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**Invasion Genetics: the Baker &
Stebbins legacy provides a state-**

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of-the-art treatment of the evolutionary biology of invasive species, whilst also revisiting the historical legacy of one of the most important books in evolutionary biology: The Genetics of Colonizing Species, published in 1965 and edited by

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Herbert Baker and G. Ledyard Stebbins. This volume covers a range of topics concerned with the evolutionary biology of invasion including:

phylogeography and the

reconstruction of invasion

history; demographic genetics;

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the role of stochastic forces in the invasion process; the contemporary evolution of local adaptation; the significance of epigenetics and transgenerational plasticity for invasive species; the genomic consequences of colonization;

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**the search for invasion genes;
and the comparative biology of
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of invasive organisms are
discussed including plants,
animals, fungi and microbes.
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**authored and international
perspective on the ways in which
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integrated with other disciplines.
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book addresses the challenges of
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production of bulk and quality food, fodder, fiber and energy, which are of ongoing international concern. * Provides a view of crop physiology as an active source of methods, theories, ideas and tools for application in genetic

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from around the world with
publication records of
demonstrable influence and
impact * Combines environment-
specific cropping systems and
general principles of crop science

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to appeal to advanced students and scientists in agriculture-related disciplines, from molecular sciences to natural resources management
Principles of Behavioral Genetics
provides an introduction to the fascinating science that aims to

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understand how our genes determine what makes us tick. It presents a comprehensive overview of the relationship between genes, brain, and behavior. Introductory chapters give clear explanations of basic processes of the nervous system

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and fundamental principles of genetics of complex traits without excessive statistical jargon. Individual chapters describe the genetics of social interactions, olfaction and taste, memory and learning, circadian behavior, locomotion, sleep, and

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addiction, as well as the evolution of behavior. Whereas the focus is on genetics, neurobiological and ecological aspects are also included to provide intellectual breadth. The book uses examples that span the gamut from classical model

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organisms to non-model systems and human biology, and include both laboratory and field studies. Samples of historical information accentuate the text to provide the reader with an appreciation of the history of the field. This book will be a valuable resource

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The Molecular Landscape

Concepts of Biology

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Genes, Genomes, and Evolution

Jay Phelan's What is Life? A

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Guide to Biology is written in a delightfully readable style that communicates complex ideas to non-biology majors in a clear and approachable manner.

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Wood, Robert M. Zink,
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number of chapters, including a new section on molecular and bioinformatic methods. Dedicated chapters were added on: Evolution of the genetic code Mendelian genetics and population

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genetics Natural selection

Horizontal gene transfers

Animal development and plant

development Cancer Extraction

of biological molecules

Analytical methods Sequencing

methods and sequencing

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and phylogenetic networks
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illustrations appear in this
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and over 100 of these diagrams are now in color. The second edition combines and integrates extensive summaries of genetics and evolutionary biology in a manner that is accessible for

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students at either the graduate or undergraduate level. It also provides both the basic foundations of molecular evolution, such as the structure and function of DNA, RNA and proteins, as well as more

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advanced chapters reviewing analytical techniques for obtaining sequences, and interpreting and archiving molecular and genomic data. At a glance, most species seem adapted to the environment in

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which they live. Yet species relentlessly evolve, and populations within species evolve in different ways. Evolution, as it turns out, is much more dynamic than biologists realized just a few

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decades ago. In *Relentless Evolution*, John N. Thompson explores why adaptive evolution never ceases and why natural selection acts on species in so many different ways. Thompson presents a

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view of life in which ongoing evolution is essential and inevitable. Each chapter focuses on one of the major problems in adaptive evolution: How fast is evolution? How strong is natural selection?

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How do species co-opt the genomes of other species as they adapt? Why does adaptive evolution sometimes lead to more, rather than less, genetic variation within populations? How does the process of

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adaptation drive the evolution of new species? How does coevolution among species continually reshape the web of life? And, more generally, how are our views of adaptive evolution changing? Relentless

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Evolution draws on studies of all the major forms of life—from microbes that evolve in microcosms within a few weeks to plants and animals that sometimes evolve in detectable ways within a few

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decades. It shows evolution not as a slow and stately process, but rather as a continual and sometimes frenetic process that favors yet more evolutionary change.

