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A Global Perspective

Tenth Edition

Raymond Scupin

Lindenwood University

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PREFACE

EDUCATIONAL GOALS AND ORIENTATION OF THIS TEXTBOOK

The world has become a small place. Global communications, international trade, geopolitical events with worldwide impact, and ease of travel have brought people and cultures into more intimate contact than ever before, forcing this generation of students to become more knowledgeable about societies other than their own. This textbook is grounded in the belief that an enhanced global awareness is essential for people preparing to take their place in the fast-paced, increasingly interconnected world of the twenty-first century. Anthropology is ideally suited to introduce students to a global perspective. Through exploring the range of human diversity, each of the subfields of anthropology helps liberate students from a narrow, parochial view and enables them to appreciate the full sweep of the human condition.

The anthropological perspective, which stresses critical thinking, the evaluation of competing hypotheses, and the skills to generalize from specific data, contributes significantly to a well-rounded education. This text engages readers in anthropology by delving into both classic and current research in the field. This reflects a commitment to anthropology's holistic and integrative approach. It spells out how the four basic subfields of anthropology—biological anthropology, archaeology, linguistics, and cultural anthropology—together yield a comprehensive understanding of humanity. Because the subfields often overlap, insights from all of them are woven together to reveal the holistic fabric of a particular society or the threads uniting all of humanity. In examining anthropological research, this text often refers to research conducted in other fields. Contemporary anthropologists draw on the findings of biologists, paleontologists, geologists, economists, historians, psychologists, sociologists, political scientists, religious studies specialists, philosophers, and researchers in other areas whose work sheds light on anthropological inquiry. In addition to enlarging the scope of the text, exploring interactions between anthropology and other fields sparks the critical imagination that brings the learning process to life.

The comparative approach, another cornerstone of the anthropological perspective, is also highlighted in this text. When anthropologists assess fossil evidence, artifacts, languages, or cultural beliefs and values, they weigh comparative evidence, while acknowledging the unique elements of each case, society, or culture. The text casts an inquiring eye on materials from numerous geographical regions and historical eras to enrich student understanding. A diachronic approach also characterizes this textbook. In evaluating human evolution, prehistoric events, language divergence, or developments in social structure, anthropologists must rely on models that reflect changes through time, so this diachronic orientation suffuses the text.

FOUR UNIFYING THEMES OF THIS TEXT

In previous editions of this textbook, we emphasized three unifying themes that structured the material presented. These have been retained and expanded in this edition. The first two themes we introduce students to are the *diversity of human societies* and cultural patterns the world over and the *similarities that make all humans fundamentally alike*. To achieve these two objectives, we pay as much attention to universal human characteristics as we do to local cultural contexts and conditions. We emphasize the growing interconnectedness of humanity and both the positive and negative consequences of this reality. We draw on anthropological studies to discover how people are responding to the process of globalization.

The third theme focuses on the interconnections between the sciences and humanities within anthropology. We call this the *synthetic-complementary approach*, which views the scientific method and the methods in the humanities as complementary and suggests that one is incomplete without the other. This theme was mentioned in previous editions, but we have made it much more of a centerpiece in this edition. This third important theme dovetails with the two other themes, demonstrating how human behavior is unique to a specific culture yet also universal.

Several decades ago, in another anthropology textbook, the late Eric Wolf emphasized that anthropology has always had one foot in the sciences and one foot in the humanities. This observation is evermore true today. Wolf said, "Anthropology is both the most scientific of the humanities and the most humanistic of the sciences" (1964, 88). We would like to carry on the tradition that Wolf accentuated in his work.

One of the prime goals in this edition is to further highlight the fundamental importance of the synthetic-complementary

approach to science and the humanities in anthropology. Some anthropologists have argued that the scientific approach is not suitable for assessing and interpreting human behavior and culture, whereas others believe that the humanistic approach is not appropriate for developing general cross-cultural and causal explanations about human behavior and culture. This has led to textbooks that focus on either one or the other approach. In this book, we highlight how the humanistic-interpretive perspective is complementary to the scientific method, which seeks general cross-cultural and causal explanations for human behavior and culture. The humanistic-interpretive perspective provides insight into the specifics of human behavior within different cultures, whereas the scientific approach offers a method to test causal explanations that allow for insight into universal aspects of human behavior.

We have added a fourth theme that is prevalent in the textbook. The fourth theme is emphasized in a Critical Perspectives box, "Essentialism," in Chapter 1. We explain the meaning of psychological essentialism: attributing the belief that members of certain categories or classifications such as "species," "races," "ethnic groups," "genders," or "cultures" share an underlying invisible essence. Extensive psychological and anthropological research has demonstrated that psychological essentialism appears universal and is prevalent in human cognition and thinking throughout the world. One of the major missions of anthropology and this textbook is to help reduce essentialist beliefs and generalizations regarding the different categories such as ethnic or "racial" groups, cultures, civilizations, societies, tribes, or religious groups. Anthropologists have found that within these different categories there is enormous variation. Essentialist thinking has resulted in many widespread simplistic misconceptions or distorted perceptions.

In different sections of the textbook, we indicate how essentialist beliefs and perceptions have been prevalent. One of the major goals of this textbook is to introduce the student to the anthropological research that demonstrates the problems of facile generalizations and essentialist beliefs and perceptions.

WHAT'S NEW TO THIS EDITION

- A brand new chapter on gender and sexuality explores the complexities of topics such as transgender and LGBTQ issues in various societies throughout the world.
- New Anthropologists at Work boxes illustrate current research directions of an archaeologist who explores both the past and the present in Mesoamerica and a linguistic anthropologist who is assisting people in Papua New Guinea in preserving and developing their native language. We also have Anthropologists at Work boxes about cultural anthropologists who are exploring current topics such as psychiatric treatments and the psychology of religion, and an ethnographic study of how young people use YouTube. Other boxes are about anthropologists who are applying their skills in jobs outside of academia in fields such as space travel, the high-tech industry, and the global financial world.
- New coverage of recent fossil and archaeological evidence added to the chapter on human evolution.
- New updated and expanded discussions of anthropological research on color perception in various societies.
- New discussions and developments of the anthropological research on enculturation and emotions.
- New discussion of twenty-first-century "cultural evolution theories": dual inheritance models, cultural attraction theory.
- New discussions of anthropological research on inequality and debt for economic anthropology.
- New discussion of life history projects in South America by various anthropologists.
- New discussions of political power, kingships, and warfare as understood by recent research in anthropology.
- New discussion of extreme "high arousal rituals" by Dimitris Xygalatas in the religion and aesthetics chapter.
- New discussion of shamanism and examples among the Ju/'hoansi San and the Inuit.
- New discussion of anthropological explanations of human sacrifice rituals in agricultural states.
- New discussion of the Human Generosity Project as established by Lee Cronk.
- New discussions of the recent impact and reactions to globalization by indigenous communities.
- New condensed chapter on globalization, colonialism, and postcolonialism.
- New discussion of research on essentialism as it is related to "race" classification.
- New discussion of anthropological contributions to genomic research in Mexico in the race and ethnicity chapter.

- New discussion of the roles of applied anthropologists in their various activities.
- New discussion of ethnomedicine in Africa in the applied anthropology chapter.
- New discussion of how anthropologists are actively doing research on the impact of climate change on various societies throughout the world.
- New discussion of recent applied archaeology and developments in garbology.
- In addition to the new discussions described above, we have expanded and updated many sections and boxes of the chapters within the textbook, paying close attention to the readability and coherence of the content for the undergraduate student.

Features of This Text

Boxes

In the **Critical Perspectives** boxes, designed to stimulate independent reasoning and judgment, students take the role of anthropologist by engaging in the critical analysis of specific problems and issues that arise in anthropological research. A successful holdover from the first edition, these boxes encourage students to use rigorous standards of evidence when evaluating assumptions and hypotheses regarding scientific and philosophical issues that have no easy answers. I have updated my discussions in the Critical Perspectives boxes for this edition. By probing beneath the surface of various assumptions and hypotheses in these exercises, students stand to discover the excitement and challenge of anthropological investigation.

Anthropologists at Work boxes, profiling prominent anthropologists, humanize many of the issues covered in the chapters. These boxes—another carryover from the first edition—go behind the scenes to trace the personal and professional development of some of today's leading anthropologists.

Pedagogical Aids

This edition of the textbook provides some basic features that facilitate the process of teaching and learning. Each chapter opens with Learning Objectives that will guide students to the most important issues addressed in the chapter. And each chapter ends with a Summary and Review of Learning Objectives, which helps the students better comprehend the content in the chapter. In addition, each chapter has a list of Key Terms with page numbers that will help the students focus on the important concepts introduced in the chapter. The Key Terms are also found with succinct definitions in the Glossary.

Digital Assets

SAGE edge™

SAGE edge for Instructors

A password-protected resource site is available at edge.sagepub.com/scupincultural10e supports teaching, providing high-quality content to create a rich learning environment for students. The SAGE edge for this book includes the following instructor resources:

- **Test banks** built on Bloom's Taxonomy provide a diverse range of test items. Each chapter includes 50 questions
- Editable, chapter-specific **PowerPoint® slides** offer flexibility for creating a multimedia presentation for lectures
- **Lecture notes** for each chapter align with the PowerPoint slides summarize key concepts to help with preparation for lectures and class discussion
- Carefully selected **video and multimedia content** that are aligned with the book's learning objectives enhance exploration of key topics
- Chapter-specific **discussion questions** help launch engaging classroom interaction while reinforcing important content
- **Sample course syllabi** provide suggested models for structuring your course
- **Tables and figures** from the book are available for download
- **SAGE coursepacks** provide easy LMS integration

SAGE edge for Students

The open-access companion website helps students accomplish their coursework goals in an easy-to-use learning environment, featuring:

- **Learning objectives** reinforce the most important material
- **eQuizzes** encourage self-guided assessment and practice
- **eFlashcards** hat strengthen understanding of key terms and concepts.
- Carefully selected **video and multimedia content** that are aligned with the book's learning objectives enhance exploration of key topics

SAGE coursepacks

SAGE coursepacks make it easy to import our quality instructor and student resource content into your school's learning management system (LMS) with minimal effort. Intuitive and simple to use, **SAGE coursepacks** gives you the control to customize course content to me et your students' needs. The SAGE coursepacks are customized and curated for use in Blackboard, Canvas, Desire2Learn (D2L), and Moodel.

In addition to the content available on the Edge site, the coursepacks include:

- **Pedagogically robust assessment tools** that foster review, practice, and critical thinking:
  - **Chapter tests** identify opportunities for student improvement, track student progress, and ensure mastery of key learning objectives.
  - **Instructions** on how to use and integrate the comprehensive assessments and resources provided.
- **Assignable video tied to learning objectives with corresponding assessments** bring concepts to life to increase student engagement.
- **Integrated links to the eBook version** that make it easy to access the mobile-friendly version of the text, which can be read anywhere, anytime.

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Raymond Scupin is a professor of anthropology and international studies at Lindenwood University. He received his BA degree in history, Asian studies, and anthropology from the University of California–Los Angeles. He completed his MA and PhD degrees in anthropology at the University of California–Santa Barbara. Dr. Scupin is truly a four-field anthropologist. During graduate school, he did archaeological and ethnohistorical research on Native Americans in the Santa Barbara region. He did extensive ethnographic fieldwork in Thailand with a focus on understanding the ethnic and religious movements among the Muslim minority. In addition, Dr. Scupin taught linguistics and conducted linguistic research while based at a Thai university.

Dr. Scupin has been teaching undergraduate and graduate courses in anthropology for more than thirty years at a variety of academic institutions, including community colleges, research universities, and a four-year liberal arts university. Thus, he has taught a very broad spectrum of undergraduate students. Through his teaching experience, Dr. Scupin was prompted to write this textbook, which would allow a wide range of undergraduate students to understand the holistic and global perspectives of the four-field approach in anthropology. In 1999, he received the Missouri Governor's Award for Teaching Excellence. In 2007, Dr. Scupin received the Distinguished Scholars Award at Lindenwood University.

Dr. Scupin has published many essays, book chapters, and review essays based on his ethnographic research in Thailand. He returned to Thailand and other countries of Southeast Asia to update his ethnographic data on Islamic trends in that area, an increasingly important topic in the post-9/11 world. He is a member of many professional associations, including the American Anthropological Association, the Association for Asian Studies, and the Council on Thai Studies. Dr. Scupin has authored *Religion and Culture: An Anthropological Focus*, *Race and Ethnicity: The United States and the World*, and *Peoples and Cultures of Asia*. He is also a coauthor with Christopher DeCorse of *Anthropology: A Global Perspective* (9th ed., with SAGE).

Courtesy of Raymond Hames

1 INTRODUCTION TO ANTHROPOLOGY

LEARNING OBJECTIVES

After reading this chapter, you should be able to:

- **1.1** Compare and contrast the four major subfields of anthropology.
- **1.2** Describe how the field of anthropology is holistic, interdisciplinary, and global.
- **1.3** Explain how the scientific method is used in anthropological explanations.
- **1.4** Discuss how the field of anthropology bridges both the sciences and the humanities.
- **1.5** Describe why students should study anthropology.

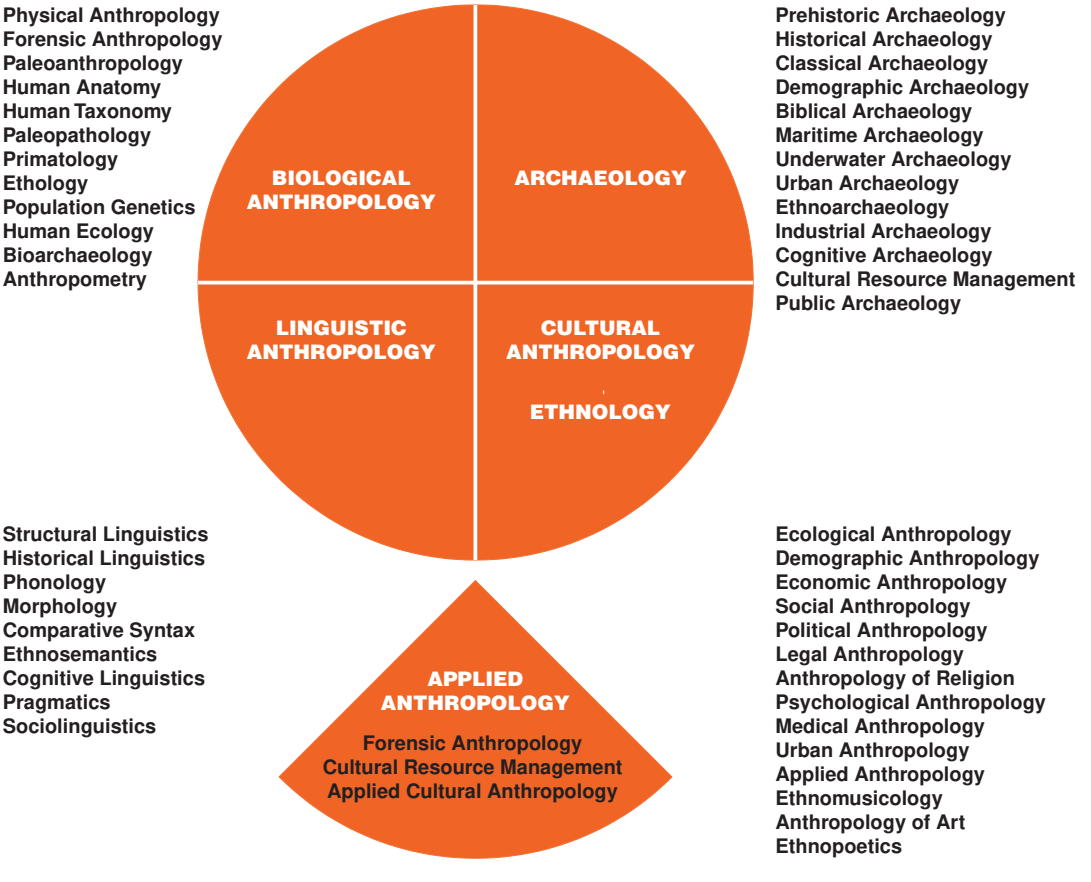
Anthropologists use varied methods, techniques, and theoretical approaches in their investigations, which have two major goals: to understand the *uniqueness and diversity* of human behavior and human societies around the world and to discover the *fundamental similarities* that connect human beings throughout the world. To accomplish these goals, anthropologists undertake systematic case studies across the globe, focusing on human populations in both the past and the present. These studies have broadened our understanding of humanity, from the earliest human societies to the present. This chapter introduces the distinctive approaches used in anthropology to achieve these goals.

