

PREFACE

How Humans Evolved focuses on the processes that have shaped human evolution. This approach reflects our training and research interests. As anthropologists, we are interested in the evolutionary history of our own species, *Homo sapiens*. As evolutionary biologists, we study how evolution works. In this book, we integrate these two perspectives. We use current theoretical and empirical work in evolutionary theory, population genetics, and behavioral ecology to interpret human evolutionary history. We describe the changes that have occurred as the hominin lineage has evolved, and we consider why these changes may have happened. We try to give life to the creatures that left the bones and made the artifacts that paleontologists and archaeologists painstakingly excavate by focusing on the processes that generate change, create adaptations, and shape bodies and behavior. We also give serious attention to the role of evolution in shaping contemporary human behavior. There is considerable controversy about evolutionary approaches to human behavior within the social sciences, but we think it is essential to confront these issues openly and clearly. Positive responses to the first three editions of *How Humans Evolved* tell us that many of our colleagues endorse this approach.

One of the problems in writing a textbook about human evolution is that there is considerable debate on many topics. Evolutionary biologists disagree about how new species are formed and how they should be classified; primatologists argue about the adaptive significance of infanticide and the effects of dominance rank on reproductive performance; paleontologists disagree about the taxonomic relationships among early hominin species and the emergence of modern humans; and those who study modern humans disagree about the meaning and significance of race, the role of culture in shaping human behavior and psychology, the adaptive significance of many aspects of modern human behavior, and many other things. Sometimes multiple interpretations of the same data can be defended; in other cases, the facts seem contradictory. Textbook writers can handle this kind of uncertainty in two different ways. They can weigh the evidence, present the ideas that best fit the available evidence, and ignore the alternatives. Or they can present opposing ideas, evaluate the logic underlying each idea, and explain how existing data support each of the positions. We chose the second alternative, at the risk of complicating the text and frustrating readers looking for simple answers. We made this choice because we believe that this approach is essential for understanding how science works. Students need to see how theories are developed, how data are accumulated, and how theory and data interact to shape our ideas about how the world works. We hope that students remember this long after they have forgotten many of the facts that they will learn in this book.

NEW IN THE FOURTH EDITION

Many users of the book have found that it is hard to cover all of the material in a single quarter or semester. In response to this concern, we have put the book on a diet. Diets are hard because you have to give up things that you like. In this case, we eliminated the

chapter on language and the chapter on the human life cycle. We incorporated some material about the evolution of language in Part Four and some of the material about primate life history in Part Three. Readers familiar with previous editions will also notice that the readings are gone. Few of the instructors who were asked to review the third edition of the book seemed to think that the readings were essential. Removing them reduces the length of the book and helps streamline the text.

The study of human evolution is a dynamic field. No sooner do we complete one edition of this book than researchers make new discoveries that fundamentally change our view of human evolution. These kinds of discoveries include the spectacular fossil finds that reveal new chapters in human ancestry, new data that alter our interpretation of the behavioral strategies of primates, and experimental studies that reveal cross-cultural regularities in mating preferences. New developments in human evolutionary studies require regular updates of the textbook. Although we have made many changes throughout the book, readers familiar with prior editions will find significant changes in Parts II (Primate Behavior and Ecology), III (The History of the Human Lineage), and IV (Evolution and Modern Humans).

In Part I, we expanded Chapter 1 to provide more examples of the power of natural selection. We describe recent work which documents the rapid evolution of a complex placenta-like organs independently in several species of a single fish genus. In Chapter 2, we provide expanded coverage of molecular genetics, and discuss more fully the role of proteins, gene regulation, and cell differentiation in development. Sometimes less is more: in Chapter 4 we have streamlined and updated the discussion of measuring genetic distance using sequence data rather than hybridization data.

In Part II, we revised a number of chapters to include recent empirical findings. For example, in Chapter 7 we discuss new evidence about the function of male-female relationships in baboons, and in Chapter 8 we describe new work on paternal kin recognition. We rewrote Chapter 9 entirely, integrating our discussion of the evolution of life history strategies (formerly covered in Part IV) with our discussion of the evolution of cognitive abilities in primates. These changes are prompted by new theoretical models that consider why evolution favored enhanced cognitive abilities in the primate order, and explore the consequences of these changes on primate life histories.