Genetics and Evolution of

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***Studies the biological
characteristics and internal
structure of animal species,***

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*and analyzes the
significance of the genetic
factor in evolution*

*"A central goal of
evolutionary biology is to
understand how organisms
adapt to their environment.
Though much progress has*

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been made in answering this question, many aspects of the process of adaptation remain mysterious. This is especially true for biologists' understanding of the genetic basis of adaptation in natural

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populations of organisms. My dissertation integrates phenotypic and genetic perspectives to advance our understanding of selection and adaptation in natural populations of organisms. I take multiple approaches to

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this question, combining meta-analysis, population surveys, and manipulative experiments in the field. In my first chapter, I explore the consequences of natural selection on genetic variants. In many population

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genetic models, selection is parameterized as the selection coefficient, s . Through a meta-analysis of over 3000 selection coefficients from 79 studies, I reveal generalities about how

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natural selection operates at the genetic level. I relate these results to population genetic theory and studies of phenotypic selection, and provide recommendations for the calculation, interpretation,

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and reporting of selection coefficients. In my second chapter, I consider natural selection and adaptation within a rapidly moving hybrid zone between two races of Heliconius erato butterfly that differ in

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colour pattern. Because the genetic loci responsible for variation in colour pattern in H. erato are well characterized, I consider selection at the phenotypic and genetic levels simultaneously. I develop

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new statistical methods for quantifying hybrid zone position and shape and apply these to show that over the last 15 years the H. erato hybrid zone has grown wider while its movement has slowed. I show that this is

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due to a decrease in the strength of selection on colour pattern and the underlying colour-pattern allele. I then use remotely-sensed data on forest loss and productivity to test hypotheses about the

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ecological forces that influence hybrid zone dynamics. In my final chapter, I examine whether phenotypic and genetic change are predictable. I take an experimental approach, using a large-

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*scale, long-term, eco-
evolutionary field study
with Anolis sagrei lizards.
Anoles are an exemplar of
parallel evolution across an
adaptive radiation, and
their interactions with
competitor and predator*

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species have been well-studied in within-generation experiments. This provides clear predictions for how these ecological interactions might drive adaptive evolution over multiple generations. I test

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*these predictions by
manipulating the presence
and absence of predator and
competitor species in a
factorial design across 16
small islands in the
Bahamas. I measure changes
in a suite of morphological*

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traits relevant to habitat use and performance, and use DNA sequencing to characterize changes in allele frequency across the genome. Despite strong and consistent effects of predators and competitors on

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behavior, diet, and population size in A. sagrei, I found that phenotypic and genetic change were difficult to predict in advance. Phenotypic change was related to variation in

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vegetation structure and lizard densities across islands, making a priori prediction challenging. Genetic change, on the other hand, was unpredictable and unrelated to either our experimental manipulations,

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*phenotypic change, or
environmental differences.*

*My work reveals the
necessity of ecological data
and knowledge of natural
history for predicting
natural selection, and shows
how field experiments can be*

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used to test and clarify hypotheses about how natural selection operates. Overall, my dissertation demonstrates that integrating phenotypic and genetic perspectives can help biologists understand how natural selection

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operates in the wild. In particular, it shows the value of combining these perspectives with detailed ecological data, novel statistical techniques, and experimentation to directly test hypotheses about

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*evolution in natural
populations"--*

*This impressive author team
brings the wealth of
advances in conservation
genetics into the new
edition of this introductory
text, including new chapters*

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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

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amphibians, plants and invertebrates, this is an ideal introduction to conservation genetics for a broad audience. The text tackles the quantitative aspects of conservation genetics, and has a host of

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pedagogy to support students learning the numerical side of the subject. Combined with being up-to-date, its user-friendly writing style and first-class illustration programme forms a robust teaching package.

