Principles Of Population Genetics

Principles of Population GeneticsA Primer of Population GeneticsGenetics of PopulationsIntroduction to Population GeneticsGenetics of PopulationsAn Introduction to Population Genetics TheoryPopulation GeneticsPopulation GeneticsPopulation GeneticsThe Foundations of Population GeneticsConservation and the Genetics of PopulationsOutline of Population GeneticsIntegrated View of Population GeneticsA Primer of Population Genetics and GenomicsEvolution and the Genetics of Populations, Volume 2Mathematical Population Genetics 1Population Genetics:Theories of Population Variation in Genes and GenomesUnderstanding Population GeneticsGenetics of Populations Daniel L. Hartl Daniel L. Hartl Philip W. Hedrick Richard Halliburton Philip Hedrick J.F. Crow John H. Gillespie Matthew B. Hamilton W.J. Ewens Daniel M. Weinreich Fred W. Allendorf D.P. Mukherjee Rafael Maia Daniel L. Hartl Sewall Wright Warren J. Ewens Donald P. Doolittle Freddy B. Christiansen Torbjörn Säll Principles of Population Genetics A Primer of Population Genetics Genetics of Populations Introduction to Population Genetics Genetics of Populations An Introduction to Population Genetics Theory Population Genetics Population Genetics Population Genetics The Foundations of Population Genetics Conservation and the Genetics of Populations Outline of Population Genetics Integrated View of Population Genetics A Primer of Population Genetics and Genomics Evolution and the Genetics of Populations, Volume 2 Mathematical Population Genetics 1 Population Genetics: Theories of Population Variation in Genes and Genomes Understanding Population Genetics Genetics of Populations *Daniel L. Hartl Daniel L. Hartl Philip W. Hedrick Richard Halliburton Philip Hedrick J.F. Crow John H. Gillespie Matthew B. Hamilton W.J. Ewens Daniel M. Weinreich Fred W. Allendorf D.P. Mukherjee Rafael Maia Daniel L. Hartl Sewall Wright Warren J. Ewens Donald P. Doolittle Freddy B. Christiansen Torbjörn Säll*

this edition provides a balanced presentation of theory and observation it introduces the principles of genetics and statistics that are relevant to population studies and examines the forces affecting genetic variation from the molecular to the organismic level

the use of molecular methods to study genetic polymorphisms has made a familiarity with population genetics essential for any biologist whose work is at the population level a primer of population genetics third edition provides a concise but comprehensive introduction to population genetics the four chapters of the book address genetic variation the causes of evolution molecular population genetics and the genetic architecture of complex traits chapter end problems reinforce ideas and while there are some equations the emphasis is on explanation rather than derivation

genetics and evolution

making the theory of population genetics relevant to readers this book explains the related mathematics with a logical organization it presents the quantitative aspects of population genetics and employs examples of human genetics medical evolution human evolution and endangered species for an introduction to and understanding of population genetics

preface chapter 1 general background and the diversity of genetic variation chapter 2 measures of genetic variation chapter 3 selection chapter 4 genetic drift and effective population size chapter 5 mutation chapter 6 neutral theory and coalescence chapter 7 gene flow and population structure chapter 8 inbreeding and related topics chapter 9 molecular population genetics and evolution bibliography answers to numerical problems index

this text book originally published in 1970 presents the field of population genetics starting with elementary concepts and leading the reader well into the field it is concerned mainly with population genetics in a strict sense and deals primarily with natural populations and less fully with the rather similar problems that arise in breading live stock and cul t i vat ed plans the emphasis is on the behavior of genes and population attributes under natural selection where the most important measure is darwinian fitness this text is intended for graduatestudents and advanced undergraduates in genetics and population biology this book steers a middle course between completely verbal biological arguments and the rigor of the mathematician the first two thirds of the book do not require advanced mathematical background an ordinary knowledge of calculus will suffice the latter parts of the book which deal with population stochastically use more advanced methods

this concise introduction offers students and researchers an overview of the discipline that connects genetics and evolution addressing the theories behind population genetics and relevant empirical evidence john gillespie discusses genetic drift natural selection nonrandom mating quantitative genetics and the evolutionary advantage of sex first published to wide acclaim in 1998 this brilliant primer has been updated to include new sections on molecular evolution genetic drift genetic load the stationary distribution and two locus dynamics this book is indispensable for students working in a laboratory setting or studying free ranging populations

now updated for its second edition population genetics is the classic accessible introduction to the concepts of population genetics combining traditional conceptual approaches with classical hypotheses and debates the book equips students to understand a wide array of empirical studies that are based on the first principles of population genetics featuring a highly accessible introduction to coalescent theory as well as covering the major conceptual advances in population genetics of the last two decades the second edition now also includes end of chapter problem sets and revised coverage of recombination in the coalescent model metapopulation extinction and recolonization and the fixation index