ANTHROPOLOGY: THE FOUR SUBFIELDS

1.1 Compare and contrast the four major subfields of anthropology.

The word *anthropology* is derived from the Greek words *anthropo*, meaning "human beings" or "humankind," and *logia*, translated as "knowledge of" or "the study of." Thus, we can define **anthropology** as the study of humankind. This definition in itself, however, does not distinguish anthropology from other disciplines. After all, historians, psychologists, economists, sociologists, and scholars in many other fields systematically study humankind in one way or another. Anthropology stands apart because it combines four

FIGURE 1.1 The Four Core Subfields of Anthropology and Applied Anthropology



subfields that bridge the natural sciences, the social sciences, and the humanities. These four subfields—biological anthropology, archaeology, linguistic anthropology, and cultural anthropology—constitute a broad approach to the study of humanity the world over, both past and present. Figure 1.1 shows these subfields and the various specializations that make up each one.

The subfields of anthropology initially emerged in Western society in an attempt to understand non-Western peoples. When Europeans began exploring and colonizing the world in the fifteenth century, they encountered native peoples in the Americas, Africa, the Middle East, and Asia. European travelers, missionaries, and government officials described these non-Western cultures, providing a record of their physical appearances, customs, and beliefs. By the nineteenth century, anthropology had developed into the primary discipline for understanding non-Western societies and cultures. The major questions that these nineteenth-century anthropologists sought to answer dealt with the basic differences and similarities of human societies and cultures and with the physical variation found in peoples throughout the world. Today, anthropologists do not solely focus their attention on non-Western cultures: They are just as likely to examine cultural practices in an urban setting in the United States as to conduct fieldwork in some far-off place. However, anthropologists continue to grapple with the basic questions of human diversity and similarities through systematic research.

Biological Anthropology

Biological anthropology (also referred to as physical anthropology) is the subfield of anthropology concerned with humans as a biological species. As such, it is the subfield most closely related to the natural sciences. Biological anthropologists conduct research to understand both human evolution and modern human variation. The investigation of human evolution presents one of the most tantalizing areas of anthropological study. Research has now traced the African origins of humanity back over 6 million years, while fieldwork in other world areas has sketched the expansion of early human ancestors throughout the world. Much of the evidence for human origins consists of **fossils**, the fragmentary remains of bones and living materials preserved from earlier periods. The study of human evolution through analysis of fossils is called **paleoanthropology** (the prefix *paleo* from the Greek word *palaios* meaning "old" or "ancient"). Paleoanthropologists use a variety of scientific techniques to date, classify, and compare fossilized bones to determine the links between modern humans and their biological ancestors. Paleoanthropologists may work closely with archaeologists when studying ancient tools and activity areas to learn about the behavior of early human ancestors.

Other biological anthropologists explore human evolution through **primatology**, the study of primates. **Primates** are a diverse order of mammals that includes humans, as well as other species such as chimpanzees, gorillas, gibbons, and orangutans that share an evolutionary history and, therefore, have many physical characteristics in common with us. Many primatologists observe nonhuman primates in their natural habitats to ascertain the similarities and differences between these other primates and humans. These observations of living primates provide insight into the behaviors of early human ancestors.

Courtesy of Zachary J. M. Beier

Staff and students from the University of the West Indies document a human burial discovered during excavations at White Marl in Jamaica. One of the largest pre-Columbian settlements on the island, it was continuously inhabited from AD 850 to the Spanish conquest in the 16th century.

Other biological anthropologists focus their research on the range of physical variation within and among modern human populations. These anthropologists study human variation by measuring physical characteristics—such as body size, variation in blood types, or differences in skin color—or genetic traits. Their research aims at explaining *why* such variation occurs, as well as documenting the differences in human populations.

Skeletal structure is also the focus of anthropological research. Human *osteology* is the particular area of specialization within biological anthropology dealing with the study of the human skeleton. Skeletal remains are crucial in the study of human evolution, prehistoric societies, and individual life histories. For example, osteological studies can determine social and gender inequalities, which impact diet and living conditions, traces of which are preserved in an individual's bones (Klaus, Harvey, and Cohen 2017). Such studies have wide-ranging applications, from the identification of murder victims from fragmentary skeletal remains to the design of ergonomic airplane cockpits. Biological anthropologists are also interested in evaluating how disparate physical characteristics reflect evolutionary adaptations to different environmental conditions, thus shedding light on why human populations vary.

An increasingly important area of research within biological anthropology is *genetics*, the study of the biological "blueprints" that dictate the inheritance of physical characteristics. Genetic research examines a wide variety of questions. It has, for instance, been important in identifying the genetic sources of some diseases, such as sickle cell anemia, cystic fibrosis, and Tay-Sachs disease. Genetic research has also provided important clues into human origins. Through the study of the genetic makeup of modern humans, biological anthropologists have calculated the genetic distance among modern humans, thus providing a means of inferring rates of evolution and the

ANTHROPOLOGISTS AT WORK

JOHN HAWKS, BIOLOGICAL ANTHROPOLOGIST

Courtesy John Hawks

John Hawks

John Hawks is a biological anthropologist who works on the border between paleoanthropology and genetics. He got his start teaching evolution in his home state of Kansas, followed by doctoral training and teaching in Michigan and Utah and then at his current home, the University of Wisconsin. Hawks feels that it is especially important for biological anthropologists to be trained in human anatomy—especially *bone* anatomy, or osteology, to interpret evidence from the fossil record. They have to understand the anatomical differences between humans and other primates, and the way these anatomies relate to habitual behaviors. The social and ecological behaviors of primates vary extensively in response to their unique ecological environments. Understanding the relationship of anatomy, behavior, and environment gives biological anthropologists a way to interpret ancient fossils and place them in their environmental context. Hawks has also incorporated recent genetic data to better understand human origins.

Hawks has made substantial contributions in the understanding of the Neandertals, an extinct species of humans or human relatives (discussed in Chapter 2). The evolutionary relationship between Neandertals and humans has been a source of debate among researchers since the first fossil finds in the mid-nineteenth century. In many respects, these debates highlight the challenges anthropologists face in classifying species on the basis of fragmentary fossil finds. How much physical variation was present within ancient populations? By integrating genetic evidence with studies of the physical difference of living primates, Hawks and his colleagues have provided a more nuanced view of how physical differences do not necessarily mirror differences in genetic relatedness (Ahern, Hawks, and Lee 2005).

Hawks has also studied the relationships between the genes of living and ancient people to discover the ways that natural selection has affected them. In 2007, Hawks and his coworkers scanned the genome, finding evidence for widespread selection on new, advantageous mutations during the last 40,000 years (Hawks et al. 2007). The breadth of this selection across the genome indicated that human evolution accelerated as larger populations and new agricultural subsistence patterns exerted pressures on human populations. Far from slowing down human evolution, culture created new opportunities for adaptive change.

More recently, Hawks has collaborated on studies of *Homo naledi*, a previously unknown species discovered in the Rising Star cave system in South Africa (L. Berger et al. 2015). Dated to approximately 250,000 years ago, *Homo naledi* is particularly interesting as the species would have overlapped temporally with early modern humans. While the species shares many physical characteristics with other members of the genus *Homo*, including its cranial capacity, it also processes more primitive features, similar to earlier species. For this reason, it is placed in a side branch on the human family tree. The story of this find is told in Hawks's recent coauthored book *Almost Human: The Astonishing Tale of* Homo naledi *and the Discovery That Changed Our Human Story* (L. Berger and Hawks 2017).

Hawks is widely known for his blog, which is visited by several thousand readers every day. Describing new research from an expert's perspective, he has shown the power of public outreach as an element of the scientific process. This aspect of his work has made him a leader in "open science," a movement to expand public accessibility to scientific research and open access to scientific data. Hawks welcomes everyone who is interested in human evolution based on a scientific approach to go to his blog at http://johnhawks.net/.

evolutionary relationships within the species (Kitchen 2015). These data have helped provide independent evidence for the African origins of the human species.

Archaeology

Archaeology, the branch of anthropology that examines the material traces of past societies, informs us about the culture of those societies—the shared way of life of a group of people that includes their values, beliefs, and norms. **Artifacts**, the material products of former societies, provide clues to the past. Some archaeological sites reveal spectacular jewelry like that found by the film character Indiana Jones or in the treasures of a pharaoh's tomb. Most artifacts, however, are not so spectacular. Despite the popular image of archaeology as an adventurous, even romantic pursuit, it usually consists of methodical, time-consuming, and—sometimes—somewhat tedious research. Archaeologists often spend hours sorting through ancient trash

piles, or **middens**, to discover how members of past societies ate their meals, what tools they used, and what beliefs gave meaning to their lives. They collect and analyze the broken fragments of pottery, stone, glass, and other materials. It may take years to fully complete the study of an archaeological excavation. Unlike fictional archaeologists, who experience glorified adventures, real-world archaeologists thrive on the challenges of scientific research that enlarge our understanding of the past.

While excavation, or "scientific digging," and fieldwork remain the key means of gathering archaeological data, a host of new techniques are available to help archaeologists locate and study archaeological sites. One innovative approach commonly used in archaeology employs GIS (geographic information systems), a tool that is also increasingly used by geologists, geographers, and other scientists. Archaeologists can integrate satellite data to plot the locations of ancient settlements, transportation routes, and even the distribution of individual objects, allowing them to study the patterns and changes represented (Tripcevich and Wenke 2010).

Archaeologists have examined sites the world over, from ancient campsites to modern landfills. Some archaeologists investigate past societies whose history is primarily told by the archaeological record. Known as **prehistoric archaeologists**, they study the artifacts of groups such as the ancient inhabitants of Europe and the first human settlers of the Americas. Because these researchers have no written documents or oral traditions to help interpret the sites they examine and the artifacts they recover, the archaeological record provides the primary source of information for their interpretations of the past. **Historical archaeologists**, on the other hand, draw on documentary records and oral traditions to investigate the societies of the more recent past. Some historical archaeologists have probed the remains of plantations in the southern United States to gain an understanding of the lifestyles of enslaved Africans and slave owners during the nineteenth century. Other archaeologists, called **classical archaeologists**, conduct research on ancient civilizations such as in Egypt, Greece, and Rome. **Ethnoarchaeologists** study the material artifacts of the past along with the observation of modern peoples who have knowledge of the use and symbolic meaning of those artifacts.

There are many more areas of specialization within archaeology that reflect the geographic area, topic, or time period on which the archaeologist works (see Figure 1.1).

Archaeological excavations in Saint Martin in the Caribbean Islands.

Linguistic Anthropology

Linguistics, the study of language, has a long history that dovetails with the discipline of philosophy, but is also one of the integral subfields of anthropology. **Linguistic anthropology** focuses on the relationship between language and culture, how language is used within society, and how the human brain acquires and uses language. Linguistic anthropologists seek to discover the ways in which languages are different from one another, as well as how they are similar. Two wide-ranging areas of research in linguistic anthropology are structural linguistics and historical linguistics.

Structural linguistics explores how language works. Structural linguists compare grammatical patterns or other linguistic elements to learn how contemporary languages mirror and differ from one another. Structural linguistics has also uncovered some intriguing relationships between language and thought patterns among different groups of people. Do people who speak different languages with distinct grammatical structures think and perceive the world differently from each other? Do native Chinese speakers think or view the world and life experiences differently from native English speakers? Structural linguists are attempting to answer this type of question.

Linguistic anthropologists also examine the connections between language and social behavior in different cultures. This specialty is called **sociolinguistics**. Sociolinguists are interested both in how language is used to define social groups and in how belonging to a particular group leads to specialized kinds of language use. In Thailand, for example, there are thirteen

ANTHROPOLOGISTS AT WORK

ARCHAEOLOGIST KATHRYN SAMPECK

Courtesy Kathryn Sampeck

Kathryn Sampeck

Kathryn Sampeck's career path was not a straight line, but rather a voyage that has led to many different places. Growing up on a Texas ranch fostered a love of the outdoors, hard physical work in varied conditions, and coming up with clever ways to solve everyday problems: how to get that reluctant colt into the pen in the pouring rain, how to soothe a mare giving birth, or the best way to stack all those bales of hay. Sampeck became enchanted with archaeology because it offered these challenges, and even more. She hungered for an equally rigorous workout and reveled in thinking about and debating all sorts of things. Sampeck found that the best of both worlds has been archaeology, particularly archaeology of the recent past.

She gradually came to this conclusion with experience. From one field school in archaeology to the next, she moved from some of the most ancient evidence of humanity at Koobi Fora, Kenya, to the remarkable Paleolithic contexts for stunning artwork in Altamira and nearby caves in northern Spain. Sampeck's first graduate work at the University of Chicago and then at Tulane University focused on palatial complexes in the great pre-Columbian cities of Tiwanaku in the Bolivian Andes and Copán of the ancient Maya in Honduras. Each of these contexts—early hominins, Paleolithic Europe, America's first cities—is fascinating in its own right. What increasingly captured her attention, however, was the extraordinary meeting of different worlds during the fifteenth- and sixteenth-century European colonialism of Latin America. Sampeck's research evaluates pre-Columbian practices and material worlds, how they both shape and are transformed by colonial dynamics, and their lasting legacies. Her research questions may seem pretty simple: Why do so many people today enjoy chocolate and other American products? How did ideas of race become part of people's lives? When do people use money? How old are current place names and territorial boundaries? All of Sampeck's diverse interests relate strongly to each other because they are different avenues toward the same goal: understanding the development and maintenance of inequalities as a first step for promoting a more equitable future. She is a champion of archaeology's unique perspectives, methods, and information as crucial to this endeavor. Her emphasis on material culture, food production and cuisine, and spatial organization and practices provides alternative ways to understand the past.

For example, archaeological survey and excavations give an intimate view of what living and working spaces of producers of cacao, the tree seed that people use to make chocolate, were like in the birthplace of chocolate in Central America. The connections between those producers and local consumers to consumers in the rest of the world are visceral and tangible. The taste, texture, appearance, and meanings of chocolate today are the product of a long colonial history. Archaeological methods are not just survey or excavation, but a way of looking at information. She analyzed quantitative elements—ingredients—of historic recipes to create dendrograms, rather like family trees, as a systematic way to evaluate when and where strong differences in taste occurred, which gives insight into gastropolitics.

Sampeck's work on GIS modeling of travel routes in the U.S. Southeast clarifies that analyses of topography, travel, and movement have to consider the size of the traveling party; the human scale of the endeavor has a dramatic effect on the paths people took. Where and when people used colonial tin-glazed earthenware, *maiolica*, gives a way to evaluate how much Spanish colonial city neighborhoods—some segregated by racial and ethnic categories—differed from one another. Dissecting these material histories pushes to the forefront those assumptions that continue to impact people's lives; with that knowledge, we can choose to make the commodity chain for cacao producers more equitable; we can recognize inequalities that disproportionately affect the lives of people of African descent in Latin America. Likewise, understanding the cultural geography of the U.S. Southeast reveals the extent to which Native Americans such as the Cherokees continue to be dispossessed from history and their ancestral homelands.

Sampeck notes that not only the results of archaeology but the very process of investigation and the subsequent sharing of results can promote fairness, transparency, and respect. She believes that archaeological research is really a program of partnership with local stakeholders, including decisions about what to investigate, how, and ways to share results. While changes in today's economy or political system may be slow to happen, archaeology can move rapidly by creating digital humanities environments to share insights and information. She feels fortunate to work on digital projects in close partnership with Maya colleagues in Central America, the Eastern Band of Cherokee Indians Tribal Historic Preservation Office in North Carolina, and numerous colleagues across Latin America who participate in the Afro-Latin American Archaeological Consortium, an organization she founded to support activities and agendas that promote understanding and conservation of resources relating to the culture and history of peoples of African descent in Latin America. Sampeck believes that archaeology continues to be hard physical work and require intellectual heavy lifting, but even more energizing is its capacity to be a collective endeavor for social justice in the future.

Some of Sampeck's publications include "Archaeology in Post-War El Salvador," in *Post-Conflict Archaeology and Cultural Heritage: Rebuilding Knowledge, Memory and Community From War-Damaged Material Culture*, edited by Paul Nelson and Ruth Young (Taylor & Francis, 2018); *Substance and Seduction: Ingested Commodities in Early Modern Mesoamerica*, edited with Stacey Schwartzkopf (University of Texas Press, 2017); "Insights of Afro-Latin American Archaeology," in *International Journal of Historical Archaeology* 22, no. 1 (2018): 167–182; "Ancient Quelepa, Colonial San Miguel: Shifting Cultural Frontiers and Rogue Colonialism in Eastern El Salvador," in *The Maya and Their Central American Neighbors: Settlement Patterns, Architecture, and Ceramics*, edited by Geoffrey Braswell (Routledge, 2014); and "GIS Modeling of De Soto's Route From Joara to Chiaha," *American Antiquity* 80, no. 1 (2015): 46–66.

