in the central precincts of Tenochtitlán.

Tenochtitlán

In its late fourteenth-century heyday, **Tenochtitlán** was a sophisticated and cosmopolitan city with a social, political, and economic organization flexible enough to integrate large numbers of outsiders—merchants, pilgrims, and foreigners—as well as thousands of laborers into its already large permanent population. The Aztec capital reflected a society that depended on military strength and on its ability to organize large numbers of people to achieve its end. Thousands of hectares of carefully planned swamp gardens (*chinampas*) that intersected with canals provided food for the large urban population.

The city originally consisted of two autonomous communities, Tenochtitlán and Tlatelolco, each with its own ceremonial precincts. By 1519, Tenochtitlán was the center of religious and secular power, while the main market was at Tlatelolco. The capital was divided into four quarters, which intersected at the foot of the stairway up the Great Temple of Huitzilopochtli and Tlaloc within the central walled plaza. The rectangular plaza was about 457 meters (500 yards) square, large enough to accommodate nearly 10,000 people during major public ceremonies (Figure 13.6).

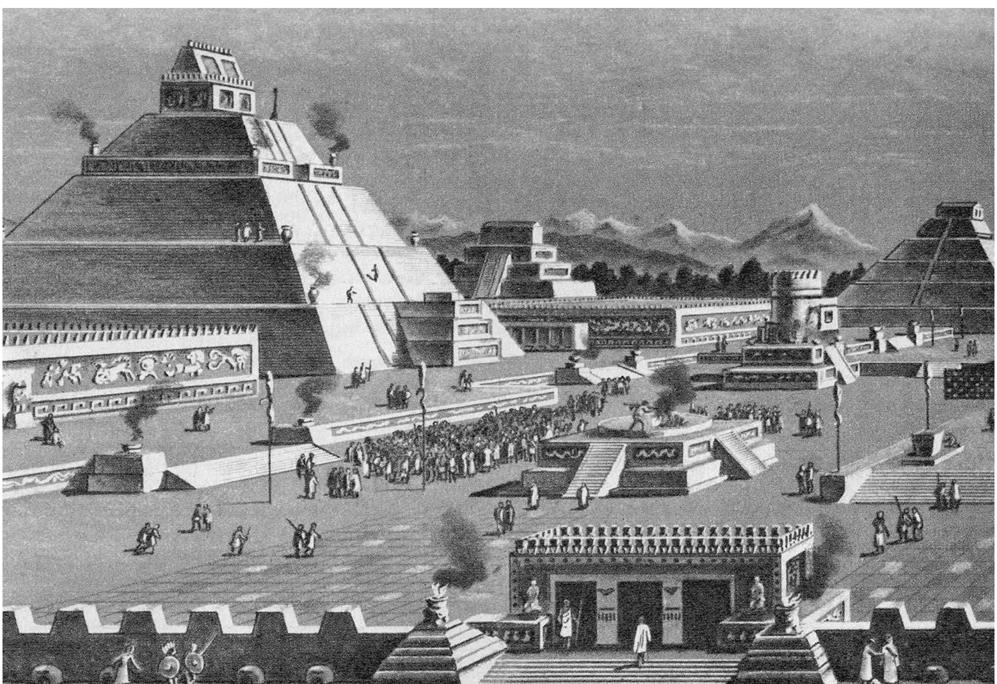


Figure 13.6 Artist's reconstruction of the central precincts of Tenochtitlán, the Aztec capital. The Great Temple of Huitzilopochtli is at the left.
(American Museum of Natural History, negative 326597)

Site

The Aztec Templo Major at Tenochtitlán

The focal point of Aztec religious life was the Great Temple of the gods Huitzilopochtli and Tlaloc in the heart of Tenochtitlán. Until quite recently our knowledge of this hub of the Aztec universe came largely from documentary sources. The Spaniards demolished the final temple at the conquest and built Mexico City's cathedral on much the same site. In 1978 electricity workers digging a pit came across a gigantic oval stone, more than 3.2 meters (10 feet 7 inches) in diameter, not far from the cathedral. Reliefs carved on the stone depicted the dismembered body of the goddess Coyolxauhqui who, according to myth, had been killed by her brother, Huitzilopochtli. Five years of excavations on the site led by archaeologist Matos Moctezuma and his colleagues unearthed the remains of the Great Temple (Templo Major). Little survived of the final building razed by the Spanish, but beneath it lay no fewer than six earlier phases of the temple, the second dating to about AD 1390, virtually complete.

The original temple structure had been a small, crude construction, later enclosed within successively larger shells, new pyramids each with its own shrines, sculpture, offerings, and other artifacts. In all, about 6,000 objects were excavated from 86 separate offering caches—some of them objects of Aztec manufacture, but the great majority clearly tribute or spoils of war from different parts of the empire buried here as a sacred expression of Aztec power and might. They included magnificent artifacts of obsidian, jade, and terra-cotta—and even ancient stone masks from Teotihuacán. Perhaps the Aztecs were themselves amateur archaeologists, who dug up the masks at this ruined city.

The Great Temple depicted the Aztec vision of the cosmos. The platform that supported the whole structure of the temple corresponded to the terrestrial level of existence. The four tapering tiers of the pyramid itself rose to the summit and represented the celestial levels. At the summit was the supreme level, with the two shrines to the two supreme gods, Huitzilopochtli and Tlaloc. The underworld lay beneath the platform. Most of the offerings come from below it. These offerings include a very large number associated with Tlaloc—not just depictions of him, but extraordinary quantities of fish and marine animal bones appropriate for this god of water and rain.

According to the Aztecs, the earth lay at the center of the universe, encircled by a ring of water. Above lay the heavens with the gods and beneath lay the underworld. The terrestrial level of existence had a central point, located at the Great Temple, from which radiated the four directions of the Aztec world. The Great Temple was the symbolic pivotal point, the place where a vertical channel led both to the heavens and to the underworld. The symbolism went even further, for Tenochtitlán itself lay in the midst of a lake. Indeed it was sometimes called Cemanahuac, "Place in a Circle of Water," thought of as a turquoise ring. Such, also, was Aztlan, the mythical Aztec island homeland to the northwest, surrounded by water. Thus, Tenochtitlán was the symbolic center of the universe and the place where the supreme ruler interceded with the gods.

Thanks to excavations by Eduardo Matos Moctezuma and others, we know that the Great Temple stood on the north side of the plaza, a stepped pyramid with two stairways and two shrines, dedicated to Huitzilopochtli and Tlaloc, respectively (see "The Aztec Templo Major at Tenochtitlán" box) (Figure 13.7). Huitzilopochtli's red chapel lay to the right, Tlaloc's blue shrine to the left. Moctezuma unearthed no fewer than six earlier phases of the temple, the second dating to about 1390 and virtually complete. Moctezuma points out that the great pyramid depicts the four celestial levels of the Aztec cosmos, the original ground surface being the earthly plane of existence. It was from this point that the four cardinal directions of the Aztec world radiated, each associated with colors and different personifications of gods and goddesses. From here a vertical channel led to the heavens above and the underworld below.

Tenochtitlán was the symbolic center of the universe, a city set in a circle of water, like Aztlan itself, the mythical island surrounded by water. The greatest festivals of the Aztec world unfolded at the great pyramid, ceremonies marked by rows of brightly dressed prisoners climbing the steep stairway to their death. The victim was stretched out over the sacrificial stone. In seconds, a priest with an obsidian knife broke open his chest and ripped out his still-beating heart, dashing it against the sacrificial

Figure 13.7 Ruins of the Templo Major in the heart of Mexico City. (kohey/Shutterstock)

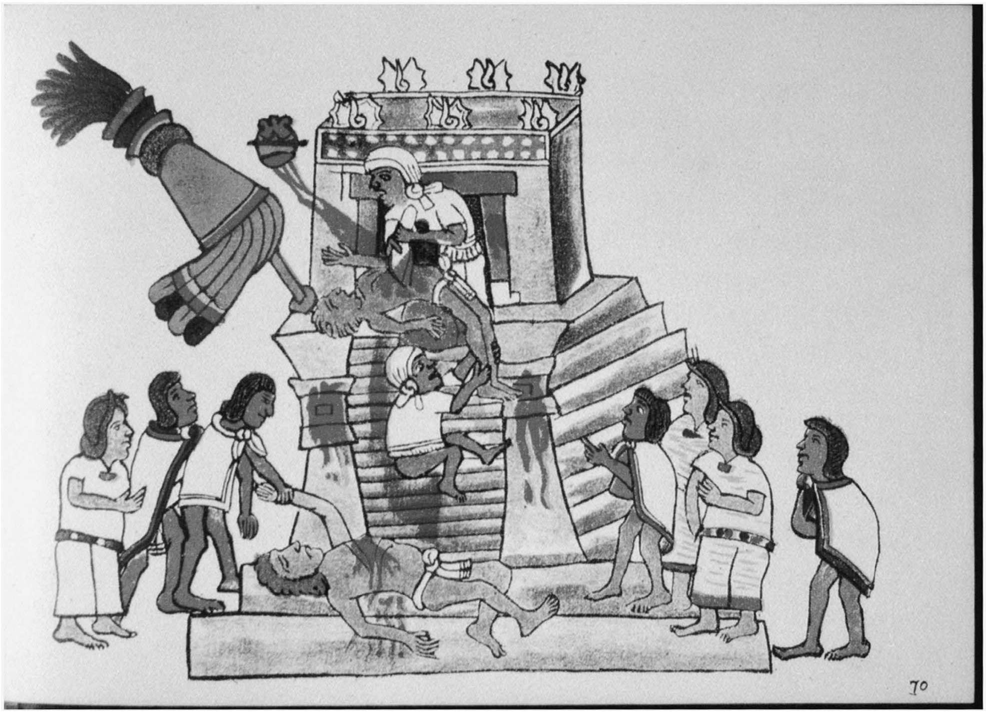


Figure 13.8 Aztec human sacrifice. A victim's heart is torn out at the temple of Huitzilopochtli. (World History Archive/Alamy)

stone. The corpse rolled down the steep pyramid into the hands of butchers at the foot, who dismembered the body and set the skull on the great skull rack nearby (Figure 13.8). Despite a reputation for cannibalism, most experts believe the Aztecs consumed only small amounts on ritual occasions, perhaps as acts of spiritual renewal.

The World of the Fifth Sun

The Aztecs were militaristic, but every deed, every moment of living, was filled with symbolic meaning and governed by ritual (see "Voices: Aztec Thoughts on Human Existence" box). They inherited the cyclical view of time, established by the movements of the heavenly bodies, which had lain at the core of Mesoamerican civilization for millennia. Their 365-day secular calendar measured the passing of seasons and market days. A ritual calendar on a 260-day cycle consisted of 20 "weeks" of 13 days each. Each week, each day, had a patron deity, all of them with specific good and evil qualities. Once every 52 years, the two calendars coincided, a moment at which time was thought to expire until rekindled by the priests lighting a sacred fire in a sacrificial victim's chest. Then a new cycle began amid general rejoicing.

Voices

Aztec Thoughts on Human Existence

For all their well-ordered lives, Aztec wise men puzzled over the meaning of life and probed into the nature of reality and the verities of life. They wondered if life was all a dream:

> Do we speak the truth here, Giver of Life?
> We merely dream, we are only wakened from dreams.
> All is like a dream….
> No one speaks here of truth….
>
> (Leon-Portilla, 1963, p. 220)

These same philosophers had more practical missions, too, to "place a mirror before the people, that they might become wise and prudent: to endow with wisdom the countenances of others." Their task was to give people born faceless a purpose and an identity. So they sought a meaning for human existence. Was there a truth to human life? Were humans real beings or just transitory illusions?

The wise men taught that one's self attempted to fill its own emptiness by searching for wisdom and art, for its own image, the Aztec image of the individual. So deeply traditional was this notion that the Aztec teacher was called "the 'face and heart' of peoples' faces."

Beyond attempting to influence their pupils' wills, Aztec wise men taught self-discipline through strict education. They well knew the dilemma confronting a people who have a measure of personal freedom while at the same time facing a world controlled by the Creator. "We are but toys to Him; He laughs at us," speculated one sage. Humans existed to serve the gods. Existence on earth was but transitory. With death, one entered the world of the beyond, the region of the dead. Here, those favored by Tlaloc, the god of rain, went to an earthly paradise called Tlalocan, where "never is there a lack of green corn, squash, sprigs of amaranth… and flowers" (Anderson and Dibble, 1963, p. 122).

Most people lived well-regulated, humdrum lives, for which the wise men prepared them well:

> Our forefathers, the old men, the old women… went saying that on earth we travel, we live along a mountain peak. Over here there is an abyss, over there is an abyss. Wherever thou art to deviate, wherever thou art to go astray, there wilt thou fall, there wilt thou plunge into the deep. Continue with caution on earth, for thou hast heard that moderation is necessary.
>
> (Anderson and Dibble, 1963, pp. 121–126)

Aztec creation legends spoke of four suns preceding the Aztecs' own world, that of the Fifth Sun. A cataclysmic flood destroyed the world of the Fourth Sun. Primordial waters covered the earth. The gods gathered at the sacred city, Teotihuacán, where they took counsel. Two gods were chosen to represent the sun and moon. They did penance for four days, then immolated themselves in a great fire in the presence of the other gods. They emerged as the sun and moon, blown on their cyclical courses by the wind god Ehecatl. Thus was born the world of the Fifth Sun, but a world doomed to inevitable, cyclical extinction. A strong sense of fatalism underlay Aztec existence, but Aztecs believed they could ensure the continuity of life by nourishing the sun with the magic elixir of human hearts. This was the reason human sacrifice was so prevalent in Mesoamerican society, as a means of returning food and energy from living people to the earth, the sky, and the waters. Feeding the sun was warriors' business, for they were the chosen people of the sun, destined to conquer or to suffer the "flowery death" (death on the sacrificial stone) when captured in battle. From birth, in formal orations, in schools, through art, architecture, poetry, even in dress codes, the Aztecs were told theirs was a divine quest—to carve out an empire in the name of Huitzilopochtli.

The Aztec State

The Aztec Empire was a mosaic of ever-changing alliances cemented together by an elaborate tribute-gathering machine and controlled by a tiny group of rulers, the lord of Tenochtitlán principal among them. Everything was run for the benefit of a growing elite, who maintained their power by ruthless and efficient taxation campaigns, political marriages, and the constant threat of military force. Tribute was assessed on conquered cities and taken in many forms, as raw materials like gold dust, metal artifacts, or tropical bird feathers for ceremonial mantles and headdresses (Figure 13.9). Fine ornaments, even capes, were assessed from communities specializing in such products. Twenty-six cities did nothing but provide firewood for one royal palace alone. Expert smiths made musical instruments like bells and alloyed copper to bring out shimmering gold and silver hues. Both color and sound were central parts of Mesoamerican ideology, commemorating the sun and moon, and the sounds of rain, thunder, and rattlesnakes, helping bring symbolic order to the world. Both settlement data and other archaeological data suggest that the Aztec Empire was less centralized, as both a society and an economy, than its great predecessor, Teotihuacán. To what extent it originated through decision making at the top, as opposed to market dynamics such as supply and demand, is still unknown.