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This collection of specially commissioned articles looks at fragmented habitats, bringing together recent theoretical advances and empirical studies applying the metapopulation approach. Several chapters closely

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*integrate ecology with
genetics and evolutionary
biology, and others
illustrate how
metapopulation concepts and
models can be applied to
answer questions about
conservation, epidemiology,*

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*a wide range of disciplines.
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all aspects of
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novel applications of the
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continue with their lives.
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*the constantly evolving
field of infectious
diseases and their
continued impact on the
health of populations,
especially in resource-
limited areas of the*

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world. Students in public health, biomedical professionals, clinicians, public health practitioners, and decisions-makers will find valuable information in

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this book that is relevant to the control and prevention of neglected and emerging worldwide diseases that are a major cause of global morbidity, disability, and mortality.

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Although substantial gains have been made in public health interventions for the treatment, prevention, and control of infectious diseases during the last century, in recent decades

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*the world has witnessed a
worldwide human
immunodeficiency virus
(HIV) pandemic, increasing
antimicrobial resistance,
and the emergence of many
new bacterial, fungal,*

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parasitic, and viral pathogens. The economic, social, and political burden of infectious diseases is most evident in developing countries which must confront the

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mutants resistant to antiviral agents or host immune responses arise readily, for example, with HIV and influenza. These variations are all of utmost importance for human and animal health as they have prevented us from controlling these epidemic pathogens. This book focuses on the mechanisms that viruses use to

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virus evolution * UNIQUE - combines theoretical concepts in evolution with detailed analyses of the evolution of important virus groups * SPECIFIC - Bacterial, plant, animal and human viruses are compared regarding their interaction with their hosts
To cope with the abiotic stress-induced

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osmotic problems, plants adapt by either increasing uptake of inorganic ions from the external solution, or by de novo synthesis of organic compatible solutes acting as osmolytes. Of the osmoregulants and protectants discussed in this volume, trehalose, fructans, ectoine and citrulline, which are

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definition of organic evolution itself is in need of some modification, the number of known mechanisms of evolutionary change has increased dramatically, and the emphasis placed on opportunity and contingency has increased. This book

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and researchers in, as well as students and academics in these areas and professional scientists in many subfields of biology. Discusses many of the mechanisms responsible for evolutionary change Includes an appendix that provides a brief

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Covers some topics not typically addressed, such as opportunity, contingency, symbiosis, and progress

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Extraordinary in the diversity of
their lifestyles, insect parasitoids
have become extremely

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important study organisms in the field of population biology, and they are the most frequently used agents in the biological control of insect pests. This book presents the ideas of seventeen international specialists, providing the reader not only

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with an overview but also with lively discussions of the most salient questions pertaining to the field today and prescriptions for avenues of future research. After a general introduction, the book divides into three main sections: population dynamics,

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population diversity, and population applications. The first section covers gaps in our knowledge in parasitoid behavior, parasitoid persistence, and how space and landscape affect dynamics. The contributions on population

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diversity consider how evolution has molded parasitoid populations and communities. The final section calls for novel approaches toward resolving the enigma of success in biological control and questions why parasitoids have been largely

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neglected in conservation biology. Parasitoid Population Biology will likely be an important influence on research well into the twenty-first century and will provoke discussion amongst parasitoid biologists and population biologists. In addition

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If you want to know whether evolution is a science, how life began, what Charles Darwin really said about evolution, why a fungus is more closely related to humans than to a plant, how experiments in evolution can be carried out, why birds are flying

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***dinosaurs, how we manipulate
the evolution of other species,
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of the processes that result in
evolution, then this is the book
for you! Written for those with a
minimal science background,
Evolution: Principles and***

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Processes provides a concise introduction of evolutionary topics for the one-term course. Using an engaging writing style and a wealth of full-color illustrations, Hall covers all topics from the origin of universe, Earth, the origin of life,

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and on to how humans influence the evolution of other species. He brings together the principles and processes that explain evolutionary change and discusses the patterns of life that have resulted from the operation of evolution over the past 3.5

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billion years. This overview, coupled with numerous case studies and examples, helps readers understand and truly appreciate the origin and diversity of life.

