

Preface

This textbook is about where we come from and the scientific ways we can explore our beginnings. Our species, like all species on earth, evolved from earlier life-forms. As a result of this long shared ancestry, we and all other life are *connected* in a variety of ways: genetically, anatomically, physiologically, and even behaviorally. These connections are the main focus of the book and are highlighted in every chapter.

Physical anthropology, also called “biological anthropology,” is the study of human adaptation, variability and evolution as well as of our living and fossil relatives from a biological perspective. Consequently, throughout this text, you will encounter topics that emphasize basic biological concepts. This broad biological framework allows us to connect our evolutionary history with that of other life-forms in order to better understand the evolutionary pressures that shaped our species.

In the last few years scientific knowledge in many fields has accumulated amazingly fast. What’s more, the biological sciences are certainly among the most rapidly expanding areas of knowledge as information increases dramatically every year—indeed, every month. This edition has been updated to reflect these changes and to provide the most current information available.

But, in reality, our presentation is just a beginning for students new to this field of study. It is our goal to give students a strong foundation relating to the key aspects of evolutionary biology, which includes physical anthropology. Our aim is to provide fundamental information which will allow you to better understand some of the dramatic scientific advances that almost surely will directly affect you in coming years.

Because genetic mechanisms lie at the heart of understanding evolution, in the early chapters (2 through 5) we address the basic aspects of life, cells, DNA, and the ways species change. In Chapters 6 and 7, we turn to an exploration of our evolutionary cousins, the nonhuman primates, and show how they are closely connected to us genetically, physically and behaviorally. In Chapters 8 through 13, we first discuss the evolutionary history of early primates and how they relate to living nonhuman primates and our own earliest ancestors (Chapter 8). In Chapters 9–13, we turn to a more detailed exploration of

our specific human evolutionary history over the past 6 million years. This evolutionary journey begins with our small-brained, apelike ancestors in Africa and follows the development of their descendants through time and over an expanding geographical range into Asia and Europe, and much later into Australia and the Americas.

In the last section of this book (Chapters 14–17), we cover the most recent part of our evolutionary journey with a discussion of modern human biology, and we trace the ongoing evolution of our species. Major topics include the nature of human variation (including an anthropological discussion of the concept of “race”), patterns of adaptation in recent human populations, and the developmental changes experienced by humans through the course of their lives. In our new concluding chapter, “The Human Disconnection,” we discuss how contemporary humans are severely altering the planet. We compare these recent and sudden developments with our species’ long evolutionary past, when humans were not so numerous or so dependent on nonrenewable resources.

What’s New in the 2013–2014 Edition

First, as previously mentioned, we have incorporated the unifying concept of our “connection” to all life as the framework for presenting material throughout the text. To further reinforce this central focus, each chapter now opens with a pedagogical aid that clearly shows students the biological connections as they are organized within and between chapters. Students are also now presented with the learning objectives they are expected to master after reading the chapter. In addition, at the end of each chapter we have included a new section (How Do We Know?) which briefly summarizes the basic scientific information that allows physical anthropologists and other biologists to draw accurate conclusions regarding our evolutionary history.

As genetic technology continues to grow at an unprecedented pace, it is our task to present the most rele-

vant new discoveries in as simple a manner as possible. Chapter 3 includes a new discussion of the ENCODE (Encyclopedia of DNA Elements) project that involves more than 400 geneticists from around the world. The goal of the project is to identify the functions of the “non-coding” DNA that comprises about 98 percent of the human genome. This discussion is important because some of this DNA is involved in regulatory functions and changes in regulatory genes are critical to the evolutionary process. We also increased our discussion of regulatory DNA and types of regulatory genes to emphasize their role in evolution.

A major change to this edition is the reduction of the number of nonhuman primate chapters from 3 to 2. This change was in response to reviewer comments that there be somewhat less coverage. However, all major topics have been retained, and there is added material on cooperation and empathy in nonhuman primates. We have also added more information emphasizing the endangered status of many nonhuman primates, both in the text, and in a new table (Table 6.1) that lists some of the 25 species considered most endangered by the IUCN (International Union for the Conservation of Nature). The table includes estimated numbers and the major threats to these species.

Chapter 8 (formerly Chapter 9) has been trimmed and extensively updated to include new discoveries as well as ongoing reinterpretations of fossil primates. These changes include a reassessment of molecular dating for primate origins and the evolution of all groups, as well as an updated and streamlined treatment of lower primates. This new approach relies less on nomenclature and instead emphasizes key trends in primate adaptation and relation to living groups. Three new “At a Glance” boxes call attention to significant transitional primate groups and act as handy study tools. A complete revision of ape origins is supplemented by a detailed map showing the dispersal patterns of early apes from Africa to Europe and Eurasia and then back into Africa. The chapter, as a whole, includes attractive new art emphasizing important primate traits and differences between groups in an easy-to-understand visual format.

