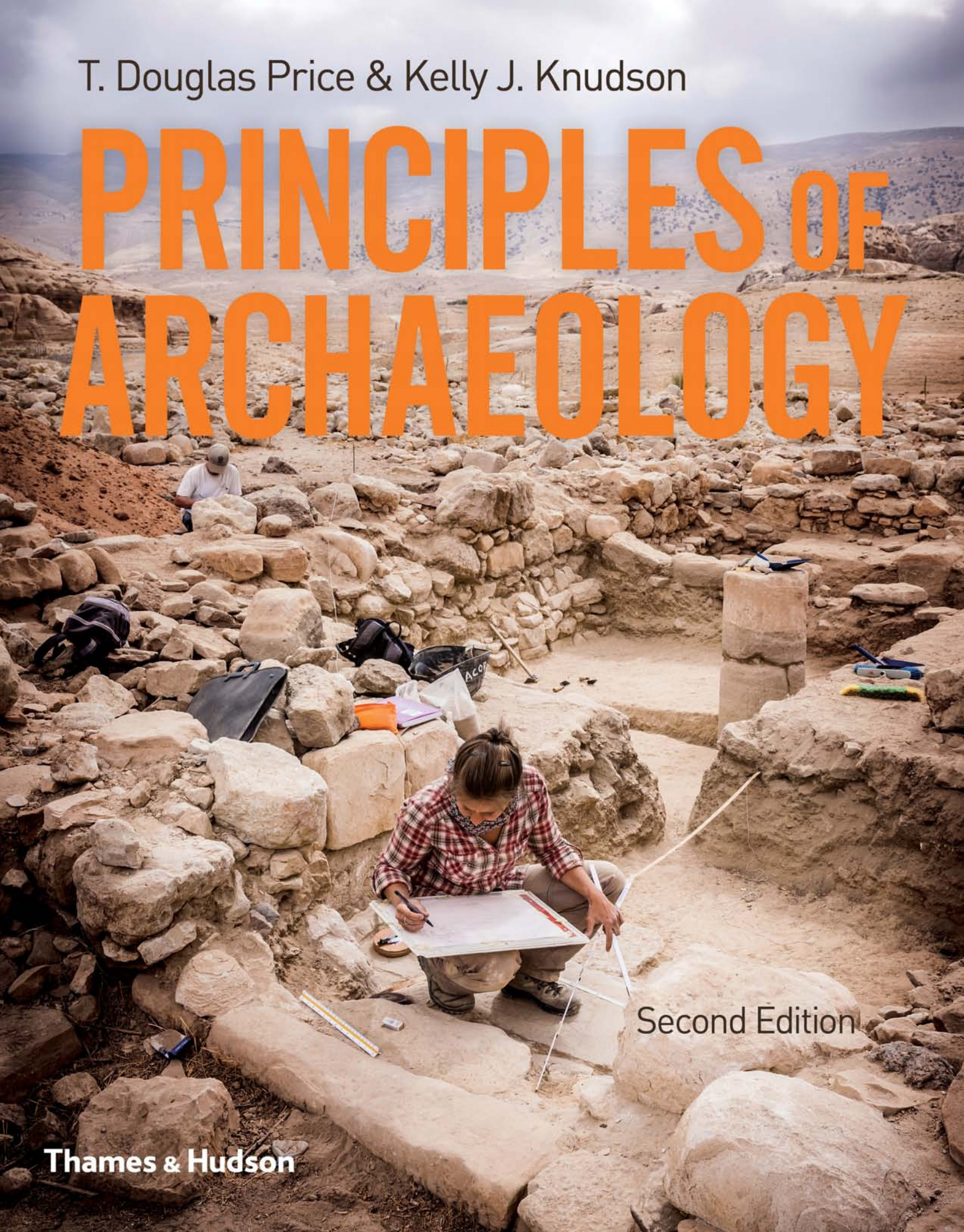
T. Douglas Price & Kelly J. Knudson

PRINCIPLES OF ARCHAEOLOGY



Second Edition

Thames & Hudson

PRINCIPLES OF ARCHAEOLOGY

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381 illustrations, 348 in color

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Front: Excavations at Bayda and "Little Petra," Jordan by the Italian archaeologist Micaela Sinibaldi.
Photo Lutz Jaekel/laif/Camera Press.
Back: Cliff Palace, Mesa Verde National Park, Colorado. Photo Kravka/depositphotos.com; Moai Statues, Easter Island. Photo thakala/depositphotos.com; Terra Portable XRD Analyzer in use in the field. Photo Courtesy Olympus; SEM photo of parenchyma tissue in a modern elderberry (*Sambucus*) stem. Photo Courtesy Kathleen B. Pigg.

BRIEF CONTENTS

CONTENTS

PREFACE

We each decided independently to become archaeologists when we were nine years old. Doug was lucky enough to visit the remains of a massive Roman tomb along a roadside in northern Spain. Standing in awe before the crumbling walls of that ancient stone mausoleum, he wondered who had made it, why it had been built, how old it might be. After hearing about the Romans and how archaeologists studied such ruins, Doug decided that he wanted to be an archaeologist. For Kelly, the desire to study archaeology was sparked during a fourth-grade class on Colorado history and the Ancestral Puebloan people (sometimes called Anasazi). Who were these people who had lived in cliffs? How was she able to see leather shoes that someone actually wore one thousand years ago? It was all so fascinating!

After some twists and turns (Kelly has a chemistry degree and was once a pre-med student), we both became archaeologists. We both love what we do: it is a wonderful job, filled with travel, fieldwork, discovery, ideas and intellectual challenges, interesting friends and quirky colleagues, demanding and delightful students, and endless ways to learn more about the past. We still find archaeology fascinating and believe that it provides an important part of human knowledge. Archaeology helps us understand ourselves, where we have come from, what we have experienced, how we have survived, and even where we may be going. Enrollment in archaeology courses in colleges and universities continues to grow. Media coverage of new discoveries and interpretations appears almost daily.

We hope that this book, *Principles of Archaeology*, will help you understand what archaeologists do. This book is written primarily to introduce college students to the ideas and methods of today's archaeology, where research in the field and laboratory combine to uncover our past. It is intended to tell you about this intriguing subject that combines so many disciplines and skills in the study of earlier human behavior. We hope that the book may encourage some of you to consider archaeology as a career and to enter this exciting field of study, but if nothing else, we hope that it will help you to understand the world around you better, and to appreciate the inherent allure of the past.

This book explores the principles of archaeology; in other words, how archaeologists look at the past and how they obtain the information they use to make sense of it. It is not easy to write a straightforward book about the theories and techniques of archaeology, because of the great diversity and breadth of the subject. Archaeologists do all kinds of things, including research, teaching, public outreach, excavations, rescue work and cultural resource management, museum exhibitions, caring for monuments and parks, and submitting grant proposals—they even write books. The tools of modern archaeology are numerous and the areas of interest are myriad, which is why the subject is so fascinating. There is so much involved in modern archaeology, however, that one book simply cannot cover its entirety.

We have opted for a straightforward approach in *Principles of Archaeology*, focusing on fundamentals and incorporating the information that we believe a first course in archaeology ought to cover. We have described interesting sites and situations (from all over the world) that provide intriguing examples of methods and theories.

At the same time, we have included some of the cutting edge, breakthrough areas where science and technology are telling us new and exciting things about the past.

By providing a text that covers the fundamentals, our hope is that you will be able to focus on what is essential. Each chapter includes a box feature straight after the Introduction section that answers *why* the approaches and techniques covered in the chapter are important to archaeology. (These features are marked by green header and footer lines separating them from the rest of the text.) It is much easier to learn something if there is a reason for it!

THEMES OF THE BOOK

There are several recurring themes in *Principles of Archaeology*. The first concerns *how archaeologists think* and learn about the past. While it is important to master the methods and theories of archaeology, we believe that it is equally important for you to get a sense of how archaeologists think. By encouraging you to reflect on the process of how archaeologists come to know the past, our hope is that this book will allow you to go beyond a basic reading to being able to think for yourself.

This theme is expressed most clearly in text boxes called **Archaeological Thinking**, where we highlight situations where reason and ideas have resulted in new insight into past human behavior and where innovative thoughts have had important consequences.

As part of this "thinking" theme, many of the chapters include a final section called **Archaeological Project**, where you can work on some fairly typical projects in archaeology using method, data, and theory. These projects or assignments utilize actual or simulated information from real world archaeological situations to expose you to some of the evidence from the past and the ways that archaeologists learn about that past. We hope that you will learn about critical analyses and experience the complexities of trying to understand past human behavior.

A second theme in the text concerns the preservation of the past. Archaeological sites are being destroyed at a rapid rate—much faster than they can be studied or saved—as modern civilizations expand across the earth. Looting, careless development, and the wanton destruction of archaeological resources can eliminate future opportunities to learn from our past. If we are to have archaeology in the coming decades, it is essential that fundamental information be recorded or protected before there is little left to be studied. For this reason, the second theme of this book concerns the ways and means by which we can save and protect archaeological sites. Our goal is to encourage you to understand and help with the effort. This goal is shown clearly in our **Protecting the Past** boxes, where we focus on what is or is not being done to protect some of the sites and places discussed in the text. This should give you some idea of the various problems and solutions involved in preserving our common cultural heritage.

A third theme concerns the important role of science in archaeology. Scientific approaches to understanding the past are growing rapidly. Major discoveries in the future will come from the laboratory as much as from the ground. For this reason, it is essential that students of archaeology learn about the possibilities and potential of the various laboratory and instrumental techniques that are employed in the study of the past. To this end, in this book there is a separate chapter on archaeological chemistry. In addition, studies involving chemical and physical means of analysis are emphasized in a number of the other chapters. Our **Science in Archaeology** text boxes highlight studies where instrumental and analytical techniques have provided new information about the past.

THE ORGANIZATION OF THE TEXT

Archaeology is not rocket science; it is mostly common sense. Archaeologists collect information about the past, study it, and try to make

sense of it. This information takes the form of archaeological materials that are discovered and which provide evidence of past human activities, evidence that can be analysed to determine basic facts, such as age, use, location, and movement. Archaeologists have a powerful set of tools for investigating the evidence they discover, but the facts and estimates that result from this investigation must then be interpreted in order to become meaningful. Theories, hypotheses, ideas, and assumptions are the bridging concepts that archaeologists use to interpret—to attach meaning—to evidence and analytical results.

This book has three main parts. **Part One**, "**Introduction**," contains three chapters. These initial chapters are important: they provide background for the other sections and introduce significant themes that recur throughout the book. Chapter 1, "An Introduction to Archaeology," discusses what it is and what it is not. It also explores the scientific method and the role of evolution, the question of why we should study archaeology, and the various careers in the field so that you can see how many interesting opportunities there are as you begin your study. Chapter 2, "A Brief History of Archaeology," offers some history of the field as a basis for comprehending the discipline and its distinctive perspectives. This history provides a background for understanding how archaeology has developed over time and how archaeologists think about the past. Chapter 3, "Interpretation in Archaeology," builds upon the history of archaeology in Chapter 2 with a more detailed discussion of explanation in archaeology and the theoretical ways in which archaeologists look at the past. This chapter focuses on theories, ideas, and interpretation in archaeology. It could also be read at the end of the textbook, after you have a firm understanding of how archaeology works.

Part Two, "**Discovery**," describes how archaeological information is found, including the questions that are asked (what archaeologists want to know) in Chapter 4; the archaeological record (the nature of the evidence) in Chapter 5; and the methods of fieldwork in Chapter 6.

Part Three, "**Analysis and Interpretation**," concerns the various kinds of *analyses* or studies that are done in archaeology and how archaeologists make sense of their data. We have assembled a series of chapters dealing with the classification of the materials (Chapter 7); the dating of evidence (Chapter 8); geology and archaeology (Chapter 9); stone tools (Chapter 10); pottery (Chapter 11); plant remains (Chapter 12); animal bones (Chapter 13); graves and human skeletal remains (Chapter 14); and the physical and chemical composition of archaeological materials (Chapter 15). A concluding Chapter 16 focuses on the ethics and responsibilities of archaeology in today's world and offers more details on what can and is being done to protect the past and involve the public.

THE FEATURES OF THE BOOK

The features in the text are designed to help you master the material and to highlight the themes. Learning is largely about recognizing what is important to remember and we have incorporated both organizational and structural means for emphasizing what is of the essence.

We have taken a consistent approach to the format of the chapters in the book. Each chapter includes a running narrative that highlights the ideas and methods that comprise the basics of how archaeology is done. Along with this running text, we have included three distinct sections called **Introductions**, **In Focus**, and **Conclusions**.

The Introduction section provides an overview of the subject matter, themes, and the organization of the chapter. In order to gain attention and draw you into the content of the chapter, the Introduction begins by focusing on a distinctive image that we hope conveys some of the fascination of the field. The In Focus features are case studies from important archaeological investigations throughout the world that illustrate some of the concepts and methods described in the text, and they also show how archaeologists

think and work. The Conclusion section synthesizes the contents of the chapter and places that information in a larger context.

A few final features are included to help you learn more effectively. Each chapter opens with an outline giving you a preview of what is to come. Technical terms and important concepts in archaeology are indicated in bold type the first time they appear in the text, with their definitions assembled in a glossary at the back of the book. There is also an index to help you find names and topics quickly among the pages. We have also provided, in parentheses after the word, a pronunciation guide for foreign or unusual terms and names.

The Study Questions at the end of each chapter are designed to help you review the contents. A suggested list of Further Reading appears at the end of each chapter as well, while a more complete list of references is located at the back of the book. Specific citations within the written text were avoided in favor of a more readable prose, but references to specific topics can be found at the end of the book under the name of the individual associated with the work. For information on other aspects of archaeology outside the scope of this text, we will direct you toward suggested readings and websites.

An important note on dates: the age of archaeological materials is given in two forms in this book. Dates greater than 10,000 years ago are described in years before the present (BP) or in millions of years ago (m.y.a.); a millennium is a period of 1,000 years. Dates less than 10,000 years ago are given in calendar years before Christ (BC) or calendar years after Christ (AD, or *anno Domini*, meaning "in the year of the Lord"). It is also important to note that BC dates run in reverse: 1 BC, for example, is more recent than 1000 BC. Most archaeologists do not use the terms BCE ("Before the Common Era"), or CE ("the Common Era").