population genetics is the mathematical investigation of the changes in the genetic structure of populations brought about by selection mutation inbreeding migration and other phenomena together with those random changes deriving from chance events these changes are the basic components of evolutionary progress and an understanding of their effect is therefore necessary for an informed discussion of the reasons for and nature of evolution it would however be wrong to pretend that a mathematical theory depending as it must on a large number of simplifying assump tions should be accepted unreservedly and that its conclusions should be accepted uncritically no one would pretend that in the event of disagreement between observation and mathematical prediction the discrepancy is due to anything other than the inadequacy of the mathematical treatment the biological world is of course far too complex for the study of population genetics to be simply a branch of applied mathematics so that while we are concerned here with the mathematical theory i have tried to indicate which of our results should continue to apply in a context wider than that in which they are formally derived the difficulties involved in the joint discussions of mathematical and genetical problems are obvious enough i have tried to aim this book rather more at the mathematician than at the geneticist and for this reason

a brief glossary of common genetical terms is included

an accessible but rigorous treatment of the theoretical foundations of population genetics population genetics the branch of evolutionary biology concerned with understanding how and why populations genetic compositions change over time rests on a well developed theoretical foundation that draws on genetics mathematics and computer science this textbook provides an approachable but rigorous treatment for advanced undergraduate and graduate students interested in building a quantitative understanding of the genetics of evolution existing texts either assume very mathematically advanced readers or avoid much of the underlying theory instead focusing on current methods of data analysis in contrast the foundations of population genetics develops the theory from first principles requiring only confidence in algebra this self contained student friendly book illustrates the conceptual framework terminology and methods of mathematical modeling it progressively introduces concepts from genetics as needed while emphasizing biological implications throughout as a result readers come away with a deep understanding of the structure of population genetics without needing to master its mathematics connects theory with the most recent genetic data better than existing texts features engaging real world examples and extensive original figures provides dozens of carefully scaffolded questions that deepen the reader s understanding of key concepts ideal as a succinct reference for established scientists in biology medicine and computer science instructor resources available

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 wiley com go allendorf populations

this is a concisely presented and precise outline of the subjects matter of population genetics addressed to all those who are concerned and have interest in this rich subject the topics covered in the book include importance of genes in the continuity of a population and the gene frequency analysis deviation from the infinitely large sample sie of the population leading to various types and forms of random genetic drift neutral genes and the problem of panmixia method of detecting inbreeding intensities and their effects gene flow and changes in genetic structure of the population the process of natural selection and the idea of in clusive fitness and affecting the social life of animals and men pointing out the irrelevance of social darwinism in science use of population genetics in the study of classical genetics pedigree analyses and changes and genetics of complex variations and the principles of quantitative genetics glossary certain statistical formations the use of x2 test t test analysis of variance or f test relative ratios and that of correlation and the concept of randomness the discussion is brief and often critical making this book outshine many contemporary textbooks found in the market it is expected that readers will develop a clear and thorough understanding of the foundation of this subject of study and associated statistical analysis after going through the book

population genetics is the basis of evolutionary studies and has been widely used in several researches this recent field of science has important applications for the management of populations natural and domesticated as well as for evolutionary studies of the various factors that affect gene frequencies over time and spatial distribution in this work presented in three sections population and quantitative genetics genetic diversity in crop management population genetics for conservation studies the reader will find cutting edge information in carefully selected and revised works this book is intended for all researchers academics and students who are

interested in the intriguing area of population genetics

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

these volumes discuss evolutionary biology through the lense of population genetics

population genetics occupies a central role in a number of important biological and social undertakings it is fundamental to our understanding of evolutionary processes of plant and animal breeding programs and of various diseases of particular importance to mankind this is the first of a planned two volume work discussing the mathematical aspects of population genetics with an emphasis on the evolutionary theory this first volume draws heavily from the author s classic 1979 edition which appeared originally in springer s biomathematics series it has been revised and expanded to include recent topics which follow naturally from the treatment in the earlier edition e g the theory of molecular population genetics this book will appeal to graduate students and researchers in mathematical biology and other mathematically trained scientists looking to enter the field of population genetics

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

this textbook provides an authoritative introduction to both classical and coalescent approaches to population genetics written for graduate students and advanced undergraduates by one of the world s leading authorities in the field the book focuses on the theoretical background of population genetics while emphasizing the close interplay between theory and empiricism traditional topics such as genetic and phenotypic variation mutation migration and linkage are covered and advanced by contemporary coalescent theory which describes the genealogy of genes in a population ultimately connecting them to a single common ancestor effects of selection particularly genomic effects are discussed with reference to molecular genetic variation the book is designed for students of population genetics bioinformatics evolutionary biology molecular evolution and theoretical biology as well as biologists molecular biologists breeders biomathematicians and biostatisticians contains up to date treatment of key areas in classical and modern theoretical population genetics provides in depth coverage of coalescent theory discusses genomic effects of selection gives examples from empirical population genetics incorporates figures diagrams and boxed features throughout includes end of chapter exercises speaks to a wide range of students in biology bioinformatics and biostatistics

an inspiring introduction to a vital scientific field the reader is taken through ten mathematical derivations that lead to important results explaining in a hands on manner the key concepts and methods of theoretical population genetics the derivations are carefully worked out and easy to follow particular attention is given to the underlying assumptions and the mathematics used the results are discussed and broadened out with relevant current implications all topics feature questions with helpful answers the book is intended for the reader who already knows some population genetics but requires a more comprehensive understanding it is particularly suited to those who analyse genetic data and wish to better grasp what their results actually mean it will also be helpful for those who wish to understand how population genetics contributes to the explanation of evolution or as the writers claim if one wants to understand life in all its improbable and amazing richness one must start by understanding population genetics

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