ANTHROPOLOGISTS AT WORK

LINGUISTIC ANTHROPOLOGIST LISE DOBRIN

Courtesy Lise Dobrin

Linguistic anthropologist Lise Dobrin with Martin Maitana, an Abu' Arapesh speaker from East Sepik Province, Papua New Guinea.

Lise Dobrin is an associate professor of anthropology and director of the interdepartmental program in linguistics at the University of Virginia. She began her career as a PhD student in linguistics at the University of Chicago, a field that she discovered during coursework as an undergraduate psychology major at the University of Illinois at Urbana-Champaign. While in graduate school at Chicago, Dobrin became interested in morphology, the subfield of linguistics that studies how the words in a language are composed and related with other words. Dobrin became fascinated by the Arapesh languages of Papua New Guinea. According to the available records, Arapesh has an elaborate set of noun classes, akin to the grammatical genders of European languages, that depends not on what the words mean, but on how they sound: What determines a noun's class is its final consonant. These same consonants are also used to mark grammatical agreement (associating an adjective with a noun, as in *dəbei**t**i nimba**t*** "big dog" or *dəbei**h**^{w}i uro**h**^{w}* "big house.post"), which means that "raw" sounds are getting grammatically propagated around sentences in ways that are much freer than linguists generally thought possible. Dobrin made an extended field trip to an Arapesh village in order to directly study and audio-record this interesting grammatical phenomenon. You can read about the results of this study in her 2012 book *Concreteness in Grammar: The Noun Class Systems of the Arapesh Languages*.

When Dobrin arrived in Papua New Guinea, it became evident to her that the language she had come so far to study was no longer being learned by children. In other words, Arapesh, like many other small languages throughout the world, was heading toward extinction. So, she began to create and preserve what knowledge could still be gleaned about how Arapesh was spoken. In addition to taking field notes, Dobrin made and transcribed audio-recordings in order to create a lasting documentary record of the language. In collaboration with specialists in the digital humanities, Dobrin has continued to curate these recordings, extracting information about Arapesh words into a lexicon to which the recordings are linked. She also worked with a missionary linguist who studied a related variety of Arapesh to archive his materials. Some of this work can be seen at the Arapesh Grammar and Digital Language Archive (www.arapesh.org). Dobrin and her collaborators have designed a system that allows the recordings and associated transcripts to be played together on a web browser, even without access to the internet, since many people in Papua New Guinea are not online. She is currently working on a grammatical description of the language that refers to all these materials.

Knowledge production always builds upon work done by other scholars. In the 1930s, Arapesh language and culture were studied by two researchers, Margaret Mead and Reo Fortune, who carried out their fieldwork together as a married couple but who came to opposite conclusions about Arapesh culture. Together with her husband, Ira Bashkow, a cultural anthropologist who was with her during her own fieldwork, Dobrin has written about what led to these earlier researchers' differences of interpretation. Blending methods drawn from history, ethnography, and linguistic anthropology, Dobrin and Bashkow's analysis emphasizes the way personal factors play a role in ethnographic interpretation. This collaborative research is described in their coauthored

(*Continued*)

(Continued)

2010 essay "'Arapesh Warfare': Reo Fortune's Veiled Critique of Margaret Mead's *Sex and Temperament*" published in the *American Anthropologist*.

Dobrin's experiences in Papua New Guinea led her to try to understand how and why communities shift their linguistic allegiance away from a traditional language to another language of wider communication, and how cultural factors shape the revitalization activities communities engage in as they attempt to address language shift. Cultural contact plays a role in all aspects of endangered language documentation, since this activity is motivated by the way social difference is interpreted by both those in communities undergoing shift and outsiders doing research that responds to it—though it may not mean the same thing to each of these groups. These problems are discussed in her 2008 journal article "From Linguistic Elicitation to Eliciting the Linguist: Lessons in Community Empowerment From Melanesia" (*Language* 84, no. 2: 300–324) as well as several other essays, including "Language Shift in an 'Importing Culture': The Cultural Logic of the Arapesh Roads," which appeared in a volume about endangered languages (Austin and Sallabank 2014).

Currently, Dobrin is preparing to annotate and publish a historical document that was composed by an important Arapesh intellectual, Bernard Narokobi. Narokobi was one of the founding fathers of the modern nation of Papua New Guinea, which only underwent decolonization in the 1970s. The document tells the history of Narokobi's village from mythical times to the present. The goal of the project is to preserve local knowledge while also shedding light on Narokobi's published writings in which he promoted a conception of the new nation as a "village writ large." This work will be important not only for anthropologists and historians, but also for the Papua New Guinean people, who have so generously welcomed her into their communities.

Dobrin's interests in linguistic anthropology are not limited to Arapesh and Papua New Guinea. For example, in 2016 she coauthored a review essay with Americanist anthropologist Saul Schwartz on "The Cultures of Native North American Language Documentation and Revitalization." Finally, Dobrin has a more general interest in the ethical issues that arise during fieldwork in anthropology. She has served on her university's Social and Behavioral Sciences Institutional Review Board (IRB), the American Anthropological Association's Committee on Ethics, and the Linguistic Society of America's Committee on Endangered Languages and Their Preservation.

Courtesy Christina Pomianek

Anthropologist Christina Pomianek doing linguistic research in West Kalimantan, Borneo, Indonesia.

forms of the pronoun *I*. One form is used with equals, other forms come into play with people of higher status, and some forms are used when males address females (Scupin 1988).

Another area of research that has interested linguistic anthropologists is historical linguistics. **Historical linguistics** concentrates on the comparison and classification of different languages to discern the historical links among them. By examining and analyzing grammatical structures and sounds of languages, researchers are able to discover rules for how languages change over time, as well as which languages are related to one another historically. This type of historical linguistic research is particularly useful in tracing the migration routes of various societies through time by offering multiple lines of evidence—archaeological, paleoanthropological, and linguistic. For example, through historical linguistic research, anthropologists have corroborated the Asian origins of the Native American populations.

Cultural Anthropology

Cultural anthropology is the subfield of anthropology that examines contemporary societies and cultures throughout the world. Cultural anthropologists do research the world over, from tropical rainforests to the Arctic, from remote farming villages to urban centers. The first professional cultural anthropologists focused on non-Western cultures in Africa, Asia, the Middle East, Latin America, and the Pacific Islands and on the Native American populations in the United States. Today, however, many cultural anthropologists have turned to research on their own societies in order to gain a better understanding of their institutions and cultural values.

Cultural anthropologists (sometimes the terms *sociocultural anthropologist* and *ethnographer* are used interchangeably with *cultural anthropologist*) use a unique research strategy in conducting their fieldwork in different settings. This research strategy is

ANTHROPOLOGISTS AT WORK

SCOTT ATRAN, CULTURAL ANTHROPOLOGIST

Courtesy Scott Atran

Scott Atran

Born in 1952 in New York City, Scott Atran went to Columbia University as a Westinghouse mathematics scholar. At a student demonstration against the Vietnam War in 1970, he met the famous anthropologist Margaret Mead, and she invited him to work as her assistant at the American Museum of Natural History. In 1970, Atran also traveled to the Middle East for the first time, conducting fieldwork in Palestinian villages. As a graduate student in 1974, Atran organized a famous debate at the Abbaye de Royaumont in France on the nature of universals in human thought and society, with the participation of some well-known scholars such as the linguist Noam Chomsky, the psychologist Jean Piaget, the anthropologists Claude Lévi-Strauss and Gregory Bateson, and the biologists François Jacob and Jacques Monod, a conference that many consider a milestone in the development of the field known as cognitive science.

Atran continued observing societies as he traveled overland from Portugal to China, via Afghanistan and Pakistan. Landing again in the Middle East, he conducted ethnographic research on kinship and social ties, land tenure, and political economy among the Druze, a religious group in Israel and Lebanon. Later, Atran became a pioneer in the study of the foundations of biological thinking in Western science and other Native Americans such as the Itzá Maya in Mexico. This research became the basis of his well-known books *Cognitive Foundations of Natural History: Towards an Anthropology of Science* (Cambridge University Press, 1990), *The Native Mind and the Cultural Construction of Nature* (MIT Press, 2008), *and Plants of the Petén Itzá Maya* (University of Michigan Museum of Anthropological Archaeology, 2004), which illustrate how people throughout the world classified biological species of plants and animals in very similar ways.

Later, Atran began an investigation of the cognitive and evolutionary foundations of religion, which resulted in his widely acclaimed book *In Gods We Trust: The Evolutionary Landscape of Religion* (Oxford University Press, 2002). In this book, Atran explores the psychological foundations of religion and how it has become a universal feature of all human societies. He has also contributed toward an understanding of the characteristics associated with suicide bombers and political and religious terrorism in different areas of the world. Atran has been funded by the National Science Foundation and other agencies to study the phenomena of terrorism; this has included fieldwork and interviews with al-Qaeda associates and other militant groups, as well as with political leaders in conflict zones in Europe, the Middle East, Central and Southeast Asia, and North Africa. His book *Talking to the Enemy: Faith, Brotherhood and the (Un)Making of Terrorists* (HarperCollins, 2010) is based on this long-term research.

More recently in 2015, Atran and a team of anthropologists went to Iraq to interview combatants fighting against the Islamic State (ISIS, ISIL) as well as captured ISIS fighters to investigate the spiritual and cognitive motivations that led them to become militant insurgents. There were feature stories of this research on the spiritual dimension of these human conflicts in the *Chronicle of Higher Education*, *Science*, and *Nature*. Also, in that year Atran was the first anthropologist to formally address the United Nations Security Council discussing how young people can promote peace and security in those conflict zones.

Atran has taught at Cambridge University, Hebrew University in Jerusalem, and the *École des hautes études en sciences sociales* (School for the Advanced Studies of the Social Sciences) in Paris. He is currently a research director in anthropology at the *Centre national de la recherche scientifique* (French National Center for Scientific Research, CNRS) based in Paris and is a member of the Jean Nicod Institute at the *École normale supérieure*. He is also visiting professor of psychology and public policy at the University of Michigan and cofounder of ARTIS Research and Risk Modeling. Most recently, Atran has become Senior Fellow and cofounder of the Centre for the Resolution of Intractable Conflicts, at Harris Manchester College and the Department of Social Anthropology, Oxford University.

Atran's broadly interdisciplinary scientific studies on human reasoning processes and cultural management of the environment, and on religion and terrorism, have been featured around the world in science publications, such as *Science*, *Nature, Proceedings of the National Academy of Sciences USA,* and *Brain and Behavioral Sciences*, as well as the popular press, including feature stories with BBC television and radio, NPR, *the Wall Street Journal*, and *Newsweek*. He has been the subject of a cover story in *the New York Times Magazine* ("Darwin's God," 2007) and has written numerous op-eds for the *New York Times* and the magazine *Foreign Policy*.

Atran has teamed up with psychologists and political scientists, including Douglas Medin and Robert Axelrod, to experiment extensively on the ways scientists and lay people categorize and reason about nature, on the cognitive and evolutionary psychology of religion, and on the role of sacred values in political and cultural conflict. Based on recent fieldwork, he has testified before the U.S. Congress and has repeatedly briefed National Security Council staff at the White House on paths to violent extremism among youth in Southeast and South Asia, the Middle East, North Africa, and Europe. Atran has utilized his knowledge and research as a cultural anthropologist to help understand some of the basic questions of human life and also to contribute to solving some of our current problems with globally sponsored political and religious terrorism.

referred to as **participant observation** because cultural anthropologists learn the language and culture of the group being studied by participating in the group's daily activities. Through this intensive participation, they become deeply familiar with the group and can understand and explain the society and culture of the group as insiders. We discuss the methods and techniques of cultural anthropologists at greater length in Chapter 7.

The results of the fieldwork of the cultural anthropologist are written up as an **ethnography**, a description of a society. A typical ethnography reports on the environmental setting, economic patterns, social organization, political system, and religious rituals and beliefs of the society under study. This description is based on what anthropologists call *ethnographic data*. The gathering of ethnographic data in a systematic manner is the specific research goal of the cultural anthropologist. Technically, **ethnology** refers to anthropologists who focus on the cross-cultural aspects of the various ethnographic studies done by the cultural anthropologists. Ethnologists analyze the data that are produced by the individual ethnographic studies to produce cross-cultural generalizations about humanity and cultures. Many cultural anthropologists use ethnological methods to compare their research from their own ethnographic fieldwork with the research findings from other societies throughout the world.

Applied Anthropology

The four subfields of anthropology (biological anthropology, archaeology, linguistic anthropology, and cultural anthropology) are well established. However, anthropologists also recognize a fifth subfield. **Applied anthropology** is the use of anthropological data from the other subfields to address modern problems and concerns, ranging from interventions in the treatment of disease to the management of cultural resources, and assisting the police in murder investigations. Anthropologists have played an increasing role in creating government policies and legislation, the planning of development projects, and the implementation of marketing strategies. Although anthropologists are typically trained in one of the major subfields, an increasing number find employment outside of universities and museums. Although many anthropologists see at least some aspects of their work as applied, it is the application of anthropological data that is the central part of some researchers' careers. Indeed, approximately half of the people with doctorates in anthropology currently find careers outside of academic institutions.

Each of the four major subfields of anthropology has applied aspects. Biological anthropologists, for example, sometimes play

ANTHROPOLOGISTS AT WORK

A. PETER CASTRO, APPLIED ANTHROPOLOGIST

Courtesy A. Peter Castro

A. Peter Castro with olive growers in Jordan.

Conflict over use of the environment is a theme that unites A. Peter Castro's work as an applied cultural anthropologist, including his service as a consultant for the Near East Foundation, the Food and Agriculture Organization of the United Nations (FAO), the United States Agency for International Development (USAID), the United Nations Development Programme (UNDP), CARE International, and other organizations. Conflict is a ubiquitous aspect of human existence. Disputes offer an important means for people to assert their rights, interests, and needs, yet conflicts can escalate into violence that threatens both lives and livelihoods. Castro has used his perspective, skills, and knowledge as a cultural anthropologist to address environmental conflicts in participatory and peaceful ways. Besides his ongoing work as a consultant, he incorporates conflict issues into his classes in the anthropology department of the Maxwell School of Citizenship and Public Affairs at Syracuse University, where he is an associate professor. He is also a Robert D. McClure Professor of Teaching Excellence.

Castro's interest in environmental conflicts reflects his rural California upbringing, where farmworker unionization struggles, debates about offshore oil development, and conflicts over housing and commercial expansion were everyday occurrences. He credits his professors at the University of California–Santa Barbara, where he obtained his undergraduate and graduate degrees, with giving him the inspiration and training to use cultural anthropology to address pressing social and environmental issues. As an

undergraduate, Castro was a research assistant on a number of applied anthropology projects. In classes and through long discussions outside of class, he learned invaluable lessons about the importance of linking local, national, and global dimensions of human and environmental crises. Castro's PhD advisor, David Brokensha, a distinguished applied anthropologist, was instrumental in providing opportunities for Castro to develop contacts in international agencies. Brokensha was a founder of the Institute for Development Anthropology, a nonprofit research and educational organization dedicated to applying anthropological theories and methods to improve the condition of the world's poor (A. P. Castro and Chaiken 2018).

Castro's early applied work for international organizations focused on social aspects of planning, managing, and evaluating community forestry programs and projects. Although disputes between rural people and forest agencies often propelled the rise of community-oriented programs and projects, conflict itself was not initially seen by officials and technical officers as a topic of concern. Nonetheless, Castro found that, whether carrying out applied fieldwork on deforestation in Kenya for USAID or preparing a literature-based review of indigenous forest management practices for the FAO, one needed to take conflict into account. For example, Castro discovered through ethnographic interviews and archival research that numerous, sometimes violent, conflicts had existed over forest resources in Central Kenya, yet the contending parties sometimes in the past had negotiated agreements calling for their co-management of local resources that still had relevance today (for example, see Castro's book *Facing Kirinyaga: A Social History of Forest Commons in Southern Mount Kenya*, 1995). Castro's concern with integrating historical analysis, as well as conflict analysis, into international development planning is illustrated in his edited collection of articles on the theme "Historical Consciousness and Development Planning" in the interdisciplinary journal *World Development* (1998).

The importance of dealing with environmental conflicts became starkly clear when Castro was asked by UNDP in 1992 to serve as team leader for the midterm evaluation of Bangladesh's Social Forestry Project, a countrywide effort being implemented at a cost of $46 million. The UNDP's decision to select an anthropologist, rather than forester, to head the mission underscored its commitment to participatory development. The project was supposed to create the capacity for Bangladesh's Forest Department to engage in community-oriented training, tree planting, and resource protection. The project had many accomplishments but also widespread problems due to its lack of public participation (see A. P. Castro and Nielsen 2001, 2003). Sadly, a project meant to address long-standing conflicts between the Forest Department and the public sometimes served to intensify them.