NEW FOR THIS EDITION

- All-new design for easy navigation, making full use of Thames & Hudson's strengths in illustration and design.
- Archaeology Projects, one of the most popular features of the first edition, have been made even more accessible so that students at a wider variety of colleges and universities can work on them, and learn about how to apply archaeological methods.
- New organization better reflects the equal relationship between theory and method. "Interpretation in Archaeology" (Chapter 3) and the discussion of Cultural Resource Management (Chapter 1) now appear in Part 1 of the book, highlighting their importance in archaeology today.
- New co-author Kelly J. Knudson contributes cutting-edge research in bioarchaeology and archaeological chemistry, as well as a focus on archaeology in Latin America.

SUPPLEMENTS

FOR THE STUDENT

- Flashcards: Students can test themselves on vocabulary and concepts with our interactive flashcards.
- Online Glossary.
- Interactive quizzes that allow students to check their mastery of course material.
- Videos:
  - Five exclusive videos created by co-author Kelly Knudson:
    - "Why Study Archaeology?" (for Chapter 1)
    - "Science in Archaeology" (for Chapter 1)
    - "Bioarchaeology" (for Chapter 14)
    - "Isotopes" (for Chapter 15)

    - "Ethics and Responsibilities" (for Chapter 16)
- Thames & Hudson videos, created by Lord Colin Renfrew:
    - "Social Archaeology" (for Chapter 3)
    - "Trade and Exchange" (for Chapter 4)
    - "Radiocarbon" (for Chapter 8)
    - "DNA Studies in Archaeology" (for Chapter 14)
    - "Protecting our Cultural Heritage" (for Chapter 16 and all "Protecting the Past" boxes)

FOR THE INSTRUCTOR

- The *Principles of Archaeology* coursepack, available free of charge to all instructors and in all major Learning Management System formats.
- Lecture PowerPoint slides.
- Images from the book, available in both PowerPoint and JPEG formats.
- The Test Bank, written by the authors, covers all concepts and artwork in the textbook. It features 560 multiple-choice, true/false, discussion/research essay-style, and matching pair questions, at three levels of difficulty. It is available in ExamView and RTF formats and is compatible with major Learning Management Systems.
- Online Instructor's Manual, written by the authors.

Principles of Archaeology is also available as an ebook.

ACKNOWLEDGMENTS

Any book is a major undertaking; it is probably a good thing that authors do not remember that when they begin. A book also requires the efforts of numerous individuals in addition to the authors. There are many people to thank who have graciously provided their time, comment, information, and/or illustrations. Their help is both essential and greatly appreciated.

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Finally, we would like to thank all the thousands of students at the University of Wisconsin at Madison and Arizona State University over the years who have allowed us the privilege of teaching them about archaeology—it has been a profound pleasure. This one's for you.

We hope that the path from here through discovery, analysis, and interpretation will be smooth, and that you will enjoy the journey. If you have any suggestions about how to improve this book we would be happy to hear from you.

T. Douglas Price
Frederiksberg, Denmark

Kelly J. Knudson
Tempe, Arizona, USA

For Annalise, Soren, and Mathias

CHAPTER 1
AN INTRODUCTION TO ARCHAEOLOGY

INTRODUCTION: WHAT IS ARCHAEOLOGY?

Almost every summer outside of Lynchburg, Virginia, a group of professional archaeologists and students move the earth and sift the soil at the place known as Poplar Forest, a plantation that belonged to the former US president Thomas Jefferson (1743–1826) from 1809 until his death. Jefferson was a wealthy landowner, scholar, inventor, architect, politician, and third president of the United States; he also undertook some of the earliest archaeological **excavations** in North America (described in Chapter 2).

The photograph above shows the large octagonal mansion that Jefferson built at Poplar Forest, with several archaeologists digging in the foreground. Jefferson referred to this house as his most valuable possession, but Jefferson's possessions also included enslaved individuals, more than ninety of whom lived at Poplar Forest during Jefferson's time. These individuals worked the fields, tended the stock, and built roads and buildings. They were the masons, blacksmiths, carpenters, spinners, weavers, and servants who kept the plantation running and profitable.

History does not have a particularly good memory when it comes to the less fortunate. Jefferson and his overseers left written records about work schedules, births, deaths, and the expenses of a large plantation, but these accounts contain little about the everyday lives of most of the people who lived and worked there. **Archaeology**, however, can recover some of this missing information, and has played a major role in increasing our understanding of the conditions of slavery at Poplar Forest and

elsewhere in the United States. The archaeological research conducted each summer at Poplar Forest has revealed information about the size and construction of the slave homes as well as the inhabitants' possessions, diet, and daily activities, forming a composite portrait of private enterprise and private lives. Archaeologists have found two important areas with slave residences, the Quarter site and the North Hill site, at Poplar Forest. Four slave houses have been excavated in total. At both sites, the houses were built at the edges of the fields. These houses were probably crowded and dark, so many daily activities must have taken place outdoors, often in a yard that was largely out of the overseer's view.

A single house was uncovered at the North Hill site, which pre-dated Jefferson's residence at Poplar Forest. This house, along with the three discovered at the Quarter site, was a log cabin and probably had a wooden chimney. (Pieces of the clay lining used in such chimneys were found at both sites.) The house at North Hill also had a large pit in the floor that would have been used as a storage cellar. Materials found there and around the house included burned seeds and animal bones**,** woodworking and farming tools, several silver Spanish coins, and such items of clothing and adornment as buttons, shoe buckles, and beads.

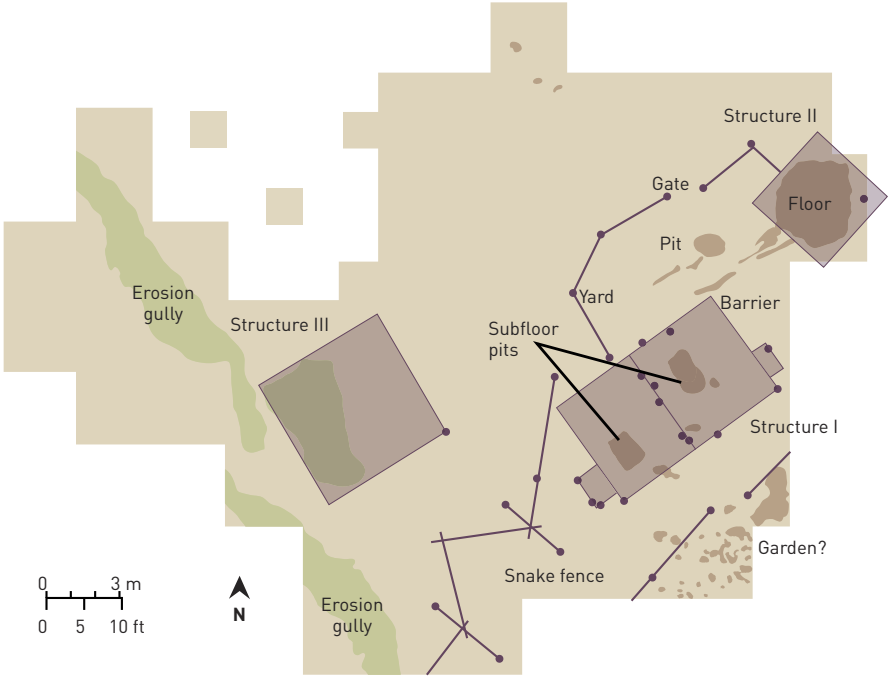
The three cabins at the Quarter site were probably occupied by four families between 1790 and 1812, overlapping with the time of Jefferson's residence (**fig. 1.1**). The largest building (5 x 8 meters [15 x 25 ft]) was a "duplex" of two large rooms that probably housed separate families. Each room had a deep root cellar in the manner of the house at North Hill. The remaining two structures were considerably smaller and probably also served as residences. The archaeological evidence documents a variety of activities at this site, including sewing, cooking, handicrafts, and keeping animals. The remains of a garden was observed next to one of the cabins.

The plantation provisioned the slaves with food (pork, corn, wheat flour, and salt) and cloth (for clothing, bedding, and blankets). Enslaved women who married at the plantation were given a cook pot and a bed. The plant and animal remains found at the site reflect a varied diet, including plants common in Africa. Some thirty-three different **species** of domestic and wild plants were found at the North Hill site, including fruits, grains, nuts, vegetables, medicinal herbs, and spices. These plants comprise both those cultivated at the plantation and other species collected in the wild or grown in gardens. Interestingly, sorghum was found at the North Hill site; this cereal was unfamiliar to Jefferson at the time, indicating that this plant, originally from Africa, may have been grown in the slave gardens without the knowledge of the overseer. Jefferson recorded purchases of garden produce, ducks, chickens, and eggs from the slave quarters.

Only a small number of animal bones were found at the two sites, mostly from pigs, the staple meat in the diet, with some cow and chicken bones. The most common bones were from the feet and skull, suggesting that the best cuts of meat may have gone to the plantation owners. In addition to the domestic animals, the remains of deer, squirrels, possums, a raccoon, and fish were also found. Bones were heavily fragmented, perhaps as a consequence of meal preparation. African dishes were often one-pot meals, in which a variety of meats and vegetables were chopped or broken up and added to a stew or soup. Lead shot and gunflints for a rifle were discovered in the excavations, suggesting that the slaves had some firearms.

More than 120 beads, buttons, and buckles were also found in the houses and yard at the Quarter site (**fig. 1.2**). These are items of personal adornment, worn by the enslaved individuals at Poplar Forest. These objects were not provided by the owners and so must have been acquired independently by the slaves, suggesting that people expressed individual tastes and differences by purchasing or acquiring fancy buttons, ribbons, and buckles.

At Poplar Forest, archaeology provides a voice for individuals who endured the tragedy of slavery and reveals some of the details of everyday life



1.1
Plan of the structures and features at the Quarter site excavations at Poplar Forest. Three structures—two single family cabins and a duplex structure—can be seen, most with a large pit or root cellar in the center. Indications of fencing, a garden, and a yard are also visible.

1.2
Buttons, buckles, and beads used for personal adornment, excavated at the Poplar Forest sites.

that are missing in historical accounts. Through archaeology, we can learn more about the homes, individual pursuits, and personal activities of the people who lived at Poplar Forest. Gardening, gathering, and hunting provided food and promoted traditional dietary and medicinal practices, while enslaved individuals could also generate some income by selling produce from gardens, chicken coops, and other private endeavors. Items of personal adornment were purchased and worn, perhaps as a means of identifying one's self amid the anonymity of slavery.

The example of Poplar Forest demonstrates that archaeology can help us learn about people in the past, particularly people who have often been left out of written records. The principles of archaeology—the theme of this book—provide the means and methods to read this unwritten past. This chapter is intended to introduce you to what it means to be an archaeologist. The first sections of the chapter consider what archaeology is and what it is not, and include information on the scientific method. The final sections address the questions of why we should study the past, and some basic information about the profession of archaeology as a career and the different kinds of jobs that archaeologists have.

WHY IS ARCHAEOLOGY IMPORTANT?

Archaeology, which is the study of our human past using the material remains that have survived, is a kind of time machine for visiting the millennia that have gone before. There are many things we will never know, but what can be learned is often surprising and intriguing. One of the most important things that archaeology can do is to help us learn about our common history on this planet, but knowing where we came from is not just interesting; our past can help us understand our present and make better choices in the future. Archaeology can also help give voices to people who have traditionally been ignored in the past, such as the slaves who lived at Poplar Forest. Therefore, archaeology has value both as a repository of information on the human past and as one of the best ways to determine what actually happened (as opposed to what people imagine happened, or what did not happen).

ARCHAEOLOGY IS...

What is archaeology? From fossilized remains of our earliest human ancestors in Africa to buildings in present-day New York or London, archaeologists analyse the physical remnants of the past in pursuit of a broad and comprehensive understanding of human behavior.

Archaeology is a subfield of anthropology, the study of all human **culture**. In the United States, for historical reasons, archaeology is usually part of a Department of Anthropology, which combines archaeology with **biological anthropology** and **cultural anthropology**. Biological anthropology is the study of the biological nature of humankind. Biological anthropologists study bones, blood, genetics, growth, **demography**, and other aspects of humans and primates (such as monkeys and apes), both living and in the fossil record. Cultural, or social, anthropologists study living peoples and focus on the shared aspects of the human experience, describing both the differences and the common characteristics that exist. **Linguistics**—the study of human languages—is sometimes included in anthropology, but often found in another academic department.

Archaeology is many things to many people. It is both a popular pastime and an academic discipline, and involves both amateur and professional practitioners. It can be found on popular television and in obscure scientific journals. One reason for archaeology's appeal is its unique combination of global reach and the thrill of investigating the past. In some ways, the tagline on the cover of *Archaeology* magazine says it all: Adventure, Discovery, Culture, History, Travel. Archaeology is truly everywhere: the **artifacts** and architecture of the past dot the **landscape** (**fig. 1.3**), and a few hours spent in a plowed field almost anywhere will reveal something from the past. Excavations are one of the very fascinating aspects of archaeology (**fig. 1.4**).

Archaeology is also a detective story, a mystery far more complex and harder to solve than most crimes. The clues to past human behavior are enigmatic —broken, decomposed, and often missing—and piecing together these bits of information to make sense of the activities of our ancestors is a challenge. This challenge—and the ingenuity, technology, and hard work necessary to solve it—creates much of the excitement and the frustration of archaeology.

1.3 (below)
Archaeology is often hauntingly beautiful. This is a Roman aqueduct, still standing at Pont du Gard near Nîmes, France.

1.4 (above)
Excavations of a large trench at a Stone Age site in Denmark.

TYPES OF ARCHAEOLOGY

Archaeology is a fascinating field, in part because the subject matter is so diverse. There are so many times and places involved, so many questions to be asked. Archaeology accommodates an extraordinarily wide range of interests: chemistry, zoology, human biology, ceramics, Classics, computers, experiments, geology, history, stone tools, satellites, museums, human fossils, **theory**, genetics, scuba diving, and many others, most of which are discussed in the following chapters.

In practice, archaeology extends across a number of disciplines: the natural sciences for the collection and **analysis** of the material remains of past human activity; the social sciences for questions about human behavior and the major themes of **technology**, demography, diet and

subsistence, **economy**, and behavior; and into the humanities for the study of human creativity.

Archaeology in anthropology departments is sometimes called **anthropological archaeology**, or **prehistory**. Anthropological archaeology refers specifically to archaeological investigations that seek to answer larger, fundamental questions about humans and human behavior that are part of anthropological enquiry. Prehistory refers to the time of humans before the written record placed us in history. Many archaeologists do study prehistory, but many also study literate societies, such as the Maya and Aztec, and the urban civilizations of ancient Mesopotamia and China, where writing began. The term prehistory is often misused and applied to these early literate civilizations as well.

