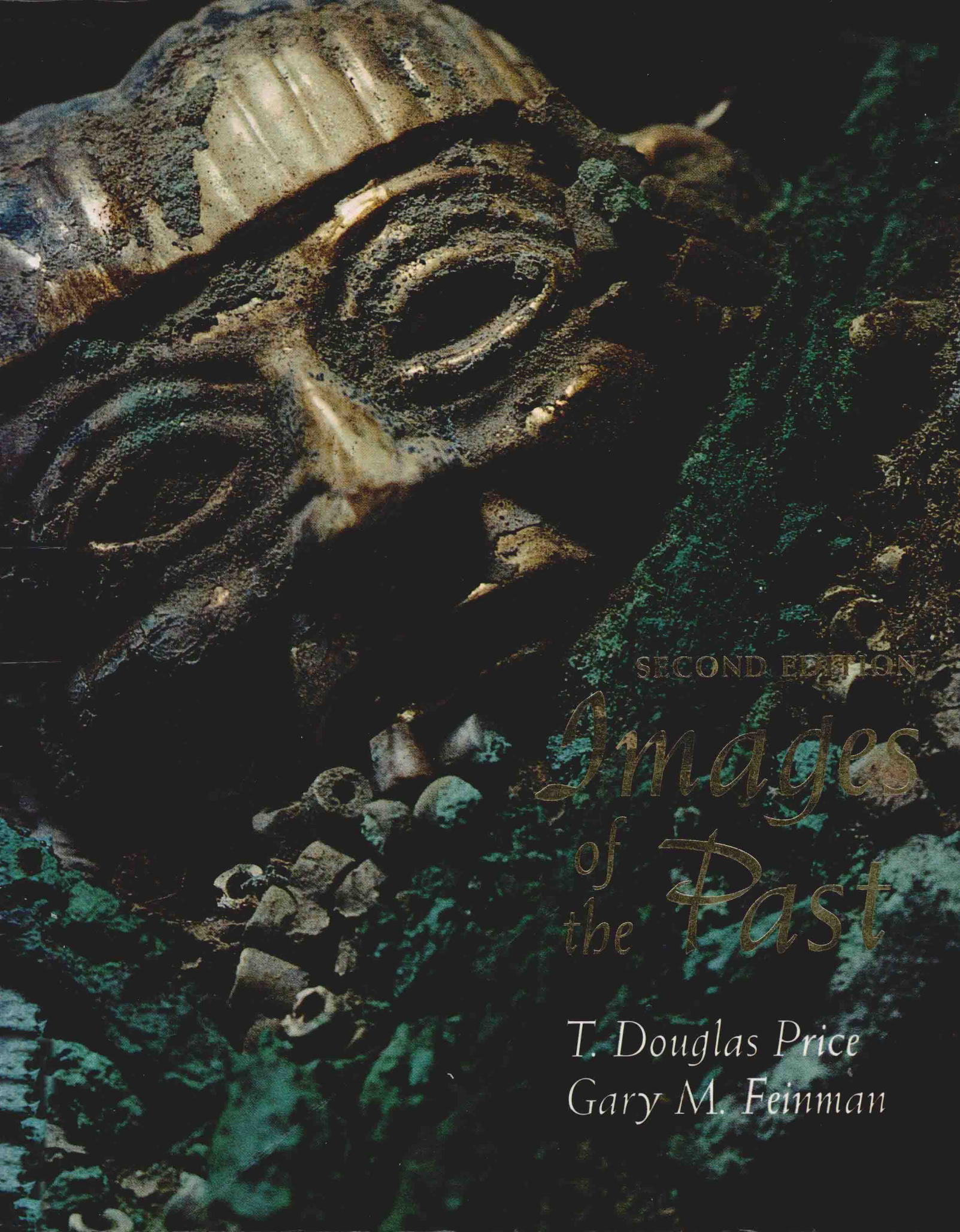

SECOND EDITION

Images of the Past

T. Douglas Price
Gary M. Feinman

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IMAGES OF THE PAST

T. Douglas Price

Gary M. Feinman

University of Wisconsin, Madison

Mayfield Publishing Company

Mountain View, California

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FOR ANNE BIRGITTE GEBAUER AND LINDA NICHOLAS

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PREFACE

Images of the Past is an introduction to prehistoric archaeology that aims to capture the excitement and visual splendor of archaeology while at the same time providing insight into current research methods, interpretations, and theories in the field.

A number of introductory books on the subject of archaeology already exist. Such volumes generally take one of two directions; they offer either a comprehensive survey of world prehistory or a primer on method and theory. Surveys of world archaeology summarize what archaeologists have learned, but they often tend to be rather dry encyclopedias of information on the many places and times that people have lived in the past. That vast body of data is formidable to the beginning student. Primers on method and theory, on the other hand, are compilations of the history, techniques, concepts, and principles of archaeology: how to search for archaeological remains, how excavations are done, how to determine the age of prehistoric materials, who Louis Leakey was, and the like.

