

Genetics Of Populations

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TOMMY WILLIAMSON

Introduction to Population Genetics Oxford University Press
 At least since the 1940s neo-Darwinism has prevailed as the consensus view in the study of evolution. The mechanism of evolution in this view is natural selection leading to adaptation, working on a substrate of adaptationally random mutations. As both the study of genetic variation in natural populations, and the study of the mathematical equations of selection are reckoned to a field called population genetics, population genetics came to form the core in the theory of evolution. So much so, that the fact that there is more to the theory of evolution than population genetics became somewhat obscured. The genetics of the evolutionary process, or the genetics of evolutionary change, came close to being all of evolutionary biology. In the last 10 years, this dominating position of population genetics within evolutionary biology has been challenged. In evolutionary ecology, optimization theory proved more useful than population genetics for interesting predictions, especially of life history strategies. From developmental biology, constraints in development and the role of internal regulation were emphasized. From paleobiology, a proposal was put forward to describe the fossil record and the evolutionary process as a series of punctuated equilibria; thus exhorting population geneticists to give a plausible account of how such might come about. All these developments tend to obscure the central role of population genetics in evolutionary biology.

Evolution and the Genetics of Populations, Volume 2 Wiley-Interscience

Introductory guide to human population genetics and microevolutionary theory Providing an introduction to mathematical population genetics, *Human Population Genetics* gives basic background on the mechanisms of human microevolution. This text combines mathematics, biology, and anthropology and is best suited for advanced undergraduate and graduate study. Thorough and accessible, *Human Population Genetics* presents concepts and methods of population genetics specific to human population study, utilizing uncomplicated mathematics like high school algebra and basic concepts of probability to explain theories central to the field. By describing changes in the frequency of genetic variants from one generation to the next, this book hones in on the mathematical basis of evolutionary theory. *Human Population Genetics* includes: Helpful formulae for learning ease Graphs and analogies that make basic points and relate the evolutionary process to mathematical ideas Glossary terms marked in boldface within the book the first time they appear In-text citations that act as reference points for

further research Exemplary case studies Topics such as Hardy-Weinberg equilibrium, inbreeding, mutation, genetic drift, natural selection, and gene flow *Human Population Genetics* solidifies knowledge learned in introductory biological anthropology or biology courses and makes it applicable to genetic study. NOTE: errata for the first edition can be found at the author's website: <http://employees.oneonta.edu/relethjh/HPG/errata.pdf>
Theoretical Aspects of Population Genetics. (MPB-4), Volume 4 Jones & Bartlett Publishers
 Loss of biodiversity is among the greatest problems facing the world today. *Conservation and the Genetics of Populations* gives a comprehensive overview of the essential background, concepts, and tools needed to understand how genetic information can be used to conserve species threatened with extinction, and to manage species of ecological or commercial importance. New molecular techniques, statistical methods, and computer programs, genetic principles, and methods are becoming increasingly useful in the conservation of biological diversity. Using a balance of data and theory, coupled with basic and applied research examples, this book examines genetic and phenotypic variation in natural populations, the principles and mechanisms of evolutionary change, the interpretation of genetic data from natural populations, and how these can be applied to conservation. The book includes examples from plants, animals, and microbes in wild and captive populations. This second edition contains new chapters on Climate Change and Exploited Populations as well as new sections on genomics, genetic monitoring, emerging diseases, metagenomics, and more. One-third of the references in this edition were published after the first edition. Each of the 22 chapters and the statistical appendix have a Guest Box written by an expert in that particular topic (including James Crow, Louis Bernatchez, Loren Rieseberg, Rick Shine, and Lisette Waits). This book is essential for advanced undergraduate and graduate students of conservation genetics, natural resource management, and conservation biology, as well as professional conservation biologists working for wildlife and habitat management agencies. Additional resources for this book can be found at: <http://www.wiley.com/go/allendorf/populations> www.wiley.com/go/allendorf/populations/a.
Molecular Genetic Analysis of Populations Cambridge University Press
 These volumes discuss evolutionary biology through the lens of population genetics.
Introduction to Theoretical Population Genetics Academic Press
 To show the importance of stochastic processes in the change of

gene frequencies, the authors discuss topics ranging from molecular evolution to two-locus problems in terms of diffusion models. Throughout their discussion, they come to grips with one of the most challenging problems in population genetics--the ways in which genetic variability is maintained in Mendelian populations. R.A. Fisher, J.B.S. Haldane, and Sewall Wright, in pioneering works, confirmed the usefulness of mathematical theory in population genetics. The synthesis their work achieved is recognized today as mathematical genetics, that branch of genetics whose aim is to investigate the laws governing the genetic structure of natural populations and, consequently, to clarify the mechanisms of evolution. For the benefit of population geneticists without advanced mathematical training, Professors Kimura and Ohta use verbal description rather than mathematical symbolism wherever practicable. A mathematical appendix is included.