Castro worked as a consultant for the FAO, writing and editing a number of publications aimed at providing information and practical training on natural resource conflict management. He coedited a useful book with Antonio Engel called *Negotiation and Mediation Techniques for Natural Resource Management* in 2007. He also coedited a book on *Climate Change and Threatened Communities: Vulnerability, Capacity and Action* with Brokensha and anthropologist Dan Taylor (A. P. Castro et al. 2012). Among its fifteen case studies is one written by Castro based on his fieldwork in the north-central Ethiopian highlands, a drought- and hunger-prone area, with the BASIS-CRSP Horn of Africa Program. Another case study is by Castro and Sudanese scholar Yassir Hassan Satti on agricultural change in Zalingei, Central Darfur State, Sudan.

Recently, Castro has been a consultant for the Near East Foundation. He served as lead trainer for workshops on collaborative natural resource conflict management in Zalingei in 2012 and 2014; in Sévaré, Mopti Region, Mali, in 2013; and in Amman, Jordan, in 2017. These areas have suffered from prolonged conflicts. For more than a decade, Darfur, an area the size of France, has suffered from large-scale violence and instability. National political instability and violence in Mali's North and West have had a severe impact on Mopti, including its world-renowned tourist areas at Djenné and in the Dogon area. The Amman training brought together Jordanians and Palestinians as part of its Olive Oil Without Borders project that also involves Israelis. These Near East Foundation projects seek to foster livelihood restoration and peace building. Trainees at the workshop included local members of the Near East Foundation staff, as well as members from local partner organizations and other nongovernmental organizations. Castro (2018) recently published a study of the impacts of the Darfur projects, recording its accomplishments, especially regarding local conflict resolution and reconciliation activities, but also highlighting the limitations of working in a conflict-prone and illiberal setting.

a crucial role in police investigations, using their knowledge of the human body to reconstruct the appearance of murder victims on the basis of fragmentary skeletal remains or helping police determine the cause of death. Archaeologists deal with the impact of development on the archaeological record, working to document or preserve archaeological sites threatened by the construction of housing, roads, and dams. Some linguistic anthropologists work with government agencies and indigenous peoples to document disappearing languages or work in business to help develop marketing strategies. Cultural anthropologists have played key roles in planning of government programs so that they take people's cultural beliefs and needs into consideration. These applied aspects of anthropological research are highlighted in Chapter 17.

HOLISTIC ANTHROPOLOGY, INTERDISCIPLINARY RESEARCH, AND THE GLOBAL PERSPECTIVE

1.2 Describe how the field of anthropology is holistic, interdisciplinary, and global.

Anthropology is an interdisciplinary, holistic field. Most anthropologists receive some training in each of four subfields of anthropology. However, because of the wide-ranging scope of these different subfields—more than 300 journals and hundreds of books are published every year—no one individual can keep abreast of all the developments across the entire discipline. Consequently, anthropologists usually specialize in one of the four subfields. Nevertheless, most anthropologists are firmly committed to a **holistic** approach to understanding humankind—a broad, comprehensive vantage that draws on all four subfields under the umbrella of anthropology. This holistic approach integrates the analyses of biological, environmental, psychological, economic, historical, social, and cultural conditions of humanity. In other words, anthropologists study the physical characteristics of humans, including their genetic makeup, as well as their prehistoric, historic, and social and cultural environments. Through collaborative studies across the four subfields, anthropologists can ask broadly framed questions about humanity.

Anthropology does not limit itself to its own four subfields to realize its research agenda. Although a distinct discipline, anthropology has strong links to other social sciences. Cultural anthropology, for instance, is closely related to sociology. The two fields explore many of the same societies using similar research approaches. For example, both rely on statistical and nonstatistical data whenever appropriate in their studies of different types of societies. Similarly, cultural anthropologists also draw on psychology when they assess the behavior of people in other societies. Psychological questions bearing on perception, learning, and motivation all figure in ethnographic fieldwork. As we shall discover in later chapters, cultural anthropology also overlaps the fields of psychology, economics, and political science. Anthropology dovetails especially closely with the field of history, which, like anthropology, investigates the human past. Every human event that has ever taken place in the world is a potential topic for both historians and anthropologists. Historians describe and explain human events that have occurred throughout the world; anthropologists place their biological, archaeological, linguistic, and ethnographic data in the context of these historical developments. An important area of anthropological research that overlaps with history is the field of ethnohistory. **Ethnohistory** is the study of the history of a particular ethnic group. Ethnohistory may be based on written historical documents, or more often oral narratives that are recorded by ethnographers working in various regions of the world. Through the four subfields and the interdisciplinary approach, anthropologists have emphasized a *global perspective*. The global perspective enables anthropologists to consider the biological, environmental, psychological, economic, historical, social, and cultural conditions of humans at all times and in all places. Anthropologists do not limit themselves to understanding a particular society or set of societies, but attempt to go beyond specific or local conditions and demonstrate the interconnections among societies throughout the world. This global perspective is used throughout this text to show how anthropologists situate their findings in the interconnecting worldwide context.

ANTHROPOLOGICAL EXPLANATIONS

1.3 Explain how the scientific method is used in anthropological explanations.

A fundamental question faced by anthropologists is how to evaluate the particular social, cultural, or biological data they gather. Human knowledge is rooted in personal experience, as well as in the beliefs, traditions, and norms maintained by the societies in which people live. This includes such basic assumptions as putting on warm clothing in cold weather and bringing an umbrella if it is going to rain, for example. Yet, it also includes notions about how food should be prepared, what constitutes "appropriate" behavior, and what the correct social and cultural roles are for men and women.

Religion constitutes another source of human knowledge. Religious beliefs and faith are most often derived from sacred texts, such as the Bible, Qur'an, and Talmud, but they are also based on intuitions, dreams, visions, and extrasensory perceptions. Most religious beliefs are cast in highly personal terms and, like personal knowledge, span a wide and diverse range. People who do not accept these culturally coded assumptions may be perceived as different, abnormal, or nonconformist by other members of their society. Yet, ethnographic and cross-cultural research in anthropology demonstrates that such culturally constituted knowledge is not as general as we might think. This research indicates that as humans, we are not born with this knowledge. Rather, it is culturally coded, and learned through socialization. Such knowledge varies both among different societies and among different groups within the same society.

Popular perceptions about other cultures have often been based on ethnocentric attitudes. **Ethnocentrism** is the practice of judging another society by the values and standards of one's own society. To some degree, ethnocentrism is a universal phenomenon. As humans learn the values, beliefs, and norms of their society, they tend to think of their own culture as

preferable, and as what is normal, while ranking other cultures as less desirable. Members of a society may be so committed to their own cultural traditions that they cannot conceive of any other way of life. They may view other cultural traditions as strange or alien, perhaps even inferior, crazy, or immoral.

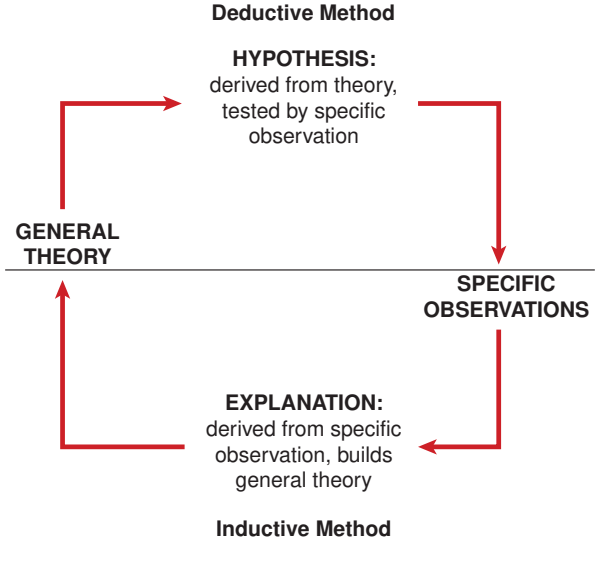
Such deeply ingrained perceptions are difficult to escape, even for anthropologists. Nineteenth-century anthropologists, for example, often reinforced ethnocentric beliefs about other societies. The twentieth century saw the co-opting of anthropological data to serve specific political and social ends. As the twentieth century progressed, however, anthropologists increasingly began to recognize the biases that prevented the interpretation of other cultures in more valid, systematic ways.

Evaluating Anthropological Data

Given the preceding concerns, it is critical to understand how anthropological interpretations are evaluated. In contrast to personal knowledge and religious faith, anthropological knowledge is not based on traditional wisdom or revelations. Rather, anthropologists employ the **scientific method**, a system of logic used to evaluate data derived from systematic observation. Through critical thinking and skeptical thought, scientists strive to suspend judgment about any claim for knowledge until it has been verified.

Testability and *verifiability* lie at the core of the scientific method. There are two ways of developing testable propositions: the inductive method and the deductive method. In the **inductive method**, the scientist first makes observations and collects data (see Figure 1.2).

FIGURE 1.2 ■ Deductive and Inductive Research Methods



The data collected are referred to as variables. A **variable** is any piece of data that changes from case to case. For example, a person's height, weight, age, and sex all constitute variables. Researchers use the observations about different variables to develop hypotheses about the data. A **hypothesis** is a testable proposition concerning the relationship between particular sets of variables in the collected data. The practice of testing hypotheses is the major focus of the scientific method, as scientists test one another's hypotheses to confirm or refute them. If a hypothesis is found to be valid, it may be woven together with other hypotheses into a more general theory.

Theories are statements that explain hypotheses and observations about natural or social phenomena. Because of their explanatory nature, theories often encompass a variety of hypotheses and observations. One of the most comprehensive theories in anthropology is the theory of evolution (see Chapter 2). This theory explains diverse hypotheses about biological and natural phenomena, as well as discoveries by paleoanthropologists and geneticists.

In contrast to the inductive method, the **deductive method** of scientific research begins with a general theory from which scientists develop testable hypotheses. Data are then collected to evaluate these hypotheses. Initial hypotheses are sometimes referred to as "guesstimates" because they may be based on guesswork by the scientist. These hypotheses are tested through experimentation and replication. As with the inductive method, scientists test and retest hypotheses and theories to ensure the reliability of observations made.

Theories always remain open to further testing and evaluation. They are assessed in light of new data and may be invalidated by contradictory observations. The systematic evaluation of hypotheses and theories enables scientists to state their conclusions with a certainty that cannot be applied to personal and culturally construed knowledge.

Despite the thoroughness and verification that characterize the research, anthropologists face challenges in offering explanations and interpretations. They must grapple with a myriad of complex, interwoven variables that influence human society and biological processes. The complexities of the phenomena being studied make it difficult to assess all of the potential variables, and disagreements about interpretations are common. Consequently, conclusions are frequently presented as tentative and hypothetical. The point here, however, is not that progress is impossible. Anthropological evidence can be verified or discarded by making assumptions explicit and weeding out contradictory, subjective knowledge. Inadequate hypotheses are rejected and replaced by better explanations. Explanations can be made stronger by drawing on independent lines of evidence to support and evaluate theories. This process makes the scientific method much more effective than other means of acquiring knowledge.

HUMANISTIC-INTERPRETIVE APPROACHES IN ANTHROPOLOGY

1.4 Discuss how the field of anthropology bridges both the sciences and the humanities.

The scientific method is not the only means used by anthropologists to study different societies and cultures. Anthropologists also employ a more humanistic-interpretive approach as they study cultures. Think of this analogy: When botanists examine a flower, they attempt to understand the different components of the plant within a scientific framework; they analyze the biochemical and physical aspects of the flower. However, when painters, poets, or novelists perceive a flower, they understand the plant from an aesthetic standpoint. They might interpret the flower as a symbolic phenomenon that represents nature. The scientist and the humanist use different approaches and perspectives when examining the natural world. Anthropologists employ a humanistic-interpretive approach in many circumstances.

James Peacock (1986) uses another type of analogy to discuss the difference between the scientific and the humanistic-interpretive approaches in anthropology. Peacock draws from the field of photography to construct his analogy. He discusses the "harsh light" of the rigor of scientific analysis, used to study the biological and material conditions of a society, versus the "soft focus" used when interpreting the symbols, art, literature, religion, or music of different societies. Peacock concludes that both the "harsh light" and the "soft focus" are vital ingredients of the anthropological perspective.

Cultural anthropologists utilize the humanistic-interpretive method as they conduct ethnographic research. However, all anthropologists employ similar methods whenever they examine different societies. In order to comprehend the different practices and institutions they observe, anthropologists often have to interpret them just as one might interpret a literary, poetic, or religious text. Cultural beliefs and practices may not be easily translatable from one society to another. Practices and institutions may have meaning only within a specific language and culture. Thus, anthropologists endeavor to understand cultural practices or institutions that may have rich, deep, localized meaning within the society being examined, but that are not easily converted into transcultural or cross-cultural meaning. We focus more thoroughly on this humanistic-interpretive approach in Chapter 6 on anthropological explanations.

Many anthropologists explore the creative cultural dimensions of humanity, such as myth, folklore, poetry, art, music, and mythology. **Ethnopoetics** is the study of poetry and how it relates to the experiences of people in different societies; for example, a provocative study of the poetry of a nomadic tribe of Bedouins in the Middle East has yielded new insights into the concepts of honor and shame in this society (Abu-Lughod 1987). Another related field, **ethnomusicology**, is devoted to the study of musical traditions in various societies throughout the world. Ethnomusicologists record and analyze music and the traditions that give rise to musical expression, exploring similarities and differences in musical performance and composition. Ethnomusicologist Dale Olsen (2004) completed a fascinating study of Japanese music in South America. There are Japanese minority populations in the countries of Peru, Brazil, Argentina, Paraguay, and Bolivia. Olsen has studied the musical forms, both popular and classical, of these Japanese minorities and how they reflect the maintenance of ethnicity and culture in South America. Other anthropologists study the art of particular societies, such as pottery styles among Native American groups.

Studies of fine art conducted by anthropologists have contributed to a more richly hued, global portrait of humankind. Artistic traditions spring up in all societies, and anthropologists have shed light on the music, myths, poetry, literature, and art of non-Western and other remote peoples. As a result, we now have a keener appreciation of the diverse creative abilities exhibited by humans throughout the world. As anthropologists analyze these humanistic and artistic traditions, they broaden our understanding of the economic, social, political, and religious conditions that prevail within these societies.

Thus, in addition to its interconnections with the natural and social sciences, the discipline of anthropology is aligned with the humanistic fields of inquiry. One fundamental difference exists between the scientific and the humanistic-interpretive aspects of anthropology. This difference pertains to the amount of progress one can achieve within these two different but complementary enterprises. Science has produced a cumulative increase in its knowledge base through its methodology. Thus, in the fields of astronomy, physics, chemistry, biology, and anthropology, there has been significant progress in the accumulation of knowledge; we know much more about these fields of science than our ancestors knew in the fifteenth or even the nineteenth century.

Getty/ NurPhoto

Ethnomusicologists do research on the music of different societies. This photo shows Indian music students from the Veenalayam Temple of Music performing in Ontario, Canada.

As a result of scientific discoveries and developments, the scientific knowledge in these areas has definitely become more effective in offering explanations regarding the natural and social world. As we shall see in Chapter 6 on anthropological explanations, anthropologists today have a much better understanding of human behavior and culture than did anthropologists in the nineteenth century. Through the use of the scientific method, anthropology has been able to make great strides in assessing human behavior and cultural developments.

In contrast, one cannot discuss the progress in the humanities in the same manner. As we shall see, the various humanistic endeavors involving beliefs, myths, and artistic expression in small-scale and ancient civilizations are extremely sophisticated and symbolically complex, and one cannot assess modern societies as "superior" or more "progressive" in those domains.

The fundamentals of anthropology consist of understanding and explaining human behavior and culture with endeavors monopolized by no single approach. Such an enlarged perspective within anthropology requires peaceful coexistence between scientism and humanism, despite their differences. In a recent discussion of this issue within anthropology, Augustin Fuentes and Polly Wiessner (2016) call for a reintegration of the scientific and humanistic approaches. Many anthropologists may not agree with one another's assumptions from either a humanistic or a scientific perspective because of their philosophical commitments to one or the other area. Nevertheless, both perspectives have been extremely valuable in contributing to our knowledge of humanity. Anthropologists recognize the differences in perspectives among themselves, and this is helpful, to a great degree, in making progress in our field because we continue to criticize and challenge one another's assumptions and orientations, which results in a better understanding of both the scientific explanations and the humanistic understandings within our field.

