An Introduction To Molecular Ecology

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Generation Molecular Ecology Molecular Ecology of Aquatic Microbes New Zealand Journal of Ecology Molecular Ecology Resources Molecular Approaches to Ecology and Evolution *Trevor Beebee Joanna R. Freeland Joanna R. Freeland Gary R. Carvalho John C Avise Bernd Schierwater Klaus H. Hoffmann Allan Baker J.P. Zehr Graham Rowe Joanna R. Freeland John T. Romeo Maximiliano Nardelli John Romeo Neil Griffin Ian Joint Rob DeSalle*

how do we know whether a particular species is monogamous or promiscuous how can we monitor the illegal trafficking of wildlife how can we differentiate between the many similar species making up a microbial community an introduction to molecular ecology introduces the latest molecular concepts and techniques demonstrating how genetic markers and molecular tools can be used to answer such ecological questions such questions whose answers were previously out of our reach can now be probed thereby revolutionizing our understanding of ecological systems and phenomena blending conceptual detail with the most instructive examples an introduction to molecular ecology is an ideal resource for those new to the subject needing to develop a strong working understanding of the field the book captures the broad scope of the subject exploring the use of molecular tools in the context of topics including behavioral genetics phylogeography microbial ecology and conservation features demonstrates the power of molecular ecology as a research tool in a style ideally suited for an undergraduate audience uses practical examples to demonstrate the latest methods and concepts rather than relying exclusively on theoretical models blends factual content with tools for active learning

a fully updated guide to the increasingly prevalent use of molecular data in ecological studies molecular ecology is concerned with how molecular biology and population genetics may help us to better understand aspects of ecology and evolution including

local adaptation dispersal across landscapes phylogeography behavioral ecology and conservation biology as the technology driving genetic science has advanced so too has this fast moving and innovative discipline providing important insights into virtually all taxonomic groups this third edition of molecular ecology takes account of the breakthroughs achieved in recent years to give readers a thorough and up to date account of the field as it is today new topics covered in this book include next generation sequencing metabarcoding environmental dna edna assays and epigenetics as one of molecular ecology s leading figures author joanna freeland also provides those new to the area with a full grounding in its fundamental concepts and principles this important text is presented in an accessible user friendly manner offers a comprehensive introduction to molecular ecology has been revised to reflect the field s most recent studies and research developments includes new chapters covering topics such as landscape genetics metabarcoding and community genetics rich in insights that will benefit anyone interested in the ecology and evolution of natural populations molecular ecology is an ideal guide for all students and professionals who wish to learn more about this exciting field

molecular ecology provides a comprehensive introduction to the many diverse aspects of this subject the book unites theory with examples from a wide range of taxa in a logical and progressive manner and its accessible writing style makes subjects such as population genetics and phylogenetics highly comprehensible to its readers the first part of the book introduces the essential underpinnings of molecular ecology starting with a review of genetics and a discussion of the molecular markers that are most frequently used in ecological research this leads into an overview of population genetics in ecology the second half of the book then moves on to specific applications of molecular ecology covering phylogeography behavioural ecology and conservation genetics the final chapter looks at molecular ecology in a wider context

by using a number of case studies that are relevant to various economic and social concerns including wildlife forensics agriculture and overfishing comprehensive overview of the different aspects of molecular ecology attention to both theoretical and applied concerns accessible writing style and logical structure numerous up to date examples and references this will be an invaluable reference for those studying molecular ecology population genetics evolutionary biology conservation genetics and behavioural ecology as well as researchers working in these fields

this volume is a reprinted collection of 69 classics from the avise laboratory chosen to illustrate a trademark brand of research that harnesses molecular markers to scientific studies of natural history and evolution in the wild spanning the early 1970s through the late 2000s these articles trace how the author and his colleagues have used molecular genetics techniques to address multifarious conceptual topics in genetics ecology and evolution in a fascinating menagerie of creatures with oft peculiar lifestyles the organisms described in this volume range from blind cavefish to male pregnant pipefishes and sea spiders from clonal armadillos to natal homing marine turtles from hermaphroditic sea snails to hybridizing monkeys and tree frogs from clonal marine sponges to pseudohermaphroditic mollusks to introgressing oysters and from endangered pocket gophers terrapins and sparrows to unisexual all female fish species to living fossil horseshoe crabs and even to a strange little fish that routinely mates with itself the conceptual and molecular topics addressed in this volume are also universal ranging from punctuated equilibrium to coalescent theory to the need for greater standardization in taxonomy from cytonuclear disequilibrium statistics to the ideas of speciation duration and sympatric speciation from historical population demography to phylogenetic reconstructions of males sexual ornaments from the population genetic consequences of inbreeding to pleistocene effects on phylogeography and from the molecular underpinnings of null alleles to the notion of

clustered mutations that arise in groups to compelling empirical evidence for the unanticipated processes of gene conversion and concerted evolution in animal mitochondrial dna overall this collection includes many of the best most influential sometimes controversial occasionally provocative always intriguing or otherwise entertaining publications to have emerged from the avise laboratory over the last four decades thus this book conveys through the eyes of one of the field s longstanding pioneers what the organismal side of molecular ecology and evolution really means

insects represent the most abundant and diverse animal group on earth the number of described species is more than one million and up to ten million are estimated insects have one of the widest distributions in the world because they have adapted to extreme ranges of environments molecular ecology studies ecological processes based on the analysi