Human Population Genetics and Genomics Jones & Bartlett Learning

I have for a number of years taught a course in population genetics for students interested in plant and animal breeding. The objective of the course has been to lay a foundation in population genetics for the concepts of quantitative genetics which are introduced in the last third of the course. I have not been able to find an appropriate text for this purpose. For a quarter of a century, Falconer's *Introduction to Quantitative Genetics* has been the standard, and excellent, text in that subject. For my purposes, however, this text is not sufficiently detailed in the population genetics basis for quantitative theory. A number of good texts in population genetics are available, of which Li's *First Course in Population Genetics* is didactically the best. But these texts are directed toward the genetics of natural populations, rather than domestic populations, breeding under human control. They also tend to treat quantitative genetics gingerly, if at all. I have therefore developed the present text from my teaching notes. The chapters of this book are labeled "Lectures". Each is intended to correspond approximately to the amount of material which can be covered in a 50-minute lecture. Divisions are, of course, dictated by the natural divisions of the subject matter, and the lectures are therefore not of uniform length. Nevertheless, in so far as possible, an attempt has been made to make the average length a lecture's worth.

The Genetic Structure of Populations Cambridge University Press

The Fourth Edition of *Genetics of Populations* is the most current, comprehensive, and accessible introduction to the field for advanced undergraduate and graduate students, and researchers in genetics, evolution, conservation, and related fields. In the past several years, interest in the application of population genetics

principles to new molecular data has increased greatly, and Dr. Hedrick's new edition exemplifies his commitment to keeping pace with this dynamic area of study. Reorganized to allow students to focus more sharply on key material, the Fourth Edition integrates coverage of theoretical issues with a clear presentation of experimental population genetics and empirical data. Drawing examples from both recent and classic studies, and using a variety of organisms to illustrate the vast developments of population genetics, this text provides students and researchers with the most comprehensive resource in the field.

Population Genetics and Evolution University of Chicago Press
This impressive author team brings the wealth of advances in conservation genetics into the new edition of this introductory text, including new chapters on population genomics and genetic issues in introduced and invasive species. They continue the strong learning features for students - main points in the margin, chapter summaries, vital support with the mathematics, and further reading - and now guide the reader to software and databases. Many new references reflect the expansion of this field. With examples from mammals, birds ...

Conservation and the Genomics of Populations Oxford University Press

This book aims to make population genetics approachable, logical and easily understood. To achieve these goals, the book's design emphasizes well explained introductions to key principles and predictions. These are augmented with case studies as well as illustrations along with introductions to classical hypotheses and debates. Pedagogical features in the text include: Interact boxes that guide readers step-by-step through computer simulations using public domain software. Math boxes that fully explain mathematical derivations. Methods boxes that give insight into the use of actual genetic data. Numerous Problem boxes are integrated into the text to reinforce concepts as they are encountered. Dedicated website at www.wiley.com/go/hamiltongenetics This text also offers a highly accessible introduction to coalescent theory, the major conceptual advance in population genetics of the last two decades.

Population Genetics Oxford University Press

A Primer of Population Genetics and Genomics has been completely revised and updated to provide a concise but comprehensive introduction to the basic concepts of population genetics and genomics. Recent textbooks have tended to focus on such specialized topics as the coalescent, molecular evolution, human population genetics, or genomics. This primer bucks that trend by encouraging a broader familiarity with, and understanding of, population genetics and genomics as a whole. The overview ranges from mating systems through the causes of evolution, molecular population genetics, and the genomics of complex traits. Interwoven are discussions of ancient DNA, gene drive, landscape genetics, identifying risk factors for complex diseases, the genomics of adaptation and speciation, and other active areas of current research. The principles are illuminated by numerous examples from a wide variety of animals, plants, microbes, and human populations. The approach also emphasizes learning by doing, which in this case means solving numerical or conceptual problems. The rationale behind this is that the use of concepts in problem-solving lead to deeper understanding and longer knowledge retention. This accessible, introductory textbook is aimed principally at students of various levels and abilities (from senior undergraduate to postgraduate) as well as practising scientists in the fields of population genetics, ecology, evolutionary biology, computational biology, bioinformatics, biostatistics, physics, and mathematics.