We assume that most beginning students of archaeology want to know what archaeologists have learned about the past. It is our goal, then, to discuss *what* archaeologists have learned more than *how* they have learned it. But you can't have one without the other. We believe that a combination of what has been discovered and how it was found will prove to be of most value for those beginning to learn about archaeology.

For this reason we are taking a new tack in this book. Our focus is on more than eighty archaeological sites from a variety of times and places around the world. Rather than try to cover all of prehistoric archaeology, we have chosen to emphasize certain discoveries that have resulted in important insights into prehistory. These sites, then, are signposts through the past.

We begin this journey with the evidence for the first humans, almost five million years ago, and we conclude with the stirrings of written history in the Old World and the European conquest of the New World. The sites are grouped in ten chapters organized along chronological and/or geographic lines. The first four chapters are in chronological order, from the earliest human remains several million years ago to the beginnings of farming around 10,000 years ago. These chapters follow the expansion of the human species from its original home in Africa into Asia, Europe, and eventually Australia and the Americas. Chapter 5 covers the beginnings of agriculture in the Old and New Worlds.

Chapters 6 through 10 treat the rise of large, complex societies and early states. This second half has a geographic focus, with chapters on North America, Mesoamerica, South America, Old World states, and Europe. Within each of these chapters we have generally followed the sequence of development through time, from earlier to later. Although the earliest state societies arose in the Old World, we have arranged the chapters from the New World to the Old in order to emphasize and compare the rise of states in both areas. This arrangement of the chapters is intended to enhance comprehension of major processes such as the origins and spread of agriculture and the rise of more complex societies.

Each chapter contains an introduction and summary. The introductions provide an overview of the time period and developments that are discussed in the chapter. They also offer continuity between the sections and contain essential maps and chronological charts for the chapter. The summaries vary in content—some provide a summation, others introduce new information and concepts, others are theoretical, and yet others are more comparative. Examples of discussions included in the summaries are the behavioral correlates of cold climate adaptations, the origins of language, and the nature of cultural complexity. The introductions and summaries should be read with some care, for they provide the glue that binds the site descriptions together.

Interspersed among the site descriptions are highlighted sections that cover some of the how and why of archaeology: essential methods, debates about archaeological interpretation, or simply certain spectacular finds. In these sections, we illustrate some of the more interesting questions archaeologists ask about the past and show various new methods employed to decipher the archaeological record.

Because prehistory is a very visual subject, we have included more than 500 illustrations. It is essential to see and study the maps, plans, artifacts, and places that comprise the archaeological record. The basic framework of

archaeology is the location of prehistoric materials in time and space. For this reason there is a series of coordinated maps and time lines to show readers where these sites and materials fit in terms of geography and chronology. In addition, we've included a number of color photographs in a separate section of the text to provide some impression of the captivating beauty of the past.

Throughout the text we provide a number of learning aids to help students better understand the material that is presented. Following difficult site names, we have included a pronunciation guide in parentheses. Technical terms and important concepts in archaeology are indicated in bold type; these words can be found in a glossary at the end of the book. Where appropriate, we have tried to provide some sense of the size of areas and structures from archaeological sites with reference to modern features such as city blocks, football fields, and the like. A list of general suggested readings appears at the end of each chapter, while more detailed lists of references are found at the end of the book. Specific citations were not used in the text for the sake of continuity, but references for the information can be found under the name of the individual associated with the work in the references at the back of the book. Finally, an appendix offers some English–metric measure conversions and equivalents to help make sizes more concrete.

A note on dates: The age of archaeological materials in the text is given in two ways. Dates from the Pliocene and Pleistocene are expressed in years before the present (B.P.), or as millions of years ago (m.y.a.). Dates from the last 10,000 years or so are given in calendar years before Christ, B.C., or *anno Domini,* A.D. Because corrected radiocarbon (calibrated) dates can only be extended back 5000 or 6000 years from the present, we have not used such corrections for the dates in this text. This subject is discussed in more detail in Chapter 3. The more recent dates are given in uncalibrated radiocarbon years unless otherwise noted.

Finally a note on the creation of this book. We began this project because we were generally dissatisfied with the texts available for introductory archaeology. We divided up the book according to our own areas of knowledge and activity. Doug Price is interested in prehistoric foragers and the transition to agriculture; Gary Feinman is concerned with the rise of complex societies and the organization of states. Price works primarily in the Old World with stone tools and hunter-gatherers; Feinman does fieldwork largely in Mexico and the American Southwest. We hope that our interest and enthusiasm for archaeology carry over to you in this book and that you enjoy these *Images of the Past*.