Under the highly visible and much touted imperial veneer lay a complex foundation of small kingdoms, towns, and villages, all integrated into local economies. Many of them existed before the Aztec state; civilizations came into being and continued after the Spanish conquest. At the same time, the economic and political patterns of the empire were highly variable, both regionally and socially, in everything from land tenure to craft specialization, patterns of urbanization to merchants and markets. This intricate social mosaic, only now being revealed by a new generation

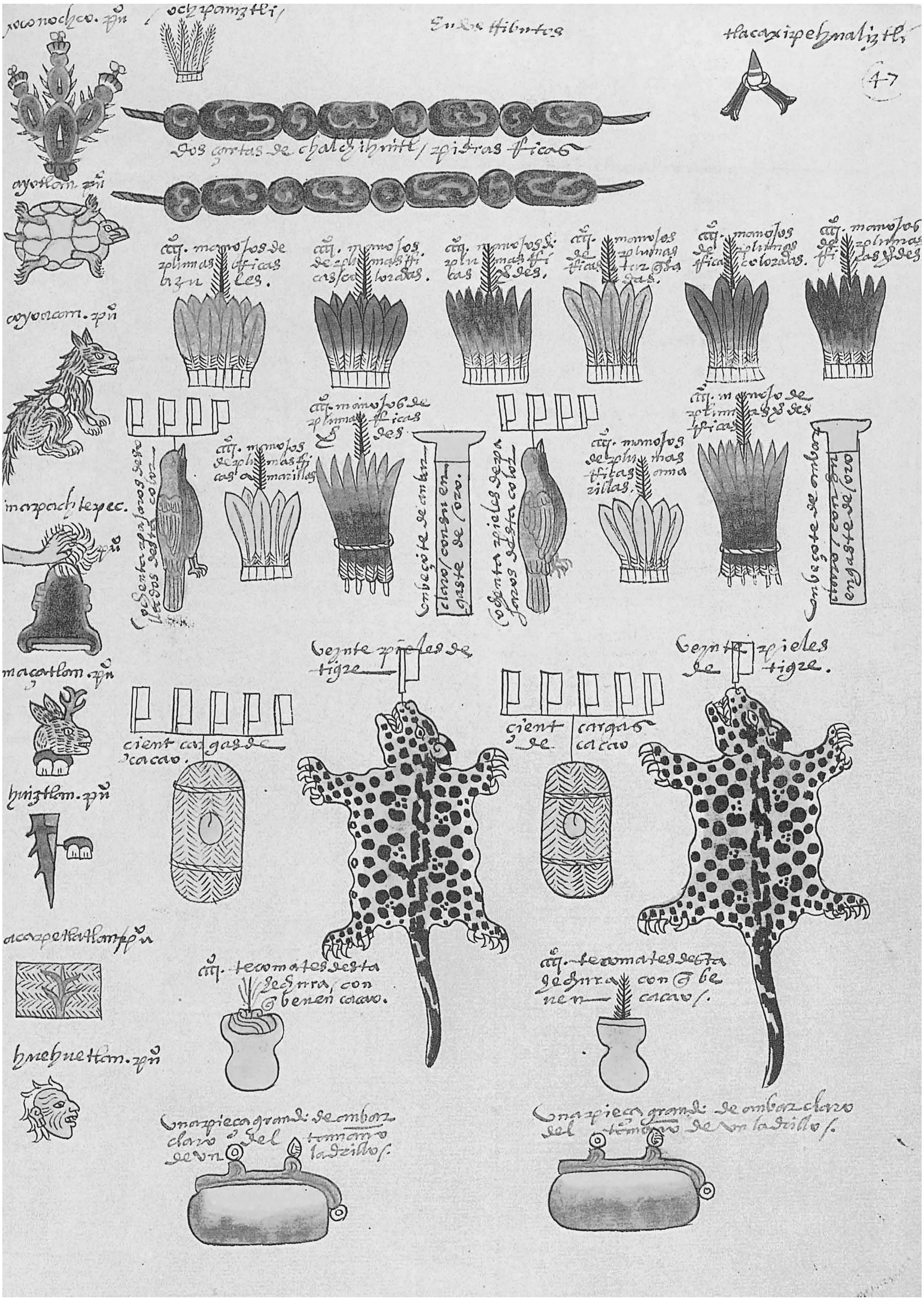


Figure 13.9 Aztec tribute. An inventory preserved in the *Codex Mendoza*, an account of Aztec society compiled after the Spanish conquest for the viceroy of New Spain, which lists among other items from the province of Tochtepec: "1,600 rich mantles, 800 striped red, white, and green mantles, 400 warrior's tunics and shorts." The tribute included colored bird feathers, cacao, and tree gum.
(World History Archive/Alamy)

of archaeological research, lay behind a façade of seeming political and economic uniformity and centralization.

Tribute and trade went together, for the Aztec Empire depended heavily on professional merchants, *pochteca*. The Aztec merchants formed a closely knit class of their own, serving as the eyes and ears of the state, and sometimes achieving great wealth. Tenochtitlán's great market at Tlatelolco was the hub of the Aztec world, attended, so the Spanish chroniclers record, by at least 20,000 people a day and 50,000 on market days. There were gold and silver merchants, dealers in slaves and tropical feathers, sellers of capes and chocolate, and every kind of merchandise imaginable. Specially appointed officials supervised the market to ensure that fair practices prevailed.

The state itself was run for the benefit of the rulers and the nobility, a privileged class who controlled land and had the right to make use of communal labor. Through birthright, tribute levies, and appointed positions, nobles controlled nearly every strategic resource in the empire and the trade routes that handled them. An elaborate dress code covered everything from ornaments to cape and sandal styles—regulations designed to restrict the size of the nobility. The tribute and labor of tens of thousands of commoners supported the state. The humble commoners with their coarse capes and work-worn hands supplied a small number of people with an endless supply of food, firewood, water, fine clothing, and a host of luxury goods that came from all over the lowlands and highlands. Only slaves and prisoners were lower in the social hierarchy.

Every Aztec was a member of a **calpulli**, or "big house," a kin-based group of families who claimed descent through the male line from a common ancestor. The four quarters of Tenochtitlán were organized into neighborhoods based on such groups. The calpulli served as the intermediary between the individual commoner and the state, paying taxes in labor and tribute, and allocating people to carry out public works. Most important, the calpulli held land communally and allocated it to its members. An elected leader maintained special maps showing how the land was being used and dealt with government tribute collectors. The calpulli provided a measure of security to every member of society, while providing an efficient device for the state to govern a teeming and diverse urban and rural population and to organize large numbers of people for armies or work projects at short notice. None of the Aztecs' social and political institutions was new, for they inherited them from the Toltecs and the rulers of Teotihuacán, even if, in the Aztec case, they worked within a more flexible and diverse milieu.

The Spanish Conquest (from AD 1517 to 1521)

The Aztec Empire was at its height when the aggressive and militaristic ruler Ahuitzotl died in 1501. The following year, Moctezuma Xocoyotzin ("the Younger") was elected to the throne, a complex man said to be a good soldier, but given to introspection. When reports reached Tenochtitlán in 1517 of mountains moving on the Gulf of Mexico, of white-bearded visitors from over the eastern horizon to the Maya of the distant Yucatán, Moctezuma became obsessed with ancient Toltec legends, with the departure of Topiltzin Quetzalcoatl, who had sailed over the eastern horizon vowing to return in the year 1 Reed. By grotesque historical coincidence, Hernán Cortés landed in Veracruz in the year 1519, 1 Reed, convincing Moctezuma that Topiltzin Quetzalcoatl had returned to claim his kingdom.

The story of the Spanish conquest that followed unfolds like a Greek tragedy. The conquest pitted an isolated, battle-hardened expeditionary force of about 600 men against a brave, driven people who were convinced, like their illustrious predecessors, that every act of war was imbued with deep symbolism. The Aztecs had long used war to feed the relentless appetite of the gods and to keep a loose patchwork of vassal states in order. With a skilled enemy exploiting their uneasy allies, they found themselves on their own. All they could do was to defend themselves desperately against a puzzling foe quite unlike any adversary they had encountered. This small and determined band of gold-hungry adventurers was accustomed to long and arduous military campaigns, and it was inevitable that they would prevail.

Ten years passed before the whole of Mexico (New Spain) was under secure Spanish control. Tens of thousands of people died in bloody encounters, hundreds of thousands more from exotic diseases like influenza and smallpox introduced by the newcomers. Instead of the divine benevolence of Quetzalcoatl, the conquerors brought suffering, death, exotic diseases, and slavery. More than 3,000 years of Mesoamerican civilization passed rapidly into centuries of historical obscurity.

Summary

- Highland Mesoamerican civilization stemmed from both indigenous and lowland roots. Olmec influence was strong, but small kingdoms developed in the Valley of Oaxaca by at least 1000 BC.
- These coalesced into the Monte Albán state, which reached its heyday during the first millennium AD and coexisted with Teotihuacán on the edge of the Basin of Mexico.
- Teotihuacán was the dominant political and economic force on the highlands and in the Basin of Mexico for the first seven centuries of the first millennium AD. Its rulers traded constantly with the Maya, and its militaristic philosophies and religious beliefs permeated much of Mesoamerica. The great city with its huge pyramids and sacred precincts was an intensely sacred place, credited as the birthplace of Aztec civilization.

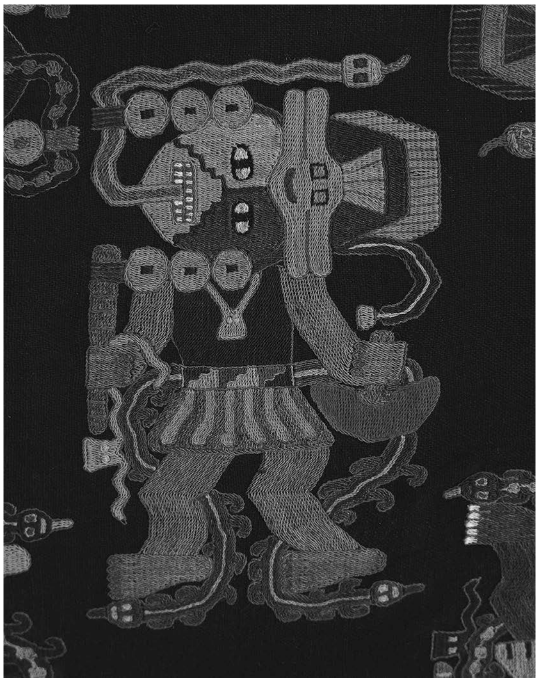
- Toltec civilization, also based in the Valley of Mexico, filled the political vacuum the collapse of Teotihuacán had left behind, but fell apart in AD 1200.
- By the fourteenth century, the Aztecs, who originated to the northwest of the Basin of Mexico, were becoming the dominant force in the highlands. Over the next two centuries, their rulers created a vast tribute-paying empire, which extended into the lowlands and as far south as Guatemala. Aztec civilization depended on militaristic doctrines and human sacrifice to further the ambitious goals of the sun god Huitzilopochtli.
- The empire was already showing signs of strain when Hernán Cortés and 600 conquistadors entered the Aztec capital, Tenochtitlán, in 1519. Two years later, the city was in ruins after a bitter siege. Aztec civilization collapsed abruptly in the face of superior military technology, helped by rebellious vassals who rose against their hated masters.

Further Reading

Susan Toby Evans, *Ancient Mexico and Central America* (London and New York: Thames and Hudson, 2004) is an excellent synthesis. Kent Flannery's edited *The Early Mesoamerican Village* (New York: Academic Press, 1976) contains valuable information on early complexity in the Valley of Oaxaca. Joyce Marcus and Kent Flannery's *The Zapotec Civilization* (London: Thames and Hudson, 1996) is a richly illustrated account of Monte Albán and the origins of civilization in the Valley of Oaxaca. Teotihuacán is well described in René Millon, R. B. Drewitt, and George Cowgill's *Urbanization at Teotihuacán* (Austin: University of Texas Press, 1974) and in Esther Pasztory, *Teotihuacán: An Experiment in Living* (Norman: University of Oklahoma Press, 1997). William Saunders, Jeffrey Parsons, and Robert Santley's *The Basin of Mexico* (New York: Academic Press, 1979) describes the comprehensive archaeological surveys carried out in this highland region. Richard Diehl summarizes the Toltecs in *Tula, the Toltec Capital of Ancient Mexico* (New York: Thames and Hudson, 1983). For the Aztecs, see Geoffrey W. Conrad and Arthur A. Demarest, *Religion and Empire* (Cambridge, England: Cambridge University Press, 1984). Their civilization is described in Michael Smith, *The Aztecs (The Peoples of America)*, 3rd ed. (Hoboken, NJ: Wiley-Blackwell, 2011).

Chapter 14

Andean Civilizations



A shaman on a funerary blanket from Paracas, Peru.
(DEA/G. Dagli Orti/Getty Images)

Chapter Outline

Prologue

The year was 1911. American explorer Hiram Bingham was high in the Andes, struggling along precipitous, densely forested paths, slipping ankle-deep in mud at every corner. Bingham was searching for Vilcabamba, the last refuge of the Inca ruler Manco Inca when he fled from the Spaniards in 1537. With a local farmer as a guide, he and his men climbed in places on all fours, high above the tumbling Urubamba River. Suddenly, he emerged into the open, high atop a mountain ridge. He wandered through "a maze of beautiful granite houses… covered with trees and moss and the growth of centuries." He wandered for hours among "walls of white granite… carefully cut and exquisitely fitted together." Stone terraces climbed like giant staircases up the hillside. A twisting path led to ruined houses built with fine Inca stonework. A granite stairway led Bingham to a plaza with two temples, one containing a large altar stone. "The sight held me spellbound," declared Bingham. On this mountain ridge, the Incas had built **Machu Picchu**, a settlement in such a remote, inaccessible setting that Bingham claimed it was the "lost city of the Incas" (see Figure 14.14). For three years, Bingham worked at Machu Picchu, clearing, excavating, and mapping houses and temples.

Machu Picchu is one of the most spectacular archaeological sites in the world, but was never a lost city, for the local farmers were well aware of its existence. Bingham himself believed he had found Vilcabamba, but in 1964 explorer Gene Savoy identified the remote Inca settlement of Espiritu Pampa in the forested Pamaconas Valley as the last Inca capital (Bingham, 1964, p. 212).

In its late fifteenth-century heyday, the vast Inca Empire, known as **Tawantinsuyu** ("The Land of the Four Quarters"), extended from high-altitude mountain valleys in the Andes through dry highland plains to foothills to tropical rain forests and to coastal deserts, some of the driest landscape on earth (Figure 14.1).

Over many centuries, two "poles" of Andean civilization developed, one along the north coast of what is now Peru, the other in the south-central Andes. Only the Inca succeeded in joining the two into one vast empire. The northern pole was centered on the bleak and effectively rainless Peruvian desert plain, which extends south nearly 550 kilometers (350 miles) along the coast as far as Collasuyu, reaching a width of up to 100 kilometers (62 miles) in the area of the Lambayeque River. Some 40 rivers and streams fueled by mountain runoff flow across the plain, but they can be used for irrigation only in areas where the surrounding desert is low enough.