Historical archaeology—archaeology practiced in combination with the written record—as its name suggests, borders on the field of history and usually refers specifically to the archaeology of civilizations of the Renaissance and Industrial Era, where archaeology can complement the written record and provide more insight about our own recent past. What was life like 50, or 100, or 200 years ago? How did our great-grandparents live? One example of historical archaeology, at Poplar Forest, was described at the beginning of this chapter. Another example of how archaeology can tell us about history comes from the Battle of Little Bighorn. Custer's Last Stand in AD 1876 is an enduring part of American history, taught in almost every school in the country, yet there are few written accounts of the battle between the 7th Calvary and the Sioux and Cheyenne. Little was known of the details and progress of the battle until archaeologists investigated the site at Little Bighorn in Montana in the mid-1980s. The archaeological detective work across the battlefield uncovered spent cartridges, fired bullets, personal items, and human remains; evidence that has revealed much of the progress and nature of the conflict (**fig. 1.5**). A much clearer picture of a scattered and lengthy running engagement has now emerged.

1.5
Spur from a US soldier, found during archaeological investigations at Little Bighorn.

Archaeology can also be taught in a Department of Classics or Art History or Religious Studies. **Classical archaeology** is concerned with the literate Mediterranean civilizations of Greece and Rome. Departments of Classics teach the literature, architecture, language, and archaeology of the Classical civilizations. Biblical archaeology, which focuses on the places, events, and artifacts in the Holy Land, can normally be found in Departments of Religion. Archaeologists interested in geology and landscape formation are sometimes housed in Departments of Geology or Geography.

CULTURAL RESOURCE MANAGEMENT (CRM)

Another important distinction in archaeology is made between academic archaeology and **cultural resource management (CRM**). Two important laws in the United States, passed in the 1960s, largely established this field. The National Historic Preservation Act of 1966 and the National Environmental Policy Act of 1969 require a consideration of whether a proposed action, such as development and construction, will affect archaeological or historical remains. The US Environmental Protection Agency requires an environmental impact study to determine whether important cultural remains are in danger of destruction prior to the start of federally funded construction. Both federal agencies and private corporations must provide information on the effect their construction projects may have on the history and prehistory of an area. This legislation has led to substantial growth in archaeology in both government and private sectors, with the creation of state and federal agencies and private companies to conduct these impact studies. Various kinds of construction—reservoirs, highways, sewage systems, power lines, to name just a few—require archaeological **surveys** and environmental impact statements. Businesses, governments, and private citizens must pay to have such impact studies made. This kind of work, known as cultural resource management, is an important part of archaeology and is done by people at universities, museums, government agencies, and private companies. In fact, the majority of archaeology done in the United States is now CRM-related work.

Whether the work is CRM related or not, practicing archaeologists are trained in universities and take jobs doing research, teaching, and protecting the past. They are serious about

learning and about demanding proof of what happened in the past. They must be. Because the past is both obscure and fascinating, archaeology is a subject that attracts wild speculation, alternative views, and charlatans. That is what archaeology is not.

ARCHAEOLOGY IS NOT...

Please answer the following questions as true or false.

- The first humans appeared almost fifty million years ago.
- All archaeological sites are protected under the law.
- Archaeology is the study of ancient humans and dinosaurs.
- The earliest human remains come from Southeast Asia.
- The first ten million years of human existence were spent in Africa.
- Evolution cannot explain how humans came to be on earth.
- The earliest human ancestors appeared around sixty thousand years ago.
- Stonehenge was built by the Druids.

All of the answers are false. There are many misconceptions about the past and about archaeology, due in part to an absence of knowledge and in part to the presence of charlatans and the popularity of **pseudoscience**.

This section of Chapter 1 deals with what archaeology is not—what the archaeologist Kenneth Feder has called the fraud, myth, and mystery of the past. It is important to be alert to this aspect of archaeology and to emphasize the importance of questioning, criticism, and proof. There are hundreds of examples of fraudulent finds from the past. People search for Atlantis; members of Mother Earth cults eat the soil at important archaeological sites. In almost every country, fake objects have been promoted as ancient and genuine for financial or political reasons.

The mysteries of the past continue to mesmerize and seduce, causing some to make wild speculations and extravagant claims to explain what they cannot understand. As the archaeologist Robert Bettinger writes:

> Science, and especially archaeology, is always going to be plagued by crackpots and crackpot hypotheses. That's because science makes room—in essence, provides a "niche"—for any hypothesis, no matter how silly. Indeed, it is progress in knowledge, evidence, and understanding that separates plausible hypotheses from the silly ones which are simply abandoned and pass from scientific consciousness….Thus the more archaeology progresses in its pursuit of plausible hypotheses, the more it invites challenges from the lunatic fringe….It's just a cost of doing business.

In the sections that follow, we first present a well-known forgery, the Piltdown Man, as an example of archaeological fraud. In addition, we examine the pseudoscience of Erich von Däniken as a case study of the potency of archaeological mystery. Finally, we offer our thoughts on the evaluation of claims about the past, scientific or otherwise.

IN FOCUS

THE FAMOUS FORGERY OF PILTDOWN MAN

Late in the year AD 1912, a lawyer, Charles Dawson (1864–1916), and a respected geologist, Arthur Smith Woodward (1864–1944), presented new discoveries of fossil remains to the Geological Society in London (**fig. 1.6**). Their finds included part of a thick human skull, a fragment of an ape-like lower jaw, some animal remains, and even early stone tools. They estimated these fossils, found close together near a place called Piltdown in southern England, to be 500,000 years old.

For forty years, the remains of Piltdown Man were accepted as an important part of our evolutionary development. Piltdown Man was proclaimed genuine and declared the "missing link" between apes and humans by several of the most important British scientists of the day.

But Piltdown Man was finally debunked many years later by chemical tests that showed that the skull and jaw were neither the same age nor very old. Piltdown Man was a fake: the bones had been heavily stained and chemically treated to make them appear ancient, and diagnostic anatomical features had been broken off or filed down to change the appearance of the jaw. Today, the word "Piltdown" is a term of ridicule, used to label fraudulent research. The identity of

the perpetrator(s) of the forgery is still debated but Charles Dawson is often implicated.

Why did this fraud fool the experts? There are several reasons. For the most part, the forgery was well executed and not seriously questioned: the scientists wanted to believe the find because it fitted with their preconceived notions. Moreover, Germany and France had important human fossils, discovered decades before Piltdown Man. Perhaps national pride blinded the researchers from noticing the scratch marks made by the filing traces on the jaw and teeth.

1.6
A painting of some of the principal characters involved in the Piltdown discovery and examination. Dawson and Woodward are in the back row, to the right.

IN FOCUS

ERICH VON DÄNIKEN AND ALIEN ARCHAEOLOGY

Since writing *Chariots of the Gods* in 1970, a book that was wildly popular and has sold in excess of seven million copies, Erich von Däniken (born 1935) has been at the forefront of alien archaeology. Von Däniken, a Swiss entrepreneur, argued that many prehistoric monuments were actually built by aliens who visited Earth in the past. He said, for example, that alien landing and launching pads are recognizable at several archaeological sites, and suggested that the famous Nazca lines in the desert of southern Peru were signposts for space travelers. Von Däniken has even claimed that God was an ancient astronaut (**fig. 1.7**).

A TV special called "In Search of Ancient Astronauts" ensured Von Däniken's fame in the United States. His books have been translated into thirty-two languages and sold more than sixty million copies. The popular History Channel series called "Ancient Aliens" had at least ten seasons.

Despite the popularity of alien archaeology, the claims of Von Däniken and others are demonstrably fraudulent. For example, Von Däniken mistakenly described the soft, carvable tuff (a type of rock made out of volcanic ash) used for the giant heads on Easter Island as one of the hardest rocks on Earth. He also said that archaeologists did not know how the Egyptians moved the massive construction stones for the Pyramids, when in fact we do. Finally, humans with artificially modified skulls are often shown as evidence of alien interference, when in fact archaeologists know just how ancient humans shaped the skulls of their children (by applying pressure with fabric strips or with boards). The list of errors is long: many of the statements of pseudoscience are either demonstrably false or completely unverifiable.

1.7
Erich von Däniken overlooks the now-closed Mystery Park that he founded in Switzerland.

EVALUATING SCIENCE AND PSEUDOSCIENCE

Why do people believe such myths, hoaxes, and lies? There is so much in the world around us that is uncertain or unknown, which means that answers—right or wrong—are usually welcome. Too often, however, such answers are uncritically accepted as truth, and it is this uncritical acceptance that is the basis of pseudoscience.

An essential distinction must therefore be made in archaeology (and other fields) between science and pseudoscience: science is a method for evaluating the correctness of explanations, while pseudoscience is a technique for creating "truth." Pseudoscience is the name given to the myriad of stories and explanations proposed by charlatans, swindlers, and true believers. It is false science, based either on deceit or belief, founded in perception, not **observation**, often involving the paranormal. Its proponents make bizarre statements and allegations about matters that are said to be beyond the reach of science and scientists, but this avoidance or disavowal of the scientific method means that pseudoscience's claims to truth are unsubstantiated.

It is important to be accurate in our understanding of the world around us, because misconceptions and false facts can create many problems, in medicine, in diet, and in archaeology. Accurate information requires reason, evaluation, and testing, but it also provides a more enlightened and insightful appreciation of the world. The astronomer Carl Sagan (1934–1996) wrote, "I maintain there is much more wonder in science than in pseudoscience. And in addition, to whatever measure this term has any meaning, science has the additional virtue, and it is not an inconsiderable one, of being true."

If you have reason to doubt the validity of a claim or explanation about the past (or anything else for that matter), you should ask questions. What is the evidence for the claim? What are the credentials of the claimant? Is this a reasonable argument? Have other experts or professionals substantiated the argument? Does the claim involve intangible or unknown forces or individuals? In most cases, it is better to be dubious than naïve or gullible.

THE SCIENTIFIC METHOD

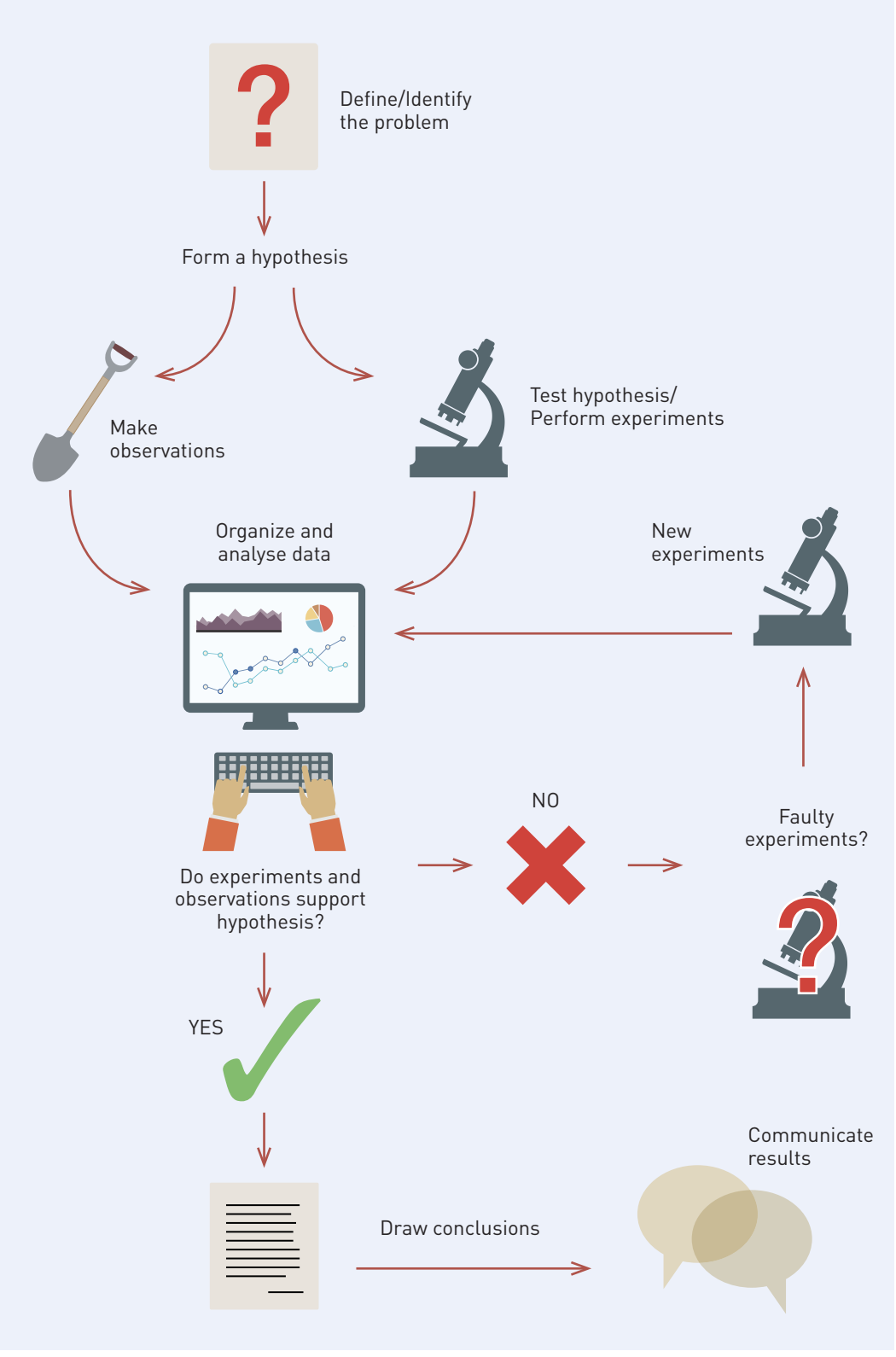
Science, in fact, has developed in order to separate fact from fiction. Science is a method for seeking the real nature of the universe through observation and experimentation. The scientific method is one of critique; all ideas are assumed to be wrong until proven otherwise. This practice is perhaps best understood in the context of medicine. If all drugs were automatically assumed to work before they were given to patients, there would be many casualties and people would be afraid of doctors. In reality, drugs are assumed to be dangerous before their benefits and safety have been repeatedly demonstrated. (Scientists are skeptics with good reason.) The same is true of scientific ideas in archaeology and other fields, although the consequences are usually not as dramatic.