WHAT'S NEW IN THIS EDITION

The response to the first edition of *Images of the Past* exceeded our expectations, and we are delighted to compile a second edition. Because of the many helpful comments and suggestions we have received, we have been able to revise in accordance with both new discoveries in archaeology and the interests of our readers. The pace of discovery and insight in modern archaeology is such that each year there are dramatic changes in our understanding of the past. We hope to keep *Images of the Past* as up to date as a book about the past can be.

Along these lines, we have dropped some sites and added new ones that represent very important recent discoveries. Some of the new additions include recent East African finds and changing views on the biological and cultural evolution of early hominids, two newly discovered French caves containing Upper Paleolithic art, the spectacular tombs from Sipán in Peru, the remarkable discovery of the Iceman in the Alps of Europe in 1991, and the recognition of indigenous domestication of plants in North America. We have updated information on the first peoples of the New World and added more material on the genetics of domestication. By expanding the discussion of comparative states and new information on South Asia, Mesopotamia, and Mexico, we have placed more emphasis on cross-cultural similarities and differences.

We have expanded the chapter introductions and summaries to better synthesize and link the issues raised in the discussion of individual sites, as well as to point out why we chose to include these sites. We have also deleted most of the biographies of archaeologists in favor of increased discussion of significant controversies in the field. Controversies highlight dynamic areas of archaeological research and provide insight into how archaeologists think about the past. Such controversies include the debate over hunting versus scavenging activities among our early ancestors, the use of DNA to reconstruct the human family tree and the Eve hypothesis, the end of Neanderthal, the rise of fully modern humans and how they emerged, the timing of the appearance of early maize, the origins of agriculture in North America, the origins of social inequality, and competing perspectives on power and strategies of rulership.

We have also added a brief section in the Introduction on principles of archaeology to provide more information up front about theory and method in the study of the past. Boxes with information on methods, controversies, theories, and the like are now highlighted in such a way as to make them more distinctive from the sites in the chapters.

ACKNOWLEDGMENTS

Any project like this one is the culmination of the efforts and contributions of a multitude of individuals and institutions. We want to thank the many individuals who have helped with this book in a number of different ways from reviewing the text, providing new data, supplying photographs, helping us locate a variety of materials, and general support. We have done our very best to contact the copyright holders of the original work included herein and to secure their permission to reprint their material; if we have overlooked anyone, we offer our sincere apologies.

This project has been long and complex and would not have been feasible without the help of these friends and colleagues: Kim Aaris-Sørensen, Melvin Aitkens, Niels Andersen, Larry Bartram, Gert Jan Bartstra, John Bennet, C. K. Brain, Robert Brightman, Brian Byrd, Christopher Chippendale, Tim Champion, Grahame Clark, Desmond Clark, Carmen Collazo, Meg Conkey, George Dales, Jack Davis, Hilary and Janette Deacon, John de Vos, Preben Dehlholm, Tom Dillehay, Christopher Donnan, Scott Fedick, Lisa Ferin, Kent Flannery, Melvin Fowler, George Frison, Anne Birgitte Gebauer, Henry George, Jon Gibson, Peter Christian Vemming Hansen, Matt Hill, Brian Hoffman, Frank Hole, Vance Holliday, F. Clark Howell, Tom Jacobsen, Dick Jeffries, Greg Johnson, Ken Karstens, Larry Keeley, Mark Kenoyer, Susan Kepecs, J. E. Kidder, Jr., Richard Klein, François Lévèque, Katina Lillios, Henry de Lumley, Tom Lynch, Joyce Marcus, Alexander Marshack, Ray Matheny, Alan May, Richard Meadow, A. T. M. Moore, Chris O'Brien, John Parkington, Peter Vang Petersen, Theron D. Price, Jeffrey Quilter, John Reader, Charles Redman, Merle Greene Robertson, Gary Rollefson, William Ruddiman, Denise Schmandt-Besserat, Jeff Shokler, Brian Siegel, Ralph Solecki, Charles Spencer, Dragoslav Srejovic, Sharon Steadman, Jim Stoltman, J. F. Thackeray, David Hurst Thomas, Donald Thompson, Larry Todd, B. L. Turner II, Patty Jo Watson, Huang Weiwen, J. Peter White, Joyce White, Edwin Wilmsen, Peter Woodman, and Tineke van Zandt.

Several individuals deserve special mention. Linda Nicholas helped greatly with many parts of the project, but especially with finalizing large parts of the text and illustrations. Jennifer Blitz spent much of a year obtaining illustrations and permissions for the first edition with extraordinary energy and care. We're also grateful to our teaching assistants in our introductory course in archaeology at the University of Wisconsin: Andrew Balkansky, Linda Gaertner, Brian Hoffman, Jeff Shokler, Robert Simpkins, and Tina Thurston. At Mayfield, our editor, Jan Beatty, inspired and cajoled at the appropriate times to get the job done. Jan has become a valued friend in the process. Julianna Gustafson provided assistance and the production team—Lynn Rabin Bauer, Jeanne Schreiber, Bettina Borer, Brian Pecko, and Randy Hurst—labored long, hard, and well to put all of this together.