The southern pole embraced the high plains of the Lake Titicaca Basin, highland Bolivia, and parts of Argentina and northern Chile in the south-central Andes. Much of this region was too dry and cold to

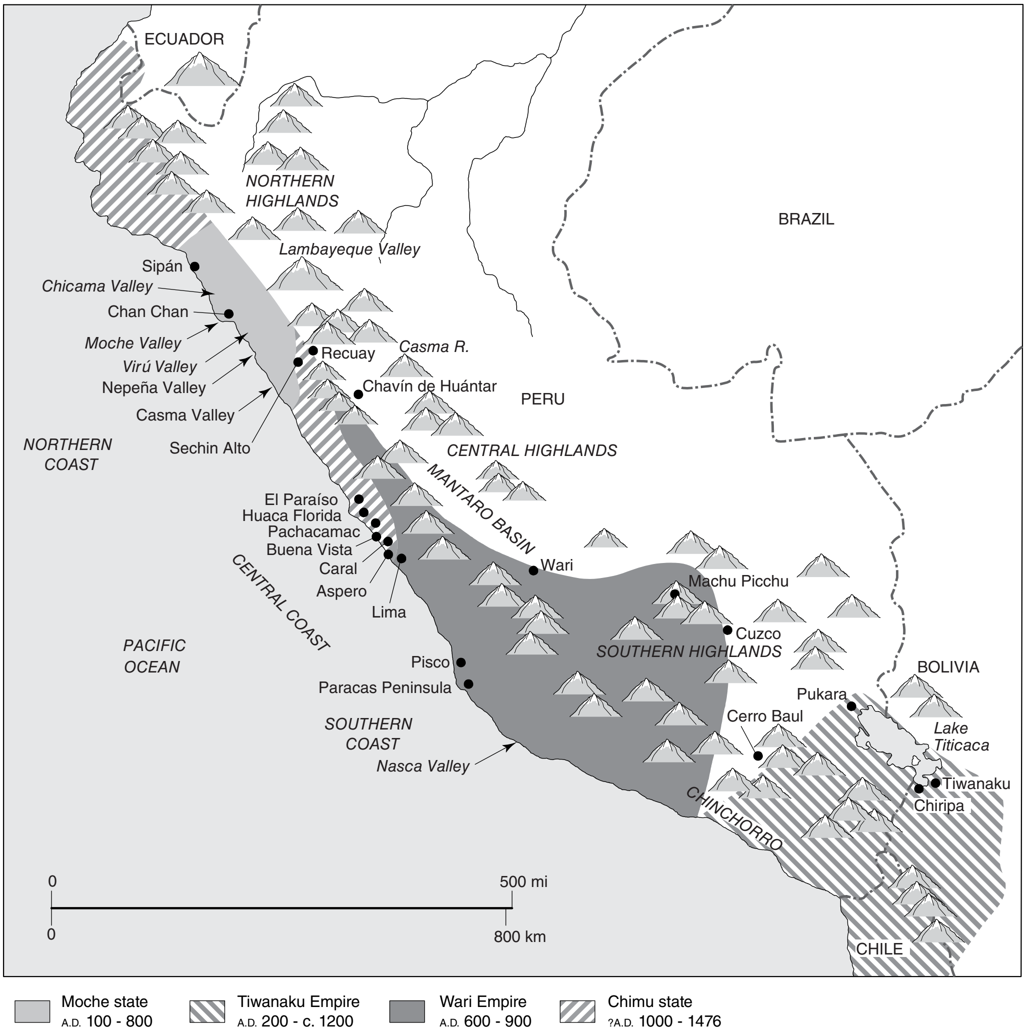


Figure 14.1 Map showing archaeological sites in the chapter.

sustain dense human populations. The northern end of the Lake Titicaca Basin was somewhat warmer and better watered, making both alpaca and llama herding and potato and quinoa agriculture possible.

Andean civilization pursued many different evolutionary pathways, which came together in a remarkable mosaic of states and empires, in large part as a result of widely held spiritual beliefs and by constant interchange between the coast and the highlands and between neighboring valleys and large population centers. Tawantinsuyu itself was a unique political synthesis the Inca lords of the Andes sewed together in the centuries just before European contact. It was the culmination of many centuries of increasing social complexity throughout the Andean area. This chapter describes the development of Andean civilization, which ended in the Inca Empire.

The Maritime Foundations of Andean Civilization

The rugged central Andean mountains are second only to the Himalayas in height, but only 10 percent of their rainfall descends the Pacific watershed. The foothill slopes and plains at the western foot of the mountains are mantled by one of the world's driest deserts, which extends virtually from the equator to 30 degrees south, much of it along the Peruvian coast. At the opposite extreme, the richest fishery in the Americas hugs the Pacific shore, yielding millions of small schooling fish such as anchovies. These easily netted shoals support millions of people today, and they supported dense prehistoric populations. In contrast, the cultivation of this dry landscape requires controlling the runoff from the Andes with large irrigation systems that use long canals built by the coordinated labor of hundreds of people. Only 10 percent of this desert can be farmed, so its inhabitants rely heavily on the bounty of the Pacific, including the enormous shoals of easily netted anchovies. Surprising, perhaps, this apparently inhospitable desert was a major center of complex early states, which traded with neighbors in the highlands and built large ceremonial centers.

In the 1970s, archaeologist Michael Moseley proposed what he called the "maritime foundations of Andean civilization" hypothesis. He argued that the unique maritime resources of the Pacific coast provided sufficient calories to support rapidly growing, sedentary populations, which clustered in large communities. In addition, the same food source produced sufficient surplus to free up time and people to erect large public monuments and temples, work organized by the leaders of newly complex coastal societies. This scenario runs contrary to conventional archaeological thinking, which regards agriculture as the economic basis for state-organized societies. In the Andes, contended Moseley, it was fishing. For thousands of years, coastal populations rose, and their rise preadapted them to later circumstances under which they would adopt large-scale irrigation and maize agriculture.

Several critiques of the maritime foundations hypothesis have appeared, all of them based on the assumption that maritime resources alone could not have supported large coastal settlements. Most of these critiques have tended to ignore the potential of anchovies. Overall, the maritime foundations hypothesis has stood the test of time well, provided it is seen as a component in a much broader evolutionary process, which also took place inland, in the highlands, and in areas where the width of the coastal shelf precluded extensive anchovy fishing.

Richard Burger claims that changing dietary patterns in the highlands, where agriculture became increasingly important, would have created a demand among farmers for lowland products—salt, fish, and seaweed. Seaweed is rich in marine iodine and could have been an important medicine in the highlands, used to combat endemic goiter and other conditions. By the same token, carbohydrate foods like white potatoes that could not be grown on the coast have been found in sites in the Pacific lowlands. Thus, the formation of states in both lowlands and highlands may have been fostered by continuous interchange between coast and interior.

Michael Moseley believes that the reliance on maritime resources led to a preadaptation in the form of large, densely concentrated populations, whose leaders could organize the labor forces needed not only for building large ceremonial centers but also for transforming river valleys with sizable irrigation schemes. Under this scenario, irrigation farming was in the hands of a well-defined group of authority figures, who took advantage of existing simple technology and local populations to create new economies. This transformation, based as it was on trade, maize agriculture, and a maritime diet, acted as a "kick" for radical changes in Andean society. But the transformation was based on ancient fishing traditions, which can be documented thousands of years earlier at early coastal villages.

Coastal Foundations (from 2600 to 900 BC)

Agriculture remained a secondary activity until comparatively recently in the lowlands. Despite this, sedentary villages of several hundred people flourished along the north coast between 2500 and 1800 BC. This initial period of Andean civilization was a critical millennium, for new concerns both with the cosmos and with religion permeated the Andes. The new beliefs manifested themselves in a wave of monumental construction in both lowlands and highlands, notably of U-shaped ceremonial structures.

We do not know when the first more-complex societies developed along the coast, but it was before 3000 BC. **Aspero**, a settlement covering at least 15 hectares (37 acres) flourished at the mouth of the Supe River by 3055 BC. By 2600 BC, a large kingdom was ruled by a center named **Caral** in the hot Supe Valley about 193 kilometers (120 miles) north of modern-day Lima. As many as 17 centers sprang up in the Supe region, supported by cultivating guavas, beans, peppers, and fruit grown with skilled irrigation agriculture. The farmers also grew cotton, but not maize and potatoes, the two later staples of Andean life. The kingdom may have prospered by growing and trading cotton for net manufacture. Much of its subsistence came from anchovies, which occur in desiccated human feces from the site.

Caral is dominated by six large stone platforms with structures atop them built of quarried stone and filled in with cobbles from the nearby river. The largest is 152 by 137 meters (500 by 450 feet) and 18 meters (60 feet) high (Figure 14.2). A small elite governed this important kingdom, but we still know almost nothing about them, or about the ways in which they commanded the loyalty of the hundreds, if not thousands, of people

Figure 14.2 Caral pyramids.
(Mark Green/Alamy)

who built their imposing centers. Caral was abandoned for unknown reasons between 2000 and 1500 BC, just as other kingdoms came into prominence along the coast to the north. **Buena Vista**, by the Chillón River near Lima, has yielded a stepped pyramid temple with distinctive sculpture dating to 2200 BC. The shrine is aligned with the sun and constellations on the equinox and at the summer and winter solstices, which the Andeans used to schedule their agricultural activities.

El Paraíso, built close to the mouth of the Chillón River near Lima in about 1800 BC, is the oldest of these U-shaped ceremonial complexes and the closest one to the Pacific (Figure 14.3). This vast site consists of at least six huge square buildings constructed of roughly shaped stone blocks cemented with unfired clay. The people painted the polished clay-faced outer walls in brilliant hues. Each complex featured a square building surrounded by tiers of platforms reached by stone and clay staircases. The largest is more than 250 meters (830 feet) long and 50 meters (166 feet) wide, standing more than 10 meters (30 feet) above the plain. The rooms apparently were covered with matting roofs supported by willow posts. Perhaps as many as 100,000 tons of rock excavated from the nearby hills were needed to build the El Paraíso buildings. Few signs of occupation appear around them, though, as if they were shrines and public precincts rather than residential quarters. The two largest mounds of collapsed masonry lie parallel to one another, defining a vast, elongated patio covering more than 2.5 hectares (6 acres).

What is most surprising is that people from dozens of scattered villages erected these huge structures. For reasons not yet understood, they

Figure 14.3 El Paraíso.
(AFP Photo/Ernesto Benavides/Getty Images)

united in a building project that channeled most of their surplus energies into a vast monumental center, a place where few people lived but where everyone apparently congregated for major public ceremonies.

El Paraíso's U-shaped layout coincides with the florescence of similarly shaped ceremonial centers in the interior, at a time when coastal people began to consume much larger amounts of root crops, to make pottery, and to shift their settlements inland to river valleys. Some scholars believe that this move coincided with the introduction of large-scale canal irrigation. Perhaps the spread of U-shaped ceremonial centers reflects a radical restructuring of society that accompanied major economic change.

What does this mean in ritual terms? In many parts of the Americas the ritual manipulation of smoke and water served as a way of bridging stratified layers of air, earth, and bodies of water in the cosmos. The early ceremonial centers of the coast and highlands may reflect an ancient tradition of using these substances to maintain communication with the cosmos.

The Early Horizon and Chavín de Huántar (from 900 to 200 BC)

In 1943, archaeologist Julio Tello identified a distinctive art style in stone, ceramics, and precious metals over a wide area of highland Peru, a style he named Chavín after a famous prehistoric ceremonial center at Chavín de Huántar in central Peru. Tello's research led to a long-held belief among Peruvianists that the widespread Chavín art style was a "mother culture" for all later Andean civilizations, somewhat equivalent to the Olmec phenomenon in Mesoamerican prehistory. This became a distinctive "Early Horizon" in Peruvian prehistory, dating to about 900 BC, when there was a great expansion of indigenous religious belief by conquest, trade, and colonization when civilization began.

Chavín de Huántar is testimony to an elaborate, well-developed iconography. The site had a long history, beginning in at least 1500 BC. From small beginnings as a shrine, the builders expanded the site. The temple area is terraced with an impressive truncated pyramid on the uppermost level (Figures 14.4a, b). The 10-meter- (32-foot)-high pyramid appears solid but is in fact hollow, a honeycomb of stone passages and rooms. Special rectangular tubes ventilate the galleries. The temple housed a remarkable carving of a jaguar-like human with hair in the form of serpents, the famous "Lanzón," which may have served as an axis joining the heavens, the earth, and the underworld. The deity seems to be acting as an arbiter of balance and order. The entire center was a place of mediation with the heavens and the underworld. Chavín's priests and religious functionaries served as intermediaries between the living and the supernatural. In this shamanic role, they transformed themselves into supernatural jaguars and crested eagles.

Figure 14.4a The main courtyard of Chavín de Huántar.
(Jesse Kraft/Alamy)

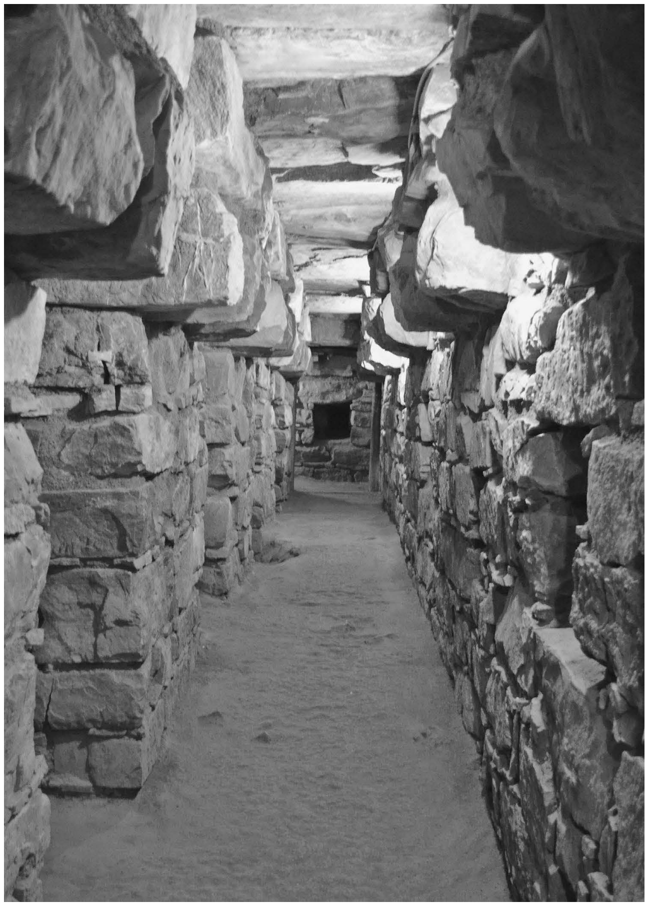


Figure 14.4b A subsurface tunnel in the temple of Chavín de Huántar. (Mark Green/Alamy)

Chavín art reflects these transformations. Jaguar motifs predominate; humans, gods, and animals have jaguar-like fangs or limbs; snakes flow from the bodies of many figures. The art is both grotesque and slightly sinister. Many figures were carved in stone, others in clay or bone, their nostrils dripping with mucus from ingesting hallucinogenic substances. The principal god may have been a nature deity associated with thunder and other powerful meteorological phenomena of the nearby high mountains.