Provides a quantitative and Darwinian perspective on

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population biology, with problem sets, simulations and worked examples to aid the student.

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contributors present integrative reviews of uniformly high quality that will inform and inspire generations of academic and applied biologists. Their presentation together provides an invaluable synthesis of perspectives that is rare in any

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***discipline.--Brian D. Farrell,
Professor of Organismic and
Evolutionary Biology, Harvard
University Tilmon has assembled
a truly wonderful and rich
volume, with contributions from
the lion's share of fine minds in
evolution and ecology of***

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herbivorous insects. The topics comprise a fascinating and deep coverage of what has been discovered in the prolific recent decades of research with insects on plants. Fascinating chapters provide deep analyses of some of the most interesting research on

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these interactions. From insect plant chemistry, behavior, and host shifting to phylogenetics, co-evolution, life-history evolution, and invasive plant-insect interaction, one is hard pressed to name a substantial topic not included. This volume will launch

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a hundred graduate seminars and find itself on the shelf of everyone who is anyone working in this rich landscape of disciplines.--Donald R. Strong, Professor of Evolution and Ecology, University of California, Davis Seldom have so many

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excellent authors been brought together to write so many good chapters on so many important topics in organismic evolutionary biology. Tom Wood, always unassuming and inspired by living nature, would have been amazed and pleased by this

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***tribute.--Mary Jane West-
Eberhard, Smithsonian Tropical
Research Institute
The Evolution of Population
Biology
Components and Mechanisms
Genetic Processes in Populations
Scientific American Biology for a***

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Introduction to Population

Biology

What Is Life? A Guide to Biology

W/Prep-U

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analyses, and interpretation across a wide repertoire of demographic techniques and protocols, clearly guided throughout with fully reproducible R scripts.

Principles of Evolution considers evolution in the context of systems biology, a contemporary approach for

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handling biological complexity. Evolution needs this systems perspective for three reasons. First, most activity in living organisms is driven by complex networks of proteins and this has direct implications, particularly for understanding evo-devo and for

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seeing how variation is initiated. Second, it provides the natural language for discussing phylogenetic trees. Third, evolutionary change involves events at levels ranging from the genome to the ecosystem and systems biology provides a context for integrating material of this complexity.

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Understanding evolution means, on the one hand, describing the history of life and, on the other, making sense of the principles that drove that history. The solution adopted here is to make the science of evolution the primary focus of the book and place the various parts of the history of life in the

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context of the research that unpicks it. This means that the history is widely distributed across the text. This concise textbook assumes that the reader has a fair amount of biological knowledge and gives equal weight to all the major themes of evolution: the fossil record, phylogenetics, evodevo,

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and speciation. Principles of Evolution will therefore be an interesting and thought-provoking read for honors-level undergraduates, and graduates working in the biological sciences. The Fundamentals series introduces students to the principles of the law by way of clear text combined with visual

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aids, tools and diagrams to enable an easy understanding of the subject without sacrificing the detail that is required for proper comprehension. Each title assumes no level of prior knowledge, allowing the book to be used for those new to the subject and for distance learning. Criminal Law -

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The Fundamentals includes full coverage of all topics likely to be studied on Criminal Law courses and it includes summaries of the key Law Commission's proposals for reform where relevant.

Ecologists are aware of the importance of natural dynamics in

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ecosystems. Historically, the focus has been on the development in succession of equilibrium communities, which has generated an understanding of the composition and functioning of ecosystems. Recently, many have focused on the processes of disturbances and the evolutionary

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significance of such events. This shifted emphasis has inspired studies in diverse systems. The phrase "patch dynamics" (Thompson, 1978) describes their common focus. The Ecology of Natural Disturbance and Patch Dynamics brings together the findings and ideas of those studying

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varied systems, presenting a synthesis of diverse individual contributions.

The Economy of Nature: Data Analysis Update

Invasion Genetics

Principles and Processes

Integrating Phenotypic and Genetic Perspectives

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*Modeling Evolution of
Heterogeneous
Populations: Theory and
Applications describes,
develops and provides
applications of a method
that allows*

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incorporating population heterogeneity into systems of ordinary and discrete differential equations without significantly increasing system dimensionality.