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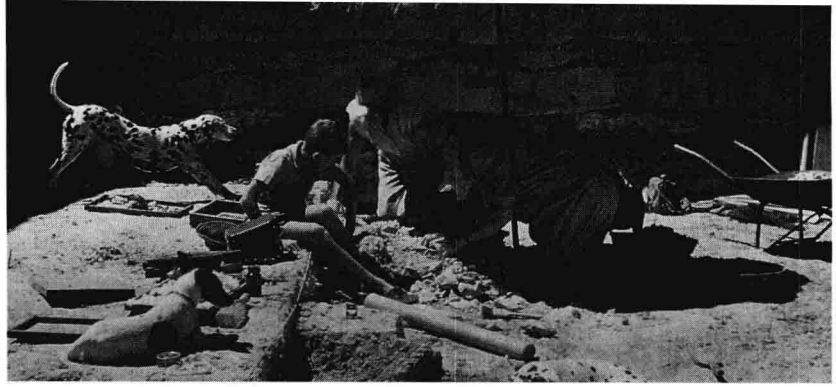
To all of these individuals goes our sincere appreciation. We hope that you find the result worth your efforts, and that you will continue to provide input that will improve the next edition.

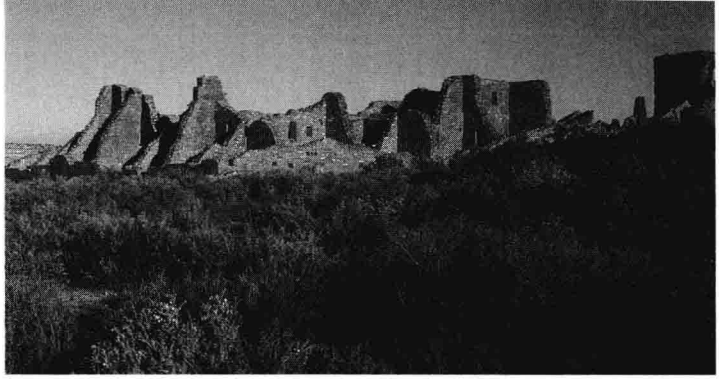
CONTENTS



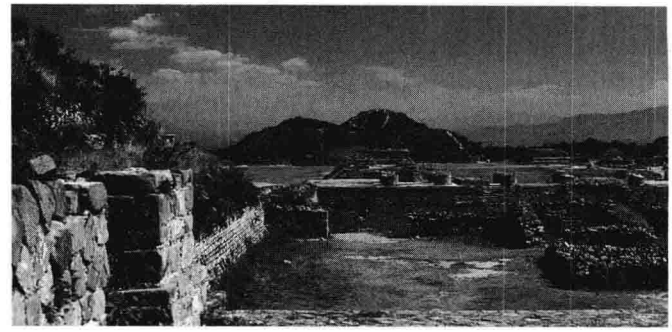
The Leakey family at work in Olduvai Gorge.

A Jomon site near Tokyo.

The Black Earth site at Carrier Mills, Illinois.

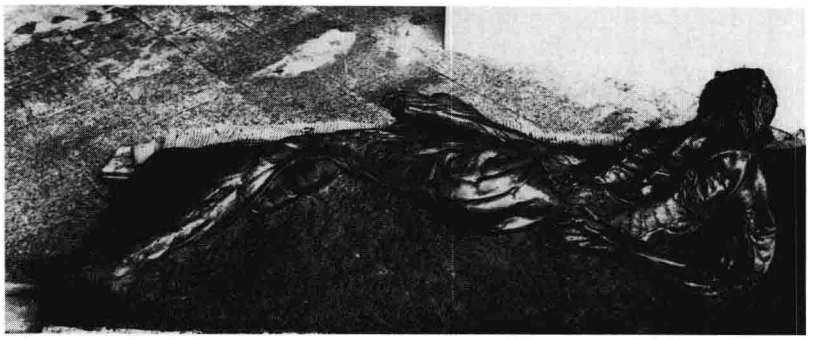


Pueblo Bonito in Chaco Canyon, New Mexico.



The Main Plaza at Monte Albán, looking south from the North Platform.

The Great Wall of China, north of Beijing.



Grauballe Man, a 2000-year-old body from a Danish bog.

INTRODUCTION

Images of the Past is a survey of world archaeology, covering more than 4 million years and all the continents except Antarctica. It is not possible to describe all of human prehistory in a single volume such as this; that would be a little like trying to see Washington, D.C., in 15 minutes. Because we have to be selective and can visit only some of the most interesting and important places, we have chosen archaeological sites that have increased our understanding of the past. We hope that the pathway that begins in the next pages will provide you with a sense of what archaeologists know about the past and how they have come to know it.