Conceivably, theorizes Richard Burger, Chavín de Huántar was a four-stage artificial mountain, where rituals surrounded the circulation of water. Under these beliefs, the earth floated on a vast ocean. From there, water circulated through mountains to the Milky Way in the heavens, where it became rain to water human fields before flowing back into the ocean. Peruvian archaeologist Luis Lumbreras has replicated the deep roaring sound of water flowing through the elaborate stone-lined tunnels and canals of the great shrine. He believes that the roar of the water would have echoed through the temple during the rainy season, a symbolic link between the rain-giving mountains, the temple, and the layers of the cosmos. With its tangled animal and human motifs, Chavín art has all the flamboyance and exotic touches of the tropical forest. The animals depicted—cayman, jaguar, and snake—are all forest animals. The art may have originated in the tropical forests to the east of the Andes, but the Early Horizon Chavín temple has a U shape with a sunken central plaza, an architectural design documented centuries earlier at other coastal and highland sites.

Chavín represents a coalescence of traits and ideas from both the coast and the forest that formed a flamboyant cultural manifestation over a local area of the highlands. The Early Horizon may have been a long period of cultural change and political adjustment.

The Initial Period

The Initial Period saw the development of distinctive coastal and highland societies at either end of the Andean world, on the north coast and on the shores of Lake Titicaca far to the south.

The Coast (after 1800 BC)

After 1800 BC, a set of interacting kingdoms developed in the Moche, Casma, Chillón, and other river valleys where irrigation agriculture flourished. Centuries before, communication networks had arisen that linked not only neighboring coastal river valleys but lowlands and highlands as well. These trade routes, which straddled all manner of environmental zones, helped spread technology, ideology, pottery making, and architectural styles over large areas, giving a superficial sense of unity that was reflected in the widespread use of common art motifs.

By this time, people had moved from the coast inland. The subsistence base changed from fishing to large-scale irrigation agriculture. Even the first farmers probably made some limited use of canals to water their riverside gardens. However, the new works were on a far larger scale, spurred by the availability of an army of workers fed by abundant Pacific fish; by the presence of gentle, cultivable slopes inland; and by the expertise of the local people in farming cotton, gourds, and many lesser crops such as squashes and beans.

At first, each family may have worked to irrigate its own sloping gardens, but gradually each community grew so much that essential irrigation works could be handled only by cooperative effort. Organized irrigation perhaps began as many minor cooperative works between individual families and neighboring villages. These simple projects eventually evolved over many centuries into elaborate public works that embraced entire inland valleys, controlled by a corporate authority that held a monopoly over both the water and the land it irrigated.

Lake Titicaca Basin: Chiripa and Pukara (from 1000 BC to AD 100)

As Chavín de Huántar rose to prominence in the northern highlands, a separate Early Horizon tradition of complex society developed around Lake Titicaca far to the south. The plains landscape of the basin was gradually transformed by ever more intensive agriculture and herding.

At **Chiripa** on the southern shore of the lake, farming and herding were integrated into much earlier hunter-gatherer traditions. Chiripa itself remained a small village until about 1000 BC, when a platform mound was built in the community, then modified many times over the centuries. Eventually, carved stone plaques set into the walls depicted serpents, animals, and humans, the earliest appearance of a stone-carving tradition that persisted along the shores of the lake for many centuries. Sixteen rectangular buildings surrounded the court. Many features of the Chiripa shrine, especially the stepped doorways, sunken courts, and niche-like windows, are ancestral to the later Tiwanaku architectural tradition, which used the same devices for its ceremonial architecture. The religious beliefs associated with this architecture have been grouped under the Yaya-Mama religious tradition, which flourished for many centuries.

Another major center flourished at **Pukara**, 75 kilometers (47 miles) northwest of Lake Titicaca, with a large residential area and an imposing ceremonial complex on a stone-faced terrace, complete with rectangular sunken court and one-room structures on three sides. Judging from the distribution of Pukara pottery styles, the kingdom's power was confined to the northern Titicaca Basin, but ceramics and other artifacts from as far afield as the north coast reflect widespread trade connections. Tiwanaku, then a smaller center than in later centuries, presided over the southern shores of the lake between 400 BC and AD 100. Archaeologists have found no evidence that Pukara incorporated its southern neighbor.

From the Initial Period onward, the Andean region witnessed an extraordinary array of state-organized societies that displayed a remarkable diversity of culture, art, organization, and religious belief. At the same time, broad similarities in cosmology and culture distinguished these societies from states elsewhere in the prehistoric world.

The Moche State (from AD 100 to 800)

By AD 100, the Moche state had begun in northern coastal Peru, and it flourished for 700 years. Its origins lay in the Chicama and Moche valleys, with great ceremonial centers and huge irrigation works. The spectacular discovery of undisturbed Moche tombs near the village of Sipán about 680 kilometers (420 miles) northwest of Lima has revolutionized our knowledge of Moche's elite. There, Peruvian archaeologist Walter Alva has excavated unlooted royal burials. The sepulchers contained plank coffins holding the extended skeletons of men wearing gold nose and ear ornaments, gold and turquoise bead bracelets, and copper sandals. A ceremonial rattle, crescent-shaped knives, scepters, spears, and exotic seashells surrounded each body (see "The Moche Lords of Sipán" box).

Site

The Moche Lords of Sipán

The discovery of the undisturbed Moche burials at *Sipán*, on Peru's northern coast, ranks as one of the greatest archaeological discoveries of all time. Peruvian archaeologist Walter Alva spent months painstakingly excavating the royal tombs, using conservation laboratories in Peru and Europe. The result is a triumph of scientific archaeology.

Tomb I held the body of a warrior-priest in his late thirties or early forties (Figure 14.5). The mourners had constructed a brick burial chamber deep in the pyramid (Figure 14.6), building the sepulcher like a room with solid

Figure 14.5 A mannequin wearing a lord of Sipán's regalia. (Bert de Ruiter/Alamy)

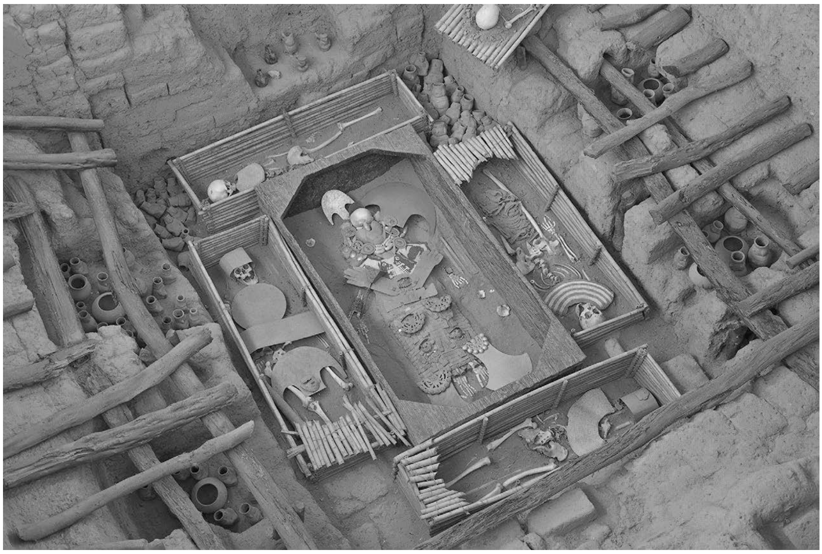


Figure 14.6 Artist's reconstruction of Tomb I at Sipán, showing the lord in his regalia set in his coffin, also male and female attendants.
(wening/Alamy)

mud-brick benches along the sides and at the head end. They set hundreds of clay pots in small niches in the benches. Priests dressed the dead lord in his full regalia, including a golden mask, and wrapped his corpse and regalia in textile shrouds. Then they placed him in a plank coffin and set it in the center of the burial chamber, the lid secured with copper straps. They laid out more ceramics, mainly fine spouted bottles, at the foot and head of the coffin. Next, someone sacrificed two llamas and placed them on either side of the foot of the coffin. At some point, the priests also sat the body of a nine- or ten-year-old child in poor health at the head of the warrior-priest.

Five cane coffins were then lowered into the grave, each containing the body of an adult. The two male dead, perhaps bodyguards or members of the lord's entourage, were both laid on top of one of the llamas. One was a strongly built male, more than 35 years old, adorned with copper ornaments and laid out with a war club. The other bore a beaded pectoral and was between 35 and 45 years old. Two of the three women's coffins lay at the head of the royal casket; in the third, at the foot of the coffin, the woman had been turned on her side. Interestingly, the women's disarticulated and jumbled bones suggest they were not sacrificial victims, for they had died long before the lord, and were partly decomposed at the time of their burial. Perhaps they had been wives, concubines, or servants. Once the coffins had been positioned, a low beam roof was set in place, too low for someone to stand inside the chamber. Then the tomb was covered, a footless male victim being laid out in the fill. Finally, a seated body with crossed legs watched over the burial chamber from a small niche in the south wall, about 1 meter (3 feet) above the roof.

Figure 14.7 A Moche lord presides over a parade of prisoners who are being sacrificed. A frieze from a painted pot "unrolled" photographically.
(Fowler Museum of Cultural History, UCLA)

Comparing the objects found in the tomb with people depicted in Moche art, Christopher Donnan has identified the man as a warrior-priest. Such individuals are depicted on Moche pots presiding over sacrifices of prisoners of war (Figure 14.7). Apparently, Moche warriors went to war specifically to take captives. They would strip the captives of their armor and weapons, then lead them in front of the warrior-priest. Then the prisoner's throat was cut and the warrior-priest and others drank the blood of the slain victim while the corpse was dismembered. On pot after pot, the warrior-priest wears a crescent-shaped headdress atop a conical helmet, exactly the regalia found in the Sipán tombs. Such men were a priesthood of nobles living in different parts of the kingdom, who enacted the sacrifice ceremony at prescribed times.

Moche society consisted of farmers and fisherfolk as well as skilled artisans and priests, who are depicted on pots with feline-like fangs in their mouths and wearing puma-skin headdresses. A few expert craft potters created superb modeled vessels with striking portraits of arrogant, handsome men who can only have been the leaders of Moche society (Figure 14.8). The potters modeled warriors, too, complete with shields and war clubs, well-padded helmets, and colorful cotton uniforms. Moche burials show that some members of society were much richer than others, lying in graves filled with as many as 50 vessels or with weapons or staffs of rank.

We do not know exactly how Moche society was organized, but we can assume that the ruler wielded authority over a hierarchical state of warriors, priest-doctors, artisans, and the mass of the agricultural population. For instance, there was at least one Moche-style settlement in each subject valley.

Figure 14.8 A Moche portrait head.
(Danita Delimont/Alamy)

By this time the coastal people were expert metalworkers. They had discovered the properties of gold ore and extracted it by panning in stream beds rather than by mining. Soon they had developed ways of hammering it into fine sheets and had learned how to emboss it to make raised designs (Figure 14.9). They also had worked out the technique of annealing, making it possible to soften the metal and then hammer it into more elaborate forms, and they joined sheets with fine solder. The smiths used gold as a setting for turquoise and shell ornaments, and in crafted crowns, circlets, necklaces, pins, and tweezers.

The Moche was a multi-valley state that may have consisted of a series of satellite centers that ruled over individual valleys but owed allegiance to the great centers of the Moche Valley. At one time the Moche Valley presided over the coast as far south as the Nepeña Valley. Where possible, the Moche extended their ambitious irrigation systems to link several neighboring river valleys and then constructed lesser copies of their capital as a basis for secure administration of their new domains.

Like all Andean coastal societies, the Moche lived at the mercy of droughts and El Niños. Michael Moseley believes that a series of natural

Figure 14.9 Moche ear ornament in hammered gold from the tomb of a lord of Sipán. The warrior wears a turquoise tunic and holds a detachable war club. He wears an earplug and minute bells on his belt, and carries a removable circular shield. Every part of this intricate ornament had intense symbolic meaning in Moche society. (Agefotostock/Alamy)

disasters struck Moche domains in the late sixth century. The first may have been a major drought cycle between AD 564 and 594, identified from the growth rings deep in mountain glaciers between Cuzco and Lake Titicaca. Crop yields in some valleys may have fallen as much as 20 percent. Sometime between 650 and 700, a great earthquake struck the Andes, choking rivers with debris from landslides. Within a century Moche civilization collapsed.

Science

El Niños and Andean Civilization

El Niños are arguably the most powerful influence on global climate after the seasons. They were years of rising ocean temperatures off the Peruvian coast. Ocean temperatures climbed, exotic tropical fish appeared close offshore, and heavy rain fell in the coast desert, one of the driest landscapes on earth. Known to Peru's fisherfolk as El Niño, "the Christmas Child," for it appeared around Christmas time, it was originally thought to be a local phenomenon. During the 1960s, University of California, Los Angeles (UCLA) scientist Jacob Bjerknes showed that they were global events that came about when a plate of warm water accumulated in the central Pacific and moved east, reversing normal weather conditions. Rain forests in Southeast Asia turn as dry as tide; heavy rain reaches part of the West Coast; severe droughts develop in southern Africa. We now know that the climate engine that produces El Niños interacts with other climate producing as part of a huge global weather machine. As archaeologists and historians have begun cooperating with climatologists, they have realized that El Niño events with their monsoon failures, droughts, and rainfall-generated flood had an important effect on the course of history—on Ancient Egyptian civilization, on the Khmer of Southeast Asia, the Maya of Central America, and on the ancient Andeans.

For example, 1,500 years ago, the Moche warrior-priests, who ruled over several fertile river valleys along Peru's North Coast, poured generations of hydrological and irrigation expertise into their river valley field systems. They ruled by a combination of military power, and also using a religious ideology that validated their rule as inspired by the forces of the supernatural realm. The Moche's rulers developed a glittering, wealthy civilization, but in the final analysis, they were powerless in the face of drought and then in the inevitable El Niño floods that could wipe out entire irrigation systems in hours. Climatological research using ice cores from glaciers high in the Andes has documented vicious drought cycles, especially one between AD 563 and 594, Mountain runoff from the Andes nourished irrigation system in the desert river valleys, so a 25 or 30 percent reduction in the water supply would have been catastrophic, even if the rulers managed to ration grain. The rich coastal anchovy fisheries fed people, but when El Niños arrived, the anchovies moved away. The state was in a desperate crisis, to which there was no easy answer. The warrior-priests adjusted their ideology to allow for these catastrophic events. Their art depicts exotic tropical fish; human sacrifices, recorded in excavations, show that they tried to appease the powerful forces that unleashed El Niños on the Moche world.

A combination of El Niños and huge sand dunes that blew inland caused the rulers to move upstream, closer to where precious water emerged from the mountains. After AD 500, prolonged droughts and strong El Niños led to widespread political disorder and the Moche state imploded. Of course, climate change was not the only cause of the collapse, but there is no question that it was a major contributor.

