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# HUMAN EVOLUTIONARY BIOLOGY

Wide-ranging and inclusive, this text provides an invaluable review of an expansive selection of topics in human evolution, variation, and adaptability for professionals and students in biological anthropology, evolutionary biology, medical sciences, and psychology. The chapters are organized around four broad themes, with sections devoted to phenotypic and genetic variation within and between human populations, reproductive physiology and behavior, growth and development, and human health from evolutionary and ecological perspectives. An introductory section provides readers with the historical, theoretical, and methodological foundations needed to understand the more complex ideas presented later. Two hundred discussion questions provide starting points for class debate and assignments to test student understanding.

**Michael P. Muehlenbein** is an Assistant Professor of anthropology at Indiana University, Bloomington. He holds an MsPH in both tropical medicine and biostatistics from Tulane University, as well as an MPhil and PhD in biological anthropology from Yale University. His research interests are focused most recently on (1) evaluating hormone-mediated immune functions in reference to evolutionary and life history theories, and (2) investigating potential zoonotic and anthropozoonotic pathogen transmission associated with primate-based ecotourism. He has received teaching awards for his graduate and undergraduate courses on human biological variation, behavioral endocrinology, evolutionary medicine, and global health. In addition to running an endocrinology and infectious disease laboratory in Indiana, he presently conducts fieldwork in the United States, Malaysia, Dominica, and the Dominican Republic.

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# HUMAN EVOLUTIONARY BIOLOGY

*Edited by*

**MICHAEL P. MUEHLENBEIN**

Indiana University, Bloomington

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# Contributors

**Barry Bogin**
Department of Human Sciences
Loughborough University
Loughborough, UK

**Richard G. Bribiescas**
Department of Anthropology
Yale University,
New Haven, CT, USA

**Tom D. Brutsaert**
Department of Exercise Science
Syracuse University
Syracuse, NY, USA

**Noël Cameron**
Department of Human Sciences
Centre for Human Development and Ageing
Loughborough University
Loughborough, UK

**Benjamin C. Campbell**
Department of Anthropology
University of Wisconsin
Milwaukee, WI, USA

**Douglas E. Crews**
Department of Anthropology
Ohio State University
Columbus, OH, USA

**Peter S. W. Davies**
Children's Nutrition Research Centre
Discipline of Paediatrics and Child Health
The University of Queensland
Royal Children's Hospital
Herston, Australia

**S. Boyd Eaton**
Department of Anthropology
Emory University
Atlanta, GA, USA

**Guillaume Evanno**
Department of Ecology and Evolution
University of Lausanne
Lausanne, Switzerland

**Paul W. Ewald**
Department of Biology
University of Louisville
Louisville, KY, USA

**Mark V. Flinn**
Department of Anthropology
University of Missouri
Columbia, MO, USA

**A. Roberto Frisancho**
Department of Anthropology
University of Michigan
Ann Arbor, MI, USA

**Douglas J. Futuyma**
Department of Ecology and Evolution
State University of New York, Stony Brook
Stony Brook, NY, USA

**Peter B. Gray**
Department of Anthropology and Ethnic Studies
University of Nevada, Las Vegas
Las Vegas, NV, USA

**Nina G. Jablonski**
Department of Anthropology
Pennsylvania State University
University Park, PA, USA

**Grazyna Jasienska**
Department of Epidemiology and Population Studies
Institute of Public Health
Jagiellonian University, Collegium Medicum
Krakow, Poland

**James Holland Jones**
Department of Anthropological Sciences
Stanford University
Stanford, CA, USA

**Laura L. Jones**
Division of Epidemiology and Public Health
Nottingham City Hospital
Nottingham, UK



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**Hillard S. Kaplan**
Department of Anthropology
University of New Mexico
Albuquerque, NM, USA

**Peter T. Katzmarzyk**
Pennington Biomedical Research Center
Baton Rouge, LA, USA

**Christopher W. Kuzawa**
Department of Anthropology
Northwestern University
Evanston, IL, USA

**Jane B. Lancaster**
Department of Anthropology
University of New Mexico
Albuquerque, NM, USA

**William R. Leonard**
Department of Anthropology
Northwestern University
Evanston, IL, USA

**Michael A. Little**
Department of Anthropology
State University of New York, Binghamton
Binghamton, NY, USA

**Jonathan Marks**
Department of Anthropology
University of North Carolina, Charlotte
Charlotte, NC, USA

**Thomas W. McDade**
Department of Anthropology
Northwestern University
Evanston, IL, USA

**Robert J. Meier**
Department of Anthropology
Indiana University
Bloomington, IN, USA

**Lauren A. Milligan**
Department of Anthropology
University of California, Santa Cruz
Santa Cruz, CA, USA

**Michael P. Muehlenbein**
Department of Anthropology
Indiana University
Bloomington, IN, USA

**Alexia J. Murphy**
Children's Nutrition Research Centre
Discipline of Paediatrics and Child Health
The University of Queensland
Royal Children's Hospital
Herston, Australia

**Colleen H. Nyberg**
Department of Anthropology
University of Massachusetts Boston
Boston, MA, USA

**Ivy L. Pike**
Department of Anthropology
University of Arizona
Tucson, AZ, USA

**Jennifer A. Raff**
Department of Anthropology
University of Utah
Salt Lake City, UT, USA

**Lawrence M. Schell**
Department of Anthropology
State University of New York, Albany
Albany, NY, USA

**David P. Schmitt**
Department of Psychology
Bradley University
Peoria, IL, USA

**Michael E. Steiper**
Department of Anthropology
Hunter College
New York, NY, USA

**James A. Stewart**
Department of Social and Behavioral Sciences
Columbus State Community College
Columbus, OH, USA

**Trudy R. Turner**
Department of Anthropology
University of Wisconsin-Milwaukee
Milwaukee, WI, USA

**Stanley J. Ulijaszek**
Institute of Social and Cultural Anthropology
University of Oxford
Oxford, UK

**Claus Wedekind**
Department of Ecology and Evolution
University of Lausanne
Lausanne, Switzerland

**Brant Wenegrat**
Department of Psychiatry and Behavioral
Sciences
Stanford University
Palo Alto, CA, USA

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# Preface

In review of a different text, Moses Hadas (1900–1966) remarked that "this book fills a much-needed gap." Unlike the text he was referring to, the topic of human evolutionary biology deserves no such gap in our understanding. To identify one's place in nature and to appreciate how human evolution has been guided by the same evolutionary principles that guide other organisms is humbling and necessary. We are products of evolution, and this is reflected throughout our biology and behaviors.