CRITICAL PERSPECTIVES
ESSENTIALISM

One term or phrase that will frequently be mentioned throughout this textbook is *essentialism* or *essentialist views*. **Essentialism** is the misguided idea that members of certain categories or classifications (e.g., animal and plant species, "races," ethnic groups, genders, even cultures and some objects) share an underlying invisible "essence."

Although biologists no longer believe that species have essences, lay people and especially children seem to have a strong willingness to believe in essences. Developmental psychologist Susan Gelman (2003) has studied young children and finds that by the age of two, they distinguish between males and females and expect them to behave differently. Her research indicates that children easily acquire an ability to think in essentialist ways regarding the classification of animals, plants, and inanimate objects. Children acquire this essentialist reasoning to form generalizations and cognitive habits in order to make sense of the world. Humans appear to be predisposed to become essentialists.

Gelman has collaborated with a number of anthropologists including Lawrence Hirschfeld to show how children by the age of four to six years old classify people into "races" and "ethnicities" as if these groups have an inner quality—an invisible essence—that explains why members of the group have so much in common (Hirschfeld and Gelman 1994; see also Hirschfeld 1996). This essentialist thinking results in people assuming that various groups share some invisible essence that is supposedly inherited and allow people to make inferences that go beyond their personal experience about how the members of those groups behave, what their inner dispositions might be, and how well they might perform particular kinds of tasks. The cognitive process involving essentialist thinking is universal, and anthropologists find it throughout the world (Atran 1990; Boyer 2018).

Like biologists, who have abandoned the idea of inner essences, anthropologists have also rejected essentialist explanations for social categories such as gender, so-called races, ethnic groups, religious groups, cultures, civilizations, and many other types of phenomena. Indeed, much research in paleoanthropology has shown that there is often more variation within a social (or biological) category than between them. Thus, in Chapter 2, we will find that early species of humans classified as Neandertals or archaic *Homo sapiens* exhibit a great deal of variation. In fact, modern humans have a small percentage of Neandertal genes, suggesting that interbreeding between the two species was not only possible but did occur. Paleoanthropologists have similarly found that essentialist classifications of the early species of modern humans are also erroneous (Athreya 2018). Biologists and biological anthropologists agree that species do not have an internal, unobservable "essence" that creates uniformity. Instead, diversity and variation are evident within these species.

We will also be discussing "race," and the faulty essentialist views of "race" that have been perpetuated over the centuries and are still prevalent today. For example, in the United States, many believe that there are three or four different "races," such as Whites, Blacks, and Asians, and that these different "races" have some inherited internal essential features that result in not only specific physical characteristics, but also mental or behavioral patterns. As we will see, anthropologists have been studying the concepts of race for over a century and have demonstrated through many lines of evidence that these essential views of so-called races are unfounded and invalid.

Archaeologists also find that past understandings of artifacts and other phenomena associated with various groups,

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cultures, or civilizations were based on faulty essentialist thinking. Thus, when discussing Maya, Aztec, Inca, Chinese, Japanese, African, or Middle Eastern groups or past civilizations, many archaeologists and historians in the past believed that these societies, cultures, and civilizations had an internal "essence" that provided uniform features and human behaviors. Contemporary archaeologists are careful not to categorize these societies as if they have an underlying reality or true "essence" that determines their characteristics and stereotypical behaviors.

Throughout this textbook, we will be discussing many different societies, tribes, cultures, ethnic groups, and civilizations. As we will see later, essentialist views of these societies are still prevalent today in some academic fields. For example, some political scientists have discussed Western, Asian, and Islamic societies, cultures, and civilizations as having uniformities and essentialist characteristics that make them incompatible and in conflict with one another. These views have influenced the media, government, and popular understandings of these societies. Contemporary cultural anthropologists have discovered through extensive ethnographic studies that these societies, tribes, ethnic groups, cultures, and civilizations have a great deal of diversity and hybridity (mixtures of cultural values, beliefs, and norms) and are tremendously varied and cannot be described in monolithic essentialist terms.

Later in this textbook, we will be discussing sex and gender as studied by anthropologists. Essentialist thinking about gender is widespread, leading to simplifications regarding how males and females are easily categorized biologically and result in universal generalizations such as "men are aggressive and women are gentle." As we will see, anthropological research on gender has debunked these simplistic essentialist and stereotypical generalizations.

Additionally, we will be discussing religion and religious groups throughout the world. Cultural anthropologists have been studying the religious beliefs and practices within tribal and small-scale religions as well as Judaism, Christianity, Islam, Buddhism, Hinduism, Sikhism, and other traditions. In contrast to some essentialist views of these religions, ethnographic studies have shown there are many different kinds of Jews, Christians, Muslims, Buddhists, Hindus, or Sikhs based on socioeconomic or class background, sect, denomination, or region of the world. None of these religions has an internal essence that determines its specific beliefs and practices. Instead, within these traditions, ethnographers find a multiplicity of different religious beliefs and practices.

Although anthropologists find that essentialism is widespread and universal and it is easily learned by young children as a means to comprehend and classify the world around them, these cognitive habits are faulty and lead to many misperceptions. In addition, these essentialist views of peoples, cultures, ethnic groups, and societies are difficult to overcome and often lead to stereotypical perceptions that can be harmful. As we will discuss, contemporary anthropologists have revealed through careful study that these essentialist views are too simplistic to understand the peoples and societies around the world.

Questions to Ponder

1. Have you ever had essentialist beliefs about groups of people, including your own group?
2. In what ways can essentialist views be harmful?
3. Do you find it difficult to unlearn essentialist beliefs?

WHY STUDY ANTHROPOLOGY?

1.5 Describe why students should study anthropology.

Students sometimes question the practical benefits of their educational experience. Hence, you might ask, "Why study anthropology?" First, anthropology contributes to a general liberal arts education, which helps students develop intellectually and personally, as well as professionally. Studies indicate that a well-rounded education contributes to a person's success in any chosen career, and because of its broad interdisciplinary nature, anthropology is especially well suited to this purpose (Briller and Goldmacher 2008). Because students of anthropology can see the "whole picture," they may be able to generate creative solutions to the problems that face humanity today. Anthropology students have diverse and widely applicable skill sets that include research, critical thinking, speaking foreign languages, and an understanding of law, politics, history, biology, and economics, just to name a few. Further, anthropology students understand fundamental aspects of what it means to be human—an understanding that can be applied to multiple areas of life.

Critical Thinking and Global Awareness

In the context of a liberal arts education, anthropology and anthropological research cultivate critical thinking skills. As discussed, the scientific method relies on constant evaluation of, and critical thinking about, data collected in the field. By being exposed to the cultures and lifestyles of unfamiliar societies, students may adopt a more critical and analytical stance toward conditions in their own society. Critical thinking skills enhance the reasoning abilities of students wherever life takes them.

Anthropology also fosters global awareness and an appreciation for cultures other than our own. In this age of rapid communication, worldwide travel, and increasing economic interconnections, young people preparing for careers in the twenty-first century must recognize and show sensitivity toward the cultural differences among peoples, while understanding the fundamental similarities that make us all distinctly human. In this age of cultural diversity and increasing internationalization, sustaining this dual perception of underlying similar human characteristics and outward cultural differences has both practical

and moral benefits. Nationalistic, ethnic, and racial bigotry are rife today in many parts of the world, yet our continuing survival and happiness depend upon greater mutual understanding. Anthropology promotes a cross-cultural perspective that allows us to see ourselves as part of one human family in the midst of tremendous diversity. Our society needs not just citizens of some local region or group but also, and more importantly, world citizens who can work cooperatively in an inescapably multicultural and multinational world to solve our most pressing problems of bigotry, poverty, and violence.

In addition, anthropology gives students a chance to delve into a discipline whose roots lie in both the sciences and the humanities. As we have seen, anthropology brings to bear rigorous scientific methods and models in examining the causes of human evolution, behavior, and social relationships. But anthropologists also try to achieve a humanistic understanding of other societies in all their rich cultural complexity. Anthropology casts a wide net, seeking an understanding of ancient and contemporary peoples, biological and societal developments, and human diversity and similarities throughout the world.

Viewing life from the anthropological perspective, students will also gain a greater understanding of their personal lives in the context of the long period of human evolution and development. In learning about behavior patterns and cultural values in distant societies, students question and acquire new insights into their own behavior. Thus, anthropology nurtures personal enlightenment and self-awareness, which are fundamental goals of education.

While these general goals are laudable, the study of anthropology also offers more pragmatic applications (Nolan 2017). As seen in the discussion of applied anthropology, all of the traditional subfields of anthropology have areas of study with direct relevance to modern life. Many students have found it useful to combine an anthropology minor or major with another major. For example, given the increasingly multicultural and international focus of today's world, students preparing for careers in business, management, marketing, or public service may find it advantageous to have some anthropology courses on their résumés. The concepts and knowledge gleaned from anthropology may enable students to find practical applications for dealing with issues of cultural and ethnic diversity and multiculturalism on a daily basis. Similarly, policymakers in federal, state, and local governments may find it useful to have an understanding of historic preservation issues and cultural resource management concerns. In education, various aspects of anthropology—including the study of evolution, the human past, and non-European cultures and the interpretation of cultural and social phenomena—are increasingly being integrated into elementary and secondary school curricula. Education majors preparing for the classroom can draw on their background in anthropology to provide a more insightful context for some of these issues.

SUMMARY AND REVIEW OF LEARNING OBJECTIVES

1.1 Compare and contrast the four major subfields of anthropology.

Anthropology consists of four subfields: biological anthropology, archaeology, linguistic anthropology, and cultural anthropology or ethnology. Each of these subfields uses distinctive methods to examine humanity in the past and in all areas of the world today. Biological anthropologists investigate human evolution and the physical variation of modern human populations throughout the world. Archaeologists study past societies by analyzing the artifacts (material remains) they left behind. Linguistic anthropologists focus their studies on languages, seeking out historical relationships among languages, pursuing clues to the evolution of particular languages, and comparing one language with another to determine differences and similarities. Cultural anthropologists conduct fieldwork in human societies to examine people's lifestyles. They describe these societies in written studies called ethnographies, which highlight behavior and thought patterns characteristic of the people studied. In examining societies, cultural anthropologists use systematic research methods and strategies, primarily participant observation, which involves participating in the daily activities of the people they are studying.

1.2 Describe how the field of anthropology is holistic, interdisciplinary, and global.

Through the combination of the four subfields in anthropology, many different variables are investigated, ranging from biological factors such as genetics to material artifacts, language, and culture, to provide a holistic view of humankind. Anthropology is inherently interdisciplinary and connects with other fields of research such as biology, psychology, economics, history, political science, and sociology, as well as the fine arts and humanities. By its nature, anthropology takes a global approach with its studies of humanity everywhere throughout the world, both past and present.

1.3 Explain how the scientific method is used in anthropological explanations.

Central to anthropological inquiry is the systematic collection and evaluation of data. This includes employing both inductive and deductive methods to evaluate hypotheses and

develop theories. Theories explain natural or social phenomena. The conclusions reached are always open to reevaluation and further testing in light of new data. In this way, faulty interpretations and theories are discarded.

1.4 Discuss how the field of anthropology bridges both the sciences and the humanities.

Anthropologists draw on the scientific method to investigate humanity, while recognizing the limitations of science in grasping the subtleties of human affairs. Yet, anthropology is also a humanistic discipline that focuses on such cultural elements as art, music, and religion. By bridging the sciences and the humanities, anthropology enables us to look at humanity's biological and cultural heritage with a broad perspective.

1.5 Describe why students should study anthropology.

For students, anthropology creates a global awareness and a deep appreciation of humanity past and present. By evaluating anthropological data, students develop critical thinking skills. And the process of anthropological inquiry—exploring other cultures and comparing them to one's own—sheds light on one's personal situation as a human being in a particular time and place.

KEY TERMS

anthropology, p. 2
applied anthropology, p. 10
archaeology, p. 4
artifacts, p. 4
biological anthropology, p. 3
classical archaeologists, p. 5
cultural anthropology, p. 8
deductive method, p. 13
essentialism, p. 15
ethnoarchaeologists, p. 5
ethnocentrism, p. 12
ethnography, p. 10
ethnohistory, p. 12
ethnology, p. 10
ethnomusicology, p. 14
ethnopoetics, p. 14
fossils, p. 3
historical archaeologists, p. 5
historical linguistics, p. 8
holistic, p. 12
hypothesis, p. 13
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scientific method, p. 13
sociolinguistics, p. 5
structural linguistics, p. 5
theories, p. 13
variable, p. 13

UrbanZone / Alamy Stock Photo

2 HUMAN EVOLUTION

LEARNING OBJECTIVES

After reading this chapter, you should be able to:

- **2.1** Explain how cosmologies regarding human origins differ from the scientific view of evolution.
- **2.2** Discuss how the scientific revolution provided the context for the theory of evolution.
- **2.3** Explain how natural selection works.
- **2.4** Describe how early hominins are different from other primates.
- **2.5** Discuss how *Homo habilis*, *Homo rudolfensis*, *Homo floresiensis*, and *Homo naledi* differ from australopithecines.
- **2.6** Discuss the cultural characteristics of *Homo erectus.*
- **2.7** Describe the physical and cultural characteristics of Neandertals.
- **2.8** Discuss the three models of evolutionary development of modern humans.
- **2.9** Describe the cultural features of the Upper Paleolithic.
- **2.10** Discuss the factors of natural selection that influence skin color differences in modern humans.

THEORY OF EVOLUTION

2.1 Explain how cosmologies regarding human origins differ from the scientific view of evolution.

The most profound human questions are the ones that perplex us the most: Who are we? Why are we here? Where did we come from? What is our place in the universe? What is the purpose of our lives? Is there a purpose to our lives? What happens after death? Universally, all peoples have posed these questions throughout time. Most cultures have developed sophisticated beliefs and myths to provide answers to these fundamentally important questions. **Cosmologies** are conceptual frameworks that present the universe (the cosmos) as an orderly system and include answers to those basic questions about the place of humankind in the universe.

Origin Myths

Traditionally, the questions posed above have been the basis for origin myths, usually considered the most sacred of all cosmological conceptions. Origin myths account for the ways in which supernatural beings or forces formed the Earth and people. They are transmitted from generation to generation through ritual, education, laws, art, and cultural performances such as dance and music. They are highly symbolic and are expressed in a language rich with various levels of meaning. These supernatural explanations are accepted on the basis of faith and have provided partially satisfying answers to these profound questions.

Many origin myths deal with the origin of humans in the context of the origin of the universe. For example, the Navajo Indians traditionally believed that Holy People, supernatural and sacred, lived below ground in twelve lower worlds. A massive underground flood forced the Holy People to crawl through a hollow reed to the surface of the Earth, where they created the universe. A deity named Changing Woman gave birth to the Hero Twins, called Monster Slayer and Child of the Waters. Mortals, called Earth Surface People, emerged, and First Man and First Woman were formed from the ears of white and yellow corn.

Another cosmological tradition, found in India, teaches that life resulted from the opening of a cosmic egg, which is the source of all life. In China, in the religious tradition of Taoism, the male and female principles known as *yin* and *yang* are the spiritual and material sources for the origins of humans and other living forms. *Yin* is the passive, negative, feminine force or principle in the universe, the source of cold and darkness; *yang* is the active, positive, masculine force or principle in the universe, the source of heat and light. Taoists believe that the interaction of these two opposite—yet complementary—principles brought forth the universe and all living forms out of chaos.

Western Origin Myths

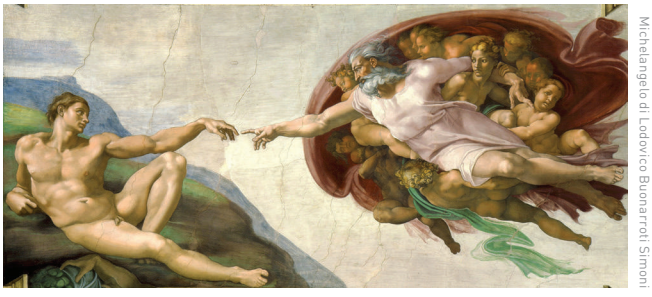
In the Western tradition, the ancient Greeks had various mythological explanations for the origin of humans. One early view was that Prometheus fashioned humans out of water and earth. Another had Zeus ordering Pyrrha to throw stones behind

his back; these stones became men and women. Later Greek cosmological views considered biological evolution. Thales of Miletus (c. 636–546 B.C.) argued that life originated in the sea and that humans initially were fishlike, eventually moving onto dry land and evolving into mammals. A few hundred years later, Aristotle (384–322 B.C.) suggested an early theory of creation through evolution. Based on comparative physiology and anatomy, his argument stated that life had evolved from simple lower forms such as single-celled amoebas to complex higher forms such as humans.