The scientific method usually begins with an observation; say, for example, that water turns solid. An idea or a guess (a **hypothesis**) about how or why that happens is put forth—maybe cold temperatures make water hard. The hypothesis is evaluated and tested—put water in the freezer, water turns hard. If the hypothesis—that cold temperatures freeze water to ice—passes the test, then the hypothesis can become a theory, but not a truth. This theory is not truth because there may be other factors or forces that we do not know about that turn water to a solid. A theory is simply a generally accepted explanation.

Both the questions we ask and the ideas that we use for answers are at the heart of science. Science in archaeology is really an argument made by an accumulation of evidence, rather than by experimentation. What makes archaeology a science is the testing or careful evaluation of the answers in order to be confident that they are not wrong. The science of archaeology lies in bridging the gap between the information we recover and the questions we seek to answer.

Figure 1.8 schematically depicts the scientific method. In archaeology, the scientific method is a research strategy that begins with the formulation of the problem or question. Once a question is asked, it is necessary to come up with hypotheses (possible answers to the question). Evaluating those hypothetical answers is the crux of the scientific method. Archaeologists conduct fieldwork and undertake a variety of analyses to evaluate the hypothetical answers. Is layer A older than layer B? Was this stone tool used for cutting meat? How many people lived in this house? Fieldwork and analysis generate new questions and new answers. The process spirals, eliminating wrong answers and constantly raising new questions. Answers that appear to be correct are made public to a wider audience. Negative evidence is also published so that other scientists will not take the same path again.

1.8
The scientific method in archaeology is a way of evaluating, by testing and retesting ideas, to eliminate those that are wrong. Once a research question is selected, possible answers are evaluated through field and lab investigations. If the results do not support the answer, the process begins again. If the results do support the answer, conclusions are published.



EVOLUTION AND CREATIONISM

Evolution is an example of a scientific theory that is based on observable facts. It is a fundamental theory in the biological sciences, describing the mechanisms that cause changes in the plants and animals of the Earth over time and explaining the development and current state of life on Earth through the idea of natural selection.

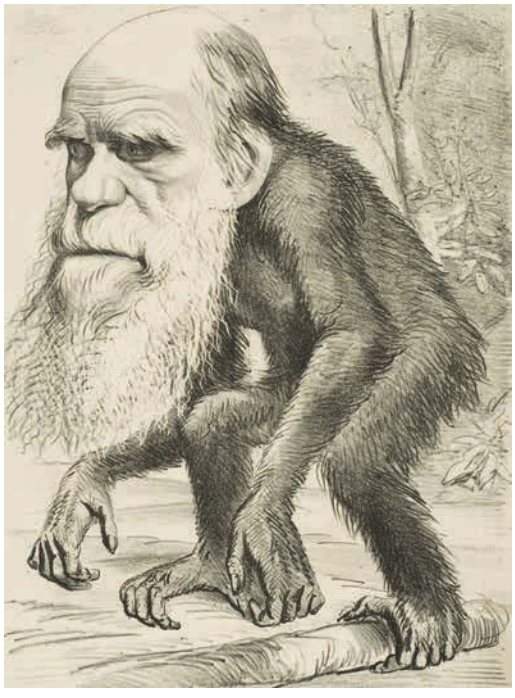
The theory of natural selection, formulated by the naturalists Charles Darwin (1809–1882) and Alfred Russel Wallace (1823–1913) in the middle of the nineteenth century, explains this process of change. Darwin coined the term "natural selection"

to account for the increase in offspring of those individuals who survived from one generation to the next. He introduced the concept in his publication *On the Origin of Species* (1859) in which he pointed out that all organisms produce more offspring than can survive and that the individuals that survive do so because of certain advantageous characteristics they possess. In other words, the surviving organisms are better adapted to the world that confronts them. For example, offspring with better hearing or eyesight can more effectively avoid predators or find more food. The "survival of the fittest," according to Darwin, leads to continual change in the species, as their 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.

Biological evolution involves changes in genetic characteristics over time. That is a fact. The evidence for evolution—fossil, anatomical, and genetic—is so strong that it is also fact. But exactly how evolution operated in the past is not always clear. Thus the mechanisms of evolution involve theory—such as that of natural selection—but that does not change the patterns and evidence seen as facts. (Remember that gravity is also a theory.) Almost all archaeologists and other scientists affirm the validity of an evolutionary perspective.

Most major religious groups have accepted the fact that evolution is not at odds with their view of creation and human origins. For example, in 2014, in an address to the Pontifical Academy of Sciences, Pope Francis said that there was no contradiction between believing in God and using evolution to understand our planet's history, and that "evolution in nature is not inconsistent with the notion of creation."

Most of the world's **religions** have their own creation stories, which some people, however, still do interpret as literal truth. Many creationists in the United States, for example, believe that God made the Earth and all the animals as they exist today in a period of seven days (as described in the Book of Genesis). Creationists, who sometimes use the term "intelligent design" to avoid religious overtones, do not believe that one form of life changes into another and cite several arguments against evolution, such as saying that the fossil record does not show gradual change, or that scientific dating methods are flawed (**fig. 1.9**). The Supreme Court ruled in 1987 that creationism was religious and therefore could not be promoted in public schools, but in some communities, debates still continue about whether evolution should be taught.



1.9
Charles Darwin's ideas regarding the evolution of humans from apes were often ridiculed at the time, as this derogatory caricature illustrates.

WHY STUDY ARCHAEOLOGY?

Having seen what archaeology is and what it is not, the next question must be: why should we study archaeology? Why is it important to know about what happened in prehistory? Why do we need to know about the past?

One basic reason to learn about archaeology is simply a curiosity about the past: a curiosity shared by many people. Public opinion in the United States is very positive with regard to archaeology. One opinion poll revealed that 76 percent of those questioned expressed a strong interest in archaeology and 90 percent thought that archaeology should be taught in high school. Reasons for this interest were varied: learning about how people lived in the past, connecting the past to the present, and the thrill of discovery were mentioned (**fig. 1.10**). Archaeology is clearly of inherent interest to the general public.

This fascination with archaeology stems from the inherent significance of the subject. There is, of course, an exciting mystery involved in uncovering treasures in the earth but, more than that, archaeology tells us about ourselves and how we came to be the way we are. The human condition is one that has changed and will change over time. To know our place and to have confidence about where we are going is an essential ingredient for the success of our species.

1.10
The moai statues found on Easter Island in the Pacific are often considered to be mysterious and confounding. Archaeology, however, has helped us to understand when, how, and why our ancestors made these extraordinary sculptures.

THE IMPORTANCE OF THE PAST FOR THE FUTURE

The importance of archaeology to the present and the future is inestimable. Knowing and understanding the past is essential to any comprehension of the future; as the poet Lord Byron (1788–1824) said, "The best prophet of the future is the past." There is no question that archaeology has significance and meaning in our modern world beyond its value in building human knowledge. Archaeology continually documents the diversity of our human past, while at the same time making clear that we are in fact all one, descended from our earliest human ancestors, passing through time and space together.

Archaeology also serves to document many of the environmental changes and problems that humans have faced over the millennia. Catastrophic events in the past and their destructive nature are widely evidenced in archaeology: Pompeii, Akrotiri, and other sites document past volcanic activity and its effect on human settlements. Ancient earthquakes are often recorded in archaeological sites and provide information on the incidence of these events. Climatic change and its effects on culture can be seen dramatically in some archaeological studies: information on terrain stability, wildlife population dynamics, and the nature and distribution of plant and animal communities in the past are subjects of archaeological study. (The consequences of the Little Ice Age for the inhabitants of Greenland are detailed in Chapter 15.) Sea level change is of great interest in an era of global warming, and archaeologists have developed extensive records on the human use of coasts and changes in those coastlines over time.

By understanding past catastrophes and, importantly, past human reactions, we can better solve the challenges facing us today and in the future. In the Netherlands, for example, archaeological studies of settlement and land use in prehistory have been an essential ingredient in the planning of the dikes and drainage systems that create and protect much of the **country**. In the example described below, archaeologists were responsible for reintroducing an ancient farming technology that turned out to be very useful for modern agriculture in the Andes of South America.

IN FOCUS

RAISED FIELDS OF TIWANAKU, BOLIVIA

Among the several cultures that dominated the Andes Mountains of South America, the empire of Tiwanaku [TEA-wah-NAH-coo] was one of the largest in the period between AD 500 and 1000. The ancient city of Tiwanaku was an enormous urban center with two large pyramid complexes, elite residences, and diverse neighborhoods that housed perhaps forty thousand people. This capital was located along the shore of Lake Titicaca [TIT-ee-COCK-ah]—the highest navigable lake in the world—on the border between Bolivia and Peru at an elevation of 3,810 meters (12,500 ft).

The key to Tiwanaku's success lay in engineering a vast zone of swamps along the edge of the lake into richly productive farmland. The swamps were turned into agricultural fields by the construction of a series of canals 5 to 10 meters (15 to 30 ft) apart and a meter or two (3 to 6 ft) in depth. The canals and the earthen platforms between were carefully designed and constructed to maximize agricultural production and minimize risk.

The soil from the ditches was piled up onto the land to create **raised fields** (**fig. 1.11**). This system was perfectly suited to the high altitude and the crops of the region. The canals provided water for moisture in an area of unpredictable rainfall and were home to significant numbers of fish, also an important source of food. The water plants in the canals provided additional sources of food and served as a fertilizer for the fields. The water also acted as a buffer against the cold nights of a high-altitude land, protecting the crops against killing frosts. The fields were very productive, perhaps four times more so than traditional methods, and fed a large population in the region.

1.11
Aerial photograph of prehistoric raised field platforms (white) and canals (dark) on the edge of Lake Titicaca, Peru. The dry platforms are arranged in bundles of 5 to 20 parallel fields with adjacent water-filled canals. The larger oval features (light colored) are island-like settlements where the farmers lived.

1.12
Part of rehabilitated raised field system in use along the shore of Lake Titicaca in Peru. The platforms are planted with local Andean crops along with such introduced crops as wheat and barley.

Following the collapse of the Tiwanaku Empire, these fields were largely abandoned, the canals silted up, and the land returned to marsh. The ancient agricultural techniques were forgotten. In the last forty years, however, archaeologists have re-discovered these field systems and determined how they worked. In the early 1980s, the archaeologist Clark Erickson of the University of Pennsylvania and the Peruvian agronomist Ignacio Garaycochea realized that these field systems had been an important part of highland agriculture. They were able to persuade local farmers on the Peruvian side of Lake Titicaca to rebuild a few of the raised fields, plant indigenous crops, and farm them using traditional methods (**fig. 1.12**). Across the lake, at the site of Tiwanaku itself, the archaeologists Alan Kolata, of the University of Chicago, and Oswaldo Riviera, from Bolivia, were starting similar experiments. Village farmers near Tiwanaku embraced the important opportunity to improve their agricultural production in a region where malnutrition and poverty are rampant problems.

The first crop in the new raised fields averaged about 20 tons of big potatoes per hectare (2.5 acres)—and some potatoes were the size of grapefruit. Rich crops of cereals and vegetables followed: the ancient techniques yielded almost seven times more food compared to normal dry farming in the area. The success of the trial was such that contemporary farmers still use these rehabilitated ancient field systems today. In this way, archaeologists have not only documented an impressive indigenous knowledge system that sustained large populations over long periods of time and revealed the remarkable insights, energy, and abilities of the former inhabitants of this region, but have also helped local communities by supplying an ancient solution to a modern problem.

ARCHAEOLOGY AND ETHICS

Despite the many benefits archaeology brings, it is important to recognize that the analysis of the past is not without ethical issues that need to be considered. Given the importance of archaeology to our past and future, it is extremely important that we hold ourselves to high ethical standards. As we will see in Chapter 16, however, defining the best ethical practices and balancing our ethical responsibilities to different stakeholders is a complex issue. Here, we focus on the ethical imperative to protect the **archaeological record** for future generations by examining the role of such organizations as UNESCO World Heritage, and how the past is protected under US law.

IN FOCUS

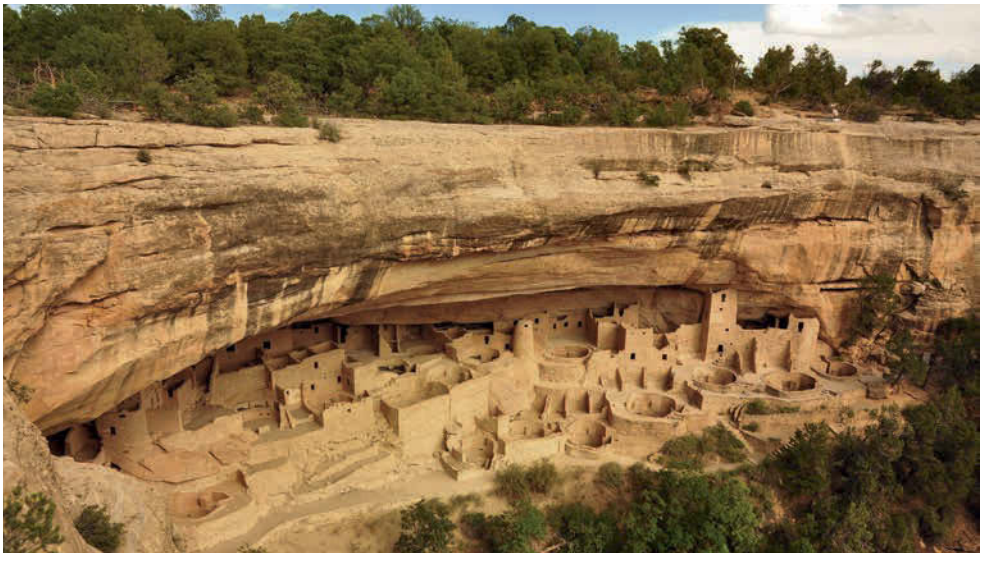
UNESCO WORLD HERITAGE

The United Nations Educational, Scientific, and Cultural Organization (UNESCO) was created in 1972 to encourage the identification, protection, and preservation of outstanding cultural and natural heritage around the world. Cultural heritage refers to monuments, groups of buildings, and sites with historical, aesthetic, archaeological, scientific, historical, or cultural value. Natural heritage refers to outstanding geological formations; habitats of threatened species of animals and plants; and areas of scientific, conservation, or aesthetic value.