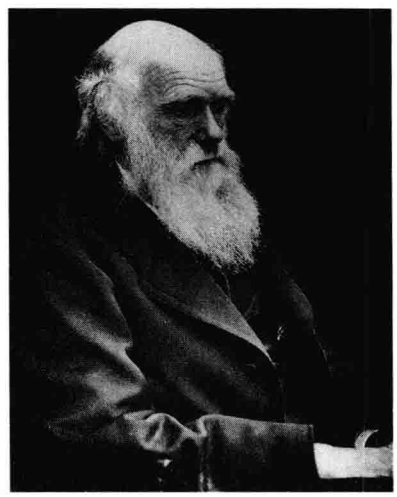
The trails that run through this volume and tie the past to the present are the major trends in our development as a technological species: growth and diversification—growth in the number of people on the planet and in the complexity of human organizations, diversity in the roles that exist in society and in the kinds of environments our species inhabits, plus specialization in the tools and techniques used to obtain food and manufacture objects. The story of our human past, then, is the story of these changes through time as we evolved from small, local groups of people living close to nature to large nation states involved in global trade.

Archaeology is the study of the human past, combining the themes of time and change. The major themes of time and change—change in our biology and change in our behavior through time—are also the focus of this book. Archaeology is the closest thing we have to a time machine, a machine that travels backward through the mists of the ages. The mists become denser the farther back we go, and the windows of our time machine become more obscured. In Chapter 1, we will go as far back as we as humans can go, some 4–5 million years ago, when we took our first steps in Africa. But first we need to examine change through time in more detail in terms of biological and cultural evolution, as well as some of the basic principles of archaeology.

BIOLOGICAL EVOLUTION

Change, modification, variation—these themes describe the process through which humans have evolved, all the way from the earliest replicating molecules. The theory of natural selection, formulated by Charles Darwin and Alfred Russel Wallace in the middle of the nineteenth century, accounts for this process of change. Wallace and Darwin were strongly influenced by the ideas of Thomas Malthus, an English clergyman and philosopher. In his 1798 *Essay on the Principle of Population,* Malthus observed that the growth of human population potentially exceeded the quantity of food available. Malthus argued that famine, war, and disease restrained the size of human populations and therefore the number of people did not exceed the resources available to feed them. Thus, not everyone who was born survived to reproduce.

Darwin coined the term "natural selection" to account for the increase in offspring of those individuals who did survive. He introduced the concept in his 1859



The last known photograph of Charles Darwin.

publication *On the Origin of Species by Means of Natural Selection.* During his global voyage of exploration aboard the HMS *Beagle,* Darwin had observed that most species of plants and animals showed a great deal of variation—that individuals were distinct and exhibited different characteristics. Following Malthus, Darwin pointed out that all organisms produce more offspring than can survive. High rates of mortality are often observed among the young, and Darwin argued that the individuals that survive do so because of certain beneficial characteristics they possess.

In other words, the surviving organisms are better adapted to the world that confronts them. Offspring with better hearing or eyesight can more effectively avoid predators. Nature's choice of better adapted individuals—the "survival of the fittest," according to Darwin—leads to continual change in the species, as more advantageous characteristics are passed genetically from one generation to the next. This basic process gave rise to the myriad creatures that occupy the world today. Evolutionary change is often described as differential reproductive success, and natural selection is the principal, though not the exclusive, mechanism responsible for it. Of course, as environmental conditions change, those physical characteristics that enhance survival and successful parenting also may vary.

Views on this process of **evolution** develop over time, too. Today there is some debate about the pace of change—whether major evolutionary modifications occurred gradually, as Darwin emphasized, or rather abruptly and suddenly. Stephen Jay Gould and Niles Eldredge, of Harvard University, called such an uneven pace of evolution the theory of "punctuated equilibrium." It now seems that some biological shifts occur gradually, as Darwin described, while others may occur in rapid spurts following long periods of stasis, or little change.