The most important cosmological tradition that influenced Western views of creation is found in the Book of Genesis in the Bible. This Judaic tradition describes how God created the cosmos. It begins with "In the beginning God created the heaven and the earth," emphasizing that the creation took six days, during which light, heaven, Earth, vegetation, Sun, Moon, stars, birds, fish, animals, and humans were formed. In Genesis, the creator is given a name, Yahweh, and is responsible for creating man, Adam, from "dust" and placing him in the Garden of Eden. Adam names the animals and birds. Woman, Eve, is created from Adam's rib. Eventually, according to this ancient Hebrew tradition, Yahweh discovers that his two human creations have disobeyed his laws and have eaten fruit from the forbidden tree of knowledge of good and evil. Yahweh expels Adam and Eve from the Garden of Eden.

As generations pass, humans continue to disobey God's laws. As punishment, God produces a catastrophic flood that destroys all of his creations except Noah and his family, the descendants of Adam and Eve. Noah and his family take two of every animal on an ark built according to God's directions. Noah, his family, and the different species of animals are saved from the flood on the ark. Eventually, Noah and his family give birth to all the peoples throughout the Earth. Later, as the Judeo-Christian tradition spread throughout Europe, the biblical cosmology became the dominant origin myth in the Western world.

In Europe before the Renaissance, the Judeo-Christian view of creation provided the only framework for understanding humanity's position in the universe. The versions of creation discussed in the biblical text fostered a specific concept of time: a linear, nonrepetitive, unique historical framework that began with divine creation. These events were chronicled in the Bible; there was no concept of an ancient past stretching far back in time before human memory. This view led some theologians to attempt to calculate the precise age of the Earth on the basis of information in the Bible, such as references to births and deaths and the number of generations. One of the best known of these calculations was done by Archbishop James Ussher of Ireland (1581–1656). By calculating the number of generations mentioned in the Bible, Ussher dated the beginning of the universe to the year 4004 B.C. Thus, according to Bishop Ussher's estimate, the Earth was approximately 6,000 years old.



Michelangelo di Lodovico Buonarroti Simoni

This painting by Michelangelo in the Sistine Chapel represents the idea of spiritual creation, the dominant worldview in Western cosmology for centuries.

The biblical account of creation led to a static, fixed view of plant and animal species and the age of the Earth. Because the Bible recounted the creation of the world and everything on it in six days, medieval theologians reasoned that the various species of plants and animals must be fixed in nature. God had created plant and animal species to fit perfectly within specific environments and did not intend for them to change. They had been unaltered since the time of the divine creation, and no new species had emerged. This idea regarding the permanence of species influenced the thinking of many early scholars and theologians.

THE SCIENTIFIC REVOLUTION

2.2 Discuss how the scientific revolution provided the context for the theory of evolution.

In the Europe during the Renaissance (c. A.D. 1450), scientific discoveries began to influence conceptions about the age of the Earth and humanity's relationship to the rest of the universe. Copernicus and Galileo presented the novel idea that the Earth is just one of many planets revolving around the Sun, rather than the center of the universe, as had traditionally been believed. As this idea became accepted, humans could no longer view themselves and their planet as the center of the universe.

This shift in cosmological thinking set the stage for entirely new views of humanity's links to the rest of the natural world. New developments in the geological sciences began to expand radically the scientific estimates of the age of the Earth. These and other scientific discoveries in astronomy, biology, chemistry, mathematics, and other disciplines dramatically transformed Western thought (Henry 2002).

Among the most dramatic ideas to result from the scientific revolution was the scientific theory of evolution, which sees plant and animal species originating through a gradual process of development from earlier forms. **Evolution** is the process of genetic changes within a population through time. Although it is not intended to contradict cosmologies, it is based on a different kind of knowledge. Cosmological explanations frequently

involve divine or supernatural forces that are, by their nature, impossible for human beings to observe. We accept them and believe in them, on the basis of faith. Scientific theories of evolution, in contrast, are derived from the belief that the universe operates according to regular processes that can be observed. The scientific method is not a rigid framework that provides indisputable answers. Instead, scientific theories are propositions that can be evaluated by future testing and observation. Acceptance of the theory of evolution is based on observations in many areas of geology, paleontology, and biology.

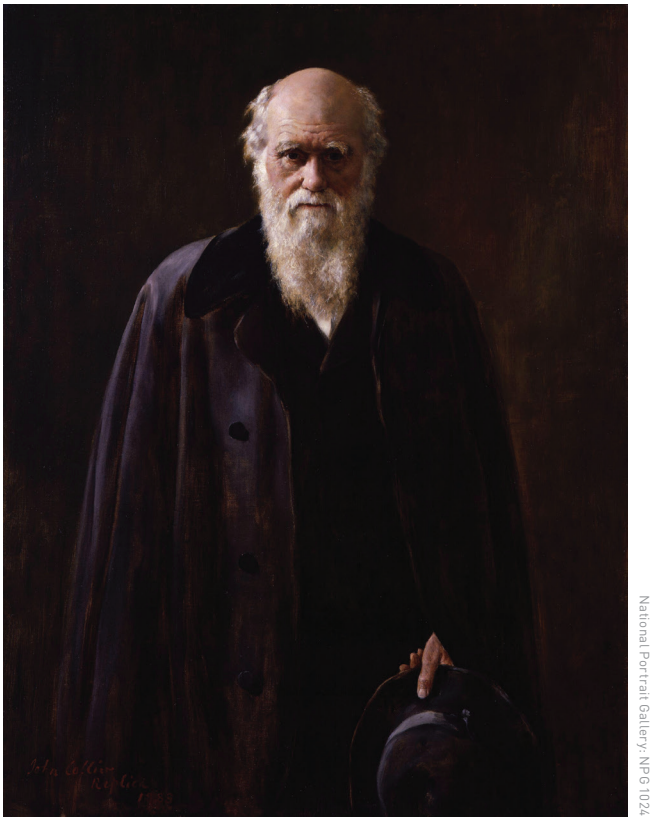
DARWIN, WALLACE, AND NATURAL SELECTION

2.3 Explain how natural selection works.

Two individuals strongly influenced by the scientific revolution were Charles Robert Darwin (1809–1882) and Alfred Russel Wallace (1823–1913), nineteenth-century British naturalists. Through their careful observations and their identification of a plausible mechanism for evolutionary change, they transformed perspectives of the origin of species. Impressed by the variation in living species and their interaction with the environment, Darwin and Wallace independently developed an explanation of why this variation occurs and the basic mechanism of evolution. This mechanism is known as **natural selection**, which can be defined as genetic change in a population resulting from natural or environmental changes that produce differential reproductive success. This is now recognized as one of the four principal evolutionary processes.

Beginning in 1831, Darwin traveled for five years on a British ship, the HMS *Beagle*, on a voyage around the world. During this journey, he collected numerous plant and animal species from many different environments. In the 1840s and 1850s, Wallace observed different species of plants and animals during an expedition to the Amazon and later continued his observations in Southeast Asia and on the islands off Malaysia. Darwin and Wallace arrived at the theory of natural selection independently, but Darwin went on to present a thorough and completely documented statement of the theory in his book, *On the Origin of Species*, published in 1859.

In their theory of natural selection, Darwin and Wallace emphasized the enormous variation that exists in all plant and animal species. They combined this observation with those of Thomas Malthus (1766–1834), a nineteenth-century English clergyman and political economist whose work focused on human populations. Malthus was concerned with population growth and the constraints that limited food supplies had on population size. Darwin and Wallace realized that similar



National Portrait Gallery; NPG 1024

Charles Darwin (1809–1882).

pressures operate in nature. Living creatures produce more offspring than can generally be expected to survive and reproduce. For the thousands of tadpoles that hatch from eggs, few live to maturity. Similarly, only a small number of the seeds from a maple tree germinate and grow into trees. In recognizing the validity of this fact, Darwin and Wallace realized that there would be *selection* in which organisms survived. What factors would determine their survival?

Variation within species and reproductive success are the basis of natural selection. Darwin and Wallace reasoned that certain individuals in a species may be born with particular characteristics or traits that make them better able to survive. For example, certain seeds in a plant species may naturally produce more seeds than others, or some frogs in a single population may have coloring that blends in with the environment better than others, making them less likely to be eaten by predators. With these advantageous characteristics, certain species are more likely to reproduce and, subsequently, pass on these traits to their offspring. Darwin called this process *natural selection* because nature, or the demands of the environment, actually determines which individuals (or which traits) survive. This process, repeated countless times over millions of years, is the means by which species change or evolve over time.

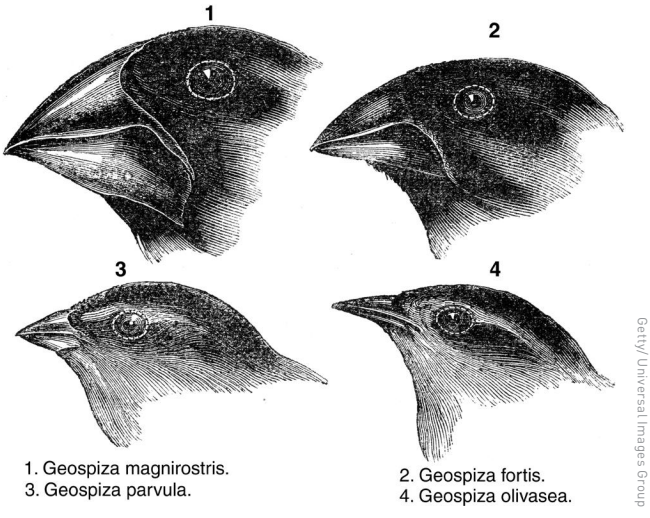
Examples of Natural Selection

One problem Darwin faced in writing *On the Origin of Species* was a lack of well-documented examples of natural selection at work. Most major changes in nature take place over thousands or millions of years. As a result, the process of natural selection is often too slow to be documented in a researcher's lifetime. However, when animals or plants are exposed to rapid changes in their environment, we can actually observe natural selection in action.

A classic case of natural selection is illustrated by the finches of the Galápagos Islands, located about 500 miles off the coast of South America. Darwin studied these birds when he visited the islands during his travels on the HMS *Beagle*. Volcanic in origin and cut off from the South American mainland, the Galápagos have a diversity of species related to, but distinct from, those of South America. Darwin was struck by how the geographic isolation of a small population could expose its members to new environmental conditions where different adaptive features might be favored. Darwin described the variation in the islands' finches: In general, the birds have rather dull plumage and are quite similar, except in the size and shape of their beaks—a feature that is closely related to the ways in which the birds obtain their food. Some species of finch, for example, have short, thick beaks that they use to eat seeds, buds, and fruits, while others have long, straight beaks and subsist primarily on nectar from flowers.

The finches on the island of Daphne Major in the Galápagos were the focus of a long-term research project by Peter and Rosemary Grant, beginning in 1973 (Grant 1999; J. Weiner 1994). The island is small enough to allow researchers to study intensively the island's flora and fauna and provide an unambiguous demonstration of natural selection in operation. The Grants and their students focused on two species of finch—the medium ground finch and the cactus finch. Over time, every finch on the island was captured, carefully measured and weighed, and also tagged so that each bird could be identified in the field. The diet of the birds was documented and the availability of food resources charted. A dramatic change in the finches' food resources occurred between mid-1976 and early 1978 as a result of a drought. The lack of rainfall led to a decrease in the food supplies favored by smaller-beaked finches. The remaining food consisted of larger, harder seeds that were difficult for finches with small beaks to break open. On the other hand, finches with larger, heavier beaks were able to more easily crack and extract food from hard-shelled seeds. Not surprisingly, many of the finches with smaller beaks died of starvation during the drought.

The variation in beak size is a good illustration of how natural selection may act on different species, but it also illustrates the significance of variation within individual species. Of the more than 1,000 medium ground finches found on the island at the beginning of the Grants' study, only 180 remained after the drought. Notably, the finches that survived had a larger average beak size than that of the population prior to the drought. As beak size is an inherited characteristic, the new generations of birds born after the drought also had a larger average beak size. This case study illustrates how natural selection can eliminate maladaptive traits from a population and select for features that help ensure survival and, ultimately, reproductive success for some members of a species. Many modern scientists believe that new species emerge when small populations become isolated from the parent group and encounter new selective pressures that may favor different characteristics.



Getty/ Universal Images Group

Finches of the Galápagos Islands showing their different beaks due to evolution and natural selection, first documented by Charles Darwin.

Natural selection is currently viewed as one of four major guiding forces in the evolution of species. It enabled Darwin to explain the mechanisms of biological evolution, and it remains a powerful explanation for the development of living species of plants and animals.

Principles of Inheritance

Darwin contributed to the modern understanding of biological evolution by thoroughly documenting the variation of living forms and by identifying the process of natural selection. But Darwin did not understand how individuals pass on traits to their offspring. This discovery, and the study of heredity, was left to the experiments of an Austrian Catholic monk, Gregor Mendel (1822–1884). During the 1860s, Mendel began a series of breeding experiments with pea plants. The results of these experiments revolutionized biological thought. Although his findings were not recognized until the twentieth century, they have shaped our basic understanding of inheritance. Through his experiments, Mendel established the new science

of **genetics**, a field of biology that deals with the inheritance of different characteristics. We now know Mendel's particles or units of inheritance as *genes*. For the purposes of this discussion, a **gene** can be considered a deoxyribonucleic acid (DNA) sequence that encodes the production of a particular protein or portion of a protein. In combination, these DNA sequences determine the physical characteristics of an organism. Genes, discrete units of hereditary information, may be made up of hundreds or even thousands of DNA sequences.

Most sexually reproducing plants and animals have two genes for every trait, one inherited from each parent. More than 4,500 human traits are inherited in this manner. However, while some human characteristics are inherited as discrete traits, the majority are passed on in a more complicated fashion. Many physical characteristics in humans are referred to as *polygenic* or *continuous traits* that display a graded series determined by a multiplicity of genes. They include many of the most visible aspects of human features, such as height, skin color, and hair color, and consequently were often used as the basis for racial classifications.

According to the most recent research on the human genome, it is estimated that a human being inherits between 20,000 and 25,000 genes that specify various characteristics (Bernstein et al. 2012).

The Evolution of Life

Modern scientific findings indicate that the universe as we know it began to develop 13.8 billion years ago. Approximately 4.545 billion years ago, the Sun and the Earth formed, and about a billion years later, the first life forms appeared in the sea. Through the evolutionary processes, living forms that developed adaptive characteristics survived and reproduced. Geological forces and environmental alterations brought about both gradual and rapid changes, leading to the evolution of new forms of life. Plants, fish, amphibians, reptiles, and eventually mammals evolved over millions of years of environmental change.

About 67 million years ago, a family of mammals known as *primates*—a diverse group, introduced in Chapter 1, with similarities such as increased brain size, stereoscopic vision, grasping hands and feet, longer periods of offspring, dependence on their mothers, a complex social life, and enhanced learning abilities—first appeared in the fossil record. Early primates include ancestors of modern *prosimians*, such as lemurs, tarsiers, and lorises. Later primates that appeared in the fossil record include anthropoids, such as monkeys, apes, and humans, who shared a common ancestor and have some fundamental similarities with one another. We can trace the striking similarities among primates to a series of shared evolutionary relationships. Many people hold a common misconception about human evolution—the mistaken belief that humans descended from modern apes such as the gorilla and chimpanzee. This is a highly inaccurate interpretation of both Darwin's thesis and contemporary scientific theories that suggest that, while humans and modern apes share common evolutionary origins, each rests at the end of its own evolutionary lineage. Millions of years ago, some animals developed characteristics through evolutionary processes that gave rise to later primates, including modern chimpanzees, gorillas, and humans.