The mission of this program is described in **Table 1.1**. More than one thousand sites have been inscribed in the program to date, including various archaeological localities in the United States, such as Mesa Verde (**fig. 1.13**), Mammoth Cave, Cahokia Mounds, and Chaco Canyon. The World Heritage program actively monitors the places under its protection and provides assistance for endangered sites, including training, technical cooperation, education, information, and promotional activities. Perhaps the most important part of the program is the encouragement it provides to countries all over the world to preserve their cultural and natural heritage.

Table 1.1
The mission of UNESCO's World Heritage program.

Encourage countries to sign this convention and to ensure the protection of their natural and cultural heritage;
Encourage countries to nominate sites within their national territory for inclusion on the World Heritage List;
Encourage countries to set up reporting systems on the state of conservation of World Heritage sites;
Help countries safeguard World Heritage sites by providing technical assistance and professional training;
Provide emergency assistance for World Heritage sites in immediate danger;
Support public awareness-building activities for World Heritage conservation;
Encourage participation of the local population in the preservation of their cultural and natural heritage;
Encourage international cooperation in conservation of cultural and natural heritage.



1.13
The archaeological sites in Mesa Verde, such as Cliff Palace (shown here), are protected through UNESCO and are also part of the US National Parks system.

PROTECTING THE PAST

THE TEMPLES OF ABU SIMBEL IN EGYPT

1.14
The reconstruction of Ramses' temple at Abu Simbel in the 1960s was an enormous, international effort to save these ancient monuments from the rising waters of the Aswan Dam.

One of the most famous rescue projects in archaeology was the removal and reconstruction of the Egyptian temples of Abu Simbel, which was sponsored by UNESCO. The two temples at Abu Simbel are among the most magnificent ancient monuments in the world. Built by Pharaoh Ramses II, the site is most famous for the four imposing statues of the seated pharaoh, more than five stories high, guarding the entrance to the temple. The statues and the cave-like temple behind them were carved into a sandstone cliff along the banks of the Nile more than 3,000 years ago. Twice a year, during the spring and fall equinox, a shaft of sunlight reaches the interior of the cave and illuminates the innermost room of the temple.

The construction of the Aswan High Dam across the Nile River in the 1960s meant that the temples at Abu Simbel would be flooded and eventually submerged by the rising waters behind the dam. A remarkable feat of engineering was undertaken to move the temples up 60 meters (185 ft) to higher ground by cutting the sandstone cliff into 950 large blocks and reassembling the structures above the encroaching water (**fig. 1.14**). An international effort was mounted involving more than fifty countries supplying the funding and workers to accomplish this task. After four years of work, the temples were saved and have become one of the major tourist attractions of Egypt.

IN FOCUS

NAGPRA AND US LAWS

In the United States, there are a number of laws in place to protect the past. One very sensitive and contentious issue involves the disposition of archaeological human skeletal remains. North American archaeologists have been excavating burials, along with other cultural materials, for many years. By some estimates, more than 100,000 Native American graves have been exposed in the United States, and the skeletons placed in museums. The Smithsonian Institution in Washington, D.C., for example, housed the remains of more than 16,000 Native Americans collected over the years. Because of growing concern about this archaeological practice and the desire of native peoples to take these remains for reburial, the United States Congress passed the **Native American Graves Protection and Repatriation Act (NAGPRA)** in 1990.

NAGPRA provides a mechanism for museums and federal government agencies to return certain Native American cultural materials—such as human remains, funerary and sacred artifacts, and objects of cultural patrimony—to lineal descendants, culturally affiliated Native American tribes, and Native Hawaiian organizations. Items requested for return must be repatriated to a lineal descendant or related group. Several different lines of evidence are required to determine cultural affiliation, including geographic, biological, archaeological, linguistic, and anthropological evidence. The law also forbids trafficking in Native American cultural or human material and establishes procedures for notification and consultation with tribes for planned excavation or accidental discovery of cultural materials on tribal property. (The major features of NAGPRA are listed in **Table 1.2**.)

As a result of NAGPRA and similar legislation, the Smithsonian has repatriated the remains of more than 6,000 individuals to native tribes for reburial since 1984; in addition

to the human remains, the Smithsonian has also repatriated 250,000 funerary objects and 1,400 sacred objects (**fig. 1.15**). The repatriation of human skeletal remains is not always a clear-cut issue, however, and this legislation has created several controversial situations, which we will explore further in Chapter 16.

Table 1.2 Major stipulations of the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990.

Federal agencies and museums must identify cultural items in their collections that are subject to NAGPRA, and prepare inventories and summaries of the items.
Federal agencies and museums must consult with lineal descendants, Indian tribes, and Native Hawaiian organizations regarding the identification and cultural affiliation of the cultural items listed in their NAGPRA inventories and summaries.
Federal agencies and museums must send notices to lineal descendants, Indian tribes, and Native Hawaiian organizations describing cultural items and lineal descendancy or cultural affiliation, and stating that the cultural items may be repatriated. The law requires the Secretary of the Interior to publish these notices in the Federal Register.

1.15
In Arizona, Apache tribal members bring thirty-eight sacred objects back to tribal lands after being repatriated from the Smithsonian National Museum of the American Indian. Because the Apache believe the masks and other artifacts are alive, the shipping crates had breathing holes.

CAREERS IN ARCHAEOLOGY

1.16
One of many scholarships for archaeology students, the Society for American Archaeology Arthur C. Parker Scholarship supports training for Native Americans and is named after the first president of the Society of American Archaeology, who was of Seneca descent.

There are many different ways to participate in archaeology: watch a TV program, read a book, visit a museum, or tour an archaeological site. For those with a more serious interest and a desire to pursue a career in archaeology, an advanced degree is normally required, either a Master of Arts (MA) or Science (MS) or a Doctorate of Philosophy (PhD). Students can apply for a number of fellowships and scholarships to help pay for their education (**fig. 1.16**).

Academic departments in colleges and universities offer degrees in archaeology. Undergraduate students interested in archaeology usually take courses in anthropology, geography, geology, zoology, botany, chemistry, Classics, genetics, physics, and statistics (among others) to learn basic information about the discipline and related fields. Participation in fieldwork is an important activity at all levels. The problems and questions of field research are complex, and gaining experience in a variety of situations and time periods is a great way to learn about the past. To achieve this, students often enroll in field schools—training programs in archaeological survey and excavation—that are offered as credit courses by many universities in the summer. Fieldwork is often the crucible where students learn if archaeology is really the career they want to follow.

Undergraduate students in the United States interested in archaeology as a career apply to graduate school during their senior year or after graduation. There are also returning students who have decided to pursue their interest in archaeology. Application to graduate schools usually requires an undergraduate transcript, letters of recommendation, scores from the Graduate Record Examination (GREs), and a statement of interest, along with a processing fee.

Most graduate students start their studies with some specific interest in a time or place or subject matter. Most have an undergraduate background in archaeology and often some field experience. Advanced degrees require a major commitment in time, energy, and money, but with a Master's or PhD in hand, there are many directions to go, although not a large number of jobs. Archaeologists work in several kinds of places: as professors teaching and doing research in universities and

1.17
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colleges; as curators cataloging and investigating artifacts in museums; as professional archaeologists in commercial firms doing fieldwork and report writing in regard to the impact of development on cultural resources; and in government positions, employed as rangers, researchers, and managers of archaeological and historic resources on federally owned lands.

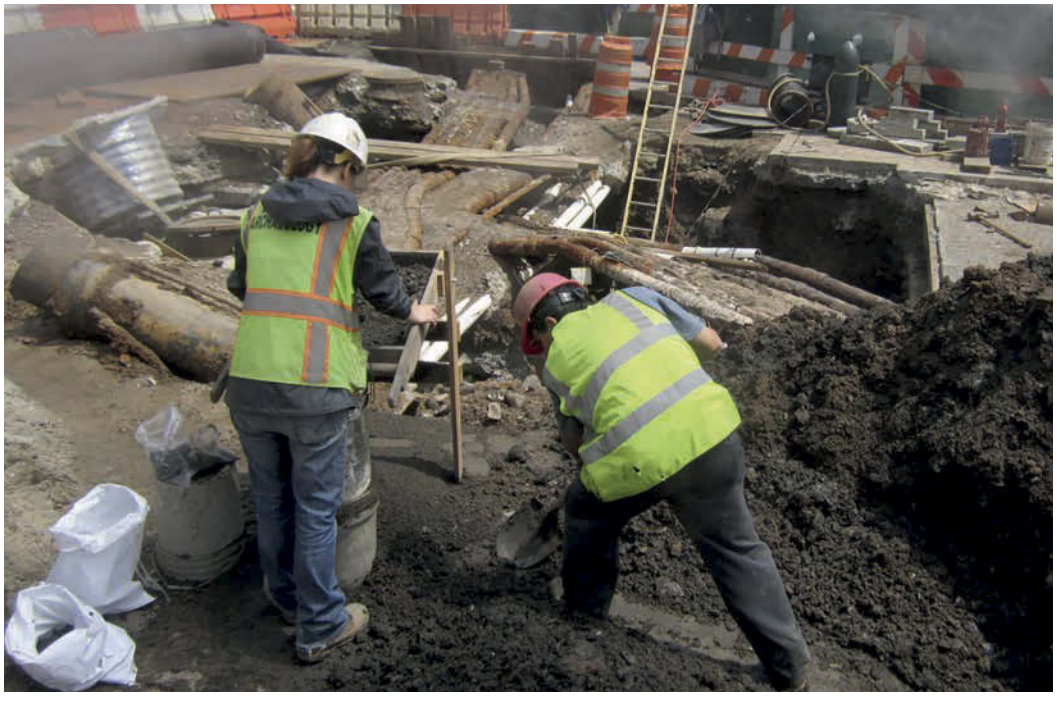
If you are serious about a career in archaeology and want to learn more, get in touch with your local college or university, contact the Society for American Archaeology or the Archaeological Institute of America for information, or search online. There are thousands and thousands of websites about this fascinating field.

Even if you do not want to become an archaeologist, it is a useful field of study for a number of reasons. Archaeology encourages critical and creative thinking, and involves forming arguments and theories based on a variety of different kinds of data, helping develop a highly analytical mindset. Archaeology also involves collaboration and social interaction that improves the ability to work with others. These skills can be carried forward to many careers outside of archaeology. Finally, archaeology is also often done outdoors in distant places involving exercise and travel. It builds character!

ARCHAEOLOGISTS IN THE UNITED STATES TODAY

Many people think that being an archaeologist would be a great job, but few know what it is that archaeologists actually do. What are archaeologists like as people, what kinds of jobs do they have, and how much money do they make?

In 2010, the Society for American Archaeology—the national organization for archaeologists—conducted a survey of its 6,500 members to find out more about the people in the discipline. About half of the archaeologists replied; of these, 44 percent were female, and 84 percent identified as Caucasian (non-Hispanic). (From these data, it is clear that one of



1.18
CRM archaeologists with Chrysalis Archaeological Consultants screen for artifacts at the site of Peck Slip in New York.

1.19
The archaeoBus, organized by the Society for Georgia Archaeology, is a mobile classroom that brings archaeologists and activities to classrooms and libraries throughout Georgia.

archaeology's challenges for the future is creating a profession that better matches the ethnicities and genders.)

Another important question asked archaeologists where they worked. Among the respondents, about 36 percent were employed in colleges and universities, 19 percent were employed in CRM firms, 14 percent were students, 13 percent worked in government agencies, and 4 percent worked in museums. The remaining respondents were either retired or specified "other."

As we can see, most archaeologists who responded work in universities and colleges, where they spend a good bit of time teaching and interacting with students both inside the classroom and outside of it (for example, in laboratories or on field projects [**fig. 1.17**]). Professors also spend a lot of time in service to the college or university, doing the work that keeps these institutions running. These kinds of tasks can be exciting—such as working to hire a new archaeologist—or mundane, such as sitting in a faculty meeting and approving minutes from previous meetings. Research and writing often take place in the few hours that one can manage outside of the normal requirements of a day's work.

For archaeologists employed by CRM firms or in governmental positions involved with cultural resource management, there are also a lot of organizational and administrative tasks that have to be done to keep everything operating. CRM specialists spend a significant amount of time with the forms and paperwork of bureaucracy, mainly in project review. Most CRM archaeologists also spend time outside, however, engaged in archaeological survey and excavation (**fig. 1.18**).

Archaeologists working at museums are responsible for collections of archaeological materials and providing exhibits and educational opportunities for the public. The work of museum personnel can involve managing collections, designing exhibits, and dealing with the public. Public outreach is often an important part of museum work, and can involve anything from bringing artifacts to an elementary school for a presentation (**fig. 1.19**) to leading museum tours.

How much do archaeologists actually earn? In general, an archaeologist with a BA or BS who is working as a field technician on a project can make about $12 per hour. Assistant professors in academia or field directors in the CRM sector have comparable pay scales, generally ranging between $40,000 and $70,000 per year. At the next level, an associate professor or project manager can earn $60,000 to $80,000 per year. The highest-paid archaeologists include full professors or presidents of private CRM firms, who generally make more than $80,000 per year. Promotion is also an important factor. In academia, it normally requires six years for an assistant professor to become an associate professor, and another six years for an associate to become a full professor. Promotion in the private sector is not as structured; moving up the corporate ladder may take significantly less time.

CONCLUSIONS

Archaeology is the study of the human past. Archaeologists use the material remains and residues that have survived the passage of time to learn about the lives and activities of our ancestors. Archaeology is not easy; the pieces of the past are the broken fragments and discarded trash of the former inhabitants of our Earth.

Archaeologists use a wide range of techniques and perspectives to explore that information and learn about the past.

Archaeology is the science of the past, using observation and evaluation to test ideas and theories about what happened in antiquity. As a discipline, it provides a fascinating and frequently beautiful window on the ancient world. It does not involve speculation or myths about our ancestors and their ways; it is not pseudoscience or fiction. Archaeologists rigorously try to formulate accurate statements about the past.

We have all been taught that opinions count, and they do. At the same time, you cannot believe everything you hear, and in our daily lives we constantly evaluate the accuracy of the opinions and information we receive. The scientific method is essentially a formal model of that process, a way of carefully evaluating opinions to separate fact from speculation. Opinions in archaeology are the answers, ideas, explanations, and hypotheses that are offered to explain something. Evaluation is the testing part of the scientific method, designed to weed out wrong or inaccurate opinions and ideas.