the incorporation of molecular methods in ecological research has added an exciting new dimension to conventional studies and opened windows into previously intractable areas of research at the interface between ecology and genetics using these new methods it has now become routine to use genetic markers to study ecological phenomena from molecular sexing of individuals and parentage of offspring through to population structure of species and phylogenetic relationships of taxa these methods have stimulated an explosion of empirical and analytical developments in molecular ecology which have in turn increasingly attracted students and professional biologists eager to employ them in their studies molecular methods in ecology traces the development of molecular ecology by reviewing basic molecular biological techniques and earlier methods such as protein electrophoresis dna dna hybridisation restriction analysis of dna and dna fingerprinting later chapters review methods using newer classes of markers such as microsatellites introns mhc ssrs and aflp markers

in plants and molecular sexing in animals the strengths and limitations of methods are discussed and guidance is provided in selecting the most appropriate methods for particular problems in ecology this book will provide both postgraduates and researchers with a guide to choosing and employing appropriate methodologies for successful research in the field of molecular ecology provides up to date summaries of the latest molecular approaches in this rapidly expanding field gives guidance on the appropriate choice of methods for particular problems in ecology and their strengths and limitations provides brief laboratory protocols for each molecular method and summaries of software available for analysis of data in molecular ecology outlines examples of the latest research results from studies of both plants and animals integrated within the framework of molecular ecology

this book presents a compendium of molecular biology applications for the study of aquatic community ecology the collection presents the diversity of approaches that have been used and provides future directions for the study of molecular ecology of aquatic communities from viruses to fish and in aquatic systems ranging from freshwater streams and lakes to estuaries and oceans this collection of papers will provide a useful text and resource for upper level undergraduate and graduate students in ecology as well as for the researcher and educator

molecular ecology 2nd edition provides an accessible introduction to the many diverse aspects of this subject the book takes a logical and progressive approach to uniting examples from a wide range of taxonomic groups the straightforward writing style offers in depth analysis whilst making often challenging subjects such as population genetics and phylogenetics highly comprehensible to the reader the first part of the book introduces the essential underpinnings of molecular ecology and gives a review of genetics and discussion of the molecular markers that are most frequently used in

ecological research and a chapter devoted to the newly emerging field of ecological genomics the second half of the book covers specific applications of molecular ecology covering phylogeography behavioural ecology and conservation genetics the new edition provides a thoroughly up to date introduction to the field emphasising new types of analyses and including current examples and techniques whilst also retaining the information rich highly readable style which set the first edition apart incorporates both theoretical and applied perspectives highly accessible user friendly approach and presentation includes self assessment activities with hypothetical cases based on actual species and realistic data sets uses case studies to place the theory in context provides coverage of population genetics genomics phylogeography behavioural ecology and conservation genetics

this monograph series is commissioned by the phytochemical society of north america psna the volumes in this series contain articles on developing topics of interest to scientists students and individuals interested in recent developments in the biochemistry chemistry and molecular biology of plants volume 37 concentrates on the integration of techniques to solve complex phytochemistry problems this volume describes the combination of multiple techniques to solve complex plant science problems the chapters investigate what why and how secondary metabolites are formed volume 37 covers a wide range of phytochemistry topics from ethnobotany to molecular ecology

although all living beings modify their environment human beings have acquired the ability to do so on a superlative space time scale as a result of industrialization and the use of new technologies the anthropogenic impact has been increasing in the last centuries causing reductions in the sizes or the extinction of numerous wild populations in this sense from the field of conservation genetics various efforts have

been made in recent decades to provide new knowledge that contributes to the conservation of populations species and habitats in this book we summarize the concrete contributions of researchers to the conservation of the neotropical mammals using molecular ecology techniques the book is divided into three major sections the first section provides an up to date review of the conservation status of neotropical mammals the applications of the molecular markers in its conservation and the use of non invasive and forensic genetic techniques the second and third sections present respectively a series of case studies in various species or taxonomic groups of neotropical mammals

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molecular ecology is an emerging field of study that focuses on crucial challenges of ecological and environmental conservation like assessment and protection of biodiversity and species analysing behavioural ecology etc it involves the use of genetics and genomics for evaluating and addressing these problems some of the topics covered in this extensive book are cell biology genetics microbial population microbial and environmental biotechnology applications of bioremediation and biodegradation etc the aim of this book is to serve as a resource guide for students

and experts alike

a nato asi on molecular ecology of aquatic microbes was held at ii ciocco lucca italy from 28 august 9 september 1994 the aims of the asi were to evaluate the potential for molecular biology to solve some important questions in aquatic microbiology particularly in relation to biogeochemical cycling and microbial physiology techniques developed by molecular biologists have now been adopted by a wide range of scientific disciplines in the last 5 years aquatic microbial ecologists have begun to incorporate these methods into their research and as a result are developing a much clearer understanding of phylogenetic diversity the molecular basis of physiological acclimations and the transduction of environmental signals and organism responses the aim of this asi was to assess progress in this new field of research to compare and describe techniques and experimental approaches and to foster communication between disciplines the asi offered an excellent opportunity to bring together aquatic ecologists with molecular biologists and to encourage efficient technology transfer the meeting of information on the status provided a forum for detailed and broad exchange and trends of aquatic molecular ecology and to assess how emerging molecular techniques might solve some important problems in ecology which have prove intractable because of lack of appropriate methodologies

the last ten years have seen an explosion of activity in the application of molecular biological techniques to evolutionary and ecological studies this volume attempts to summarize advances in the field and place into context the wide variety of methods available to ecologists and evolutionary biologists using molecular techniques both the molecular techniques and the variety of methods available for the analysis of such data are presented in the text the book has three major sections populations species and higher taxa each of these sections contains chapters by leading scientists

working at these levels where clear and concise discussion of technology and implication of results are presented the volume is intended for advanced students of ecology and evolution and would be a suitable textbook for advanced undergraduate and graduate student seminar courses publisher

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Introduction

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