HOMININ EVOLUTION

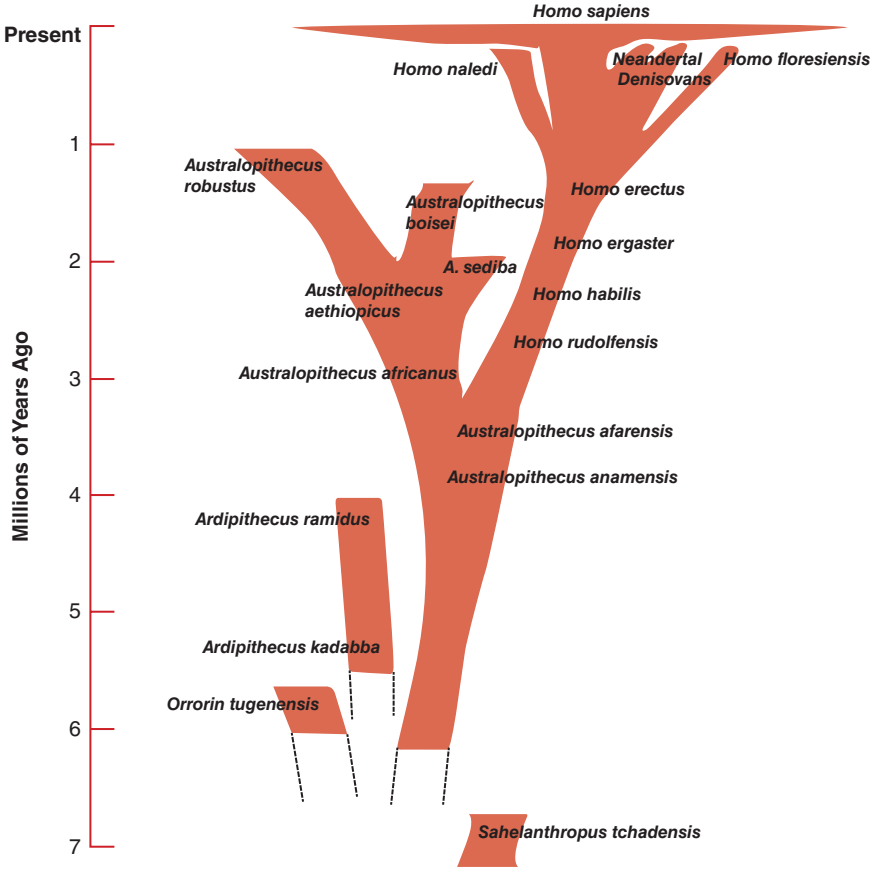
2.4 Describe how early hominins are different from other primates.

Scientists have traditionally used physical characteristics that reflect shared adaptive histories in classifying primates—placing them into various families, genera, and species. In the past decade, the unraveling of genetic codes has revealed the specific genetic links between living primate species. These data indicate that humans and the African apes are more closely related than either group is to the orangutans. In recognition of this relationship, orangutans, chimpanzees, and gorillas, as well as humans and their ancestors, are sometimes now all placed into family Hominidae. The subfamily Ponginae is then used to just refer to the orangutans, while the subfamily Homininae includes the gorillas, chimpanzees, and humans. Humans and their ancestors are then placed in their own tribe, Hominini (hominin), to indicate their unique characteristics.

Anthropologists have been evaluating hypotheses regarding hominin evolution for the past 150 years (see Figure 2.1). **Hominins**, the family of primates that includes the direct ancestors of humans, share certain subtle features in their teeth, jaws, and brain. However, by far the major characteristic that identifies them as a distinct group is the structural anatomy needed for **bipedalism**, the ability to walk erect on two legs. Within the Hominini, members of genus *Homo*, including modern humans, are further characterized by increase in cranial capacity.

Fossil evidence provides a clear record of the evolution of the human species from a small-brained bipedal ape over the past 10 million years. Some people believe that paleoanthropologists are searching for the "missing link" between us and other primate creatures such as the chimpanzee. However, paleoanthropologists are skeptical of the popular phrase "missing link" because it implies that evolution develops in a linear path of development with well-defined junctures demonstrating common ancestors and linkages. This popular view assumes that there is a single transitional link between a living ape and a living human. The reality of the fossil record demonstrates that evolution is much messier, with different branches evolving at varying rates, new traits emerging numerous times independently, and populations diverging and interbreeding, producing splits over many years

FIGURE 2.1 A Schematic Diagram of Hominin Evolution



across multiple continents. Rather than a tree of life with distinctive branches showing common ancestors, the fossil record is much more like a dense, tangled thorny bush with overlapping lines of descent (Quammen 2018). Thus, there is no single "missing link" between earlier primates such as the chimpanzee and humans. Yet, some fossils indicate transitional forms of creatures that have both apelike and humanlike characteristics.

Some fossil evidence dated between 6 and 7 million years ago (mya) in Chad is fragmentary but intriguing for understanding early evolution (Brunet et al. 2002). This specimen is named *Sahelanthropus tchadensis*. The fossil evidence indicates an apelike sloping face, a very small brain, small humanlike canine teeth, and a prominent brow ridge. The specimen has a complete, though distorted, cranium. The spinal cord is centered underneath the cranium, suggesting an upright bipedal creature, but since the finds are fragmentary, it is difficult to determine full bipedalism.

Two other intriguing new fossil discoveries of early creatures were described in 2001, both from Kenya. The first is *Orrorin tugenensis* (nicknamed Millennium Man), a collection of postcranial and dental material dated at about 6 mya (Pickford, Gommery, and Treil 2002). The postcranial fossils suggest a primitive form of bipedalism. These early finds of very primitive creatures are fascinating because they may suggest a common ancestry with the later evolution of our genus *Homo*, rather than *Australopithecus*, described later.

A significant collection of 110 fossil remains from a female hominin discovered by paleoanthropologist Tim White and colleagues in Ethiopia and dated at 4.4 mya presents new understandings of early hominin evolution (Lovejoy et al. 2009; T. White et al. 2009; T. White et al. 2003; T. White et al. 2015). These fossils are so different from early australopithecines (described later) that they have been classified as a new genus, *Ardipithecus ramidus* (Ardi). Ardi had a robust frame and was about four feet tall. The hands and digits of Ardi are more similar to gorillas than to later creatures. She also had a grasping apelike toe that helped her climb in the trees. However, the pelvis and other postcranial traits indicate some bipedalism. Again, bipedalism is the major characteristic that distinguishes hominins from earlier primates. Further evidence of these fossils is needed to determine whether they are the earliest true hominins yet to be discovered.

CRITICAL PERSPECTIVES

CREATIONISM, INTELLIGENT DESIGN, AND EVOLUTION

Despite the compelling and increasing scientific evidence supporting evolution, not all segments of American and Western society have accepted the geological, genetic, and fossil data that are the basis of evolutionary theory (Petto and Godfrey 2007; Young and Largent 2007). Various versions of creation that rely on literal interpretations of the Bible are taught by some Christian, Jewish, and Islamic groups, as well as other religious denominations. For example, many members of the Old Order Amish (discussed in Chapter 3) accept an extreme literal reading of the biblical passage that refers to "four corners of the Earth held up by angels" and believe that the Earth is a two-dimensional flat plane. Members of the International Flat Earth Society have similar beliefs about a flat Earth (E. Scott 2009). These views reflect the ancient Hebrew description in the biblical passages referring to the Earth as a flat disk floating on water with the heavens held up by a dome (or firmament) with the Sun, Moon, and stars attached to it.

In the nineteenth century, some individuals attempted to reconcile a literal reading of the account of creation in Genesis 1:22 by translating the Hebrew term *day* as a nonspecific period of time that could last thousands or millions of years long, rather than twenty-four hours (Sedley 2007). Some contemporary creationists' teachings expose similar views; they are sometimes referred to as "day-age creationists." However, the vast majority of activists in the campaign against teaching evolution call themselves "progressive creationists." The progressive creationists accept the modern scientific view of the big bang and that the Earth is billions of years old, but do not accept the theory of evolution. They believe that God not only created the big bang, but also created separate "kinds" of plants and animals with genetic variations that resulted in the development of contemporary species of living organisms.

A group of creationists who have actively campaigned against the teaching of evolution call themselves "scientific creationists," represented by the Institute for Creation Research. The members of this group propose a biblically based explanation for the origins of the universe and of life. They reject modern physics, chemistry, and geology concerning the age of the Earth. They argue that the entire universe was created within a period of six days, based on the account in Genesis 1:2. They believe that the universe was spontaneously created by divine fiat 6,000 to 10,000 years ago, challenging evidence for billions of years of geological history and fossil evidence. These creationists explain the existence of fossilized remains of ancient life by referring to a universal flood that covered the entire Earth for forty days. Surviving creatures were saved by being taken aboard Noah's ark. Creatures that did not survive this flood, such as dinosaurs, became extinct (Gish 1995). This creationist view is taught in some of the more fundamentalist denominations of Protestantism, Judaism, and Islam.

Scientific creationists read the texts and theories presented by biologists, geologists, and paleontologists and then present their arguments against the evolutionary views. They do very little, if any, direct biological or geological research to refute evolutionary hypotheses (Rennie 2002). Their arguments are based on biblical sources mixed with misinterpretations of scientific data and evolutionary hypotheses. The cosmological framework espoused by the scientific creationists is not based on any empirical findings. For example, scientists around the world find no physical evidence of a universal flood. Local floods did occur in the Near East and may be related to the story of Noah that appears in the Bible (and in earlier Babylonian texts). But to date, no evidence exists for a universal flood that had the potential to wipe out human populations worldwide or to cause the extinction of creatures such as dinosaurs (Isaak 2007).

A more recent form of creationism has been referred to as "intelligent design creationism" (Gross and Forest 2004; Petto and Godfrey 2007). The historical roots of this conceptual stance go back to philosophers such as Plato and Aristotle in the Greek tradition, who suggested that a spiritual force structured the universe and society. These ideas were Christianized by Saint Thomas Aquinas (1225–1274) and European scholars during the medieval period. In the nineteenth century, theologian William Paley (1743–1805) argued that one could see proof of God's existence by examining the Earth and the remarkable adaptations of living organisms to their environments, using the famous analogy that if we found a watch, we would have to assume that there was a watchmaker—we can see God's plan as we observe the natural world (Paley, 1802). Two contemporary theorists who support this position are Lehigh University's biochemist Michael Behe, author of *Darwin's Black Box* (1996) and *Darwin Devolves* (2019), and philosopher and mathematician William Dembski, professor of science and culture at Southern Evangelical Seminary in Matthews, North Carolina, author of the book *Intelligent Design* (1999).

Debates between intelligent design proponents and other researchers have been extensive and, at times, quite spirited (Rennie 2002; Shanks 2004; Shanks and Joplin 1999). Critics of intelligent design creationism note that Behe, Dembski, and their followers concede that microevolution and macroevolution have occurred, but they contend that some biological phenomena and the complexity of life cannot be explained by modern science and that this complexity itself is proof that there must be an intelligent supernatural designer. Although most scientists would not rule out the possibility of supernatural creation, they do require evidence. In this respect, intelligent design has failed to provide a more compelling argument of human origins than evolutionary theory.

Given these diverse perspectives, is there any common ground between religious explanations of human origins and scientific theories? Surveys indicate that a surprising number of Americans assume that the creation–evolution controversy is based on a dichotomy between believers in God and secular atheists who are antireligious. This is incorrect. There are many varieties of both religious perspectives and evolutionary explanations, many of them compatible. Scientists and others who accept evolution are not necessarily atheists (Pennock 2003; E. Scott 2009). One major view of evolution is known as *theistic evolution*, which promotes the view that God creates through the evolutionary processes. Supporters of this perspective accept the modern scientific findings in astronomy, biology, genetics, and fossil and

geological evidence, but see God as intervening in how evolution takes place. Theistic evolution is the official view accepted by the Roman Catholic Church; it was reiterated by Pope John Paul II in 1996. In this statement, John Paul II emphasized that evolution was not just "theory," but was based on an enormous amount of empirical evidence, or "facts." The Roman Catholic theological position is that although humans may indeed be descended from earlier forms of life, God created the human soul. Other contemporary mainstream Protestant, Jewish, Muslim, Hindu, and Buddhist scientists also accept theistic evolution. This position sees no conflict between religion and science and reflects a continuum between the creationist and evolutionary views.

Another view of evolution is sometimes referred to as *materialist evolutionism* or *philosophical materialism*. Scientists and philosophers who hold this view believe that the scientific evidence for evolution results in a proof of atheism. Charles Darwin recorded in his memoirs how he vacillated between muddled religious faith, atheism, and what he later accepted as agnosticism (the belief that one cannot know as humans whether God exists or not) (Desmond and Moore 1991). Survey polls demonstrate that most Americans believe materialist evolutionism is the dominant view among scientists, despite the fact that this is not the case. Because it challenges religious interpretations, it is one of the primary reasons why some fundamentalist religious-based groups have opposed the teaching of evolution in the public schools in the United States.

In actuality, many scientists accept theistic evolution or other spiritual views along with scientific theories. For example, one of the leading critics of intelligent design creationism is the practicing Roman Catholic biologist at Brown University, Kenneth Miller. Miller has authored a book called *Finding Darwin's God: A Scientist's Search for Common Ground Between God and Evolution* (2000). In this book, Miller draws on biology, genetics, and evolutionary data to challenge intelligent design proponents' claims that the complexity of life demonstrates an intelligent designer. Paul Davies, a Protestant theologian and philosopher who authored the book *The Fifth Miracle* (2000) about faith and the evolution of life, is also critical of the intelligent design creationist model and relies on the empirical findings in science and evolution to refute their claims.

These individuals and other scientists accept theistic views of evolution, but they emphasize that scientific understanding of the universe and life must be based on the methods of *naturalism*. This *methodological naturalism* requires the scientist to rely on "natural" or "materialist" (biological and physical) explanations rather than spiritual or theological explanations for examining the universe and evolution, *but it does not compel one to accept atheism.* In fact, many major philosophers and scientists, such as anthropologist Eugenie Scott (former director of the National Center for Science Education) and the famed Albert Einstein, argued that one cannot prove or disprove the existence of God through the use of science. Methodological naturalism does not result in a conflict between faith and science. Rather, faith and science are viewed as two separate spheres and modes of understanding the world. This method of naturalism coincides with the teachings of the Roman Catholic position and many mainstream Protestant, Jewish, Muslim, Hindu, and Buddhist traditions.

Evolutionary explanations and other scientific theories often fail to satisfy our deep spiritual questions and moral concerns. While science can give us some basic answers about the universe and life, it cannot reveal spiritual insights. And yet, a scientific perspective does tend to leave us in a state of "spiritual awe" as described by Darwin in the famous closing passage of *On the Origin of Species*: "There is grandeur in this view of life."

Questions to Ponder

1. Can accounts of creation such as that found in Genesis 1:2 be evaluated empirically?
2. Have any of the scientific creationist claims convinced you of the falsity of evolution?
3. Do you think that faith and science are compatible when assessing the scientific record regarding evolution?

Australopithecus

An enormous amount of fossil evidence for at least six different species of australopithecines has been discovered in Africa. The genus *Australopithecus* means "southern ape" as it was first found in South Africa. The most complete early form of this genus, found in the Afar region of Ethiopia, is known as *Australopithecus afarensis*. It was discovered in 1974 by a joint American–French team of paleoanthropologists led by Donald Johanson. The best-known *A. afarensis* individual is popularly known as "Lucy" (named after the Beatles' song "Lucy in the Sky With Diamonds") (Johanson and Edey 1981). Forty percent of the skeleton of this individual was preserved, allowing paleoanthropologists to determine its precise physical characteristics. Lucy is a female *Australopithecus* with features such as a small cranium, or skull—440 cubic centimeters (cc), compared with a capacity of 1,000 to 1,800 cc for modern humans—indicating a small brain and large teeth. Fragments of Lucy's skull resemble that of a modern chimpanzee; however, below the neck, the anatomy of the spine, pelvis, hips, thighbones, and feet has characteristics of a bipedal creature, though one that did a lot of climbing also (Kappelman et al. 2016). Lucy was fairly small, weighing approximately seventy-five pounds, and was about 3.5 to 4 feet tall. Lucy is dated at 3.2 mya.

There are many other *A. afarensis* fossils, including skulls that have been discovered. For example, other important discoveries came in 1975 at a fossil locality at Hadar (Ethiopia) known as Site 333. Johanson and his crew found many hominin bones scattered along a hillside. Painstakingly piecing them together, the researchers reconstructed thirteen individuals, including both adults and infants, with anatomical characteristics similar to those of Lucy. Experts hypothesize that these

Lanmas / Alamy Stock Photo

This photo shows a reconstruction of "Lucy," an *Australopithecus afarensis* discovered by Donald Johanson and his team of paleoanthropologists in 1974.

finds may represent one social group that died at the same time for unknown reasons. The *A. afarensis* fossils discovered at Hadar have been dated between 3 and 4 mya, making these some of the earliest well-described hominin remains.

Another fascinating discovery from Hadar is the popularly named "Dikika baby" or "Lucy's baby" found at a site called Dikika, located just a couple of miles from where the Lucy find was discovered. Like the Lucy discovery, the Dikika find is the well-preserved remains of an *A. afarenis*, but whereas Lucy was an adult, the Dikika fossil is of a three-year-old child (Alemseged et al. 2006). The find consists of an almost complete skull, the entire torso, much of the legs, and parts of the arms. The completeness of this find is especially exciting because the smaller bones of young children are even more unlikely to survive the ravages of time than are those of adults.