Archaeology is usually a rewarding career. It can be exciting, exotic, and fun, but at times it can be frustrating and tedious. There are not many archaeologists—perhaps twelve thousand in the United States today—and most spend only a few weeks a year doing fieldwork; the rest of their time is spent in the office, laboratory, or classroom. Some work in universities and museums teaching, curating, and studying the past, while others are employed in the government or private sectors, protecting and preserving the past. Whatever their particular fields, most archaeologists find their work stimulating, absorbing, and meaningful.

STUDY QUESTIONS

1. What does archaeology mean? How would you define the term?
2. What is pseudoscience? Can you think of some examples of pseudoscience that you have encountered?
3. Is archaeology relevant for today? Why study archaeology?
4. What kinds of jobs are available for archaeologists?
5. What kinds of things do archaeologists do? Would you like to be an archaeologist?

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CHAPTER 2
A BRIEF HISTORY OF ARCHAEOLOGY

INTRODUCTION: THE HISTORY OF PREHISTORY

This drawing of the site of Chichen Itza [CHEECH-in EAT-zah] in the Yucatán of Mexico is one of many made by two explorers during the first half of the nineteenth century. A London artist, Frederick Catherwood (1799–1854), and a New York lawyer, John Lloyd Stephens (1805–1852), visited the region twice between AD 1839 and 1841 and recorded their discoveries of more than a hundred Maya sites and fifteen lost cities in words and drawings. Catherwood used an optical device known as a *camera lucida* to make vivid, accurate, and captivating drawings of the ruins and sculptures they encountered. Stephens was so fascinated by the site of Copan that he purchased the ruins from their owner for $50. (Today the site is the property of the Honduran government.) *Incidents of Travel in Yucatan*, Stephens and Catherwood's account of the exploration, was published in two illustrated volumes in AD 1841 and 1843, and became a national bestseller, revealing the spectacular Maya civilization to the reading public of England and North America for the first time. These books, now more than 170 years old, remain compelling accounts of ancient Maya ruins and provide an early and important record in the history of archaeology.

In common with most academic disciplines today, archaeology did not really exist as a separate branch of study until the second half of the nineteenth century. The history of the discipline of archaeology closely follows the path that each of us takes to learn almost any subject, from awareness to interest, interest to questioning, questioning

to investigation, leading—eventually—to some understanding. Archaeology is also a product of the times, in the sense that current issues and concerns influence the development of the discipline. The period of exploration—in which many new archaeological regions and sites were recognized and new questions were asked—accompanied the European colonization of large parts of the world. The period after the Second World War was generally one of optimism and a sense that everything could be known using modern technology and ideas. A growing awareness of the environmental effects of the "baby boom" that followed the Second World War led to greater concern with **population** and environment in archaeological thinking. Today in archaeology, there is growing concern with globalization, ethical issues, and responsible behavior.

In the following pages, the history of the field is examined in four major time periods: before 1900; 1900–1950; 1950–2000; and from 2000 into the near future. Descriptions of four investigations offer some sense of how archaeology was conducted in these different eras: Thomas Jefferson's **mound** excavation in Virginia in the late eighteenth century; a major British project in Iraq in the 1920s; a Cultural Resource Management project in Illinois in the late 1970s and 1980s; and more recent excavations at the African Burial Ground in New York City. Some comments about the current status of archaeology conclude the chapter.

WHY IS THE HISTORY OF ARCHAEOLOGY IMPORTANT?

We are always reminded that history is important because it prevents us from repeating the past. Since archaeology is a science dedicated to exploring that past, the history of archaeology is therefore important for a number of reasons. Today, we can see that excavations carried out one hundred years ago were rather coarse and haphazard, and in a similar way, the history of archaeology helps us to recognize that many of the old assumptions regarding aspects of past human behavior (such as gender and diversity) were likewise flawed and are now obsolete. The history of archaeology makes us aware of our responsibilities as archaeologists by allowing us to see how archaeology and the past affect people's lives both for better and for worse, such as the use of archaeology to promote nationalism or the role of archaeology in empowering native peoples.

BEFORE 1900

Several stages mark archaeology's early years. Before AD 1800, during what has been called the romantic phase of archaeology, there were very few discoveries and excavations. These few, however, do include the celebrated examples of the English antiquarian William Stukeley's (1687–1765) work at Stonehenge and Avebury in England (published in 1740 and 1743), and Thomas Jefferson's excavation of a mound in Virginia in 1784. These studies were unusual for their time, when biblical orthodoxy defined the prevailing views regarding the origin, chronology, and course of the human past (claiming that humankind had been in existence for only six thousand years).

The emergent phase of archaeology began after AD 1800, and was marked by the creation of museums of antiquity, the appointment of the first university chairs in archaeology, and the initiation of more systematic fieldwork in various parts of Europe and the New World. By the beginning of the nineteenth century, the museums of Europe were filling with artifacts from collections of exotic memorabilia, assembled from colonies and ports of call around the world by ship captains and wealthy dilettantes. The French emperor Napoleon (1769–1821) conquered large parts of Europe and ventured into Egypt at the turn of the nineteenth century, where his engineers and scientists recorded the achievements of the pharaohs in a series of volumes entitled *Description de l'Egypt,* which captivated the European public (**fig. 2.1**, p. 42).

In 1819, the Danish antiquarian Christian Jørgensen Thomsen (1788–1865) was appointed first director of the new National Museum of Denmark (**fig. 2.2**, p. 42). Thomsen also established the chronological foundation for Old World archaeology with his three-age system of stone,

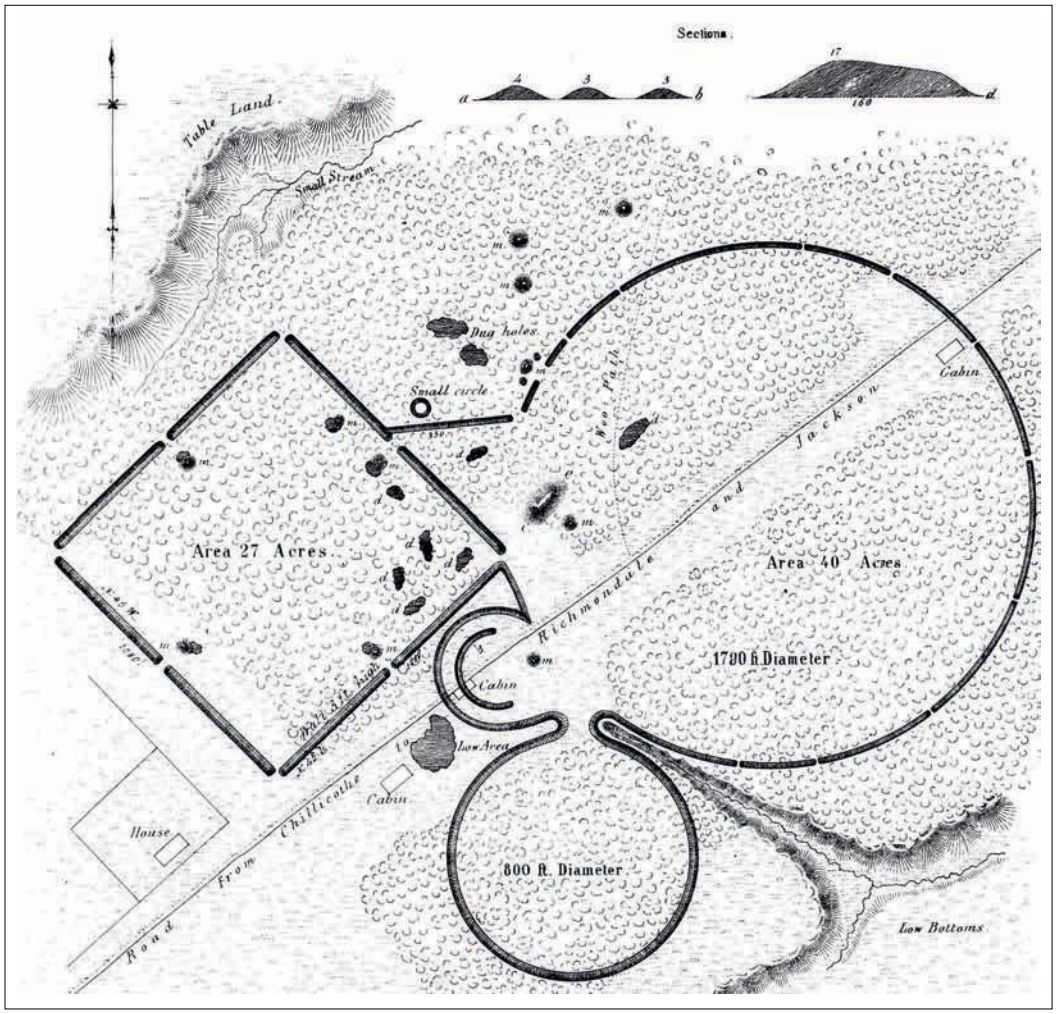
2.1
One of the etchings from the *Description de l'Egypt* volumes shows a fanciful head of the Sphinx being measured by French engineers.

bronze, and iron. Not only was there now a new framework for the past, but also the importance of time and chronology was explicitly recognized. The first university chair in archaeology was C. J. C. Reuvens (1793–1835), who was appointed at the University of Leiden in the Netherlands in 1818.

In addition to directing new museums and working in universities, archaeologists were also conducting excavations around the world. Jacques Boucher de Perthes (1788–1868), excavating in his native France in the 1830s to 1850s, uncovered the bones of extinct animals in association with handaxes and argued that humanity was clearly older than six thousand years, despite the claims of the clergymen. In **Mesoamerica**, John Lloyd Stephens and Frederick Catherwood explored and illustrated the Maya ruins, as described at the opening of this chapter. In North America, Ephraim Squier and Edwin Davis recorded and reported on the extraordinary sites being discovered in their book *Ancient Monuments of the Mississippi Valley*, published in 1848 (**figs. 2.3** and **2.4**).

The second half of the nineteenth century marked a formative stage in the professionalization of archaeology. Charles Darwin's *On the Origin of Species* (1859) eventually led to the general acceptance of the antiquity of the Earth and human ancestors, and the theory of evolution. Darwin's work was an intellectual turning point in our understanding of the past. (Antiquarian studies—as distinguished from

2.2
Christian Jørgensen Thomsen, the first director of the National Museum of Denmark.



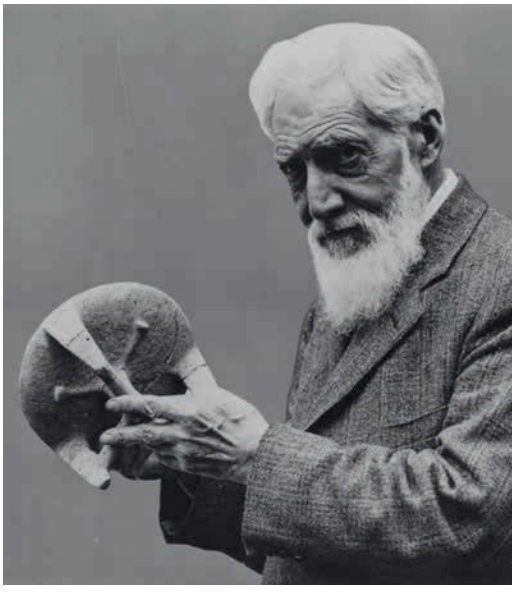
2.3
A plan from Ephraim Squier and Edwin Davis, *Ancient Monuments of the Mississippi Valley* (1848), showing the Hopeton Work in Ohio, with a series of major earthworks, mounds, and a causeway.

2.4
A photo of the Great Serpent Mound in Ohio, also recorded by Ephraim Squier and Edwin Davis in *Ancient Monuments of the Mississippi Valley* (1848).

history and natural science—also emerged during this period.)

Museums of natural history were the primary base for archaeological researchers, but academic positions were increasing in number. (The first PhD in archaeology in the United States was granted at Harvard University in 1894.) Interest during this time was largely in the Classical and the exotic, and in treasure and inscriptions, but eventually shifted toward ancient technologies and more commonplace artifacts. Although few archaeological journals existed and only a handful of general texts were available, several basic tenets of scientific archaeology were established during this period, such as the principles of **stratigraphic** excavation; the significance of common artifacts; the documentation of fieldwork with notes, maps, drawings, and photography; and the publication of results.

Across the globe, intrepid individuals investigated local prehistory. In Switzerland, F. Keller (1800–1881) described the discovery of **lake dwellings** during a period of extremely low water levels in the winter of 1853–54. The Italian archaeologist Guiseppe Fiorelli (1823–1896) directed excavations at Pompeii in the 1860s, exposing entire room blocks and recording stratigraphic layers. Two noted British prehistorians developed methods of excavation and analysis. Working in England, Augustus Henry Lane-Fox Pitt-Rivers (1827–1900)—"the father of scientific excavation"—stressed the significance of simple artifacts for understanding the past. William Matthew Flinders Petrie (1853–1942) demonstrated the importance of stratigraphic excavation and comparative artifact analysis in the study of the chronology of early Egypt (**fig. 2.5**). In the 1870s, Heinrich Schliemann (1822–1890) popularized his finds at Troy and Mycenae with dramatic newspaper accounts that captivated the public.



2.5
The early Egyptologist William Matthew Flinders Petrie.

IN FOCUS

JEFFERSON AT RIVANNA RIVER

As mentioned in Chapter 1, Thomas Jefferson—one of the founding fathers of the United States—was many things: scholar, politician, architect, musician, inventor, horticulturalist, president, slave owner, and archaeologist. Jefferson was interested in the past and, as a practical man, he believed that the way to learn about that past was to excavate the remains of earlier societies. Jefferson grew up on the frontier of Virginia and encountered Native Americans regularly in his early years, an interaction that instilled a lifelong interest in the past of Virginia and in its native peoples. The only book that Jefferson ever wrote, *Notes on the State of Virginia* (1787), dealt in part with the history of the original inhabitants of the state.

2.6
An earthen mound in Virginia, once thought to have been built by a race of Moundbuilders.

The Spanish conquistadores, who explored parts of North America during the early sixteenth century, saw large earthen mounds built and used by the Native American populations in the southeastern United States (**fig. 2.6**). Their observations had been forgotten two hundred years later, however, supplanted by a new explanation for the mounds. The incoming Europeans settlers refused to believe that Native American groups—who had been decimated by disease and conflict—could have been responsible for the numerous large mounds and spectacular artifacts. To account for the mound constructions, the settlers adopted a story of a race of people called the Moundbuilders, who were responsible for the fine artifacts and earthworks but had since disappeared and been replaced by Native Americans. This "Myth of the Moundbuilders," as it is now known, helped to justify the land grab that was taking place, since European settlers believed that the Moundbuilders, not Native Americans, were the original owners of the land.