Conservation Genetics in the Age of Genomics Oxford University Press

The Hardy-Weinberg law; Selection and mutation; The fundamental theorem of natural selection; Stochastic treatment; discrete processes; Diffusion approximations; Applications; Results derived from branching processes; Two-locus behaviour; Linkage; Dominance.

Genetics and Conservation of Rare Plants Springer Science & Business Media

What are the genomic signatures of adaptations in DNA? How often does natural selection dictate changes to DNA? How does the ebb and flow in the abundance of individuals over time get marked onto chromosomes to record genetic history? Molecular population genetics seeks to answer such questions by explaining genetic variation and molecular evolution from micro-evolutionary principles. It provides a way to learn about how evolution works and how it shapes species by incorporating molecular details of DNA as the heritable material. It enables us to understand the

logic of how mutations originate, change in abundance in populations, and become fixed as DNA sequence divergence between species. With the revolutionary advances in genomic data acquisition, understanding molecular population genetics is now a fundamental requirement for today's life scientists. These concepts apply in analysis of personal genomics, genome-wide association studies, landscape and conservation genetics, forensics, molecular anthropology, and selection scans. This book introduces, in an accessible way, the bare essentials of the theory and practice of molecular population genetics.

Conservation and the Genetics of Populations JHU Press

Conservation and the Genetics of Populations gives a comprehensive overview of the essential background, concepts, and tools needed to understand how genetic information can be used to develop conservation plans for species threatened with extinction. Provides a thorough understanding of the genetic basis of biological problems in conservation. Uses a balance of data and theory, and basic and applied research, with examples taken from both the animal and plant kingdoms. An associated website contains example data sets and software programs to illustrate population genetic processes and methods of data analysis. Discussion questions and problems are included at the end of each chapter to aid understanding. Features Guest Boxes written by leading people in the field including James F. Crow, Nancy FitzSimmons, Robert C. Lacy, Michael W. Nachman, Michael E. Soule, Andrea Taylor, Loren H. Rieseberg, R.C. Vrijenhoek, Lisette Waits, Robin S. Waples and Andrew Young. Supplementary information designed to support *Conservation and the Genetics of Populations* including: Downloadable sample chapter Answers to questions and problems Data sets illustrating problems from the book Data analysis software programs Website links An Instructor manual CD-ROM for this title is available. Please contact our Higher Education team at HigherEducation@wiley.com for more information.

The Genetics of Human Populations Courier Corporation

In this revised and updated edition of the comprehensive population genetics book, treatment extends basic genetic principles to the dynamics of genes and genotypes in groups of interbred individuals. Presents three points of view: evolutionary, quantitative, and medical/anthropological. Considers random mating, non-random mating, and evolutionary forces that can change gene and genotype frequencies over time. The impact of DNA sequencing is addressed and illustrative examples from the experimental literature are included.

Evolution and the Genetics of Populations, Volume 4 John Wiley & Sons

"Wright's views about population genetics and evolution are so fundamental and so comprehensive that every serious student must examine these books firsthand. . . . Publication of this treatise is a major event in evolutionary biology." -Daniel L. Hartl, BioScience

Principles of Population Genetics John Wiley & Sons

Human Population Genetics and Genomics provides researchers/students with knowledge on population genetics and relevant statistical approaches to help them become more effective users of modern genetic, genomic and statistical tools. In-depth chapters offer thorough discussions of systems of mating, genetic drift, gene flow and subdivided populations, human population history, genotype and phenotype, detecting selection, units and targets of natural selection, adaptation to temporally and spatially variable environments, selection in age-structured populations, and genomics and society. As human genetics and genomics research often employs tools and approaches derived from population genetics, this book helps users understand the basic principles of these tools. In addition, studies often employ statistical approaches and analysis, so an understanding of basic statistical theory is also needed. Comprehensively explains the use of population genetics and genomics in medical applications and research. Discusses the relevance of population genetics and genomics to major social issues, including race and the dangers of modern eugenics proposals. Provides an overview of how population genetics and genomics helps us understand where we came from as a species and how we evolved into who we are now.

