

Essentials of Biological Anthropology

Noel T. Boaz
Alan J. Almquist



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To our children

Lydia, Peter, and Alexander

Christopher and Emily



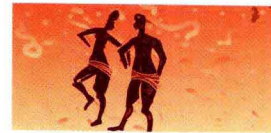
Preface

Essentials of Biological Anthropology is an abbreviated version of our longer work, *Biological Anthropology*, which first appeared in 1997. One might imagine an abbreviated version to be rather simple to produce. It wasn't. Many difficult decisions had to be made as to what to leave out, what to modify, and what to enhance. Many favorite passages fell by the wayside. In the end, though, *Essentials* retains the overall structure and organizational flow of the original version—perhaps the single most important ingredient in making that version a good book.

ABOUT THE BOOK

In a field as fast paced as biological anthropology, we welcomed the opportunity to revise and update the original text. New insights into old problems, new fossil finds, new people working in the field—all require comment. Every chapter in *Essentials* has been revised. The outcome of the combined efforts of reviewers, students who had used the original text, and our second look at what we had done is a thoroughly updated condensed text. Yet our efforts are humbled almost daily by new discoveries in the field. For example, researchers recently found that a region of the brain (the planum temporale) thought to control language is larger in the left hemisphere in both chimpanzees and humans, disproving the notion that this area was asymmetrical only in humans. The human planum temporale of the left hemisphere is normally larger than in the right, but 94% of the brains of chimpanzees showed the same asymmetry. These findings affect our continuing studies of the origin of human language and will be discussed in the next edition. Thus goes the field of biological anthropology—exciting, challenging, ever changing.

Above all else, this is a book of ideas. Students will find this text stimulating as well as challenging, factors that characterize the field as a whole. This version is more user-friendly, with important concepts better illustrated, thanks to the artists at Prentice Hall. Explanations of difficult concepts and numerous examples help the student to thoroughly understand the message. In other words, instructors do not have to spend valuable class time explaining the text to students.





The volume provides the “essentials” without so simplifying or condensing them that the excitement of discovery that hallmarks the field is lost. It represents both a useful approach to the teaching of human evolution at the introductory college and university level and a restatement of the coherency and fundamental compatibility of the many subdisciplines that contribute to biological anthropology. Throughout the book is the unifying thread of evolution by natural selection that forms the basic paradigm of the discipline. As scientists we believe that every question should remain open to the possibility of a new answer; however, Charles Darwin’s formulations of evolution and its modifications continue to be the best explanation for our presence and for the world around us. We hope our exposition does justice to his elegant theoretical framework, on which modern biological anthropology is based.

This book is organized along lines of increasing organismal complexity, leading from prebiotic replicating molecules through to modern *Homo sapiens*. Following this organization, the text proceeds generally from very early time to the present, and from broad taxonomic categories that include human beings to progressively more specific categories, ending with *Homo sapiens sapiens*. We have used available paleoecological data to set the stage and provide the context of the morphological and behavioral adaptations characterizing our ancestors at each major time period. We believe that this organization serves to build students’ understanding of the biological, genetic, and anatomical basics of biological anthropology so that the complex questions of hominid phylogeny, human sociocultural behavior, human variability, and modern-day adaptation to our increasingly demanding environment can be approached in more meaningful ways.



SUPPLEMENTS

The supplements package for this text is of exceptional quality. It is intended to give the instructor the resources needed to teach the course and the student the tools needed to successfully complete the course.

Instructor’s Resource Manual: This essential instructor’s tool includes detailed chapter outlines, teaching objectives, discussion questions, classroom activities, and additional resources.

Test Item File: This carefully prepared manual consists of over 1000 questions in multiple-choice, true/false, fill-in, and essay formats. Each question is page referenced to the text.

Prentice Hall Custom Test: This computerized test item file allows you to create your own personalized exams, edit existing questions, import questions, and print multiple versions of the same test. It is available in Windows, DOS, and Macintosh formats.



Study Guide: This carefully written guide helps students better understand the material presented in the text. Each chapter consists of chapter summaries, definitions of key terms and concepts, critical thinking exercises geared to the questions in the text, and self-test questions page referenced to the text.

Boaz Companion Website, at <http://www.prenhall.com/boaz>: This site allows students using the text to fully access the power of the World Wide Web. Students can challenge themselves through this online study guide by working with multiple choice, true/false, and essay questions keyed to each chapter. The online study guide quiz sections provide immediate feedback to the student, with specific page references in the text. The links contained within this site will introduce students to a new world of physical anthropology.