The Middle Horizon: Tiwanaku and Wari (from AD 600 to 1000)

The Middle Horizon flourished between AD 600 and 1000 in the southern highlands. This period saw the beginnings of monumental building at a highland site—Tiwanaku—that would influence much of the Peruvian world.

Tiwanaku

Between AD 600 and 1000, the wealthiest highland districts lay at the southern end of the central Andes, in the high, flat country surrounding Lake Titicaca. This was fine llama country. The local people maintained enormous herds of these beasts of burden and were also expert irrigation farmers. The altiplano supported the densest population in the highlands, and almost inevitably the Titicaca region became an economic and demographic pole to the prosperous northern coast.

By AD 450 **Tiwanaku**, on the eastern side of the lake, was becoming a major population center as well as an economic and religious focus for the region. The arid lands on which the site lies were irrigated and supported a population of perhaps 20,000 around the monumental structures near the center of the site. By AD 600 Tiwanaku was acquiring much of its prosperity from trade around the lake's southern shores. Copper working probably developed independently of the well-established copper technology on the northern coast.

Tiwanaku was not only an economic force; it was a religious one as well. The great enclosure of Kalasasaya is dominated by a large earth platform faced with stones. Nearby, a rectangular enclosure is bounded with a row of upright stones, and there is a doorway carved with an anthropomorphic god, believed to be the staff god, sometimes called Viracocha (Figure 14.10).

Figure 14.10 The Kalasasaya Temple, Tiwanaku.
(Eduardo Rivera/Thinkstock by Getty Images)

The striking Tiwanaku art style is related to earlier iconography found at Pukara. So powerful was the iconography and, presumably, the political and economic forces behind Tiwanaku that a serious political vacuum opened in the south after AD 1200, when Tiwanaku inexplicably collapsed into obscurity, perhaps in part because of prolonged droughts recorded in Andes glacial ice cores.

Wari

Wari in the Ayacucho Valley is a highland urban and ceremonial center that stands on a hill. It is associated with huge stone walls and many dwellings that cover several square miles. The Wari art styles show also some Pukara influence, especially in anthropomorphic, feline, eagle, and serpent beings depicted on ceramic vessels. Like their southern neighbors, the Wari people seem to have revered a Viracocha-like being. By AD 800, their domains extended from Moche country in the Lambayeque Valley on the northern coast to south of Nazca territory, down the Moquegua Valley of the south-central Andes and into the highlands south of Cuzco. They were expert traders, who probably expanded their domain through conquest, commercial enterprise, and perhaps religious conversion. The state probably maintained storehouses and roads. As with the Inca of later centuries, the state controlled food supplies and labor.

Wari itself was abandoned in the ninth century AD, but its art styles persisted on the coast for at least two more centuries. Both Wari and Tiwanaku were a turning point in Peruvian prehistory, a stage when small regional states became integrated into much larger political units. There was constant and often intensive interaction between two poles of Andean civilization in the highlands and lowlands, each with quite different food resources and products. This interaction, long a feature of Andean life, was to intensify in the centuries that lay ahead.

The Late Intermediate Period: Sicán and Chimu (from AD 700 to 1460)

The highland states traded regularly with several emerging polities on the coast, each of them founded on extensive irrigation systems. The decline of Moche in the Lambayeque Valley had left somewhat of a vacuum, filled by the **Sicán** culture after AD 700. Sicán reached its peak between 900 and 1100, centered on the Lambayeque Valley and remarkable for its magnificent gold work. Elite burials from its capital rival those from Sipán. Between 1050 and 1100, an El Niño caused widespread flooding and disruption. In 1375, an expanding Chimu state overthrew Sicán and absorbed its domains into a new empire.

The Moche Valley had long been densely cultivated, but the **Chimu** people now embarked on much more ambitious irrigation schemes; they built large storage reservoirs and terraced hundreds of miles of hillside to control the flow of water down steep slopes. So effective were these irrigation techniques that the Chimu controlled more than 12 river valleys with at least 50,600 hectares (125,000 acres) of cultivable land, all of it farmed with hoes or digging sticks.

The focus of the Chimu state was **Chan Chan,** a huge complex of walled compounds lying near the Pacific at the mouth of the Moche Valley. Chan Chan covers nearly 10.3 square kilometers (4 square miles), the central part consisting of nine large enclosures laid out in a sort of broken rectangle. Each enclosure likely functioned as the palace for the current ruler of Chan Chan, who probably built himself a new headquarters near those of his predecessors (Figure 14.11). The adobe walls of these compounds once stood as high as 10 meters (33 feet) and covered areas as large as 200 by 600 meters (670 by 2,000 feet). The walls were not constructed to defend the rulers but to provide privacy and some shelter from the ocean winds. Each enclosure had its own water supply, a burial platform, and lavishly decorated residential rooms roofed with cane frames covered with earth and grass. The same enclosure that served as a palace during life became the ruler's burial place in death. The common people lived in tracts of small adobe and reed-mat houses on the western side of the city. Similar dwellings can be seen on the coast to this day.

Oral traditions tell us that the Chimu rulers practiced the institution of split inheritance, whereby each ruler inherited no material possessions to

Figure 14.11 Entrance to an adobe walled compound enclosure at Chan Chan, Peru. (Ubu-ibmee/iStock by Getty Images)

finance his reign. Split inheritance was to play a major role in Inca civilization (both described in the next section). Chimu rulers had access to and control of a huge labor pool. They employed laborers to expand and maintain irrigation works, and they served as military levies to acquire new lands and expand the tax base.

Rulers soon learned the value of officially maintained roadways that enabled them to move their armies from one place to the next rapidly. They constructed roads that connected each valley in their domain with the capital. These were the roads that carried gold ornaments and fine hammered vessels to Chan Chan and textiles and fine black-painted vessels throughout the empire. All revenues and tribute passed along the official roadways, as did newly conquered peoples being resettled in some area far from their original homeland. This draconian resettlement tactic was so successful that the Inca adopted it. The ruler then would install his own appointee in the new lands, in a compound palace that was a smaller version of Chan Chan itself.

The Chimu state (**Chimor**) extended far south, at least to Casma and perhaps reaching to the vicinity of modern Lima, but the main focus of civilization lay on the northern Peruvian littoral, where the soils were fertile and large-scale irrigation was a practical reality.

For all its wide-ranging military activities and material wealth, Chimor was vulnerable to attack from outside. The massive irrigation works of the northern river valleys were easily disrupted by an aggressive conqueror, for no leader, however powerful, could hope to fortify the entire frontier of the empire. The Chimu were vulnerable to prolonged drought, too, for the storage capacity of their great irrigation works was sufficient to carry them over only one or two lean seasons. Perhaps, too, the irrigated desert soils became too saline for agriculture, so that crop yields fell drastically when population densities were rising sharply. Since the Chimu depended on a highly specialized agricultural system, once that system was disrupted—whether by natural or artificial causes—military conquest and control of the irrigation network were easy, especially for aggressive and skillful conquerors such as the Inca, who conquered the Chimu in the 1460s.

The Late Horizon: The Inca State (from AD 1476 to 1534)

The Late Horizon of Peruvian archaeology was also the shortest, dating from AD 1476 to 1534, embracing the heyday of the Inca Empire. The Inca were born into an intensely competitive world, their homeland lying to the northwest of the Titicaca Basin in the area around Cuzco. They were a small-scale farming society living in small villages, organized in kin groups known as **ayllu**, groups claiming a common ancestry and also owning land in common.

The later Inca rulers clothed their origins in a glorious panoply of heroic deeds. It is likely, however, that the Inca were a fractious, constantly quarreling petty chiefdom. The chronicles of early conquest reflect the constant bickering of village headmen, and the earliest Inca rulers were probably minor war leaders (*sinchi*), elected officials whose success was measured by their victories and booty. To stay in office, they had to be politically and militarily adept so that they could both defeat and appease their many potential rivals. The official Inca histories speak of at least eight Inca rulers between 1200 and 1438, but these genealogies are hardly reliable.

During the fourteenth century, the Inca flourished in this competitive atmosphere because their leaders were expert politicians as well as warriors. A leader named Viracocha Inca rose to power at the beginning of the fifteenth century. Unlike his raiding predecessors, however, he turned to permanent conquest and soon presided over a small kingdom centered in **Cuzco**. Viracocha Inca became the living god, the first in a series of constant religious changes that kept the new kingdom under tight control.

Around 1438, a brilliant warrior named Cusi Inca Yupanqui was crowned Inca (the term *Inca* can refer to both the ruler and the people) after a memorable victory over the neighboring Chanca tribe. He immediately took the name Pachakuti ("He Who Remakes the World") and set about transforming the Inca state. In particular, he and his henchmen developed a form of royal ancestor cult. This in itself was not especially significant since Pachakuti simply reworked an age-old Andean tradition, but the law of split inheritance that went along with it had a lasting and profound significance. A dead ruler was mummified. His palace, servants, and possessions were still considered his property and were maintained by all his male descendants except his successor, normally one of his sons. The deceased was not considered dead, however. His mummy attended great ceremonies and would even visit the houses of the living (Figure 14.12).

Those entrusted to look after the king ate and talked with him, just as if he were still alive. This element of continuity made the royal mummies some of the holiest artifacts in the empire. Dead rulers were visible links with the gods, the very embodiment of the Inca state and of the fertility of nature.

Meanwhile, the ascending ruler was rich in prestige but poor in possessions. The new king had to acquire wealth so he could both live in royal splendor and provide for his mummy in the future—and the only wealth in the highland kingdom was taxable labor. Therefore, every adult in Inca country had to render a certain amount of labor to the state each year after providing for the basic subsistence needs of his own *ayllu*. This *mit'a* system repaired bridges and roads, cultivated state-owned lands, manned the armies, and carried out public works. It was a reciprocal system. The state, or those benefiting from the work, had to feed and entertain those

Figure 14.12 Inca ancestor worship. A drawing by seventeenth-century native Andean chronicler Felipe Guaman Poma de Ayala.
(Brian Fagan collection)

doing it. Since the Inca rulers needed land to provide food for those who worked for them and the earlier kings owned most of the land near Cuzco, the only way a new ruler could obtain his own royal estates was by expansion into new territory (Figure 14.13). The conquest had to be permanent, the conquered territory had to be controlled and taxed, and the ruler's subjects had to be convinced of the value of a policy of long-term conquest.

A complicated set of benefits, economic incentives, rewards, and justifications fueled and nourished the Inca conquests. Inca rulers turned into brilliant propagandists, reminding everyone that they were gods and that the welfare of all depended on the prosperity of all rulers, past and present, and on constant military conquest. There were initial economic advantages, too, in the form of better protection against famine. Also, the rulers were careful to reward prowess in battle. Nobles were promoted to new posts and awarded insignia that brought their lifestyle ever closer to that of the king, and a brave warrior could even become a member of the secondary nobility.

Figure 14.13 Inca agricultural terracing at Pisac, Peru. The Inca were experts at high-altitude agriculture and made extensive use of rock-faced terraces to grow quinoa and other crops. (julof90/Thinkstock by Getty Images)

Site

Cuzco, the Inca Capital

At the heart of Tawantinsuyu lay Cuzco, the home of the sun god Inti, its patron. The royal families lived in the capital itself, they and their dependents numbering perhaps 40,000 people. A further 20,000 or so lived within 50 kilometers (30 miles), many of them artisans, minor officials, or engineers. The highest nobles had fine estates close to the city, the navel of the universe that was Tawantinsuyu.

In the days of Pachakuti, a brilliant architect named Huallpa Rimachi Inca laid plans for a massive fortress to be built against a hill named Sacsahuaman, which means "Speckled Hawk." The great rocky headland and its fort dominate Cuzco, looking eastward toward the rising sun. Sacsahuaman is bathed in sunlight long before the rest of the city, so it was a logical place for the House of the Sun, Intihuasi. Intihuasi was the *pukara*, or place of refuge, for Cuzco. A close relative of the ruler commanded the fortress, a position of great trust, for he was responsible for the royal treasury and a vast array of weaponry stored in an armory close to the soldiers' barracks. The great walls that brood over Cuzco today are but a shadow of the original edifice, which the Spaniards wrecked soon after the conquest (Figure 14.14).

Figure 14.14 The Sacsahuaman fortress near Cuzco. Inca architecture was based on closely fitted stone blocks. They were moved by human hands since Andean llamas could only carry loads of about 45 kilograms (100 pounds). (Micajah/Thinkstock)

The Inca called the city Topa Cuzco, "royal Cuzco." Their capital lay along the spine of a narrow ridge between two deep gullies, in a landscape shaped like a triangle facing to the southeast. The great compounds of the living ruler and his deceased predecessors lay within this triangle. Each compound was a world unto its own, close to its neighbors yet separate, an invitation to the ardent factionalism that marked the Inca court.

The central plaza of Cuzco was called Huacaypata, today the Plaza de Armas. The Inca plaza was about 120 meters on its long axis along the river and 91 meters across (400 by 300 feet). The Sapi River defined the southern side, paved over with stone slabs to join Huacaypata with Cusipata, a square on the other bank. Huacaypata was where the four main roads of the empire met, defining the four quarters of Tawantinsuyu and merging them into the heart of the empire. Imposing buildings and royal palaces surrounded the plaza. Pachakuti's palace stood on the west side. The Yuchahuasi, the House of Learning—the school for young nobles and scribes—adjoined the palace. The entire area was an architectural commemoration of Inca rulers and their deeds.

The Inca royal palaces were much enlarged and elaborated versions of rural farm enclosures. The entrance led to a courtyard where a regiment of guards was stationed. Soldiers in ceremonial uniform bearing war clubs protected the entry to the palace proper. The guard room led to an antechamber where high officials awaited their audiences in the nearby audience room. Here the Sapa Inca sat on the stool of state to receive ambassadors and delegations. The storage area and treasury lay in the heart of the palace, where they were most protected. The "House of Spoils" contained trophies from the ruler's victories and sometimes the dried and stuffed bodies of conquered enemy leaders. The harem quarter was the most sequestered of all, where the royal women lived in adjoining, cell-like rooms, close to lush gardens hidden from the outside world. The royal living quarters were close by, where the Inca was looked after by carefully selected young women. During the Inca's life, the palace was a labyrinth of important happenings, ceremonies, and intrigue. When the ruler died, the palace continued to function as if nothing had happened, except that no one debated policy there.

The Coricancha was the largest palace of all, the place where the gods resided, each with his own thatched house and patio. At least 4,000 people were attached to the divine households, some 200 to 300 of them the virgin women, called *manaconas*, who served as Inti's wives. They prepared his food and fermented maize beer, wove his clothes, and drummed for him at major festivals. The manaconas also symbolically satisfied Inti's sexual desires as his consorts. The walls of the Coricancha were built on precipitous terraces in the oldest part of the city. The tapered wall with its beautifully fitted blocks gave a powerful illusion of height and strength, still towering 3 meters (10 feet) above the highest level of the temple platform inside. The temple itself was clad with gold sheet and housed the golden image of the sun, with a garden of golden plants before the room where the symbol lay.