In 2008, a nine-year-old boy, Matthew Berger, son of South African paleoanthropologist Lee Berger, was chasing his dog when he stumbled over some fossilized bones. His father studied the bones at a site called Malapa and discovered that they were from a previously unknown hominin species, now known as *Australopithecus sediba* (L. Berger 2012; S. A. Williams, Desilva, and De Ruiter 2018). Following ten years of research, the Malapa hominin was dated at 1.977 mya. Two partial skeletons that have been analyzed, including three-dimensional scanning, show that *A. sediba* was a small creature weighing just seventy-seven pounds. But it had a unique combination of traits such as hands that were capable of precise manipulations and a powerful grip for climbing trees. The shoulders and forelimbs are very primitive, but the pelvis and lower limbs indicate bipedalism. Thus, *A. sediba* represents one of the creatures evolving sometime between *A. afarensis* and the emergence of the *Homo* line.

HOMO

2.5 Discuss how *Homo habilis, Homo rudolfensis, Homo floresiensis,* and *Homo naledi* differ from australopithecines.

The first representatives of our own species first appear in the fossil record about 2.5 mya. The earliest representatives of the genus include/are represented by *Homo habilis*, *Homo rudolfensis*, *Homo floresiensis*, and *Homo naledi.* The average size of the skull of *H. habilis* is 640 cc, indicating a much larger brain than that of the australopithecines. However, *H. habilis* fossils indicate that this creature had some apelike features such as climbing abilities aside from upright bipedalism. The *H. rudolfensis* skull had a cranial capacity of 775 cc, considerably larger than *H. habilis. H. habilis* and *H. rudolfensis* were contemporaries and date from between 2.2 and 1.6 mya; therefore, they coexisted with later species of australopithecines (Leakey et al. 2012).

Two more forms of the *Homo* lineage, *H. floresiensis* and *H. naledi*, have been discovered and analyzed more recently. Although *H. floresiensis* was first discovered at a site known as the Liang Bua cave on the island of Flores in Indonesia in 2003, it has been extensively reanalyzed since then. *H. floresiensis* was a diminutive creature popularly nicknamed "the Hobbit" based on its small body size and small cranium. Skeletal material from nine individuals has been recovered, with one complete skull. The cranial capacity of the skull was very small at 380 cc, in the range of chimpanzees or early australopithecines. The height of *H. floresiensis* is estimated at three feet, six inches. The remains at Liang Bua cave are dated at 86,000 mya, but at another site on Flores, fossils are dated at 700,000 mya. Following fifteen years of research based on comparisons of skeletal material from both Africa and Asia, paleoanthropologists have concluded that *H. floresiensis* is a late survivor of *H. habilis* or its close descendants, indicating an early migration from Africa to Asia (Argue et al. 2017).

In 2013, a cache of fossil bones known as *Homo naledi* was discovered in a remote cave chamber of the Rising Star cave system in South Africa. The cave was so deep with narrow passages that South African paleoanthropologist Lee Berger had to recruit "skinny" and mostly female paleoanthropologists and archaeologists through Facebook in order to carry out

Courtesy of John Hawks

This photo shows the enormous amount of fossil evidence for *Homo naledi* discovered in the Rising Star cave in South Africa.

the excavation (L. Berger and Hawks 2017). Over 1,500 fossil bones were found from fifteen individuals of various ages. One of the adult individuals had a complete skull along with other cranial evidence. This fossil evidence suggests a small brain for *H. naledi* ranging from 460 cc to 565 cc (L. Berger and Hawks 2017; L. Berger et al. 2015; Holloway et al. 2018). The cranial, dental, and postcranial remains consist of both humanlike characteristics and australopithecine traits. However, surprisingly, following sophisticated dating techniques, the fossil assemblage was dated between 236,000 and 335,000 years ago. This means that *H. naledi* existed at the same time as other later hominins including early forms of *Homo sapiens.* One other intriguing aspect debated by paleoanthropologists and archaeologists regarding the *H. naledi* is that although there were no tool artifacts found, it may be one of the first intentional burials deep within this South African cave.

Early Stone Tools: The Lower Paleolithic

The first tools were very likely *unmodified* pieces of wood, stone, bone, or horn that were picked up to perform specific tasks and then discarded soon afterwards. Although it is perhaps tempting to associate the manufacture of the first tools with the larger-brained members of our own genus *Homo*, the oldest stone tools clearly predate the earliest representative of the genus. The oldest evidence for unmistakable stone tool use was found at a site called Lomekwi near Kenya's Lake Turkana by a team led by archaeologist Sonia Harmand (Harmand et al. 2015). These stone tools, over 150 of them, were dated at 3.3 mya. Other, indirect evidence for early stone tool use comes from cut marks left on two bones recovered in Dikika, Ethiopia, and dated to roughly 3.4 mya (McPherron et al. 2010). These early dates suggest that australopithecines may have been engaged in stone tool production.

Other recognizable stone tools dating back just over 2.6 mya are found at several sites in eastern and southern Africa (Semaw et al. 2003). These early stone tools are called *chopper tools* or *hammer stones*. Hammer stone tools were used to knock off "flakes" to form choppers. This technique is referred to by archaeologists as *percussion flaking*. Called Oldowan tools (because they were first discovered at Olduvai Gorge in Tanzania), these tools could be used for cutting the hides of animals, cutting wood, and possibly shaping wooden tools (Keeley and Toth 1981).

A recent excavation of a site in Shangchen in southern China has unearthed some early stone tools outside Africa dated at 2.1 mya (Zhu et al. 2018). This discovery along with the conclusions about the ancestral line of *Homo floresiensis* in Indonesia as described earlier indicates that early hominins such as *Homo habilis* or its closest descendants were migrating long distances from Africa to Asia at a very early time period.

The importance of the discovery of the artifacts is that they suggest that early hominins had the intellectual capacity to fashion stone tools to develop a more effective means of subsistence. This innovation indicates an increased brain size, which led, in turn, to new forms of complex learning. These technologies mark the beginnings of what is known as the Lower Paleolithic period of hominin evolution, or the earliest period of the Old Stone Age.

HOMO ERECTUS

2.6 Describe the cultural characteristics of *Homo erectus*.

As previously discussed, early fossils indicating hominin evolution have been discovered both inside and outside of Africa. However, most of the fossil evidence found in China, Java (a major island in Indonesia), the Middle East, Europe, and Africa is associated with *Homo erectus*. These finds date to between 1.8 million and 250,000 years ago. In early periods in Africa, *H. erectus* coexisted with other species of earlier hominins such as *H. habilis* and *H. rudolfensis*. One of the most complete finds, known as "Turkana boy," was recovered at the Nariokotome site near Lake Turkana in Kenya. The relatively complete skeleton of an eight-year-old boy about five feet tall is comparable with the size of modern humans today. The skeleton demonstrates that the Turkana boy is definitely human below the neck. The cranium indicates a brain capacity of about 900 cc, which falls into the range of *H. erectus* (Stringer and Andrews 2005).

Anatomically, *H. erectus* fossils represent a major new stage of hominin evolution, especially with respect to brain size. The cranial capacity of *H. erectus* ranges between 895 and 1,040 cc, making the skull size of some of these individuals not much smaller than that of modern humans (Kramer 2002; Stringer and Andrews 2005). This evidence indicates that most of the growth in brain size occurred in the neocortex. The populations of *H. erectus* differed from modern humans in that they had a low, sloping forehead and thick, massive jaws with large teeth.

However, the jaws and teeth were much smaller than those of earlier *Homo* species such as *H. habilis.* From the neck down, their skeletal features are similar to those of modern humans, but their bones are much heavier, indicating a very powerful musculature. During this period of hominin evolution, there appears to be very little anatomical change among the *H. erectus*.

Migration of *Homo erectus*

Given that the early hominins evolved in Africa, the question arises of how these hominins including *H. erectus* became so widely dispersed throughout the world. The major hypothesis is that as populations increased, a certain percentage migrated into new territories following game animals as they moved out of Africa (Antón, Leonard, and Robertson 2002).

As these populations migrated across continents, they encountered different climates and environments. This movement occurred during a period known as the Pleistocene Epoch, which marked the later stages of what we popularly call the Ice Age. At intervals during this time, huge masses of ice, called glaciers, spread over the northern continents, producing colder climates in the temperate zones such as Europe and northern Asia, and increased rainfall in the tropical areas, creating grasslands and new lakes. *Homo erectus* populations had to adapt to a wide variety of climatic and environmental conditions whether they remained in the tropics, as many did, or migrated to new areas of the world.

Fire

Homo erectus probably could not have survived in the colder climates without the use of fire. The earliest use of fire, however, appears to be in Africa near Lake Turkana in northern Kenya dated at 1.8 mya (Gowlett and Wrangham 2013; Hlubik et al. 2017). Later, fire was also associated with *H. erectus* sites in both Europe and Asia. The use of fire to cook food added an important element to the diet. Cooking food made it more digestible and safer to consume. In addition, fires could be used to keep predators away, enabling *H. erectus* to survive more effectively. It is unclear whether *H. erectus* knew how to make fire (fire begun by lightning or forest fires could have been kept lit), but there is no question that fire was controlled. In some regions, the high frequencies of natural fires may have provided a consistent and reliable access for these hominins (Sandgathe and Berna 2017). Anthropologist Richard Wrangham (2010) suggests that *H. erectus* mastered the use of fire for cooking, enabling more efficient foraging and digesting, resulting in smaller teeth, jaws, and face, freeing energy to develop a larger brain.

Acheulean Technology

An abundance of stone tools associated with *Homo erectus* indicates a remarkable evolution in technology. This new technology is known as the Acheulean technology, named after the town of Saint-Acheul, France, where some of the first finds were made. This Acheulean technology is dated at 1.5 mya in Africa, and it persists in Europe long after *H. erectus* becomes extinct.

Like the Oldowan choppers, Acheulean tools were produced by percussion flaking, but they exhibit more complexity. Most characteristic of the Acheulean tool is the hand ax, a sharp, bifacially flaked stone tool shaped like a large almond, which would have been effective for a variety of chopping and cutting tasks. Unlike Oldowan choppers, which consisted of natural cobbles with a few flakes removed, the hand ax was fashioned by removing many flakes to produce a specific form. In other words, the toolmaker had to be able to picture a specific shape in a stone. Late Acheulean tools were produced through a more refined form of percussion flaking, the *baton method*. In this technique, a hammer, or baton, of bone or antler was used to strike off flakes. The baton allowed for more accurate flaking and produced shallower, more delicate flakes than a hammer stone.

TRANSITION TO HOMO SAPIENS

2.7 Describe the physical and cultural characteristics of Neandertals.

The fossil evidence demonstrates that there was a gradual evolution of *H. erectus* into an anatomically modern *H. sapiens.* Paleoanthropologists classify varied transitional species that exhibit a mix of characteristics seen in *H. erectus* and *H. sapiens* as archaic *Homo sapiens*. They are represented in fossil finds in sites throughout Europe, England, Africa, Asia, and the Middle East.

The oldest transitional forms discovered, first known from Heidelberg, Germany, have been classified as *Homo heidelbergensis* dated from about 700,000 to 200,000 years ago, but may be linked to another find known as *Homo antecessor* found in Spain that is dated at around 800,000 years ago. These transitional forms may be the ancestors of the archaic *Homo neanderthalensis* and modern humans (Stringer 2012). The Neandertal, or *H. neanderthalensis*, the hominin population that lived in Europe, dates between 430,000 and 24,000 years ago. Because of inconclusive evidence, some paleoanthropologists include this species within our own as *H. sapiens neanderthalensis* (Tattersall 1998; Trinkaus and Shipman 1994).

Physically, all archaic *H. sapiens* populations shared some general characteristics, although distinctive variations existed from region to region. The skeletal evidence suggests that they were short, about five feet, six inches tall, but powerfully built. The hands and feet were wider and thicker than those of modern humans. The skull and face were broad, with a larger jaw, larger teeth, and extremely prominent brow ridges. The Neandertal physique, which is very distinct from that of other archaic *H. sapiens*, has become the model for the stereotype of "cavemen" frequently portrayed in cartoons and other popular entertainment.

This image of a brutish prehistoric creature is misleading. The skull of the Neandertal was large, ranging from 1,200 to 2,000 cc, and could accommodate a brain as large as, or even larger than, that of a modern human. Moreover, recent studies of the Neandertal skull indicate that the structure of the brain was essentially the same as that of modern humans, suggesting similar intellectual capacities.

Possible clues to Neandertals' relatedness to modern humans come from molecular testing of genetic material extracted from Neandertal bones. Though estimates of the separation of the Neandertals and modern humans range from 500,000 years ago, the genetic evidence suggests interbreeding between the two different populations at about 50,000 years ago (Sankararaman et al. 2012). The genetic testing has demonstrated that Neandertal DNA in non-African modern human populations ranges from 1.5 to 4 percent (Hawks 2013; Simonti et al. 2016). Though the Neandertal DNA may have provided immunity from regional pathogens and diseases for modern humans, today it may influence health conditions ranging from allergies to risks of depression (Hawks 2017; Simonti et al. 2016).

Increasing understanding of archaic human populations has been made by the fossil and archaeological identification of the **Denisovans**, or the **Denisova hominins**, a subspecies that was contemporaneous with modern humans and Neandertals (Hawks 2017). These hominin remains are located in Denisova cave in Siberia, Russia. Archaeological data suggest that the site was occupied from over 125,000 years ago up until modern times (Dalton 2010; Hawks 2017; Krause et al. 2010). Archaeological excavations suggest possible occupation by both Neandertals and modern humans. Genetic data gleaned from bones recovered from the site dating to between 30,000 and 48,000 years ago suggest that the Denisovans share a common origin with Neandertals and that they interbred with both Neandertals and anatomically modern humans. Additional study of the genomic data suggests interbreeding with another, unknown human lineage distinct from the Neandertals and modern humans (Hawks 2013; Pennisi 2013). Recently, a new discovery of a Denisovan jawbone on the Tibetan Plateau in a cave in Gansu, China, dated at 160,000 years ago indicates that this hominin was also in Asia (Chen et al. 2019). Discoveries such as these are indicative of the complex history of human interactions and the questions that remain for paleoanthropologists to answer.

Neandertal Technology: The Middle Paleolithic

The early European archaic *Homo sapiens* who had migrated from Africa were using Acheulean stone tools. However, the stone tool industry associated with Neandertal populations is called the **Mousterian tradition**, named after a rock shelter at Le Moustier, France, where it was first identified. The Mousterian technology is classified within the period known as the *Middle Paleolithic*, or Middle Stone Age. It shows a remarkable variability compared with earlier technologies and for this reason is distinguished as a Middle Paleolithic industry. Mousterian implements could have been used for cutting, leather working, piercing, food processing, woodworking, hunting, and weapons production (Binford and Binford 1966; Bordes 1968; Hayden 1993). Neandertals also must have been capable of making some type of clothing, or else they would not have been able to survive the cold European climate. In addition, archaeologists have discovered evidence of the extensive occupation of caves and rock shelters, as well as of open-air sites that may have been temporary camps used during the summer months. Archaeological evidence includes the remains of charcoal deposits and charred bones, indicating that, like earlier *Homo erectus*, Neandertals used fire not only for warmth but also for cooking and perhaps for protection against dangerous animals. In Neandertal sites in Spain, France, and Belgium, cut marks on skeletal material indicate evidence for cannibalism (Rougier et al. 2016).

The remains discovered at the Neandertal sites suggest that, like populations of archaic *H. sapiens* in other areas, Neandertals were efficient hunters. They hunted both small and large game, including such extinct creatures as European elephants, giant elk, bison, and huge bears weighing up to 1,500 pounds and standing over twelve feet tall. These bears, related to the Alaskan brown bear, are known as "cave bears" and were formidable prey for Neandertal hunters.

Neandertal Ritual and Beliefs?

Study of Neandertal sites has also given archaeologists the first hints of activities beyond hunting and gathering and the struggle for subsistence—possible evidence that Neandertals practiced rituals. Regrettably, much of this evidence, portrayed in countless movies, novels, and caricatures, is far more circumstantial than archaeologists would like. Finds that have been examined include both bear bones and Neandertal artifacts.

Despite the romantic appeal of a Neandertal "cave bear cult," however, these interpretations lack the most important thing archaeologists need to glean insights into such complex issues as prehistoric ritual beliefs: clearly documented archaeological context (Chase and Dibble 1987; Trinkaus and Shipman 1993). In the absence of clear associations between the bear bones and the tools, this evidence suggests only that Neandertals visited a cave in which bears may have hibernated and occasionally died. Many of the finds were not excavated by trained archaeologists, and no plans or photographs of the discovery were made at the time of excavation (Rowley-Conwy 1993). Without this information, interpretation of Neandertal ritual remains entirely speculative.

FIGURE 2.2 ■ Comparisons of Cranial Features of *Homo sapiens*, Neandertals, and *Homo erectus*

Homo sapiens

Homo sapiens neanderthalensis

Homo erectus

Source: Courtesy of Christopher DeCorse.