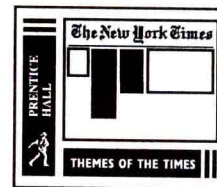
Anthropology on the Internet: 1998–1999: This brief guide introduces students to the origin and innovations behind the Internet and provides clear strategies for navigating the complexity of the Internet and World Wide Web. Exercises within and at the end of the chapters allow students to practice searching for the myriad of resources available to the student of anthropology. This supplementary book is free to students when packaged with this text. Local Prentice Hall representatives can explain shrink-wrap options.

Prentice Hall Color Transparencies: Physical Anthropology, Series I: Full-color illustrations, charts, and other visual materials have been selected to help amplify lecture topics.

Videos: A selection of high quality, award-winning videos that show students the world of anthropology are available from Films for the Humanities and Sciences as well as Filmmaker's Library. Prentice Hall sales representatives can provide more information.

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Many individuals have shaped this book. Sherwood Washburn and Jane Lancaster were instrumental in developing our ideas of a text that brought together fossils and behavior. Joe Birdsell was an important influence in our incorporation of ecology and population perspectives. Jack Cronin deserves credit for contributing the concept of a textbook that fully integrated molecular and fossil approaches. We are indebted to the authors of the text's Frontiers boxes who agreed to share their perspectives and insights: Eugenie C. Scott, Lloyd H. Burckle, Matt Cartmill, Linda D. Wolfe, David R. Begun, Alan Walker, Craig B. Stanford, Kenneth K. Kidd, Judith R. Kidd, and S. Boyd Eaton.

Essentials is a reality because one individual at Prentice Hall made it so. For this reason, we are indebted to Nancy Roberts, Editor in Chief of the Social Sciences. She has always believed in the book and encouraged us onward. Within the scope of Nancy's vision came the other creative people we worked with on a day-to-day basis. The efforts of Sabina Johnson and Barbara Reilly, editors for the first book, remain apparent in this edition. For *Essentials*, the careful and painstaking work of Elaine Silverstein, development editor, and Joan Stone, project manager, can only be described as monumental. All of these people, in addition to Joyce Rosinger, who obtained the necessary permissions, and the artists at Prentice Hall, who created new art often from nothing more than crudely drawn sketches, did a truly magnificent job. We gratefully thank all of you for your efforts.

Readers and reviewers have helped immensely in refining passages and editing muddled text. We particularly wish to thank Marc Feldesman, John Fleagle, Paris Pavlakis, and Sue Parker for their help in preparing the first book; their efforts have been retained in *Essentials*. Reviewers whose comments were invariably helpful to *Essentials* were Mark Fleischman, Syracuse University; Leonard Greenfield, Temple University; Lawrence A. Kuznar, Indiana University–Purdue University Fort Wayne; and Robert Shanafelt, Florida State University.

Our students contributed to the development of the book by their many questions and careful reading. Particular thanks for this round of student reviews go to Beth Bedrin and Nancy Cassquero. The excellent work of Leslie Khayatpoor and Margaret Kring on the study guide and instructor's resource manual, respectively, measures up to the task.

For much of the research in biological anthropology that has been conducted and reported in this volume we wish to thank the L. S. B. Leakey Foundation for their program of grants and awards and Dr. Karla Savage, grants officer for the Foundation, for her untiring efforts in this regard. Toward the support of new research in the field (and, thus, assuring that we will have something to write about in the future), a portion of the royalties from the sale of this book is being donated to the Foundation.

Finally, the forbearance, support, and encouragement of Barbara Almquist and Meleisa McDonell ensured that *Essentials* did not take the decade to complete that the first book did. For that we are all most grateful.

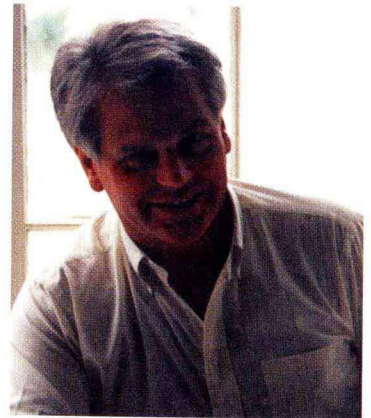


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Noel T. Boaz is Director of the International Institute for Human Evolutionary Research at Central Oregon University Center in Bend, Oregon. A paleoanthropologist with many years of field experience in Africa, he was trained at the University of Virginia and the University of California, Berkeley, where he received his Ph.D. in Anthropology in 1977. Dr. Boaz's current research interests are in the earliest origins of the hominid lineage, ecological change and human evolution, and biomedical anthropology. Recent publications include *Quarry: Closing in on the Missing Link* (1993) and *Eco Homo*, an ecological history of the human species (1997).