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The method additionally allows making use of results of bifurcation analysis performed on simplified homogeneous systems, thereby building on the existing

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*body of tools and
knowledge and expanding
applicability and
predictive power of many
mathematical models.*

*Introduces Hidden
Keystone Variable (HKV)*

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method, which allows modeling evolution of heterogenous populations, while reducing multi-dimensional selection systems to low-

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*dimensional systems of
differential equations
Demonstrates that
replicator dynamics is
governed by the
principle of maximal
relative entropy that*

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*can be derived from the
dynamics of selection
systems instead of being
postulated Discusses
mechanisms behind models
of both Darwinian and
non-Darwinian selection*

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Provides examples of applications to various fields, including cancer growth, global demography, population extinction, tragedy of the commons and resource

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*sustainability, among
others Helps inform
differences in
underlying mechanisms of
population growth from
experimental
observations, taking one*

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*from experiment to
theory and back*

*Quantitative traits-be
they morphological or
physiological
characters, aspects of
behavior, or genome-*

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level features such as the amount of RNA or protein expression for a specific gene-usually show considerable variation within and among populations.

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Quantitative genetics, also referred to as the genetics of complex traits, is the study of such characters and is based on mathematical models of evolution in

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*which many genes
influence the trait and
in which non-genetic
factors may also be
important. Evolution and
Selection of
Quantitative Traits*

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*presents a holistic
treatment of the
subject, showing the
interplay between theory
and data with extensive
discussions on
statistical issues*

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relating to the estimation of the biologically relevant parameters for these models. Quantitative genetics is viewed as the bridge between

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complex mathematical models of trait evolution and real-world data, and the authors have clearly framed their treatment as such. This is the second

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*volume in a planned
trilogy that summarizes
the modern field of
quantitative genetics,
informed by empirical
observations from wide-
ranging fields*

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*(agriculture, evolution,
ecology, and human
biology) as well as
population genetics,
statistical theory,
mathematical modeling,
genetics, and genomics.*

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*Whilst volume 1 (1998)
dealt with the genetics
of such traits, the main
focus of volume 2 is on
their evolution, with a
special emphasis on
detecting selection*

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(ranging from the use of genomic and historical data through to ecological field data) and examining its consequences.

This 2004 collection of

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*essays deals with the
foundation and
historical development
of population biology
and its relationship to
population genetics and
population ecology on*

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the one hand and to the rapidly growing fields of molecular quantitative genetics, genomics and bioinformatics on the other. Such an

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*interdisciplinary
treatment of population
biology has never been
attempted before. The
volume is set in a
historical context, but
it has an up-to-date*

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coverage of material in various related fields. The areas covered are the foundation of population biology, life history evolution and demography, density and

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*frequency dependent
selection, recent
advances in quantitative
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conservation, infectious diseases and human diversity. This is the third of three volumes published in honour of Richard Lewontin.

Recent advances that

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allow scientists to quickly and accurately sequence a genome have revolutionized our view of the structure and function of genes as well as our

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*understanding of
evolution. A new era of
genetics is underway,
one that allows us to
fully embrace
Dobzhansky's famous
statement that "Nothing*

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*in biology makes sense
except in the light of
evolution". Genetics:
Genes, Genomes, and
Evolution presents the
fundamental principles
of genetics and*

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*molecular biology from
an evolutionary
perspective as informed
by genome analysis. By
using what has been
learned from the
analyses of bacterial*

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*and eukaryotic genomes
as its basis, the book
unites evolution,
genomics, and genetics
in one narrative
approach. Genomic
analysis is inherently*

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both molecular and evolutionary, and every chapter is approached from this unified perspective. Similarly, genomic studies have provided a deeper

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*appreciation of the
profound relationships
between all organisms -
something reflected in
the book's integrated
discussion of bacterial
and eukaryotic*

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and how it can be
adopted in your class.*