The purpose of our text is to provide thorough and modern reviews of a wide range of pertinent aspects of human evolutionary biology and contemporary human biological variation. The history of research on human biological variation is a long one, and includes studies on general human adaptability, variations in growth patterns, body sizes and shapes, genetic diversity, and race concepts. More recently, the study of human biology has included analyses of reproductive physiology and behavior within evolutionary and ecological frameworks. Other advancements include the science of evolutionary medicine, in which evolutionary research on health and disease is used to elucidate medical research and practices.

The text before you is different from most others. Unlike traditional texts on evolutionary biology, our book focuses specifically on humans and the application of evolutionary theories on understanding modern human variation and adaptability. Unlike traditional texts on human biology, our book does not include detailed descriptions of all human physiological and anatomical systems. You will also not find detailed accounts of the history of human evolution, where we came from and how we are related to other species. What you will find are historical perspectives on the study of human evolutionary biology, detailed reviews of modern methods for studying human evolutionary biology, descriptions of fundamental research on genotypic and phenotypic variation within and between contemporary human populations, comprehensive discussions on human reproductive physiology and behavior as well as evolutionary medicine.

It is not possible to produce one single inclusive text on such a diverse topic. Supplemental materials to our book would include, among others, detailed reviews of basic evolutionary biology, molecular biology, biological anthropology, behavioral ecology, and statistics. We have, however, tried to produce a text readable to a wide audience and organized in an intuitive fashion. Part I of the book begins where it should, with basic and detailed reviews of theory, history, and methods in human evolutionary biology. This includes introductions to evolutionary theory, human adaptability, genetics, demography, evolutionary endocrinology, anthropometry, and nutrition/energetics, as well as the history of the study of human biology. We even introduce readers to some of the ethical considerations for human biology research. Clearly the purpose of Part I is to provide readers with a basic foundation in theory and methodology that can be used as a basis for understanding some of the more complex problems presented by authors throughout the remainder of the volume.

Part II of the book focuses on phenotypic and genotypic variation. This has been the bread and butter of research on contemporary human biological variation. Body size and shape, skin color, and adaptations to high altitude are all revisited. Chapters 13 and 14 provide detailed accounts of classic (e.g., serological, etc.) and DNA markers of human variation, and Chapter 15 importantly addresses the "race concept," a long-held discussion in physical and cultural anthropology. A chapter on human behavioral endocrinology logically bridges our section on phenotypic/genotypic variation with the following Part III: reproduction. This section begins with more discussion on human behaviors, specifically mate choice. Female reproductive ecology/physiology is addressed in Chapters 19 and 20, and male reproductive ecology/physiology in Chapter 21. Unfortunately, we were unable to provide at this time a chapter on female reproductive senescence (i.e., menopause).

As Part IV focuses on growth and development, it contains discussions on the evolution of, and variation in, rates and patterns of somatic growth. This includes classic and modern ideas on the sensitivity of human development to environmental factors like nutrition, disease, and even social challenges. Chapter 26 shows us how human life histories, cognition, and body/brain development are intimately intertwined. Its discussion



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on human longevity also serves as a logical transition to our final section of the book. Part V focuses on various aspects of human health from evolutionary and ecological perspectives. This includes basic discussions of immunity and infectious diseases, the evolution of chronic diseases (including the metabolic syndrome and mental disorders), the infectious causes of some chronic diseases, and human senescence. We conclude the section and book with discussions on some of the cultural determinants of health that have and will continue to be influential on human evolution.

We have intended this text to be used as a general reference for professional scholars as well as graduate/postgraduate students and advanced undergraduates in evolutionary biology, biological anthropology, and other academic programs. The ultimate goal is to forward research on human evolutionary biology by identifying gaps in our understandings of this inclusive discipline. Admittedly, it may be difficult to cover all chapters of this book in a single semester in a classroom setting. In this case, instructors may choose to focus only on certain sections. Alternatively, instructors may choose to have different students present the contents of different chapters to their classmates. It is never too early to learn how to give an effective presentation. Readers are also encouraged to utilize the questions listed at the end of each chapter to facilitate discussion. Identifying and stimulating future directions of research should be the primary goal.

Lastly, credit must be given where credit is due. Acknowledgments belong to Dr. Dominic Lewis and others at Cambridge University Press for being brave enough to tackle this project. The friends, families, and colleagues who assisted each contributing author are too numerous to list, but all deserve recognition. We do not do this by ourselves or for ourselves.

Michael P. Muehlenbein
Indiana University

". . . And we must acknowledge, as it seems to me, that man with all his noble qualities, with sympathy which feels for the most debased, with benevolence which extends not only to other men but to the humblest living creature, with his god-like intellect which has penetrated into the movements and constitution of the solar system – with all these exalted powers – Man still bears in his bodily frame the indelible stamp of his lowly origin."

Charles Darwin (1809–1882), *The Descent of Man and Selection in Relation to Sex* (1871)

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