Alan J. Almquist is Professor of Anthropology at California State University, Hayward. Dr. Almquist received his Ph.D. in Anthropology in 1972 at the University of California, Berkeley. A dedicated teacher, he has also headed the Clarence Smith Museum of Anthropology at Hayward and has undertaken fieldwork at early hominid sites in the Middle Awash, Ethiopia. Current research interests include the evolution of human sexual behavior and paleoanthropology. Recent publications include *Milestones in Human Evolution* (1993) edited with Ann Manyak, and a reader, *Human Sexuality* (1995) with Andrei Simic and Patricia Omidian.





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Summary

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Biological Anthropology is about humankind's place in nature, how we came to be, how and why our bodies and brains are built the way they are, and why we behave as we do. Portions of these subjects are studied by scientists in many diverse disciplines, but the general, or holistic, study of them is the domain of **biological anthropology**. This broad-based understanding of the human organism is the strength of biological anthropology, and in today's increasingly specialized world of science, it is an important perspective.

The basic scientific framework of modern bi-

ological anthropology is *evolution by natural selection*, Charles Darwin's theory to explain the origin and diversity of species on earth. This theory provides scientists with a way to make predictions about human evolution, biology, and behavior and to test their predictions against observations made in nature. These observations may involve laboratory experiments, field studies of our living primate relatives in remote rain forests, or excavations of fossils millions of years old. To give our readers an overall appreciation of human adaptation, anatomy, behavior, and evolution, this book integrates the advances that biological anthropologists have made in understanding human evolution and biology. We draw upon many different lines of evidence to demonstrate both the uniqueness of the human condition and those continuities that make humans part of nature.

biological anthropology—the study of human evolution, biology, variation, and adaptation (also known as physical anthropology).



Human beings evolved out of and are still today intimately connected with the natural world. Our ancestors lived as gatherers and hunters for the last several million years. We have been “civilized”—living in permanent structures packed into villages, towns, and cities, growing food plants, tending domesticated animals, and using metal tools—only for the last few thousand years. This period is less than one-half of one percent of our evolutionary history, which began approximately 2.5 million years ago when we became stone tool-using early humans. Our biology is still that of hunter-gatherers, quick-witted opportunists who can eat almost anything and who can survive under conditions of great hardship as well as prosperity.



ANTHROPOLOGY STUDIES HUMANKIND

Anthropology is the science that studies humans, their biology, adaptations, behavior, and variation within the context of a specialized adaptation of learned social behavior called **culture**. Anthropologists study such broad-ranging phenomena as physical and cultural differences among human groups, the structure of the many human languages, the adaptability of human groups to different environmental conditions, the patterns of growth, and the changing patterns of culture over time. This broad scientific agenda makes anthropology a discipline with many specialists and many subdisciplines. For this reason, anthropological research is frequently described as “multidisciplinary.” One characteristic of all anthropologists is a commitment to understanding humanity in its entirety, as a functioning whole. For this reason anthropology is also termed “holistic.”

Anthropology in the United States is made up of four fields: biological or physical anthropology, cultural anthropology or ethnology, archaeology, and linguistics. Biological anthropologists study the physical makeup, evolution, and variations of human populations, the relationships of humanity with the natural world, and the biological bases of human behavior. **Cultural anthropologists** study living societies of people, their customs, their myths, their kinship systems, their rituals, and all aspects of their social behavior within the uniquely human adaptation of culture. **Archaeologists** look at how human culture has adapted and evolved over time through the study of artifacts and sites. **Linguists** study language: its many varieties, the forces governing how languages change, the relationships between language and the brain, and the interactions between language and cultural concepts. The four disciplines are joined, sometimes loosely, by their shared focus on human adaptation within culture, that set of learned behaviors which, shared by each member of a society, mediates all social interactions.

Biological anthropology, the subject of this book, is closely related to the branch of biology known as **human biology**. Biological anthropologists strive to accurately describe human physical structure both in the present and in the past. They seek to understand how human structure functions in real life and how human individuals with that structure be-

anthropology—the study of humankind.

culture—learned aspects of behavior passed on from one generation to the next in human societies.

cultural anthropology—the anthropological study of human societies, their belief systems, their cultural adaptations, and their social behavior.

archaeology—the anthropological study of past cultures, their social adaptations, and their lifeways by use of preserved artifacts and features.

linguistics—the anthropological study of languages, their diversity and connections, and the interaction of language and culture in society.

human biology—the branch of biology that studies human physiology and adaptation; closely related to biological anthropological study of the same topics.