Remarkable new discoveries of fossil hominins and evidence of their behavior are discussed in Chapters 9 through 13. In Chapter 9 we provide further information that sheds light on the controversial interpretation of what some researchers have claimed are the earliest stone tools (ostensibly used for butchering) as well the latest chemical evidence used to reconstruct early hominid diets. Chapter 10 covers the earliest hominins and presents varied interpretations, including further infor-

mation about *Ardipithecus* as well as a new find of foot remains that suggest many of these early hominins were likely bipedal, but in a very different way from us or even some other contemporary hominin species.

Our coverage of *Homo erectus* in Chapter 11 covers a new find from Java as well as new and more precise dating of several key sites. Chapter 12 contains a new framework for understanding premodern humans, especially as they occupied wider areas of the Old World with some populations becoming more isolated. In addition, we cover the amazing new DNA results obtained from a finger bone found in Siberia that have allowed researchers to determine not only that the individual was female but also her hair, skin, and eye color. Chapter 13 concludes the section on fossil hominins with a discussion of the origins of modern humans. Updates include further evidence showing more precisely the evolutionary relationships of *Homo floresiensis* as well as new archaeological discoveries pushing back the dates of cave painting in western Europe and the development of sophisticated tools in southern Africa.

In Chapters 14 through 16, our focus turns to modern human biology. Our understanding of human variation (discussed in Chapter 14) has been completely transformed by more complete DNA data, published in just the last five years. We have updated and modified our main perspective in this chapter to reflect the remarkable new findings contributed by molecular biology. New data from contemporary hunter-gatherer populations in Africa tell us about human origins; other very recent research further clarifies how migrations outside of Africa led to the peopling of Eurasia, Australia, and the New World.

In Chapter 15, there's a new discussion of recent research demonstrating a population-wide genetic mutation in Tibetan highlanders that increases their ability to adapt to living at high altitude. We have also included a major new section on “Human Skeletal Biology: What Bones Can Tell Us about Ancient Diseases and Lifestyles.” The discussion of diseases found in bone is linked to the overall human adaptation theme of the chapter and is heavily illustrated with new photos.

In Chapter 16, now titled “Legacies of Human Evolutionary History: Effects on the Individual,” we focus on ways in which our biology, resulting from millions of years of evolution, seems to be mismatched with the lives we lead today, leading in some cases to compromised health. For example, the biology of women may not be well suited to the highly frequent menstrual cycling that results from the use of modern forms of birth control. Some health disorders that we are dealing with today may

stem from the dramatic differences between the diets of our ancestors and the foods we eat today.

Finally, in the new concluding Chapter 17 ("The Human Disconnection"), we focus on another theme that runs through the book—why it is so crucial that we know and understand human evolutionary history, its impact on the world today, and how we have distanced ourselves from other living species with which we share so many connections. We humans and the consequences of our activities are probably the most important influences on evolution today, causing the extinction or near-extinction of thousands of other life-forms and threatening the very planet on which we live. Our disconnection from other species and from our own evolutionary past pose the biggest challenges our species has ever faced. Only by understanding how we got to this point can we begin to respond to the challenges that are in our future and the futures of our children and grandchildren.

We also expanded our treatment of climate change in Chapter 17, including two new figures. The discussion provides current information from the National Snow and Ice Data Center showing that in September 2012, the Arctic sea ice minimum was 49 percent less than the average figure for the years 1979 to 2000. We point out that there has been a steady decline in Arctic sea ice since the year 2000 and we briefly deal with the likely consequences of continued melting.

In-Chapter Learning Aids

Connections graphic at the beginning of each chapter shows the biological relationships emphasized in the chapter in the context of topics in other chapters.

Student Learning Objectives are listed on the opening page of each chapter.

A Closer Look boxes are high-interest features found throughout the book. They supplement chapter material and include more in-depth discussion of selected stimulating topics.

How Do We Know? chapter concluding sections summarize the basic scientific information used in drawing accurate conclusions about our evolutionary history.

Video Media Resources are now listed at the end of half of the chapters. Students are referred to the anthropology CourseMate at www.cengagebrain.com for access.

A running glossary in the margins provides definitions of terms immediately adjacent to the text where the term is first introduced. A full glossary is provided at the back of the book.

At a Glance boxes found throughout the book briefly summarize complex or controversial material in a visually simple fashion.

Figures, including numerous photographs, line drawings, and maps, most in full color, are carefully selected to clarify text materials and directly support the discussion in the text.

Critical Thinking Questions at the end of each chapter reinforce key concepts and encourage students to think critically about what they have read.

Full bibliographical citations throughout the book provide sources from which the materials are drawn. This type of documentation guides students to published, peer-reviewed source materials and illustrates for students the proper use of references. All cited sources are listed in the comprehensive bibliography at the back of the book.