CULTURAL EVOLUTION

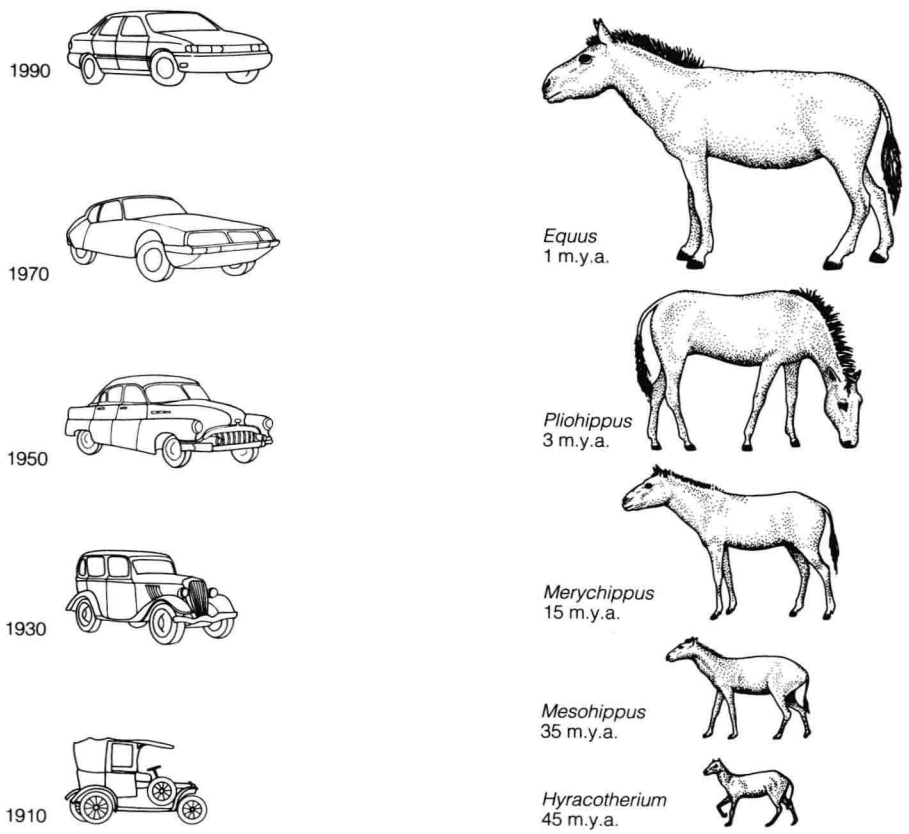
For humans, there is also an important nongenetic, or cultural, component of variation and long-term change. What was selected for during the biological evolution of human beings was an unusual capability for adaptation, known as **culture,** based on learning, experience, and the use of tools. Within limits, culture enables us to modify and enhance our behavior without a corresponding change in our genetic composition. As a consequence, natural selection alone is neither adequate nor appropriate for explaining the culturally acquired traits of the human species.

Man is only one of the earth's "manifold creatures" and he cannot understand his own nature or seek wisely to guide his destiny without taking account of the whole pattern of life.

George Gaylord Simpson (1967)

The prehistoric record of our species and its immediate ancestors is characterized by both biological and cultural evolution. Biological, rather than cultural, changes dominated the first several million years of our existence. The evolution of our earliest ancestors is highlighted by key changes in walking, teeth, and the size and organization of the brain. The last hundred thousand years or so of our presence on the planet, however, are marked primarily by cultural changes rather than biological ones. The transmission of cultural traits through learning occurs much more rapidly than Darwinian evolution. The rates of these recent changes are unmatched in the entire history of life. In tens of thousands of years, the human species has spiraled from a few tens of thousands of individuals using stone implements to billions with cars, airplanes, cities, satellites, frozen foods, computers, and the hydrogen bomb—all without any significant genetic change in the species.

For centuries, scholars have tried to understand and explain cultural evolution and change. As yet, no single approach has been widely accepted—at least in the way that Darwin's concept of natural selection has been adopted in contemporary biology. Like biological evolution, cultural change is neither unilinearly directed nor inevitable. There is an opportunistic aspect to both processes. Yet over the course of human history, we can see general (albeit not uniform) increases in the scale and complexity of human societies. These changes are illustrated in the latter sections of this book, where we observe that, over time, humans aggregated in larger and more hierarchi-



Biological organisms and cultural artifacts evolve over time. The evolution of the automobile from A.D. 1910 to 1990. The evolution of the horse from *Hyracotherium*, 45 m.y.a., to *Equus*, 1 m.y.a.

cally arranged organizations. These groups were often part of more expansive and more populous social systems that included a greater number of different levels and institutions.

PRINCIPLES OF ARCHAEOLOGY

Physical anthropologists study the evolution of human biology in terms of anatomy and genetics. Archaeologists study past human culture, from the time of our early ancestors to the historical present. The basic information archaeologists use to learn about the past comes from artifacts and sites. **Artifacts** are the objects and materials that people in the past made and used. **Sites** are accumulations of such artifacts, representing the places where people lived or carried out certain activities. Much of the information gathering for archaeological studies requires **fieldwork** that is intended to discover artifacts and sites.

Artifacts and sites are found either on the surface or beneath the ground. Surveys are made to discover artifacts on the ground, and excavations are conducted to expose buried materials. An archaeological **survey** is a systematic search for artifacts and sites. A survey involves walking across the landscape looking for stones, potsherds, and bones that are turned up by plowing, animal burrowing, and erosion. In areas where thick grass or dense vegetation make it hard to see the surface of the ground, small test holes may be excavated to determine whether buried archaeological remains are present.

Archaeological excavation involves careful removal and sieving of the sediments at a site.