For Jefferson, the origins of the Virginia Indians were less clear, and he set out to learn who had built the mounds, and why. In 1784, Jefferson carefully excavated a large burial mound near the Rivanna [riv-VAHN-ah] River on his own property. His excavations are remarkable for the methods he used and the careful observations he made. His notes contain details on the size of the mound, the growth of trees on the mound, the various layers encountered in the excavations, and the human remains and artifacts that he discovered. He kept some of the materials from his excavations in his home at Monticello, but the largest portion of the collection was sent to the American Philosophical Society in Philadelphia for safekeeping and future study.

Jefferson estimated that perhaps one thousand individuals had been buried in the mound. By examining the sequence of different layers in the ground, his stratigraphic analysis showed that the construction of the mound was performed in several discrete episodes of enlargement and interment. Each new group of burials was covered and separated by a layer of stones and earth. The absence of wounds on the bodies and the presence of children among the dead suggested to Jefferson that their deaths were not related to warfare or militarism, as others had surmised. He correctly concluded that the mound had been constructed by the ancestors of the Native Americans who were living in Virginia during his childhood. On the basis of the skeletal remains and his linguistic research, Jefferson argued that the ancestors of these people had come from Asia. Unfortunately, his results were generally ignored, and Jefferson's book sold better in France than it did in his native Virginia.

Although he did not use the term, Jefferson's archaeology was remarkable in several aspects. Not only was he one of the very first individuals in the Americas to conduct any kind of excavation, but he also carried out his excavation carefully, and recorded stratigraphic observations that helped him to understand the construction and function of the mound. Finally, Jefferson's research was problem oriented; he was trying to answer questions about the origins of the Virginia Indians.

2.7
Hiram Bingham's discovery of Machu Picchu at the edges of the Inca Empire ignited the American public's interest in archaeology in 1910.

1900–1950

By the end of the nineteenth century, archaeology was on a path to becoming a more systematic and scientific study of the past, but the discipline of archaeology was still unknown to most. During the first decades of the twentieth century, however, archaeologists visited distant lands in search of the origins of civilization and brought spectacular new sites to the attention of the public. Excavations by Howard Carter (1874–1939) at Tutankhamen's tomb in Egypt; Charles Leonard Woolley (1880–1960) at the Royal Cemetery of Ur [UHR] in Iraq; and Hiram Bingham (1875–1956) at Machu Picchu [MACH-eew PEACH-eew] in Peru (**fig. 2.7**) constitute some of the hallmarks of that period of wonder. In Mesoamerica, a series of projects integrated hieroglyphic inscriptions and massive excavations to develop new understandings of the ancient Maya civilization. V. Gordon Childe (1892–1957) defined the concept of an "**archaeological culture**" and synthesized much of European prehistory. These years were also a time of large-scale public works projects in Europe and North America, in which extensive excavations produced mountains of artifacts and information, revealing the richness of the archaeological record.

Archaeology became a staple in academic settings, and autonomous departments of archaeology were created in many parts of the world. In the United States, archaeology was combined with cultural and physical anthropology (and sometimes linguistics) into a single departmental unit. These subdisciplines of anthropology often were joined with sociology, and sometimes other disciplines as well. Such departments usually had fewer than ten professors and a small number of students. Specializations were geographic and occasionally chronological. The first female PhD in archaeology in the United States was granted to Frederica de Laguna (1906–2004) in 1933; Dorothy Garrod (1892–1968) was made Disney Professor of Archaeology (and the first female professor) at Cambridge University in England in 1939 (**fig. 2.8**).

2.8
Dorothy Garrod, the first female professor and Disney Professor of Archaeology at Cambridge University.

By the end of the first half of the twentieth century, archaeology had become both a household word and a quest for **culture history**, a product of stratigraphy, chronology, and the study of artifacts. Culture history focused on the questions of when and where major changes and innovations happened, and the source of those changes. (Primary sources for change were thought to be either innovation or diffusion; new artifacts and ideas were either local inventions or borrowed from elsewhere.) In other words, culture history was an attempt to determine the time and space parameters of material remains from the past.

Despite the advances in techniques and thinking, there was still no widely useful method for **absolute dating** by 1950. (Humanity was thought to have originated less than 500,000 years ago, and the first farmers were said to have emerged in Egypt around 4000 BC.) The difficulty in ascertaining more detailed information about the past was compounded by the relatively small number of working archaeologists and the limited areas of research. In 1946, there were 661 members in the Society for American Archaeology, with a comparable number of archaeologists in Europe. Ethnoarchaeology had barely been imagined. Historical and underwater archaeology were in their infancy. The standard use of quantitative techniques, and the explicit elaboration of the theoretical frameworks that underpin field studies, were still nascent endeavors.

There was, however, light at the end of the tunnel. One of the positive outcomes of the development of the atomic bomb during the Second World War was the intensive study of **radioactivity** and the isotopes of many elements. Willard Libby (1908–1980), a physicist at the University of Chicago, is credited with recognizing the potential for measuring calendar years with radiocarbon dating, using the **half-life** of ^{14}C, the radioactive isotope of carbon. One of the first dates he measured in 1949 came from the archaeologist Robert Braidwood's investigations of the early farmers in the Middle East, and the results pushed back the beginnings of the origins of agriculture by several thousand years. (Radiocarbon dating is discussed in more detail in Chapter 8.)

IN FOCUS

WOOLLEY AND THE ROYAL CEMETERY AT UR

Charles Leonard Woolley made one of the great archaeological discoveries of the twentieth century, comparable to Howard Carter's find of the tomb of King Tutankhamen in Egypt just a few years earlier. Woolley began his career at the Ashmolean Museum in Oxford as an assistant keeper in 1905, and became interested in the ancient Near East. He worked with T. E. Lawrence (of Arabia fame) in Egypt, Syria, and Iraq between 1910 and 1920 (**fig. 2.9**).

2.9
Charles Leonard Woolley (right) with his foreman Hamoudi Ibn Shaikh Ibrahim at Ur.

Iraq was invaded and occupied by Britain during the First World War. In 1920, the League of Nations established the British Mandate over Iraq and the archaeologists began to arrive. From 1922 until 1934, Woolley directed the project that would bring him worldwide renown: the joint Oxford University–University of Pennsylvania excavation at the site of Ur of the Chaldees, the fabled home of biblical Abraham and capital of an ancient civilization in the modern-day country of Iraq. As the author Agatha Christie wrote, "Leonard Woolley saw with the eye of imagination: the place was as real to him as it had been in 1500 BC, or a few thousand years earlier....While he was speaking I felt in my mind no doubt whatever that the house on the corner had been Abraham's."

The site of Ur is located in southern Mesopotamia, the land around the Euphrates and Tigris Rivers, close to the Persian Gulf (**fig. 2.10**). Ur was one of the earliest city-states, inhabited by perhaps two hundred thousand people at its peak around 2500 BC during a period known as the Early Dynastic, in which bureaucratic organization, social stratification, trade, crafts, and writing were all highly developed. The site is enormous: the mounded remains in the center of the site cover an oval area approximately 1,200 by 800 meters (3,900 by 2600 ft; the size of a small airport). The ruins stand up to 20 meters (65 ft) above the featureless and flat surrounding plain. The **ziggurat** [ZIG-uhr-aht], or temple pyramid, on the northwest end of the site would have been substantially higher, perhaps 80 to 100 meters (260 to 330 ft). A long, broken line of smaller mounds extends more than 1.5 kilometers (1 mile) to the north.

Mesopotamia, the cradle of the first **states** and **cities**, was largely unoccupied until the discovery of irrigation; after this discovery, canals carried water from the Tigris and Euphrates rivers and created very fertile agricultural lands. The irrigated farmland is a great natural resource, but there is little else for hundreds of kilometers—no stone, no wood, no metals. Almost all of these raw materials had to be imported by the people

2.10
Aerial photo of the site of Ur in southwestern Iraq. The large structure near the center of the photo is the ziggurat. Surrounding it can be seen the foundations of many other large buildings.

who lived at Ur. The soil itself was used for the construction of the buildings, shaped into bricks of mud and left in the sun to harden. The lack of rain meant this material would last for years. Today, however, it has largely turned back to dust and blows around the cores of the mounds and architectural remnants that still stand.

Woolley's workers first exposed an enormous ziggurat at Ur, along with the remains of smaller temples and residences. The most spectacular finds at Ur, however, were the royal tombs that contained the remains of nearly two thousand people. These royal tombs were constructed as vaulted chambers at the bottom of a shaft dug deeply into the earth. Access was provided by ramps leading down to the chamber, filled in when the tomb was closed. The body of the ruler was placed in the center of the chamber with great quantities of grave furnishings, equipment, and human sacrifices. Several of the tombs included wheeled wagons or sleds, along with horses or oxen to carry some of the grave goods. Servants and attendants were found both in the chamber with the deceased king or queen, and in the adjacent area that Woolley called the "death pit" (**fig. 2.11**).

2.11
Woolley's excavations of the "death pit" at Ur, an enormous excavation done by hand by hundreds of local workers.

2.12
The Ram in the Thicket, excavated by Woolley at Ur.
H: 45.7 cm (18 in.)

The contents of these graves showed that the majority of wealth was concentrated in the hands of the early kings and queens of Mesopotamia. The rich grave goods provided graphic evidence of superb craftsmanship, opulent wealth, and pronounced social stratification (**fig. 2.12**).

Perhaps the best-known vault is thought to contain the body of a queen (**fig. 2.13**, p. 48). Woolley sent a telegram to the University Museum in Philadelphia in 1928, written in Latin to conceal the news: "I found the intact tomb, stone built and vaulted with bricks, of Queen Puabi adorned with a dress in which gems, flower crown, and animal figures are woven. Tomb magnificent with jewels and golden cups."

Queen Puabi was lying on her back on a bed, accompanied by female attendants. Two wagons drawn by oxen and attended by male servants had been backed down the entry ramp, where fifty-nine bodies, mostly female, were on the ground near the tomb chambers. All of the queen's retainers were lavishly bedecked with gold, silver, carnelian, lapis lazuli, and turquoise jewelry and ornaments. Woolley believed that all the people and animals buried with the queen entered the vault alive, although no violence is evident in the arrangement of the corpses. After the queen and her possessions were placed in the pit, the animals were dispatched by their keepers, who

2.13
The crushed skull and headdress of Queen Puabi.

then consumed the poison that had been waiting for them in the tomb.

Woolley attempted to establish the relative chronology of the tombs and graves at Ur, from earlier to later. The cemetery area was small and crowded with tombs and burials from different periods. Graves were superimposed one over another and later graves had frequently disturbed earlier ones. Woolley knew that the depth of the chamber was unimportant because the graves had been dug down from an irregular surface. To solve the problem, Woolley recorded a series of changes in pottery, stone, and metal artifacts that could be used to establish the chronological order of the tombs (a method called dating by association).

Woolley was knighted by the British king in 1935. He wrote twenty-five books about his research, including *Spadework: Adventures in Archaeology* (1953) and *Excavations at Ur: A Record of 12 Years' Work* (1954). His career is a classic example of the period of archaeological exploration and discovery in the first part of the twentieth century, when archaeological theory was almost unknown, scientific techniques were just emerging, and archaeologists were often adventurers.

PROTECTING THE PAST

THE ANCIENT CITY OF UR

The ancient city of Ur—known today as Tell el-Muqayyar, the Mound of Tar—was once a heavily populated green island in the center of the Euphrates River in southern Iraq, situated amid rich, irrigated agricultural fields on both sides of the river. Today, however, this isolated area lies between Baghdad and the Persian Gulf in a wasteland of blowing sand. Two events brought the end of ancient Ur. The river changed course and moved away, and the cultivated lands became unusable after they developed a crust of salt from the continuous farming and evaporation of irrigation waters. After Woolley's excavations, and the restoration of the ziggurat and some of the building walls at Ur, the site became a minor tourist attraction as the biblical home of Abraham and one of the world's first cities.

In Iraq, everything below the **plow zone** usually belongs to the state, following the Napoleonic and Ottoman codes of law. All major sites are therefore owned by the state and protected by Antiquities Department guards. The first Director-General of Antiquities in Iraq, Gertrude Bell, pushed through strong legislation, specifically about the protection of monuments, sites, and Ur itself.

Unfortunately, in recent years Ur has suffered in the wake of the US invasions of Iraq (**fig. 2.14**). Part of the site was bombed in the invasion of 1991, which affected a number of archaeological sites. Rocket or shellfire damaged the brickwork of the ziggurat. Saddam Hussein's regime built a large air base called Talil just south of Ur, and when the US military took over the base in April 2003, they expanded the base perimeter to include the site itself. American forces stationed in the area vandalized the site, spray-painting graffiti and slogans on the monuments, and stealing ancient bricks with cuneiform inscriptions, before the US military declared Ur off-limits. Several of the treasures of the site and the tombs—stored or on display in the National Museum in Baghdad—were stolen by looters at the start of the war in 2003. The US Congress passed an Emergency Protection for Iraqi Cultural Antiquities act in late 2004 to try and preserve these archaeological materials, and in 2009, the US military returned the site to

PROTECTING THE PAST (CONTINUED)

Iraqi authorities, who are now working with the Global Heritage Fund and the Italian Development Cooperation to protect and preserve what remains of Ur. An updated survey and aerial map was completed in 2014. It shows the tragic destruction of parts of the site, but it is also an important part of the Master Conservation Plan being developed for Ur.

2.14
US troops and Humvees at the base of the ziggurat at Ur in 2003.

1950–2000

The second half of the twentieth century was a stage of growth and confidence in archaeology, yet it was followed by a period of doubt and reassessment, a "postclassic" stage of development involving a quest for both data and theory and an explosion of new scientific methods. Brian Fagan of the University of California at Santa Barbara described these changes as the result of developments in three areas: (1) computers and new scientific methods; (2) theoretical advances; and (3) the increasing number of archaeologists. The advent of radiocarbon dating also played a major role in the growth of the field. Prior to 1950, fewer than 100 PhDs had been granted in archaeology in North America, compared to the thousands of post-doctoral archaeologists who are working today. In 2015, there were more than 8,500 members in the national Society for American Archaeology and perhaps twelve thousand practicing archaeologists in the United States.

