
PREFACE

WHAT ARE WE DOING HERE?

This book is about the intersection of mathematics, biology, and anthropology. As such, it has two basic goals. First, the book provides an *introduction* to the study of population genetics, which provides the mathematical basis of evolutionary theory by describing changes in the frequency of genetic variants from one generation to the next. Second, this introduction has been designed for specific application to *human* populations. Although population genetics is a field that applies to all organisms, the focus throughout this book, particularly in case studies, is on human populations. As an anthropologist, my interest is by definition primarily on *human* populations and genetic diversity. Not that this book has no utility outside of human populations—far from it. I have designed this book to provide a simple introduction to population genetics with minimal mathematics that can be used by advanced undergraduate and graduate students in a variety of fields, including anthropology, biology, and ecology. If you are using this book in one of those other disciplines, rest assured that the same basic principles presented here are applicable to organisms, and your instructor will likely provide other, nonhuman, case studies for clarification. You need not have a detailed background in genetics, although this book is intended for students that have had some initial grounding in genetics, such as one would obtain from an introductory course in biological anthropology or biology.

FORMAT AND ORGANIZATION OF THE BOOK

A quick look through the pages of this book will reveal a number of formulas. This may seem intimidating, but it is not. Although some elementary mathematics is needed to understand population genetics, we do not have to use very advanced math to learn the basics. Throughout this book, we will use only simple algebra of the type that you likely learned in middle or senior high school and some basic concepts of probability, which are developed in the text as we proceed. I also use additional ways, beyond equations, to present the material. Although it is a wonderful experience to glance at a mathematical formula and gain immediate insight into what that formula says about reality, it is (at least for me) a rare

experience. I usually have to look at a graphic representation of the formula or utilize an analogy to understand the underlying ideas. Thus, this text uses a lot of graphs and analogies to make the basic points and help you relate the evolutionary process to mathematical ideas.

As with any field, population genetics has its own set of terms. Anything specific to genetics or population genetics is defined in the text, with an additional glossary at the end of the book collecting all such terms. All glossary terms are marked in **boldface** in the text the first time they appear. In-text citation is used in this text, where specific citations are references by author(s) name(s) and year, such as "Relethford (2004)."

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I was first introduced to the study of population genetics in 1975 when I met my graduate school advisor, Frances Lees. I owe Frank a lot for his guidance and friendship over the years in addition to his patience at teaching me population genetics. He got me started both in my profession and in this particular field. I am also very grateful to his academic advisor, Michael Crawford, for helping me learn even more about population genetics over the course of several decades of friendship and collaboration on research projects.

I have worked with other colleagues on research in human population genetics. Two of these colleagues stand out in particular—John Blangero and Henry Harpending. My work with them has been a high point of my career.

Looking back, I can identify many friends and colleagues over the years with whom I have shared discussions at some level or another on population genetics. Some of these have been coauthors, and others have been colleagues with similar interests who have shared one or many conversations or emails. They all have contributed to my understanding of human population genetics. Needless to say, my errors are mine and mine alone. This is the list (and my most sincere apologies if I have missed anyone): Guido Barbujani, Deborah Bolnick, the late Ellen Brennan, Ranajit Chakraborty, Ric Devor, Ravi Duggarali, Elise Eller, Alan Fix, Jon Friedlaender, Rosalind Harding, Mike Hammer, John Hawks, Jeff Heilveil, Keith Hunley, Cashell Jaquish, Lynn Jorde, Lyle Konigsberg, Tibor Koertvelyessy, Ken Korey, the late Gabe Lasker, Paul Leslie, Jeff Long, Lorena Madrigal, Andrea Manica, Yoshiro Matsuo, Jim Mielke, Andy Merriwether, John Mitchell, Kari North, Carolyn Olsen, Esteban Parra, Alan Rogers, Charles Roseman, Dennis O'Rourke, Lisa Sattenspiel, Michael Schillaci, Tad Schurr, Steve Sherry, Peter Smouse, Bob Sokal, Dawnie Steadman, Anne Stone, Mark Stoneking, Alan Swedlund, Alan Templeton, Forrest Tieron, John VandeBerg, Noreen von

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Last, but certainly not least, I dedicate this book to the five people who mean the most to me in the world—my wife, Hollie Jaffe; my sons, David, Ben, and Zane; and my mother-in-law, Terry Adler. Thanks to all for putting up with me and loving me.

JOHN H. RELETHFORD
State University of New York