Cuzco was also filled with the incredible wealth of the empire. Cuzco's storehouses held gigantic stocks of raw materials and finished goods that poured into the capital from all corners of Tawantinsuyu, stocks of cloaks, wool, weapons, metals, and food supplies neatly arranged in hundreds of stores.

The Incas' successful ideology provided them with a crucial advantage over their neighbors. Within a decade of Pachakuti's accession they were masters of the southern highlands. Their army had become an invincible juggernaut. In less than a century the tiny kingdom Pachakuti took over had become a vast empire. Topa Inca (1471–1493) extended the Inca Empire into Ecuador, northern Argentina, parts of Bolivia, and Chile. Another king, Wayna Capac, ruled for 32 years after Topa Inca and pushed the empire deeper into Ecuador.

Tawantinsuyu, the empire, was divided into four large provinces known as *suyu* ("quarters"), each subdivided into smaller provinces, some of them coinciding with older, conquered kingdoms. Inca nobles held all the really important government posts. The Inca rulers realized, however, that the essence of efficient government in such varied topography was efficient communications, so the road builders commandeered a vast network of age-old highways from the states they conquered. They linked them in a coordinated system with regular rest houses so that they could move armies, trade goods, and send messengers from one end of the kingdom to the other in short order.

The Inca passion for organization impinged on everyone's life. Their society was organized into 12 age divisions for the purposes of census and tax assessment, divisions based on both physical changes like puberty and major social events like marriage. The most important stage was adulthood, which lasted as long as one could do a day's work. Census and other data of the empire were recorded not on tablets but on knotted strings. These *quipu* were a complex and sophisticated record-keeping system that seems to have been so efficient that it more than made up for the lack of writing. They also were a powerful instrument for codifying laws and providing data for the state's inspectors, who regularly visited each household to check that everyone engaged in productive work and lived in sanitary conditions.

At the time of the Spanish conquest, the Inca controlled the lives of as many as 6 million people, most of them living in small villages dispersed around larger centers. Inca political and religious power was based on major ritual locations like Cuzco in the Andes, where the ceremonial precincts were built of carefully fitted stone blocks (see Figure 14.13 and "Cuzco, the Inca Capital" box). The Inca ruler held court in Cuzco, surrounded by plotting factions and ever-changing political tides. One villain was the very institution of split inheritance that fueled Inca military conquest. Every ruler faced increasingly complex governance problems as a result. The need for more and more conquests caused great military, economic, and administrative stress. The logistics of long-distance military campaigns were horrendous, and the soldiers had to be fed from state-owned land, not royal estates. Moreover, although their tactics were well adapted to open country, where their armies were invincible, the rulers eventually had to start fighting in forest country, where they fared badly. Meanwhile the empire had grown so large that communication became an increasingly lengthier process, compounded by the great diversity of people living within Inca domains (Figure 14.15). Under its glittering façade, Tawantinsuyu was becoming a rotten apple. In the end, the Inca Empire was overthrown not by Peruvians but by a tiny band of foreigners with firearms who could exploit the inherent vulnerability of such a hierarchical, conforming society.

Figure 14.15 Machu Picchu high in the Andes, once thought to have been the last city of the Incas. In fact, it was occupied much earlier.
(Martin Bisof/Thinkstock)

The Spanish Conquest (from AD 1532 to 1534)

This vulnerability came home to roost in 1532, when a small party of rapacious Spanish conquistadors landed in northern Peru. When Francisco Pizarro arrived, the Inca state was in some political chaos, its people already decimated by smallpox and other diseases the first conquistadors had introduced. Inca Wayna Capac had died in an epidemic in 1525. The empire plunged into a civil war between his son Huascar and another son, Atahuallpa, half-brother to Huascar. Atahuallpa eventually prevailed, but as he moved south from Ecuador to consolidate his territory, he learned that Pizarro had landed in Peru.

The Spaniards had vowed to make Peru part of Spain and were bent on plunder and conquest. Pizarro arrived in the guise of a diplomat, captured Atahuallpa by treachery, ransomed him for a huge quantity of gold, and then brutally murdered him. A year later the Spaniards overthrew the Inca capital with a tiny army. Despite pockets of resistance, the world's last preindustrial state collapsed.

Summary

- The earliest complex societies of coastal Peru may have developed as a result of the intensive exploitation of maritime resources, especially small fish easily netted from canoes.

- In time, abundant food surpluses, growing population densities, and larger settlements preadapted coastal people to intensive irrigation agriculture. These societies were organized in increasingly complex ways.
- During the Initial Period, large monumental structures appeared, many of them U-shaped, just before and during the transition toward greater dependence on maize agriculture. This was also a period of continuous interaction and extensive trade between the coast and the highlands.
- The trend culminated in various local traditions, among them the famous Chavín style. Chavín de Huántar, once thought to have been the source of Peruvian civilization, is now known to be a late manifestation of cultural trends that began as early as 2000 BC.
- After the Early Horizon ended in about 200 BC, a series of coastal kingdoms developed until about AD 700, the political and economic influence of which spread beyond their immediate valley homelands. These states included Moche, remarkable for its fine pottery styles and expert alloy and gold metallurgy, which existed in the period between AD 100 and 800.
- About AD 1375, Chimu, with its great capital at Chan Chan on the northern coast, dominated a wide area of the lowlands. Its compounds reflect a stratified state with many expert craftspeople and a complex material culture.
- During the Late Horizon of Peruvian prehistory (1400–1534), unification of the highlands and the lowlands took place under the Inca Empire, which may have emerged as early as 1200 and lasted until the Spanish conquest in 1532–1534.
- The Inca rulers were masters of bureaucracy and military organization and governed a highly structured state—one, however, that was so weakened by civil war and disease that it fell easily to the conquistador Francisco Pizarro and his small army of adventurers.

Further Reading

Michael Moseley's *The Incas and Their Ancestors*, 2nd ed. (New York: Thames and Hudson, 2001) is an excellent summary of Andean archaeology for the general reader. Jerry Moore, *A Prehistory of South America* (Boulder, CO: University Press of Colorado, 2014) is informative and readable. Lawrence Sullivan's monumental excursion into traditional Latin American religions, *Icanchu's Drum* (New York: Macmillan, 1988), is essential for any student of Andean archaeology. The Moche: Jeffrey Quilter, *The Moche of Ancient Peru* (Cambridge, MA: Peabody Museum Press, 2011). Christopher Donnan and Walter Alva's *Royal Tombs of Sipán* (Los Angeles: Fowler Museum of Cultural History, UCLA, 1994) is the definitive account of one of the most spectacular archaeological finds of the twentieth century. Tiwanaku: see Alan Kolata, *Tiwanaku* (Oxford, England: Blackwell, 1993). For Chimu, see Michael Moseley and C. Kent Day, eds., *Chan Chan: Andean Desert City* (Albuquerque: University of New Mexico Press, 1982). The Inca: Both Terence N. D'Altroy, *The Incas*, 2nd ed. (Oxford: Wiley-Blackwell, 2014) and Craig Morris and Adriana von Hagen, *The Incas* (London: Thames and Hudson, 2012) are excellent accounts.

Epilogue

Our journey through the long millennia of prehistory ends on the very threshold of modern times. It ends with the so-called Age of Discovery that saw European explorers sailing ever further from their homelands in search of gold and spices, to serve God, or simply out of compelling curiosity.

Western Europe was born 3,000 years ago. For thousands of years it had been a geographical outpost of Asia, on the fringes of civilizations and empires based in the Middle East and Mediterranean lands. Twenty-five centuries ago, Europe became a Western Peninsula with a consciousness and identity all its own. Born of Greek civilization, this consciousness matured still further in much later European victories against Huns, Turks, and Moors. It was a Christian enclave, driven by doctrines that encouraged a deep sense that the individual was as important as the state. A growing sense of individualism and adventure bred an intense curiosity about the outside world. What peoples lived south of the endless sands of the Sahara Desert? Were there distant lands beyond the boundless horizons of the Western Ocean?

During the 1420s and 1430s, Henry the Navigator, prince of Portugal, organized annual voyages of exploration southward from Europe, deep into tropical latitudes. His captains coasted down the west coast of Africa and rounded the great western bulge in 1433. Then, in 1488, Bartolomeu Dias rounded the southern tip of Africa. He came in contact with the Khoe Khoe, simple cattle herders who appeared to wander aimlessly with their herds. The Khoe Khoe made a profound impression on the Western mind, for they appeared more primitive in their customs than any other people on earth. For centuries, the Khoe Khoe were thought of as half-apes, half-humans, lower on the great chain of being than other humans. They vanished a mere 70 years after European settlement at the Cape of Good Hope in 1652, their herding adaptation destroyed by encroaching white farmers.

Dias was followed in 1497 by Vasco da Gama, who sailed up the East African coast to what is now Kenya, then followed the trade winds to India. Thus, Europeans found an alternative route to the rich gold and spice markets of South and Southeast Asia. They sailed along ancient seaborne routes that linked Africa, with its seemingly inexhaustible exports of gold, ivory, and slaves, with markets that had an insatiable demand for such commodities. In the centuries that followed, Africa was exploited for human and material wealth, not only by European nations but by Islamic lands as well. The burgeoning international slave trade decimated African populations far from the continent's familiar coastlines. European explorers did not penetrate the far interior until the nineteenth century, by which time Africa was already part of a vast and complex world economic system.

As Dias and Vasco da Gama explored African shores, so did Christopher Columbus sail west to the "Indies" in 1492. He thought he was at the threshold of Asia. In fact, he revealed a New World teeming with new species of animals and plants and a great diversity of American Indian societies. As we have seen, the great civilizations of Mexico and Peru collapsed rapidly in the face of the conquistadors, while epidemics of smallpox and other exotic diseases decimated Native American populations within a few generations of the first European visitors wherever they appeared.

With the rounding of the Cape of Good Hope and the discovery of the Americas, the final chapter of human prehistory began, a complex and long-drawn-out clash between increasingly elaborate Western civilization and a myriad of non-Western societies in all parts of the world. The basic scenario was relived again and again. A small party of European explorers would arrive, as did Captain James Cook in Tahiti and New Zealand, or French voyager Marion du Fresne in Tasmania, Australia. Usually the first encounter was a fleeting kaleidoscope of curiosity, sometimes horrified fascination, and often romantic excitement. Sometimes spears were thrown and muskets fired. At others there was friendly trading of furs for cheap glass beads and other trinkets. Almost invariably, however, there was total incomprehension on both sides.

Sometimes the people thought that their strange visitors were gods, as did Moctezuma with Hernán Cortés at the gates of Tenochtitlán. An elderly Maori chief in New Zealand told a nineteenth-century official that the priests had told him the whites were spirits with eyes in the backs of their heads, an apparent reference to Cook's oarsmen facing the stern in their boats. All too soon, and wherever they appeared, the strangers proved not to be gods, but to be only too human—aggressive, warlike, and acquisitive.

At first the contacts were brief ones. But soon Europeans came in larger numbers to trade for furs, to refit their ships, or to search for gold. Then the missionaries arrived, seeking to convert the heathen and to save their souls. Australia became a dumping ground for convicts, many of whom escaped and brutalized Australian Aboriginal groups. In many places a flood of colonists followed the first visitors. They were often impoverished, land-hungry farmers from Europe who sought a better life in the fertile soils of the African interior, British Columbia, New Zealand, or Tasmania.

These were permanent residents, people with iron tools and firearms in search of new homes and lush acreage. They competed with the indigenous populations for prime land, elbowing them aside, sometimes hunting them down, and often acquiring large farms through shady land sales or illegal treaties. Almost inevitably, the indigenous population lost their land, territory that had often been vested in the same kin groups for centuries, if not millennia. They had few options open to them, except to retreat onto remote, marginal lands where they preserved a shadow of their former culture and lifeway, if they managed to survive at all. The only alternative was to assimilate themselves into the newcomers' society, where they almost always lived on the margins, often employed as agricultural laborers or domestic servants.

The spread of Western civilization around the world accelerated dramatically after the Industrial Revolution of the late eighteenth century. This revolution was another catalyst in human history, which created industrial societies driven not by human hands but by fossil fuels. It fostered insatiable demands for raw materials of all kinds, gave birth to the steamship and the railroad, and led to large-scale human migrations from Europe to America, and from Asia to all parts of the Pacific and North America on an unprecedented scale. The mass population movements of recent times have had catastrophic effects on non-Western societies large and small.

Today, in no parts of the world do traditional lifeways survive untouched by modern civilization. A handful of groups survive deep in the Amazon Basin and in highland New Guinea who have still not come into sustained contact with industrialized civilization. These are endangered societies, as rain forests are felled and landscapes modified beyond recognition by the insatiable maw of industrial civilization. To all intents and purposes, however, the ancient world, which began more than 3 million years ago in Africa, has vanished into near oblivion except insofar as we know it from modern scientific research.

Further Reading

Three books cover the closing centuries of prehistory from different perspectives. John Bodley's *Victims of Progress*, 6th ed. (Lanham, MD: Rowman and Littlefield, 2014) is a widely consulted college textbook on culture change and modernization. Brian Fagan, *Clash of Cultures*, 2nd ed. (Lanham, MD: Rowman and Littlefield, 1997) describes contact between Westerners and a series of non-Western societies for a general audience. Eric Wolf's *Europe and the People without History* (Berkeley and Los Angeles: University of California Press, 1984) is the authoritative account, with a strong anthropological bias.

Glossary of Technical Terms

Accelerator mass spectrometry (AMS) A radiocarbon dating method that uses a mass spectrometer, which is more accurate than conventional radiocarbon dating.

Adaptive radiation The proliferation of variants following the appearance of an evolutionary innovation, which typically occurs with the establishment of a new clade, a group of species that contains the common ancestor and all its descendants.

Agricultural Revolution A term V. Gordon Childe coined to refer to the beginnings of food production, caused by drought and close associations between animals, humans, and plants.

Andean Term archaeologists use to refer to those areas of Peru and adjacent countries where state-organized societies developed.

Arboreal Tree-living.

Archaeological culture The material remains of a human culture preserved at a specific space and time at several archaeological sites.

Archaeology The study of the human past using the surviving material remains of human behavior.

Artifact A human-manufactured or modified object.

Atlatl Throwing stick early North American hunters used; a spear-thrower.

Band Egalitarian association of families knit together by close social ties.

Bipedal Walking upright on two feet.

Blade core technology A stone tool technology involving the use of pre-shaped cores and long, parallel-sided blades produced with the aid of a punch, characteristic of many Upper Paleolithic peoples.

Burin A chisel-like stone tool made on a blade used for grooving stone, antler, bone, and wood, and also for making rock engravings.

Chiefdom Society headed by leaders with exceptional entrepreneurial, political, or ritual powers, and which is still kin-based.

Civilization See state-organized society.

Cladistics An analytical system for reconstructing evolutionary relationships that emphasizes diversity over homogeneity.

Clan A group of people from many lineages who live in one place and have a common line of descent from a kin grouping.

Cognitive archaeology The study of the "archaeology of mind," using archaeological methods to study human motives, ideologies, and intangibles.

Composite tool An artifact made up of more than one component such as a stone spear point and its shaft.