The postwar years that followed immediately after the Second World War were an extraordinary time. Interest grew in human ancestors; in hunters and gatherers and early farmers; and in the first civilizations. The questions also became bigger. Archaeologists began to think about the goals and meaning of archaeology, beyond the simple issues of shovel and trowel. Emphasis switched from culture history to **culture process**, which focused on how cultures evolved and changed. A multidisciplinary approach involving geologists, botanists, and zoologists was introduced in such projects as Grahame Clark's (1907–1995) excavations at Star Carr in England, the Braidwoods' investigations in Iraqi Kurdistan, and Richard MacNeish's studies in the Tehuacán [tay-wah-CAHN] Valley of Mexico. Gordon Willey (1913–2002) initiated a search for regional settlement patterns in the Virú Valley of Peru, and archaeological survey became accepted practice in the Americas. The Leakey family pursued its extraordinary quest at Olduvai Gorge (**fig. 2.15**, p. 50), leading to the discovery of early human ancestors in Africa.

The next generation of giants in the discipline made their names during the decades that followed the Second World War. François Bordes (1919–1981) delineated a basic order for much

2.15
Louis and Mary Leakey at work on Olduvai Gorge, Tanzania, *c.* 1963.

2.16
François Bordes (in hat) directing excavations in France.

of the European Paleolithic (**fig. 2.16**). Lewis Binford (1931–2011) defined archaeology as a science and explicitly called for the investigation of culture process. David Clarke (1937–1976) argued for an analytical archaeology to investigate the past. Glynn Isaac (1937–1985) foraged into the obscure behavior of early hominids. Colin Renfrew (born 1937), Disney Professor at Cambridge University, spearheaded British archeology for decades and developed a number of models of major transitions in the past. Kent Flannery (born 1934) of the University of Michigan kept things honest with a humorous, practical sense of how to study the past, and also worked on early agricultural societies.

In the context of the optimism and expansionism of the immediate postwar decades, the discipline of archaeology diversified. Culture history gave way to culture process in the 1960s and 1970s as archaeology defined itself in terms of both science and anthropology. The "New Archaeology," developed by Binford, Clarke, and their students, emphasized deductive reasoning, quantitative methods, and a search for general laws and process. The focus on process led to the term "processual archaeology" for this new point of view.

During the 1980s, a self-proclaimed "post-processual" group of archaeologists, led by Ian Hodder (then of the University of Cambridge, now of Stanford), questioned many of the basic premises of the discipline and pointed to new directions and goals in the pursuit of the past (**fig. 2.17**). Emphasis was placed on interpretation and the importance of **symbol**, **ideology**, and cognition in the operation of society. Explanation became a narrative, biased by the internal goals and agenda of each individual author. Archaeology was to be pluralistic and involve many points of view, all equally valid.

At the same time that postprocessualism was being defined, several evolutionary and environmental approaches regained a foothold in North America under a variety of titles: evolutionary ecology, evolutionary archaeology, and neo-Darwinism. New ideas melded with old as archaeologists engaged in theoretical disputes and emerged on the other side with a greater sense of how the social and ideological—along with technology and the environment—were significant factors in shaping our past. (These issues are considered in more detail in Chapter 3.)

In that same period, the archaeology of heritage grew in importance around the globe. A series of legislative acts made the protection of the past a legal requirement, and such institutions

2.17
Ian Hodder's excavations of Çatalhöyük, Turkey, have produced symbolic interpretations that involve many different points of view.

as the National Register of Historic Places, the National Park Service Archaeology and Ethnography Program, State Historic Preservation Offices, and English Heritage were founded during this period. The legislation required that impact assessments be conducted before any construction was undertaken, and this mitigation of the destruction of cultural resources led to the new business of archaeology in the private and government sectors.

Many factors contributed to an increasing focus on the preservation of archaeological sites and resources, including the environmental movement; a greater awareness of the rapid pace of site destruction; a concern for the rights of native peoples and descendent groups; the commercial importance of archaeology as a magnet for tourism; and the rebirth of interest in archaeology for nationalistic and political motives. A large cadre of professional archaeologists—in fact, the majority of the discipline by the end of the twentieth century—were no longer found in universities or museums, but rather operated in government agencies and private businesses for the purpose of heritage rescue, preservation, and management. (The amount of funding expended in heritage preservation is estimated to be twenty to fifty times that available for academic research.) This trend has resulted in more diversified interests and goals in archaeology and has generated an enormous body of new information about the past.

IN FOCUS

THE FAI-270 PROJECT IN EASTERN ILLINOIS

The National Historic Preservation Act of 1966 (NHPA) established federal and state responsibilities for identifying and managing cultural properties, such as archaeological resources, historic buildings, and structures that are eligible for listing on the National Register of Historic Places maintained by the Department of the Interior. The Archaeological Resources Protection Act of 1979 provided for the protection of archaeological resources located on public lands and Native American lands; defined archaeological resources to be any material remains of past human life or activities that are of archaeological interest and are at least one hundred years old; encouraged cooperation between groups and individuals in possession of archaeological resources from public or Native American lands with special permit and disposition rules for the protection of archaeological resources on Native American lands in light of the American Indian Religious Freedom Act; provided that information regarding the nature and location of archaeological resources may remain confidential; and established civil and criminal penalties, including forfeiture of vehicles, fines of up to $100,000, and imprisonment of up to five years for second violations for the unauthorized appropriation, alteration, exchange, or other handling of archaeological

resources with rewards for furnishing information about such unauthorized acts.

Prior to the start of any federally funded construction, the National Environmental Policy Act and NHPA Section 106 require an impact study to determine whether important archaeological or historical sites are in danger of destruction. Both federal agencies and private corporations must provide information on the effect their projects may have on the history and prehistory of an area. Various kinds of construction, such as reservoirs, highways, and sewage systems, require archaeological surveys and impact statements. This kind of archaeology, known as cultural resource management (CRM) and described in Chapter 1, has become very important in the last thirty years.

These CRM projects usually involve three stages. An initial archive and field survey (Phase I) is made to see if archaeological or historical artifacts are known from the area. If such materials are found, a second stage (Phase II) of more detailed testing and evaluation is undertaken. If these results are positive, a third stage (Phase III) may involve a full program of excavation and recovery, or mitigation. Mitigation may involve moving the place of construction, re-routing rights of way, or more complete excavation.

CRM projects vary greatly in size and scope. Many of these evaluations are relatively small scale and require only a few days or weeks to determine the impact of construction. On the other hand, major building projects—such as dams, pipelines, and highways—may require years of fieldwork, analysis, and report writing to complete an evaluation.

The FAI-270 project in eastern Illinois was one of the largest CRM projects in US history. The designation FAI-270 refers to Federal Aid Interstate 270 (later re-numbered 255), a six-lane expressway to be constructed as part of a long-term expansion of the highway system around St. Louis, Missouri. This area is known as the American Bottom, and lies just south of the confluence of the Illinois, Missouri, and Mississippi rivers (**fig. 2.18**). The American Bottom is extremely fertile land with a variety of environmental zones, including swamps, ponds, forests, and wet prairie grasslands.

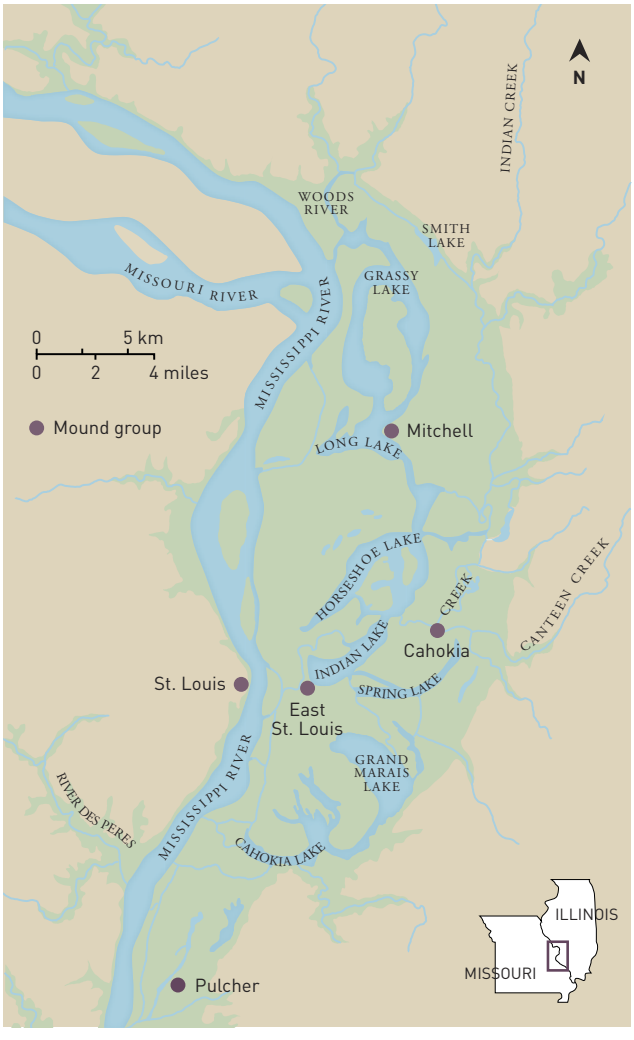
The planned route of the highway ran along one side of the Cahokia Mounds State Historic Site. Cahokia [kah-HOKE-ee-ah] is one of only twenty World Heritage sites in the United States and the location of the largest human-made earthen mound in North America (**fig. 2.19**). Between AD 1050 and 1250, Cahokia was the most extensive site north of Mexico, and may have had a population of as many as thirty thousand people. The site includes more than one hundred earthen mounds, residential areas, plazas, and many other features in an area of 16 square kilometers (6 square miles). The enormous Monks Mound has a base of almost 300 by 250 meters (1,000 by 820 ft), approximately 7 hectares (18 acres), and rises in 4 terraces to a height of 30 meters (100 ft).

The original FAI-270 highway plan detailed approximately one thousand acres of land that would be impacted by construction. The combination of the major prehistoric center at Cahokia and the very rich environment of the American Bottom meant that a large number of archaeological sites were in the right of way for the six-lane highway.

The primary contractor for the highway, the Illinois Department of Transportation (iDOT), asked the University of Illinois at Champaign-Urbana to undertake the CRM work on the project. The directors of this project hired archaeologists from all over the country in 1977, and several other universities and museums also became involved as the project grew in size.

The FAI-270 investigations were planned from the start to learn more about the natural environment of the American Bottom and the archaeological record along the corridor of the planned highway. The design of the project included three

2.18
The FAI-270 project study area of the American Bottom, east of St. Louis, Missouri, on the floodplain of the Mississippi River in western Illinois. Note the many oxbow lakes in existence in this region prior to European settlement. Major mound groups in this area are indicated by dots.



2.19
Monks Mound at Cahokia, the largest prehistoric earthwork in the United States and Canada. Note the cars along the highway for a sense of size.

2.20
Aerial view of excavations at the Range site, showing houses from the Mississippian period. Humans appear on the right-hand side of the photo for scale.

major questions that would direct research: (1) What was the nature of the transition from the Late Archaic to Early Woodland period? (2) What kinds of settlement and community plan characterized the Late Woodland and Mississippian periods? What can this information tell us about the rise of more complex societies? (3) What is the evidence for the rise and fall of the site of Cahokia outside the boundaries of the site itself?

To answer these questions, archaeologists first surveyed the right of way and identified fifty-nine new sites. Testing and evaluation of these sites continued until 1982. At the same time, the preparations for the highway generated new development in the area and required more archaeological survey. After this stage of the project, a total of 102 archaeological sites had been identified. Excavations were undertaken at the twenty most promising sites that had been located in the survey (**fig. 2.20**). The research questions of the project meant that excavations were undertaken for large-scale recovery of community plans at the archaeological sites. Earthmoving equipment was used to expose the subsurface of many of these locations to help reveal the larger site plan. This was new information for many of the time periods encountered and provided important new data.

Based on the survey and excavation data, the archaeologists determined that the Late Archaic was a time of **hunter-gatherers** in this region, prior to the introduction of ceramics. This period also witnessed the adoption of squash, probably

2.21
The Birger Figurine—one of the discoveries of the FAI-270 project—was carved from pipestone, and depicts a woman hoeing or hitting a cat-faced snake that wraps around her.

domesticated in Mexico, and several native North America domesticates, such as sunflower, marshelder, and gourds. Subsistence was based on a range of activities including hunting, fishing, fowling, and gardening, along with nut, seed, and shellfish collection. Settlements from this period were large, rich in artifacts and features, and some appeared to be sedentary.

The transition to the Woodland period took place *c.* 600 BC with the introduction of pottery and a number of new types of artifacts. The Early Woodland appears to represent the arrival of new groups of people in the American Bottom. Sites were small, short-term occupations with limited deposits of artifacts. The Woodland period continued until approximately AD 800, which marks the beginning of the Mississippian period and the rise of the center of Cahokia. Several spectacular artifacts dating from the Mississippian period were discovered by the project (**fig. 2.21**).

The FAI-270 project involved more than one thousand archaeologists. Fieldwork lasted from 1978 until 1985. At least thirty books and numerous scientific articles have been published on various aspects of the project and the finds. The funding for the archaeological portion of the project was more than $4,000,000, a tiny portion of the entire highway construction budget of hundreds of millions of dollars.

In the end, the FAI-270 project managed to rescue a huge amount of information before the road construction disturbed the area. The results of this project were summarized by the noted American archaeologist James Griffin (1905–1997) in 1984: "Seldom if ever has so much been added to archaeological knowledge, by so many participants, supported by so much money. Together these participants comprised a non-institutionalized, unfortunately short-lived, archaeological institute of high quality."

ARCHAEOLOGICAL THINKING

HOUSE SIZE AND POPULATION IN THE MISSISSIPPIAN PERIOD

The rise of corn agriculture and a remarkable expansion in population and cultural complexity mark the Mississippian period in the American Bottom. Settlements were large and permanent. Based on information collected during the FAI-270 project, an intriguing pattern was seen; while house size and the number of structures increased, site size decreased. This pattern suggested a growing population in the context of a need for more farmland. A number of sites with earthen mounds are known from the beginning of the Mississippian period, distributed approximately every 20 kilometers (12 miles) across the American Bottom. Clear differences in status and power were emerging at that time, culminating in the town-and-mound pattern of stratified sociopolitical organization that characterized this period. Four levels of a settlement hierarchy could be identified: small settlements without mounds; sites with a single mound; sites with a number of mounds; and the primary center at Cahokia itself. Native American occupation of the American Bottom declined after AD 1300, and ended with the westward expansion of European-American settlement in the eighteenth century.