Excavation is the technique archaeologists use to uncover buried remains from the past. Buried materials usually are more abundant and better preserved than those found on the surface. Excavations are conducted to answer specific questions, such as who lived at the site and when, what did they eat, what did they do, where did they get raw materials for making tools and equipment, what kind of relationship did they have with their neighbors, and how was their society organized and structured?

When the fieldwork is over, all the materials collected in surveys and excavations must be cleaned, classified, counted, cataloged, and analyzed. Archaeological fieldwork produces three major categories of materials: (1) **artifacts**—portable objects altered by human activity; (2) **features**—the immovable structures, layers, pits, and posts in the ground; and (3) **ecofacts**—the remains of plants, animals, sediments, and other unmodified materials resulting from human activity.

These archaeological remains are defined in terms of their context in time and space and with other archaeological materials. The **association** between objects is an important concept in archaeological thinking. Artifacts and features associated together in specific contexts are probably contemporaneous. The accurate placement of past materials in time is extremely important for the archaeologist because a focus on change over time is a major emphasis in the discipline.

The major goals of archaeology are to reconstruct past human behavior and to understand the operation of human societies in general. Given their long-term perspective, archaeologists are particularly interested in changes in society over time. They

also endeavor to understand the differences and similarities among past societies and cultures. The archaeologist infers how past societies functioned by investigating the evidence from artifacts, features, and ecofacts to answer questions involving technology and economy, social and political organization, and ideology.

Technology is the combination of manufacturing techniques and knowledge that enables people to convert natural resources into tools, food, clothing, shelter, and other products and equipment they need or want. Technology is the means by which people interact most directly with the natural environment, and it is also the aspect of past culture that is most easily observed in archaeological data.

Economy involves how people obtain food, material, and goods to sustain their lives. One aspect of prehistoric economies is *subsistence,* the activities and materials people use to feed and shelter themselves. *Exchange* is another aspect of economy. When artifacts such as stone axes, obsidian knives, metal spearpoints, or certain kinds of food have passed from person to person, archaeologists talk about "exchange." One way to study interaction within and between societies is to look at the distribution of items of exchange or trade. Archaeologists are also interested in *production,* another aspect of economic organization. In some societies, household members made most or all of the items that were needed to survive. Among other groups, specialists produced specific goods for exchange and trade.

That's the thing about history, it's over before you know it.

Garrison Keillor

Social organization refers to the roles and relationships within a society, and includes relationships between women and men and between people of different age groups and other segments of society. Kinship and marriage systems, lineages, and class structure are important aspects of social organization. *Political organization* encompasses the nature of decision making, authority, power, and rule in a society. The study of nonresidential or public architecture is one way for archaeologists to examine this aspect of human behavior.

Ideology is a conceptual framework by which people structure their ideas about the order of the universe, their place in that universe, and their relationships among themselves and with other objects and forms of life around them. Ideology encompasses the norms, values, and beliefs held by a society. Religious beliefs, art styles, symbols, and **cosmologies,** or worldviews, are examples of ideological expression.

These aspects of human life—technology, economy, social and political organization, and ideology—are closely interrelated in prehistoric materials. The same artifact or object may contain information about all these aspects. A certain type of knife found exclusively in female graves holds information about tool manufacture, the nature of women's work, the distinction between sexes in the society, and ideas about death. Technology, economy, social and political organization, and ideology thus are different, but related, dimensions of past cultures and of human life.