Context In archaeology, the exact location of a site, artifact, or other archaeological find in time and space.

Cultural ecology The study of the ways in which human societies adapt to and transform their environments.

Cultural process The ways in which human cultures change over time.

Cultural system The adaptive mechanism, made up of many parts, that humans use to adapt to their physical and social environment.

Culture The primary non-biological means by which humans adapt to their natural environment.

Culture as adaptation See cultural ecology.

Culture history Descriptions of human cultures derived from archaeological evidence.

Cuneiform From the Greek word *cuneus*, "wedge." Mesopotamian script made by stamping clay tablets with a wedge-shaped stylus. Long used as an international diplomatic script in the ancient eastern Mediterranean world.

Dendrochronology Tree-ring dating.

Diffusion The spread of ideas over short or long distances.

Ethnoarchaeology The study of living societies to aid in the interpretation of ancient ones.

Ethnographic analogy Comparison of artifacts and other culture traits from living societies with those of ancient ones.

Ethnographic present A term used to describe prehistoric societies at their moment of contact with Europeans. It is not based on reality, because no culture was ever static, and a momentary portrait of a culture is misleading.

Fertile Crescent The crescent of territory from the Nile Valley through the Iranian highlands to Mesopotamia, where agriculture and civilization began.

Flotation A method of recovering plant remains by passing them through screens and water.

Fluted A term used to describe Paleo-Indian projectile points in North America in which a vertical thinning flake had been removed from the base with a punch. The thinned base made it easier to mount the point on the shaft.

Food production Agriculture and animal domestication.

Groove-and-splinter technique Longitudinal grooving of antler and bone to produce long, parallel-sided grooves for making spear points, harpoons, and other artifacts. Used by Upper Paleolithic and Mesolithic peoples.

Ground stone Artifacts manufactured by pecking the surface and edges with a stone, then grinding them smooth to form sharp working edges. A technique used for axes and adzes employed for felling trees and woodworking.

History The study of the past using written records.

Holocene From the Greek word for "recent." Refers to the millennia since the end of the Pleistocene (Ice Age) about 10,000 BC.

Hominid A member of the biological family *Hominidae* (great apes) that includes humans, chimpanzees, gorillas, orangutans, and their ancestors.

Hominin A recent term denoting members of the biological tribe Hominini, which includes modern humans, earlier human subspecies, and their direct ancestors after the split from the last common ancestor of the chimpanzee around 7 Ma. (Note that some scientists also include chimpanzees in this group, but this book does not.)

Inevitable variation Cumulative culture change due to minor differences in learned behavior over time.

Invention New ideas that originate in a human culture by accident or design.

Knuckle walking Specialized way of getting around on four limbs, which uses the backs of the hands for supporting body weight.

Loess Fine, glacial wind-blown sand distributed over vast areas of central Europe and the Eurasian steppe during Ice Age glaciations, especially during the late Ice Age.

Malakunanja, Australia Rockshelter in Arnhem Land with artifacts said to date to 60,000 years ago.

Mandala A Hindu conception of the state used in Southeast Asian archaeology.

Matuyama/Brunhes A moment of reversal of the earth's magnetic field, ca. 730,000 years ago.

Megalith From the Greek for "large stone." A term applied to stone-built graves widespread during early farming times in Western Europe, generally in the fifth millennium BC.

Mesoamerica A term archaeologists use to refer to those parts of Central America where state-organized societies arose.

Microlith From two Greek words for "small stone." Diminutive stone artifacts manufactured on tiny blades and used as barbs and points for spears and later arrows, characteristic of the late Ice Age and early Holocene societies.

Migration The movement of people from one area to another.

Mitochondrial DNA DNA inherited through the female line, which is of great value in establishing ancient evolutionary relationships.

Monophyletic In evolution, a phylum whose members are all descended from a single ancestor.

Multilinear cultural evolution Cultural evolution along many diverse tracks.

Neolithic Revolution See Agricultural Revolution.

Obsidian Volcanic glass.

Phytoliths Minute particles of silica from plant cells produced throughout the life of a plant and used to identify species in archaeological sites.

Pleistocene The last geological epoch, sometimes called the Ice Age or Quaternary.

Post-processual archaeology Approaches to the past that examine ideology, motives, and non-environmental aspects of culture change.

Potassium argon dating A radiometric dating method that dates geological strata and early archaeological sites from volcanic rocks. Used to date prehistory from the earliest times up to about 100,000 years ago.

Prehistory Human history before the advent of written records.

Preindustrial civilization See state-organized societies. Also, a civilization organized without the use of fossil fuels.

Prestate societies Small-scale societies based on the community, band, or village.

Primordium The very beginning. The starting point of creation myths.

Quaternary See Pleistocene.

Rachis A hinge that joins a seed to a plant.

Radiocarbon dating An absolute dating method based on measuring the decay rate of the carbon isotope carbon-14 to stable nitrogen. The resulting dates are calibrated with tree-ring, ice core, and tropical core chronologies to convert radiocarbon ages into dates in calendar years.

Settlement pattern The distribution of human settlement on the landscape and within archaeological communities.

Shaman (spirit medium) The word comes from the Siberian Tungus word *saman*, meaning "priest."

Sinodonty A distinctive cluster of tooth features associated with Siberian and Native American populations.

Spear-thrower A hooked and sometimes weighted stick or equivalent device used for hurling spears.

State-organized society A large-scale society with strongly centralized government and marked social stratification, synonymous with pre-industrial civilizations.

Sundadonty Teeth characteristics shared by ancient Eurasian and European populations.

Tribe Clusters of bands linked by formal kin groups.

Urban Revolution V. Gordon Childe's concept of an Urban Revolution was based on the assumption that metallurgy, specialists, and food surpluses caused a revolution in human life and urban civilization.

World prehistory The study of human prehistory, from human origins to the advent of literate civilization, from a global perspective.

Glossary of Archaeological Sites and Cultural Terms

This glossary covers major cultural terms and archaeological sites. It does not include names of leaders and other individuals.

Abri Pataud, France A rock shelter used by Upper Paleolithic foragers in southwestern France during the late Ice Age. Famous for its evidence of reindeer hunting.

Abu Hureyra, Syria A village site by the Euphrates River occupied first by foraging groups before 10,500 BC, then by very early farmers. Famous for its excellent botanical evidence for agricultural origins.

Abydos, Egypt Burial place of Egypt's earliest pharaohs, considered a sacred entry to the underworld.

Acheulian stone technology A technology based on hand axes, cleavers, and flake artifacts that flourished in Africa, Europe, Southwest Asia, and parts of Southeast Asia between about 1.65 million and 100,000 years ago. Named after the town of St. Acheul in northern France.

Adena culture A culture dating between 500 BC and AD 400, centered on the Ohio Valley and famous for its elaborate earthworks.

Adulis, Ethiopia A Red Sea port associated with the Aksum civilization.

Aguateca, Guatemala Late Classic Maya settlement of the ninth century AD.

'Ain Ghazal, Syria Early farming village of the eighth millennium BC.

Aksum, Ethiopia Ethiopian highland civilization of the first millennium AD that traded with the Mediterranean and Indian Ocean worlds.

Ali Kosh, Iran A farming settlement on the Khuzestan Plains occupied between 9000 and 6000 BC.

Allia Bay, Kenya Early hominin site by Lake Turkana, which yielded *Australopithecus anamensis* about 4 Ma.

Altamira, Spain Magdalenian painted cave dating to about 15,000 years ago. Famous for its polychrome bison paintings.

El-Amarna, Egypt Capital of the New Kingdom pharaoh Akhenaten, occupied for only about 12 years, ca. 1340 BC.

Ambrona, Spain An Acheulian butchery site dating to between 200,000 and 400,000 years ago.

Ancestral Pueblo (Anasazi) Major Southwest cultural tradition centered on the Four Corners region, which reached its greatest efflorescence after AD 1100.

Angkor Thom and Angkor Wat, Cambodia Royal capitals and shrines built by the Khmer rulers of Cambodia between AD 1000 and 1200.

Anyang, China Central core region of Shang civilization of northern China between 1400 and 1122 BC.

Ao, China Shang civilization capital in northern China occupied in about 1560 BC.

Aramis, Ethiopia Site on the Awash River where *Ardipithecus ramidus* was discovered and dated to 4.5 million years ago.

Archaic Generalized label given to later forager cultures in the Americas, highly diverse and often sophisticated cultures dating from 6000 BC into recent times. In Egypt, this term refers to the first few centuries of dynastic Egyptian civilization.

Arlington Springs California Site on Santa Rosa Island in Southern California with evidence of human occupation about 13,000 years ago.

Aspero, Peru A large settlement with platform mounds dating to ca. 3055 BC at the mouth of the Supe River.

Assur, Iraq Assyrian capital on the Tigris River, which was powerful after 900 BC.

Atapuerca, Spain Cave system that has yielded fossils of *Homo antecessor* (Pioneering man) dated to 1.2 Ma –500,000 BP. This is a controversial species, which some lump with *Homo heidelbergensis.*

Avebury, England A large circular earthwork with stone circles that was the focus of a Stone Age landscape, reaching its final form in about 2500 BC.

Ayllu Andean kin group claiming descent from a common ancestor.

Babylon, Iraq Major early city-state, and later capital of the Babylonian Empire under King Nebuchadnezzar in the sixth century BC.

Bandkeramik complex A cultural label describing the first farmers of central and northwestern Europe of about 6000 BC. Distinguished on the basis of line-decorated pottery.

Benin, Nigeria A West African forest kingdom with a capital of the same name, which flourished before the fourteenth century AD until recent times.

Boghazkoy, Turkey Capital of the Hittite Empire, second millennium BC.

Boxgrove, England Hunting site in southern England used by *Homo erectus* some 500,000 years ago.

Buena Vista, Peru An important religious center in the Chillón Valley near Lima, with distinctive astronomical alignments, dating to ca. 2200 BC.

Cahokia, Illinois Major ceremonial center of the Mississippian culture, built after AD 900.

Calakmul, Guatemala Major Maya political and religious center from Preclassic times to AD 800.

Calpulli An Aztec kin grouping used to organize rural and urban populations.

Caracol, Belize An important Maya center in the seventh century AD. A rival of Calakmul and a major center of stone trade.

Caral, Peru An early coastal ceremonial center on the Peruvian coast, built ca. 2600 BC and abandoned between 2000 and 1500 BC.

Çatalhöyük, Turkey Early farming town that prospered on the obsidian trade between 6000 and 5000 BC.

Çayönü Tepesi, Turkey Early farming settlement with ritual buildings and evidence of an ancestor cult, ca. 8600 to 7000 BC.

Cerén, San Salvador A small Maya village destroyed by a volcanic eruption in the sixth century AD, the ash preserving many details of domestic life.

Chaco Canyon, New Mexico See Chaco phenomenon.

Chaco phenomenon Generic name given to the Ancestral Pueblo sites and associated phenomena of Chaco Canyon, New Mexico, in the eleventh and twelfth centuries AD.

Chan Chan, Peru Capital of the Chimu civilization after AD 1000.

Chauvet See Grotte de Chauvet.

Chavín de Huántar, Peru Ceremonial center in Peru's Andes foothills dating to between 900 and 200 BC. Source of much Andean art and ideology.

Chichén Itzá, Mexico Postclassic Maya center in the northern Yucatan, especially in the thirteenth century AD.

Chilca, Peru A semipermanent foraging settlement on the Peruvian coast dating to after 4000 BC.

Chimor, Peru The domains of the Chimu civilization.

Chimu civilization Lowland civilization in Peru's Lambayeque Valley, which flourished between ca. AD 1000 and 1476.

Chiripa, Peru A ceremonial center near Lake Titicaca founded in 1000 BC.

Cliff Palace, Mesa Verde, Colorado Major Ancestral Pueblo site, which reached its greatest extent after AD 1200.

Clovis tradition Widespread Paleo-Indian tradition associated with very early settlement throughout North America. Dates to the eleventh millennium BC.

Copán, Honduras Major Maya center during the mid-first millennium AD.

Coxcatlán Cave, Mexico A rock shelter in the Tehuacán Valley that yielded desiccated maize cobs dating to about 2000 BC.

Cro-Magnon, France A rock shelter near Les Eyzies in southwestern France where the first late Ice Age people were found in 1868. The Upper Paleolithic people of western and central Europe are often called Cro-Magnons.

Cuello, Belize An early Maya settlement and ceremonial center, occupied as early as 1500 BC, which contains shrines dating to the early second millennium BC.

Cuzco, Peru Capital of the Inca Empire in highland Peru.

Dilmun, Bahrain Important transshipment port between Mesopotamia and the Indus Valley in the Persian Gulf as early as 2500 BC.

Dmanisi, Georgia A site that has yielded crania of *Homo erectus* (or possibly *Homo georgicus*) and dated to ca. 1.8 Ma, the earliest known hominin fossils in Europe and Eurasia.

Dos Pilas, Guatemala Important Classic Maya center after AD 600.

Dyuktai Cave, Siberia The best-known site for a widespread, very late Ice Age culture in northeastern Siberia, which may have been the ancestor of some early Native American groups. Dates to as early as 18,000 years ago.

East Turkana, Kenya Location where fossil hominins and their sites date to ca. 2.5 million to 1.6 Ma.

El Mirador, Guatemala Preclassic Maya center dating to between 250 and 50 BC.

El Paraíso, Peru Ceremonial center in Peru's Chillón Valley dating to ca. 1800 BC.

Eridu, Iraq One of the world's earliest cities, famous for its shrine, ca. 4000 BC and later.

Fort Rock Cave, Oregon A site with possible evidence of human occupation in North America as early as 12,000 BC.

Funan, Cambodia Prosperous city-state region in Southeast Asia between the third and sixth centuries AD.

Ganj Dareh, Iran A seasonal foraging camp of 10,500 BC in the Zagros Mountains.

Giza, Egypt Major pyramid site of Old Kingdom Egypt dating to ca. 2600 BC.

Göbekli Tepe, Turkey Shrine site dating to ca. 9500 BC, boasting of semisubterranean structures and carved monoliths.

Great Zimbabwe, Zimbabwe Major religious and trading center and Karanga chiefdom between before AD 1250 and 1450.

Grotte de Chauvet, France Painted late Ice Age cave with remarkable depictions of lions, rhinoceroses, and other animals, dating to as early as 31,000 BC.

Guilá Naquitz, Mexico A cave occupied by a small band of foragers between 8750 and 6670 BC. Important for the study of early bean and squash cultivation.

Hadar, Ethiopia Location where many specimens of *Australopithecus afarensis* have been found, dating to about 3 Ma.

Harappa, Pakistan Major city of the Indus civilization, ca. 2500 BC.

Hatti, Turkey Hittite kingdom centered on Anatolia in the second millennium BC.

Herto, Ethiopia Location where three anatomically modern skulls dating to 160,000 years ago were found, northeast of Addis Ababa.

Hidden Mammoth site, Alaska A hunting camp in central Alaska dating to about 9700 BC.

Hittites See Hatti.

Hohokam culture A widespread desert farming culture centered on southern Arizona, which flourished from about 300 BC to AD 1500.