A Primer of Molecular Population Genetics John Wiley & Sons
Avian Genetics: A Population and Ecological Approach is a collection of papers that deals with the study of birds in relation to the synthetic theory of evolution. This book studies the ecology, demography, behavior, and geographical distribution of birds; the text also discusses quantitative, chromosomal,

biochemical, and population genetics. Part I reviews the various genetic interactions, including an analysis of DNA sequence variation. The different and newer techniques are compared such as the works of Sibley, Quinn, and White. Part II describes the molding genetic variation and covers topics such as inbreeding; gene flow and the genetic structure of populations; non-random mating; and the process of selection in natural populations of birds. Part III covers actual genetic case histories, including quantitative ecological genetics of great tits; genetic evolution of house sparrows; and presentation of evidence for sexual selection by female choice in the Arctic Skua. This book also presents future research in subjects such as the neutrality-selection controversy or genetics and conservation. This text can be beneficial for ecologists, ornithologists, animal conservationists, and population biologists studying birds.

Evolution and the Genetics of Populations, Volume 2 John Wiley & Sons

Comprehensive, advanced treatment of nature and source of inherited characteristics, with treatment of mathematical techniques. Mendelian populations, mutations, polymorphisms, genetic demography, much more. Emphasizes interpretation of data in relation to theoretical models.

Avian Genetics Columbia University Press

This book covers those areas of theoretical population genetics that can be investigated rigorously by elementary mathematical methods. I have tried to formulate the various models fairly generally and to state the biological assumptions quite explicitly. I hope the choice and treatment of topics will enable the reader to understand and evaluate detailed analyses of many specific models and applications in the literature. Models in population genetics are highly idealized, often even over idealized, and their connection with observation is frequently remote. Further more, it is not practicable to measure the parameters and variables in these models with high accuracy. These regrettable circumstances amply justify the use of appropriate, lucid, and rigorous approximations in the analysis of our models, and such approximations are often illuminating even when exact solutions are available. However, our empirical and theoretical limitations justify neither opaque, incomplete formulations nor unconvincing, inadequate analyses, for these may produce uninterpretable, misleading, or erroneous results. Intuition is a principal source of ideas for the construction and investigation of models, but it can replace neither clear formulation nor careful analysis. Fisher (1930; 1958, pp. x, 23-24, 38) not only espoused similar ideas, but he recognized also that our concepts of intuition and rigor must evolve in time. The book is neither a review of the literature nor a compendium of results. The material is almost entirely self-contained. The first eight chapters are a thoroughly revised and greatly extended version of my published lecture notes (Nagylaki, 1977a).

Genetics of Populations University of Chicago Press

The relentless loss of biodiversity is among the greatest problems facing the world today. The third edition of this established textbook provides an updated and comprehensive overview of the essential background, concepts, and tools required to understand how genetics can be used to conserve species, reduce threat of extinction, and manage species of ecological or commercial importance. This edition is thoroughly revised to reflect the major contribution of genomics to conservation of populations and species. It includes two new chapters: "Genetic Monitoring" and a final "Conservation Genetics in Practice" chapter that addresses the role of science and policy in conservation genetics. New genomic techniques and statistical analyses are crucial tools for the conservation geneticist. This accessible and authoritative textbook provides an essential toolkit grounded in population genetics theory, coupled with basic and applied research examples from plants, animals, and microbes. The book examines genetic and phenotypic variation in natural populations, the principles and mechanisms of evolutionary change, evolutionary response to anthropogenic change, and applications in conservation and management. *Conservation and the Genomics of Populations* helps demystify genetics and genomics for conservation practitioners and early career scientists, so that population genetic theory and new genomic data can help raise the bar in conserving biodiversity in the most critical 20 year period in the history of life on Earth. It is aimed at a global market of applied population geneticists, conservation practitioners, and natural resource managers working for wildlife and habitat management agencies. It will be of particular relevance and use to upper undergraduate and graduate students taking courses in conservation biology, conservation genetics, and wildlife management.

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