DATES EXPRESSED IN THIS BOOK

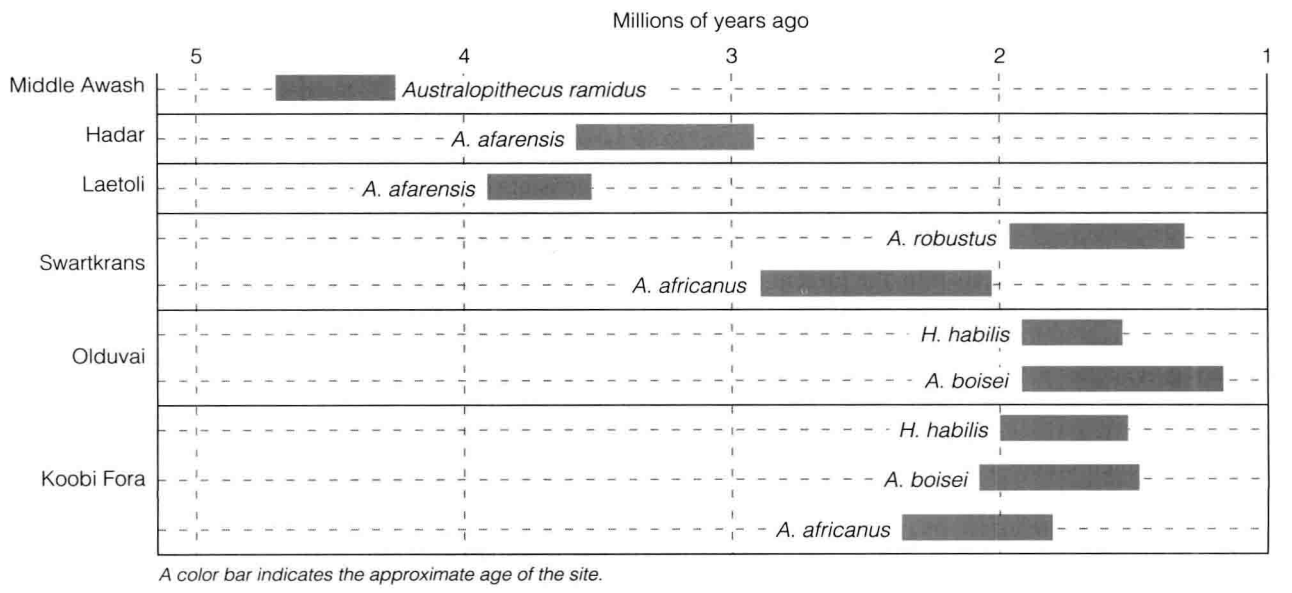
The dates in *Images of the Past* are given in two ways. Dates from the Pliocene and Pleistocene are expressed in years before the present (B.P), or as millions of years ago (m.y.a.). Dates from the last 10,000 years or so are given in calendar years before Christ, B.C., or *anno Domini,* A.D. Because calibrated radiocarbon dates can only be extended back 5000 or 6000 years from the present, we have not used calibrated dates in this volume. Thus, the more recent dates are given in uncalibrated radiocarbon years unless otherwise indicated. (For an explanation of calibrated dates, see "Radiocarbon Dating," Chapter 3, p. 120.)

Another term used for periods of time in the latter part of this book is millennium. A decade is 10 years; a century is 100 years; a **millennium** is 1000 years. Before Christ, the first millennium is 1000–0 B.C., the second millennium is 2000–1000 B.C., and so on. (Ranges of dates before Christ are often expressed in reverse: the period 2500–1500 B.C., for example.)

1

THE FIRST HUMANS

Locations of the sites discussed or mentioned in this chapter.



A color bar indicates the approximate age of the site.

THE DAWN OF HUMANITY

Our place on the planet in terms of geological time, our relationship to other animals, and our distinctively human characteristics

Try to imagine the unimaginable. Sometime around 10 billion years ago, an explosion of cosmic proportions ripped time and space apart and created our universe. Hydrogen and helium hurtled through the emptiness, cast out of that original Big Bang. Clouds of these gases began to coagulate and attract other passing clouds. As these concentrations were further compacted by gravity, temperatures rose, and the energy created in the nuclear furnaces of the first stars lit up the universe.

More complex reactions in these evolving stars gave rise to heavier atoms of carbon, oxygen, magnesium, silicon, sulfur, and the other elements. Massive eruptions and disintegrations tore these early elements out of the stars and spewed them across space, creating newer and heavier stars. As they condensed, smaller conglomerations, lacking the mass or temperature to ignite, gathered around the edges of the brightly burning stars. Some of these cold outliers became hard, metallic globes; others, frigid balls of gas. The planets were born. Some gases remained on the harder planets and condensed into oceans or enveloped the surface as a primordial atmosphere. Violent electrical storms, driven by energy from the stars and massive volcanic activity rifting the surface of the forming planets, tore apart and reconstituted these elements in the early seas and atmospheres.

On the planet we call earth, formed about 4.6 billion years ago, this alchemy of primeval forces churned out new molecules in an atmosphere of methane, ammonia, hydrogen sulfide, water, and hydrogen. Among the multitude of new chemistries created in the soup of the early earth's oceans was a remarkable combination of atoms. This was a new molecule, able to reproduce itself—to make a copy of its original. Life emerged shortly after 4 billion years ago. Like the broom of the sorcerer's apprentice in the movie *Fantasia,* once begun, the copying process filled the seas with duplicates. These reproducing molecules grew, achieved more complex forms, and became the building blocks of more elaborate organisms that developed metabolic and sexual reproductive functions. Systems for eating and internal metabolism enabled organisms to obtain energy from other life forms. Sexual reproduction allowed for a tremendous diversity in offspring, and thus a greater capacity for adapting to changing environments and conditions.

Plants appeared in the oceans and spread to the land. The atmosphere fed carbon dioxide to the plants, and they in turn replenished the air with oxygen through the process of photosynthesis. Swimming cooperatives of molecules in the oceans moved onto the land and began to use the oxygen in the air for breathing and other metabolic functions. Fish, amphibians, reptiles, insects, mammals, and birds spread across the face of the earth. And then, only a moment ago in geological time, a human creature evolved from this great chain of living beings.

GEOLOGICAL TIME

The universe is approximately 10 billion years old. Earth is roughly 4.6 billion years old. The idea of 10 billion years, 4.6 billion years, or even 1 million years is impossible

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