Homo heidelbergensis Hominin species known from various sites across Africa and Europe dated to 600,000–200,000 years ago. Thought to be the last common ancestor of Neanderthals in Europe and modern humans in Africa.

Hopewell tradition A religious and burial cult centered on Illinois and the eastern United States, which flourished from 200 BC to AD 400.

Huon Peninsula, New Guinea Site where 40,000-year-old ground stone axes offer early evidence of human settlement on the island.

Indus civilization Indigenous civilization of the Indus Valley in what is now Pakistan, ca. 2700 to 1700 BC.

Jarmo, Iraq Early farming village in the Zagros Mountains occupied before 5000 BC.

Jenne-jeno Early city and trading center in the Niger Basin, West Africa, first millennium AD

Jericho, Jordan Biblical city and famous archaeological site with evidence of an early fortified town in the eighth millennium BC and of farming settlements as early as 7800 BC.

Kalambo Falls, Zambia Lake bed site where Acheulian occupation levels more than 200,000 years old were found.

Kanapoi, Kenya See Allia Bay.

Kanesh, Turkey Hittite settlement founded in the seventeenth century BC, famous in later centuries for its Assyrian trading quarter.

Karanga Generic name given to the Shona-speaking peoples of Zimbabwe.

Karnak, Egypt Temple of the sun god, Amun, New Kingdom, Egypt. After 1500 BC.

Kerma, Sudan Nubian kingdom of the third millennium BC.

Khoe Khoe Pastoral cattle herders of the southernmost tip of Africa, encountered by Portuguese explorers in the fifteenth century AD.

Kilwa, Tanzania East African coastal trading port that was a major transshipment point for African gold and ivory after AD 1200.

Kingdom of Ghana West African state on the southern fringes of the Sahara Desert, which controlled much of the West African gold trade as early as the eighth century AD.

Kingdom of Mali West African state that succeeded Ghana in about AD 1200 and became internationally famous for its gold during the next century.

Kingdom of Songhay West African state, which succeeded Mali after AD 1450 and collapsed after 1500, partly because of the new supplies of gold that reached Europe from the Americas.

Kish, Iraq Early Sumerian city-state of about 2800 BC and later.

Kiva Sacred ceremonial room built by prehistoric peoples in the American Southwest.

Knossos, Crete The Palace of Minos at Knossos was a major center of Minoan civilization. The site was occupied from before 2000 BC to about AD 1400.

Koobi Fora, Kenya Location of some of the earliest traces of stone manufacture in the world, some 2.5 million years ago.

Koro Toro, Chad *Australopithecus afarensis* site south of the central Sahara dating to about 3 to 3.5 Ma.

Koster, Illinois A stratified site in the Illinois River Valley of the North American Midwest inhabited from about 7500 BC to AD 1200 by foragers, then by maize farmers.

Kush An African state in the Sudan that flourished along the Nile River after 900 BC. See Nubia.

Laetoli, Tanzania Site where hominin footprints were preserved in hardened volcanic ash 3.6 Ma.

La Ferrassie, France A rock shelter near Les Eyzies in southwestern France, where evidence of Neanderthal burials was found.

Lagash, Iraq Major Sumerian city-state of the third millennium BC.

La Madeleine, France See Magdalenian culture.

Lapita culture A cultural tradition in the southwestern Pacific, responsible for colonizing much of the offshore Pacific after 2000 BC.

Lascaux, France Major site of Magdalenian cave painting in southwestern France dating to about 15,000 years ago.

La Venta, Mexico Olmec ceremonial center dating to after 900 BC.

Le Tuc d'Audoubert, France A Magdalenian ceremonial site famous for its clay bison figures.

Liang Bua Cave, Flores A cave site occupied by *Homo floresiensis*, a diminutive human, from ca. 100,000 to 50,000 years ago.

Machu Picchu, Peru Inca settlement high in the Andes occupied during and after the Spanish conquest.

Magan, Persian Gulf Transshipment port between Mesopotamia and the Indus Valley.

Magdalenian culture Late Ice Age culture with sophisticated technology and art tradition found in southwestern France, parts of central Europe, and northern Spain. Flourished between 15,000 and 12,000 years ago. Named after the La Madeleine rock shelter at Les Eyzies, Dordogne, France.

Maori people New Zealand's indigenous inhabitants, with ancestry in Polynesia dating back to at least AD 1000.

Mapungubwe, South Africa Center of a cattle and trading chiefdom on the Limpopo River, from AD 1220 to 1600.

Mauryan Empire, India Early Indian empire centered on the Ganges River during the mid-first millennium BC.

Maya civilization Major lowland Mesoamerican civilization from before 1000 BC until the fifteenth century AD, with the Classic period ending in about AD 900.

Mayapan, Mexico Postclassic Maya center ruled by the Cocom family after the thirteenth century AD.

Meadowcroft Rock Shelter, Pennsylvania A long-occupied rock shelter, with possible evidence of human occupation as early as 12,000 BC.

Meer, Belgium A Stone Age camp of 6000 BC, used by stoneworkers.

Meluhha Important Persian Gulf transshipment port for the Indus civilization. Location unknown.

Memphis, Egypt Capital of Ancient Egypt.

Merimde Beni Salama, Egypt A farming settlement in the Egyptian delta dating to about 4500 BC.

Meroe, Sudan Royal capital of the kingdom of that name on the Nile River from about 500 BC to AD 400. A major trading center.

Mesa, Alaska A forager camp site in the Brooks Range of northern Alaska, occupied in about 9700 BC.

Mesa Verde, Colorado A series of canyons in Colorado famous for their multi-room Ancestral Pueblo pueblos of the thirteenth and fourteenth centuries AD.

Mezhirich, Ukraine Late Ice Age forager camp with elaborate mammoth bone houses on the Ukraine's Dnieper River, dating to about 17,000 years ago.

Minoan civilization Bronze Age kingdom centered on Crete, which reached its height between 1900 and 1400 BC.

Mississippian tradition A maize and bean farming culture in the Midwestern and Southeastern United States dating from AD 900 to 1500, remarkable for its large ceremonial centers, elaborate religious beliefs, and powerful chiefdoms.

Mitanni, Syria Bronze Age state of the second millennium BC, east of the Euphrates River. Contemporary with the Hittites.

Moche civilization Coastal Peruvian civilization centered on the Chicama and Moche Valleys, dating from AD 100 to 800.

Mogollon Southwestern cultural tradition from about 300 BC to about AD 1100. A highland farming culture without major population centers.

Mohenjo-daro, Pakistan Major city of the Indus civilization.

Monte Albán, Mexico Major city and state in the Valley of Oaxaca during the first millennium AD.

Monte Verde, Chile A streamside forager site in northern Chile dating to about 10,000 BC.

Mound City, Ohio A Hopewell mound complex covering 13 acres (5.26 hectares) in the Ohio River Valley.

Moundville, Alabama Major Mississippian town and ceremonial center after AD 900.

Mousterian technology Stone tool technology associated with Neanderthal peoples of Europe, Eurasia, and the Middle East after about 100,000 years ago. Based on carefully prepared disk cores. Named after the French village of Le Moustier.

Mycenae, Greece Citadel of Mycenaean kings, ca. 1500 BC.

Mycenaean civilization Bronze Age civilization on mainland Greece, which reached its height between 1500 and 1200 BC.

Nagada, Egypt Predynastic Egyptian kingdom in Upper Egypt dating to the fourth millennium BC.

Nakbé, Guatemala Early Maya ceremonial center of 600 to 400 BC, occupied as early as 1000 BC.

Nekhen, Egypt Ancient Egyptian town and center of an important predynastic kingdom.

Nevali Çori, Turkey Settlement and cult center dating to ca. 9600 BC.

Nineveh, Iraq Capital of Assyrian Empire under King Assurbanipal, ca. 630 BC.

Nubia "The Land of Kush," which lay upstream of Ancient Egypt in present-day Sudan.

Oldowan The earliest known human stone tool technology, based on simple flakes and choppers, which appeared about 2.5 million years ago and remained in use for nearly a million years. Named after Olduvai Gorge.

Olduvai Gorge, Tanzania A site where stratified early hominin archaeological sites are associated with long-dried-up Lower and Middle Pleistocene lakes dated to between 1.75 million and 100,000 years ago.

Olmec Lowland Mesoamerican art style and series of cultures, which formed one of the foundations of later civilizations in the region, from ca. 1500 to 500 BC.

Paisley 5 Mile Caves, Washington State Site where human feces dating to 12,300 years ago were found. Cultural association is unknown.

Palenque, Guatemala Maya city and ceremonial center ruled by the Shield Dynasty for many centuries, and powerful in the seventh century AD.

Paleo-Indian Generalized label given to the earliest forager cultures in North America. Approximate time span from before 12,000 to 6000 BC.

Paloma, Peru A large foraging settlement with limited agriculture on the Peruvian coast, dating to after 4000 BC.

Panalauca Cave, Peru A site that has yielded evidence of early quinoa cultivation and llama herding, dating to about 2500 BC.

Phoenicians Expert traders who controlled much Mediterranean trade after 500 BC. Founders of the city of Carthage in North Africa, they became hated rivals of Rome.

Preclassic The early stages of Maya civilization, ca. 1500 BC to AD 250. Sometimes called the Formative Era.

Pueblo Bonito, New Mexico A major Ancestral Pueblo "Great House" in Chaco Canyon, occupied in the twelfth century AD.

Pukara, Peru Center of a small kingdom in the north Lake Titicaca Basin in the early first millennium AD.

Pylos, Greece Mycenaean palace famous for its archives of clay tablets, dating to ca. 1500 BC.

Quirigua, Honduras Maya city subordinate to Copán, which conquered its neighbor in AD 738.

Sahul Australia, New Guinea, and area surrounding the continental shelf during the late Ice Age.

San Bartolo, Guatemala A Preclassic Maya center with murals depicting the Maya creation legend, from ca. 400 to 200 BC.

San José Mogote, Mexico Important Valley of Oaxaca farming village of the second millennium BC.

San Lorenzo, Mexico Major Olmec center dating to ca. 1250 BC.

San Marcos Cave, Mexico Important Tehuacán Valley site for the early history of maize.

Santorini, Greece Island some 113 kilometers (70 miles) north of Crete, site of a violent eruption in the fifteenth century BC. (The date is disputed and could be a century and a half earlier.)

Saqqara, Egypt Ceremonial complex on the west bank of the Nile in Lower Egypt, where many Old Kingdom pharaohs were buried. Site of the Step Pyramid of Djoser, ca. 2600 BC. Also a center of the important Apis bull cult, which flourished during the Late Period.

Schoningen, Germany Stone Age archaeological site, about 400,000 years old, which yielded the earliest known wooden spears.

Sea Peoples Traders and pirates who dominated much of the eastern Mediterranean for 300 years after 1200 BC.

Shang civilization Early civilization centered on the Huang Ho River of northern China, dating to from ca. 1766 to 1122 BC.

Sicán, Peru Coastal Andean culture, from ca. AD 700 to 1375.

Sipán, Peru Major ceremonial center of the Moche people, celebrated for its spectacular royal burials and dating to about AD 400.

Snaketown, Arizona Major Hohokam settlement near the Gila River, an important ceremonial center.

Southern Cult A term given to a series of artistic motifs and associated religious beliefs of the Mississippian culture found over a wide area of the Midwest and Southeast United States.

Stonehenge, England A stone circle complex dating to the Neolithic and Bronze Age, which flourished as early as 2950 BC and reached its apogee in about 1600 BC.

Sunda Continental shelf of Southeast Asia during the late Ice Age.

Swanscombe, England A Thames valley site that yielded Acheulian hand axes and a skull of an archaic hominin, ca. 230,000 years old.

Taima-Taima, Venezuela A site with possible evidence of early human occupation in the 12,000 BC range.

Tamarindo, Guatemala Maya center, which attacked nearby Dos Pilas, ca. AD 760.

Tawantinsuyu Inca name for their empire, "the Land of the Four Quarters."

Tehuacán Valley, Mexico A dry valley in Mexico where some of the earliest evidence of maize cultivation has been discovered.

Tenochtitlán, Mexico Capital of the Aztec civilization from about AD 1325 to 1521, estimated to have had a maximum population of about 250,000 people.

Teotihuacán, Mexico Major city in the Valley of Mexico that flourished from about 200 BC to AD 750.

Thebes, Egypt Capital of Middle and New Kingdom Egypt after 1520 BC and a major center of the worship of the sun god Amun, known to the Egyptians as Waset.

This, Egypt Predynastic Egyptian kingdom in Upper Egypt in the fourth millennium BC.

Tikal, Guatemala Classic Maya city, which reached the height of its power in AD 200–600.

Tiwanaku, Bolivia Highland Andean state near Lake Titicaca, which traded with a wide region, dating to between AD 200 and 1000.

Toro-Menalla, Chad Site of fossil-bearing beds that yielded the cranium of *Sahelanthropus tchadensis,* said to be 6–7 million years old.

Torralba, Spain See Ambrona.

Trinil, Java, Indonesia Site of gravel deposits up to 1.8 million years old, which have yielded the fossil remains of *Homo erectus.*

Trois Frères, France Magdalenian painted cave, famous for its sorcerer figures.

Tula, Mexico Capital center of the Toltec civilization, ca. AD 900 to 1160.

Uaxactún, Guatemala Classic Maya city in the Mesoamerican lowlands, defeated by its neighbor Tikal in AD 378.

'Ubaid culture Early farming culture of about 5000 BC in southern Iraq.

Ugarit, Syria Major port and commercial kingdom in the northern Levant during the Bronze Age, ca. 1200 BC and later.

Uluburun, Turkey Bronze Age shipwreck site off southern Turkey, dating to the fourteenth century BC.

Ur (Ur of the Chaldees), Iraq Biblical Calah, a major city of the Sumerian civilization in the third millennium BC.

Uruk, Iraq The world's first city, flourishing from 4500 BC for more than 2,000 years.

Valsequillo, Mexico A site where mastodon bones and artifacts date to about 12,000 BC.

Verkhne-Troitskaya, Siberia The earliest known Diuktai site in Siberia, dating to about 18,000 years ago.

Wallacea Sulawesi and Timor, Southeast Asia, during the late Ice Age.

Wangdong, China See Xianrendong.

Wari, Peru Major highland Andean kingdom centered on an urban and ceremonial center of that name, ca. 800 AD.

Willandra Lakes, Australia Shell middens and camp sites dating from 37,000 to about 26,000 years ago.

Xia Early dynasty of northern Chinese rulers dating to before 1700 BC, known from both archaeological evidence and legend.

Xianrendong, China An early site used for rice farming, ca. 9220 and 7550 BC. The exact date of the earliest rice cultivation is unknown.

Xiao-tun, China Capital of Shang civilization, from 1400 to 1122 BC, located in the Anyang region of northern China.

Yangshao, China A widespread farming culture in the Huang Ho River Valley of northern China after 5000 BC.

Zhou An important Chinese dynasty that ruled over much of northern China after 1122 BC.

Zhoukoudian, China Cave site famous for its *Homo erectus* fossils dating to as early as 600,000 years ago.

Zimbabwe See Great Zimbabwe.

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