We have thoroughly revised Part III to incorporate a number of important findings that have substantially altered our understanding of human history. We rewrote Chapter 10 to include new data on the origin of primates, new fossils that tell us more about the New World primate radiation, and important new work on the the Miocene apes. In Chapter 11, we integrate information on *Sahelanthropus tchadensis* and *Orrorin tugenensis* into our discussion of the earliest hominins, and in Chapters 11 and 12, we describe new findings about the rate of development in early hominins. The tiny hominins from Flores, Indonesia—*Homo floresiensis*—make their first appearance in this edition in Chapter 13. We also discuss some new information about global climate change that may have influenced human evolution. Chapter 14 includes a new section on the earliest African *H. sapiens*, including Herto fossils and the redating of Omo Kibish I, and a new section on what genetic sequence data from modern populations (and from Neanderthals) can tell us about human evolution.

Part IV has been reorganized to provide a more integrated view of human diversity and contemporary behavior. Chapter 15 considers the sources of variation within and between human populations, and describes new findings that are relevant to understanding the processes that underlie human diversity. We have rewritten Chapter 16 to provide a more integrated view of how evolution shapes modern human

behavior. We have eliminated the dichotomy between evolutionary psychology and evolutionary anthropology, focusing instead on the insights evolutionary theory provides about modern human minds and behavior. We have also included information about the evolution of language and the adaptive significance of culture in this chapter. Chapter 17 includes new data on how evolution shapes mate choice and mating tactics in men and women, a more comprehensive discussion of the factors that influence men's investment strategies, and a broader review of evidence about the investment patterns of stepparents and grandparents.

Throughout the book, we updated the list of references for further reading, and added a number of new study questions that are related to new material in the text. With the help of our colleagues and excellent copy editor, we also corrected a number of errors that found their way into the third edition.

We wrote this book with undergraduates in mind, and we have designed a number of features to help students use the book effectively. We have retained the "key idea" statements (now printed in blue type), and we recommend that students use these key ideas to keep track of important concepts and facts, and to structure their reviews of the material. Important terms that may be unfamiliar are set in bold type and defined in the text when they first appear. Readers can also find definitions for these terms in the Glossary. Discussion questions appear at the end of each chapter. These questions are meant to help students synthesize material presented in the text. Some of the questions are designed to help students review factual material, but most are intended to help students to think about the processes or theoretical principles they have learned. Some questions are open-ended and meant to encourage students to apply their own values and judgment to the material presented in the text. Students tell us that they find these questions useful as they attempt to master the material and prepare for exams. The list of references for further reading at the end of each chapter provides a starting point for students who want to delve more deeply into the material covered in that chapter.

The book is richly illustrated with photographs, diagrams, figures, and graphs. These illustrations provide visual information to complement the text. For some subjects, a picture is clearly worth 1000 words—no amount of description can enable students to conjure up an image of an aye-aye or appreciate the how much more similar the australopithecine pelvis is to the modern human pelvis than to the chimpanzee pelvis. The diagrams of evolutionary processes that appear in Part I, are designed to help students visualize how natural selection works. The figures depicting the hominin fossils are drawn to scale, so each is presented in the same orientation and to the same scale. This should help students compare one hominin specimen with another. We have often been advised that you cannot put graphs in an undergraduate textbook, but we think that the graphs help students understand the evidence more fully. For us, it is easier to remember data that is portrayed graphically, than to recall verbal descriptions of results.

In addition, students can consult the multimedia guide to the fossil record, *Human Evolution* by Philip L. Walker and Edward Hagen, that is packaged with the text. This student resource offers lesson modules that illustrate controversies, archaeological discoveries, and the anatomical differences between members of the nonhuman primate and human lineage, including prosimians, monkeys, apes, and hominins. The modules contain a photographs, drawings, and artwork plus a number of three dimensional animated specimens that can be "zoomed" to half-scale. Multiple-choice quizzes conclude each of the lessons.

ANCILLARY MATERIALS

For instructors, there is an instructor's manual and test-item file, which include a detailed outline of each chapter, answers to all of the discussion questions, and a bank of exam questions. The test questions are also available on CD in MS-DOS and Macintosh formats, and will be provided free of charge upon adoption of this textbook. For instructor use we also offer a media library of full-color transparencies of the figures and a CD containing many of the figures and photographs. This media library, available to adopting instructors, is especially rich, offering images not only from *How Humans Evolved*, but also from two other fine and well-illustrated books, Dean Falk's *Primate Diversity* and Glenn Conroy's *Primate Evolution*.

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